

Group 4A - ARMAMENT INSTRUMENTS

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ARMAMENT INSTRUMENTS

Introduction

1. This group contains the description and operation of the aircraft armaments instruments, together with information on the servicing required to maintain the installation in an efficient condition. Routeing and theoretical diagrams are included. A general description of the aircraft instrument installation, including removal of panels and means of access, is given in Group 1 of this chapter. Detailed information on the standard items of equipment used will be found in Air Publications listed in Table 1.

2. The aircraft installation incorporates a gunsight fitted on a fixed mounting above the centre instrument panel in the cabin. A

camera recorder may be mounted on the gunsight, when required, or otherwise stowed away in the cabin.

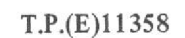
DESCRIPTION

Gunsight mounting

3. The fixed mounting for the gyro gunsight consists of a large machined casting, projecting aft on the centre line of the aircraft above the centre instrument panel. The casting is bolted at its forward end to the cross beam of frame 8 and is anchored at its centre to the instrument panel mounting tube extending across the top of frame 8. A light alloy packing piece is interposed between the seating face and the gunsight for initial alignment.

Power supply

4. The power supply is obtained from the gyro gunsight 10 amp circuit breaker in the leg panel and which feeds the gunsight on/off switch. To ensure that a constant voltage, on which the performance of the whole computing system depends, is supplied to the sight and control units, this main supply is fed through two voltage regulators. These regulators are mounted, one above the other, on a mounting structure attached to the port side of the cabin floor behind the pilot's seat. One regulator is provided with a preset voltage control to ensure that a constant voltage is supplied to the gyro motor and the lamps, while the output of the other is set by a control in the ballistics unit to supply the ranging and gravity



circuits. It is emphasized that the output voltages of these two regulators is critical to the performance of the whole system.

5. To eliminate radio interference, the regulated voltage supply is taken through a suppressor unit which is mounted on a bracket attached to the port side of the flying control casing, adjacent to the voltage regulators.

9. Gyro gunsight installation (Code GS)

6. The installation is provided with manual and radar ranging controls and contains several control units, some of which are preset prior to combat, while the others are adjusted by the pilot during combat. The radar ranging installation is described in Sect. 6, Chap. 2. Provision is made on the sight for the fitment of a camera recorder (Group G.1). When not in use, the recorder may be placed in a stowage compartment on the starboard side of the cabin. The gunsight,

camera recorder and control units are all interconnected by suitable cables, to a junction box mounted on the port side of the flying control casing.

Combat controls

7. The gyro gunsight on/off switch is located at the starboard glare shield, adjacent to the sight. A gyro gunsight control unit (selector/dimmer) is mounted at the forward end of the cabin port shelf. The unit incorporates four switches. The dimmer switch controls the degree of illumination on the gunsight graticule. The lower push-switch controls the intensity of the radar 'locked on' green lamp and the 'preset range' orange lamp, secured to the right-hand side of the gunsight, for day or night operations. The upper push-switch is used to test the functioning of these radar indicating lamp circuits. The selector switch has three positions marked G, F and G & F for operating

the sight with guns and two positions marked M.R.P. and S.R.P. selected to operate the sight with rocket projectiles.

Note

Mod.1339 alters the feed back resistor in the radar/manual control unit from 4.7 kilohms to 10 kilohms. This makes the radar/manual control unit Type R.M. a Mk.3A.

8. A twist grip control at the top of the throttle lever, in conjunction with the radar/manual control unit located on a platform at the cabin port side, adjacent to the flying control casing, automatically controls change over from manual to radar ranging operation of the sight. With the radar ranging on/off switch, at the forward end of the port cabin shelf, switched ON and its associated indicator (Group H.1) showing a radar supply is available, turning the twist grip to its fully wrist down position, the sight will operate in the manual ranging condition. Forward rotation of the twist grip increases the manual range until it just exceeds the radar range when the radar ranging circuits will take over to operate the sight.

9. When operating with the selector dimmer unit set to operate with guns, turning the throttle twist grip to its fully down minimum position, provides for a maximum current to be passed through the range coil to cage the gyro and thus prevent gyro topple during the initial attack manoeuvres. As the twist grip is rotated forward to engage the target, the restraining current in the range coil is reduced to normal. When making R.P. attacks, caging of the gyro is effected as explained in Group G.1.

Preset controls

10. To compensate for the effect of changes in altitude at which the installation is operated and to cover the aiming allowances

TABLE 1
Equipment type and Air Publication reference

Equipment Type	Air Publication
Gunsight, Mk. 8R (Pre Mod. 1285)	A.P.112E-0001-1 Formerly A.P.1275E, Vol. 1
Gunsight, Mk. 8S (Post Mod. 1285)	
Junction box, Type B, Mk. 14S (Mk. 14 Pre Mod. 1285)	
Radar/manual unit, Type R.M., Mk. 3A (Post Mod. 1339)	
Throttle twist grip, Type T.2, Mk. 2	
Terminal block unit, Type T.B., Mk. 1	
Ballistic unit, Type B.L., Mk. 2S (Mk. 2 Pre Mod. 1285)	
Altitude unit, Type A.L., Mk. 1	
Relay amplifier, Type R.A., Mk. 2	
Voltage regulators, Type 22 and 119 (or Type 22 and 22A Pre Mod. 1247)	
Suppressors, Type F.2 and F.5	
Anti-topple unit, Type A.T., Mk. 1S (Mk. 1 Pre Mod 1285)	
Selector/dimmer unit, Type S, Mk. 13S (Mk. 13 Pre Mod. 1285)	
Lamp filament 22V, 12 watt, Type G.5	
Camera recorder, Mk. 3	A.P.1355D, Vol. 1
Circuit breaker, Type A.2	A.P.4343B, Vol. 1, Book 1, Sect. 10

required by the different types of ammunition used, the gunsight is provided with an altitude unit and a ballistic unit. The altitude unit is mounted on a bracket attached to the port side of frame 14 and is connected to the static side of the pressure head installation. The ballistics unit is mounted on the flying control casing, below and forward of, the radar/manual control unit. The altitude and ballistics units are both preset before flight according to the type of ammunition carried.

11. The installation incorporates a relay amplifier which controls the range drive motor according to the range system selected by the control unit. It is located on a mounting platform attached to the port side of the cabin floor behind the pilot's seat. An anti-topple unit, which automatically re-erects the gyro should it topple due to aircraft manoeuvres, is situated on a mounting bracket attached to the cabin floor on the port side behind the pilot's seat.

Camera recorder

12. The camera recorder is controlled by the camera relay, located in the bomb/R.P. release and camera junction box (*Group G.1*) and when energized this relay will, if the recorder is mounted in position, complete a supply through its contacts 5-5a, to the solenoids of the camera recorder claw mechanism, via the suppressor. The claw mechanism will then draw the film across the lens, thus recording the target and graticule display in the gunsight reflector.

Operation

13. A full description of the operation of

the circuits of the gunsight and its associated equipment is given in the Air Publications listed in Table 1.

SERVICING

General

14. The servicing required to maintain the gunsight and control units in an efficient condition and the serviceability tests which should be applied, together with the equipment to be used and the method of conducting the tests, is contained in Appendix 1 to this chapter. Before servicing or removing any of these components, the aircraft must be rendered electrically safe, as described in Sect. 5, Chap. 1, Group A1.

REMOVAL AND ASSEMBLY

Camera recorder

15. The procedure for removing the camera recorder from the gunsight is as follows:—

- (1) Unplug the supply cable from the recorder body and stow in the stowage provided.
- (2) Disengage the spring loaded lugs on the recorder base from the corresponding attachments on the gunsight. The recorder can then be lifted free.

16. The procedure for installing the recorder on the gunsight is as follows:—

- (1) Re-engage the spring loaded lugs on the recorder with the corresponding attachments on the gunsight.
- (2) Slide the recorder firmly and gently forward until it is heard and felt to lock home.

- (3) Reconnect the supply cable with the recorder plug.

Gunsight

17. To remove the gunsight from its mounting proceed as follows:—

- (1) Disconnect and remove the camera recorder (*para. 15*).
- (2) Disconnect the range control plug (*red*) from its socket on the mounting plate.
- (3) Disconnect the gyro and optics plug (*green*) from its socket on the mounting plate.
- (4) Disconnect the radar warning lamps supply plug from its socket on the mounting plate.
- (5) Give the gunsight locking pin a quarter turn and pull out.
- (6) Unscrew the nut holding the gunsight to the mounting and remove the sight taking care to retain the light alloy alignment packing piece.

18. The gunsight is replaced on its mounting by reversing the procedure given for removal. The procedure for harmonisation of the gunsight is given in Appendix 1.

Appendix 1

SERVICING, TESTING AND HARMONIZATION OF GYRO GUN SIGHT

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SERVICING

General

1. This section describes the first line servicing which can be carried out on the G.G.S. Mk.8S installation. Servicing should be carried out in the sequence detailed below.

Clean glass surfaces (sighting head)

2. Ensure that the reflector, the sun-

screen, and the exposed surfaces of the lenses are clean. Great care must be taken to avoid scratching the lenses during cleaning and for this operation a soft lint-free cloth is recommended.

Lubrication

3. Lubricate sparingly the pivot points and bearing surfaces of the sunscreen operating mechanism with oil, OX14 (D.T.D. 822A) (Ref. No. 34B/9100589).

Drying cells

4. Ascertain whether the silica gel is due for renewal in the drying cells of the sighting head and control units, Types R.A. Mk.2 and R.M. Mk.3A. The crystals visible behind the inspection window will be pink in colour when the drying agent is saturated. Also inspect the condition of the desiccator (8B/3759) of the A.T. Mk.1S and replace if necessary.

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5. It is necessary to remove the drying cell from the sighting head when the silica gel is due for removal. To do this, remove the four screws holding the drying cell, unscrew the inspection window (*do not lose the rubber washer*) and shake out the silica gel.

6. While the drying cell is detached, examine the gauze filters at the back of the cell and ensure that they have been making good contact with the rubber grommets on the sighting head body.

7. Re-charge the cell with fresh silica gel, screw home the inspection window (8B/3514) to make an air-tight seal on the rubber washer (8B/3515) and refit the drying cell to the sight body.

8. In the control units, Types R.A.Mk.2 and R.M.Mk.3A, the drying cell is secured to the mounting plate by four screws and the silica gel crystals are contained in a cellophane tube which is placed in a gauze tube. To re-charge the drying cell with fresh silica gel, unscrew the inspection window (8B/3514), remove the saturated crystals and refill with a cellophane tube (8B/3729 and 8B/3730 respectively) containing fresh silica gel. Screw home the inspection window to make an air-tight seal.

SYSTEM TESTING

Test equipment

9. The following test equipment is required:—

(1) G.G.S. test set, Mk.5, Type 1 (Ref. No.8B/3324)

(2) Collimator, Type A (Ref. No.8B/5215).

(3) Testmeter, Type D.

(4) G.G.S. test set, Mk.5, Type 3 (Ref. No.8B/3326).

Tests to be carried out with the test set, Type 1

Preparation

10. (1) Disconnect the two sight plugs from the supply sockets in the aircraft.

(2) Connect the test set, Type 1, plugs to the installation sockets, and test set sockets to the corresponding sight plugs, using the appropriate con-

necting cables supplied with the test set. The test set plugs and sockets are marked GYRO AND OPTICS and RANGE DRIVE respectively.

Note...

When using the test set, Type 1 with the G.G.S. Mk.8R, the special Mk.8 cable adapters must be used for the GYRO AND OPTICS connections, since the plug orientation of the G.G.S. Mk.8R differs from that of other marks of gunsights. This is due to the incorporation of the anti-topple device in the G.G.S. Mk.8R.

Resistance tests

11. With the testmeter, Type D, perform resistance tests for the various ranges in Table 1.

TABLE 1

G.G.S. range resistances

Range control setting (yards)	Range				Gravity			
	Resistance in ohms between sockets H and J on Gyro and optics				Resistance in ohms between sockets H and M on Gyro and optics			
200	Zero to 1.3	...	...	Zero to 1.4
300	7.4 to 12.6	...	...	11.46 to 17.08
400	16.7 to 21.9	...	...	22.02 to 26.95
500	26.3 to 31.5	...	...	30.34 to 34.86
600	36.4 to 41.6	...	...	33.39 to 37.6
700	49.4 to 54.6	...	...	33.39 to 37.6
800	63.0 to 65.6	...	...	33.39 to 37.6

Performance tests

12. With the test set, Type 1 connected in the circuit as detailed in para.10, switch ON the G.G.S. installation and allow to operate for a period of approximately ten minutes. This warm-up period is to allow the output of the voltage regulators to become stable in operation.

Setting-up the Type 22 voltage regulator

13. (1) Check the aircraft d.c. supply voltage, this should be $28V \pm 1V$.
- (2) Set the dimmer control RV1 on the G.G.S. control unit S Mk.13S to fully bright and check that the fixed and moving gratitudes on the sighting head are illuminated.
- (3) Connect the test set, Type 1 wander plugs to the GYRO AND OPTICS sockets A (red, positive) and B (blue, negative).
- (4) Adjust the output of the regulator to read 22V on the test set meter.

Setting-up the Type 22A or 119 voltage regulator

14. (1) Ensure the aircraft d.c. supply voltage is $28V \pm 1V$.
- (2) Select G1 on the S Mk.13S.
- (3) Set range to 550 yd.
- (4) Connect the test set, Type 1 wander plugs to GYRO AND OPTICS sockets H (red, positive) and B (blue negative).

- (5) Remove the blanking cap from RV1 on the B Mk.14S and adjust RV1 to read 17.6V on the test set meter. Replace the blanking cap.

Note...

If a voltage regulator, Type 119 is fitted, adjust the regulator to read 17.6V on the test set meter. On aircraft fitted with a Type 119 voltage regulator, the potentiometer RV1 on the B Mk.14S is disconnected and the flying leads insulated to prevent shorting.

- (6) Select G2 on the S Mk.13S.

- (7) Remove the blanking cap from RV2 on the S Mk.13S and adjust RV2 to read 18.5V on the test set meter. Replace the blanking cap.

To check range drive circuits

15. (1) Connect test set, Type 1, wander plugs to RANGE DRIVE sockets A (red, positive) and B (blue, negative). Test set meter should read aircraft supply voltage.
- (2) Connect wander plugs to sockets C positive and B negative. As the range is varied from 200 yd to 800 yd in all modes the test set meter should read aircraft supply voltage at 200 yd decreasing smoothly to zero at 800 yd.

Note...

Range is varied in the 'Bombs' mode by the Bombs potentiometer RV3 on the S Mk.13S.

- (3) Connect wander plugs to sockets J positive and B negative. As the range is varied from 800 yd to 200 yd in all modes, the test set meter should read aircraft supply voltage except when range is hard over on 200 yd when meter should read zero.

- (4) Connect wander plugs to sockets K positive and B negative. As the range is varied from 200 yd to 800 yd in all modes, the test set meter should read aircraft supply voltage except when range is hard over on 800 yd when meter should read zero.

- (5) Connect wander plugs to sockets H positive and G negative. As the range is varied from 200 yd to 800 yd in all modes, the test set meter should read an approximately constant voltage over the range till 800 yd when the meter will read zero. The voltage will depend on the rate of change of range.

- (6) Connect wander plugs to sockets G positive and H negative. As the range is varied from 800 yd to 200 yd in all modes, the test set meter should read an approximately constant voltage over the range till 200 yd when the meter should read zero.

To check gyro range circuit

16. (1) Check that rotation of the dimmer control RV1 on the S Mk.13S. on both displays in all modes, gives smooth reduction in brightness.

- (a) Connect test set, Type 1, wander plugs to GYRO AND OP-

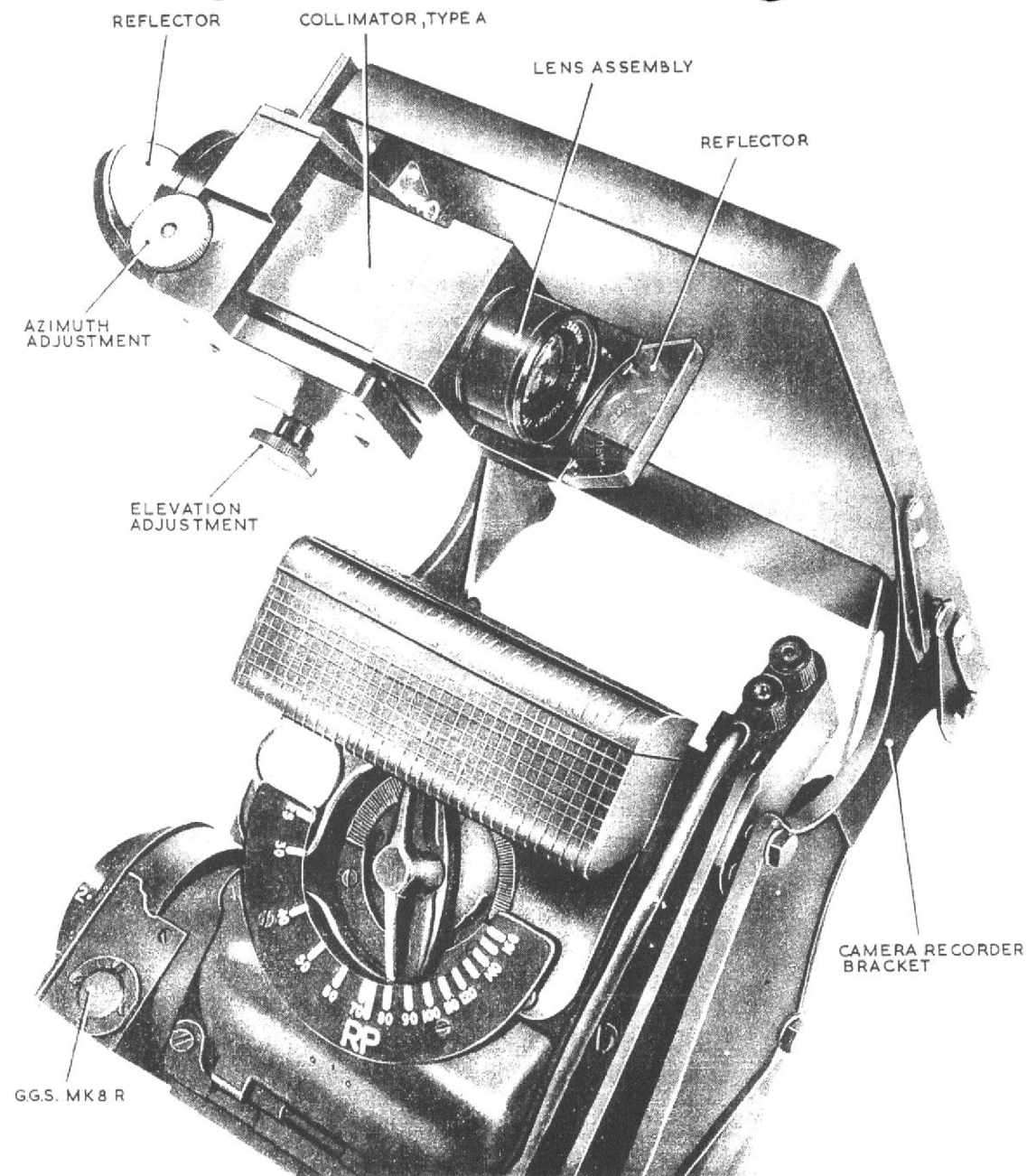


Fig.1 Collimator, Type A fixed to sighting head

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TICS sockets G positive and B negative.

(2) (a) Select G1.

(b) Check voltage varies smoothly from $6.7V \pm 1.3V$ at 200 yd, to $2.64V \pm 0.5V$ at 800 yd.

(3) (a) Select G2.

(b) Check voltage varies smoothly from $7.07V \pm 1.4V$ at 200 yd, to $2.78V \pm 0.5V$ at 800 yd.

(4) (a) Select B.

(b) Check voltmeter reads $8V \pm 1.6V$ and that voltage does not vary with range.

(5) (a) Select RP1.

(b) Check voltmeter reads $6.0V \pm 1.5V$ and that voltage does not vary with range.

(6) (a) Select RP2.

(b) Check voltmeter reads $6.0V \pm 1.5V$ and that voltage does not vary with range.

(7) (a) Select RP1.

(b) Uncage the sight by operation of the camera-button on the control column.

Note...

Check with armament personnel for the operation of the necessary armament switches and safety breaks.

(c) Check voltmeter reads $2.42V \pm 0.5V$ with $1\frac{1}{2}$ sec selected on the BL Mk.2S and $1.58V \pm 0.3V$ with 3 sec selected on the BL Mk.2S. The voltages should not vary with range.

(8) (a) Select RP2.

(b) Check voltmeter reads $1.58V \pm 0.3V$ and does not vary with range.

17. To check gyro gravity circuit.

Note...

The volts across the gravity coil is in the order of $0.3V$. Because of the build-up in tolerances in resistors, lead resistance and meter accuracy, it is impractical to measure this voltage. The following functional check will, however, adequately check the system.

(1) Fit the collimator, Type A to the camera recorder brackets (fig. 1).

(2) (a) Select G1.

(b) Set the range to 200 yd and zero the collimator graticule to the centre spot.

(c) Slowly range from 200 yd to 800 yd. The centre spot should move up approximately 1.5 milliradians pass back through zero at 600 yd and then depress approximately 3 milliradians

Note...

The centre spot is approximately 3 milliradians in diameter.

(3) (a) Select G2.

(b) Repeat (2) (b) and (2) (c).

(4) (a) Select B.

(b) Connect test set, Type 1, wander plugs to GYRO AND OPTICS sockets K positive and B negative.

(c) Voltmeter should read zero volts.

(5) (a) Select RP1.

(b) Voltmeter should read zero volts.

(6) (a) Select RP2.

(b) Voltmeter should read zero volts.

Note...

A small voltage may be obtained in tests (4), (5) and (6); this is due to the load in the common negative lead and is acceptable.

Sighting head (gyro and optics)

18. Using the Type D testmeter, check that the following interconnections exist between the pins:-

(1) Pin B to pin A through the gyro motor.

Pin B to pin D through the "fixed" lamp.

Pin B to pin D through the "gyro" lamp.

- (2) Pin B to pin G through 13.5 ohms \pm 0.5 ohms (*range coil*).

Pin B to pin K through 0.76 ohms \pm 0.07 ohms (*gravity coil*).

Pin B to pin L through 15 ohms \pm 0.14 ohms (*thermometer coil*).

- (3) Pin E to pin C through 1.54 ohms \pm 0.15 ohms (*azimuth coil*).

- (4) Pin E to pin J through 1.54 ohms \pm 0.15 ohms (*elevation coil*).

- (5) Pin H to pin M through a resistance not exceeding 35.5 ohms (*gravity resistor*).

- (6) Pin H to pin J through a resistance not exceeding 64.3 ohms (*range resistor*).

Sighting head (range drive)

19. Check that the following interconnections exist between the pins:—

- (1) Pin A is connected to pin J and to K. (*When the range dial reads less than 200 yd, pin J is isolated. When the range dial reads more than 800 yd, pin K is isolated*).

- (2) Pin A to pin B through approximately 500 ohms and pin A to pin C through a resistance not exceeding that across pins A and B.

- (3) Pin D is connected to pin F through a resistance of 10,000 ohms \pm 1 per cent and to pin E through a resistance not ex-

ceeding that across pins D and F.

- (4) Pin H to pin G through the servomotor.

20. Disconnect the test set, Type 1 and remove the collimator.

21. Reconnect the sighting head to the aircraft installation.

Tests to be carried out with the test set, Type 3

Range drive check

22. For this check, the test set, Type 3 is required for testing the range drive circuit on the ground, with the radar equipment switched off.

Note...

A long adapter lead is required to connect the test set into the circuit as detailed in para.24 so that the test set can be used in the cockpit.

23. The test set gives a check on the functioning and accuracy of the G.G.S. range drive system, and the simulated radar signal supplied by the test set enables adjustment to be made to the feedback pre-set resistance.

Preparation

24. (1) Connect the test set into the radar ranging circuit at the output connections of the radar ranging unit.

Note...

The test set supply replaces the normal radar supply.

- (2) Ensure that the test set switch is OFF

- (3) Connect the appropriate 2-core supply cable between the test set and the G.G.S. recorder supply connector.

- (4) Switch on the G.G.S.

Manual range

25. With the test set OFF and the control unit, Type S, Mk.13S set at RP2, RP1, G1 or G2 check for manual operation by rotating the twist-grip throttle control. When the control is against its mechanical stop in the "wrist down" position, the reading on the G.G.S. range dial must be below 200 yd. Rotate the control smoothly in a clockwise direction (*as viewed from the end of the control*); the range dial should show a smooth increase in range with a value of over 800 yd when the end of the traverse is reached.

26. Set the feedback manual resistance to instructions given in para.29 sub-para.(1).

Radar range

27. To check the radar range:—

- (1) Set the throttle control to give 800 yd on the range dial. Switch the test set to MANUAL and select the appropriate sensitivity (A).

- (2) Note the output reading given by the voltmeter. If this differs appreciably from 75 volts, adjust the VOLTAGE adjusting screw on the panel until 75 volts output is obtained.

(3) Rotate the manual indicator knob slowly from 200 to 800 yd and check that this causes a contraction of the moving graticule display. This rough check proves that there is no discontinuity in the range drive circuit under test.

(4) Set the manual indicator knob to 750 yd and note the reading on the milliammeter. To obtain a meter reading, press the PRESS TO READ M/A switch. The meter reading should not exceed $\pm 0.2\text{mA}$. The meter pointer will be seen to vibrate and the mean position of the pointer is to be taken for all readings.

(5) Set the feedback radar resistance according to the instructions given under para.28 sub-para.(2).

Checking and setting feedback controls

28. A compromise value of feedback resistance is required which gives maximum servo response without appreciable graticule hunt.

29. The feedback pre-sets for both manual and radar marked F.B.M. and F.B.R. respectively, are housed in the R.M. Mk.3A control unit, and access to them is obtained by removing the respective cover plates on the front of the unit. Clockwise rotation of the screw adjuster increases damping and reduces the servo response.

(1) Feedback, manual - Set the test switch to OFF. Adjust the F.B.M.

control until the G.G.S. range dial follows the throttle control smoothly and when moved rapidly stops with one overshoot only.

(2) Feedback, radar - Set the G.G.S. throttle control in the 800 yd position. Re-set the test switch to MANUAL and check that the output voltage is still 75 volts. Adjust if necessary. The servo response can be gauged by rotating the manual control knob at a uniform rate while viewing the graticule.

30. Adjust the F.B.R. control until the G.G.S. range dial smoothly follows a rapid movement of the test set manual indicator between 700 yd and 800 yd assuming its correct position with one overshoot only.

31. Set the selector switch to AUTO. The moving graticule should open from 800 to 200 yd range in approximately 12.4 sec., pause at the 200 yd setting and then close again to 800 yd in approximately 2.5 sec. The cycle is then repeated.

Note...

When the milliammeter is in circuit, the reading indicates the current passing through the control coil of the polarized relay in the Type R.A. Mk.2 control unit. Due to the transient times of the relay contacts, there may be a kick of the needle at the change-over at 200 yd.

32. Check that the graticule presentation and response are satisfactory. The response should be such that the velocity lag,

as measured by the meter, does not give a reading variation of more than 0.3mA from that noted in para.26, sub-para.(4) when that range closes from 800 to 600 yd. If necessary, re-adjust the feedback resistance to bring the meter reading within the specified limit.

33. Refit the cover plate on the Type R.M. Mk.3A control unit.

Check on "take-over"

34. Set the test set selector to MANUAL and the MANUAL INDICATOR to 700 yd.

(1) Using the throttle control, slowly increase the range indicated on the G.G.S. range dial from 200 yd. The G.G.S. range dial reading should follow the throttle control movement smoothly with one overshoot only at 700 yd and any further movement of the throttle control in the same direction should not move the G.G.S. range dial.

(2) Using the throttle control, reduce the range to minimum; at first there should be no movement of the G.G.S. range dial, but below approximately 700 yd the throttle should control the G.G.S. range dial.

(3) Repeat (1) and (2) above for manual indicator settings of 550 and 400 yd. The results should be as above with, of course, 550-400 yd respectively replacing 700 yd.

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35. Disconnect the test set, Type 3 from the installation and reconnect the radar supply connections which were disconnected when connecting the test set.

HARMONIZATION

General

36. (1) Before harmonizing is attempted ensure that the sighting system is switched on and allowed to run for 10 min. This warm-up period is to allow the output of the voltage regulators to stabilize.

Note...

The harmonization board and the sighting points are to be arranged according to Command Technical Staff Instructions.

(2) Select G1 on the selector dimmer control unit.

(3) Set the range to 550 yd.

(4) Harmonize the moving graticule centre spot to the appropriate point on the harmonization board by adjusting the reflector for errors in elevation and by moving the sighting head on the mounting for large errors in azimuth.

(5) Harmonize the fixed cross to the appropriate point on the board by means of the two flexible adjusters on the backplate.

(6) Select G2 on the selector dimmer control unit.

(7) Check that the moving graticule remains harmonized.

(8) Select RP1.

(9) Set 1½ or 3 sec, as instructed, on the BL. Mk.2S control unit.

(10) Uncage the gyro by pressing the camera button on the control column. Check with the armament personnel that the necessary armament switches are selected and the safety break is fitted.

(11) Depress the moving graticule centre spot to the appropriate point on the harmonization board by moving the slider of resistor RV1 (M) in the BL. Mk.2S.

(12) Remove any drift in azimuth by adjusting RV3 in the BL.Mk.2S.

(13) Cage the gyro by switching off the butt-test switch the centre spot should depress a further 5-10 milliradians approx.

(14) Select RP2.

(15) Uncage the gyro (see operation (10)).

(16) Depress the moving graticule centre spot to the appropriate point on the harmonization-board by moving the slider of resistor RV2 (S) in the BL. Mk.2S.

(17) Remove any drift in azimuth by adjustment of RV4 in the BL.Mk.2S.

(18) Cage the gyro by switching off the butt-test switch. The centre spot should depress a further 5-10 milliradians.

Checking or changing the RP Harmonization at First Line

37. (1) Select G1 on the selector dimmer control unit.

(2) Set range to 550 yd.

(3) Attach the collimator, Type A to the camera recorder brackets.

(4) Zero the graticule of the collimator to the moving graticule centre spot.

(5) Carry out checks para.36,(8) to (18), setting the centre spot to the appropriate reading on the collimator, Type A.

◀ Checking delay unit (post Mod. 1331)

Note . . .

Before commencing this check, ensure by liaison with armament personnel, that the aircraft is in a safe condition for the operation of the Bomb/R.P. release switch, and the Bomb and R.P. Master Switches. ▶

RESTRICTED

◀ Preparation

38. In the cabin check that the following switches are selected as shown.

Battery master	}	OFF
Bomb master		
Camera master		
R.P. master		
G.G.S. master		
Guns master		
Pylons selectors		
Fuzing selector		
Butt test		
Rocket selector to Salvo		
R.P. Salvo selector to 2		
Guns selector to All		
G.G.S. to G1 on C.U. Type S		

Ensure that Jett 1, Jett 2 and Guns circuit breakers are Out and Bomb, G.G.S. and R.P. breakers are In.

Ensure G.G.S. recorder and G90 (without over-run setting) cameras are fitted.

Procedure

39.

- (1) Connect armament safety plug. Connect and switch ON an external supply.
- (2) Select G.G.S. and G90 camera master switches ON. G.G.S. recorder camera motor should run and gunsight illuminate.

- (3) Select Butt test switch to ON position. Depress camera switch on control column. G90 camera should run and recorder camera shutter operate whilst switch is depressed.
- (4) Select RP1 on G.G.S. C.U. Type S. Depress and hold camera switch. G.G.S. recorder and G90 cameras should operate. G.G.S. moving graticule should be seen to wander from the aligned position with the fixed graticule by approximately $\frac{1}{2}$ deg. in elevation.
- (5) Release camera switch. G.G.S. and G90 cameras should stop. G.G.S. moving graticule should return to the aligned position with the fixed graticule.
- (6) Select R.P. master switch ON. Depress and release camera switch. G.G.S. recorder and G90 camera should operate and continue to do so after switch is released. G.G.S. moving graticule should be seen to wander from the aligned position with the fixed graticule by approximately $\frac{1}{2}$ deg. in elevation.
- (7) Depress and release Bomb/R.P. release switch. 1 second after depressing switch, G.G.S. and G90 cameras should stop and G.G.S. moving graticule return to the aligned position with the fixed graticule. Return R.P. master switch to OFF.
- (8) Select B on G.G.S. C.U. Type S. Depress and hold camera switch. G.G.S. recorder and G90 cameras should operate. G.G.S. moving graticule should remain in the aligned position with the fixed graticule.
- (9) Release camera switch. G.G.S. recorder and G90 cameras should stop and G.G.S. moving graticule remain in the aligned position.
- (10) Select bomb master switch ON. Depress and release camera switch. G.G.S. recorder and G90 cameras should operate and continue to do so after switch is released, G.G.S. moving graticule should remain in the aligned position.
- (11) Depress and release Bomb/R.P. release switch. 1 second after depressing switch G.G.S. and G90 cameras should stop. G.G.S. moving graticule should remain in the aligned position.
- (12) Return bomb master, G.G.S., camera and butt test switches to the OFF position and G.G.S. selector to G1.

On Completion

40.

Switch OFF and disconnect external supply. Disconnect armament safety plug. Re-set Jett 1, Jett 2 and Guns circuit breakers.

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