

INCH-POUND

MIL-DTL-16377/53C
27 September 2005

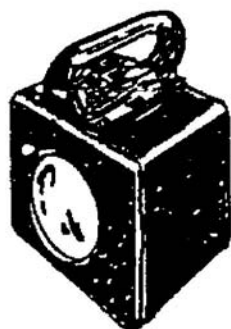
SUPERSEDING
MIL-DTL-16377/53B(SH)
25 November 1996

DETAIL SPECIFICATION SHEET

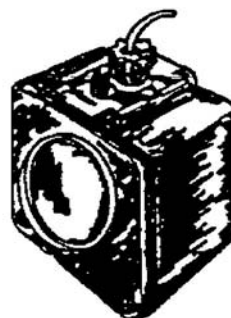
FIXTURES, INCANDESCENT AND LIGHT EMITTING DIODE (LED),
DETAIL LIGHTING, LANTERN, HAND,
PORTABLE AND BULKHEAD MOUNTED WATERTIGHT
SYMBOLS 100.2, 100.2L, 100.3, 100.3L, 101.2, 101.2L, 101.3, 101.3L, 102.2, 102.2L, 108 AND 108L

This specification is approved for use by the Department of the Navy and is available for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-DTL-16377.



PORTABLE

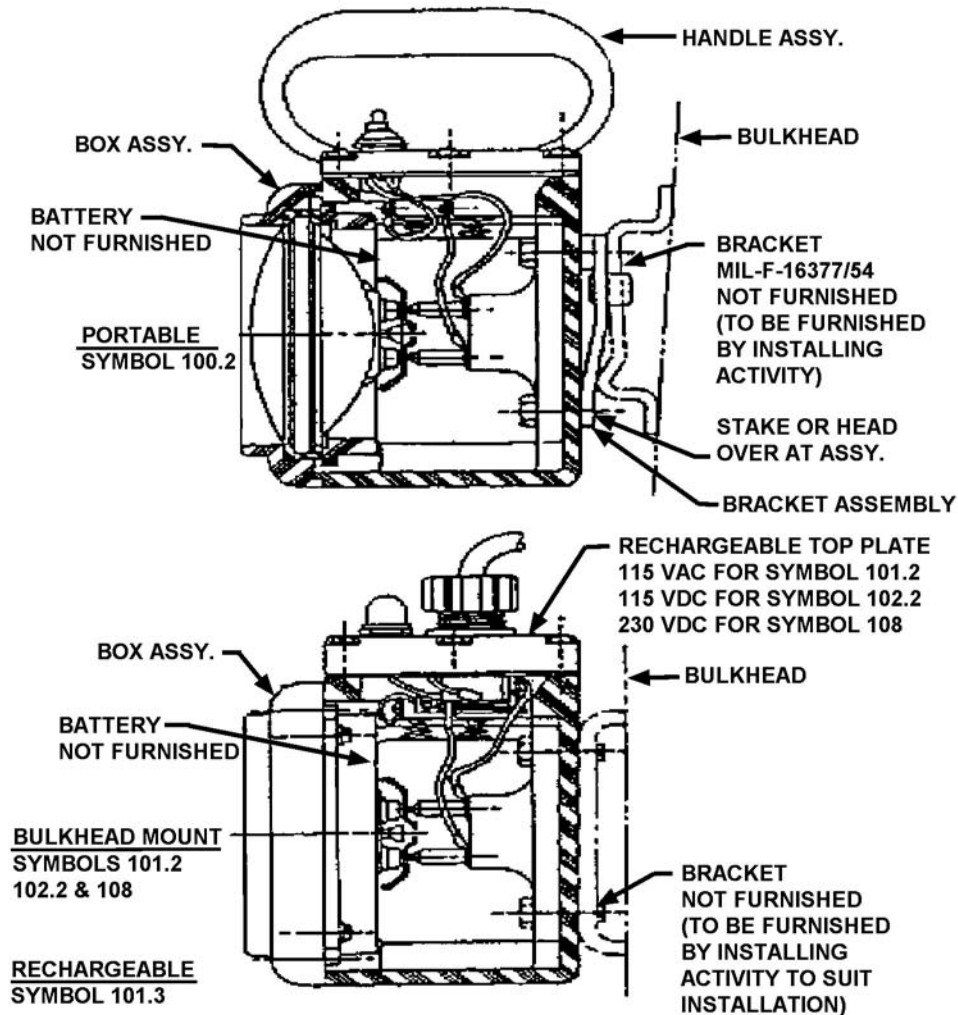


HARD WIRED/BULKHEAD
MOUNT OPERATED

FIGURE 1. Lanterns, hand, portable and hard wired/bulkhead mount.

NOTE: Unless otherwise specified, all dimensions are in inches on Figures 3-20.

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NOTE: Symbols 100.2, 101.2, 102.2, and 108 are non-rechargeable with incandescent lamps. For symbols 100.2L, 101.2L, 102.2L, and 108L with LED assemblies, the lamp function is replaced by the LED assembly.

FIGURE 2. Lantern assembly and typical mounting.

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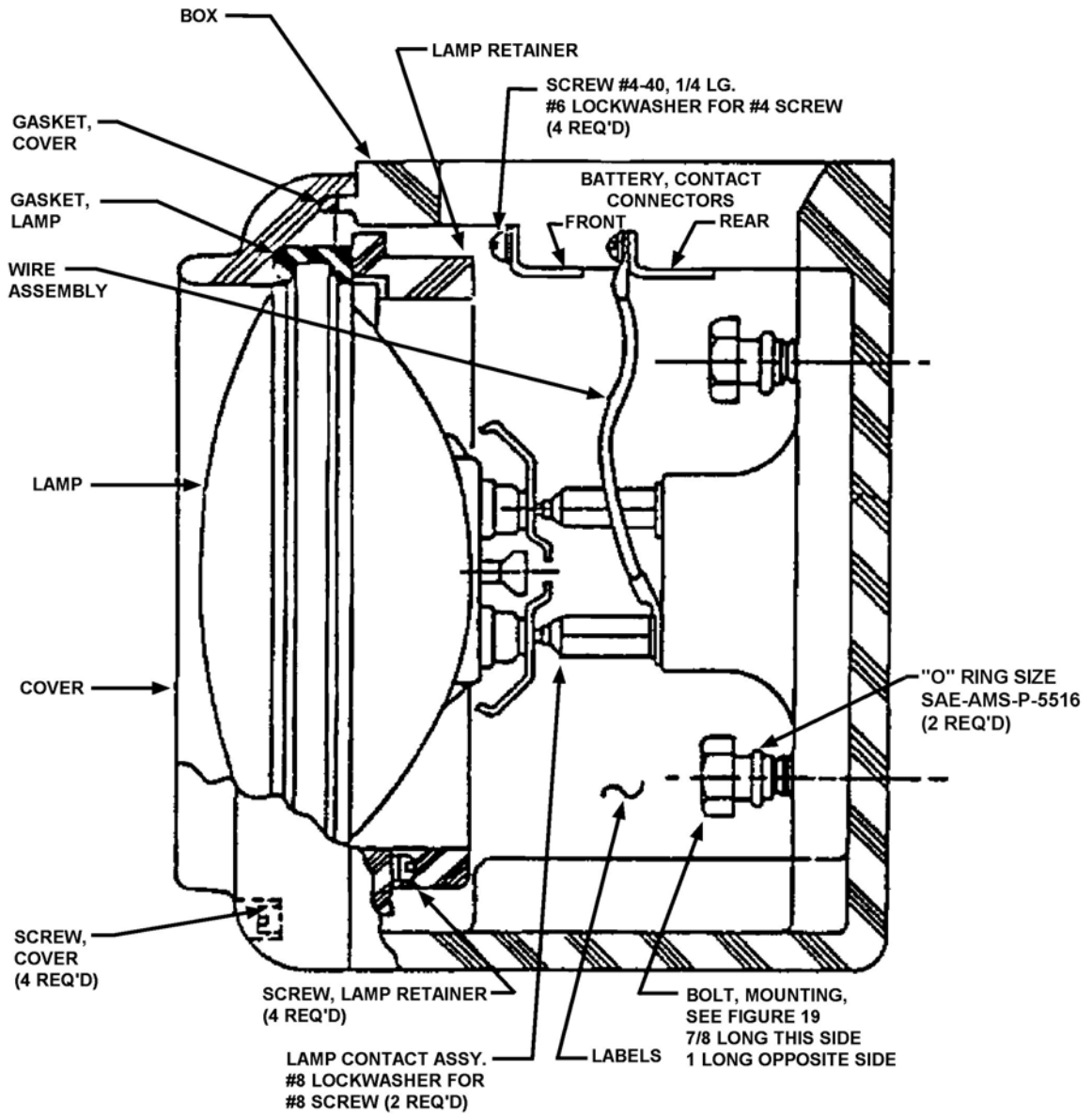
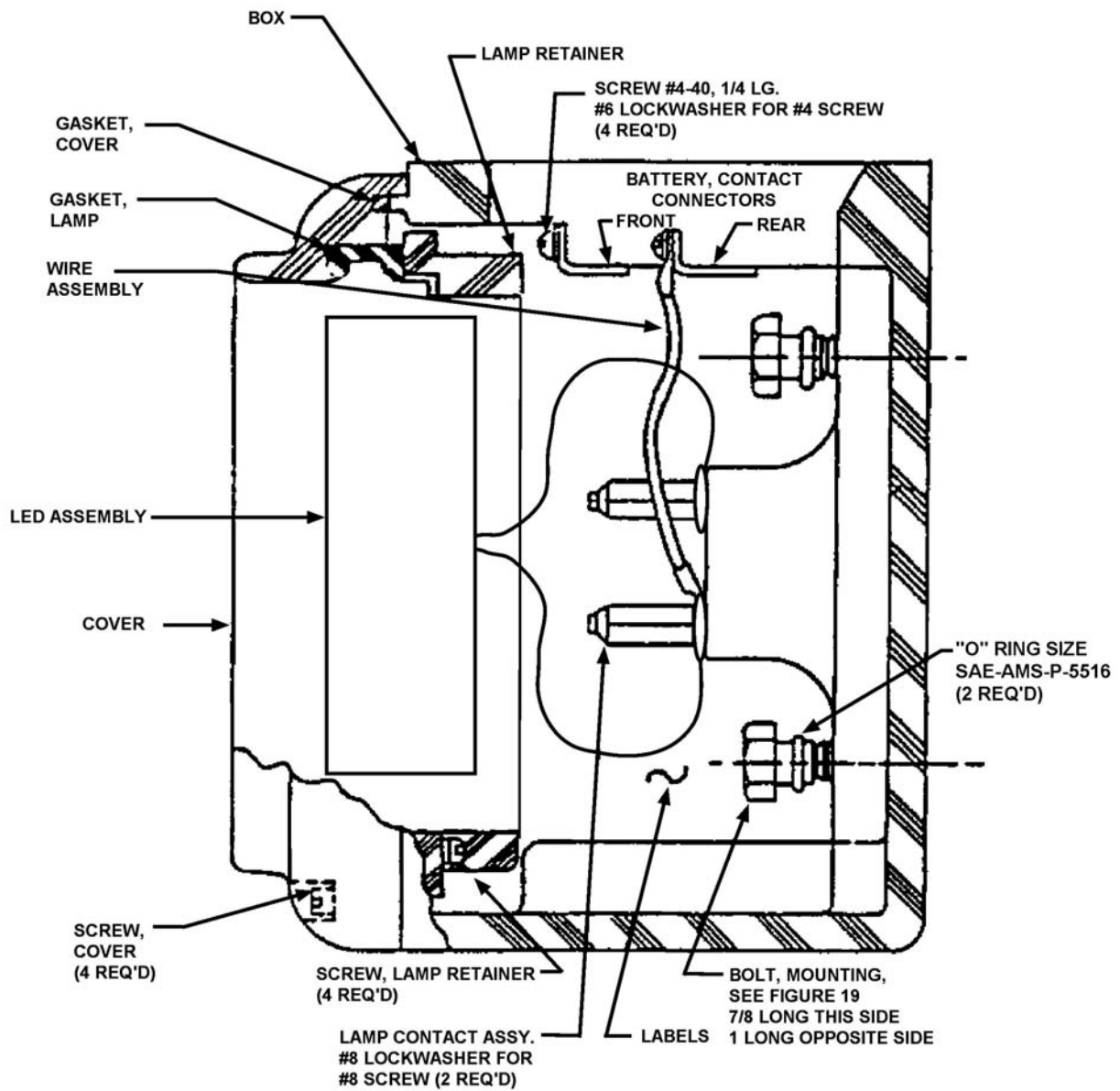


FIGURE 3. Incandescent body assembly.

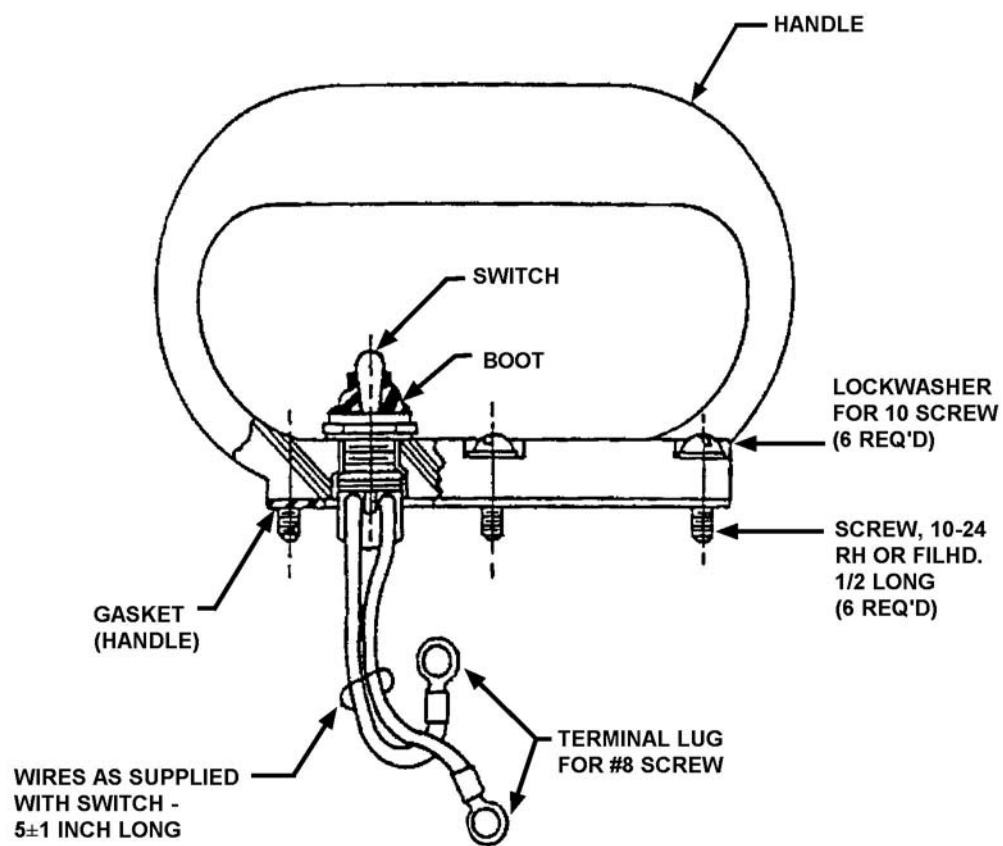
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NOTE: The connection of the LED assembly to the legacy incandescent lamp contacts (posts) in the figure is notional. Manufacturers can make this connection in whatever way they see fit as long as the connection is made.

FIGURE 4. LED body assembly.

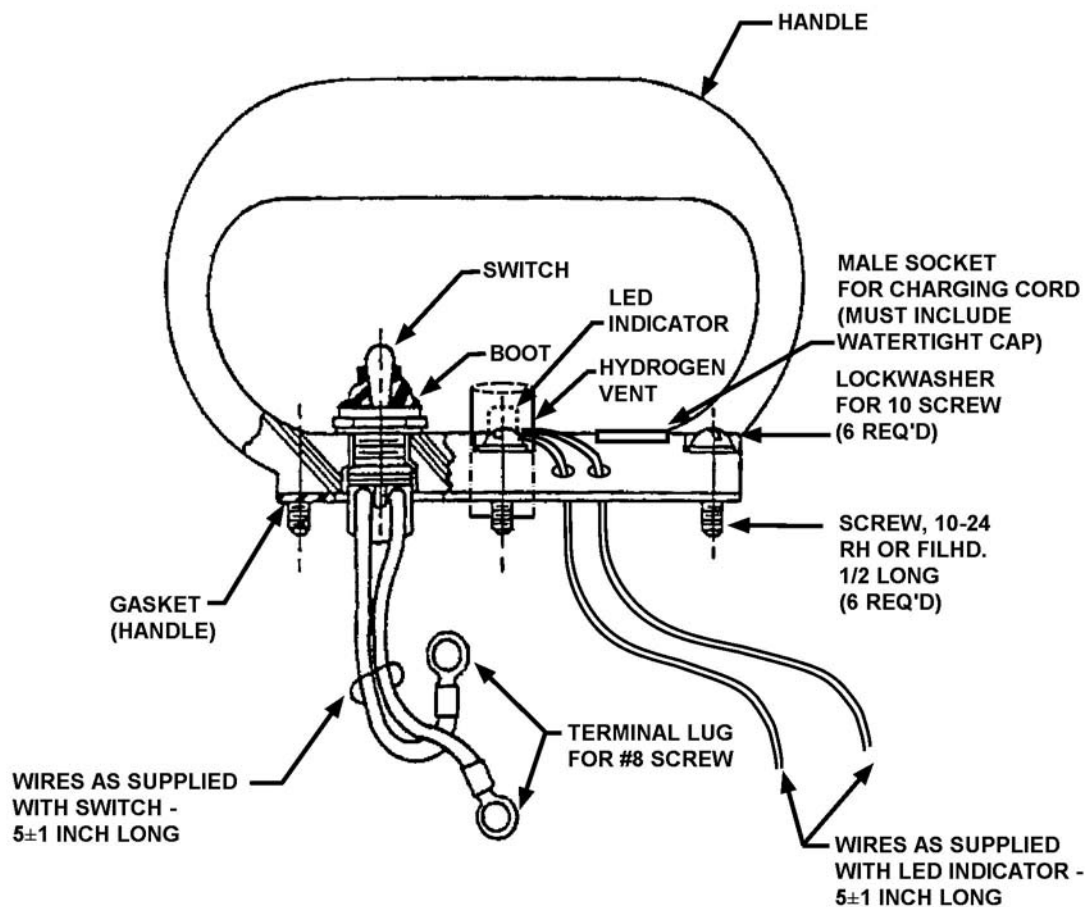
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NOTE: See Figure 21 for wiring diagram.

FIGURE 5. Handle assembly for symbols 100.2 and 100.2L (for non-rechargeable only).

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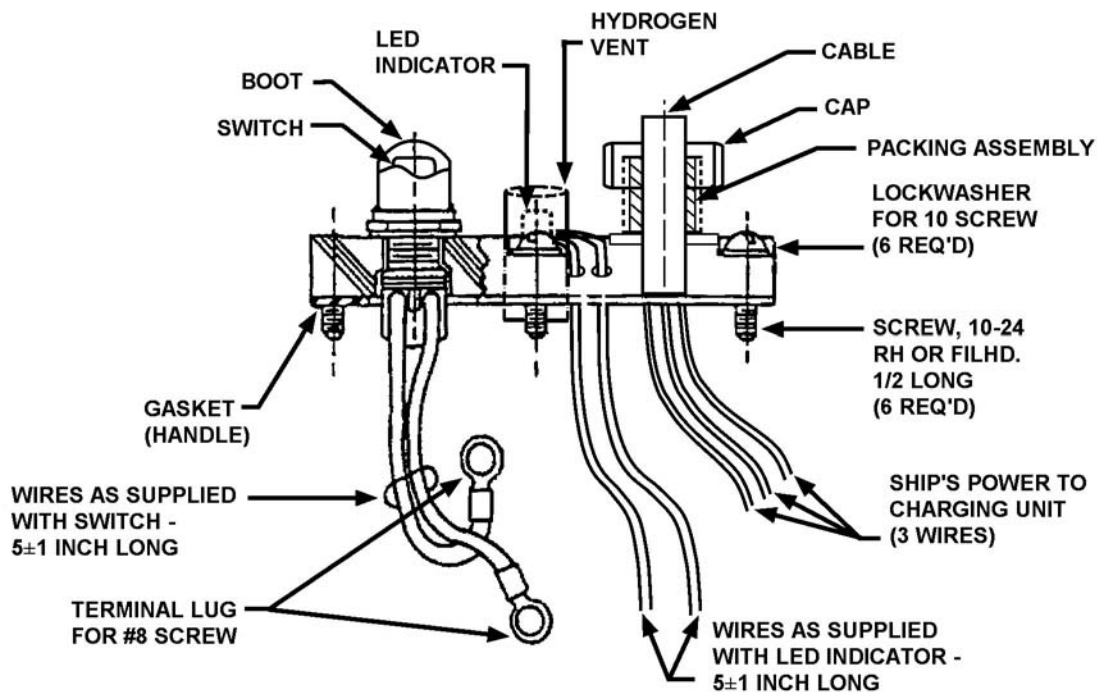
NOTE: Test switch (non-sparking or magnetic actuating) must also be included. Switch must also be watertight.

NOTE: Location of test switch, LED indicator, and hydrogen vent is at the discretion of the manufacturer.

NOTE: Wire lengths in this figure are nominal. Manufacturers must ensure that wires are long enough to make internal connections.

FIGURE 6. Rechargeable handle assembly.

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NOTE: Test switch (non-sparking or magnetic actuating) must also be included. Switch must also be watertight.

NOTE: Location of test switch, LED indicator, and hydrogen vent is at the discretion of the manufacturer.

NOTE: Wire lengths in this figure are nominal. Manufacturers must ensure that wires are long enough to make internal connections.

FIGURE 7. Bulkhead mounted rechargeable top plate.

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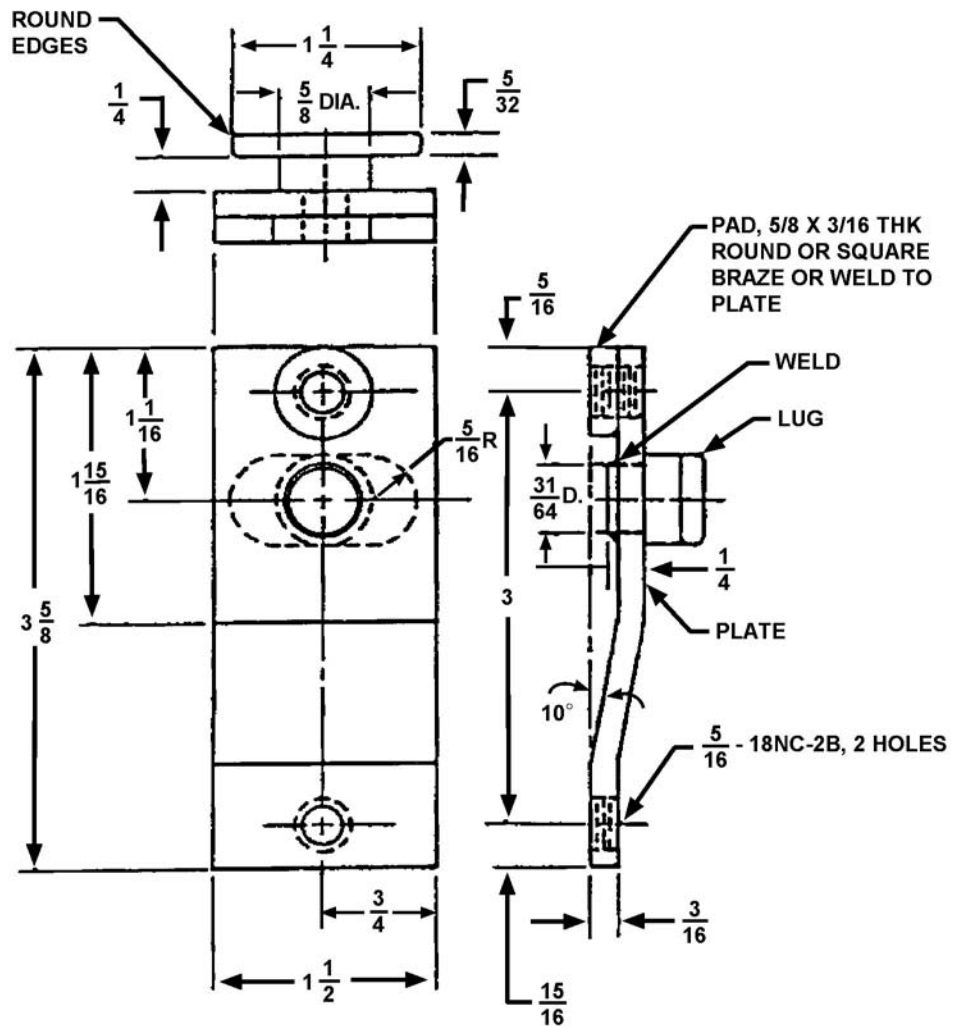
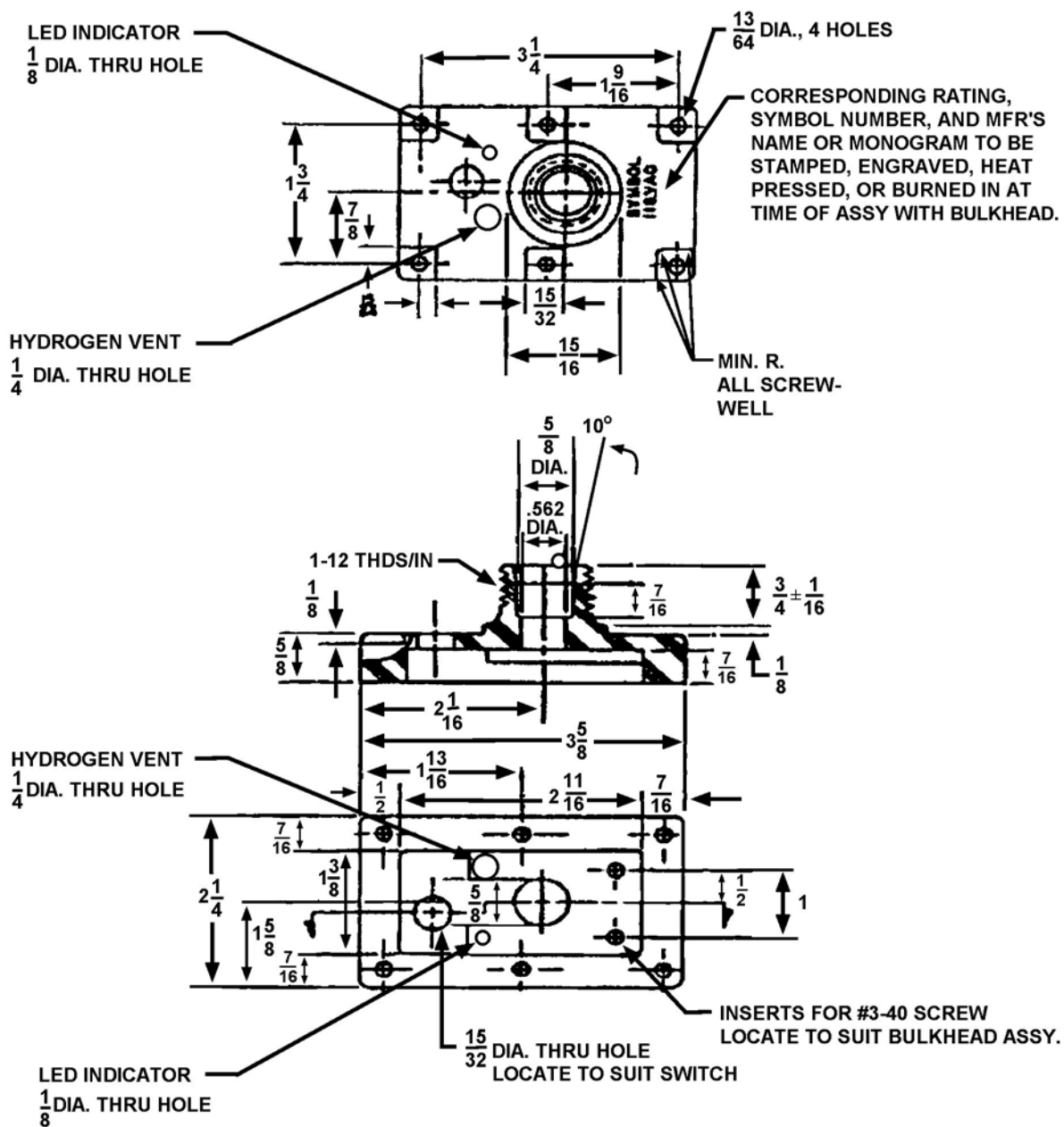


FIGURE 8. Universal bracket assembly.

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NOTE: Test switch (non-sparking or magnetic actuating) must also be included.

NOTE: Location of test switch, LED indicator, and hydrogen vent is at the discretion of the manufacturer.

FIGURE 9. Rechargeable top plate assembly.

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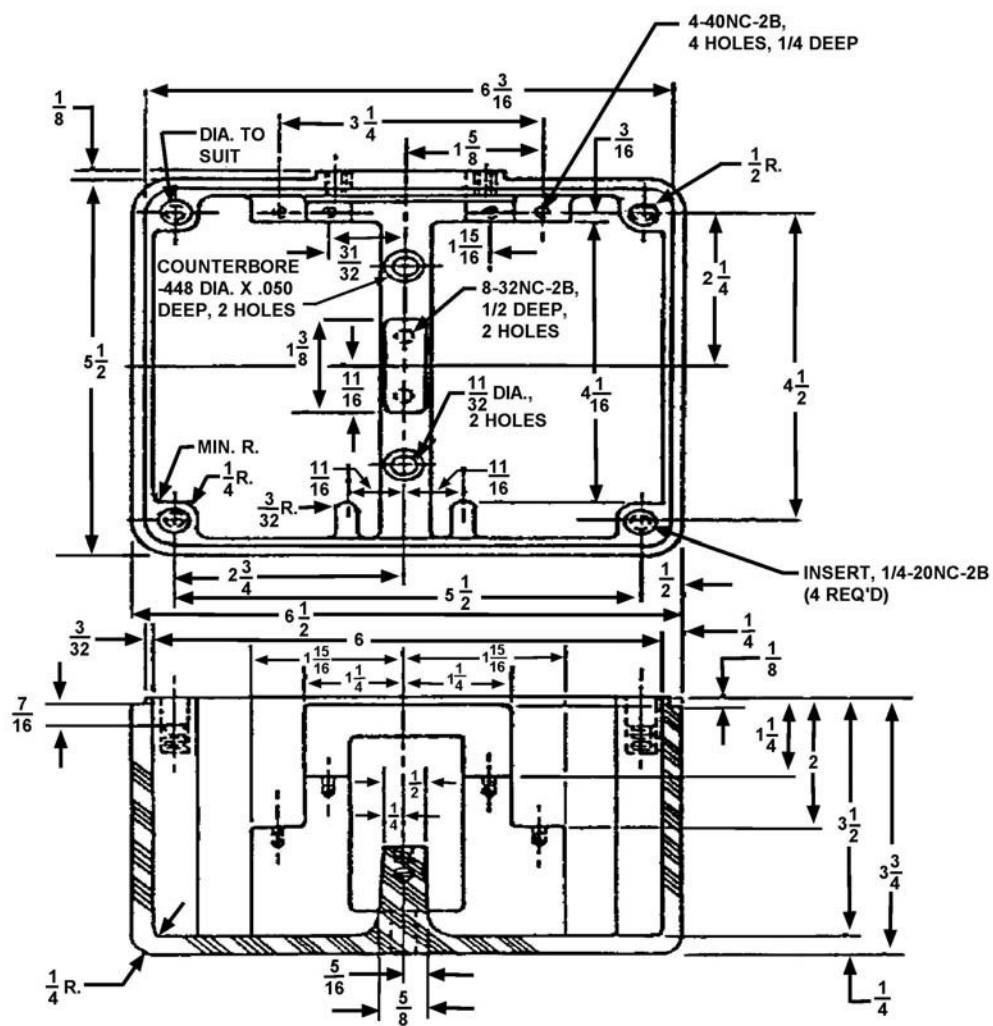


FIGURE 10. Universal box.

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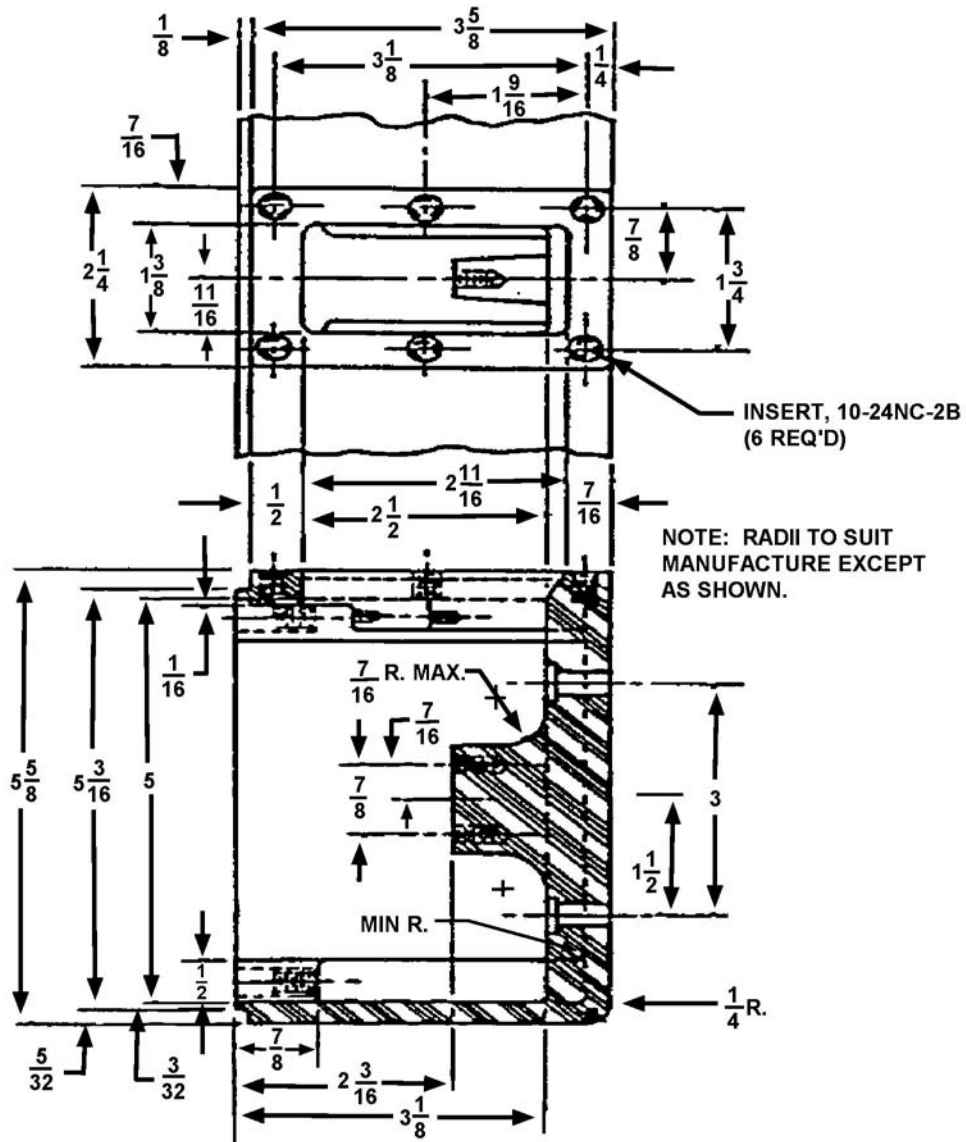


FIGURE 10. Universal box - Continued.

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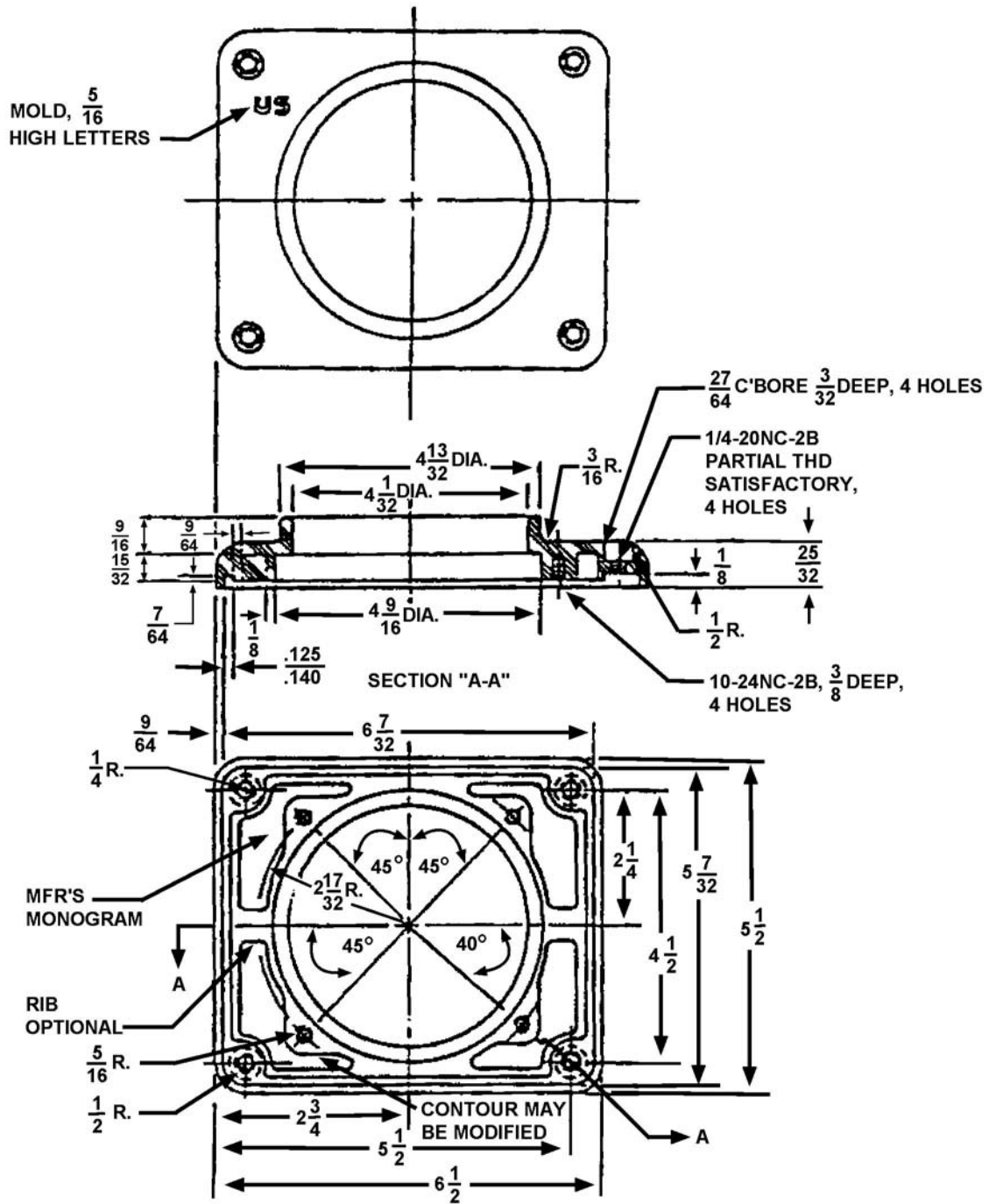


FIGURE 11. Universal cover.

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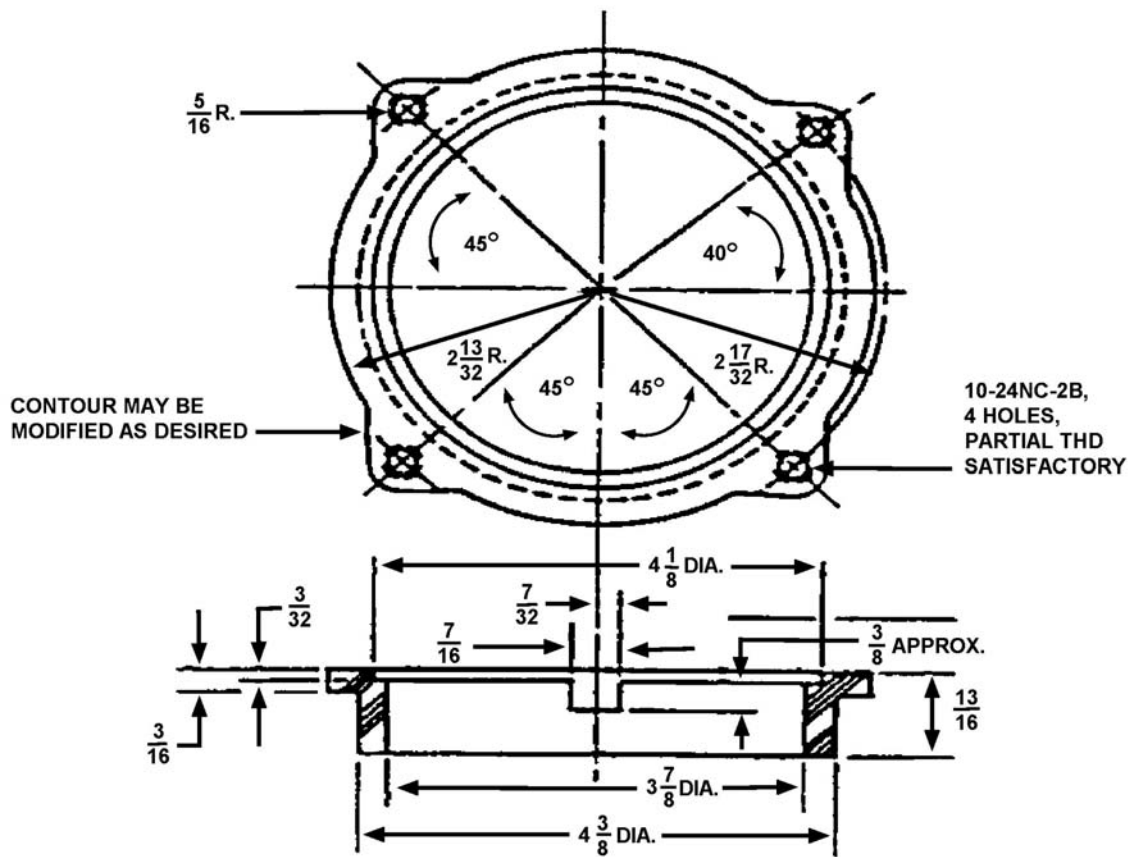


FIGURE 12. Universal lamp retainer.

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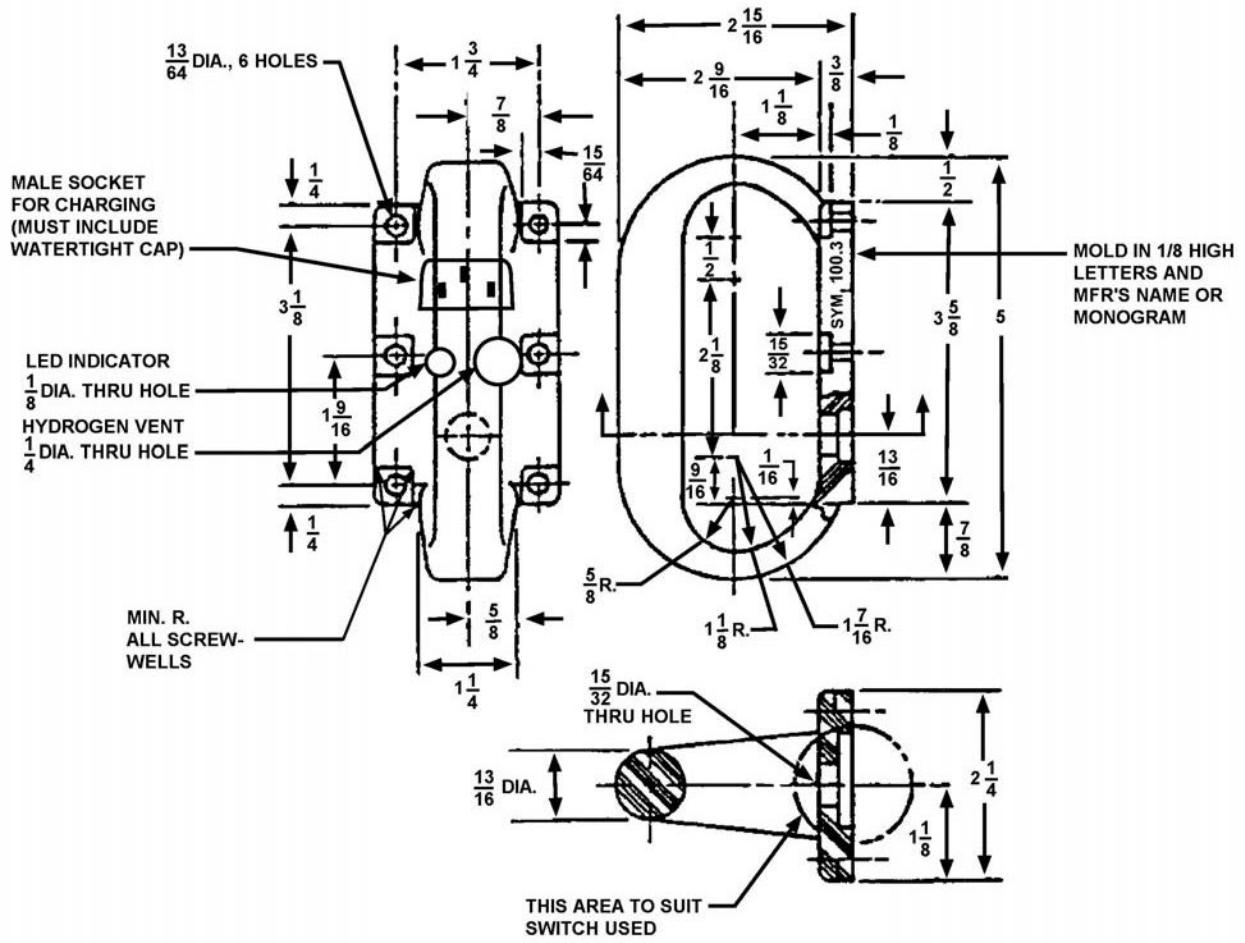


FIGURE 13. Rechargeable handle.

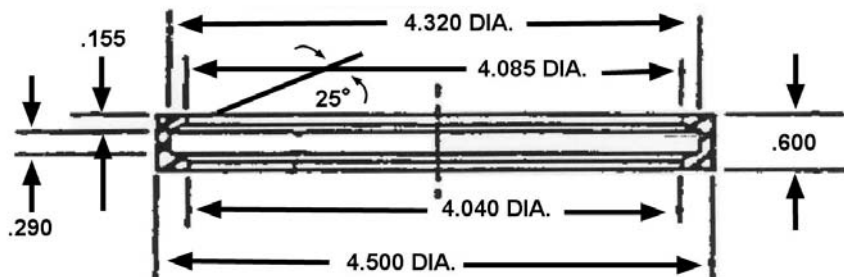


FIGURE 14. Gasket, lamp.

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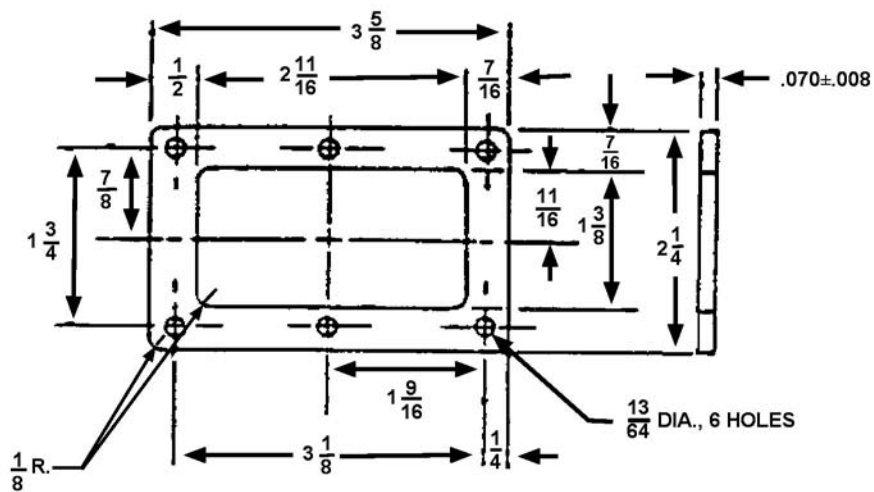


FIGURE 15. Universal gasket for handle and top plate assembly.

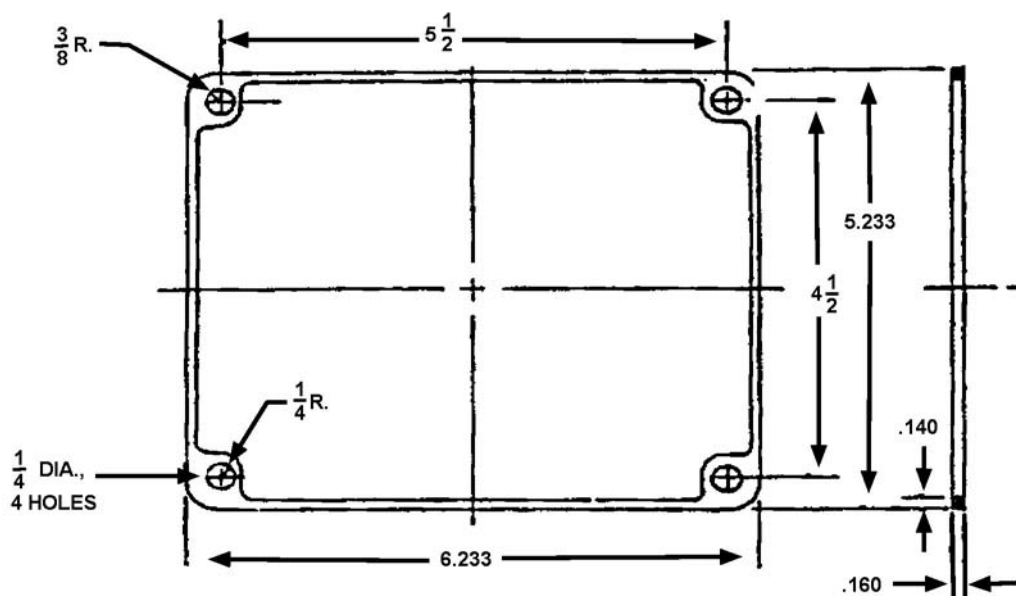


FIGURE 16. Universal gasket, cover.

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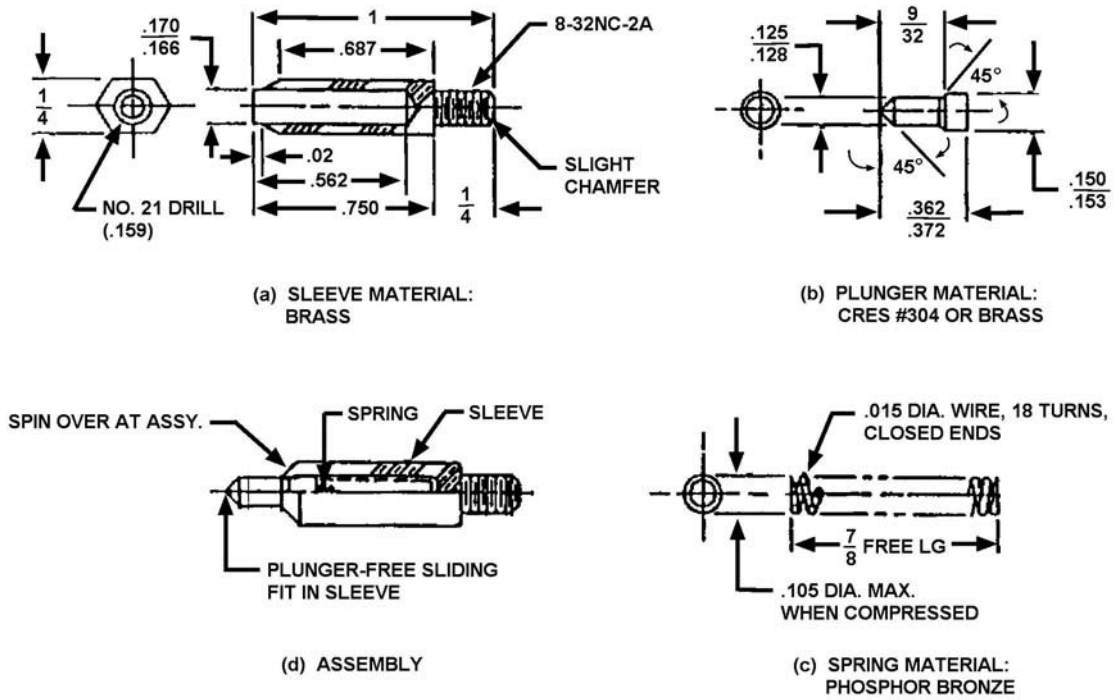


FIGURE 17. Universal lamp contact assembly.

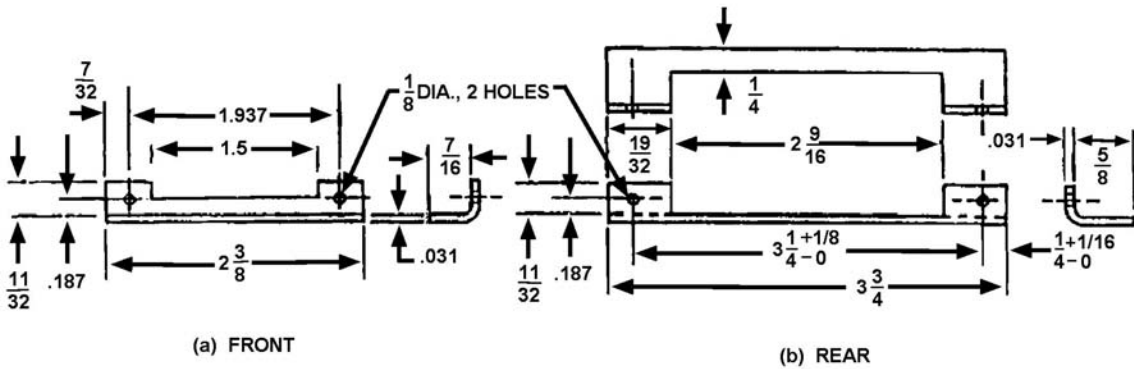


FIGURE 18. Universal battery contact connectors.

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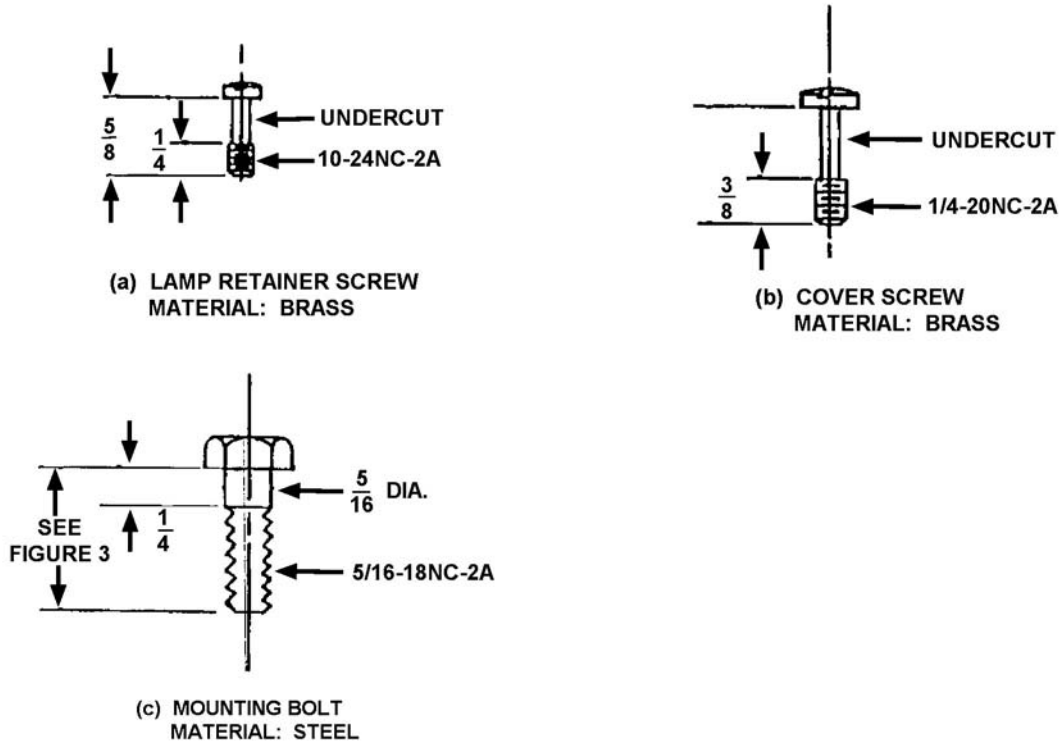


FIGURE 19. Universal screws and bolts.

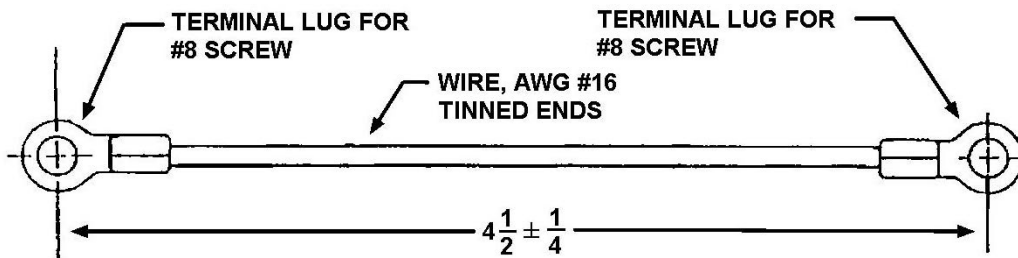


FIGURE 20. Universal wire assembly.

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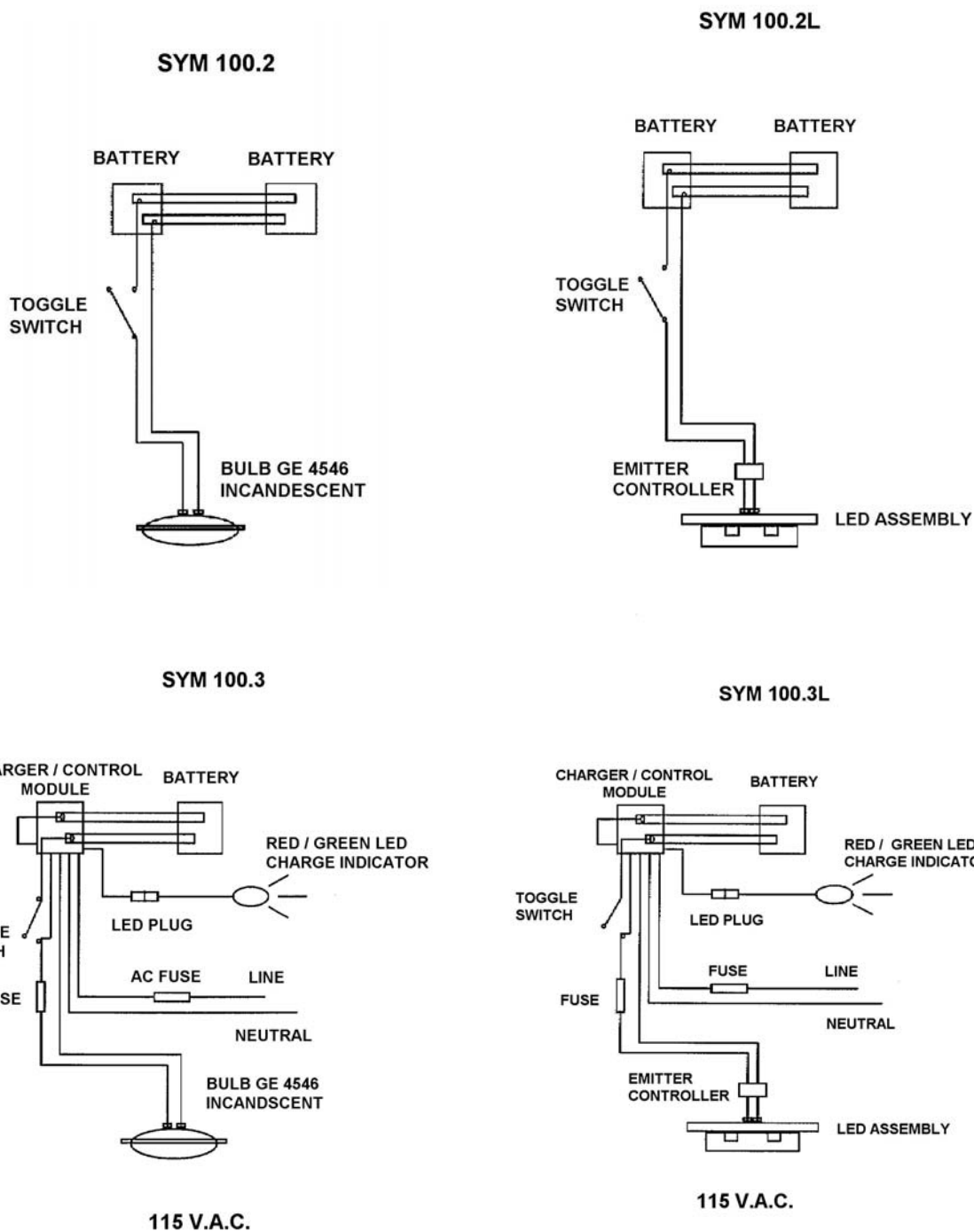
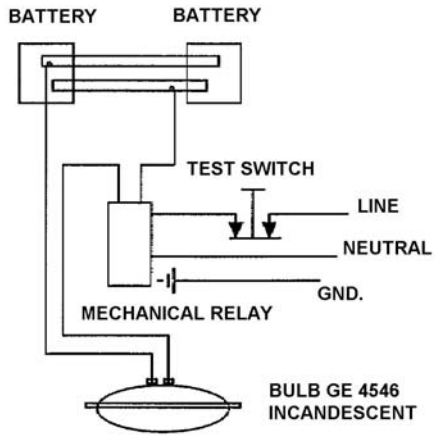


FIGURE 21. Wiring diagram.

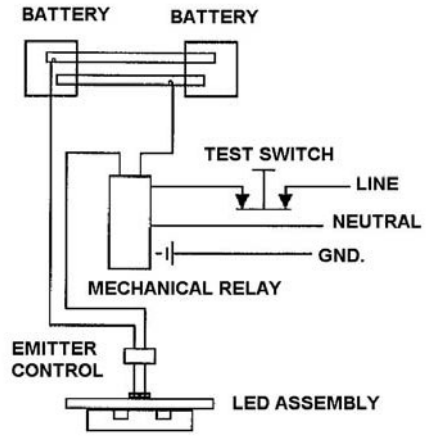
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SYM 101.2
SYM 102.2



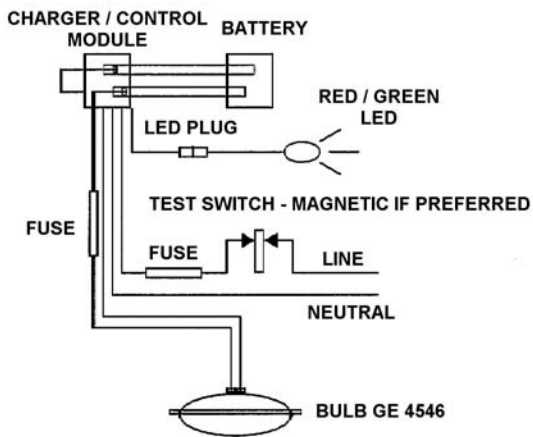
115 V.A.C.
115 V.A.C.

SYM 101.2L
SYM 102.2L



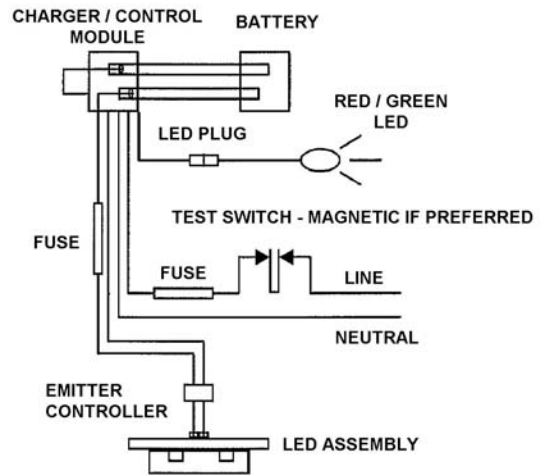
115 V.A.C.
115 V.D.C.

SYM 101.3



115 V.A.C.

SYM 101.3L

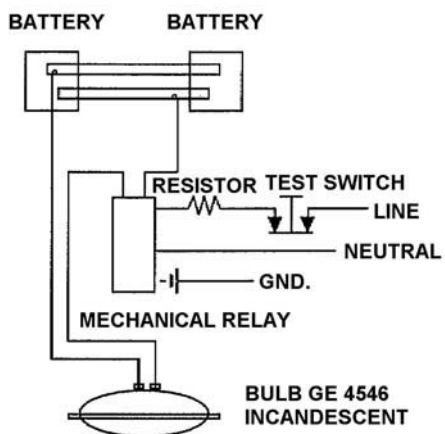


115 V.A.C.

FIGURE 21. Wiring diagram - Continued.

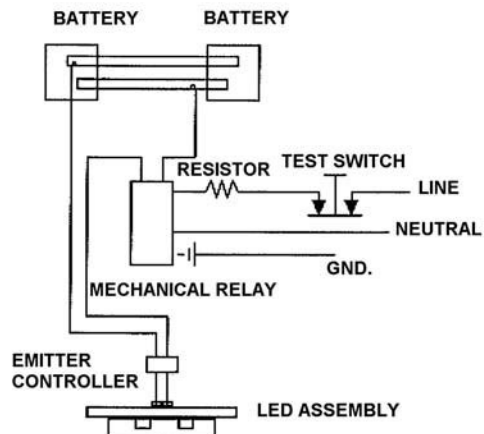
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SYM 108



230 V.D.C.

SYM 108L

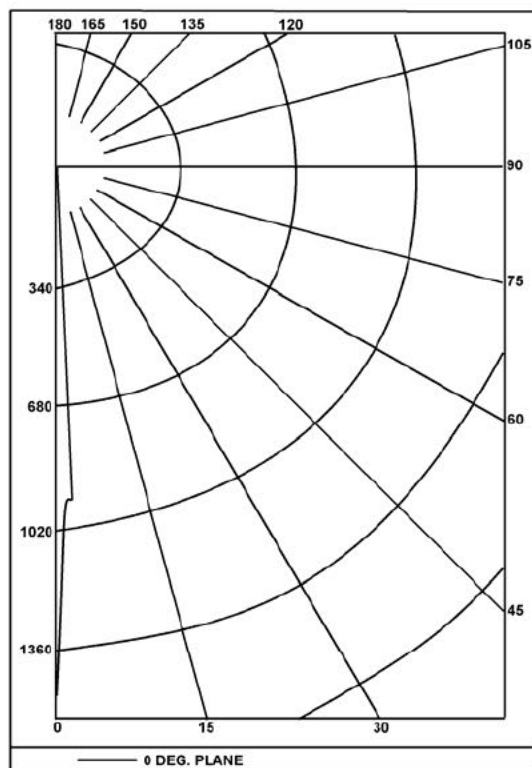
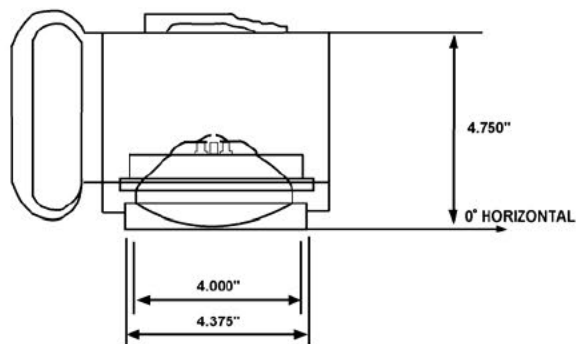


230 V.D.C.

NOTE: For Symbol 100.2, 100.3, 101.2, 102.2, and 108 lanterns, two non-rechargeable batteries are used. For Symbol 101.3 lanterns, one charger/control unit and one rechargeable battery are used.

FIGURE 21. Wiring diagram - Continued.

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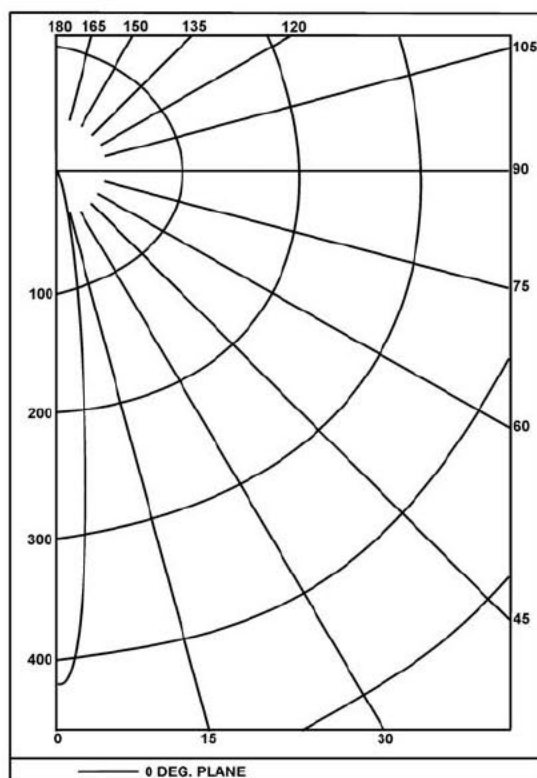
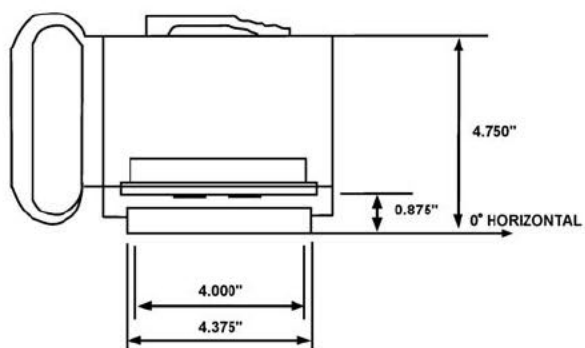


DEG	CANDELA	LUMENS
0	431	
5	242	20
15	45	13
25	6	3
35	2	2
45	1	1
55	0	0
65	0	0
75	0	0
85	0	0
90	0	

NOTE: Test distance is 10 ft.

FIGURE 22. Incandescent photometric test set-up, resultant curve, and candela/lumen distribution.

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DEG	CANDELA	LUMENS
0	1593	
5	85	13
15	2	1
25	0	0
35	1	0
45	2	2
55	4	4
65	7	5
75	0	0
85	0	0
90	0	

NOTE: Test distance is 10 ft.

FIGURE 23. LED photometric test set-up, resultant curve, and candela/lumen distribution.

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REQUIREMENTS:

Type:	II and solid state
Class:	1
Symbol 100.2/100.2L:	Lantern, portable, with handle and mounting bracket/LED model.
Symbol 100.3/100.3L:	Lantern, portable, rechargeable with handle and mounting bracket/LED model.
Symbol 101.2/101.2L:	Lantern, relay, 115 VAC/LED model.
Symbol 101.3/101.3L:	Lantern, rechargeable, 115 VAC/LED model.
Symbol 102.2/102.2L:	Lantern, relay, 115 VDC/LED model.
Symbol 108/108L:	Lantern, relay, 230 VDC/LED model.
Design:	
Dimensions and configurations:	See Figures 1 through 21.
Material:	
Box, cover, lamp retainer:	Material for box and cover lamp retainer shall be molded plastic. The color of molded parts shall be yellow conforming to color number 13415 of FED-STD-595 attained without resort to painting, enameling, or other post-molding applications. Plastic material shall be in accordance with ASTM D5948 or one of the following: Floerite number X5064, Glaskyd number 1902, Plaskon number 446, Raflon number 1030, or equal.
Screws:	All screws shall be brass.
Lockwashers:	All lockwashers shall be phosphor-bronze, internal-lock.
Inserts:	All inserts shall be brass.
Lantern assembly (complete) and typical mounting:	See Figures 1 and 2.
Body assembly:	See Figure 3. All parts shown on Figure 3 shall be furnished assembled as indicated.
Bolts:	Gaskets or bolts with self-contained gaskets such as "steel-bolts" shall be furnished so as to seal the mounting holes against the entrance of water where the body is assembled and mounted in the condition shown on Figure 2.
Mounting bolts:	Mounting bolts shall be as shown on Figures 3 and 19.
O-ring:	O-ring gaskets shall be furnished to seal the mounting holes against the entrance of water when the body is assembled and mounted in the condition shown on Figure 2.
LED cluster description:	The LED cluster shall be balanced by electronic circuitry to provide evenly distributed light output in accordance with LED manufacturer specifications. The LED cluster must also provide luminance equal to or greater than that included in Figure 2.
Lamp:	Lamp shall be in accordance with A-A-50595 and provide luminance equal to or greater than that included in Figure 2.

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Lamp contact assembly:	See Figure 17. The plunger shall work freely in the sleeve without rubbing or coming adrift.
Battery contact connectors:	See Figure 18. Material shall be brass, half hard. Battery contact connectors shall be silver plated.
Box, cover and lamp-retainer:	See Figures 10, 11, and 12 respectively.
Wire assembly:	See Figure 20.
Gasket, lamp:	See Figure 14. Material shall be neoprene rubber, 45-55 durometer A.
Gasket, cover:	See Figure 16. Material shall be neoprene rubber, 45-55 durometer A.

Note ^{1/}: No rechargeable lantern shall have test switches other than magnetic test switches or non-sparking test switches and all switches must be watertight.

Portable lantern handle assembly ^{1/} :	See Figure 5. All parts shown on Figure 5 shall be furnished assembled as indicated.
Switch:	Switch shall be non-sparking and watertight toggle, pushbutton, or magnetic actuating.
Boot:	Boot shall be in accordance with MIL-DTL-5423/2.
Gasket:	See Figure 15. Material shall be neoprene rubber 45-55 durometer A.
Bracket assembly:	See Figure 8. Material shall be steel; zinc or cadmium plated.
Packing assembly:	Packing assembly shall be in accordance with ASTM F1836M.
Switch:	Switch shall be pushbutton, momentary, in accordance with M8805/20-12 of MIL-PRF-8805/20, except that it shall be one circuit furnished without the nut and lockwasher.
Boot:	Boot shall be style 2, size 3 of MIL-DTL-5423/7.
Gasket:	See Figure 15. Material shall be neoprene rubber 45-55 durometer A.
Wire assembly:	See Figure 20.
Ground connection:	The metal neck of the pushbutton switch and the relay metallic frame shall be electrically connected to the green lead of the supply cable for grounding to ships structure.
Wiring:	Interconnecting and power leads shall be soldered on switch and relay terminals. The connections shall be mechanically secure and electrically continuous after soldering.
Insulating sleeve:	Shrink-on insulating sleeves shall be installed over all electrical connections carrying 120 or higher voltage. No metallic parts of such connections shall be exposed. Insulating sleeves shall not be loose or allowed to move. Insulating sleeves are not required for ground connections or electrical connections of the battery circuit.

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- Rechargeable retrofit kit: The rechargeable retrofit kit shall convert a Symbol 100.2 or 101.2 (non-rechargeable) lantern into a Symbol 100.3 or 101.3 (rechargeable) lantern. The rechargeable retrofit kit shall consist of a charger/control unit, a hydrogen vent with an indicating LED assembly, and the appropriate wiring and connectors. The rechargeable battery specified herein shall be acquired separate from the rechargeable retrofit kit. The configuration of the charger/control unit and the rechargeable battery shall be such that they cannot be placed in the incorrect position.
- LED retrofit kit: The rechargeable retrofit kit shall convert a Symbol 101.2 (non-rechargeable) lantern or a Symbol 101.3 (rechargeable) lantern into a Symbol 101.2L or 101.3L (LED) lantern. The LED retrofit kit shall consist of plexiglass or plastic lens in accordance with MIL-E-917 and MIL-DTL-24191, an LED mounted on a backplate that will fit in place of the incandescent assembly. The assembly must also provide a watertight seal to preserve the watertight integrity of the lantern.

Note ^{2/}: All electrical components contained in the charger/control unit must be completely sealed against gases and moisture.

Charger/control unit (for Symbol 100.3, 100.3L, 101.3, and 101.3L only)^{2/}:

- Power input: 115 VAC
- High voltage cutoff: 6.9 V nominal
- Low voltage cutoff: 5.25 - 5.5 V nominal
- Maximum charging current: 500 mA
- Recharging activation: The charger/control unit shall automatically initiate charging once the battery has less than 90 percent of full charge and 115 VAC power is restored.
- Lantern activation: The charger/control unit shall automatically turn the lantern on when there is a loss of 115 VAC power and remain on until the battery reaches the low voltage cutoff.
- Maximum recharge time: 16 hours
- Electromagnetic interference: In accordance with RE101, RE102, CE101, and CE102 requirements of MIL-STD-461.
- Terminals: Must connect to/make contact with the existing battery contact connectors (see Figure 18).
- Dimensions: The charger/control unit shall have identical dimensions of a type BA-200/U battery in accordance with ANSI C18.1M.

LED indicator assembly (for Symbol 100.3, 100.3L, 101.3, and 101.3L): The LED indicator assembly shall be mounted on the rechargeable top plate (Bulkhead Mount - see Figure 9) and rechargeable handle assembly (Portable - see Figure 6) such that it can be readily visible from the front of the lantern. The LED indicator shall distinguish between a charging and fully charged battery mode. No illumination shall be indicative of the absence of 115 VAC or a defective LED indicator.

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Wiring/connections (for Symbol 100.3, 100.3L, 101.3, and 101.3L):	Appropriate wiring for the charger/control unit and the LED indicator assembly shall be supplied as part of the rechargeable retrofit kit. The connections between the power input leads and charger/control unit and the connections between the LED indicator assembly and the charger/control unit shall be made using suitable connectors.
Time of lamp illumination (for Symbol 100.3, 100.3L, 101.3, and 101.3L):	Not less than 4 hours before the lantern reaches the low voltage cutoff of 5.25 - 5.5 V.
Batteries (for Symbols 100.2, 100.2L, 101.2, 101.2L, 102.2, 102.2L, 108, and 108L lanterns):	Lanterns shall accommodate two batteries in parallel, type BA-200/U in accordance with ANSI C18.1M. Batteries are not furnished.
Rechargeable battery (for Symbol 100.3, 100.3L, 101.3, and 101.3L):	Rechargeable lanterns shall accommodate one rechargeable battery as specified herein. Batteries are not furnished with the rechargeable retrofit kit.
Type:	Sealed, lead-acid, maintenance free.
Nominal voltage:	6.0 V
Nominal capacity:	5.0 ampere-hours at 20-hour rate, load of 200 mA 4.0 ampere-hours at 6-hour rate, load of 500 mA
Terminals:	Two coil springs, for contact with the existing battery contact connectors (see Figure 18).
End of discharge voltage:	5.5 V nominal
Self-discharge per month at 68 °F:	Not greater than 3 percent.
Operating temperature range:	0 °F to 122 °F
Cycle life (at 500 mA, at 100% depth of discharge):	Not less than 800 cycles before battery is down to 80 percent of rated capacity.
Capacity loss per 100 cycles:	Not greater than 2.5 percent.
Dimensions:	The rechargeable battery shall have the identical dimensions of a BA-200/U type battery of ANSI C18.1M.
Enclosure:	Watertight-complete lanterns.
Operating temperature:	Not greater than 122 °F.

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Weight:

Symbol 100.2 and 100.2L 5 lbs., 9 oz. maximum without batteries.

Symbols 101.2, 101.2L, 102.2, 102.2L, 108, and 108L: 6 lbs., 8 oz. maximum without batteries.

Symbol 100.3, 100.3L, 101.3, and 101.3L: 10 lbs., 8 oz. maximum with rechargeable battery, charger/control unit, rechargeable top plate, and the LED indicator assembly installed.

Labels: Labels shall be furnished in accordance with MIL-DTL-16377. The following labels and information shall be furnished.

Type I – See MIL-DTL-16377.

Type III – Wiring diagram of Figure 21.

Type IV – “USE FOLLOWING REPAIR PARTS

Lamp	A-A-50595
Boot for toggle switch	M5423/02
Boot for pushbutton switch	M5423/07-03
Toggle switch	MS16656-2
Pushbutton switch	M8805/20-12”

Quality assurance: Quality assurance shall be as specified in MIL-DTL-16377 and as follows:

First article inspection:

Body assembly: See Table I.

Handle assembly: See Table I.

Rechargeable retrofit kit See Table I.

LED retrofit kit See Table I.

Bracket assembly: Examination only.

Quality conformance:

Comparison inspection: Same as the first article inspection.

Inspection of product for delivery:

Examination: See MIL-DTL-16377.

Examination for packaging: See MIL-DTL-16377.

Quality conformance tests: See MIL-DTL-16377.

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TABLE I. Required first article testing for battle lanterns.

TEST	SPECIFICATION
Enclosure effectiveness	MIL-DTL-16377
Mechanical shock	MIL-DTL-16377
Thermal shock (glassware/plastics)	MIL-DTL-16377
High impact shock	MIL-DTL-16377
Vibration	MIL-DTL-16377
Shipboard interface	MIL-STD-1399
Luminance	Figure 2 and Figure 2

GENERAL INFORMATION:

Assignment of military part numbers and general information is shown in Table II.

TABLE II. Part number and general information.

MILITARY PART NUMBER M16377/53	ITEM NAME	REMARKS
-100.2	Complete lantern, Symbol 100.2	1/ 6/
-101.2	Complete lantern, Symbol 101.2	2/ 6/
-102.2	Complete lantern, Symbol 102.2	3/ 6/
-108	Complete lantern, Symbol 108	4/ 6/
-101.3	Complete lantern, Symbol 101.3	5/ 6/
001	Body assembly	
002	Recharging handle assembly	
003	Bracket assembly	
004	115 VAC recharging top plate assembly	
005	115 VDC recharging top plate assembly	
006	220 VDC recharging top plate assembly	
007	Cover gasket, Figure 16	
008	Rechargeable retrofit kit	

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TABLE II. Part number and general information - Continued.

MILITARY PART NUMBER M16377/53	ITEM NAME	REMARKS
009	Rechargeable battery	
010	LED retrofit kit	

NOTES:

- ^{1/} Symbol 100.2 consists of part numbers: M16377/53-001, M16377/53-002, M16377/53-003, and M16377/53-010 if LED (LED becomes Symbol 100.2L).
- ^{2/} Symbol 101.2 consists of part numbers: M16377/53-001, M16377/53-004, and M16377/53-010 if LED (LED becomes Symbol 101.2L).
- ^{3/} Symbol 102.2 consists of part numbers: M16377/53-001, M16377/53-005, and M16377/53-010 if LED (LED becomes Symbol 102.2L).
- ^{4/} Symbol 108 consists of part numbers: M16377/53-001, M16377/53-006, and M16377/53-010 if LED (LED becomes Symbol 108L).
- ^{5/} Symbol 101.3 consists of part numbers: M16377/53-001, M16377/53-008, M16377/53-009, and M16377/53-010 if LED (LED becomes Symbol 101.3L).
- ^{6/} Lanterns are not furnished as complete units. Complete lanterns shall be assembled using the component parts indicated.
- Lanterns are intended to be mounted onboard ship as shown on Figure 2.
 - Lanterns over surgical tables onboard ship are intended to be mounted using the adjustable bracket shown on MIL-F-16377/55.
 - Color filters, MIL-F-16377/43, shall be used to convert white (clear) light lanterns into colored light lanterns.

CHANGES FROM PREVIOUS ISSUE: Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:
Army – AV
Navy – SH

Preparing Activity:
Navy – SH
(Project 6230-1093-000)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil>.