

**Illustrated Parts List
and
Maintenance Instructions
with Initial Installation Instructions**

FOR

FLOAT LAMP ASSEMBLY

Part No. 369D292032

USED ON HUGHES 500D (MODEL 369D) HELICOPTERS



Hughes Helicopters division of summa corporation / culver city, california

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This manual has been prepared and distributed by the Commercial Service Publications Department and is intended for use by personnel responsible for the maintenance of Hughes Helicopters. Periodic revision of this manual will be made to incorporate the latest information. If, in the opinion of the reader, any information has been omitted or requires clarification, please direct your comments to this office via this form (or a duplicate). An endeavor will be made to include such information in future revisions.

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Remarks/Recommendations -

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FOREWORD

F-1. PURPOSE AND CONTENT OF THIS MANUAL.

F-2. This manual supplements information contained in the Basic Handbook of Maintenance Instructions, Volume 1 (HMI - Vol 1) and the Illustrated Parts Catalog (269D - IPC). It contains instructions for initial installation and maintenance of the float lamp assembly, P/N 369D292032. Weight and balance data is included. This manual also contains a parts list for procuring replacement parts for the float lamp assembly.

F-3. APPLICABILITY.

F-4. The float lamp assembly is applicable to the 369D, 369HS, and 369HM helicopters.

F-5. RELATED PUBLICATIONS.

F-6. Reference is made to applicable portions of HMI - Vol 1 and 369D - IPC as required to accomplish instructions contained herein.

F-7. LITERATURE CHANGES AND REVISIONS.

F-8. Changes and revisions to the contents of this manual are made as defined in Section 1, HMI - Vol 1.

SECTION 1

ILLUSTRATED PARTS LIST

1-1. SCOPE AND CONTENTS.

1-2. This illustrated parts list provides, by means of text (parts list) and companion illustration, a complete parts definition of the 369D292032 float lamp assembly manufactured by Hughes Helicopters, Culver City, California.

NOTE

The illustrated parts list is organized and presented in the same manner as the 369D Series Illustrated Parts Catalog (369D - IPC). For information of use, refer to the 369D - IPC.

1-3. GROUP ASSEMBLY PARTS LIST.

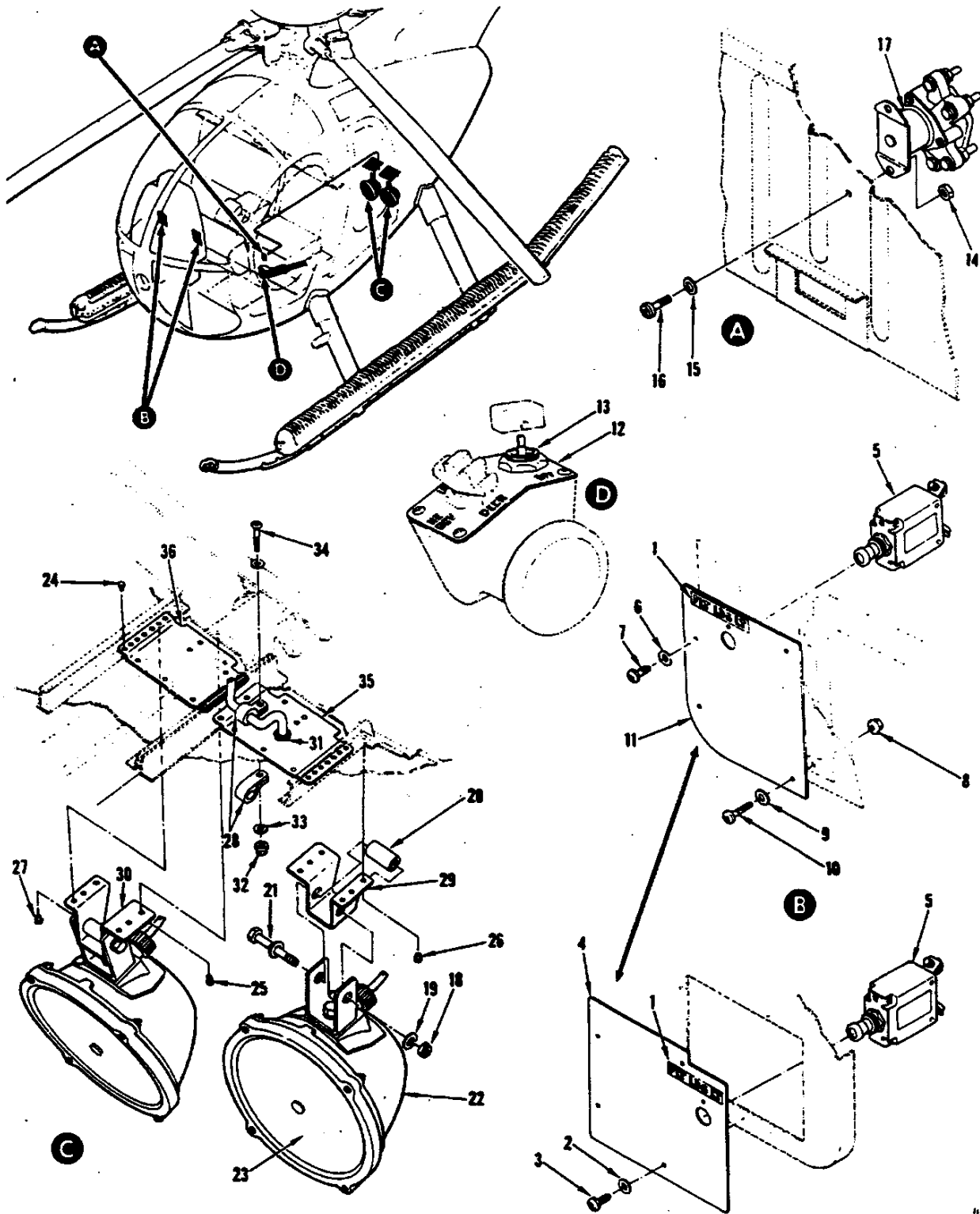
1-4. The parts list furnishes information for procuring replacement parts for the float lamp assembly and shall not be used for any other purpose.

1-5. ILLUSTRATIONS.

1-6. An isometric illustration is provided for the group assembly parts list. The illustration is exploded to the extent necessary to show parts relationship for the complete float lamp assembly.

1-7. USABLE ON CODE.

1-8. The USABLE ON CODE column located on the right-hand side of the group assembly parts list pages indicates the effectivity of parts by aircraft serial number. In many cases two different parts are listed, one representing the original installation and another representing an improved replacement item. Alphabetic codes are used to indicate the aircraft serial number applications of a given part. When no usable on code is listed, items are understood to have full effectivity.



47-986

Figure 1-1. Float lamp assembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-1-	369D292032	LAMP ASSY AND INSTL, FLOAT	1	
-1	369D2404	. DECAL	1	
-2	AN960PD6L	. WASHER	4	
-3	MS51957-27	. SCREW	4	
-4	369D292032-5	. PLATE	1	
-5	MS25244-35	. CIRCUIT BREAKER	1	
-6	AN960PD6L	. WASHER	3	
-7	MS51957-27	. SCREW	3	
-8	MS21043-08	. NUT	1	
-9	AN960PD8L	. WASHER	1	
-10	MS51957-43	. SCREW	1	
-11	369D292032-9	. PLATE (Alternate for 369D292032-5)	1	
-12	369D27308	. PLATE	1	
-13	8868K1MOD V47ZA7	. SWITCH VARISTOR	1 1	
-14	MS21043-3	. NUT	2	
-15	AN960PD10L	. WASHER	4	
-16	NAS1403-2	. SCREW	2	
-17	MS24166D	. RELAY	1	
-18	MS21042-4	. NUT	2	
-19	AN960PD416L	. WASHER	4	
-20	NAS1057T4-082	. SPACER	2	
-21	NAS1304-19	. BOLT	2	
-22	369D292032-7	. LAMP ASSY	2	
-23	369D292032-8 4580	. . LAMP HOUSING LAMP	2 2	
-24	MS20470AD3	. RIVET	AR	
-25	MS20615-3M4	. RIVET	2	
-26	MS20615-4M6	. RIVET	2	
-27	NAS1424-03	. PIN	8	
-28	MS25281-6	. CLAMP	2	
-29	369D292032-1	. BRACKET	1	
-30	369D292032-2	. BRACKET	1	
-31	NAS557-6	. GROMMET	1	
-32	MS21043-3	. NUT	1	
-33	AN960PD10L	. WASHER	2	
-34	NAS1303-7	. BOLT	1	
-35	369D292032-3	. DOUBLER	1	
-36	369D292032-4	. DOUBLER	1	

SECTION 2 MAINTENANCE INSTRUCTIONS

2-1. GENERAL.

2-2. This section provides descriptions and maintenance information for the float lamp assembly. The coverage is intended to be sufficient to cope with all problems specifically related to this equipment.

2-3. DESCRIPTION.

2-4. The float lamp assembly consists of the parts shown in figure 1-1 and listed in the illustrated parts list, Section 1 of this manual. The float lamp assembly provides a flood of light below and ahead of the helicopter so the pilot can observe and assess the suitability of a landing site without the aid of ground-based lighting. The assembly consists of two PAR 46, USASI number 4580 lamps installed at station 137.50 (see figure 2-1), relay K307 mounted on the inner side of the front panel of the pilot's seat structure lower section, FLT LDG LT circuit breaker switch (CB140) installed in the lower right or lower left corner of the instrument panel, and the LDG LT-FLOAT LT selector switch (S32) which is mounted on the pilot's collective stick.

2-5. The lamps are rigidly installed in the staggered array shown in figures 2-1 and 2-2. The left lamp is depressed 20 degrees below horizontal; the right, 40 degrees below. This arrangement provides an elliptical light pattern for a forward landing approach and for hovering. Each lamp develops 400,000 candlepower at 450 watts, 28 V dc. The approximate total spread of each beam is 13 degrees horizontally and 14 degrees vertically down to 40,000 candlepower, 10 percent of the maximum candlepower. The average life expectancy of the 4580 lamp is 10 hours.

2-6. The float lamp switch is located on the pilot's collective stick. Either the LDG LT or FLOAT LT position can be selected. The contact rating is 5 amperes, resistive load, at 28 V dc.

2-7. The FLT LDG LT circuit breaker switch (CB140), pushbutton reset type, is rated at 35 amperes. The circuit breaker switch may be located in either the lower right or lower left corner of the instrument panel.

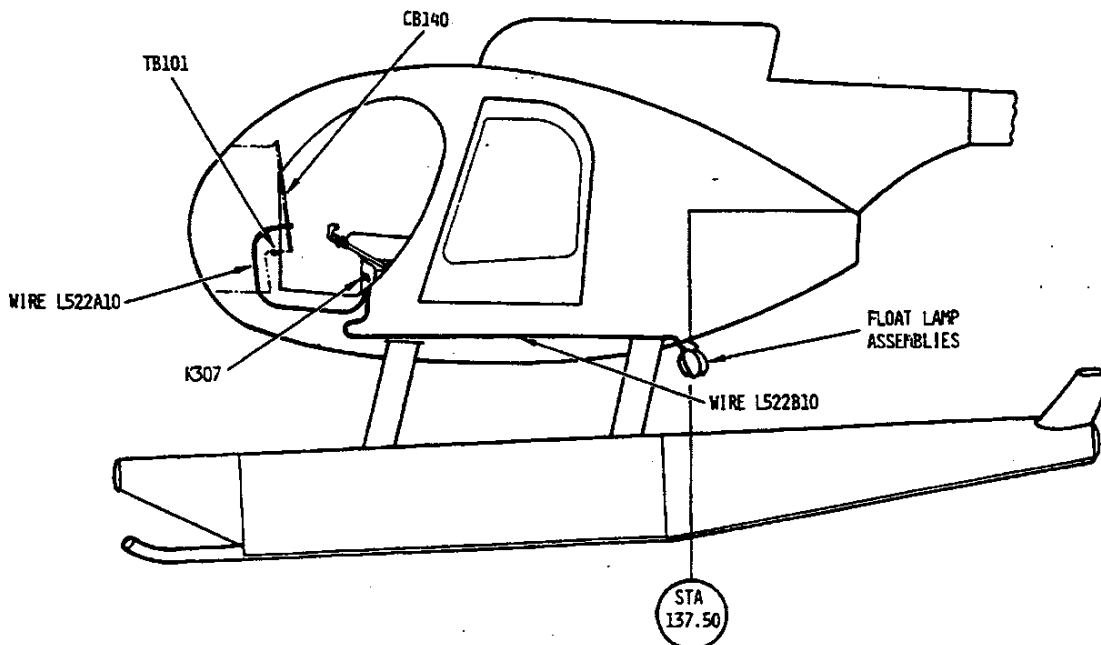
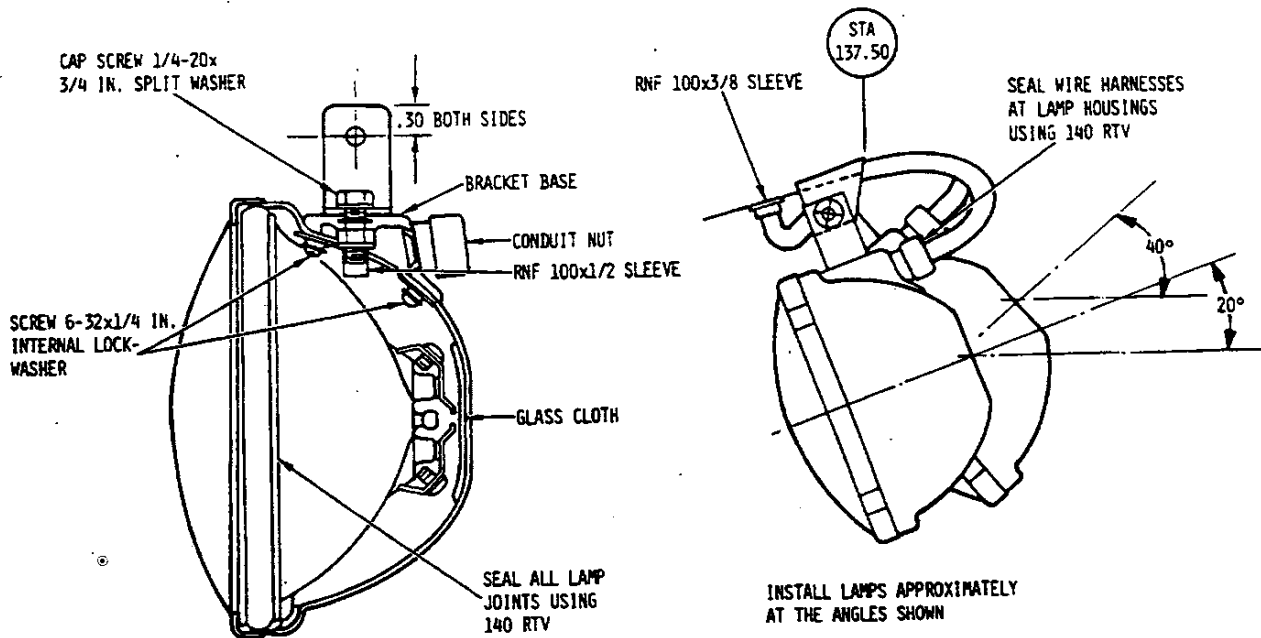


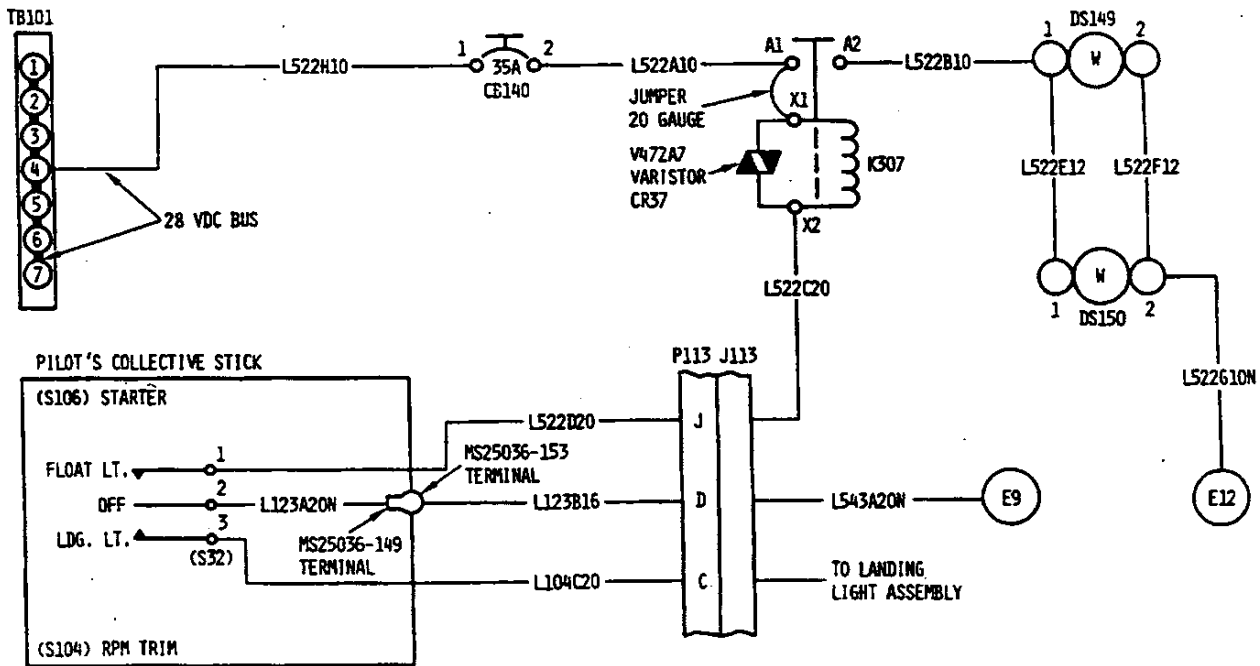
Figure 2-1. Float lamp assembly component configuration

47-1004



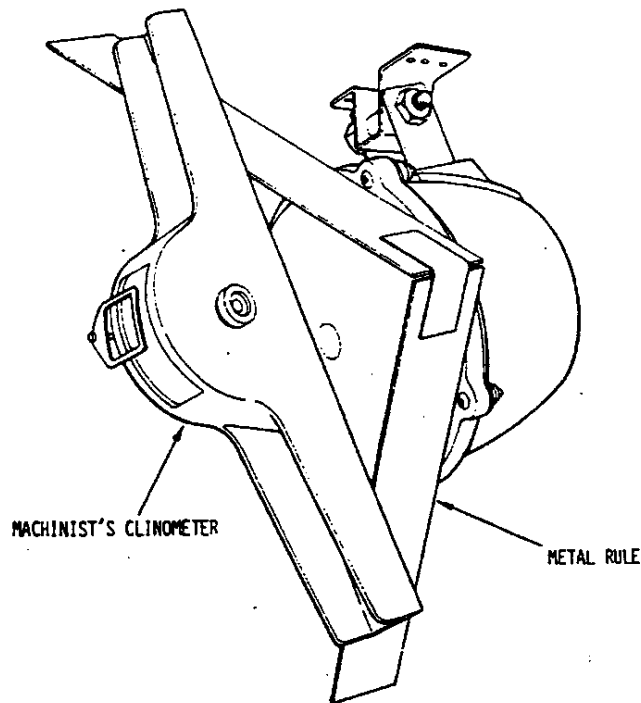
47-1005

Figure 2-2. Float lamp sealing and adjustment data



47-1006

Figure 2-3. Float lamp assembly wiring diagram



47-1014

Figure 2-4. Machinist's clinometer in position for lamp adjustment

2-8. Figure 2-3 is the wiring diagram of the float lamp assembly. Interconnecting circuit diagrams are provided in Section 20 of the basic handbook of maintenance instructions, HMI - Vol 1. When switch S32 is set to FLOAT LT, +28 V dc from terminal board TB101 passes across circuit breaker switch CB140, to terminals A and X1 and through the solenoid to terminal X2 of relay K307, through contact J of connectors J113 and P113, to terminals 1 and 2 of switch S32; back through terminal D of connectors P113 and J113 to ground at terminal E9. With relay K307 energized, +28 V dc passes from terminal A1 to the armature, to terminal A2 of the relay, to terminal 1 of each of the parallel connected lamps DS149 and DS150, through their filaments to terminal 2, then to ground at terminal E12. Use of the remote solenoid relay K307 protects the switch contacts from the high lamp current output from the terminal board and assures delivery of a maximum of current to the lamp filaments. Varistor, CR37 (fig. 2-4), prevents the relay solenoid from developing a transient overvoltage developed when switch S32 is opened.

2-9. INSPECTION.

2-10. Because of the limited average service life of the 4580 lamps (10 hours), the operator should consider maintaining a record of usage so the

lamps can be replaced before they fail. A record of operating time should be incorporated into the regular aircraft inspection log.

CAUTION

Before commencing an inspection or repair, ensure that MASTER helicopter primary power switch (S2) and LDG LT, FLOAT LT switch on pilot's collective stick are set to OFF.

1. Inspect lenses for cleanliness.
2. Inspect lenses for cracks. Replace lamp with cracked lens. Refer to paragraph 2-19.
3. Check beam angles. Left lamp: -20 degrees. Right lamp: -40 degrees.
4. Inspect seal of wire harness at lamp housing. See figure 2-2.
5. Inspect seal of lamp joints. See figure 2-2.
6. Inspect grommet at buntline -2.50 (31, fig. 1-1).

7. Inspect connection of wire L522H10 to terminal 4 of terminal board TB101.

8. Inspect wire connections to circuit breaker CB140.

9. Inspect security of circuit breaker mounting fasteners.

10. Inspect wire connections to relay K307.

11. Inspect security of relay mounting fasteners.

12. Inspect connectors J113 and P113 for security.

13. Inspect wire connections to switch S32 on pilot's collective stick.

2-11. TROUBLESHOOTING.

2-12. Table 2-1 contains symptoms, probable causes, measures required to determine causes of float lamp failures, and recommended repairs.

2-13. FUNCTIONAL TEST.

2-14. Perform the following tests after installation or maintenance of the float lamp assembly.

1. Set MASTER switch (S2) to ON.

2. Verify FLOAT LDG LT circuit breaker switch (CB140) is closed (push in).

3. Set LDG LT, FLOAT LT switch (S32) to FLOAT LT, and verify both float lamps are on.

Table 2-1. Troubleshooting - float lamp assembly

Symptom	Probable Cause	Corrective Action
Float lamps fail to come on.	MASTER switch (S2) open.	Set MASTER switch to ON.
	FLOAT LDG LT circuit breaker open.	Press and reset FLOAT LDG LT circuit breaker. If circuit breaker refuses to remain set, refer to para 2-10, step 10, and 2-37.
	FLOAT LDG LT circuit breaker defective.	Replace circuit breaker. Refer to para 2-37.
	Lamps broken or burned out.	Replace lamps. Refer to para 2-19.
	Defective LDG LT, FLOAT LT switch.	Replace switch. Refer to para 2-35.
	Defective relay.	Replace relay. Refer to para 2-31.
	Loose wire L522H10 on 4, terminal board TB101.	Tighten wire connection.
	Loose wire at terminal 1 or 2 or circuit breaker switch CB140.	Tighten wire connection.
	Loose wire at terminal A1 or A2 of relay K307.	Tighten wire connection. Refer to para 2-31.
	Loose wire L522B10 at terminal 1 of lamp DS149.	Righten wire connection. Refer to para 2-19.
Both float lamps flicker.	Loose wires at terminals indicated above.	Tighten wire connections as required. See entries above.
One or both lamps dim.	Loose wire at terminals indicated above.	Tighten wire connections as required. See entries above.

4. Set switch S32 to LDG LT, and verify landing light is on. Set switch S32 to OFF.

5. Set MASTER switch to off.

2-15. REPAIR.

2-16. Repair instructions in this section are for factory installed float lamp assemblies or for installations performed in accordance with instructions in Section 3 of this manual. Refer to table 3-1 for complete descriptions of consumable materials required to repair and replace float lamp assembly components. Always adhere to shop practices which will assure the restoration of the equipment involved to FAA certification standards.

2-17. WIRE IDENTIFICATION NUMBERS.

2-18. Before stripping wire insulation for repairs or replacements, observe wire identification numbers stamped on the insulation and sleeves. When wire insulation must be stripped back far enough to obliterate identification numbers, tag the wires carefully with their identification numbers. Figure 2-3 includes wire numbers, component reference designations, and terminal letters and numbers for all electrical components comprising the float lamp assembly. Before disconnecting wires whose identification numbers have been obliterated, determine their identification numbers by carefully observing what the wires are connected to (observe both the component reference designation and the terminal letter or number) and referring to that component and terminal in the wiring diagram. Tag the wires before disconnecting them.

2-19. LAMP REMOVAL.

2-20. See figure 1-1 and proceed as follows:

1. Verify lamp switch (13) on pilot's collective stick is set to OFF.

2. Remove four fillister-head screws (6-32 X 7/8 in.) and locknuts securing lamp retainer to lamp housing.

3. Strip 140RTV seal from lamp joint (see figure 2-2), and pull lamp out to gain access to lamp terminal screws.

4. Remove two lamp terminal screws to disconnect wires.

2-21. LAMP REPLACEMENT.

2-22. Before installing lamp, inspect interior of lamp housing (22, fig. 1-1).

1. Inspect fiberglass abrasion strip for security of attachment. Refer to table 3-1 for material descriptions.

2. Inspect RNF100X1/2 insulating sleeve on shank of cap screw (see figure 2-2) for security of attachment.

3. Verify security of attachment of cap screw and nut.

4. Verify security of attachment of bracket base.

2-23. To replace a lamp, proceed as follows:

1. Wash lamp with naphtha to remove oil, grease, or any other foreign matter, and air dry.

2. Apply coat of 140RTV around rim of lamp and over area opposite cap screw. See figure 2-2. Allow 140RTV to cure.

3. Attach wires securely with screws furnished with lamp.

4. Insert lamp into housing, and press lamp retainer into position.

5. Replace four screws and locknuts.

2-24. LAMP HOUSING REMOVAL.

2-25. Refer to figure 1-1, and proceed as follows:

1. Remove lamp. Refer to paragraph 2-19.

2. Back off conduit nut and washer (see figure 2-2).

3. Slide wires out of lamp housing (22).

4. Remove fasteners (18, 19, 20, and 21).

2-26. LAMP HOUSING REPLACEMENT.

2-27. Refer to figure 1-1, and proceed as follows:

1. Align holes in bracket (29) and lamp assembly bracket, and install fasteners (18, 19, 20, and 21). Do not tighten fasteners.

2. Insert wires through conduit nut and washer (see figure 2-2).

3. Strip old sealant from wires and from grommet inside reusable conduit.

4. Wash grease and oil off wires and grommet with naphtha, and air dry.
5. Draw sufficient length of wires through conduit to allow access to terminal screws on lamp.
6. Apply bead of 140RTV inside conduit nut and allow to cure (see figure 2-2).
7. After sealant has cured, assemble conduit nut and washer on conduit.
8. Install lamp (23). Refer to paragraph 2-21.

NOTE

An alternate method of lamp adjustment is to remove the lamp (refer to paragraph 2-19) to eliminate the convex surface, and simply apply the clinometer vertically across the open face of the lamp housing.

2-28. LAMP ASSEMBLY ADJUSTMENT.

2-29. The left and right float lamp assemblies must be adjusted for a beam angle of 20 degrees and 40 degrees, respectively, below horizontal. Normally, the helicopter has a nose-up attitude while standing. The amount of inclination must be measured, with a machinist's clinometer or other suitable instrument, so this factor of inclination can be compensated for when setting the lamp beam angles. The measured angle of inclination will be a positive number. The desired angles of the lamp beams are negative numbers: -20° and -40° . To calculate the resultant angles at which the lamps must be set, simply apply the principle for the addition of signed numbers.

Example: Assume helicopter inclination is $+10^\circ$
 $-20^\circ + 10^\circ = -10^\circ$ left lamp resultant angle
 $-40^\circ + 10^\circ = -30^\circ$ right lamp resultant angle

NOTE

One convenient point for measuring the helicopter inclination is the passenger compartment floor.

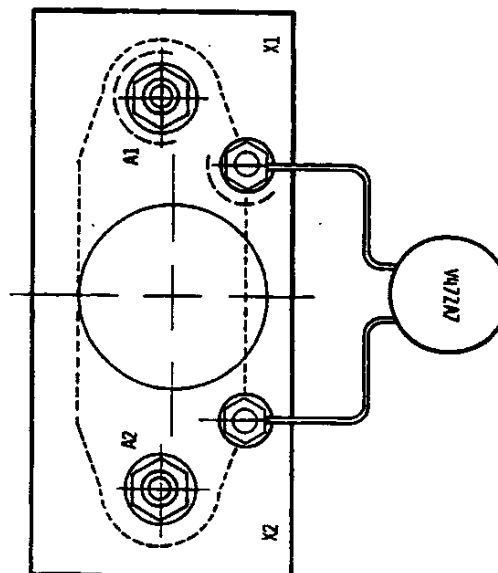
2-30. Because the 4580 lamp lens is convex, a method must be improvised for achieving a flat surface for the clinometer. One inexpensive method is as follows:

1. Tape together one end of two six-inch, or longer, metal rules which are exactly the same width. See figure 2-4.
2. Apply rules across lamp retainer, as shown, so clinometer can be placed vertically over lens.
3. Apply clinometer vertically across rules, and adjust lamp to proper computed angle.
4. Tighten fasteners (18, 19, 20, and 21, figure 1-1), and recheck lamp angle.

2-31. FLOAT LAMP RELAY REMOVAL.

2-32. The float lamp relay (K307) is mounted on the rear of the front panel of the pilot's seat structure lower section. Refer to figure 1-1, and proceed as follows:

1. Verify MASTER switch (S2) is set to OFF.
2. Remove passenger compartment left side foot support fairing.
3. Remove two MS35650-306T nuts, MS35338-100 lockwashers, and AN961-1 washers from terminals A1 and A2, and disconnect wires.
4. Remove two MS35649-265T nuts, MS35338-98 lockwashers, and AN961-6 washers from terminals X1 and X2, disconnect wires, and remove varistor (CR37). See figure 2-5.
5. Remove fasteners (14, 15, and 16) to dismount relay.



47-1007

Figure 2-5. Varistor installation configuration

2-33. FLOAT LAMP RELAY REPLACEMENT.

2-34. Before installing a new varistor, attach MS25036-102 terminals as follows:

1. Wash varistor leads clean with naphtha, and air dry.
2. Spread leads apart to match relay terminals X1 and X2, and clip any excess. See figure 2-5.
3. Install and crimp MS25036-102 terminals using MIL-C-22520/5-01 tooling with MIL-C-22520/5-100 dies.
4. Clean panel area with naphtha, and air dry.
5. Repaint panel area as required. Use acrylic lacquer primer, color green to match Fed. Std. 595, number 34151.
6. Install relay (17, fig. 1-1) using fasteners (14, 15, and 16).

7. Attach wire L522A10 to terminal A1, and attach one end of 20-gauge jumper to terminal A1, attach wire L522B10 to terminal A2, and secure with AN961-1 washer, MS35338-100 lockwashers, and MS35650-306T nuts.

8. Attach opposite end of 20-gauge jumper wire to terminal X1, attach wire L522C20 to terminal X2, attach varistor to terminals X1 and X2, and secure with AN961-6 washers, MS35338-98 lockwashers, and MS35649-265T nuts.

9. Perform functional test. Refer to paragraph 2-13.

2-35. FLOAT LAMP SWITCH REMOVAL.

1. Set MASTER switch (S2) to OFF.
2. Remove four NAS600-3 screws and AN936A4 washers from plate (12, fig. 1-1), and pull plate and switches away from collective stick switch housing assembly.
3. Unsolder three wires from switch (13) terminals.
4. Loosen NAS1081D04-2 setscrew from 369A4215 landing light switch knob, and remove knob.
5. Remove bushing nut and lockwasher from switch, and remove switch from plate.

2-36. FLOAT LAMP SWITCH REPLACEMENT.

1. Remove one bushing nut, lockwasher, and locking ring from new switch (13, fig. 1-1). Discard locking ring.

2. Tighten bottom bushing nut all the way down, then install lockwasher.

3. Insert bushing of switch through hole in plate (12). Be sure to engage tab on plate with keyway on switch bushing.

4. Install lockwasher and nut on bushing, and tighten.

5. Clean ends of wires with naphtha, and air dry thoroughly.

6. Slip new number 12 tubing (MIL-I-631, type F, form U) over ends of wires.

7. Solder wire number L522D20 to switch terminal 1.

8. Solder wire number L123A20N to switch terminal 2.

9. Solder wire number L104C20 to switch terminal 3.

10. Slip insulating sleeving into position.

11. Reinstall plate (12) and switch assembly on collective stick switch housing assembly with four NAS600-3 screws and AN936A4 washers.

12. Reinstall 369A4215 landing light switch knob, and tighten NAS1081D04-2 setscrew.

13. Perform functional test. Refer to paragraph 2-13.

2-37. FLOAT LAMP CIRCUIT BREAKER SWITCH REMOVAL.

2-38. The FLT LDG LT circuit breaker switch (CB140) may be located in the lower left or lower right corner of the instrument panel. Installation in the lower left corner requires use of Collins RCR650 radio receiver forward bracket, 369D24216, and plate 369D292032-9. For installation of CB140 in the lower right corner, only plate 369D292032-5 is required. To remove CB140, proceed as follows:

1. Set MASTER switch (S2) to OFF.
2. Remove two terminal screws (MS35206-241) and lockwashers (MS35338-42), and remove two wires.

3. Remove bushing nut (MS25082B8) and lockwasher (AN936A716S).

4. Draw CB140 rearward from instrument panel.

2-39. FLOAT LAMP CIRCUIT BREAKER SWITCH REPLACEMENT.

2-40. Proceed as follows to install FLT LDG LT circuit breaker switch (CB140):

1. Remove bushing nut (MS25082B8) and lockwasher (AN936A716S) from CB140.

2. Insert bushing of CB140 through hole in panel (4 or 11, fig. 1-1) so positioning

key engages small hole in panel above bushing hole.

3. Reinstall and tighten lockwasher and nut.

4. Remove two terminal screws (MS35260-241) and lockwashers (MS35338-42).

5. Attach wire L522H10 to terminal 1 with fasteners removed in step 4.

6. Attach wire L522A10 to terminal 2 with fasteners removed in step 4.

7. Tighten all fasteners.

8. Perform functional test. Refer to paragraph 2-13.

SECTION 3 INSTALLATION INSTRUCTIONS

3-1. GENERAL.

3-2. This section provides detailed instructions for installing the 369D292032 float lamp assembly. This modification may be performed at the discretion of the operator, or the helicopter may be returned to the factory for modification.

3-3. REFERENCE DATA.

3-4. Table 3-1 lists consumable materials and special tools required for the installation. The

consumable and expendable materials listed are of a commercial nature that could be procurable locally. Alternate, but equivalent, items might be available, but consultation with Hughes Helicopters Customer Service Department is recommended.

3-5. FUSELAGE MODIFICATIONS.

3-6. DOUBLER INSTALLATION.

3-7. Doublers (35 and 36, fig. 1-1) must be installed against the inner side of the fuselage

Table 3-1. Special tools and consumable materials

Item No.	Material	Specification	Commercial Product	
			Name/Number	Manufacturer
1	Aliphatic naphtha	Fed Spec. TT-N-95		
2	Denatured alcohol	Fed Spec. TT-I-735, type III		
3	Acrylic lacquer, colors 17875, 20371, 34151	Fed Std. 595		
4			C111 adhesive	Stabond Corp., Gardena, CA 90249
5			140RTV Silastic adhesive	Dow Corning Corp., Midland, MI 48640
6	Stoddard solvent	Fed Spec. P-D-680		
7			RNF100X3/8, RNF100X1/2 heat-shrink tubing	Raychem Corp., Menlo Park, CA 94025
8	No. 12 tubing	MIL-I-631, type F, form U		
9			Blue Dykem paint Dykem remover, 138	Dykem Co., St. Louis, MO 63114
10			Drill bits: 5, 30, 31, 41, 42, 1/16, and 7/16	ANSI series
11	Solder	Fed Spec. QQ-S-571, types R, RMA, or RA, comp. Sn 60 or 63		
12	Tooling	MIL-C-22520/5-01		
13	Dies	M22520 1-01		

Table 3-1. Special tools and consumable materials (Continued)

Item No.	Material	Specification	Commercial Product	
			Name/Number	Manufacturer
14	Dies	M22520 1-03		
15	Dies	MIL-C-22520/5-100		
16	Extraction tool	MS17806		
17	Insertion tool	MS17805		

skin in the engine bay lower section as shown in figure 3-1. It will be necessary to remove the 369H6006 landing gear brace assemblies. Refer to Section 6, HMI - Vol 1, for procedures. Install doublers as follows:

1. Remove 12 MS20470AD3 rivets as shown in figure 3-1. Use number 42 (0.0935 inch) drill bit to remove 3/32-inch rivets.
2. Remove two MS20615M3 rivets with number 42 drill bit.
3. Remove two MS20615M4 rivets. Use number 31 (0.120 inch) drill bit to remove 1/8-inch rivets.
4. Deburr holes as required.
5. Clean aircraft structure of all sealant and other foreign materials in area to be in contact with doublers.
6. Set left doubler (35, fig. 1-1) so edge of extension on long side is at station 136.94 (0.56 inch from back surface of 369H2532 ring assembly), see figure 3-2, and the inward side is 0.20 inch from buntline 0.
7. Drill two 0.062-inch holes in skin through two remotely located, existing pilot holes in doubler. Use 1/16-inch drill bit.
8. Install two Cleco fasteners, then recheck accuracy of doubler placement.
9. When doubler is properly situated, enlarge three pilot holes to 0.096 inch with number 41 drill bit.
10. Relocate two Cleco fasteners, and enlarge remaining two pilot holes with number 41 drill bit.

11. Set right doubler (36, fig. 1-1) so edge of extension on long side is at station 136.94 (0.56 inch from back surface of 369H2532 ring assembly), see figure 3-2, and the inward side is 0.20 inch from buntline 0.

12. Drill two 0.062-inch holes in skin through two remotely located, existing pilot holes in doubler. Use 1/16-inch drill bit.

13. Install two Cleco fasteners, then recheck accuracy of doubler placement.

14. When doubler is properly situated, enlarge three pilot holes to 0.096 inch with number 41 drill bit.

15. Relocate two Cleco fasteners, and enlarge remaining two pilot holes with number 41 drill bit.

3-8. With both doublers held securely in place by Cleco fasteners, drill remaining rivet holes in doublers as follows:

CAUTION

Insert drill bit into existing holes in structure from below to start new holes. Do not attempt to start new holes from inside engine bay. Minute inaccuracies will cause new holes to be out of tolerance.

1. Drill holes for MS20470AD3 and MS20615M3 rivets with number 41 drill bit. See figure 3-1.

2. Drill holes for MS20615M4 rivets with number 30 (0.1285 inch) drill bit.

NOTE

To complete the following operation, remove 369H6006 brace assemblies. Refer to Section 6, HMI - Vol 1, for procedures.

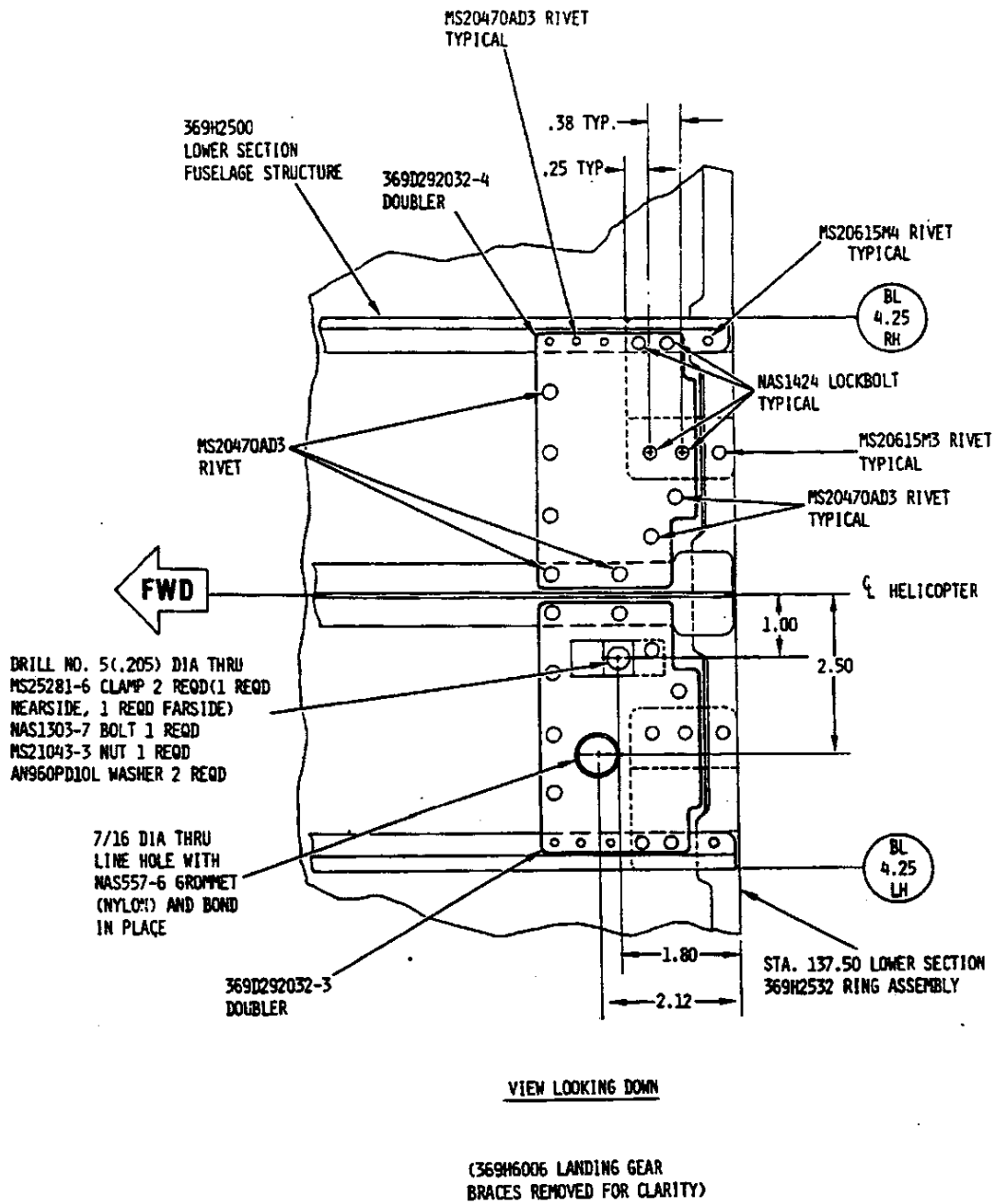
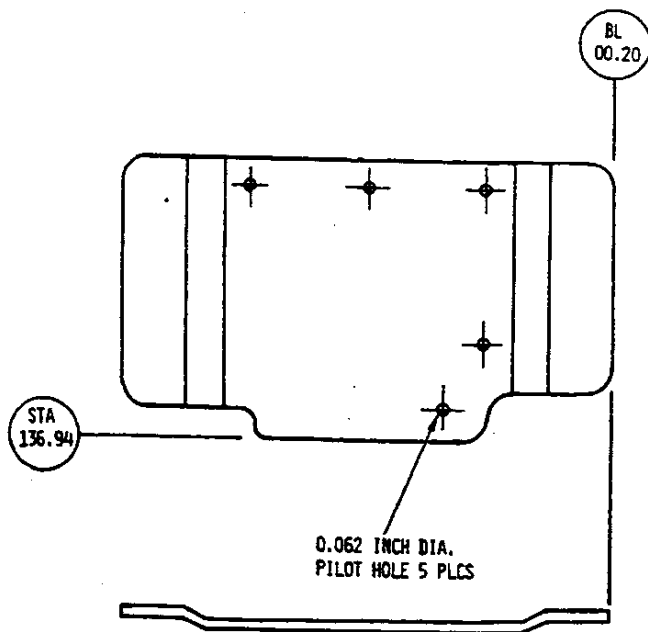


Figure 3-1. Float lamp doubler, bracket, and grommet installations



47-1024

Figure 3-2. Float lamp doubler alignment details

3. Refer to figure 3-1, and scribe hole center marks for eight NAS1424 lockbolts.

4. Drill one pilot hole through helicopter structure for each flange of 369D292032-1 and -2 brackets. Use number 42 (0.0935 inch) drill bit.

5. Deburr pilot holes as required.

6. Set left and right brackets in final assembly position (see figure 3-1), and tape brackets securely.

7. Recheck measurements of bracket positions after taping, and correct as required.

8. Mark hole centers on brackets through pilot holes in helicopter structure with machinist's blue Dykem paint. Allow paint to dry 10 to 15 minutes before removing brackets for drilling.

9. Remove brackets, dimple center of blue markers and drill one pilot hole on each flange. Use number 42 drill bit.

10. Deburr pilot holes.

11. Install brackets in final assembly position with Cleco fasteners, and carefully recheck position measurements.

12. When brackets are properly positioned, carefully drill six more pilot holes for lockbolts through helicopter structure where scribed. Use number 42 drill bit.

13. Check brackets and doublers for proper positioning once again.

14. When brackets and doublers are properly positioned, refer to figure 3-1 and scribe center marks for clamps (28, fig. 1-1).

15. Drill 0.205-inch holes with number 5 drill bit.

16. Refer to figure 3-1, and scribe hole center for grommet (31, fig. 1-1) on left doubler only.

17. Drill grommet hole with 7/16-inch drill bit.

18. Remove all Cleco fasteners, and deburr all holes as required.

3-9. Drilling and deburring make it necessary to touch up and refinish the parts and the helicopter structure. All metal surfaces shall be reprimed with Federal Standard 595 primer, color number 20371, the engine bay shall be repainted insignia white to match color number 17875, Federal Standard 595, and the exterior of the aircraft, including rivet heads, bolts, and nuts, shall be touched up with one or more coats of topcoat to match the surrounding area. After repriming and before painting, refer to figures 3-1 and 3-2 and proceed as follows:

1. Install left doubler with 11 MS20470AD3 rivets.

2. Install right doubler with 11 MS20470AD3 rivets.

3. Install left bracket with four NAS1424-03 lockscrews, one MS20615M3 rivet, and one MS20615M4 rivet.

4. Install right bracket with four NAS1424-03 lockscrews, one MS20615M3 rivet, and one MS20615M4 rivet.

5. Install one clamp (28, fig. 1-1) on each side of left doubler with fasteners (32, 33, and 34, fig. 1-1).

3-10. Install grommet (31, fig. 1-1) as follows:

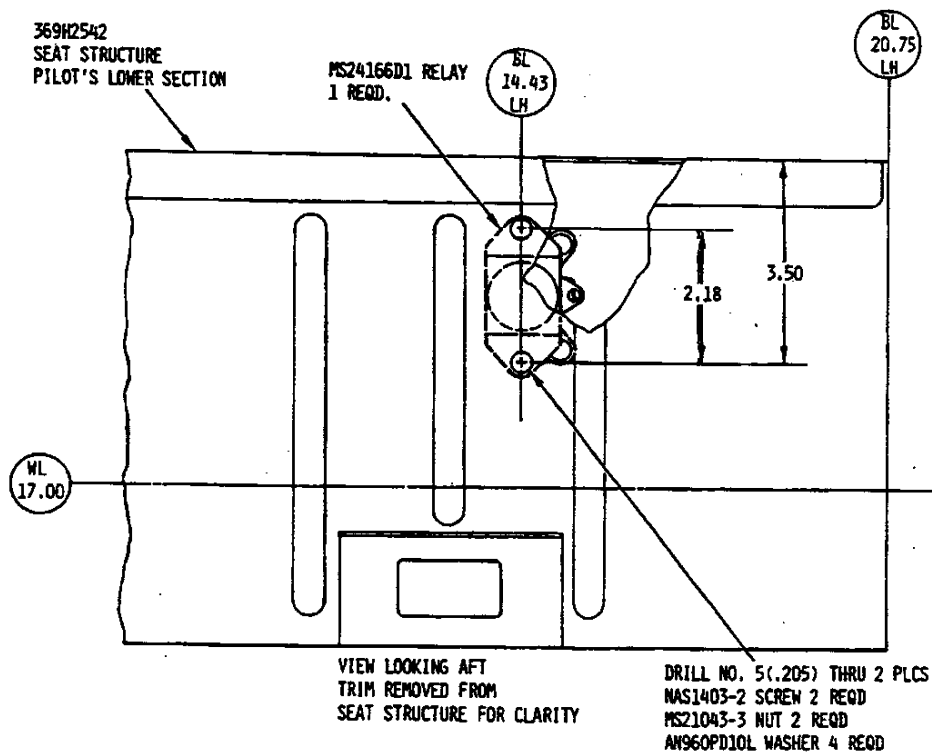
1. Wash grommet and area around hole in doubler with naphtha, and air dry.
2. Apply heavy coat of type C111 adhesive to grommet and to area around hole in doubler, and allow C111 to harden 15 minutes minimum.
3. When C111 has hardened, apply thin coat of C111 to mating surfaces and press together. Allow assembly to air-dry for eight hours minimum.
4. Install lamp housings as described in paragraph 2-26. Do not install lamps until wires are installed.

3-11. RELAY INSTALLATION.

3-12. See figure 3-3, and install relay K307 as follows:

1. Remove passenger compartment left side foot support fairing.
2. Draw vertical line at exactly 14.43 inches from center of helicopter, buntline 0.

3. Draw horizontal line intersecting vertical line at 3.50 inches from top of seat structure.
4. Draw second horizontal line intersecting vertical exactly 2.18 inches from first horizontal line.
5. Dimple both center marks with center punch.
6. Recheck hole center dimensions. Center marks must be 2.18 inches apart.
7. Drill two clearance holes with number 7 (0.2010 inch) or number 5 (0.2055 inch) drill bit.
8. Deburr holes as required.
9. Wash area around holes with naphtha and allow to air-dry thoroughly.
10. Touch up exposed metal with acrylic lacquer, color green to match number 34151, Federal Standard 595. Allow paint to dry thoroughly.
11. Assemble and install relay as described in paragraph 2-33.



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Figure 3-3. Float lamp relay installation details

3-13. CIRCUIT BREAKER SWITCH INSTALLATION.

3-14. LEFT SIDE INSTALLATION. Helicopters equipped with the Collins RCR650 radio receiver can readily accept the circuit breaker switch (CB140) in the lower left corner because the Collins RCR650 receiver forward bracket (369D24216) is already installed. For left side installation, refer to figure 1-1, and proceed as follows:

1. Remove bushing nut (MS25082B8) and lockwasher (AN936A716S) furnished with new circuit breaker switch (5).
2. Insert bushing of CB140 through hole in panel (11) from rear so positioning key engages small hole in panel above bushing hole.
3. Reinstall and tighten lockwasher and nut.
4. Set aside panel and circuit breaker switch assembly until wires are installed.

3-15. RIGHT SIDE INSTALLATION. For right side installation, refer to figure 1-1 and proceed as follows:

1. Remove bushing nut (MS25082B8) and lockwasher (AN936A716S) furnished with new circuit breaker switch (5).
2. Insert bushing of CB140 through hole in panel (4) from rear so positioning key engages small hole in panel above bushing hole.
3. Reinstall and tighten lockwasher and nut.
4. Set aside panel and circuit breaker switch assembly until wires are installed.

3-16. FLOAT LIGHT SWITCH INSTALLATION.

3-17. The landing light switch (S105) on the pilot's collective stick must be replaced with a three-position switch (S32) to accommodate the float lights and the landing light alternatively. Refer to figures 1-1 and 3-4, and install new switch S32 as follows:

1. Set MASTER switch (S2) to OFF.
2. Remove four NAS600-3 screws and AN936A4 washers from existing switch plate, and pull plate and switches away from collective stick switch housing assembly.
3. Unsolder two wires on switch S105 terminals.

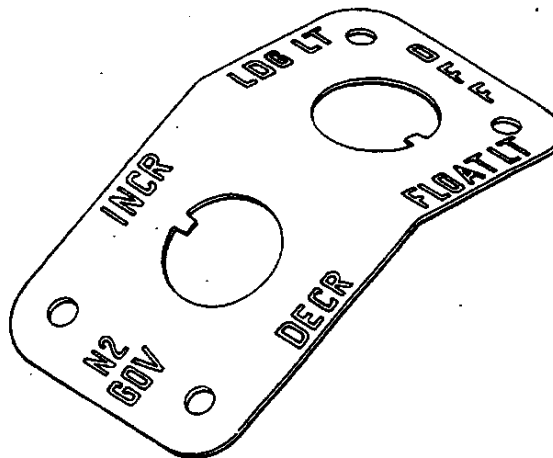


Figure 3-4. Float light-landing light switch plate for pilot's collective stick

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4. Loosen NAS1081D04-2 setscrew securing 369A4215 landing light switch knob, and remove knob. Retain knob for reuse.
5. Loosen AN565D4112 setscrew securing 369A4568 knob on N₂ governor control switch (S108), and remove knob.
6. Remove bushing nuts (15/32-32) and lockwasher from N₂ governor control switch, and separate switch from plate.

NOTE

Inspect condition of potting on N₂ governor control switch.

7. Install one nut on bushing of N₂ governor control switch; run nut all the way down bushing and tighten, then install lockwasher.
8. Insert bushing through switch plate hole from rear. Insert in hole identified as N₂ GOV, INCR, DECR. Be sure to engage tab on plate with keyway on bushing.
9. Assemble nut on bushing, and tighten.
10. Remove bushing nuts, lockwasher, and locking ring from new float light-landing light switch (13, fig. 1-1). Discard locking ring.

11. Install one nut on switch bushing; run nut all the way down bushing and tighten.
12. Install lockwasher.
13. Insert bushing through switch plate hole from rear. Engage tab on plate with keyway on bushing.
14. Assemble nut on bushing, and tighten.
15. Cover entire length of new wire, L522D20, with 1/8-inch diameter RNF sleeving, and heat sleeve for proper shrink fit at 121° to 130° C (250° to 270° F).
16. Slip new number 12 tubing (MIL-I-631, type F, form U) over ends of wires. Slide tubing down wires out of the way.
17. Resolder wire number L104C20 to switch terminal 3, and wash off flux with denatured alcohol.
18. Resolder wire number L123A20N to switch terminal 2, and remove flux.
19. Solder new wire number L522D20 to switch terminal 1, and remove flux.
20. Slip insulating sleeving over terminals.
21. Insert new wire (L522D20) down through stick, and incorporate it into cable.

NOTE

It is necessary to partially disassemble the pilot's collective stick in order to incorporate new wire L522D20. Refer to Section 7, HMI - Vol 1, for instructions, and figures 107 and 108 in the Illustrated Parts Catalog.

22. Install plate and switch assembly on pilot's collective stick switch housing assembly with four NAS600-3 screws and AN936A4 lockwashers.
23. Install knob from landing light switch on new float light-landing light switch.
24. Remove 369H6573-35 pilot's collective stick cover, and disconnect connector P113.

NOTE

Connector P113 is located at the base of the pilot's collective stick. It mates with J113 which is mounted on the left side of the pilot's seat structure lower section.

25. Remove protective shell from P113
26. With MS17806 extraction tool, remove spare contact J from insert block.
27. Strip sufficient insulation and RNF sleeving from 20-gauge wire L522D20 so exposed wire can be bent double and still insert fully into MS17803-16-16 contact.

NOTE

In order to make the 20-gauge wire fill the larger 16-gauge cavity of the MS17803-16-16 terminal, the wire must be bent double then twisted just tight enough to comply. Experiment with minute increments of twist until proper fit is obtained. Use 16-gauge wire sample to compare fit with twisted wire. Proper filling of the cavity is essential for a good crimp connection.

28. Crimp properly fitted wire with M22520 1-01 basic crimping tool and M22520 1-03 positioner.
29. Install properly crimped wire-terminal assembly into insert hole J. Use MS17805 insertion tool.
30. Reinstall shell.

3-18. WIRING INSTALLATION.

3-19. New wires for the float lamp assembly must be routed for incorporation into existing harnesses. Clean all stripped wires and terminals with solvent, Federal Specification P-D-680. Proceed as follows:

1. Dismount connector J113, and remove protective shell.
2. Remove spare contact J from insert block. Use MS17806 extraction tool.
3. Strip sufficient insulation from wire L522C20 so exposed wire can be bent double and still insert fully into 16-gauge MS17804-16-16 contact. Refer to NOTE following step 27 above.
4. Crimp and install contact with same tools described in steps 28 and 29 above.
5. Reinstall shell, and remount connector.
6. Select best cable route to terminal X2 of float lamp relay K207, and incorporate wire L522C20 into cable. See figure 3-3.

NOTE

Use MIL-C-22520/5-01 tooling with MIL-C-22520/5-100 dies for crimping all MS25036-series terminals in float lamp wiring installation.

7. Terminate wire L522C20 at relay terminal X2 with MS25036-102 terminal. Include one varistor lead on terminal X2, and tighten fastener.
8. Terminate one end of 20-gauge jumper with MS25036-103 terminal.
9. Attach end of jumper with MS25036-103 terminal to relay terminal A1. Do not tighten fastener.
10. Terminate opposite end of jumper with MS25036-102 terminal.
11. Attach end of jumper with MS25036-102 terminal to relay terminal X1, install opposite lead of varistor on terminal X1, and tighten fastener.
12. Install panel and circuit breaker assembly with fasteners (2 and 3, or 6, 7, 8, 9, and 10, fig. 1-1).
13. Select best cable route from relay terminal A1 to float lamp circuit breaker switch CB140, terminal 2, and incorporate wire L522A10 into cable.
14. Terminate wire L522A10 at circuit breaker CB140, terminal 2, with MS25036-156 terminal.
15. Terminate wire L522A10 at relay K307, terminal A1, with MS25036-112 terminal. Include end of jumper with terminal MS25036-103, and tighten fastener.
16. Combine wires L522B10 and L522G10N in RNFx3/8 tubing.
17. Combine wires L522E12 and L522F12 in RNFx3/8 tubing.
18. Let left float lamp be DS149. Select cable route from relay K307, terminal A2, to lamp DS149, terminal 1, and incorporate wire L522B10 into cable.
19. Terminate wire L522B10 at relay K307, terminal A2, with MS25036-112 terminal.

NOTE

When performing steps 20 through 29 below, allow sufficient length of wires L522B10, L522E12, L522F12, and L522G10N so lamps can be removed from housings to gain access to lamp terminals.

20. Pass wires L522B10 and L522G10N through grommet in left doubler (see figure 3-1), conduit nut, washer, and conduit of left float lamp.
21. Terminate wire L522B10 at lamp DS149, terminal 1, with MS25036-156 terminal. Do not tighten fastener.
22. Pass wires L522E12 and L522F12 through left lamp conduit, nut, washer, and conduit.
23. Terminate wire L522E12 at terminal 1 with MS25036-156 terminal. Include wire L522B10 on terminal, and tighten fastener.
24. Terminate wire L522F12 at lamp terminal 2 with MS25036-156 terminal.
25. Combine wire L522G10N with wires L522E12 and L522F12 in same tubing. Wire L522G10N is to pass out of left lamp housing and into right lamp housing.
26. Pass wires L522E12, L522F12, and L522G10N through right lamp conduit, washer, and conduit nut.
27. Terminate wire L522E12 at lamp DS150, terminal 1, with MS25036-156 terminal.
28. Terminate wire L522F12 at lamp terminal 2 with MS25036-156 terminal. Do not tighten fastener.
29. Terminate wire L522G10N at lamp terminal 2 with MS25036-156 terminal. Include wire L522F12 on terminal, and tighten fastener.
30. In engine bay, terminate wire L522G10N at ground terminal E12 with MS25036-114 terminal.

NOTE

Ground terminal E12 is located in front of the engine in the center of the bulkhead on stiffener 369H2523-15.

31. Thoroughly clean wire harnesses at lamp housings and clean washers and inside of conduit nuts with Stoddard solvent, Federal Specification P-D-680.

32. Apply coating of Dow Corning A-4094 primer to harnesses and inside of conduit nuts.

33. Apply 140RTV sealant to harnesses at lamp housings, on washers, and inside conduit nuts. Allow sealant to cure at room temperature.

34. After 140RTV as cured, assemble conduit nut and washer on conduit.

35. Select best cable route from circuit breaker switch CB140, terminal 1, to terminal board TB101, terminal 4, and incorporate wire L522H10 into cable.

NOTE

Terminal board TB101 is mounted on underside of instrument panel.

36. Terminate wire L522H10 at TB101, terminal 4, with MS25036-112 terminal.

37. Terminate wire L522H10 at circuit breaker switch CB140, terminal 1, with MS25036-156 terminal.

38. Perform functional test. Refer to paragraph 2-13.

3-20. **WEIGHT AND BALANCE DATA.**

3-21. Weight and balance changes resulting from installation of the float lamp assembly are listed in table 3-2. After installation of the float lamp assembly, incorporate changes to the helicopter weight and balance record as instructed in HMI - Vol 2.

Table 3-2. Weight and balance data

	Weight (pounds)	Longitudinal Arm (inches)	Longitudinal Moment (in. -lb/100)
Added:	4.8	115.6	5.55
Deleted:	0.0	0.0	0.0
Change:	<u>+4.8</u>	<u>115.6</u>	<u>+5.55</u>

