Chapter 63

LANDING LAMP, HARLEY, TYPE 6 MK.4

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF APPENDICES

LEADING PARTICULARS

Landing Lamp, Harley, Type 6 Mk. 4	*Ref. No. 5CX/5987*
Actuator, Plessey Jaguar, Type CZ 53681/11C	*Ref. No. 5W/2836*
Filament lamp (special cap) double filament, 28 volt 280 watt/26 volt 500 watt	*Ref. No. 5L/5959703*
Front glass, Pt. No. 6/3.102	*Ref. No. 5CX/6019*
Sealing ring, Pt. No. 6/3.111	*Ref. No. 5CX/6033*
Extended angle of lamp	90 *deg.*
Maximum permissible operating frequency of actuator	10 *cycles/hr.*
Maximum permissible lighting time:	
Main filament in flight	20 *min.*
Auxiliary filament in flight	*continuous*
Main filament on ground or in still air	10 *min.*
Auxiliary filament on ground or in still air	20 *min.*
Maximum permissible forward air speed with lamp extended	180 *knots*
Weight	$6\frac{1}{2}$ *lb.*

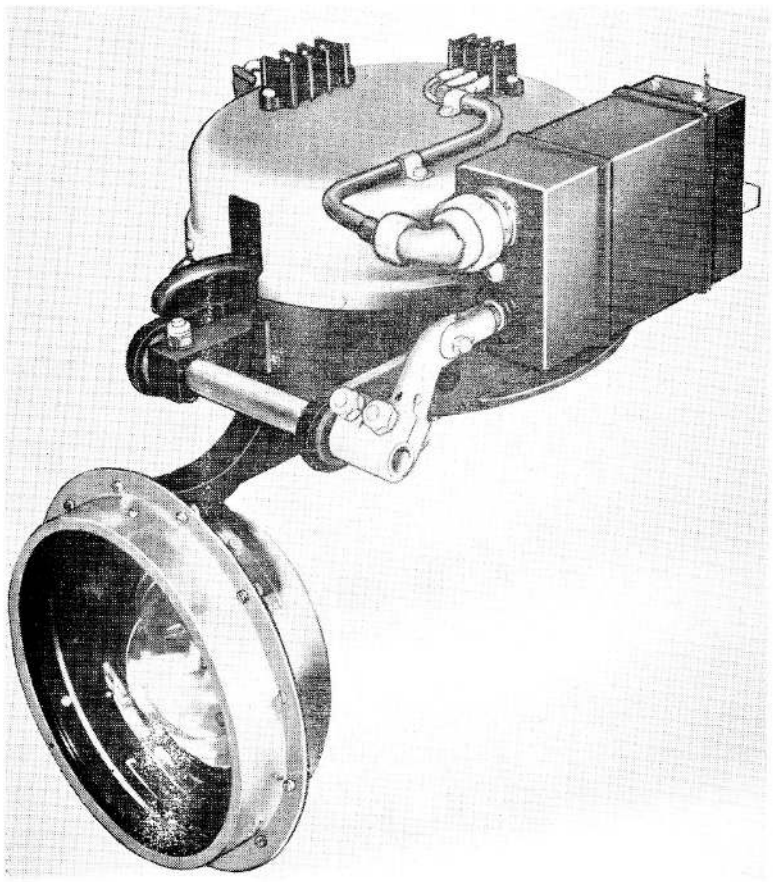

Fig. 1. Landing lamp, Hanley, Type 6 Mk. 4

Introduction

1. The Harley Type 6 Mk. 4 landing lamp is a retractable landing lamp with a 6in. light source which is fitted into a circular aperture on the underside of the main plane or fuselage. The lamp is extended and retracted by an electrically driven actuator and has a 28 volt 280 watt/26 volt 500 watt twin filament lamp which gives a main beam and a dispersed beam. Details of the actuator which is Plessey Type CZ53681/11C may be found in A.P.4343D, Vol. 1, Book 3.

DESCRIPTION

2. The Harley Type 6 Mk. 4 landing lamp has two main assemblies, the outer frame assembly and the inner frame assembly. The outer frame assembly is the fixed portion by which the lamp is mounted in the aircraft secured by six bolts which pass through holes in the mounting flange. The inner frame assembly is the moving portion and includes the filament lamp, the reflector and the front glass.

Outer frame assembly

3. The outer frame assembly consists of a cast ring which incorporates housings for the inner frame, elevation spindle, bearings and a mounting to which the actuator trunnion is secured. The bearings for the elevation spindle are grease impregnated Tufnol bushes which are an interference fit in the housings. The hollow spindle is extended through the bearings, the left-hand end having an end cap secured by a split pin passing through the cap and the spindle, fitted to the right-hand end by two clamp bolts is the actuating lever.

4. The ram of the actuator has a fork-end fitting which is secured to the actuating lever by a clevis pin, the trunnion end is secured to the outer frame bracket by a spring loaded coupling, shown in fig. 2. The rear of the outer frame assembly is closed by a back cover which is secured to the casting by six 6-32 U.N.C. screws and nuts and carries the terminal blocks to which external connection is made.

Inner frame assembly

5. The casting of the inner frame assembly is a circular ring casting incorporating the bulb clamp and a "U" shaped arm by which it is fitted to the elevation spindle. The casting is secured to the spindle by a single bolt which passes through the clamp of the arm and the spindle. Thus when the spindle is rotated by the elevation actuator the inner frame is extended or retracted on the outer frame. One half of the bulb clamp is cast integrally with the ring of the casting, the free portion of the clamp is secured to the fixed portion by two 10-32 U.N.F. screws located by a dowel and has a locating hole to accept the pin on the filament lamp cap.

6. Fitted to the inner frame casting are the reflector and the front glass, the reflector is secured by four 6-32 U.N.C. screws and anchor nuts and has an aperture through which the end cap and terminal studs of the filament lamp protrude. The front glass is mounted in the front bezel and is held against the lip of the bezel, seated on a rubber sealing ring, by a clamp ring. The ring is secured within the bezel by six 4-40 U.N.C. screws and nuts and the bezel is in turn secured to the casting by twelve screws and nuts.

7. Connection to the terminal studs of the filament lamp is made by a flexible sheathed cable which is cleated to the outer and inner frame castings. The terminal studs and the connections are covered by a protective rubber shroud and the cores of the cable are colour coded similarly to the filament terminal studs:—

Red	Main filament
Yellow	Auxiliary filament
Blue	Negative (common)

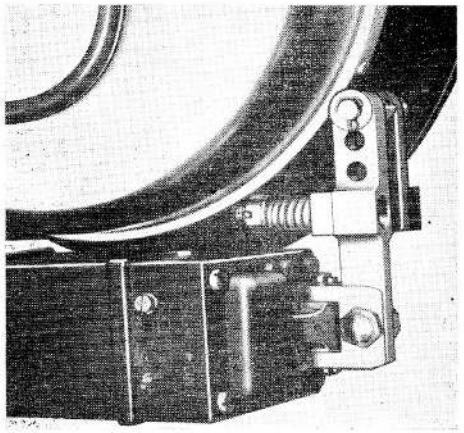

Fig. 2. Actuator trunnion mounting

OPERATION

8. The lamp is remotely controlled by two switches in the aircraft, one to select the light beam and one to select the position of the lamp. When selected to either up or down (retract or extend) the actuator will run until cut-off by the internal limit switch or until the selector switch is returned to the off position. When selected up the inner frame assembly is retracted into the outer frame by the extension of the actuator ram and when selected down it is extended by the retraction of the ram.

9. The actuator extend limit switch is set such that when the lamp is retracted and the inner frame has reached its mechanical stop, the actuator continues to run for a short period. The further extension of the ram then pushes the body of the actuator backwards as a solid link against the spring tension of the trunnion coupling. The spring pressure then serves to lock the inner frame assembly home and absorb any vibration transmitted from the airframe or set up by the wind pressure.

SERVICING

General

10. The lamp should be examined for mechanical damage or corrosion and the filament connecting cable examined for signs of chafing or wear. After a functional test

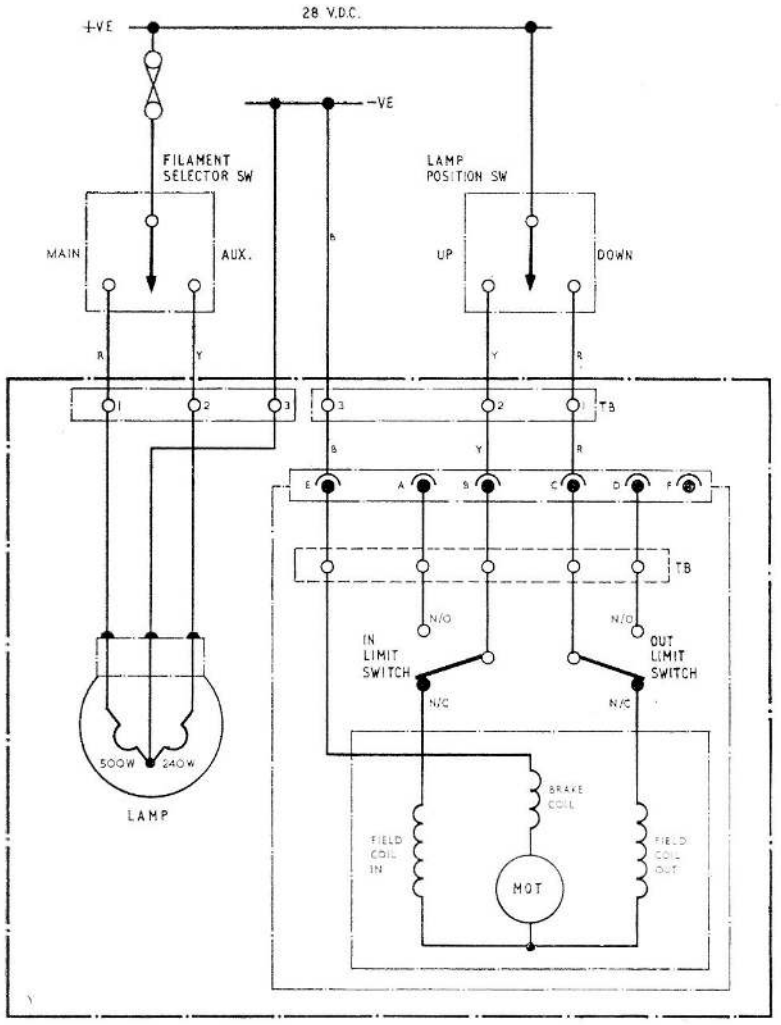

Fig. 3. Circuit diagram

the filament lamp should be examined for signs of blackening or white streaks on the glass envelope which indicate a partial failure of the glass seal. If blackening or streaking are evident the filament should be renewed to prevent failure during subsequent operational use.

Note . . .

The maximum lighting times for the filaments of the lamp are given in the Leading Particulars, this time should not be exceeded except in cases of emergency.

11. The elevation actuator should be replaced if it is suspect or if it fails to operate. The front glass and the reflector should be examined for cleanliness, if they are dirty they should be cleaned using a clean soft cloth. Warm soapy water may be used to remove grease or dirt, after which the front glass and reflector should be dried using a soft cloth. Do not use polish or abrasives.

12. The component parts of the inner frame assembly, the front glass, the bezel, the filament lamp and the reflector, may be renewed with the landing lamp fitted to the aircraft or removed to the bench. It will first be necessary to extend the inner frame assembly to gain access to the securing screws and nuts.

Front glass renewal

13. The front glass may be renewed by extending the lamp and removing the bezel securing screws after which the bezel may be pulled off the inner frame complete with the damaged front glass. The screws securing the clamp ring into the bezel should then be removed and the clamp ring withdrawn, taking care in handling the ring which is a light alloy spinning and easily distorted. The damaged front glass can then be replaced, renewing the sealing ring if deteriorated, by using the reverse of the dismantling procedure.

Filament lamp and reflector renewal

14. To renew the filament lamp or the reflector the following procedure should be used:—

(1) Extend the lamp and then remove the rubber terminal shroud.

(2) Disconnect the filament lamp terminal connections.

(3) Remove the four screws securing the reflector to the inner frame casting.

(4) Remove the reflector and the sealing ring and place the reflector on a clean surface or a soft cloth to prevent accidental damage.

Note . . .

For reflector renewal the above procedure (1)—(4) *should then be reversed, renewing the reflector seal if required.*

(5) Unscrew the two bulb clamp securing screws and withdraw the filament lamp and the loose portion of the clamp.

(6) A new filament lamp may then be fitted in the reverse order of the above procedure, (1)—(5), ensuring that the spigot on the filament lamp cap is aligned with the locating hole in the clamp and taking care not to overtighten the nuts on the lamp terminal studs.

Elevation actuator renewal

15. The elevation actuator may be renewed using the following procedure:—

(1) Operate the actuator to partially extend the lamp and thus relieve the spring pressure on the trunnion end attachments.

(2) Disconnect the actuator supply socket.

(3) Remove the split pin from the fork end clevis pin and withdraw the clevis pin from the fork end.

(4) Remove the split pin from the castellated nut on the trunnion coupling bolt and remove the nut from the bolt and withdraw the bolt.

(5) Remove the actuator from the landing lamp complete with pivot bracket.

(6) Remove the split pin from the dowel securing the trunnion pivot bracket and push out the dowel and remove the bracket.

(7) Unscrew the fork end from the actuator ram and fit it to the ram on the new actuator as close as possible to the shoulder of the ram and lock it in position with the ram locknut.

(8) Set the actuator limit switches to give the same extended and retracted lengths between the centres of the trunnion and fork end mounting holes as those of the old actuator (i.e. an extended length of 10 ins. and a retracted length of 6·96 in.).

(9) Fit the pivot bracket to the trunnion end.

(10) Fit the new actuator to the landing lamp using the reverse of the procedure given in sub. para. (2)—(5).

(11) Functionally test the lamp using the procedure given in the Standard Serviceability Test, Appendix A to this chapter.

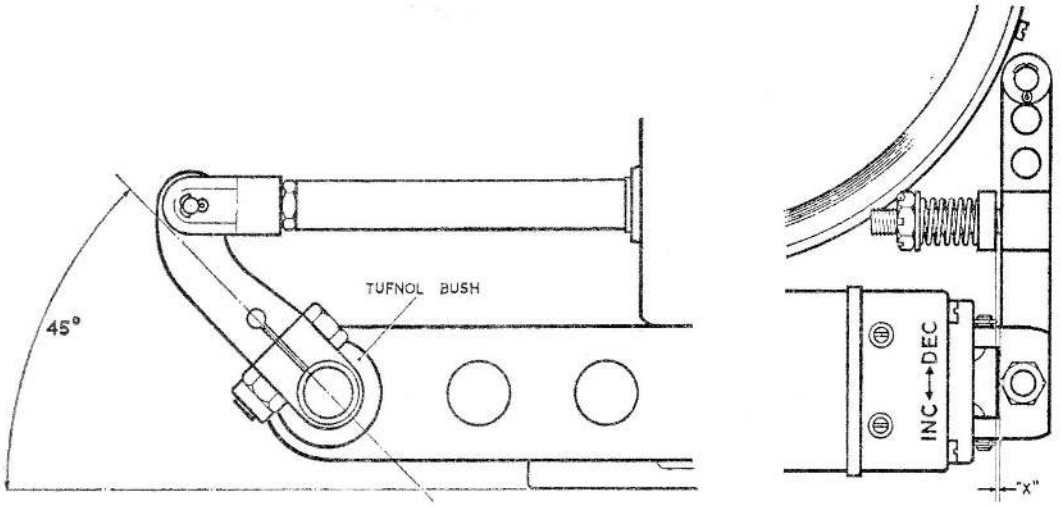

Fig. 4. Actuating lever and retract limit setting

Adjusting the landing lamp extension travel limit (open angle)

16. The open angle of the inner frame measured to the mounting face of the outer frame, with the lamp fully extended, should be 90°. Where this is found to be incorrect check that the actuator retraction limit is correctly set to the figure given in para. 15 (8). If the limit is incorrect reset the actuator internal limit switch and measure the open angle once more. When the actuator limits are correct and the fully open angle is other than 90° the following procedure should be used:—

(1) Partially extend the lamp, switch off the supply and disconnect the plug to the actuator.

(2) Remove the split pin from the fork end clevis pin and whilst supporting the inner frame withdraw the clevis pin.

(3) Push the inner frame to the fully retracted position by hand and slacken off the actuating lever clamp bolts.

(4) Adjust the angle between the actuating lever and the outer frame to 45°, measuring between the centre line of the actuating lever split clamp and the face of the inner frame as shown in fig. 4 (a).

(5) With the angle set to 45° tighten the lever clamp bolts.

(6) Reassemble the lamp and functionally test using the procedure given in the Standard Serviceability Test, Appendix A to this chapter.

Adjusting the landing lamp retraction travel limit

17. The retraction limits of the landing lamp should be checked with the lamp fully retracted i.e. the front glass flush with and square to the mounting flange of the outer frame. With the lamp in this position measure the gap between the fixed pillar and the moving arm of the trunnion mounting, shown "X" in fig. 4 (b), which should be between 0·040-0·060 in.

18. The gap may be adjusted by increasing or decreasing the extension limit of the actuator as required. If the extension limit is correct to the figure given in para. 15 (8) and the gap is incorrect check the open angle of the lamp and the retraction limit of the actuator. Though the open angle of the lamp may have previously been measured and found correct, this may be due to a combination of incorrect settings of both the actuating lever and the retraction limit which should now be checked and reset as given in para. 16.

19. With the lamp fully retracted and the gap between the pillar and the moving arm

set as in para. 17 measure the compressed length of the trunnion spring and check that the coils are not fully closed. The compressed spring length should be 0·5 in. and at this length it must be possible to insert a 0·005 in. feeler gauge between the coils in at least two places. If the length requires adjustment it should be made by moving the position of the securing nut on the spring carrier stud. If the coils are closed with the spring length correct the new spring should be fitted.

Lubrication

20. The elevation spindle bearing bushes are grease impregnated in manufacture and further lubrication should not be necessary neither should it be attempted, suspect bearing bushes should be renewed. The trunnion pin, the clevis pin, the dowels and the trunnion spring should be lubricated when necessary with a light smear of grease XG-275.

Appendix A

STANDARD SERVICEABILITY TEST FOR LANDING LAMP, HARLEY, TYPE 6 MK.4

Introduction

1. The following tests may be applied to ascertain the serviceability of a landing lamp, or prior to its installation in an aircraft.

TEST EQUIPMENT

2. The following test equipment, or suitable equivalents, will be required:—

(1) Two single-pole changeover switches with centre off position, Ref. No. 5CW/6431.

(2) A stop watch, Ref. No. 6B/9101001.

(3) A 28V d.c. supply.

(4) A suitable frame for mounting the lamp during test.

TEST PROCEDURE

3. (1) Mount the lamp on the test frame and connect it to the test circuit as shown in fig. 1.

(2) Fully extend the lamp, measuring the time taken to reach the fully open position which should be not more than 4 secs.

(3) Measure the open angle of the inner frame with respect to the mounting flange of the outer frame which should be 90°.

(4) Switch on the auxiliary and main filaments in turn, for not more than the minimum time to ensure satisfactory illumination and not exceeding 2 min.

(5) Retract the lamp to the fully retracted position measuring the time taken which should be between 4 and 6 secs.

(6) Ensure that the face of the front glass is flush with and square to the outer frame mounting flange.

(7) Measure the gap between the mounting pillar and the moveable arm of the trunnion mounting which should be 0·040-0·060 in. and the compressed length of the trunnion spring which should be 0·5 in.

(8) Check that the coils of the trunnion spring are not fully closed by ensuring that a 0·005 in. feeler gauge can be inserted between the coils of the spring in at least two positions.

(9) Extend and retract the lamp a number of times (not exceeding 10 cycles/hr.) whilst ensuring that there is no binding, fouling or tendency to sluggishness.

(10) Set all switches to off and inspect the glass envelope of the filament lamp for signs of streaking or blackening, where these are evident renew the filament lamp and repeat the tests detailed above.

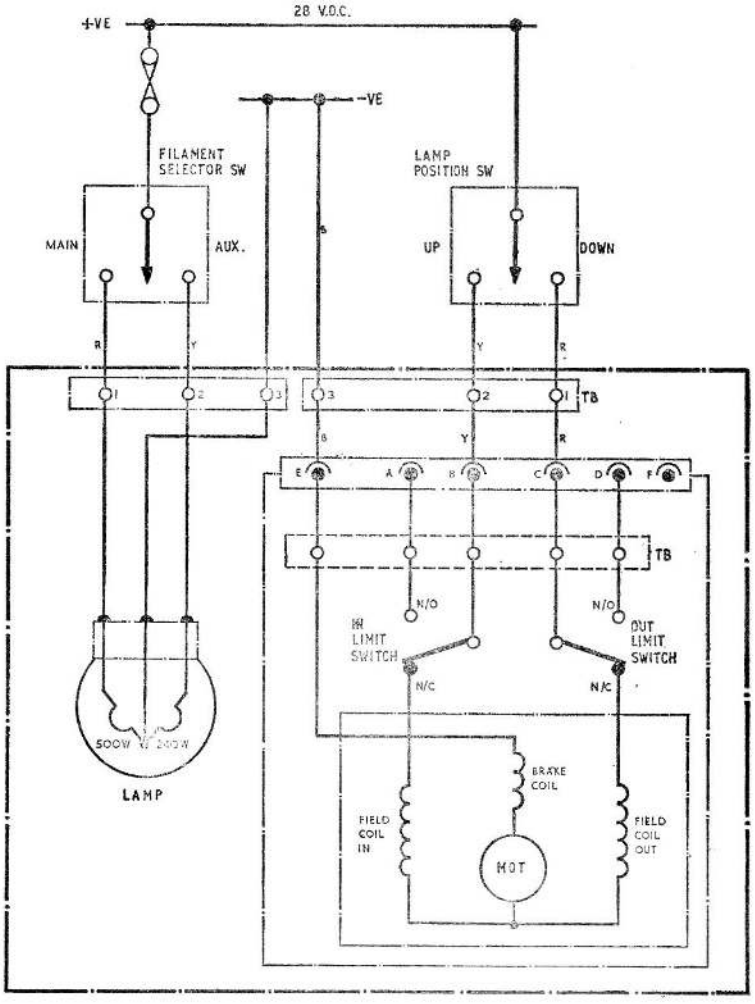

Fig. 3. Circuit diagram

Printed for H.M. Stationery Office by Ezra Sidebotham Ltd., Wigan.
371058/Wt.45431/D.1986 1,875 3/64 Gp.375/7