

Chapter 47

LANDING AND SEARCH LAMP, GRIMES TYPE G6250-1

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LEADING PARTICULARS

◀ <i>Landing and search lamp</i>	5CX/5750 ▶
<i>Filament lamp rating</i>	28V, 450W
<i>Extend-retract motor current</i>	0.25 — 1.5 amp.
<i>Rotate motor current</i>	0.25 — 1.5 amp.
<i>Minimum permissible brush length (both motors)</i>	$\frac{1}{16}$ in.
<i>Weight</i>	5.5 lb.

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Introduction

1. The Grimes Type G6250-1 landing and search lamp shown in fig. 1 is a retractable landing lamp, the filament housing of which may be continuously rotated, or turned to any selected position on a horizontal plane to air search operations. The housing is extended and rotated by two permanent magnet motors and may be extended at forward airspeeds up to 250 m.p.h. The light source of the lamp is a 28V, 450W sealed beam unit.

DESCRIPTION

General

2. The Type G6250-1 lamp consists of two main assemblies, the base assembly and the sealed beam unit housing assembly. The base assembly consists of a base plate on which is mounted, the extend-retract motor and gearing, the control relays for both motors, the filament relay for the sealed beam unit, the terminal block and the journal shaft. The sealed beam unit housing assembly is the moving portion of the lamp and incorporates the rotation motor and gearing, and the sealed beam unit. For the purpose of this chapter the sealed beam unit

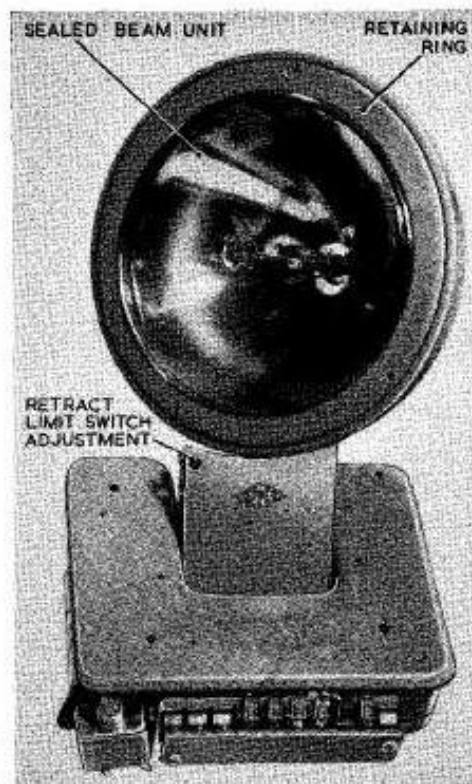


Fig. 1. General view of lamp

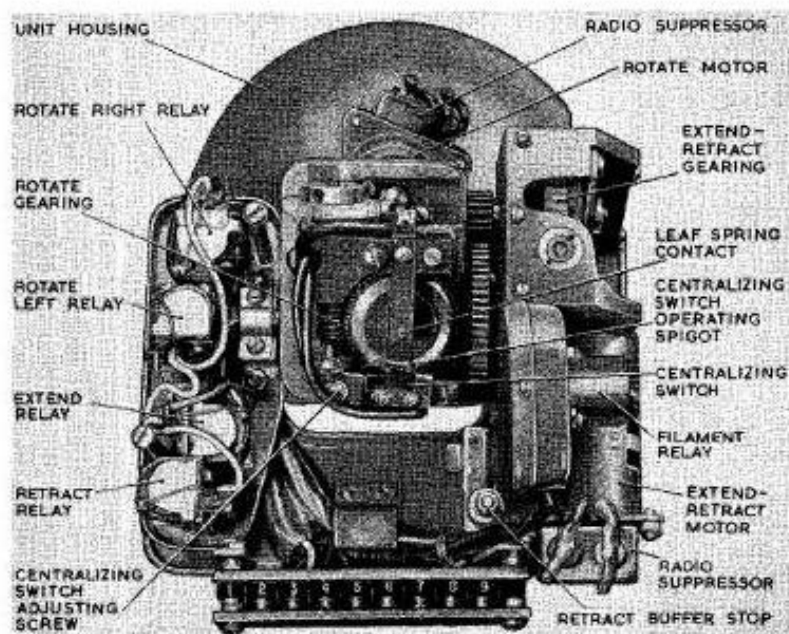


Fig. 2. Rear view of lamp with covers removed

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housing assembly is referred to as the housing assembly, and the extend-retract motor is referred to as the elevation motor.

Base assembly

3. The base plate of the base assembly is a "U" shaped plate which carries the journal shaft across the arms of the "U" shape. The journal shaft is mounted in a trunnion block at one end and in a plain bearing in the elevation gear box casting at the other, and carries the housing assembly. The base plate also accommodates the other components of the base assembly shown in a rear view of the lamp in fig. 2. The four motor-control relays are mounted on the left of the base plate and are post office type, change-over, relays which provide for the selection of movement of the lamp. The elevation motor is on the right of the base plate with its associated gear train, the final gear of which engages with a quadrant gear on the housing assembly. The filament relay is mounted within a box secured to the elevation gear casing on the left of the elevation motor.

Housing assembly

4. The lamp housing main casting is carried on bush bearings on the journal shaft and accommodates the components of the hous-

ing assembly. The rotation motor is similar to that used for the elevation motor and rotates the housing through a gear train which engages with a spur gear on the housing column. The housing column passes through the casting supported by two bush bearings, and carries the sealed beam unit housing which is secured to the column by two 10-32 Allen screws.

5. Through the hollow centre of the column passes the filament connector post, the post is a metal rod with tapped holes at each end and is supported within the column in insulating bushes. The post terminates at the inner end in a contact stud which is screwed into the post, bearing on this stud is a leaf spring contact. The stud rotates with the connector post and housing column, contact is maintained by the stationary leaf spring contact. The outer end of the terminal post terminates within the sealed beam unit housing in a terminal screw.

Sealed beam unit

6. The sealed beam unit combines the filament lamp, reflector and terminal block in one unit and is housed within the sealed beam unit housing. The unit is held in the housing by a retaining ring, which is a light alloy spinning and is secured to the housing by three Phillips headed screws. A glass locating lug on the rear of the unit rim seats into a groove in the rim of the housing, this ensures that the unit is correctly positioned and prevents it from rotating within the housing. Connection to the unit is made by two connecting wires to the unit terminal block, one connecting wire from the connector post carries the supply positive to the filament, the other is connected to an earth stud in the housing.

Limit switches

7. The switches used for protection and control of the operating units are Honeywell miniature micro switches Type ISM1 (replacement type, Type 11SM1-T, details of which are given in A.P.4343C, Vol. 1, Book 1, Sect. 2). The elevation motor is controlled by two micro switches mounted together on the side of the elevation gear box, the outer

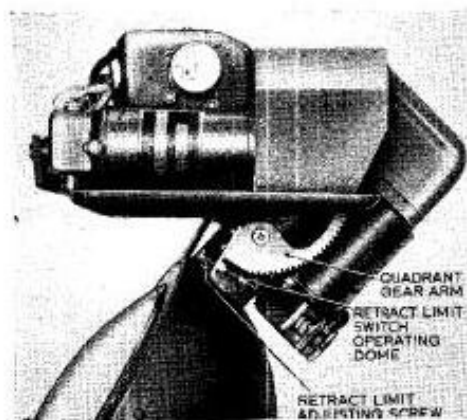


Fig. 3. View of lamp showing retract limit screw

switch is the retract limit switch and the inner switch is the extend limit switch. The retract limit switch is operated by a leaf spring actuator which is in turn operated by the retract limit adjusting screw. This screw, shown in fig. 3, passes through an anchor nut secured to a metal plate fitted to the heel of the quadrant gear, adjustment to the operating setting of the retract limit is made by turning the screw through the anchor nut. The extend limit switch is operated by a leaf spring actuator which is in turn operated by a stud on the outside of the quadrant gear (fig. 4). The position of this stud, and therefore the operational setting of the micro switch, is not adjustable.

8. No limit switches are fitted for the

rotation motor which provides continuous rotation of the housing, but a centralizing micro switch is provided to facilitate the parking of the lamp on retraction. The centralizing switch is fitted on the housing casting adjacent to the housing column (shown in fig. 2), and is operated by a leaf spring actuator, which is in turn operated by a spigot on the column spur gear. The leaf spring actuators used are modified Honeywell Type JS60 actuators, information on these actuators may be found in A.P. 4343C, Vol. 1, Book 1, Sect. 2.

OPERATION

9. The lamp is shown in fig. 5 connected in a typical circuit in which a three position

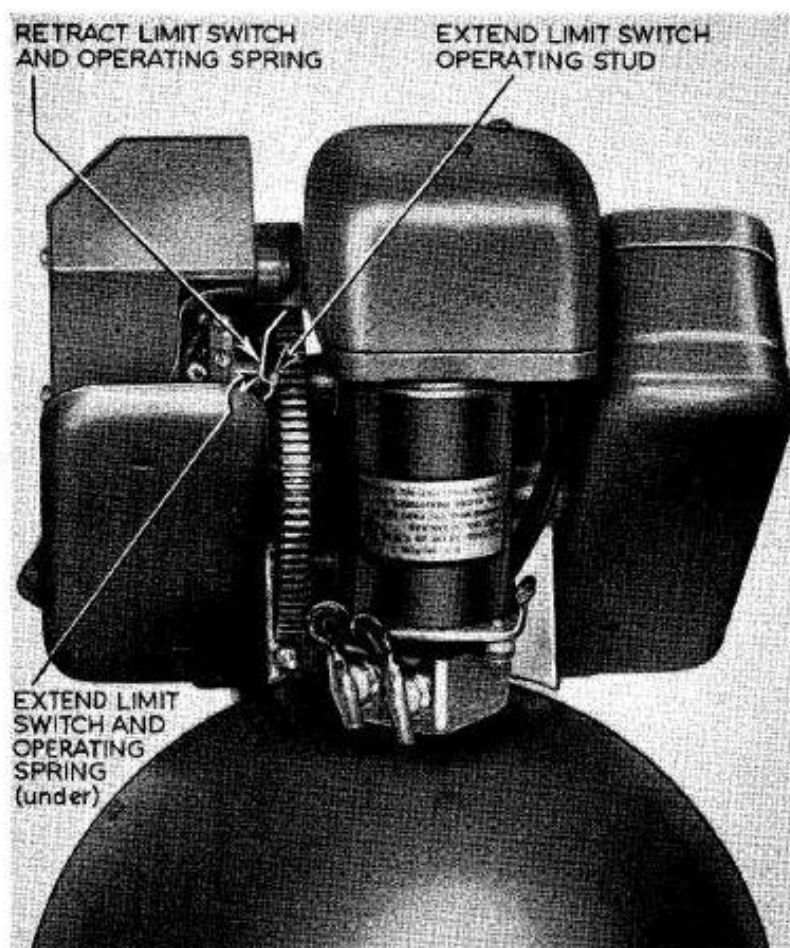


Fig. 4. View of lamp showing extend and retract limit switches

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master switch controls the supply. When selected to the ON position the switch completes the circuit to the filament relay and to the selector switch, in the RETRACT position the switch provides automatic retraction and parking of the lamp. The selector switch is a four-position, spring-loaded, centre OFF switch which is operated in a similar manner to a trim switch and permits adjacent positions of the switch to be selected simultaneously: i.e., considering the

switch shown in fig. 5 a diagonal movement to the lower left-hand corner will cause the lamp to extend whilst rotating to the left. The operation of the lamp is considered for three basic selections, extend, rotate right or left, and retract.

Extend

10. With the master switch selected ON and the selector switch in the EXTEND position a

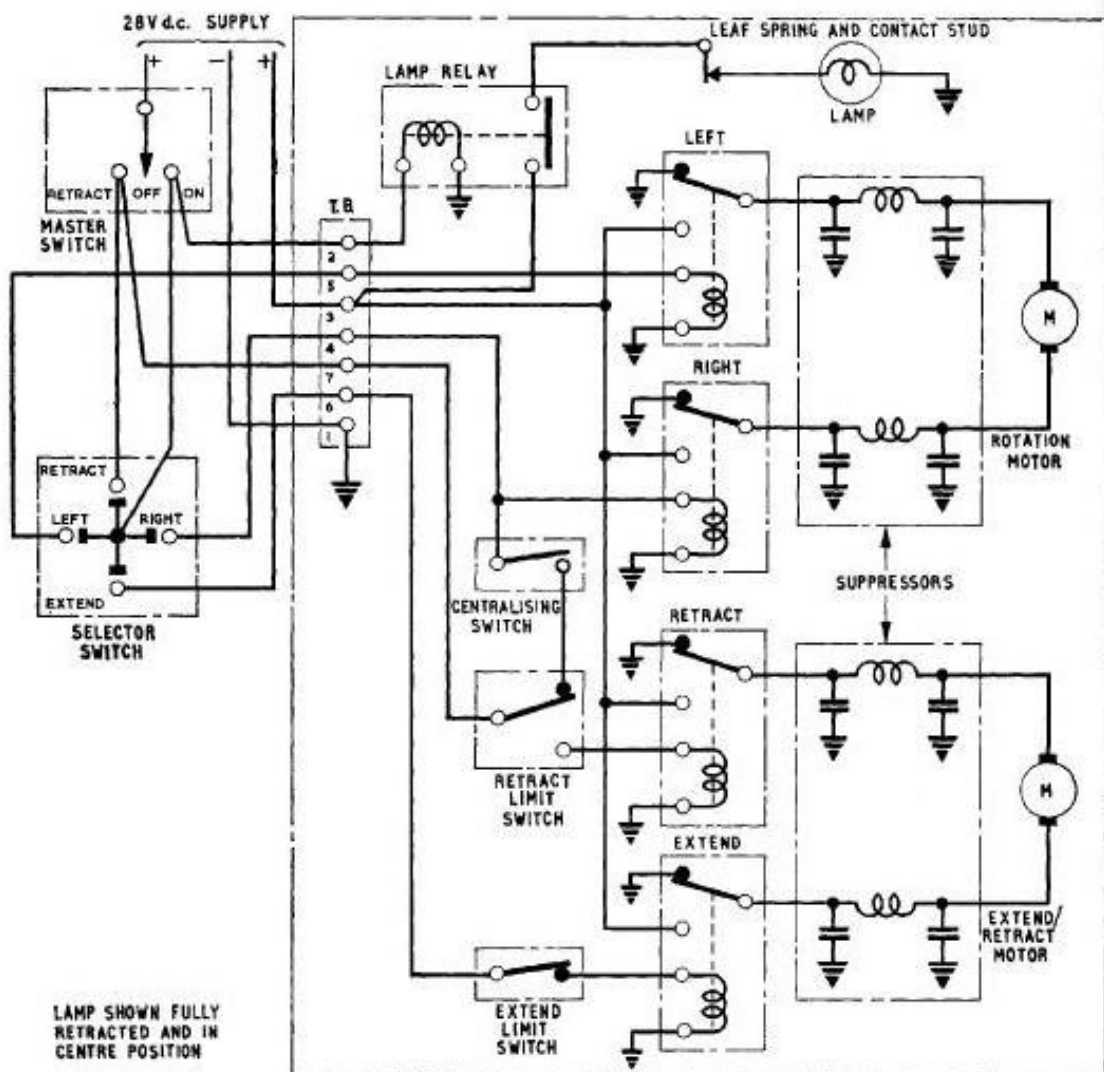


Fig. 5. Circuit diagram

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positive supply is connected to the extend relay coil via terminal 6 and the extend limit switch. The extend relay contacts change-over and a positive supply from terminal 3 is connected via the closed contacts to the elevation motor, and the return made via the normally closed contacts of the retract relay. The elevation motor runs to extend the lamp housing, and will continue to do so until either the selector switch is released or the extend limit switch is operated when the housing is fully opened to 120 deg. Either operation will de-energize the extend relay and the contacts will revert to the normal position breaking the supply to the motor.

Rotate right or left

11. When the housing is extended and rotate left selected on the selector switch a positive supply is connected to the rotate-left relay coil, via terminal 5. The rotate-left relay contacts changeover and connect the supply positive from terminal 3 to the

rotation motor. The return is made via the normally closed contacts of the rotate-right relay. The motor rotates the lamp housing to the left and will continue to do so until the selector switch is released. When rotate right is selected the rotate-right relay is energized via terminal 4 and the supply positive is connected from terminal 3 via the now closed contacts to the rotation motor. The return is made via the normally closed contacts of the rotate left relay. The current through the armature of the rotation motor is in the reverse direction to the rotate-left current and the motor now rotates the housing to the right.

Retract

12. When the selector switch is moved to the retract position the positive supply is connected to the retract relay coil via terminal 7 and the retract limit switch. The retract relay contacts changeover and connect the positive supply from terminal 3 to the elevation motor armature. The return is

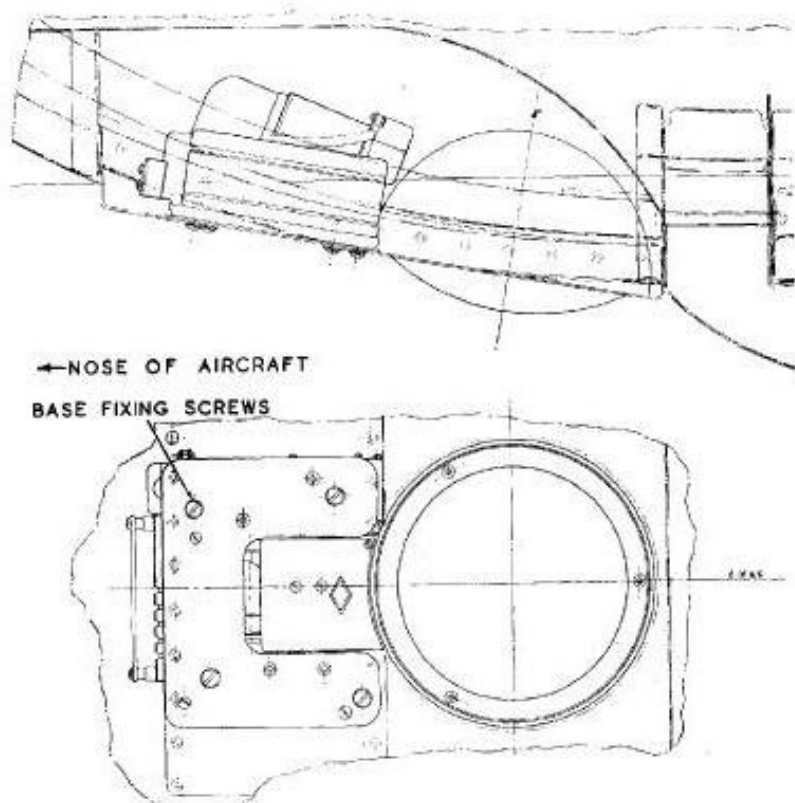


Fig. 6. Installation diagram

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made via the normally closed contacts of the extend relay. The motor will rotate in the reverse direction to that resulting from an extend selection and will continue to retract the housing until the selector switch is released, or the lamp reaches the fully retracted position breaking the limit retract switch contacts.

13. Should the housing be in an off-centre position when a retract selection is made on either the selector switch or the master switch, the sequence or operations detailed in para. 12 will be followed by the centralizing or parking of the housing. When the housing is fully retracted and the retract limit switch contacts changeover the supply positive from the retract selection will be transferred to the rotate-right relay coil, via the centralizing micro switch. The rotation motor will then rotate the housing until the spigot on the housing column operates the centralizing micro switch opening the contacts, this will de-energize the rotate-right relay, and break the supply to the rotation motor.

INSTALLATION

14. A view of an installed lamp is shown in fig. 6, four nuts on the base plate accept the four 8-32 screws which secure the lamp to the aircraft. It should be noted that the housing of the lamp is not enclosed and when operated will rotate within the wing aperture, care must therefore be taken to ensure that connections to the lamp terminal block and other cables in the vicinity of the lamp cannot foul the housing.

SERVICING

General

15. Servicing whilst the lamp is installed in the aircraft is restricted to inspection for damage, security of attachment and corrosion, and the renewal of the sealed beam unit. Renewal of the relays and motors, and adjustment of the micro switches should be made on the bench.

Sealed beam unit removal

16. To renew the sealed beam unit remove

the three Phillips headed screws securing the retaining ring, the screws should be slackened off alternately one turn at a time to avoid distorting the retaining ring and the spacers. With the retaining ring removed the unit may be withdrawn from the housing and the cable disconnected from the terminal block. The new unit should then be connected.

Note . . .

Where unit renewal is being carried out with the lamp retracted the following operation will be eased if the retaining ring is first placed over the wrist of the hand used.

Offer the new unit into the housing, ensuring that the locating lug fits into the groove on the housing, then lift the retaining ring over the hand holding the unit in position and secure with the three screws. Care must be taken to tighten the screws alternately one turn at a time to avoid distorting the retaining ring and spacers.

Component renewal

17. Should components of any of the sub-assemblies require renewal, or detailed inspection of any component be necessary, the assemblies may be removed from the base plate for ease of servicing. The key numbers given for the exploded view, fig. 7 may be used as a guide to the order of removal of the assemblies; but individual assemblies may be removed if desired. It should be noted that when the elevation gearbox and motor assembly (item 22) is removed the sealed beam housing assembly should be supported on the bench, as removal of the gearbox will leave one end of the journal shaft unsupported.

Micro switch adjustment

Retract limit switch

18. To check the adjustment of the retract limit switch the lamp should be extended and then retracted, when the housing stops moving due to the operation of the retract limit switch the rim of the housing should be flush with the base plate assembly. Should the housing stop in an incorrect position

the retract limit adjusting screw shown in fig. 1 should be moved to correct the position. Turn the adjusting screw clockwise to decrease the travel of the housing and anti-clockwise to increase travel of the housing. Care must be taken in adjusting the increase of travel to prevent the housing

from bottoming heavily on the buffer stop, which will place a heavy strain on the retract mechanism.

Centralizing switch

19. To check the adjustment of the central-

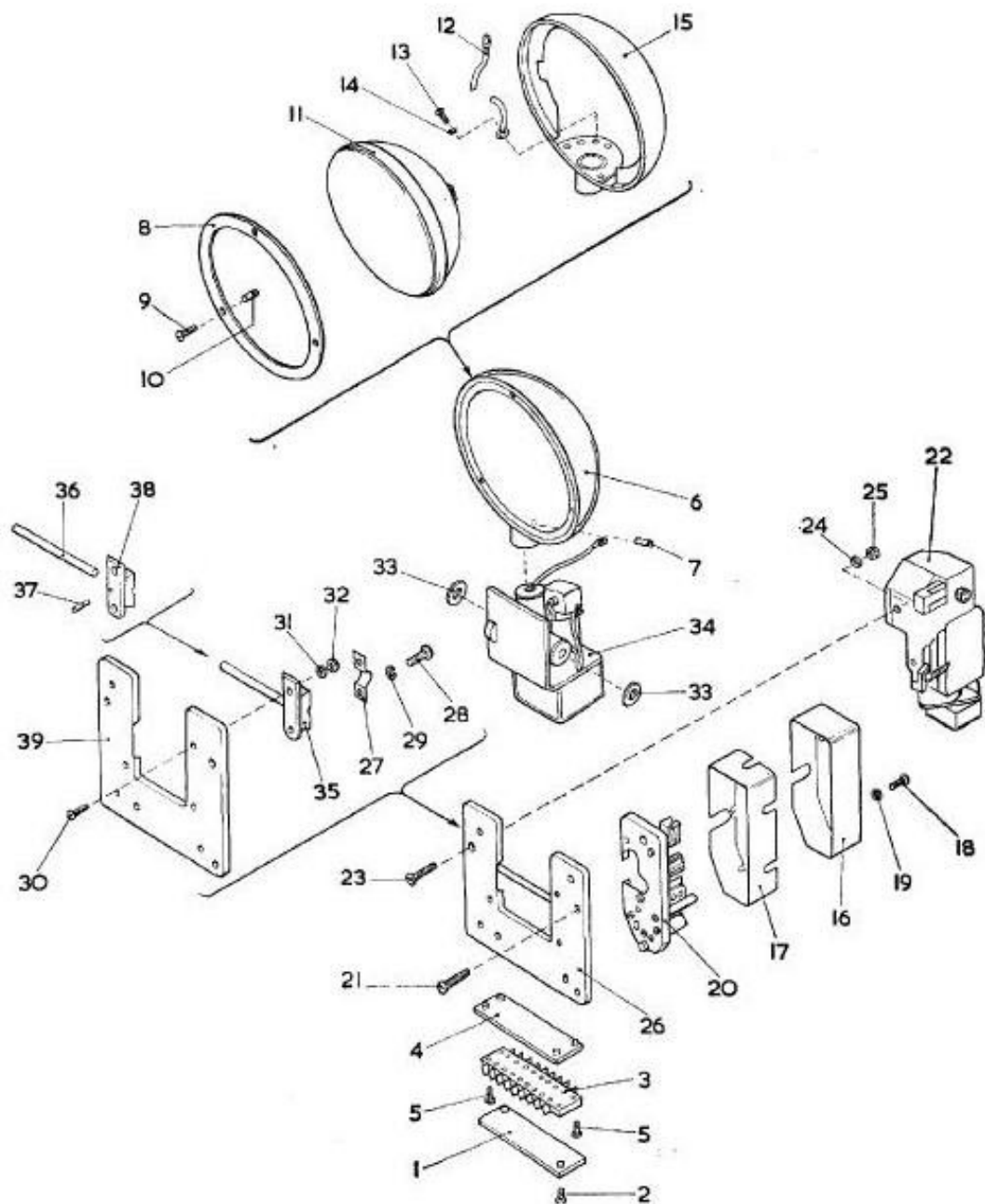


Fig. 7. Exploded view of lamp

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KEY TO FIG. 7

Exploded view of lamp

- | | | | |
|----|---------------------------------|----|---|
| 1 | TERMINAL BLOCK COVER | 22 | ELEVATION MOTOR AND GEAR ASSEMBLY |
| 2 | COVER SECURING SCREW | 23 | SECURING SCREW |
| 3 | TERMINAL BLOCK | 24 | WASHER |
| 4 | TERMINAL BLOCK MOUNTING PLATE | 25 | STIFFNUT |
| 5 | BLOCK SECURING SCREW | 26 | BASEPLATE AND JOURNAL SHAFT ASSEMBLY |
| 6 | SEALED BEAM UNIT HOUSING | 27 | CABLE CLAMP |
| 7 | HOUSING SECURING SCREW | 28 | CABLE CLAMP SECURING SCREW |
| 8 | SEALED BEAM UNIT RETAINING RING | 29 | SPRING WASHER |
| 9 | RETAINING RING SECURING SCREW | 30 | SECURING SCREW, JOURNAL SHAFT ASSEMBLY |
| 10 | SECURING SCREW SPACER | 31 | LOCK WASHER |
| 11 | SEALED BEAM UNIT | 32 | NUT |
| 12 | CONNECTING WIRES | 33 | SPACERS, JOURNAL SHAFT |
| 13 | EARTH SCREW | 34 | ROTATION MOTOR, AND UNIT HOUSING MAIN CASTING |
| 14 | LOCK WASHER | 35 | JOURNAL SHAFT ASSEMBLY |
| 15 | HOUSING | 36 | JOURNAL SHAFT |
| 16 | RELAY ASSEMBLY COVER | 37 | JOURNAL SHAFT SECURING SCREW |
| 17 | COVER INSULATOR | 38 | MOUNTING BLOCK JOURNAL SHAFT |
| 18 | COVER SECURING SCREW | 39 | BASEPLATE |
| 19 | WASHER | | |
| 20 | RELAY ASSEMBLY | | |
| 21 | RELAY ASSEMBLY SECURING SCREW | | |

izing micro switch the lamp housing should be retracted with the housing in an off-centre position; when the housing has "parked" the axis of the housing should be parallel with the base plate. Where adjustment is necessary the lamp should be extended and the following procedure should be followed:

- (1) Remove the cover of the rotate gear train.
- (2) Slacken off the adjustment screw (shown in fig. 2) holding the slotted end of the centralizing switch adjustment plate.
- (3) Remove the two Allen screws securing the worm to the rotation motor shaft and withdraw the worm. Slacken off the two Allen screws securing the spur gear to the housing column.
- (4) Turn the rotation gearing by hand until the spigot on the column spur gear is adjacent to the high contact point of

the limit switch actuator. Note: this should be *adjacent to* and not *on* the high contact point.

- (5) Move the limit switch toward the spigot until the switch operates, indicated by a faint click, then move the switch away from the spigot until a second click is heard; position the switch mid-way between the positions obtained.

- (6) Tighten the centralizing switch adjustment screw.

- (7) Turn the rotation gearing by hand and check the switch setting; a faint click should be heard as the spigot rides up the high point of the switch actuator and again as it rides past the high point.

- (8) Leave the spigot mid-way between the clicks i.e. on the high point of the actuator, and hold the gearing so that it cannot turn. Then position the housing so that it is parallel to the base plate.

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(9) Tighten the Allen screw exposed on the column spur gear.

(10) Replace the worm on the rotation motor shaft and secure it with the two Allen screws.

(11) Switch on the supply and rotate the housing to an off-centre position and then retract the housing, when fully retracted the housing should rotate to its flush position. Observe the position attained by the housing.

(12) Rotate the housing approximately 180 deg. from the flush position, and then place the master switch to retract and check the travel of the unit.

(13) If further small adjustment to the housing position is necessary loosen the exposed Allen screw in the column spur gear (the screw tightened in item 9), and set the housing to the correct position and lock the screw.

(14) After item 12 (or item 13 if the housing is reset) rotate the housing in either direction until the second Allen screw in the column spur gear is accessible and tighten the screw.

(15) Replace the rotate gear train cover

and functionally test the lamp to ensure that the cover does not foul any part of the gear train.

Lubrication

20. The following may be lubricated using a few drops of oil OX-14 (NATO Code 0-147), the journal shaft, housing column, and all bearings and gears with the exception of the final gear of the extend gear train and the quadrant gear of the housing assembly. Care must be taken to use the oil sparingly to avoid contamination of the cables. The bearings of the motor are lubricated for the life of the motor, no further lubrication should be attempted.

Testing

21. The lamp should be functionally tested using a test circuit similar to that given in fig. 5, checking all functions of the lamp. During these tests whilst the lamp is moving, check that the filament remains bright with no dimming or flickering.

Note . . .

The suppressors should not be subjected to test by any instrument having an output in excess of 100V. A standard insulation tester must not be used.