

ROYAL CANADIAN AIR FORCE



HANDBOOK WITH PART LIST
LANDING LIGHTS
ELECTRICALLY RETRACTABLE
TYPES AN3095-1-2-3

ISSUED ON AUTHORITY OF THE CHIEF OF THE AIR STAFF

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LIST OF RCAF REVISIONS

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Technical Order. All references
to USAF Tool and /or part numbers
may be referred to CAP 10".

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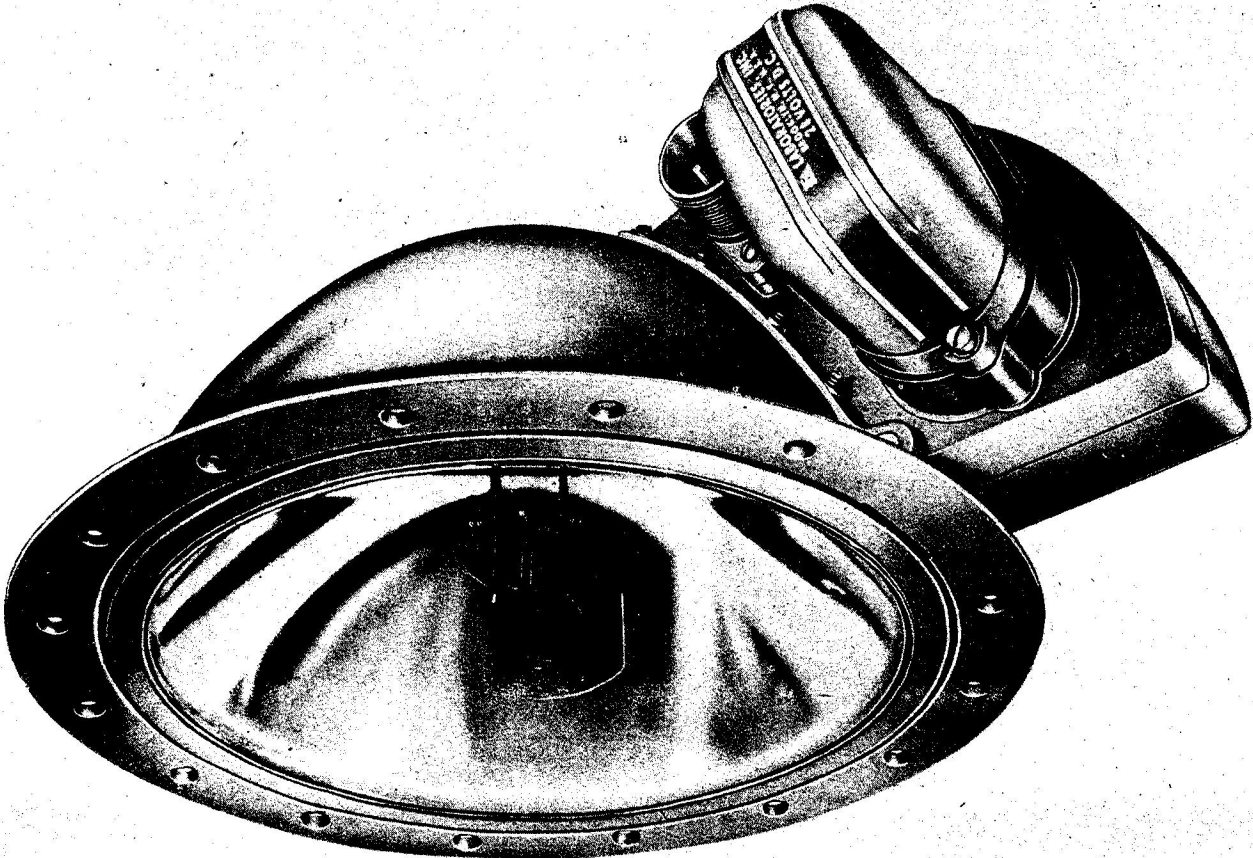


Figure 1—Electrically Retractable Landing Light

SECTION I INTRODUCTION

1. This Handbook is issued as the basic general instructions for the equipment involved.
2. This Handbook contains a parts catalog and data for the installation, maintenance, and overhaul of the

AN 3095 Electrically Retractable Landing Light manufactured in accordance with Specification MIL-L-8346A by E. A. Laboratories, Inc., Brooklyn, N. Y.

SECTION II DESCRIPTION

1. GENERAL.

(See figures 1 and 2.)

a. The AN 3095 landing light is intended for use on aircraft equipped with a ground return system and a 12 to 16-volt or 24 to 28-volt dc power supply. It is made in three types as follows:

- AN 3095-1—250 watts—for use on 12 to 16 volts dc
- AN 3095-2—250 watts—for use on 24 to 28 volts dc
- AN 3095-3—600 watts—for use on 24 to 28 volts dc

b. The landing light is to be installed inside the wing, flush with the lower surface. It may be extended, retracted, or stopped at any intermediate position by means of an electric motor which is part of the light and is controlled from a switch in the pilot's compartment.

c. Limit switches are provided which automatically open the motor circuit to start the motor when the light is fully extended or retracted. A switch is provided in the lamp circuit which automatically closes the circuit when the light is extended beyond 10 degrees from the fully retracted position and opens the circuit when the light is retracted above the 10 degree position.

d. The fully extended operating position can be varied for each installation by means of simple adjustments of the mechanism.

2. DETAILED.

(See figure 2.)

The landing light is composed of two main sub-assemblies; the inner shell and lamp assembly (3) and the outer shell assembly (5). These are hinged together by a shaft (2). Attached to the inner shell and lamp assembly is a gear segment (4) which is driven through gears by a motor (1) on the outer shell assembly to extend and

retract the inner shell and lamp assembly.

a. INNER SHELL AND LAMP ASSEMBLY.

(See figure 3.)

An 8-inch diameter, all glass reflector, clear landing lamp bulb (1) is secured into the inner shell by a retaining ring (2). Wire leads are attached to each of its two terminals. One is grounded to the inner shell; the other passes through the gear segment (3) and connects with a brush (4) which is fastened to the gear segment. The brush maintains sliding contact with a commutator assembly mounted in the mechanism cover assembly. (See figure 4.)

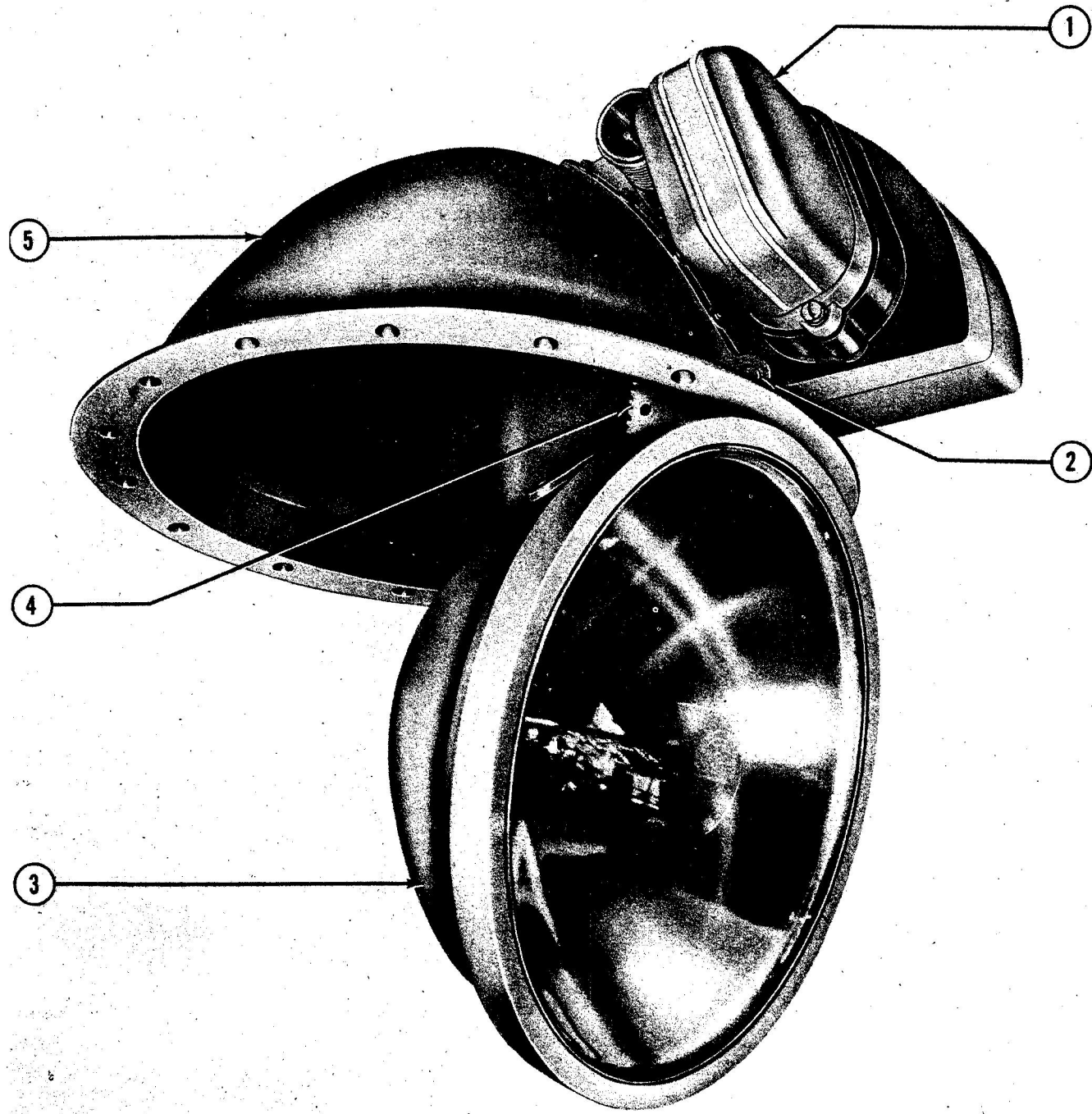
b. OUTER SHELL ASSEMBLY.

(See figure 3.)

(1) The outer shell assembly consists of a shell and mechanism (5) to which is mounted a motor and gear case assembly (6).

(2) A mechanism assembly is mounted to the outer shell and contains the limit switches and lamp switch, the receptacle (7) for connecting the landing light to the aircraft electrical system, and a spur and pinion gear assembly (8) through which the motor drives the gear segment to extend and retract the lamp.

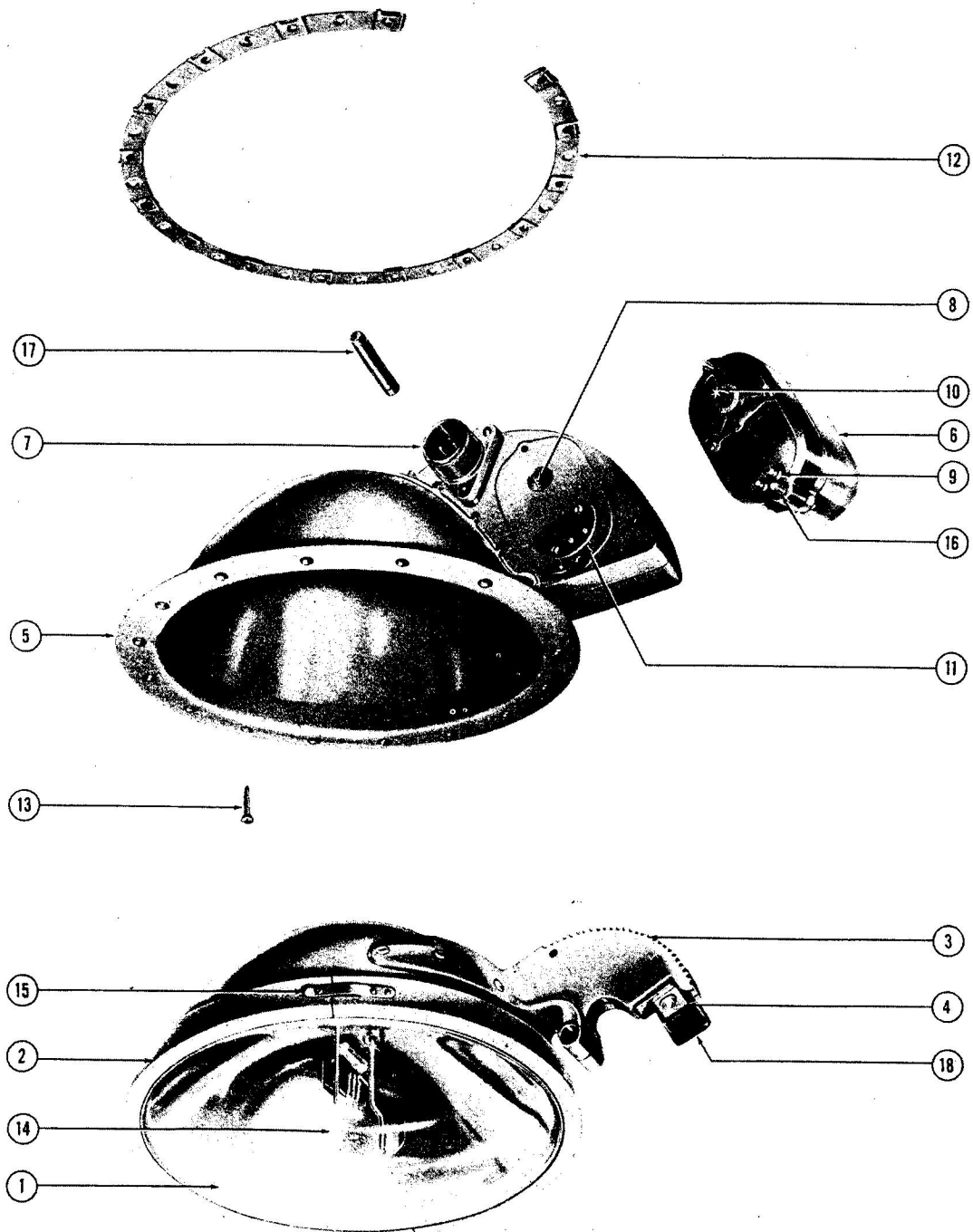
(3) Projecting from the motor and gear case assembly are two contact pins (9) and a driving gear (10). The contact pins make electrical connection, through a contact plate (11) on the mechanism assembly, with the limit switches. The driving gear meshes with the spur and pinion gear in the mechanism assembly. A brake, operated by the motor field, is built into the motor and stops it quickly when the electrical circuit to the motor is opened.



1. Motor
2. Shaft

3. Inner Shell and Lamp Assembly
4. Gear Segment
5. Outer Shell and Mechanism Assembly

Figure 2—Landing Light—Fully Extended



1. Lamp Bulb
2. Retaining Ring
3. Gear Segment
4. Brush
5. Shell and Mechanism
6. Motor and Gear Assembly
7. Receptacle
8. Spur and Pinion Assembly
9. Contact Pins

10. Driving Gear
11. Contact Plate
12. Nut Ring Assembly
13. Nut Ring Screws
14. Filament Shield
15. Spring Latch
16. Motor Screws
17. Shaft
18. Brush Holder Insulator

Figure 3—Main Assemblies of Landing Light

3. ELECTRICAL CIRCUITS.

(See figures 4 and 5.)

a. A ground return is used for the electrical circuits. An electrical receptacle (7, figure 3), in accordance with Specification MIL-C-5015, drawing No. AND 10066-18-5P, is affixed to the mechanism. The three contacts are connected as follows within the light assembly:

- Terminal "A"—Motor, retract
- Terminal "B"—Motor, extend
- Terminal "C"—lamp, positive terminal

b. By a switch in his compartment the pilot may close the circuit to either terminal "A" or terminal "B", but never to both at the same time.

c. Terminal "A" is connected with the motor retract switch, and through the motor to ground. When the cir-

cuit is closed through the motor retract switch, the light is retracted.

d. Terminal "B" is connected with the motor extend switch, and through the motor to ground. When the circuit is closed through the motor extend switch, the light is extended.

e. Terminal "C" is connected to the light contact on the cover assembly, and also to the light switch. The latter is connected to the switch contact on the cover assembly. The light contact and switch contact are both mounted on an insulating mounting plate, and this assembly is called the commutator assembly.

f. The brush assembly moves with the gear segment and slides along the commutator assembly and always makes connection with it. From the brush assembly the circuit goes through the lamp bulb to the ground.

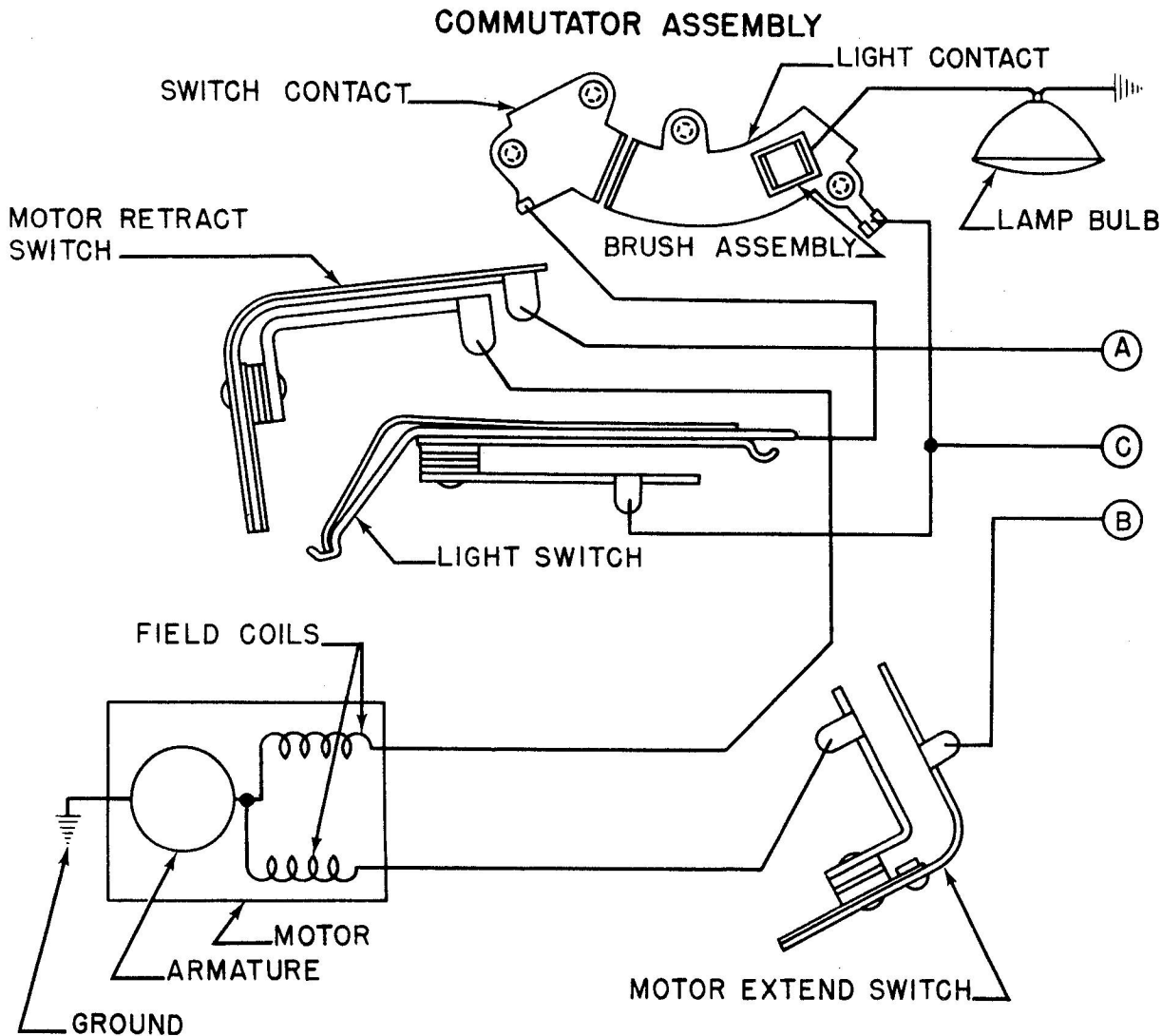
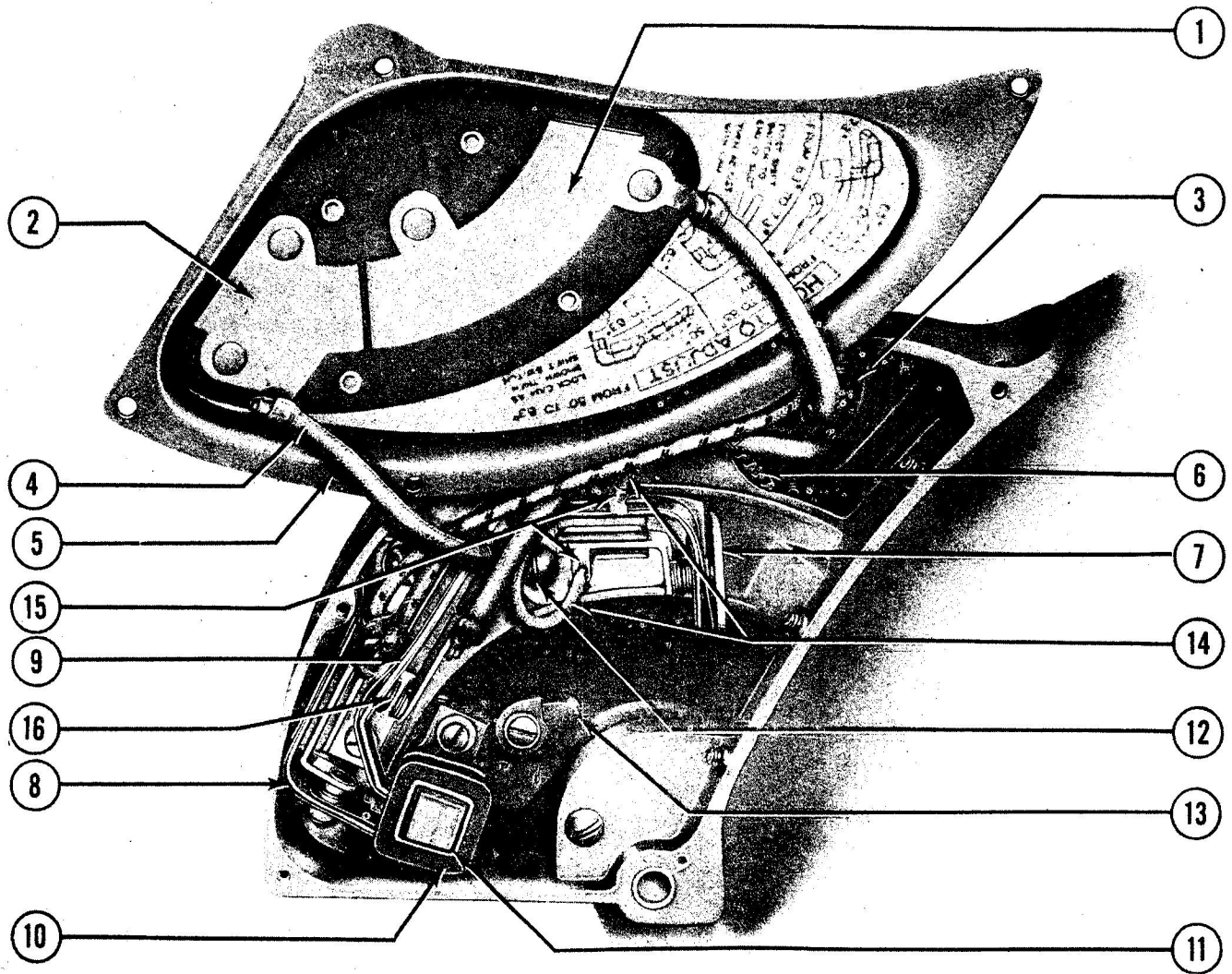


Figure 4—Schematic Wiring Diagram



1. Light Contact
2. Switch Contact
3. Receptacle
4. Cover Leads
5. Cover Assembly
6. Spur and Pinion Gear
7. Motor Extend Switch
8. Motor Retract Switch

9. Light Switch
10. Brush Assembly
11. Brush Holder
12. Screw
13. Adjustment Lever
14. Switch Leads
15. Switch Terminals
16. Switch Contact

Figure 5—View of Mechanism Assembly

SECTION III INSTALLATION

1. GENERAL.

a. The AN 3095 landing light is intended for use on aircraft equipped with a ground return system and 12 to 16-volt or 24 to 28-volt dc power supply. It is made in three types, as follows:

AN 3095-1—250 watts—for use on 12 to 16 volts dc

AN 3095-2—250 watts—for use on 24 to 28 volts dc

AN 3095-3—600 watts—for use on 24 to 28 volts dc

b. It is intended for flush installation with the lower surfaces of the wing. A nut ring assembly (12, figure 3) and screws (13, figure 3) are provided to fasten it to this surface.

c. There is a semi-circular filament shield (14, figure 3) alongside the filament in the lamp bulb. When fastening the light to the wing, be sure shield is towards pilot, that is, inboard.

2. ADJUSTMENT FOR MAXIMUM OPENING.

(See figure 6.)

CAUTION

The motor retract switch has been set in position at the factory and this setting must not be disturbed. All switches have been tested at the factory for proper tension between contact points. Do not attempt to make any adjustments by bending any of the switch blades.

a. The maximum open position of the light assembly is adjustable from 50 to 85 degrees from the fully retracted position. A simplified version of this figure is attached inside the cover assembly. (See figure 5.)

b. At the factory the adjustment is set for about 73 degrees. (A, figure 6.) The adjustment lever (1) is turned so as not to strike the motor extend switch (2). The motor extend switch is fastened in its most forward position and is opened by the brush holder (3). To increase up to 85 degrees, loosen slightly the single screw (4) which holds the motor extend switch in place and slide the motor extend switch away from the brush holder to the position which gives the desired adjustment.

c. From 73 degrees to about 63 degrees (B, figure 6), move the motor extend switch to the extreme position away from the brush holder and turn the adjustment lever up till it strikes the motor extend switch when the gear segment moves. By changing its angle of strike, an adjustment range from 63 to 73 degrees is obtained.

d. From 63 to about 50 degrees (C, figure 6), the motor extend switch should be in its extreme position toward the brush holder; then move the adjustment lever up till it strikes the motor extend switch when the gear segment moves. By changing its angle of strike, an adjustment range from 50 to 63 degrees is obtained.

SECTION IV OPERATION

1. PRINCIPLES OF OPERATION.

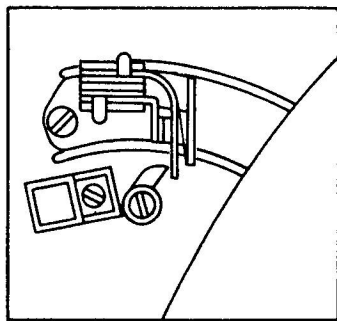
(See figure 5.)

a. In the retracted position, the brush holder (11) holds open the light switch (9) and the motor retract switch (8). To extend the light, the pilot switches the circuit through the motor extend switch (7). As the light extends, the motor retract switch closes, but does not pass current because of the switch in the pilot's compartment. Then, at 10 degrees from the retracted position, the light switch closes and the light goes on.

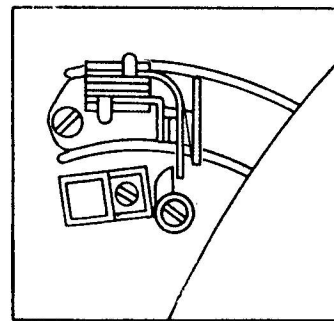
b. When the light extends to the adjusted position for

maximum opening, the brush holder or the adjustment lever (13) hits the motor extend switch and brings the light to a stop. (Section III, paragraph 2.)

c. To retract the light, the pilot switches the circuit through the motor retract switch whose contacts are now closed. As the light retracts, the motor extend switch closes but does not pass current because of the pilot's switch. When the light retracts to the 10 degree position, the brush holder opens the light switch and the light goes off. As it retracts further, the brush holder pushes open the motor retract switch and the motor stops with the light in the fully retracted position.

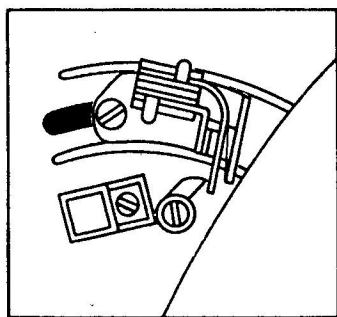


50 DEGREES

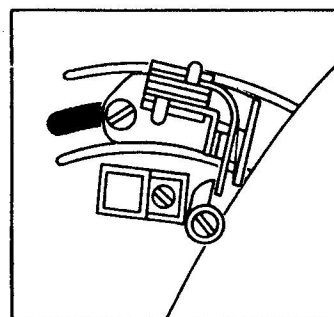


63 DEGREES

C-FROM 50 DEGREES TO 63 DEGREES

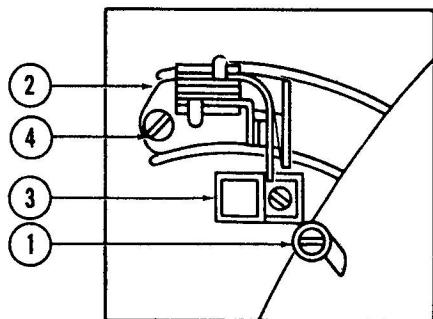


63 DEGREES

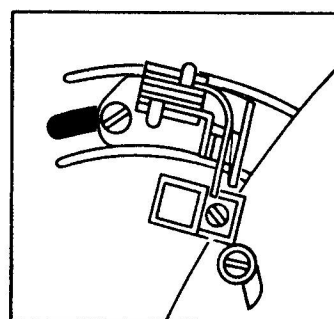


73 DEGREES

B-FROM 63 DEGREES TO 73 DEGREES



73 DEGREES



85 DEGREES

A-FROM 73 DEGREES TO 85 DEGREES

- 1. Adjustment Lever
- 2. Motor Extend Switch

- 3. Brush Holder
- 4. Screw

Figure 6—Adjustments for Maximum Open Position

2. OPERATION INSTRUCTIONS.

The landing light assembly is operated from the pilot's compartment by means of a switch located there. By using

the switch the lamp may be fully extended, fully retracted, or stopped at any intermediate position. However, the light will not be on for any position less than 10 degrees from fully retracted.

SECTION V
SERVICE INSPECTION, MAINTENANCE, AND LUBRICATION

1. SERVICE TOOLS REQUIRED.

No special service tools are required.

2. MAINTENANCE.

When this light assembly does not operate properly, it should be removed for repair and replaced by a new light assembly. Remove 15 screws and nut ring assembly that fasten the light to the plane and remove the lights for repair.

3. LUBRICATION.

No lubrication is required. If, however, it should be necessary to lubricate because of disassembly or other reasons, proceed as follows:

- a. For gear case, use low temperature lubricating grease, Specification 3-GP-683a; about one to two teaspoonfuls should be used, enough to cover the gears.
- b. Shaft wick and spur and pinion gear wick should be saturated with Specification 3-GP-335a oil.
- c. Apply some grease, Specification 3-GP-683a, to teeth of gear segment and on spur and pinion gear.

4. SERVICE TROUBLES AND REMEDIES.

<i>Trouble</i>	<i>Probable Cause</i>	<i>Remedy</i>
LAMP DOES NOT LIGHT	Lamp bulb failed. Light switch defective. Loose connection in lamp circuit.	Test and replace. Refer to section VI, paragraph 3.d.(1). Test and replace. Refer to section VI, paragraph 3.d.(4)(b). Check through lamp circuit including the receptacle and plug to find open circuit or loose connection. (See figures 4 and 5.) Try separate source of rated voltage at receptacle to check against failure in cable going to pilot's compartment.
LIGHT DOES NOT EXTEND OR RETRACT	One or both motor switches have failed. Motor has failed. Loose connection in motor circuit.	If motor operates in one direction only, the motor switch controlling the other direction has probably failed. Refer to section VI, paragraph 3.d.(4)(b). Test as discussed in section VI, paragraph 3.d.(4). Check through motor circuit including the receptacle and plug to find open circuit or loose connection. (See figures 4 and 5.) Try separate source of rated voltage at receptacle to check against failure in cable going to pilot's compartment.
OVERTRAVEL, LIGHT ASSEMBLY IS NOT BRAKED TO A QUICK STOP	Brake worn out.	Replace motor and gear case.

SECTION VI

DISASSEMBLY, INSPECTION, REPAIR, AND REASSEMBLY

1. OVERHAUL TOOLS REQUIRED.

No special overhaul tools are required.

2. DISASSEMBLY.

There is no need for a complete overhaul of this light assembly. Instead, as a part or subassembly becomes defective, it should be removed and replaced as instructed in the following paragraphs.

3. CLEANING, INSPECTION, TESTING, AND REPAIR.

a. CLEANING.—General cleaning is not required. Cleaning of switches is discussed in paragraph (4) (d) of this section.

b. INSPECTION.—General inspection is not required. As parts are repaired, inspection is made as discussed in paragraph 4, this section.

c. TESTING.—Operate the landing light at the rated voltage. It should extend, retract, and stop at an intermediate position as desired.

d. REPAIR.

(1) **LAMP BULB.** (*See figure 3.*)—Check for failure of lamp bulb (1) by applying the rated voltage, directly across the light contact in the cover assembly (1, figure 5) and to ground. If light does not go on, remove lamp bulb and check directly across lamp bulb terminals before replacing with a new bulb. To remove the lamp bulb, unfasten the retaining ring (2) by means of the spring latch (15) on its rim. When replacing bulb, be sure filament shield (14) is properly located. (Refer to section III, paragraph 1.c.)

(2) **MOTOR AND GEAR CASE ASSEMBLY.**

(*See figure 3.*)

(a) If inner shell retracts more than 1/16 inch below flush, replace the motor and gear case (6). Remove the two screws (16), one on each side of the motor, to dismount the motor and gear case, and mount the new motor and gear case with the two screws.

(b) If the light does not operate to extend or retract, remove the motor and gear case and test by applying the rated dc voltage across the motor frame and first one contact pin (9) and then the other contact pin. Motor should operate and reverse when changing from one contact pin to the other. If motor and gear case assembly does not operate satisfactorily, it should be replaced by a new motor and gear case assembly.

(c) If it is necessary to add grease to gears, use

grease, Specification 3-GP-683a.

(3) **COVER ASSEMBLY.** (*See figure 5.*)—Remove the screws which fasten the cover. Unsolder the two leads (4) from the old cover and resolder to the new cover. Then assemble the cover with the fastening screws.

(4) **SWITCHES.** (*See figure 5.*)

(a) To test any of the switches, apply 24 to 28 volts dc in series with a small 24 to 28-volts bulb across the closed switch contact (16). The bulb should burn brightly and without flickering. If it does not, the switch should be replaced. It is possible that the points are not making contact. *In an emergency*, the contact arms may be bent so as to contact the points. Clean the points with carbon tetrachloride, CGSB Specification No. O-C-141(4), or other suitable cleaner. Then check retraction and extension to be sure adjustments are correct.

(b) To replace, extend the inner shell to the fully open position. If the motor extend switch (7) is not operating at all, short across the switch terminals (15) so that the motor will operate to extend the light.

CAUTION

The motor extend switch controls the extending of the light. If it is not operating to stop the motor automatically, be careful not to go beyond the fully extended position. To do so would cause damage.

(c) Unsolder the leads (14) from the switch being replaced. For the motor extend switch (7), have a new motor extend switch ready before dismounting the old one. Insert a finger to hold the nut in place while removing the screw which holds this switch until assembling the new switch. Resolder the leads (14) to the new switch. (Refer to figures 4 and 5.) Then adjust for the proper maximum open position as instructed in section III, paragraph 2.

(d) When replacing the motor retract switch (8), locate the switch so that the brush holder (11) just begins to open the contacts when the inner shell assembly is 1/4 inch out from flush.

(5) **SHAFT ASSEMBLY.** (*See figure 3.*)

(a) The shaft (17) may be removed by first removing the cover and then tapping against the solid end of the shaft. Replacement shaft should be assembled with its hollow end near the cover and away from the motor. The shaft should be flush with the surface on which the cover assembles so as not to interfere with the cover fitting smoothly against this surface.

(b) Put five or six drops of SAE 20 W. or 30 W. oil on the wick at the open end of the shaft.

(6) INNER SHELL ASSEMBLY OR OUTER SHELL ASSEMBLY. (See figure 3.)

(a) Remove the cover assembly and the motor and gear case (6), and tap out the shaft. (Refer to 3.d. (5)(a), this section.) Then carefully maneuver to the open position, without using force. In some cases, especially if the outer shell (5) has been damaged, it may be necessary to use a screw driver to pry the inner shell from the outer shell. Use the screw driver diagonally opposite from the shaft hole. Remove the brush holder insulator (18) which is a push fit on the brush holder (4) and will easily come off.

(b) When fully open, pull the inner shell shaftway through the large slot in the outer shell and twist to remove the gear segment (3) and brush holder through the slot, being careful not to damage any parts.

(c) With the two main assemblies apart, either may be replaced and reassembled by reversing the above procedure. Put five or six drops of Specification 3-GP-335a oil on the wick at the open end of the shaft. Be sure to reassemble the brush holder insulator.

(7) SHELL AND MECHANISM ASSEMBLY. (See figure 3.)—Remove the inner shell assembly as instructed in paragraph 3.d.(6), this section. Remove the motor and gear case assembly (6) as discussed in paragraph 3.d.(2), this section, and reassemble it to the new shell and mechanism assembly (5). Reassemble the two main assemblies as discussed in paragraph 3.d.(6), this section.

4. REASSEMBLY.

Since there is no complete overhaul, there is no complete reassembly required. As parts are repaired or replaced, they are reassembled as discussed in paragraph 3.d., this section.

PARTS CATALOG

SECTION VII INTRODUCTION

1. This parts catalog includes a Group Assembly List of parts for the AN 3095 Retractable Landing Light.
2. The Group Assembly Parts List, section VIII, consists of a breakdown of the complete accessory into serviceable subassemblies and detailed parts. Each assembly listed is directly followed by its component parts properly identified to show their relationship to the assembly.
3. All parts listed are procurable.

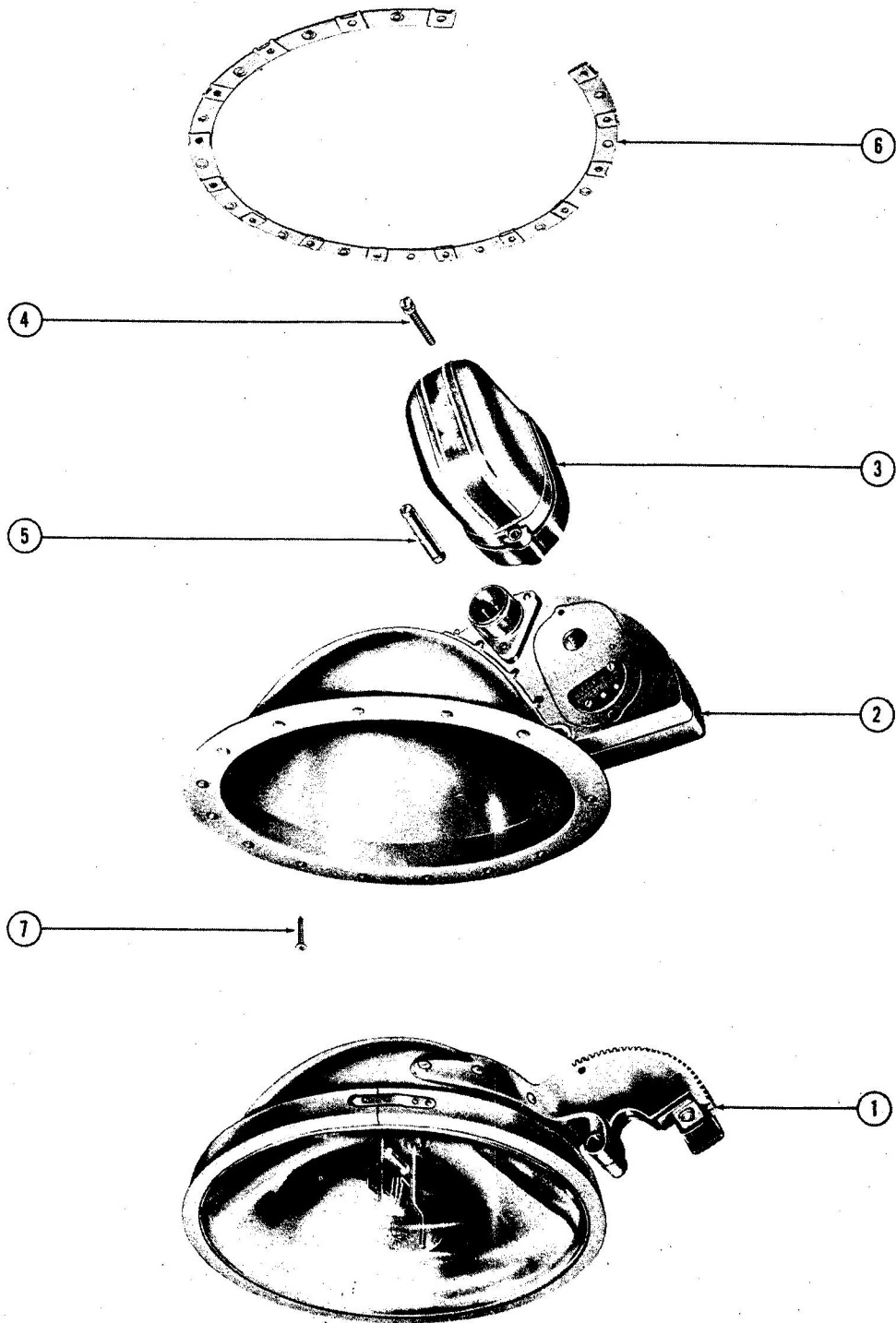


Figure 7—Exploded View of Main Assemblies

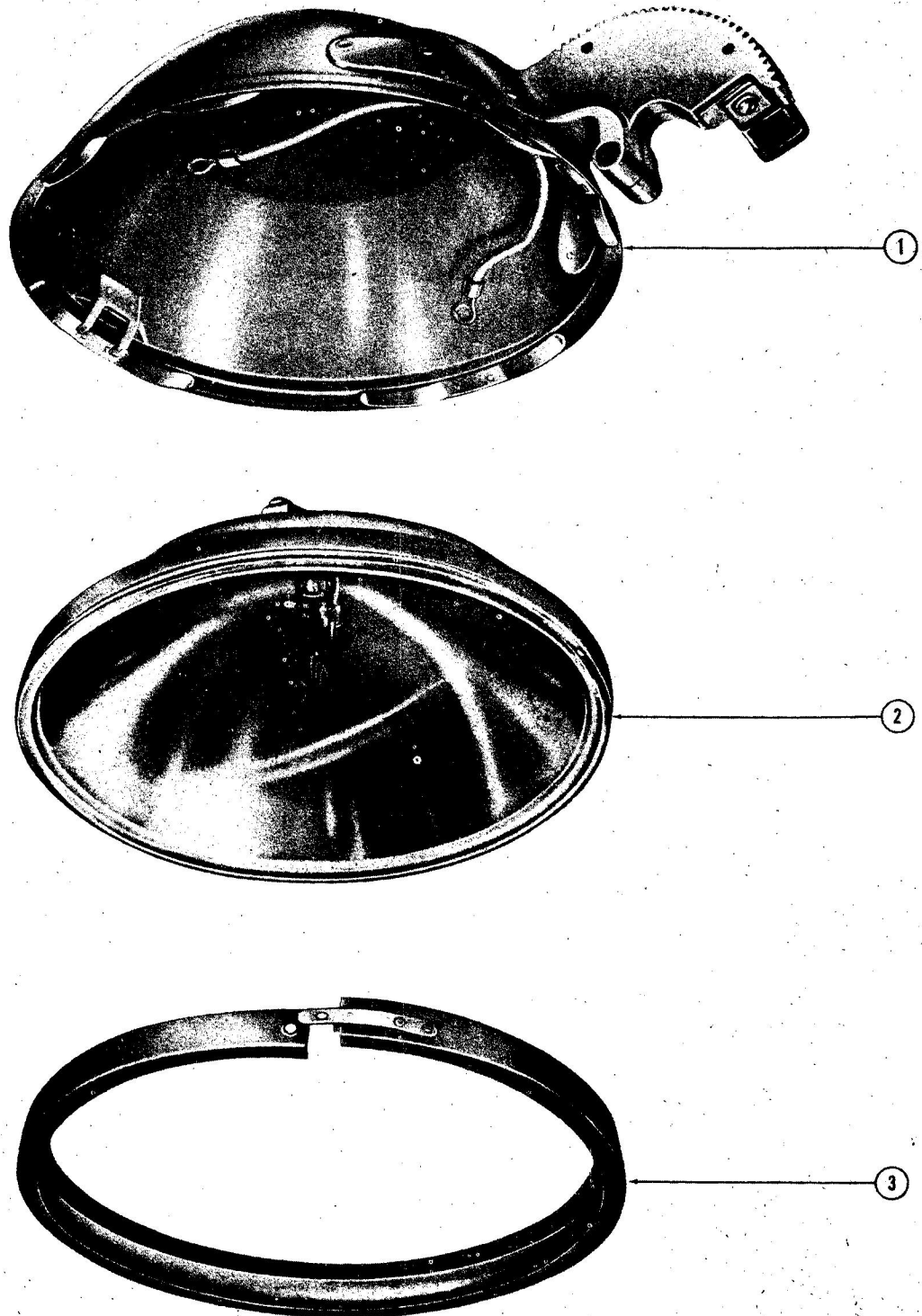


Figure 8—Exploded View of Inner Shell and Lamp Assembly

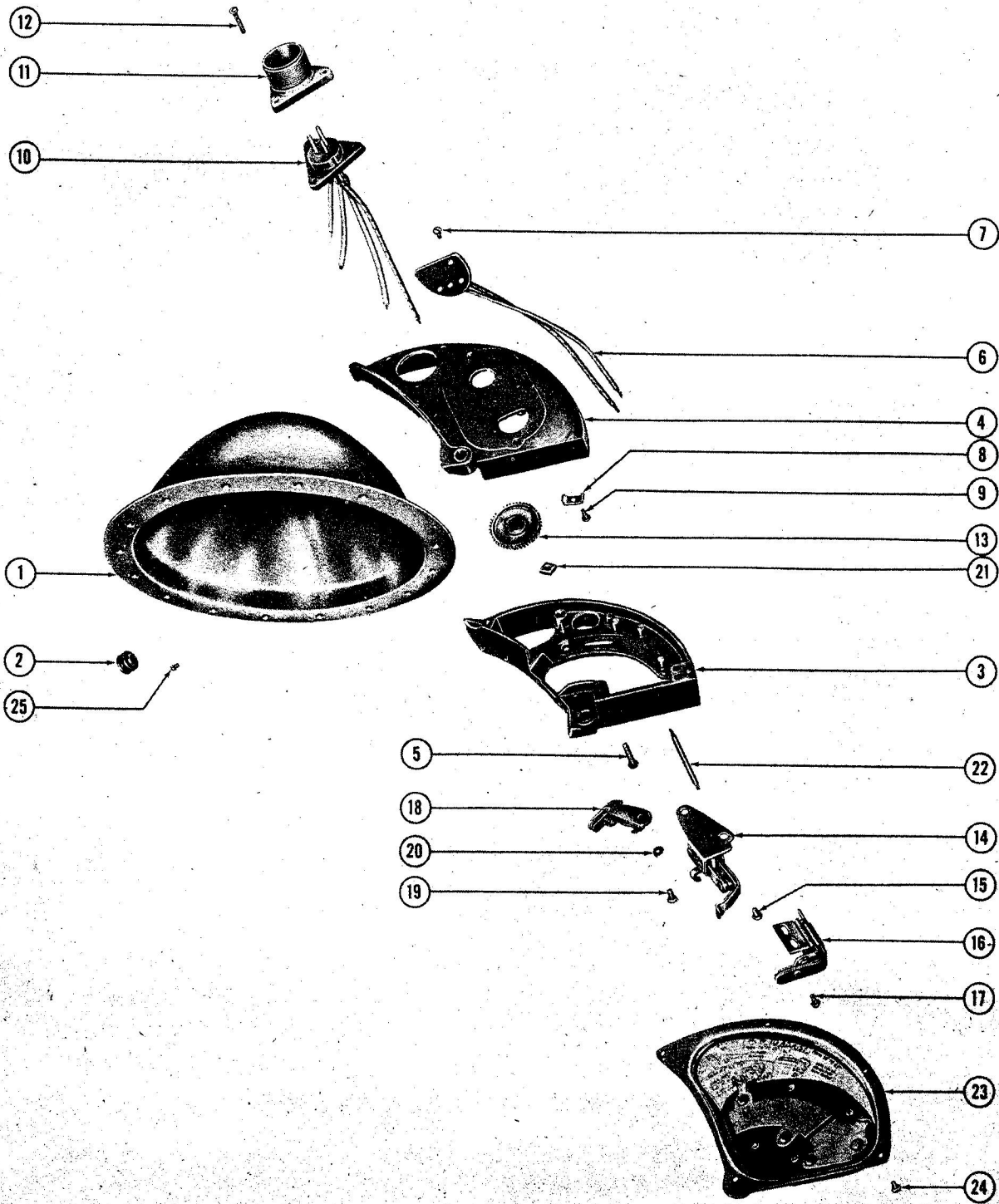


Figure 9—Exploded View of Outer Shell and Mechanism Assembly

AIRCRAFT ACCESSORIES

AN 3095 ELECTRICALLY RETRACTABLE LANDING LIGHT

Fig. No.	Index No.	Part No.	Nomenclature						Units Per Ass'y	U. S. Navy	U. S. Army	U. S. British
			1	2	3	4	5	6				
1		AN3095-1	Light—Electrically Retractable Landing, 13 v, 250 w						1			
1		AN3095-2	Light—Electrically Retractable Landing, 28 v, 250 w						1			
1		AN3095-3	Light—Electrically Retractable Landing, 28 v, 600 w						1			
7	1	3975A	Inner Shell and Lamp Assembly						1			
8	1	4046A	Shell Assembly—Inner						1			
8	2	AN3130-4561	Lamp Bulb, 13 v, 250 w						1			
8	2	AN3130-4562	Lamp Bulb, 28 v, 250 w						1			
8	2	AN3130-4580	Lamp Bulb, 28 v, 600 w						1			
8	3	4542	Ring—Lens retaining						1			
7	2	4293A	Outer Shell and Mechanism Assembly						1			
9	1	3976A	Shell—Reflector mounting						1			
9	2	3961A	Grommet—Retraction stop						1			
5		4398A	Mechanism Assembly						1			
9	3	3945A	Housing—Lamp contact						1			
9	4	3967A	Housing—Gear						1			
9	5	AN504-8-16	Screw—Self tapping						3			
9	6	4511	Plate Assembly—Contact						1			
9	7	FF440-416	Screw—Self tapping						2			
9	8	4423	Clamp—Wire						1			
9	9	AN530-6-6	Screw—Sheet metal						1			
9	10	4048	Receptacle—Insert assembly						1			
9	11	3966	Shell—Receptacle						1			
9	12	AN504-4-12	Screw—Self tapping						3			
9	13	4071	Spur and Pinion Gear Assembly						1			
9	14	4099A	Switch—Light						1			
9	15	AN504-8-4	Screw—Self tapping						2			
9	16	4562	Switch—Motor retract						1			
9	17	BF632-416	Screw—Self tapping						1			
9	18	4044	Switch—Motor open						1			
9	19	AN515-B8-5	Screw						1			
9	20	AN935-8L	Washer—Lock						1			
9	21	N832S	Nut—Square						1			
9	22	4128	Wire—Light switch						1			
9	23	4041	Cover Assembly						1			
9	24	AN504-4-4	Screw—Self tapping						5			
9	25	BF632-416	Screw—Self tapping						8			
7	3	4291A-1	Motor and Gear Case Assembly, 13 v						1			
7	3	4291A-2	Motor and Gear Case Assembly, 28 v						1			
7	4	4700	Screw and Lock Washer Assembly						2			
7	5	4397	Shaft and Wick Assembly						1			
7	6	4294	Nut Ring Assembly						1			
7	7	AN515-6-10	Screw						15			

