

MIL-S-2649B(SHIPS)  
 1 December 1972  
 SUPERSEDING  
 MIL-S-2649A(SHIPS)  
 13 July 1966  
 (See 6.4)

## MILITARY SPECIFICATION

### SEARCHLIGHTS, INCANDESCENT, 7-INCH SEALED BEAM LAMP FOR SMALL BOATS

#### 1. SCOPE

1.1 Scope. This specification covers incandescent searchlights for use on small boats.

1.2 Classification. The searchlights shall be of the following types, as specified (see 6.2):

- Type I - Pilot house (remote) control, splashproof.
- Type II - Local control, splashproof.

#### 2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal form a part of the specification to the extent specified herein:

##### SPECIFICATIONS

###### FEDERAL

J-C-580 - Cord, Flexible, and Wire, Fixture (Electrical, 0- to 600-Volt Service).

###### MILITARY

MIL-M-14 - Molding Plastics and Molded Plastic Parts, Thermosetting.  
 MIL-R-900 - Rubber Gasket Material, 45 Durometer Hardness, For Moderately Low Temperature Service.  
 MIL-E-917 - Electric Power Equipment, Basic Requirements (Naval Shipboard Use).  
 MIL-D-1000 - Drawings, Engineering and Associated Lists.  
 MIL-D-1000/2 - Drawings, Engineering and Associated Lists.  
 MIL-T-7928 - Terminals, Lug: Splices, Conductor: Crimp Style, Copper General Specification For.  
 MIL-P-15024 - Plates, Tags and Bands for Identification of Equipment.  
 MIL-P-15024/5 - Plates, Identification.  
 MIL-P-15037 - Plastic Sheet, Laminated, Thermosetting, Glass-Cloth, Melamine-Resin.  
 MIL-E-15090 - Enamel, Equipment, Light-Gray (Formula No. 11).  
 MIL-E-15130 - Enamel, Ship, Exterior, Alkyd, Haze Gray, No. 27, Formula No. 5H.  
 MIL-S-19622- Stuffing Tubes, Nylon, General Specification.

##### STANDARDS

###### MILITARY

MIL-STD-108 - Definitions of and Basic Requirements for Enclosures for Electric and Electronic Equipment.  
 MIL-STD-167 - Mechanical Vibrations of Shipboard Equipment.  
 MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.  
 MS15535 - Lamps, Incandescent, Sealed Beam Par. 56, Screw Terminal.  
 MS17339 - Cable, Safety (Wire Rope).

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply:

###### NATIONAL BUREAU OF STANDARDS

Handbook H28 - Screw Thread Standards for Federal Services.

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(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.)

AMERICAN WELDING SOCIETY (AWS)  
Welding Handbook.

(Application for copies should be addressed to the American Welding Society, Inc., United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)  
National Electrical Code, Analysis of 1962 Revision,  
200-1962.

(Application for copies should be addressed to the National Electrical Manufacturers Association, 155 East 44th Street, New York, N.Y. 10017.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

### 3. REQUIREMENTS

3.1 Sample for first article inspection. Prior to beginning production, a sample manufactured by production tools and processes shall be tested as specified in 4.2 (see 6.3).

#### 3.2 Mechanical requirements.

3.2.1 Material. Material shall be as specified herein or shall meet the performance requirements specified herein. All materials shall be noncorrosive and nonmagnetic. The magnetic permeability shall be 2.0 or less after fabrication.

3.2.2 Design. The searchlights shall be designed in general conformance with figures 1 and 2. The device shall be suitable for use as a searchlight, mounted as shown on figures 1 and 2.

3.2.3 Construction. The searchlights shall be constructed for long service without frequent overhaul under severe conditions of vibration, temperature, humidity and salt atmosphere. The construction shall be simple and sturdy and such that continued satisfactory operation and routine maintenance in service do not require special tools or excessively precise workmanship. Special tools are defined as those tools not listed in the Federal Supply Catalog (copies of this catalog may be consulted in the office of the Defense Contract Administration Service (DCAS)).

3.2.4 Painting. Painting shall be in accordance with MIL-E-917. Paint shall conform to MIL-E-15130 or MIL-E-15090. The paint shall not discolor or become soft when the searchlight is operated in an ambient temperature of 70° Fahrenheit (F.) for a period of 2 hours.

3.2.5 Interchangeability. All similar parts of corresponding apparatus furnished on the same order or built to the same manufacturer's drawings shall be strictly interchangeable without the necessity of further machining or handling of any kind.

3.2.6 Threaded parts. Screw threads shall conform to the requirements of Handbook H-28, UNC class 2.

3.2.6.1 Self-tapping devices and sheet metal screws shall not be used in the fabrication of the searchlights.

3.2.6.2 Rocking devices shall be used to secure mechanical assemblies to provide continuous satisfactory operation under conditions of vibration specified herein.

3.2.7 Welding. Welding and allied processes used in fabrication shall be in accordance with AWS Welding Handbook.

3.2.8 Stress relief. Certification of compliance shall be furnished by the manufacturer.

3.2.8.1 Metals. All metals used in fabrication and assembly shall be suitably treated or heat treated to prevent deterioration or failure due to stresses or other conditions resulting from working, forming, welding etc. during the fabrication process. (Peening after welding will accomplish stress relieving (see Welding Handbook).)

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3.2.8.2 Plastics. Adequate measures shall be taken in molding or processing plastics to insure that stress buildup does not occur or is satisfactorily treated to relieve these stresses to prevent deterioration or failure of the part or assembly.

3.2.9 Manufacturer's identification plate. The identification plate shall conform to type A, B, or C of MIL-P-15024 and MIL-P-15024/5 and shall contain the following information:

- (a) Manufacturer.
- (b) Contract number.
- (c) Specification number and type.
- (d) Symbol number.
- (e) Date of manufacture.

The identification plate shall be securely attached to the fixture.

3.2.10 Information plate. An information plate conforming to type A, B, or C of MIL-P-15024, giving complete operating, servicing and maintenance instructions and bearing the tabulated information shown in table I shall be provided, securely attached to housing.

Table I - Lamps.

MS part number	Volts	Watts	Industry number	Beam	Stock number
MS15535-1	12.5	100	4543	Spot	6240-193-0941
MS15535-2	24-28	250	4548	Spot	6240-274-4013
MS15535-3	24-28	250	4549	Flood	6240 270-4695
MS15535-7	24-28	450	4541	Spot	6240-155-7774
MS15535-4	120	300	300 PAR 56/2SP	Flood	6240-917-0774

3.2.10.1 Unless otherwise specified (see 6.2) lamps shall not be furnished with the searchlight.

3.2.11 Angles of operation. The searchlights shall be so designed to permit the following operational limits of train and elevation:

- Horizontal rotation - 370 degrees
- Depression - 45 degrees
- Elevation - 45 degrees

Appurtenances such as operating handles, stuffing tubes, cables, mounting, attachments etc. shall not interfere with the operation of these searchlights.

3.2.12 Enclosure requirements. Housing (drum) assembly shall be dripproof in accordance with MIL-STD-108. For type I, control rod packing shall provide a dripproof seal, and base assembly shall provide a dripproof seal to prevent leakage of water into the boat. A drain hole (approximately 3/16-inch) can be provided in the bottom of the housing assembly to reduce condensation and to permit escape of any leakage during service use.

3.2.13 Dissimilar metals. Application and use of dissimilar metals shall conform to the requirements of MIL-E-917.

3.2.14 Bearing surfaces. Metal-to-metal bearing surfaces, such as pivot and trunnion bearings, shall not be plated.

3.2.15 Installation. An instruction sheet giving step-by-step procedure with diagrams for correct installation shall be furnished with each searchlight. Instructions for grounding green conductor inside power source shall be provided.

#### 3.2.16 Operational requirements.

3.2.16.1 Inclination. The searchlights shall be capable of operation at any angle of inclination from normal that may be encountered by small boats.

3.2.16.2 Vibration. The searchlights shall be designed to withstand type I vibration test of MIL-STD-167 without mechanical damage, malfunction or loosening or separation of parts (see 4.5.3).

3.2.16.3 Corrosion. The searchlights shall satisfactorily withstand the salt spray test specified in 4.5.4.

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3.2.17 Dimensional tolerances. The following tolerances shall apply:

- (a) Fractional  $\pm 1/64$  inch.
- (b) Decimal  $\pm 0.005$  inch.
- (c) Angular  $\pm 1$  degree.

Wider tolerances will be permitted where interchangeability of parts, electrical or operating conditions is not affected.

3.2.18 Retainer ring. Lamp retaining ring shall be secured to housing assembly by use of a safety cable as shown on MS17339.

3.2.19 All sharp corners shall be slightly rounded.

3.2.20 Castings shall be free from cold sheets, blow holes, or any imperfections that may affect strength.

3.3 Electrical requirements.

3.3.1 Clearances. Minimum electrical creepage and clearances shall be as required by NEMA National Electrical Code Handbook.

3.3.2 Insulating materials. Insulating materials shall be type GIE in accordance with MIL-P-15037 (Note: All cut surfaces shall be given two coats of varnish prior to assembly of parts.) Molding compounds shall conform to MIL-I-14.

3.3.3 Cable. Electrical cable shall be three conductor (green grounding conductor), size 16, conforming to J-C-580, 10 inches long or length as specified in the contract or order.

3.3.4 Terminals. Terminals shall be in accordance with MIL-T-7928. Terminals shall be used on all inner (inside) searchlight connections.

3.3.5 Gaskets. Material for rubber gaskets shall conform to MIL-R-900.

3.3.6 Insulation resistance. The insulation resistance between all current carrying and noncurrent carrying parts shall be not less than 1 megohm (see 4.5.2).

3.3.7 Dielectric strength. There shall be no evidence of breakdown when the searchlight is subject to the test specified in 4.5.1.

3.3.8 Safety. Precautions shall be taken in the design and construction of the searchlight to insure the safety of operating personnel.

3.3.8.1 Grounding. Means shall be provided to attach the green conductor of the cable to the inner face of the housing.

3.3.9 Cable entrance into housing and bases shall be by plastic stuffing tubes in accordance with MIL-S-19622. Cable entrance into stanchion shall meet the requirements of 3.2.12.

3.4 Drawings.

3.4.1 Drawings shall be furnished and shall conform to category F, form 2 of MIL-D-1000 and type II of MIL-D-1000/2.

3.4.2 Drawing distribution. The manufacturer, upon being advised that his first article sample has passed the specified tests, shall place on record a set of prints of the drawing used for manufacturing the searchlight with the following activities:

- (a) One set for file with the cognizant DCAS.
- (b) One set for file with the Naval Ship Engineering Center.
- (c) One set for file with the contracting officer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the

inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 First article inspection. The first article sample shall be subjected to the examination and tests specified in 4.4 and 4.5.1 through 4.5.4.

4.2.1 First article inspection reports. Production shall not be started until a report of satisfactory completion of the first article inspection has been approved by NAVSEC.

4.3 Quality conformance inspection.

4.3.1 Lot. For the purpose of sampling, a lot shall be the identical number of searchlights of each type on the contract or order.

4.3.2 Sampling for examination and tests. A random sample of searchlights shall be selected in accordance with table II from each lot and shall be subjected to the examination specified in 4.4 and test specified in 4.5.2. Any searchlight containing one or more defects and any searchlight failing in one or more tests shall not be offered for delivery. If the number of such defective searchlights in any sample exceeds the acceptance number for the sample, the lot represented by the sample shall not be offered for delivery.

Table II - Sampling for examination and insulation resistance.

Number of searchlights in lot	Number of searchlights in sample	Acceptance number	Rejection number
2 to 10	All	-	-
11 to 15	10	0	1
16 to 25	13	0	1
26 to 40	17	0	1
41 to 65	22	0	1
66 to 110	28	1	2
111 to 180	35	1	2
181 to 300	45	2	3
301 to 500	55	2	3
501 and over	70	3	4

4.4 Examination. The searchlights shall be examined to determine compliance to the requirements of this specification.

4.5 Tests.

4.5.1 Dielectric strength. A 60 cycle voltage whose effective potential to 1240 volts shall be applied between conductors (with lamp removed) and between all conductors and searchlight frame (with lamp removed).

4.5.2 Insulation resistance. The insulation resistance with 500 volts applied between each conductor (with lamp removed) and between all conductors and the searchlight shall be not less than 1 megohm.

4.5.3 Vibration. The first article sample shall be subjected to type I vibration tests of MIL-STD-167 up to and including the frequency range of 15 cycles per second required by MIL-STD-167. The manner of mounting shall be simulated to that on shipboard. Use of resilient mounting shall not be permitted. The searchlight shall remain locked in any chosen position during this test. Failure of incandescent lamp filament shall not constitute failure of light or fixture tested. Acceptability is contingent upon the ability of the searchlight to withstand the vibration test.

4.5.4 Salt spray. The first article sample shall be subjected to the salt spray tests specified in MIL-STD-202, method 101B. The salt solution concentration shall be 20 percent. The searchlight shall be fully operable after this test. Identification plates and information plates shall be legible after this test without cleaning. Acceptability is contingent upon the ability of the searchlight to withstand the salt spray test.

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5. PREPARATION FOR DELIVERY

5.1 The levels of preservation, packaging, packing and marking for shipment shall be as specified by the procuring activity (see 6.2).

6. NOTES

6.1 Intended use. The equipment covered by this specification is intended for use on small Naval boats.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type required (see 1.2).
- (c) Lamps, if required (see 3.2.10.1).
- (d) Level of preservation, packaging, packing and marking required (see 5.1).

6.3 First article inspection. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection as to those bidders offering a product which has been previously procured or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending procurement.

6.4 THE MARGINS OF THIS SPECIFICATION ARE MARKED "\$" TO INDICATE WHERE CHANGES (ADDITIONS, MODIFICATIONS, CORRECTIONS, DELETIONS) FROM THE PREVIOUS ISSUE WERE MADE. THIS WAS DONE AS A CONVENIENCE ONLY AND THE GOVERNMENT ASSUMES NO LIABILITY WHATSOEVER FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTORS ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

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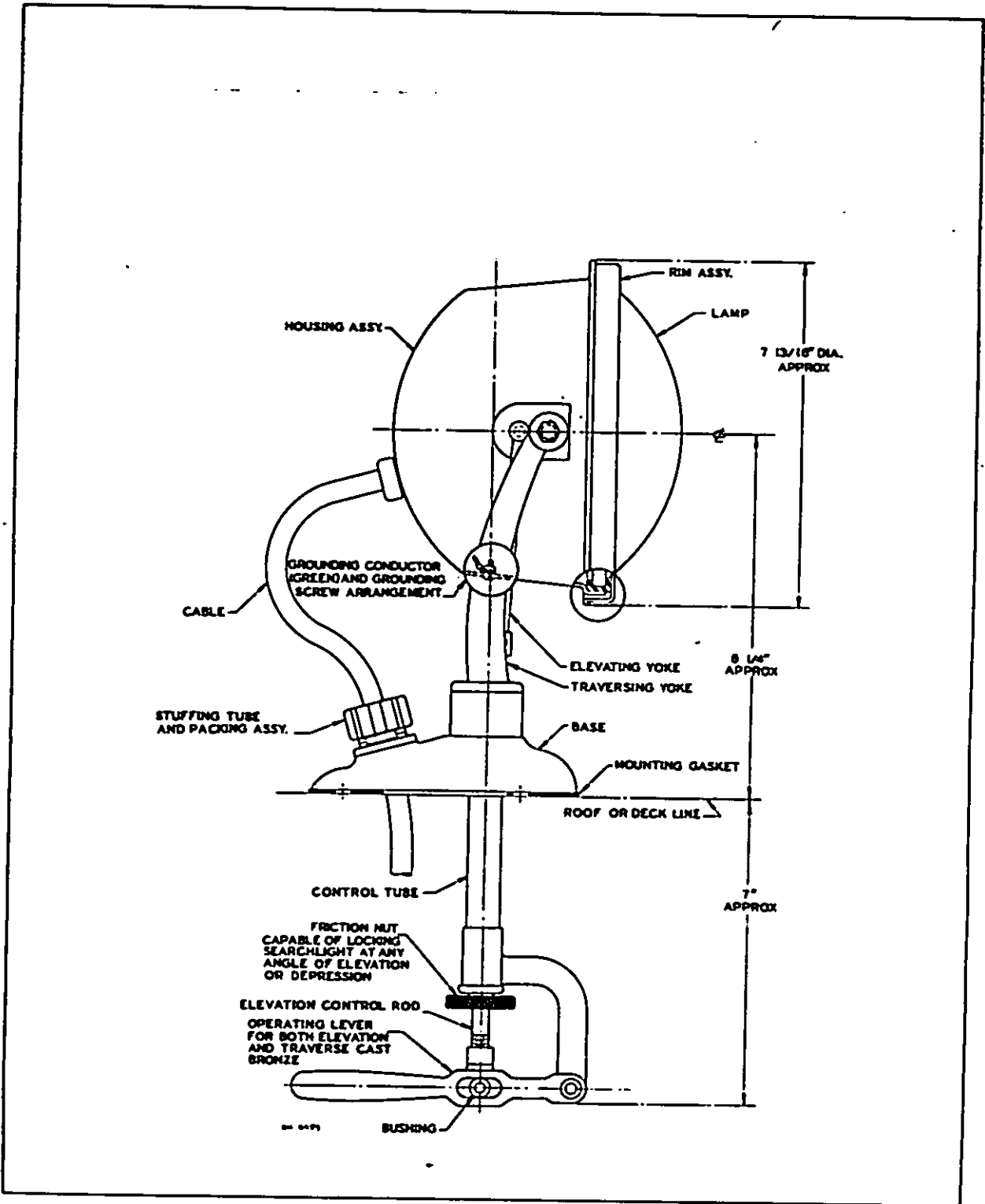


Figure 1 - Pilot house control (type I).

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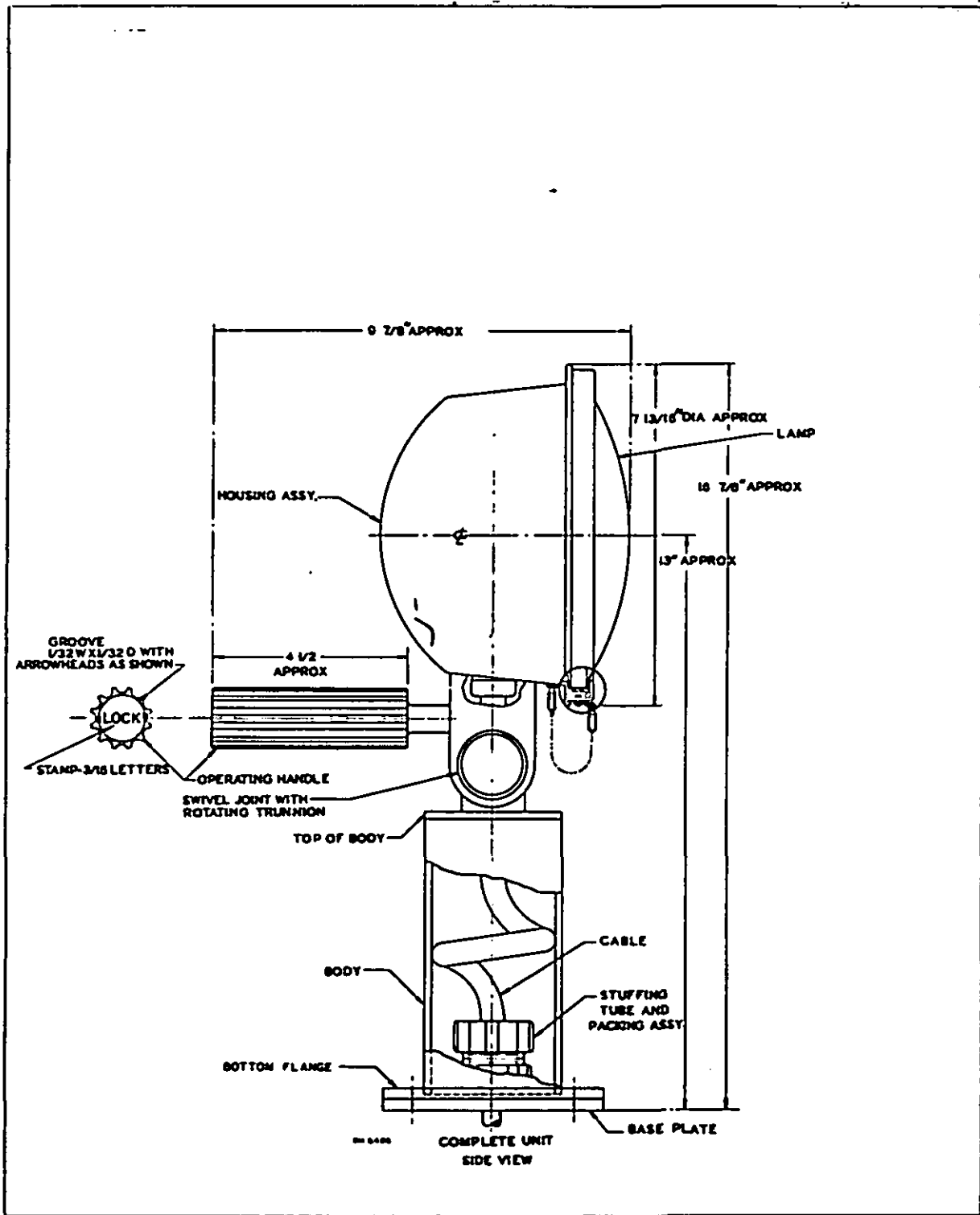


Figure 2 - Stand (type II).



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