

Chapter 39

LANDING LAMP, HARLEY, TYPE 11, Mk. 9

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LEADING PARTICULARS

Landing Lamp, Harley, Type 11, Mk. 9			
Actuator		Plessey Jaguar, Type CZ5368111C	
Lamp filament		Harley Type 10B/57, 750/250 watts	

Introduction

1. The Harley Landing lamp, Type 11, Mk. 9 (*fig. 1*) fits into a circular aperture under the wing of certain military aircraft. It can be extended for use at airspeeds up to 150 Knots by a linear actuator remotely controlled by switches and relays. The variation of beam for landing or taxiing is obtained by the selection of one of the two filaments within the bulb. A general chapter on landing lamps may be found in A.P.4343, Vol. 1, Sect. 21.

DESCRIPTION

General

2. Three main castings constitute the construction of the lamp, namely, the outer frame

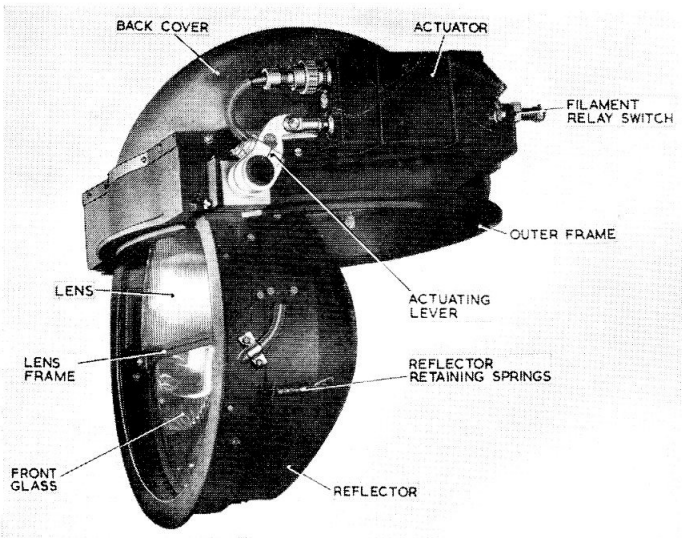


Fig. 1. Landing lamp, Harley, Type 11, Mk. 9

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casting, which carries the back cover, the terminal block and the actuator; the inner frame which is retractable, and the lens frame casting which is housed in the inner frame and carries the bulb and lens.

Outer frame casting

3. The outer frame casting incorporates the flange by which the lamp is secured to the airframe structure. Tufnol bearings, which support the retractable inner frame, are fitted to the flange, while brackets enable the actuator and terminal blocks to be mounted. A domed back cover is attached by screws to the rear of the casting.

Actuator

4. The retractable inner frame is power operated by an electric linear actuator. This actuator comprises a split field series motor which enables the desired rotation to be selected for extending or retracting the filament housing. An electro-magnetic brake is incorporated which controls the overrun of the actuator plunger by forcing a brake shoe against a friction plate when the motor current is switched off.

5. Suitable reduction gearing transmits the motor power to the lead screw of the actuator plunger, or ram, which lies parallel to, but is off set from, the motor. The general design detail of the Plessey Jaguar type actuator is described in A.P.4343, Vol. 1, Sect. 17.

6. The actuator is supported at its plunger end by the pin which couples it to the actuating lever and coupled to the outer frame by two spring loaded plungers. During the final retracting movement of the filament housing the spring loaded plungers are compressed, thereby locking the lamp and preventing vibration being set up within the lamp. The movement of the actuator also moves a small switch-plate which operates the micro-switch in the filament relay circuit.

Filament housing

7. The inner frame or filament housing pivots on 1.00 in. journals carried in the Tufnol bearings on the outer frame. The right-hand journal (viewed from the front of the lamp) is extended to protrude through the Tufnol bearing and carries a light alloy actuating lever which couples to the eye fitting of the actuator plunger. The filament housing carries the front glass with its sealing ring secured in place by a clamping ring retained by six 6 B.A. screws. Also attached

by screws to the housing casting is the lens frame which includes a bracket for supporting the two-filament bulb. The coiled springs, which retain the reflector in position, hook into holes located in the inner frame casting.

Lens frame assembly

8. The lens frame casting is machined and fits into the inner frame to which it is secured by two 2 B.A. clamping screws and nuts. The fixing holes in the inner frame casting are actually slotted to enable the lens frame to be rotated to provide a beam suitable for lamp mounting under either the port or starboard wing. The lens itself is held in place by three clips, one attached to the upper part of the frame and the other two to a cross member of the frame which serves to support the frame and form the fixed half of the bulb clamp.

9. The rim of the reflector locates against the lens frame casting and is held in position by four retaining screws which clip into holes in the inner frame casting.

Filament lamp

10. The light source in this landing lamp is a twin filament gas filled bulb. The main or landing beam filament is rated at 750 watts whilst the secondary or taxiing beam filament, which is slightly off set from the focal point of the reflector, is rated at 250 watts. These filaments are designed to operate at 26 volts to allow for a 2 volt drop in the supply lines.

11. The cap of the filament bulb has a locating spigot fitted on the side and has three 2 B.A. terminal screws, nuts and washers forming the cable connections at the rear of the cap. The terminals are colour coded to match the flexible cable cores thus:—

Red—Main filament
Yellow—Secondary filament
Blue—Common

12. A clamp, held by two screws to the cross member of the lens frame casting, secures the bulb in position. A hole in the fixed half of the clamp serves to locate the spigot on the bulb cap and thus, accurate positioning is ensured.

Electrical connections

13. The filament control is through relays connected to a three position, centre-off switch. The energizing supply to these relays is taken via the contacts of the filament

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casting, which carries the back cover, the terminal block and the actuator; the inner frame which is retractable, and the lens frame casting which is housed in the inner frame and carries the bulb and lens.

Outer frame casting

3. The outer frame casting incorporates the flange by which the lamp is secured to the airframe structure. Tufnol bearings, which support the retractable inner frame, are fitted to the flange, while brackets enable the actuator and terminal blocks to be mounted. A domed back cover is attached by screws to the rear of the casting.

Actuator

4. The retractable inner frame is power operated by an electric linear actuator. This actuator comprises a split field series motor which enables the desired rotation to be selected for extending or retracting the filament housing. An electro-magnetic brake is incorporated which controls the overrun of the actuator plunger by forcing a brake shoe against a friction plate when the motor current is switched off.

5. Suitable reduction gearing transmits the motor power to the lead screw of the actuator plunger, or ram, which lies parallel to, but is off set from, the motor. The general design detail of the Plessey Jaguar type actuator is described in A.P.4343, Vol. 1, Sect. 17.

6. The actuator is supported at its plunger end by the pin which couples it to the actuating lever and coupled to the outer frame by two spring loaded plungers. During the final retracting movement of the filament housing the spring loaded plungers are compressed, thereby locking the lamp and preventing vibration being set up within the lamp. The movement of the actuator also moves a small switch-plate which operates the micro-switch in the filament relay circuit.

Filament housing

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by screws to the housing casting is the lens frame which includes a bracket for supporting the two-filament bulb. The coiled springs, which retain the reflector in position, hook into holes located in the inner frame casting.

Lens frame assembly

8. The lens frame casting is machined and fits into the inner frame to which it is secured by two 2 B.A. clamping screws and nuts. The fixing holes in the inner frame casting are actually slotted to enable the lens frame to be rotated to provide a beam suitable for lamp mounting under either the port or starboard wing. The lens itself is held in place by three clips, one attached to the upper part of the frame and the other two to a cross member of the frame which serves to support the frame and form the fixed half of the bulb clamp.

9. The rim of the reflector locates against the lens frame casting and is held in position by four retaining screws which clip into holes in the inner frame casting.

Filament lamp

10. The light source in this landing lamp is a twin filament gas filled bulb. The main or landing beam filament is rated at 750 watts whilst the secondary or taxiing beam filament, which is slightly off set from the focal point of the reflector, is rated at 250 watts. These filaments are designed to operate at 26 volts to allow for a 2 volt drop in the supply lines.

11. The cap of the filament bulb has a locating spigot fitted on the side and has three 2 B.A. terminal screws, nuts and washers forming the cable connections at the rear of the cap. The terminals are colour coded to match the flexible cable cores thus:—

Red—Main filament
Yellow—Secondary filament
Blue—Common

12. A clamp, held by two screws to the cross member of the lens frame casting, secures the bulb in position. A hole in the fixed half of the clamp serves to locate the spigot on the bulb cap and thus, accurate positioning is ensured.

Electrical connections

13. The filament control is through relays connected to a three position, centre-off switch. The energizing supply to these relays is taken via the contacts of the filament

SERVICING

General

15. With the lamp extended to the open position, the front glass, bulb and reflector should be inspected for general cleanliness. If the bulb glass shows signs of general blackening, or white streaks are apparent, it is indicative of reduced efficiency or a leaking glass seal. In these instances the bulb should be renewed. The front glass and lens should be examined for damage and expansion cracks and cleaned or renewed as necessary. Check as much of the filament cable as is visible, paying particular attention to the bulb connections for deterioration through heat.

16. While the filament housing is dismantled for inspection or renewal of parts, the bulb and reflector should be cleaned. Use no polish or abrasive for cleaning; soapy water may be used to remove dirt, the components then being dried with a soft cloth.

Bulb renewal

17. With the lamp actuated to the extended position, unclip the four reflector retaining springs. Carefully remove the reflector and place it face downwards on a clean flat surface. Disconnect the three 2 B.A. terminal nuts from the bulb cap and remove the leads. Unscrew the bulb clamp securing screws and lift out the bulb.

18. Fit the new bulb, ensuring that the spigot is correctly located in the hole in the

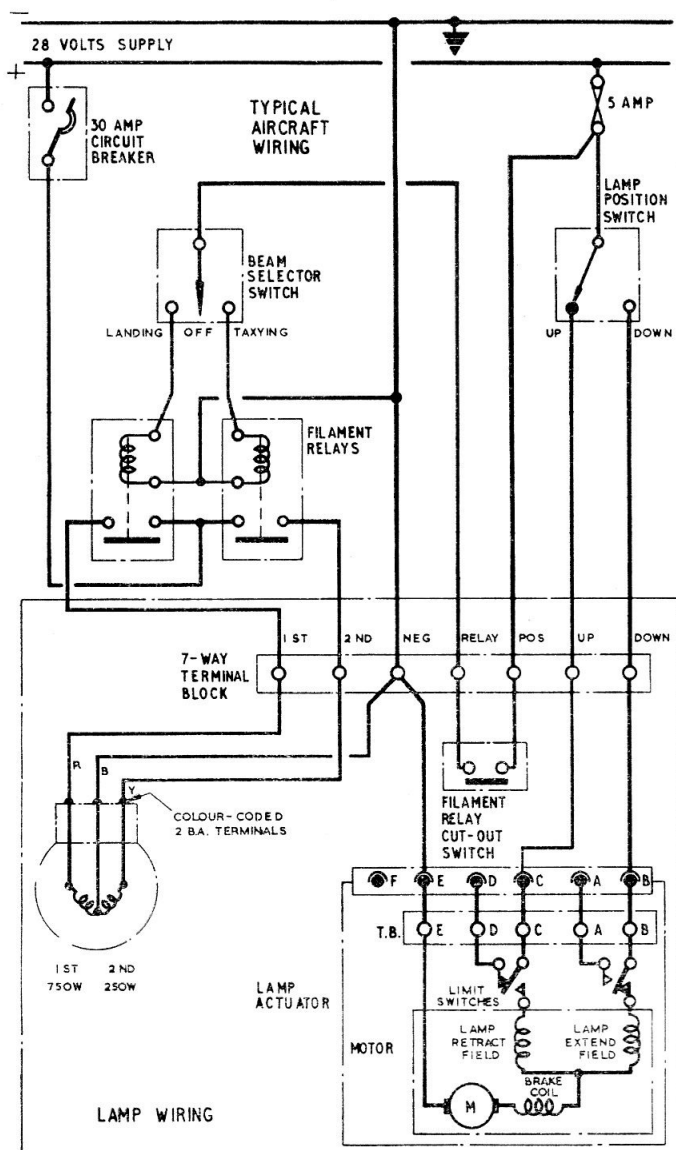


Fig. 2. Circuit diagram

cut-out micro switch, which is operated by the final retraction movement of the filament housing. This arrangement ensures that the filaments are switched off before the lamp is finally retracted. The two filament relays do not form a part of the landing lamp itself, being mounted separately from the lamp as part of the aircraft wiring.

14. The actuator control is a two position switch which selects the motor field for the required direction of movement of the

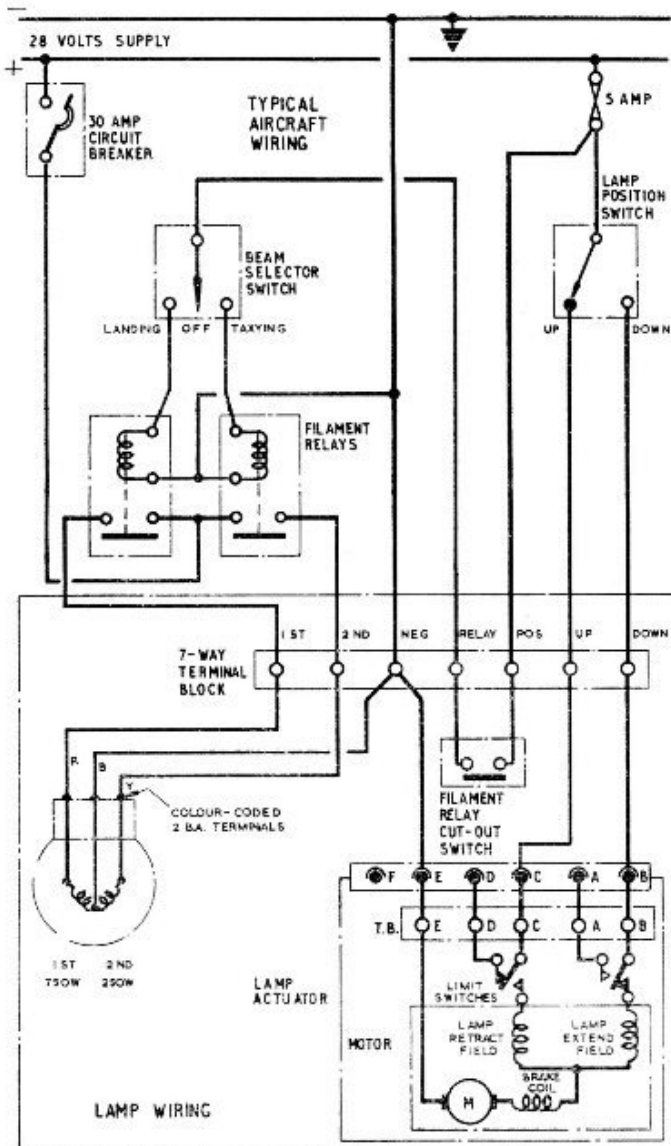


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14. The actuator control is a two position switch which selects the motor field for the required direction of movement of the

filament housing. The internal connections to the actuator are taken via three pins of a six-pole plug and socket the colour coding of the cable being as follows :—

Lamp down—Red—pin B
Lamp up—Yellow—pin C
Common—Blue—pin E

SERVICING

General

15. With the lamp extended to the open position, the front glass, bulb and reflector should be inspected for general cleanliness. If the bulb glass shows signs of general blackening, or white streaks are apparent, it is indicative of reduced efficiency or a leaking glass seal. In these instances the bulb should be renewed. The front glass and lens should be examined for damage and expansion cracks and cleaned or renewed as necessary. Check as much of the filament cable as is visible, paying particular attention to the bulb connections for deterioration through heat.

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Bulb renewal

17. With the lamp actuated to the extended position, unclip the four reflector retaining springs. Carefully remove the reflector and place it face downwards on a clean flat surface. Disconnect the three 2 B.A. terminal nuts from the bulb cap and remove the leads. Unscrew the bulb clamp securing screws and lift out the bulb.

18. Fit the new bulb, ensuring that the spigot is correctly located in the hole in the

fixed half of the bulb clamp. Connect the leads, colour coded as in para. 11, and replace the nuts and shake-proof washers. Do not overtighten the terminal nuts of the lamp or the clamp securing screws. Finally, replace the reflector, making sure that the four retaining springs are securely clipped into the inner frame casting.

Lens renewal

19. With the filament housing extended, remove the bulb as described in para. 17. Remove the two cable clips nearest to the bulb and withdraw the cable from the inner frame. Remove the two 2 B.A. round/head screws, nuts and washers (below lens clip) and withdraw the lens frame complete with lens from the inner frame.

20. Remove the lens clip from one side only and slide out damaged lens. Holding the new lens flat side down, slide it into the top lens clip and the slot of the remaining side clip. The dismantled side clip may now be replaced and secured by the 4 B.A. csk/hd. screw. Check that the lens has 0.03 in./0.04 in. movement in the spring loaded clips to allow for expansion.

21. Replace the lens frame assembly in the inner frame and secure with the two 2 B.A. round/head screws. Before finally tightening these screws the lens frame should be set for either port or starboard mounting to allow for the dihedral of the wing (*fig. 3*). Push the leads through the hole in the inner

frame, replace the cable clamps and refit the reflector as in para. 18.

Front glass renewal

22. With the filament housing extended, unclip and remove the reflector and remove the lens frame complete with bulb and lens as in para. 19. Remove the six 6 B.A. csk/hd. screws retaining the front glass clamp ring to the inner frame. Withdraw the clamp ring and rubber sealing ring and remove the damaged front glass.

23. Scrape out the old sealing compound and fit the new front glass, making sure the rebated rim of the glass is seated into the inner frame. Fill the space between the edge of the glass and the inner frame casting with sealing compound (*Ref. No. 5CX/5085*). Replace the rubber sealing ring and secure the clamping ring to the frame casting. Replace the lens frame assembly, bulb and reflector.

Operation check

24. After servicing check all screws for tightness. With power on, operate the lamp to its limits. Switch on each filament in turn and retract the lamp. See that the filament is switched off by the action of the filament cut-out micro-switch during the final retracting movement. Check that, when fully retracted, the filament housing is held rigid. If actuated in a workshop check that, when fully retracted, the spring loaded switch plate moves 0.05/0.06 in. to compress the springs and that the filament cut-out micro switch is operated.

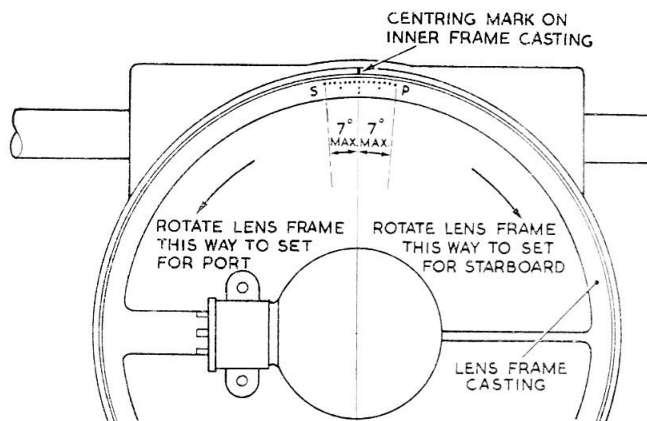


Fig. 3. Dihedral setting—housing viewed from rear

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fixed half of the bulb clamp. Connect the leads, colour coded as in para. 11, and replace the nuts and shake-proof washers. Do not overtighten the terminal nuts of the lamp or the clamp securing screws. Finally, replace the reflector, making sure that the four retaining springs are securely clipped into the inner frame casting.

Lens renewal

19. With the filament housing extended, remove the bulb as described in para. 17. Remove the two cable clips nearest to the bulb and withdraw the cable from the inner frame. Remove the two 2 B.A. round/head screws, nuts and washers (below lens clip) and withdraw the lens frame complete with lens from the inner frame.

20. Remove the lens clip from one side only and slide out damaged lens. Holding the new lens flat side down, slide it into the top lens clip and the slot of the remaining side clip. The dismantled side clip may now be replaced and secured by the 4 B.A. csk/hd. screw. Check that the lens has 0.03 in./0.04 in. movement in the spring loaded clips to allow for expansion.

21. Replace the lens frame assembly in the inner frame and secure with the two 2 B.A. round/head screws. Before finally tightening these screws the lens frame should be set for either port or starboard mounting to allow for the dihedral of the wing (fig. 3). Push the leads through the hole in the inner

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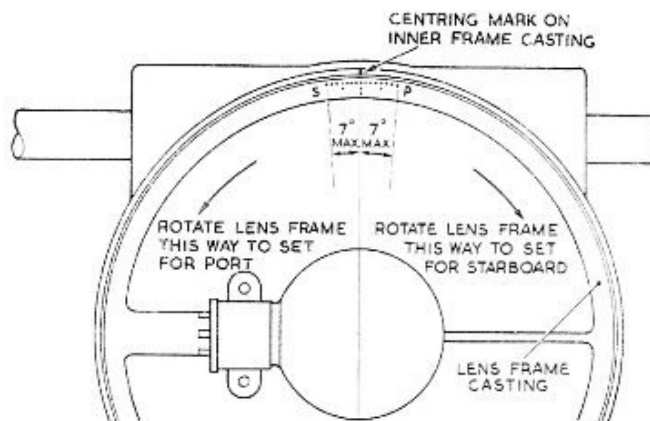


Fig. 3. Dihedral setting—housing viewed from rear