MIL-C-24174A(SH)
2 October 1987
SUPERSEDING
MIL-C-24174(SHIPS)
29 September 1967
(See 6.8)

MILITARY SPECIFICATION

CONTROLS, NAVIGATION LIGHTS, GENERAL SPECIFICATION FOR

This specification is approved for use within the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the general requirements for controls for flashing of navigational lights under conditions requiring sequence flashing (pulsation) of these lights for signalling purposes.

1.2 Classification. Controls shall be of the types specified on the individual specification sheet (see 3.1 and 6.2).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 6110

SPECIFICATIONS

MILITARY

MIL-M-14 - Molding Plastics, and Molded Plastic Parts, Thermosetting.
MIL-S-901 - Shock Tests, H.I. (High Impact); Shipboard Machinery, Equipment and Systems, Requirements for.
MIL-E-917 - Electric Power Equipment, Basic Requirements (Naval Shipboard Use).
MIL-E-2036 - Enclosures for Electric and Electronic Equipment, Naval Shipboard.
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-T-16366 - Terminals, Electrical Lug and Conductor Splices, Crimp-Style.
MIL-E-17555 - Electronic and Electrical Equipment, Accessories and Provisioned Items (Repair Parts): Packaging of.
MIL-E-24142 - Enclosures, for Electrical Fittings and Fixtures, General Specification for.
MIL-E-24142/4 - Enclosure, Submersible (15-Foot) Size 4 by 7.
MIL-E-24142/5 - Enclosures for Electrical Fittings and Fixtures, Submersible, (15-Foot), Sizes 3R, 4R and 5R.
MIL-C-24174/3 - Control (Blinker) Key, Navigation Lights Symbol No. 978.2.
MIL-C-24174/4 - Controls, Pulsator, Submarine Identification Light, A.C. 125 Volts, Symbol No. 932.
MIL-P-15037 - Plastic Sheet, Laminated, Thermosetting, Glass-Cloth, Melamine-Resin.

STANDARDS

FEDERAL

FED-STD-H28 - Screw-Thread Standards for Federal Services.

MILITARY

MIL-STD-167-1 - Mechanical Vibrations of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited).
MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
MIL-STD-740-1 - Airborne Sound Measurements and Acceptance Criteria of Shipboard Equipment.
MIL-STD-740-2 - Structureborne Vibratory Acceleration Measurements and Acceptance Criteria of Shipboard Equipment.

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN WELDING SOCIETY (AWS)
Welding Handbook

(Application for copies should be addressed to the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33135.)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
ICS 6 - Enclosures for Industrial Controls and Systems.

(Application for copies should be addressed to the National Electrical Manufacturers Association, 2101 L Street, NW, Washington, DC 20037.)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
National Electrical Code.

(Application for copies should be addressed to the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.)

UNIFORM CLASSIFICATION COMMITTEE AGENT
Uniform Freight Classification Ratings, Rules and Regulations.

(Application for copies should be addressed to the Uniform Classification Committee Agent, Tariff Publication Officer, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 First article. When specified in the contract or order, a sample shall be subjected to first article inspection (see 4.3 and 6.3).

3.3 Materials. Materials shall be as specified (see 6.2). Materials not specified shall be of the best quality for the purpose intended.

3.3.1 Restricted material.

3.3.1.1 Cast iron. Cast iron (gray iron) or other brittle material shall not be used.

3.3.1.2 Flammable material. Flammable or explosive material, or material which can produce toxic or suffocating fumes, shall not be used.

3.3.2 Insulating materials.

3.3.2.1 Plastics, molded. Molded insulated parts shall conform to type MFI-20, MAI-60 or MMI-30 of MIL-M-14.

3.3.2.2 Plastics, laminated. Laminated plastic material shall be in accordance with MIL-P-15037.

3.3.3 Recovered materials. Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and may be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

3.4 Dimensional tolerances. The following tolerances shall apply:

(a) Fractional tolerances: plus or minus 1/64 inch.
(b) Decimal tolerances: plus or minus 0.005 inch.

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

3.5 Preparation of metal parts. Drilling, countersinking or tapping of metal parts shall be accomplished before plating or finish is applied.

3.6 Threads. Threads shall be right-hand, class 2 and shall conform to FED-STD-H28.

3.6.1 Locking devices. Locking devices shall be used to secure mechanical assemblies to provide continuous operation under conditions of heat, shock and vibration specified herein.

3.6.2 Self-tapping devices. Self-tapping devices and sheet metal screws shall not be used in the assembly of these controls.

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

3.8 Stress relief. Metals used in fabrications and assembly shall be treated or heat-treated to prevent deterioration or failure due to stresses or other conditions resulting from working, forming, welding and so forth, during the fabrication process. Peening after welding is an acceptable method of stress relieving (see AWS Welding Handbook).

3.9 Junction boxes. The junction boxes shall be watertight and conform to MIL-E-24142.

3.9.1 Submersible junction boxes. Submersible junction boxes larger than 60 cubic inches shall have a moisture drain on the bottom. The opening shall be closed with a 1/4-inch or larger pipe plug.

3.9.2 Junction box configuration. Junction boxes shall be so constructed that all necessary cables of adequate size can be brought into the box through either top or bottom.

3.10 Limitations.

3.10.1 Size limitations. Controls shall be as small and light as practicable, and shall be sufficiently rugged to withstand mechanical shock so that damage or distortion will not be of sufficient magnitude as to impair continued operation of the control.

3.10.2 Mounting dimensions. Mounting dimensions shown on specification sheets (see 3.1) shall be maintained and maximum overall dimensions shall not be exceeded.

3.10.3 Interchangeability. In no case shall parts be physically interchangeable or reversible unless such parts are also interchangeable or reversible with regard to function, performance and strength.

3.11 Mechanical details.

3.11.1 Diagrams and identification plates.

3.11.1.1 Connection diagram. Each control shall include a connection diagram. The information shall be printed by a process that is nonfading, protected by transparent plastic, and secured to the enclosure door or cover in accordance with MIL-E-2036. The preferred method is to laminate the diagram between two layers of polyester film by a heat process.

3.11.1.2 Identification plate. The identification plate shall conform to MIL-P-15024 and MIL-P-15024/5 and shall contain the following information:

(a) Manufacturer.
(b) Contract number.
(c) Specification sheet number.
(d) Date of manufacture (year).

3.12 Electrical details.

3.12.1 Clearances. Minimum electrical creepage and clearances shall be as required by the National Electrical Code.

3.12.2 Lugs and terminals. Lugs and terminals shall be in accordance with MIL-T-7928 and MIL-T-16366.

3.12.3 Wiring space. Adequate cabling space shall be provided for both power input cable as well as branch circuit cabling in accordance with the requirements of the National Electrical Code.

3.13 Painting. Painting and protection against corrosion shall be in accordance with MIL-E-917 or as specified (see 6.2). The exterior and interior surfaces of all enclosures shall be painted. The order of operations shall be as follows:

(a) Complete all fabricating operations, such as welding, machining, drilling, tapping and stress relieving.
(b) Remove all rust and other visible corrosion products.
(c) Remove all grease, oil and dirt by solvent wiping, vapor degreasing, or caustic washing and rinsing.
(d) Apply primer pretreatment coating or chemical treatment and primer.
(e) Apply enamel.

3.14 Operational requirements.

3.14.1 Inclination. The controls shall operate at a rated voltage when inclined to an angle of 45 degrees from the vertical in any direction and not malfunction when inclined to an angle of 60 degrees from the vertical in any direction.

3.14.2 Vibration. The controls shall withstand type I vibration tests of MIL-STD-167-1, without mechanical damage or malfunction.

3.14.3 Shock. The controls shall withstand the shock test for grade A, class I, shockproofness specified in MIL-S-901 without damage or loosening of parts.

3.14.4 Corrosion. The controls shall satisfactorily withstand the salt spray test specified in 4.3.5.

3.14.5 Noise. The noise generated by the controls shall not exceed the noise limitation for equipment in accordance with grade A, airborne noise of MIL-STD-740-1 and type III structureborne noise requirements of MIL-STD-740-2.

3.15 Drawings. Drawings shall consist of manufacturer's drawings, certified by the cognizant Government inspector as complying with the requirements of this specification. The certification shall be documented on the drawing as a matter of record. Drawings shall carry manufacturer's numbers and the number of the applicable specification sheet. (Formal approval and validating signatures by the Naval Sea Systems Command (NAVSEA) for manufacturer's drawings will not be required nor will NAVSEA drawing numbers be assigned.)

3.16 Workmanship. Workmanship shall be first class in every respect.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor 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.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

(a) First article inspection (see 4.3).
(b) Quality conformance inspection (see 4.4).

4.3 First article inspection. The first article sample shall be subjected to the examination and tests specified in 4.6 and 4.7 and the tests specified in 4.3.1 through 4.3.5. The first article sample blinker key shall be furnished complete as shown on figure 1, including mounting bases, subbases, buswork, lugs (when required), terminals and assemblies, switches, and so forth.

4.3.1 Shock. The first article sample shall be subjected to the HI-shock tests specified in MIL-S-901 for grade A, class I equipment. Control components (that is, switches, and so forth) which have previously successfully passed the HI-shock requirements need not be retested. In lieu thereof, a simulated component may be substituted for the purpose of testing. The manner of mounting shall simulate the actual mounting on shipboard. The sample being tested shall not be reconditioned or adjusted during the testing. The specimen being tested shall be considered as failing the test in event parts are damaged or loosened.

4.3.2 Vibration. The first article sample shall be subjected to type I vibration tests up to and including the frequency range of 15 hertz (Hz) as required by MIL-STD-167-1. The manner of mounting shall simulate the actual mounting on shipboard. The use of resilient mounting shall not be permitted. Acceptability shall be contingent upon the ability of the equipment to withstand the specified tests and perform its principal functions during and after such tests. Failure of the equipment to function satisfactorily after testing shall be considered cause for rejection.

4.3.3 Noise. The first article sample shall be subjected to the noise level tests specified for the equipment in accordance with MIL-STD-740-1 and MIL-STD-740-2 (see 3.14.5).

4.3.4 Heat test. The first article sample shall be subjected to heat testing. The heat testing shall be made under simulated conditions equivalent to normal operating conditions employing maximum rated voltage, maximum load and rated frequency. The test shall be conducted continuously until the temperatures have remained constant for 1 hour. Temperature rise in current carrying parts (bus bars, connection points, fuse clips, terminals, and so forth) shall not exceed 45 degrees Celsius (°C) above an ambient room temperature of 40°C. The air temperature within the controls shall not exceed 65°C.

4.3.5 Corrosion. The first article sample shall be subjected to salt spray tests specified in MIL-STD-202, method 101D, condition A. The salt solution concentration shall be 20 percent.

4.3.6 Redesign of controls. Redesign of a control, once the manufacturer has established the control design as a matter of record, shall require resubmission of a sample for first article testing.

4.4 Quality conformance inspection. Quality conformance inspection shall consist of the examination of 4.6 and tests of 4.7.

4.5 Sampling for quality conformance.

4.5.1 Lot. For the purpose of sampling, a lot shall be considered to be the identical number of controls of each type in the contract or order.

4.5.2 Sampling for examination and effectiveness of enclosure and dielectric test. A random sample of controls of each type shall be selected in accordance with table I from each inspection lot and shall be subjected to the examination specified in 4.6 and the tests specified in 4.7. Any control containing one or more defects and any control failing in one or more tests shall not be offered for delivery. If the number of such defective controls in any sample exceeds the acceptance number for the sample, the lot represented by the sample shall not be offered for delivery.

TABLE I. Sampling for examination and effectiveness of enclosure and dielectric tests.

Number of controls in inspection lot	Number of controls 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

4.6 Examination. The controls shall be examined to determine conformance to the requirements of this specification which do not require tests. Alignment of parts shall be observed to determine that components are in good working order and that the requirement for interchangeability of parts is realistic.

4.7 Tests.

4.7.1 Effectiveness of enclosure. Each sample selected in accordance with 4.5.2 shall be tested to determine the effectiveness of the enclosure in accordance with NEMA ICS 6.

4.7.2 Dielectric. Each sample selected in accordance with 4.5.2 shall be subjected to dielectric testing. The sample shall be subjected for 1 minute to a dielectric test voltage, the effective potential of which is twice rated voltage plus 1000 volts (except low voltage controls such as 24 to 30 volts for which twice rated voltage plus 500 volts is applicable), applied between points of opposite polarity and between live parts and ground. The frequency of the voltage shall be 60 Hz root mean square alternating current (ac) and shall approximate a true sine wave.

4.8 Inspection of packaging. Sample packages and packs, and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition. For the extent of applicability of the packaging requirements of referenced documents listed in section 2, see 6.5.)

5.1 Domestic shipment and early equipment installation and for storage of on board repair parts.

5.1.1 Controls.

5.1.1.1 Preservation and packaging. Preservation and packaging which may be the contractor's commercial practice, shall afford adequate protection against corrosion, deterioration and physical damage during shipment from the supply source to the using activity and until early installation.

5.1.1.2 Packing. Packing shall be accomplished in a manner which will insure acceptance by common carrier at the lowest rate and will afford protection against physical or mechanical damage during direct shipment from the supply source to the using activity for early installation. The shipping containers or method of packing shall conform to the Uniform Freight Classification Rating, Rules and Regulations or other carrier regulations as applicable to the mode of transportation and may conform to the supplier's commercial practice.

5.1.1.3 Marking. Shipment marking information shall be provided on interior packages and exterior shipping containers in accordance with the contractor's commercial practice. The information shall include nomenclature, Federal stock number or manufacturer's part number, contract or order number, contractor's name and destination.

5.1.2 On board repair parts. On board repair parts shall be preserved and packaged by level A, packed by level C and marked by level A and C respectively in accordance with MIL-E-17555.

5.2 Domestic shipment and storage or overseas shipment. The requirements and levels of preservation, packaging, packing and marking for shipment shall be as specified by the contracting activity (see 6.2).

5.2.1 Preservation and packaging, packing, and marking. The equipment and accessories, and on board repair parts shall be preserved and packaged by level A or C; packed by level A or B and marked in accordance with MIL-E-17555.

6. NOTES

6.1 Intended use. The navigation light controls covered by this specification are intended for use with navigation light supply and control panels (see MIL-P-24175) on Navy ships.

6.2 Ordering data. Acquisition documents should specify the following:

(a) Title, number, and date of this specification.
(b) Type required (see 1.2).
(c) Title, number, and date of applicable specification sheet (see 3.1).
(d) When first article is required (see 3.2).
(e) Material required (see 3.3).
(f) Painting required, if other than as specified (see 3.13).
(g) Level of preservation, packaging, packing and marking required if other than as specified in 5.1 (see 5.2).

6.3 First article. When a first article inspection is required, the item should be a first article sample. The first article should consist of one unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired 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 contract.

6.4 Provisioning. Provisioning Technical Documentation (PTD), spare parts, and repair parts should be furnished as specified in the contract.

6.4.1 When ordering spare parts or repair parts for the equipment covered by this specification, the contract should state that such spare parts and repair parts should meet the same requirements and quality assurance provisions as the parts used in the manufacture of the equipment. Packaging for such parts should also be specified.

6.5 Sub-contracted material and parts. The packaging requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.6 Replacement data. Controls covered in the associated specification sheets of this specification replaces those covered in the following drawing:

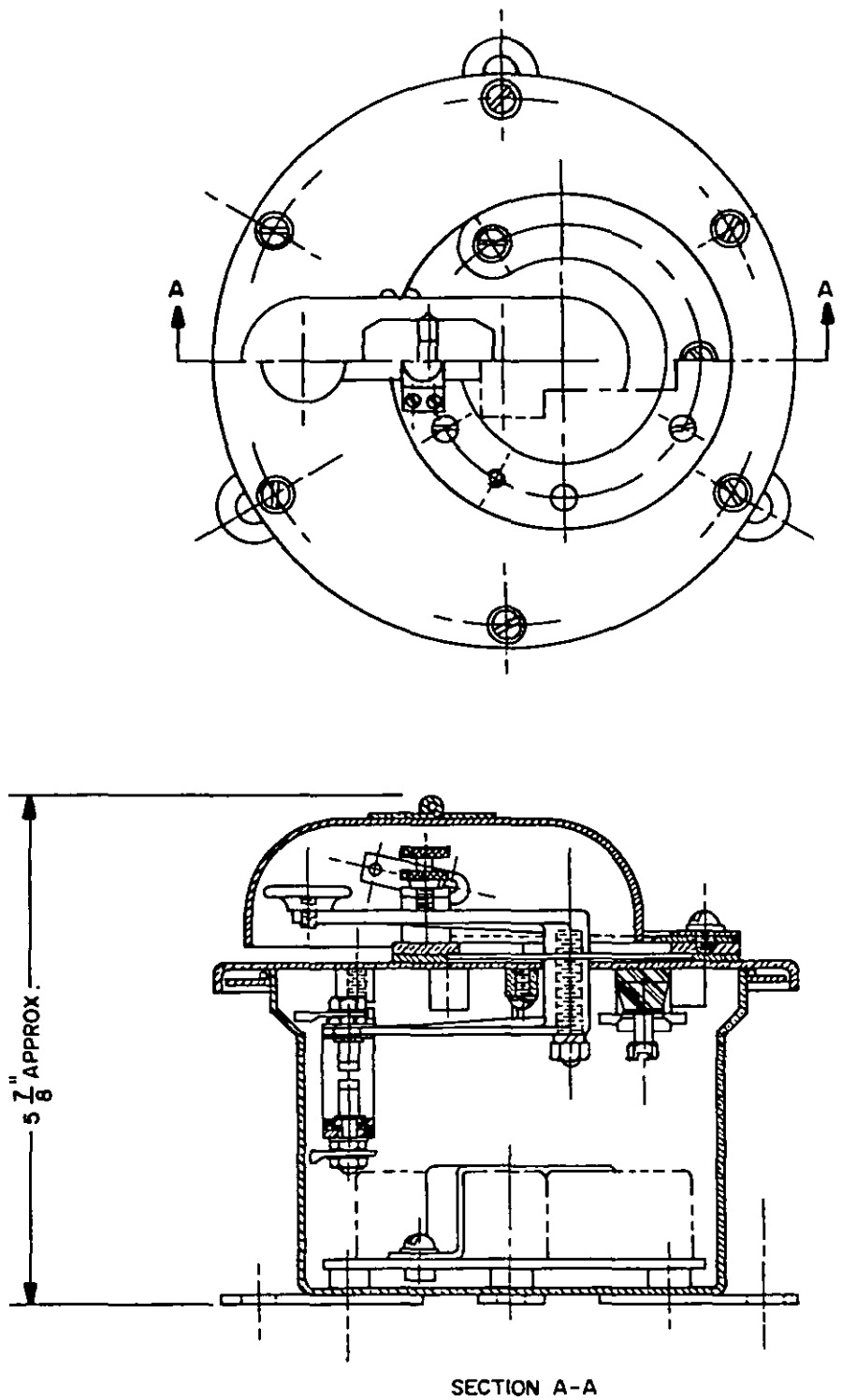
Specification Sheet		Drawing
MIL-C-24174/3(SHIPS)	replaces	9000-S6202-74272

6.7 Subject term (key word) listing.

Pulsation
Signals

6.8 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Preparing activity:
Navy - SH
(Project 6110-N318)



SH 9268

FIGURE 1. Typical control (blinker) key.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-C-24174A(SH)	CONTROLS, NAVIGATION LIGHTS, GENERAL SPECIFICATION FOR

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
	☐ USER
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ MANUFACTURER
	☐ OTHER *(Specify)*:

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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PREVIOUS EDITION IS OBSOLETE.