

ADMIRALTY  
AIR MINISTRY

## Chapter 2

### LANDING LAMP, HARLEY, TYPE 9KD

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#### LEADING PARTICULARS

Landing lamp ... ..	Stores Ref. SC/4452
Lamp, double filament ... ..	24V, 500W/240W
Retracted position ... ..	Flush with under surface of aircraft wing
Extended position ... ..	90 deg. from retracted position
Extending and retraction time... ..	Approximately 6 to 7 seconds
Effective lamp glass diameter ... ..	8.5 in.
Weight ... ..	15.25 lb.

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ELECTRICAL MANUAL—  
STATIC CONSUMER EQUIPMENT (AIRBORNE)

This is A.L. No. 12 to A.P.4343E, Vol. 1

Section 7. List of Chapters : delete "(To be issued later)" after the title of Chapter 2 and write "(A.L. 12)" in the outer margin against the deletion. Insert this Chapter 2 to follow Chapter 1. Record the incorporation of this A.L. in the Amendment Record Sheet.

## DESCRIPTION

### General

1. The landing lamp, Type 9KD, is a motor operated retractable lamp designed for installation in the undersurface of the mainplane of the aircraft. A double filament lamp bulb, wired through a 2-way change-over switch, is fitted, thus enabling either filament to be used.

2. One filament is rated at a lower wattage, and is used for taxiing and emergency purposes. By this means, the life of the other filament (main filament) is conserved and the load on the battery is reduced.

3. A cut-out switch, automatically operated by the lamp in the final stage of retraction,

ensures that the light is switched off when the lamp is fully retracted.

4. The lamp (*fig. 1*) is constructed in three major units, namely:—

- (1) The electric actuator
- (2) The lamp housing
- (3) The lamp case assembly.

5. The lamp is fitted with a fluted glass semi-circular diffuser lens, mounted in the top half of the lamp immediately behind the front glass. The diffuser is adjusted in each lamp so that the base line of the lens is parallel to the ground when mounted in the aircraft wing, and with the lamp extended. Each lamp is therefore marked for either

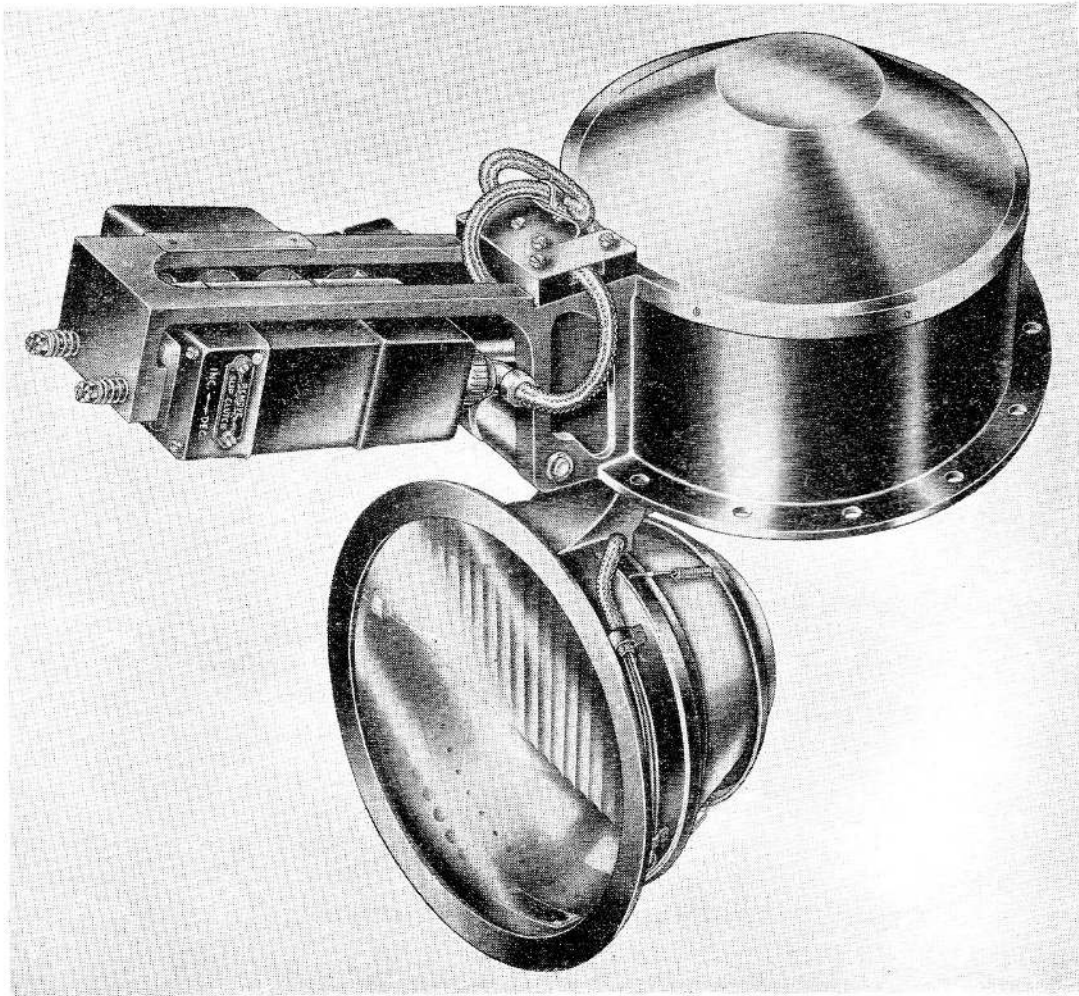


Fig. 1. General view of lamp

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right or left hand wing mounting and is only suitable for installation on aircraft with the specific wing dihedral for which the lens has been adjusted.

**Actuator**

6. The lamp is extended and retracted by a Plessey, Type CZ.53681/1/C, actuator. These units are fully described in A.P.4343D, Vol. 1, Sect. 14, Chap. 19, to which reference must be made for further details than those given below.

7. The actuator is a self-contained unit, consisting of a small reversible electric motor driving a train of spur gears through an intermediate slip clutch. The purpose of this clutch is to prevent the motor stalling if the actuator is subjected to an excessive load.

**Note . . .**

*The clutch setting is adjustable, but the correct setting is obtained during manufacture and adjustment should not normally be made during service. A makers' seal is applied to the inspection cover to indicate that the cover should not be removed. Special test equipment is necessary to make clutch adjustments.*

8. A lead screw, attached to the final gear of the train, engages with a similar thread

machined within the bore of a hollow plunger. Thus, when the lead screw is rotated, the plunger moves in or out according to the direction of rotation of the motor.

9. The actuator motor is controlled by a three position selector switch mounted in the aircraft cockpit. This switch is marked UP, OFF and DOWN. The motor is automatically stopped by limit switches when the lamp reaches either the fully retracted or extended positions.

10. To ensure the minimum amount of overrun of the motor, when the selector switch is turned to OFF or when the lamp has reached the limits of travel, a small spring loaded electromagnetic brake is mounted at the gearbox end of the motor.

11. The brake solenoid is connected in series with the motor field. With no current flowing, the brake friction plate is held in contact to a brake disc secured to the motor armature shaft, so preventing the armature from rotating. When the motor field is energized, the brake solenoid releases the brake friction plate and allows the motor shaft to rotate.

12. The brake also prevents the lamp from creeping, when fully extended, due to wind pressure acting upon the lamp glass.

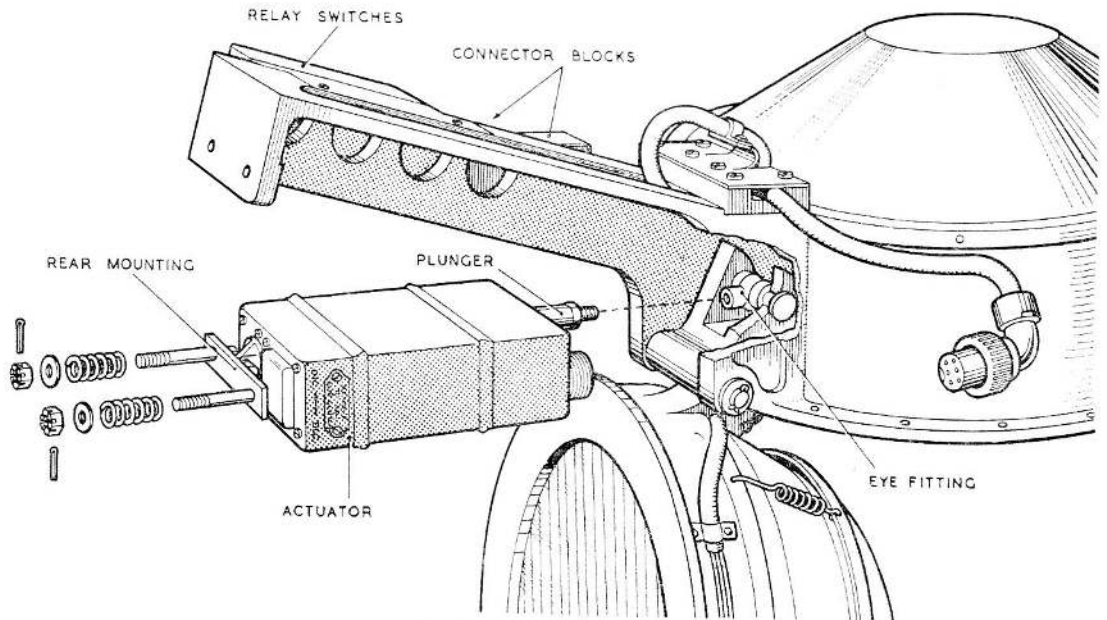


Fig. 2. Actuator mounting

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13. The actuator is secured to the lamp housing by a pivot pin, passing through a bearing in the rear end fitting of the actuator, and a bracket, spring mounted to the lamp housing (*fig. 2*).

14. An eye fitting, screwed to the end of the plunger, is secured by a pivot pin to a lever forming part of the lamp case casting. Thus, when the actuator is operated, the lamp case assembly is hinged about a pivot by movement of the plunger.

#### Lamp housing

15. The lamp housing (*fig. 1*) consists of a cylindrical casting into which the lamp case retracts; the top of the casting is covered by a sheet metal pressing forming a lid. An arm, forming part of the casting supports the rear attachment fitting of the actuator. Also mounted upon the arm of the casting are two relays, a cut-out switch, and a terminal block. The relays control the current to the lamp bulb.

16. The lamp case pivot bearing is situated at the point of junction of the arm to the cylinder, and the cut-out switch is mounted immediately above. The cut-out switch plunger protrudes to the inside of the lamp housing, and a striker spigot secured to the lamp case depresses the plunger as the lamp

retracts; the cut-out switch completes the circuit and operates the lamp filament relays.

17. A flange machined into the lamp case casting, mates against a reciprocal flange on the lamp housing, thus providing a flush metal to metal sealing with the lamp fully retracted.

18. The lamp is adjusted so that, with full retraction, the lamp case makes contact with the lamp housing just prior to the actuator 'in' limit switch breaking. This allows a slight overrun of the motor, which compresses the actuator mounting springs and applies pressure between the two lamp components.

#### Lamp case assembly

19. The lamp case assembly (*fig. 3*) consists of the following components:—

- (1) Main lamp case casting
- (2) Glass, sealing ring, and glass retaining ring
- (3) Lens frame casting, and diffuser lens
- (4) Reflector
- (5) Reflector cover
- (6) Reflector cover retainer.

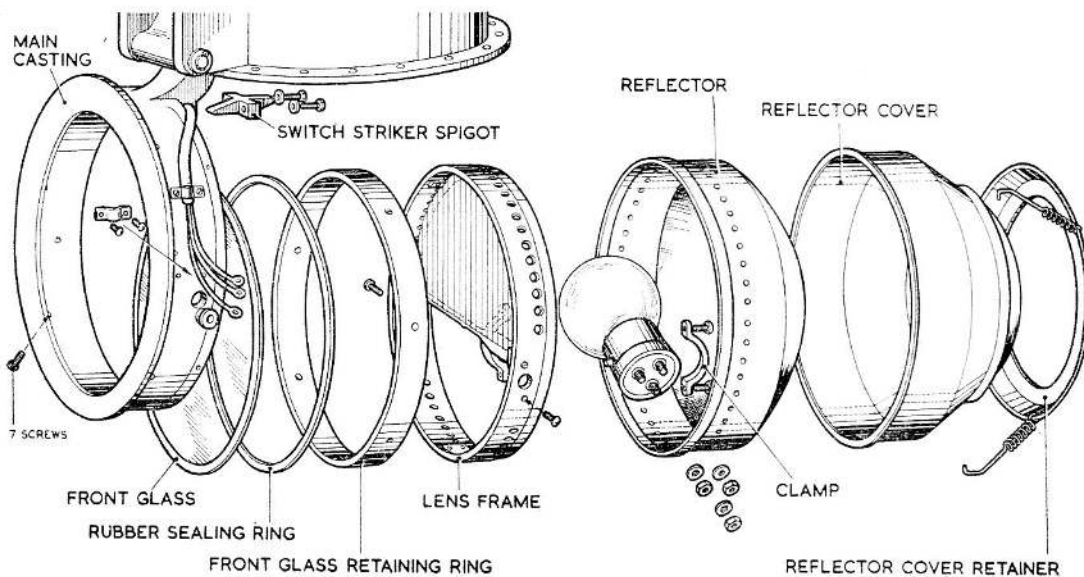


Fig. 3. Lamp case assembly

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**20.** The main component of the lamp case consists of a cylindrical light alloy casting pivoted to the lamp housing. The lamp glass is located against a flange formed in the front of the casting, and is secured by a rubber sealing ring and a retaining ring. The retaining ring is held in position by 7 screws.

**21.** The lens frame consists of an open ended cylindrical casting with the addition of a cross member or bridge piece cast across the centre. The cross member carries the bulb clamp and also forms the retaining flange for the diffuser lens. The lens frame is secured within the lamp case casting by two rd/hd. screws.

**22.** Four clips, secured to the lens frame casting by csk/hd. screws, retain the diffuser lens against the flange. The lower two clips contain compression springs upon which the lens is located.

**23.** The bulb is held by a clamp secured by two screws and is located within the clamp by a dowel pin. The three electrical leads to the bulb pass through grummets in the two castings and are clipped to the outside of the main casting. The leads are connected direct to the bulb cap by nuts and washers.

**24.** A shoulder, machined around the outside periphery of the lens frame casting, forms a seating over which the reflector is located. The reflector is then retained in position by the cover and the cover retainer (*fig. 1*).

#### OPERATION

**25.** With the lamp fully retracted and the selector switch in the OFF position, only the 'down' limit switch is made, and therefore with no current in circuit the motor armature is braked (*fig. 4*).

**26.** With a 24-volt d.c. supply connected and the selector switch set to DOWN, the

'down' field coils of the motor and brake solenoid coil will be energised, thus allowing the armature to rotate and move the lamp towards the extended position.

**27.** As soon as the lamp has left the fully retracted position, the 'up' limit switch will close (but does not complete circuit). At the same time the filament relay cut-out switch is made and, provided that the filament switch has been turned to select one of the filaments the lamp will light. Upon attaining the fully extended position the 'down' limit switch is tripped thereby automatically switching off the motor and applying the brake.

**28.** To retract the lamp, the selector switch is set to UP, this completes the circuit through the 'up' limit switch, motor field, and brake solenoid.

#### SERVICING

**29.** If it is necessary to renew the lamp bulb or front glass, or clean the reflector, care must be taken to prevent the reflector from falling when the reflector cover and retainer are removed. Handle the reflector carefully with a clean soft cloth to prevent finger marks soiling the highly polished surface. Clean the reflector with cotton wool and soapy water only.

**30.** The lamp should be extended and retracted two or three times to ensure correct functioning. With the lamp in the extended position the filament selector switch should be operated to test both filaments.

**31.** Examine all cable connections for cleanliness and security. Ensure that all cables are securely clipped with clamps to the lamp unit where necessary.

**32.** All principal bearings of the lamp actuating mechanism are of the Oilite type, and will not therefore require lubrication during normal service life.

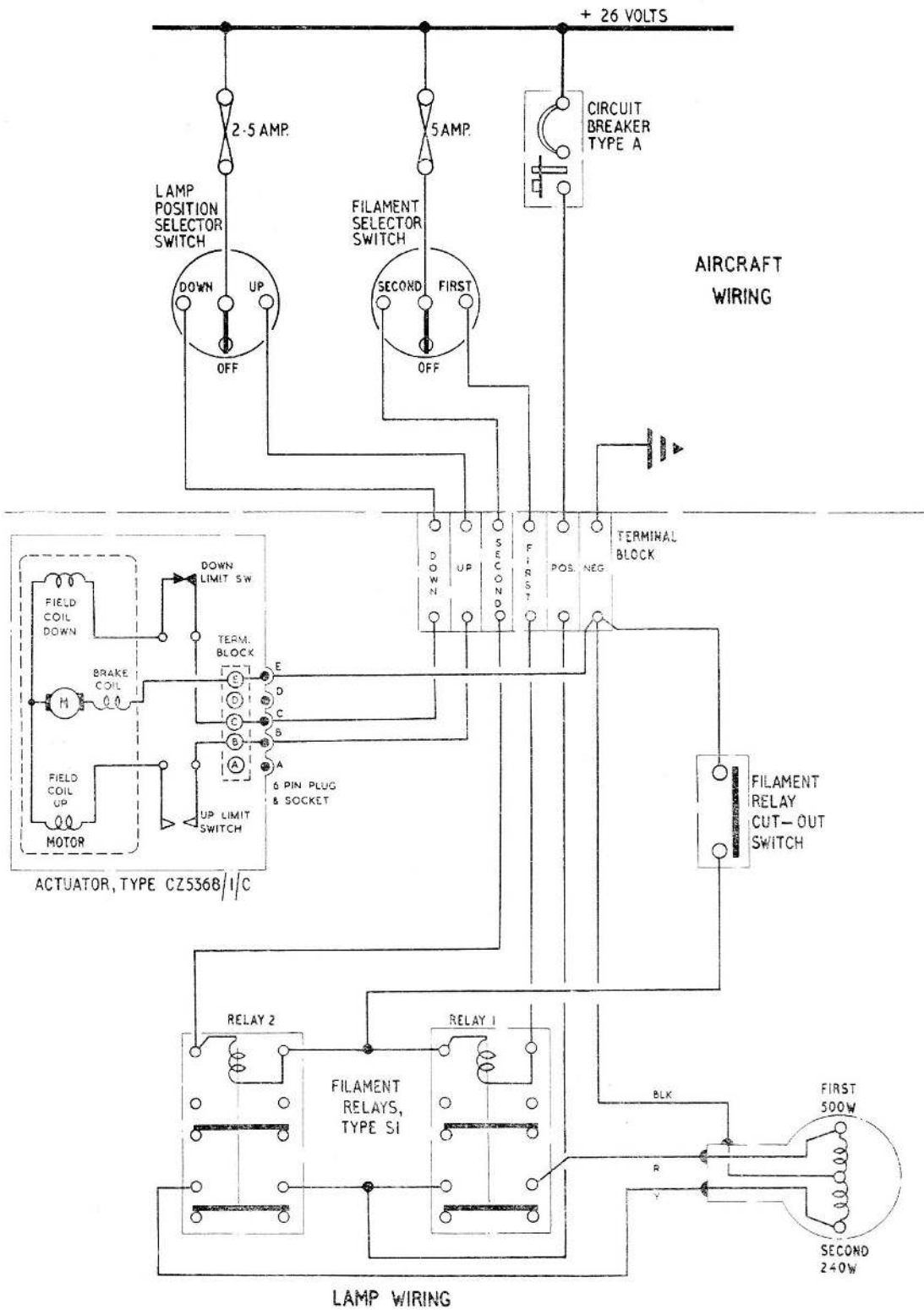


Fig. 4. Wiring diagram

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