

## Chapter 21

# OPERATING UNIT FOR LANDING LAMPS

### LIST OF CONTENTS

	Para.		Para.
<i>Introduction</i> .....	1	<i>Switch mechanism</i> .....	5
<i>Description</i> .....		<i>Operation</i> .....	6
<i>Motor and brake</i> .....	2	<i>Installation</i> .....	8
<i>Gearbox</i> .....	4	<i>Servicing</i> .....	10

### LIST OF ILLUSTRATIONS

	Fig.		Fig.
<i>Gearbox with cover removed</i> .....	1	<i>Circuit diagram</i> .....	3
<i>Switch mechanism with cover removed</i> .....	2		

### LEADING PARTICULARS

<i>Operating unit</i> .....	Stores Ref. SUD/1517
<i>Operating voltage</i> .....	24

#### Introduction

1. The operating unit consists of a motor and gearbox which is used to extend and retract the landing lamps, Type J and K, and the taxiing lamp, Type B.

#### DESCRIPTION

##### Motor and brake

2. The motor is a 2-pole, split-series field machine rated at 24 volts. Each pole piece carries one field winding; one, when energised, drives the motor in a direction to extend the lamp, and the other to cause the lamp to be retracted.

3. An electro-magnetic brake is incorporated to prevent overrun or inching of the motor. Attached to the spring-loaded brake plunger is a rubber pad which bears directly on the motor armature when the supply is switched off, and so prevents rotation. The brake winding is connected in series with the motor armature, so that when the motor is switched on, the brake winding is also energized and the brake is lifted clear, allowing the motor to rotate.

##### Gearbox

4. The worm drive from the motor shaft is transmitted to a bakelized fibre pinion and thence by reduction gearing to the lamp

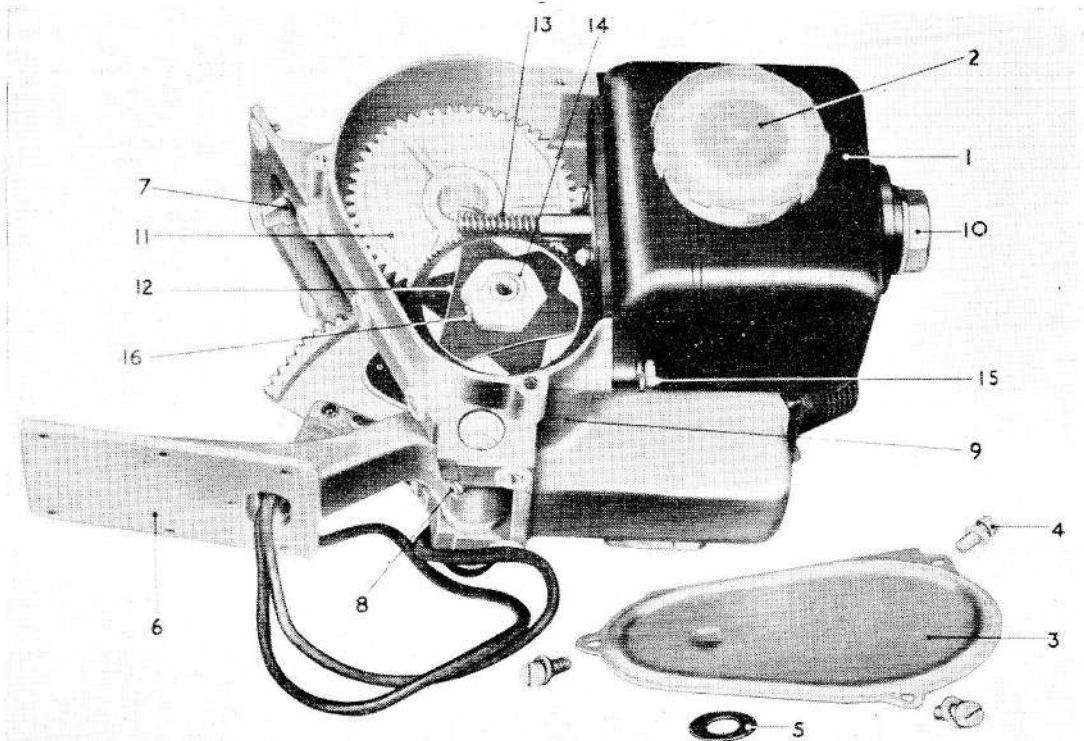
itself. A clutch, in the form of a triangular-shaped spring plate, is provided, so that if the lamp should be switched on when the speed of the aircraft is above a certain figure (normally approximately 180 m.p.h.), the clutch will slip and prevent undue strain being thrown on the aircraft wing structure. Access to the gearbox is gained after removal of the cover plate (*fig. 1*). Should the clutch have to be set to slip at any other aircraft speed, adjustment is made by means of the hexagonal nut which bears on the clutch plate.

##### Switch mechanism

5. The switch mechanism (*fig. 2*) is housed in a compartment of the casting upon which the motor is mounted. It incorporates two make-and-break switches and one single-pole, change-over switch; these can be seen in the circuit diagram in *fig. 4*, which shows the operating unit connected to the landing lamp. The switches are operated by the movement of the switch arm, driven by the gear train.

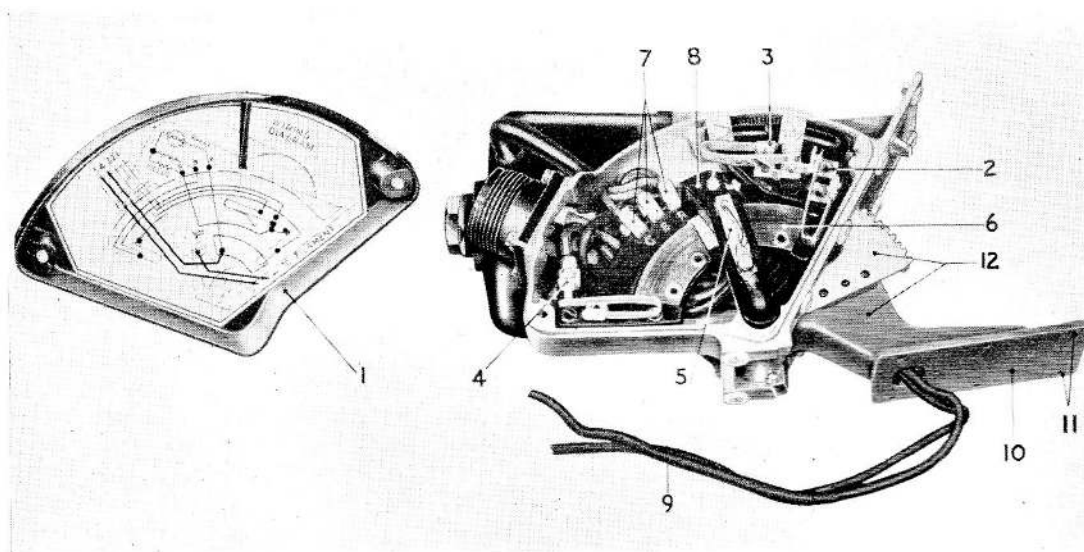
#### OPERATION

6. When the aircraft switch is operated to extend the lamp, d.c. is applied to the EXTEND winding of the motor via terminal 2 or 3, depending on the type of lamp used,



- |                           |                            |                       |
|---------------------------|----------------------------|-----------------------|
| 1 MOTOR                   | 7 MECHANICAL STOP          | 12 CLUTCH ASSEMBLY    |
| 2 ELECTRO-MAGNETIC BRAKE  | 8 FINAL SHAFT GRUB SCREW   | 13 WORM DRIVE         |
| 3 GEARBOX COVER           | 9 GEARBOX                  | 14 CLUTCH LOCK-NUT    |
| 4 SCREW FOR GEARBOX COVER | 10 BEARING LOCK-NUT        | 15 MOTOR FIXING SCREW |
| 5 CLUTCH SHAFT SHIM       | 11 INTERMEDIATE GEAR WHEEL | 16 GRUB SCREW         |
| 6 LAMP PLATFORM           |                            |                       |

Fig. 1. Gearbox with cover removed



- |  |                                    |  |
|--|------------------------------------|--|
| 1 SWITCH MECHANISM COVER               | 4 LIMIT SWITCH, RETRACTED POSITION | 9 FILAMENT LAMP LEADS                                |
| 2 LIMIT SWITCH, HIGH EXTENDED POSITION | 5 FILAMENT LEAD                    | 10 LAMP PLATFORM                                     |
| 3 LIMIT SWITCH, LOW EXTENDED POSITION  | 6 FILAMENT CONTACT                 | 11 OUTER HOLES, TO WHICH TESTING WEIGHT IS SUSPENDED |
|  | 7 MOTOR LEAD TERMINALS             | 12 MOVING ARM AND SECTOR                             |
|  | 8 SWITCH OPERATING ARM             |  |

Fig. 2. Switch mechanism with cover removed

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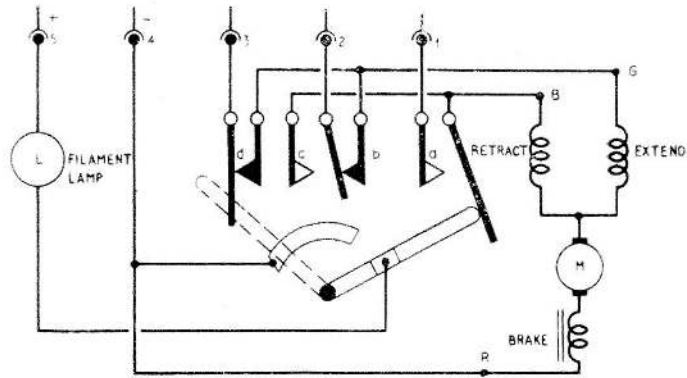


Fig. 3. Circuit diagram

and contact "b" or "d" in the switch mechanism. The motor brake is automatically lifted and the motor rotates to extend the lamp. At the same time the switch arm is caused to travel from the position shown towards the dotted position. This causes contact "a" to close (which has no effect, since no potential is applied to terminal 1), and the switch arm makes contact with the switch mechanism quadrant plate, thereby lighting the filament lamp. At the end of its travel the arm causes contact "b" or "d" to open, according to the position selected, and this switches off the motor and applies the automatic brake. The lamp is thus left in the extended position with the light switched on.

7. To retract the lamp, the aircraft switch is placed in the RETRACT position. This removes the supply from terminal 2 or 3 and applies it to terminal 1 and the now closed contact "a" to energize the motor

RETRACT winding. The ensuing operation is then in reverse of that described in para. 6.

#### INSTALLATION

8. The operation unit is secured to the outer housing of the landing lamp by the mounting holes on the side of the gearbox. The lamp platform is attached to the inner lamp casing, which carries the filament lamp and reflector, so that operation of the moving arm and sector extends and retracts the landing lamp.

9. Electrical connection to the motor and switch mechanism is made by a 5-pole plug. Two leads are provided on the operating unit for connection to the filament lamp.

#### SERVICING

10. This operating unit is regarded as a rotary actuator, general servicing instructions for which will be found in A.P.4343, Vol. 1, Sect. 17.

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