

MIL-W-24665(SH)
17 March 1986

MILITARY SPECIFICATION

WIPERS, WINDOW, ELECTRIC, SPINNING (MARINE SERVICE, HEAVY DUTY)

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 a fixed rectangular window wiper assembly fitted in a bulkhead with a spinning portion circular in shape inserted. The spinning window wipers are designed for selected locations on a ship's bridge to provide clear vision during rain, spray, ice and snow. The spinning window wiper assembly is for an entire window including frames, glass, motor, junction box and rotating components.

1.2 Classification. The spinning window wiper assembly covered by this specification shall be of the following types. Note that either dimension can be height or width (see 6.2.1).

Type I - Size 25 by 19 inches (clear opening), supporting glass panel.

Type II - Size 29 by 19 inches (clear opening), supporting glass panel.

Type III - Size 33 by 25 inches (clear opening), supporting glass panel.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and drawings. The following specifications, standards, and drawings 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.

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SPECIFICATIONS

FEDERAL

- QQ-S-763 - Steel Bars, Wire, Shapes, and Forgings, Corrosion-Resisting.
- ZZ-R-765 - Rubber, Silicone.

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- 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-C-2212 - Controllers, Electric Motor A.C. or D.C., and Associated Switching Devices.
- MIL-G-2697 - Glasses, Portlight, Circular, Heat Treated.
- MIL-G-2857 - Glass, Heat Treated, Glazing, Rectangular (For Bridge Windows).
- MIL-L-3661 - Lampholders, Indicator Lights, Indicator-Light Housings, and Indicator-Light Lenses, General Specification for.
- MIL-L-3661/8 - Housings, Indicator-Light, Style LH76.
- MIL-L-3661/14 - Lenses, Indicator-Light, Drip-proof, Style LC14.
- MIL-G-3787 - Glass, Laminated, Flat; (Except Aircraft).
- 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-M-15071 - Manuals, Technical: Equipments and Systems Content Requirements for.
- MIL-W-16878 - Wire, Electrical, Insulated, General Specification for.
- MIL-M-17059 - Motors, 60-Cycle, Alternating-Current, Fractional H.P. (Shipboard Use).
- MIL-E-17555 - Electronic and Electrical Equipment, Accessories, and Provisioned Items (Repair Parts); Packaging of.
- MIL-H-22577 - Heating Elements, Electrical: Cartridge, Strip, and Tubular Type.
- MIL-A-46146 - Adhesives-Sealants, Silicone, RTV, Noncorrosive (For Use with Sensitive Metals and Equipment).

STANDARDS

FEDERAL

- FED-STD-601 - Rubber: Sampling and Testing.

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- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-167-1 - Mechanical Vibrations of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited).

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- MIL-STD-252 - Classification of Visual and Mechanical Defects for Equipment, Electronic, Wired, and Other Devices.
- MIL-STD-331 - Fuze and Fuze Components, Environmental and Performance Tests for.
- MIL-STD-454 - Standard General Requirements for Electronic Equipment.
- MIL-STD-461 - Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference.
- MIL-STD-721 - Definitions of Terms for Reliability and Maintainability.
- MIL-STD-740 - Airborne and Structureborne Noise Measurements and Acceptance Criteria of Shipboard Equipment.
- MIL-STD-810 - Environmental Test Methods and Engineering Guidelines.
- MIL-STD-889 - Dissimilar Metals.
- DOD-STD-1399, Section 300 - Interface Standard for Shipboard Systems Electric Power, Alternating Current. (Metric)
- MIL-STD-1472 - Human Engineering Design Criteria for Military Systems, Equipment and Facilities.

2.1.2 Government drawings. The following Government drawing forms a part of this specification to the extent specified herein. Unless otherwise specified, the issue shall be that in effect on the date of the solicitation.

DRAWING

NAVAL SEA SYSTEMS COMMAND (NAVSEA)

805-1633284 - Window, Fixed Frame 1/2 and 3/4 Panel (CRES)
Details

(Copies of specifications, standards, and drawings 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 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 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.3 and 6.3).

3.2 Design. The spinning window wiper assembly shall consist of a totally enclosed drive mechanism with a rotatable, heat-treated, tempered, circular glass for removing precipitation by centrifugal force. The spinning window wiper assembly shall be suitable for heavy marine duty, compact, and of such rugged and reliable construction that minimum repairs will be required. The spinning

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window wiper assembly shall be designed and constructed in such a way that when necessary, adjustments and repairs can be made by ship's force using tools listed in the Federal Supply Catalog. Copies of the Federal Supply Catalog may be consulted in the Defense Contract Administration Services Management Area (DCASMA). A fixed, heat-treated, tempered, circular glass is mounted inboard of the rotating glass to house the drive motor mechanism and to assure air tightness of the system. A tubular electrical heating element is located around the periphery of the fixed circular glass and the motor bezel which shall work in conjunction with the ventilated warm air chamber, located between the rotating glass and the fixed circular glass, to defog and defrost. Two drain holes shall be provided on the lower side of the frame ring to allow the exit of defrosted water or other moisture. A separate dual-purpose control unit is provided for heater and motor operation.

3.3 Materials. The spinning window wiper assembly shall be of solid bronze construction (interior and exterior). Dissimilar metals, in contact with each other and the environment, shall be compatible as specified in MIL-STD-889. Screws, bolts, nuts, and lugs shall be corrosion-resisting steel and shall be as specified in QQ-S-763, class 304. Glass material shall be heat-treated, optically rectified, tempered as specified herein and in accordance with MIL-G-2857 or MIL-G-2697. Laminated, flat glass, as specified herein shall conform to MIL-G-3787 (class 2).

3.3.1 Protective treatment. Materials used in construction of the spinning window wiper assembly that are subject to deterioration when exposed to climatic conditions and environmental conditions likely to occur during service usage shall be protected against such deterioration in a manner that will in no way prevent compliance with the requirements of this specification. Metals that are not inherently corrosion-resistant, as specified in MIL-STD-889, shall be processed in accordance with MIL-STD-889 to provide corrosion-resistance. The use of any protective coating that will crack, chip, or scale with age or extremes of climatic and environmental conditions shall be avoided.

3.3.2 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 Construction. The spinning window wiper assembly shall be constructed as specified in the following paragraphs.

3.4.1 Frame. The supporting glass panel is retained between retaining frame (flat-bar frame) and main frame (a Z-bar frame) of CRES, bronze, or aluminum in accordance with Drawing 805-1633284 except that the glass and frame shall conform in size to the values as specified (see 1.2 and 6.2.1). The two frame parts are held together by screws or bolts. Frame assembly shall be mounted to ships structure by means of through bolts, welded studs, or lugs. Installing

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activity will provide gasket between retaining frame and structure faying surface at installation (see 3.14.3). Details and dimensions not specified herein shall be as indicated on Drawing 805-1633284.

3.4.2 Supporting glass panel. The supporting glass panel shall be heat-treated, thermally tempered, optically-rectified in accordance with 3.3. Final laminated glass panel thickness shall be specified as follows (see 6.2.1): 3/8, 1/2, 3/4, or 1 inch. A circular center hole ($15\text{-}3/4 \pm 1/16$ inches in diameter) in the support panel shall be removed to house the frame ring, bezel, and retaining ring assembly of the circular fixed and rotating portion of the spinning window wiper. Supporting glass panel shall be produced to the exact end-use dimensions required (all cuts accomplished) prior to being thermally tempered (hardening) or laminated (see figure 1). The supporting glass panel shall be adapted to and interchangeable within any type I, II, or III installation (see 3.14.3). The support glass panel shall be mounted between the main frame and retaining frame by means of a one-piece rubber gasket, in accordance with Drawing 805-1633284 having a channel cross section (see figure 2).

3.4.3 Gaskets. Unless otherwise specified (see 6.2.1), the gasket material covered herein shall be of Shore A 30 durometer (plus 0, minus 5) hardness in accordance with ZZ-R-765, class 1 except that it shall have inherent resistance to the environmental conditions as well as resistance to the effects of deterioration due to temperature and humidity.

3.4.4 Circular spinning assembly. The circular spinning glass assembly shall be mounted between the frame ring/retaining ring by means of a one-piece rubber gasket having a channel cross section (see figure 2). The retaining ring or frame shall have an overall diameter of $16\text{-}1/4$ (minimum) to $16\text{-}7/8$ inches (maximum).

3.4.5 Circular fixed or stationary glass. The circular fixed or stationary glass shall be mounted by means of a one-piece rubber gasket as specified in 3.4.3 having a channel cross section around the outer periphery of the glass. Between motor bezel ring and armature housing (inside of pilot house) where the aperture of the circular fixed or stationary glass is mounted, each side shall have a flat rubber gasket as specified in 3.4.3 having a rectangular cross section (see figure 2).

3.4.6 Rotating and spinning glass. At the revolving support where the aperture of the rotating and spinning glass is housed (weatherside of pilothouse), each side shall have a flat rubber gasket as specified in 3.4.3 (see figure 2).

3.4.7 Corners of gaskets. Corners of gaskets specified herein shall be vulcanized or otherwise sealed against water penetration.

3.4.8- Caulking and sealant application. A fillet bead of room temperature-vulcanizing (RTV) sealant in accordance with type I of MIL-A-46146 shall be applied around perimeter where circular fixed or stationary glass interface with retaining frame bezel ring (inboard side) and the motor bezel ring (inside), after assembly. Inject as much RTV sealing compounds as possible into voids and gaps. Primer (if required) shall be as recommended by the manufacturer of the silicone compound.

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3.4.9 Cable feeder tube. A stainless steel cable feeder tube and conduit mounted between the motor and the upper frame ring shall be provided to carry the power supply cables from the junction box to the motor and shall also house the ground strap (see 3.15.9).

3.5 Orientation. Components of the drive system shall be designed to operate in any position; however, the spinning window wiper assembly must be mounted with the drain holes located on the lower side of the frame in the down position. The supporting glass panel clear opening for types I, II, and III installations shall be oriented so that either dimension may be in height or width.

3.6 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.

3.7 Dimensions. The spinning window wiper dimensions shall conform to figure 1 (see 3.4.1 and 3.4.2).

3.8 Reliability. The spinning window wiper assembly, including the heating element controller and wiring shall be designed and manufactured to have a mission reliability of 0.96 for a 72-hour mission. It shall have a mean-time-between-failure (MTBF) value of 1,800 hours in accordance with MIL-STD-721. Operational availability of the system, defined as the MTBF divided by the sum of the MTBF, the mean time to repair and mean logistics delay time per failure, shall be 0.97 at the minimum acceptable level. The wear of the window assembly in the application shall be no less than the rated wear life of the motor, which is rated at 10,000 hours. The spinning window wiper shall operate for 500 hours without malfunction, leakage, or erratic operation.

3.9 Maintainability. The spinning window wiper assembly shall be designed and manufactured such that minimum repairs will be required and the equipment is maintainable and repairable by shipboard personnel.

3.9.1 Corrective maintenance. The spinning window wiper assembly shall be designed for an arithmetic-mean-time-to-repair not to exceed 1 hour, considering the replacement of failed components. The maximum time allowable to complete 90 percent of the maintenance actions by the ship's force shall be 2 hours.

3.9.2 Preventive maintenance. The assembly shall be designed to minimize preventive maintenance requirements. Frequency of maintenance actions for each quarter shall not exceed two times. The assembly shall be designed for a mean-time-for-preventive-maintenance of 45 man-minutes maximum, and the maximum time allowable to complete 90 percent of the preventive maintenance actions by the ship's force shall be 90 man-minutes.

3.10 Performance characteristics. Each unit shall meet the requirements as stated herein, and shall withstand the performance tests specified in section 4.6.

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3.10.1 Operational. The spinning window will revolve at 1,400 revolutions per minute (r/min) with an input voltage of 115 volts alternating current (Vac) and a power consumption of 50 watts. In the defogging mode the heating element shall have a power consumption of 100 watts at 115 Vac and in the deicing mode the power consumption shall be 400 watts at 115 Vac.

3.10.2 Shock. The spinning window wiper assembly shall be capable of withstanding the shock levels specified in MIL-S-901, grade A modified. (see 4.6.9)

3.10.3 Vibration. The spinning window wiper assembly shall conform to type I vibration requirements of MIL-STD-167-1.

3.10.4 Noise. The spinning window wiper assembly shall conform to airborne and structureborne noise criteria of MIL-STD-740, except as specified in 4.6.10.

3.10.5 Power interruption. The spinning window wiper assembly shall operate satisfactorily after power interruptions of approximately 10 seconds.

3.11 Environmental. Each window shall meet the requirements as stated herein and shall withstand the environmental tests specified in 4.6.

3.11.1 Low temperature. The spinning window wiper assembly withstand exposure to and retain its normal optical clarity when subjected to an ice accumulation rate of 1.5 inches per hour at a temperature of minus 20 degrees Fahrenheit (°F) and with winds up to 40 knots.

3.11.2 Salt-sea atmosphere. The spinning window wiper assembly shall withstand exposure to salt-sea atmosphere as specified in method 509.2 of MIL-STD-810.

3.11.3 Humidity and temperature. The spinning window wiper assembly shall withstand the humidity and temperature conditions as specified in method 105.1 of MIL-STD-331.

3.11.4 Ultraviolet exposure. The spinning window wiper assembly shall withstand exposure to ultraviolet rays of the sun in accordance with MIL-G-3787 (glass) and FED-STD-601 (rubber).

3.12 Electromagnetic interference (EMI) suppression. The EMI characteristics of the complete spinning window wiper assembly during operation shall be in accordance with MIL-STD-461, RS03 tests (limits raised to 50 volts/meters in the frequency range of 2 megahertz (MHz) to 30 MHz).

3.13 Mechanical equipment.

3.13.1 Spinning window wiper drive assembly housing. The spinning window wiper drive assembly housing shall be designed for mounting on the inboard side of the space being served. Motor and drive mechanism shall be contained within the housing assembly. Moving parts shall not be exposed and present a safety hazard to personnel. Electrical and mechanical components shall be accessible from inboard side by removing the cover of the electric motor housing assembly.

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3.13.2 Rotating glass. The rotating glass shall conform to MIL-G-2697 and shall consist of clear, untinted, heat-tempered, optically rectified glass set permanently in a bronze bezel. The clear opening diameter of glass shall be 13-1/4 (minimum) to 14-1/8 inches (maximum) and thickness of glass shall be 5/16 inch. The bronze bezel ring shall form one-half of the labyrinth seal that prevents water from reaching the chamber between the rotating glass and the stationary glass.

3.13.3 Installation and mounting. The rotating glass and bezel shall be coupled to the motor shaft, and the motor assembly shall be supported by a stationary or fixed circular glass that shall also be heat-treated and optically rectified to prevent visual distortion. The stationary glass shall conform to MIL-G-2697 and MIL-H-3787 and shall be the same thickness as the supporting glass panel (see 3.4.2) and shall have a cutout in the center 3-11/32 (minimum) to 3-3/4 inches diameter (maximum) to accommodate the motor assembly. The stationary glass shall be set into a circular bronze frame ring secured by a retaining ring bezel which shall be adjustable to suit supporting glass thickness (see 3.4.2), and shall be mounted onto a type I, II, or III supporting glass panel. The bronze frame ring shall be located on the weather (outside) side of the window panel and form the other half of the labyrinth seal to prevent entry of water. The supporting glass panel (type I, II, or III) shall be mounted in the ship's window frame of the appropriate size (see 3.4) and be adapted to any fixed window installation. The spinning window wiper and frame assembly shall be suitable for mounting either on the inboard (interior) or outboard (exterior) side of the ship deck house structure with the spinning glass facing outboard.

3.13.4 Glareproofing. Parts exposed to the ship's personnel shall be finished in such a manner as to eliminate reflections into the visual field of the personnel.

3.14 Electrical equipment. Electrical design processes and fabrication shall be in accordance with MIL-E-917 except as specified herein.

3.14.1 Motor. The motor shall be in accordance with MIL-M-17059 and shall have the following characteristics:

- | | |
|-----------------------|-------------------------------------------|
| (a) Rating | - 1/10 horsepower, output at 1,400 r/min |
| (b) Voltage | - 115 Vac, 60 hertz (Hz) |
| (c) Power consumption | - 50 watts |
| (d) Type | - Universal |
| (e) Duty | - Continuous |
| (f) Enclosure | - Watertight |
| (g) Bearings | - Ball, sealed and permanently lubricated |
| (h) Insulation | - Class B, F, or H (see 3.14.4.1) |
| (i) Service | - C |
| (j) Wear life | - 10,000 hours |

The motor housing shall contain the above information visible to operating personnel. The motor assembly cover shall be of solid bronze material. Gaskets around the motor shaft shall be of high temperature resistant materials to resist deterioration due to temperature and humidity.

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3.14.2 Controller. The control equipment shall be in accordance with MIL-C-2212 and compatible with DOD-STD-1399, section 300 and shall have the following characteristics:

- (a) Enclosure - Dripproof (metal)
- (b) Voltage - Output 115 Vac, single phase, 60 Hz
- (c) Current - 20 amperes
- (d) Operation - Manual
- (e) Type - Full voltage
- (f) Function - Motor starting, heater starting, (3-position switch for single or dual heater starting and heater off)
- (g) Protection - Overload
- (h) Service - C
- (i) Indicator lights - Individual heater energized

3.14.3 "ON" and "OFF" power switches. Each spinning window wiper unit shall be provided with a double-pole-single-throw control switch for the motor, marked with positions "ON" and "OFF". A separate rotating three-position switch shall be provided for the heater element of the spinning window wiper. Switches must be in the "OFF" position to shut down spinning window wiper unit.

3.14.4 Protection. Overload and short circuit protection for the control equipment shall be as follows:

- (a) Circuit breaker in heater circuits.
- (b) The units motor shall be protected by an overload circuit breaker, the amperage rating of the circuit breaker to be approximately 15 percent over the running amperage rating of motor or sufficient to protect the motor from burn-out. Control switches should be double pole. Circuit breakers shall be single pole.

3.14.4.1 Protection method. Protection method used shall prevent the motor in a 50 degrees Celsius ($^{\circ}\text{C}$) ambient from exceeding following degrees of temperature:

Motor insulation class	Maximum temperature rise (locked rotor)
B	130($^{\circ}\text{C}$)
F	155($^{\circ}\text{C}$)
H	180($^{\circ}\text{C}$)

3.14.5 Heating element. The two heating elements in accordance with MIL-H-22577 shall be housed in water-tight copper tubes connected to the power supply via a three position rotating selector knob or switch which provides "OFF", "DEFOG", and "DEICE" series heating operations (independent of motor functions). When the heater is energized, the electric heating resistance shall absorb 100 watts defogging and an additional 300 watts for deicing. The temperature shall be controlled by positioning the thermostat indicator knob or switch to defog mode for minimum and deice mode for maximum temperatures. Both heating elements shall be embodied between the two circular glasses (stationary and spinning) forming a warmed up ventilated air chamber. One heating element with an output power of 100 watts is fitted around the motor bezel ring extending up

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towards the junction box shall be activated for defogging or moisture formation. The other heating element with an output power of 300 watts is fitted on the inner periphery of frame ring and is combined with 100 watts (defogging) element for rapid deicing (to give 400 watts of power). The heater circuit shall operate on 120 Vac, 60 Hz. Two heater indicator lights to show the heating mode in operation, shall be furnished. The lights shall be mounted near the corresponding heater power switch. The lights shall be illuminated when the heating element is energized. The indicator light lens shall be one red and one white with an ANSI-type NE-51H lamp. The lampholder shall have a built-in resistor, and shall be as specified in MIL-L-3661, MIL-L-3661/8, and MIL-L-3661/14.

3.14.6 Wiring. Permanent internal wiring shall be copper wire and shall comply with MIL-W-16878. The size, stranding and insulation of wire shall be mechanically and electrically suited to the application. Wires exposed to heat shall be insulated with 105°C thermo-plastic insulation with an inner and an outer braid. The minimum wire size shall be AWG 16.

3.14.7 Terminating electrical wires. Connections in the spinning window wiper assembly and control box shall be soldered, except for those terminating at terminal blocks. Wires at terminal blocks shall be terminated with pre-insulated compression (crimps) type connectors in accordance with MIL-T-7928 and shall firmly and completely grip the conductor and the wire insulation.

3.14.8 Powerline filters. A filter shall be installed on each of the high and low ac lines in the junction box or gland unit of the spinning window. The following requirements apply to both of these filters:

- (a) Voltage - 125 Vac, 0 to 400 Hz
- (b) Current - 3 amperes
- (c) Insertion loss - 8 decibel (dB) at 75 kilohertz (kHz), 13 dB at 150 kHz, 20 dB at 300 kHz, 35 dB at 1 MHz, and 70 dB from 10 MHz to 1 gigahertz (GHz)
- (d) Size - Overall length, 1.078 inches; overall diameter, 0.410 inch

3.14.9 Ground strap. The EMI shall be controlled by a copper ground strap which shall be installed between the motor housing and the junction box or controller ground point (see 4.6.7).

3.14.10 Wiring diagrams and markings.

3.14.10.1 Control box. Terminal board connections shall be identified as follows:

- (a) No. 1 to ship's supply - 120 Vac, 60 Hz
- (b) No. 2 to ship's supply - 120 Vac, 60 Hz
- (c) No. 3 yellow - Spinning window cleaner motor
- (d) No. 4 blue - Spinning window cleaner motor
- (e) No. 5 red - Heaters (defogging and deicing)
- (f) Green - Grounding

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3.14.10.2 Markings and identifications. The spinning window shall contain a wiring diagram in the control box which shall be readily visible, permanent, and not easily destroyed by elements. Electrical wiring shall be color-coded and clearly identified. Switches, controls, terminals, and components shall be properly marked, identified, and functions indicated. Example: "HEATER" switch "OFF" and "ON", with an instruction plate stating, "UNDER ICING CONDITIONS, THE HEATER SWITCH SHOULD BE IN "ON" and "DEICING" POSITION - 15 MINUTES BEFORE ACTIVATING MOTOR".

3.15 Identification plate. The identification plate shall be as specified in MIL-P-15024 and MIL-P-15024/5 and shall contain the following information:

- (a) Model name.
- (b) Manufacturer's name and address.
- (c) Manufacturer's type or drawing number.
- (d) Serial number.
- (e) National stock number if required (see 6.2.1).
- (f) Year of manufacture.
- (g) Contract or order number.
- (h) Technical manual number.
- (i) Allowance parts list number to be furnished by contracting activity.
- (j) Component identification number if available (see 6.2.1).

Each controller and motor shall be provided with an identification plate.

3.16 Technical data. The contractor shall prepare drawings in accordance with the data ordering documents included in the contract or order (see 6.2.2).

3.16.1 Technical manuals. Technical manuals shall be in accordance with type I of MIL-M-15071.

3.17 Human engineering. Human engineering considerations which impact on the maintenance and operation of the spinning window wiper assembly; such as vibration and noise levels, glareproofing, selector switches, markings and identifications, safety hazards and environmental requirements, shall be in accordance with the criteria expressed in MIL-STD-1472, as appropriate to this system.

3.18 Workmanship. The spinning window wiper assembly shall be in accordance with the workmanship criteria of requirement 9 of MIL-STD-454. Burrs and scratches in excess of 0.020 inch or tool mark tolerances shall not be allowed. Sharp edges are prohibited except where specified on the detail drawings. Parts shall be clean and free of foreign matter except that protective coatings are allowed when specified.

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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. First article inspection shall consist of the examination and tests specified in table I. Tests shall be conducted in the order shown.

TABLE I. First article inspection.

Examination and tests	Requirement paragraph	Test paragraph
Visual and dimensional examination	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.13, 3.14, 3.15, 3.16, 3.17, and 3.18	4.5
Functional test	3.10.1, 3.8, 3.9, 3.11.4	4.6.1
Room temperature test	3.11.3	4.6.2
Low temperature test	3.11.1	4.6.3
Power interruption test	3.10.5	4.6.4
Endurance test	3.11.2	4.6.5
Motor protection test	3.14.4	4.6.6

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TABLE I. First article inspection. - Continued

Examination and tests	Requirement paragraph	Test paragraph
EMI suppression test	3.12	4.6.7
Vibration test	3.10.3	4.6.8
Shock test	3.10.2	4.6.9
Noise test	3.10.4	4.6.10

4.3.1 First article inspection report. A first article inspection report shall be prepared in accordance with the data ordering document (see 6.2.2).

4.4 Quality conformance inspection. Quality conformance inspection shall consist of groups A, B, C, and D.

4.4.1 Inspection lot. An inspection lot shall be as specified in MIL-STD-105 and shall include the complete assembled spinning window wiper assembly as defined in 3.2.

4.4.2 Group A inspection. Group A inspection shall consist of the examination and tests specified in table II.

TABLE II. Group A inspection.

Inspection	Requirement paragraph	Inspection paragraph	AQL defect per hundred units	
			Minor	Major
Visual and dimensional examination (spinning window cleaning system assembly)	3.2 through 3.7, 3.13 through 3.18	4.5	1.0	1.0
Functional test 3.9, 3.11.4	3.10.1, 3.8, percent level I	4.6.1	2.5	--

4.4.2.1 Sampling for group A inspection. Statistical sampling and inspection shall be in accordance with MIL-STD-105. The acceptable quality levels (AQLs) shall be specified in table II. Major and minor defects shall be classified in accordance with MIL-STD-252.

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4.4.3 Group B tests. Group B tests shall consist of the tests specified in table III. The tests shall be performed on sample units that have been subjected to and have passed group A inspection unless it is more practical to select a separate sample.

TABLE III. Group B tests.

Tests	Requirement paragraph	Test paragraph	AQL percent defective	Inspection level
Room temperature	3.11.3	4.6.2	4.0	S-4
Low temperature	3.11.1	4.6.3	4.0	S-4
Power interruptions	3.10.6	4.6.4	4.0	S-4

4.4.3.1 Sampling for group B tests. Sampling shall be in accordance with MIL-STD-105 for special inspection levels.

4.4.4 Group C tests. Group C tests shall consist of the tests specified in table IV. The tests shall be performed on sample units that have been subjected to and have passed group A inspection.

TABLE IV. Group C tests.

Tests	Requirement paragraph	Test paragraph
Endurance	3.11.2	4.6.5

4.4.4.1 Sampling for group C tests. One spinning window wiper assembly shall be selected every 12 months from each 12 month's production. No defectives shall be allowed. The first sample selected shall be at the start of the contract from the first quality conformance inspection lot.

4.4.5 Group D tests. Group D tests shall consist of the tests as specified in the sequence shown for each subgroup in table V. Group D tests shall be performed on sample units that have passed group B tests. Shipment shall be held up pending passing of the test.

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TABLE V. Group D tests.

Tests	Requirement paragraph	Test paragraph
Subgroup 1: Motor protection	3.14.4.1	4.6.6
Subgroup 2: Electromagnetic interference suppression	3.12	4.6.7
Vibration	3.10.3	4.6.8
Shock	3.10.2	4.6.9
Airborne and structureborne noise measurements	3.10.4	4.6.10

4.4.5.1 Sampling for group D tests.

4.4.5.1.1 Subgroup 1. One sample unit shall be selected once every 6 months from 6 month's production. No defectives shall be allowed. The first sample selected shall be at the start of the contract from the first quality conformance inspection lot.

4.4.5.1.2 Subgroup 2. One sample unit shall be selected every 24 months or whenever the basic design or a vital part of the equipment has been changed. No defectives shall be allowed. The first sample selected shall be at the start of the contract from the first quality conformance inspection lot.

4.4.5.2 Noncompliance. If a sample fails to pass group D tests, the contractor shall take corrective action on the material or process or both, as warranted, and on all units of the product that can be corrected and that were manufactured under essentially the same conditions with essentially the same materials, and processes, and that are considered subject to the same failure. Acceptance of the product shall be discontinued until corrective action, acceptable to the Government, has been taken. After corrective action has been taken, group D tests shall be repeated on additional sample units (all inspections, or the inspection that the original sample failed, at the option of the Government). Group A and B inspection may be reinstituted; however, final acceptance shall be withheld until group D reinspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure and the corrective action taken shall be furnished to the contracting officer.

4.5 Visual and dimensional examination.

4.5.1 External. The spinning window wiper assembly and controller shall be examined to verify that the materials, external design and construction, physical dimensions, marking, and workmanship are in accordance with the applicable requirements.

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4.5.2 Internal. The spinning window wiper assembly and controller shall be disassembled and examined to verify that the materials, internal design and construction, and workmanship are in accordance with the applicable requirements.

4.6 Tests.

4.6.1 Functional test. The spinning window wiper assembly shall be tested to verify operation, performance and full load power consumption in compliance with group A requirements. Nonconformance shall be cause for rejection.

4.6.2 Room temperature test. Sample type I spinning window wiper shall be mounted on a test stand and operated at rated speed and current at a room temperature of 70 to 85°F for a period of 2 hours. The window shall be continuously sprayed with fresh water during the test in accordance with MIL-STD-331, method 105.1. At no time during the test shall the motor frame exceed a temperature rise of 50°C. Any unit in the sample failing the operation test shall cause rejection of the lot.

4.6.3 Low temperature test. A sample spinning window shall be operated in a cold room maintained at a temperature of minus 20°F. The two fixed electrically operated heating elements embodied between two circular glasses (stationary and spinning) shall be energized approximately 15 minutes before the test and remain in operation before the motor is electrified independently. Freshwater shall be sprayed on the spinning window wiper (weatherside) for a period of 30 minutes in accordance with MIL-STD-331, method 105.1 to determine cold weather effectiveness in removing rain and spray. The spinning glass shall be examined for freedom from ice formation. Malfunction or ice formation shall be cause for rejection.

4.6.4 Power interruptions. The spinning window wiper assembly shall be subjected to the following test: With unit running at rated r/min, disconnect power source from control box. Reapply power. Time between applying and removing power shall be approximately 10 seconds. Performance degradation is not acceptable.

4.6.5 Endurance test. One spinning window (type I, II, or III) shall be operated at room temperature of 70 to 85°F at its rated speed (r/min) for a period of 500 hours. A spray of 4 percent salt water solution (5.28 ounces of sodium chloride [salt] per gallon of water) in accordance with MIL-STD-810, method 509.2 shall be sprayed on the unit and window for the duration of the test. Malfunctions, erratic operation, seepage of water or air through the window or the appearance of rust shall be cause for rejection.

4.6.6 Motor protection test. The motor protection test shall be conducted as follows:

- (a) Place thermocouple or thermometer in contact with the stator insulation.
- (b) Record ambient temperature.
- (c) Energize motor via control equipment, with motor shaft prevented from rotating, for 1 minute.

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- (d) Observe motor temperature rise and control equipment protection device for compliance with the requirements specified in 3.14.4.1.

4.6.7 EMI suppression test. The spinning window cleaning system shall be tested to determine compliance with the requirements of 3.12.

4.6.8 Vibration test. The first of identical units selected at the start of the contract from the first article and first conformance inspection lot shall be tested in accordance with MIL-STD-167-1, type I vibration. The type I vibration tests require that equipment be tested and that resonances be noted. Resonance is defined as that condition under which the vibration amplitude of the equipment under test is equal to or greater than 2.0 times the vibratory displacement values denoted as table amplitude. The total resonant frequency endurance test time shall be at least 2 hours. Thus, if a total of 12 resonant frequencies, as defined herein, are noted for the test orientations, each of the 12 frequencies shall be endurance tested for at least 10 minutes.

4.6.9 Shock test. The spinning window shall be shock tested in accordance with modified MIL-S-901 requirements for lightweight equipment. The modifications made to the MIL-S-901 grade A test to adapt it for usage on spinning windows are as follows: (1) Shock blows equivalent in magnitude and number (1, 3 and 5 feet) to those specified in MIL-S-901 shall be administered along two perpendicular axes parallel to the plane of the glass; (2) shock blows equivalent to 40 percent of hammer height of the MIL-S-901 levels (1 and 2 feet) shall be administered along an axis normal to the plane of the glass. After completion of the test, the system shall be given sufficient tests to ensure that, as a result of the shock tests, no personnel or other hazards are created, such as broken or loose glass, electric shorts, or other hazards and the window is repairable.

4.6.10 Airborne and structureborne noise measurement test. The spinning window cleaning system shall be subjected to and pass the noise measurements and acceptance criteria in accordance with MIL-STD-740 except as specified in 4.6.10.1 and 4.6.10.2.

4.6.10.1 Acceptance criteria. Airborne noise acceptance criteria are defined in terms of octave band sound pressure levels (see table VI) that each item of equipment may be permitted to generate. The system shall meet type 3 structureborne noise acceptance criteria.

TABLE VI. Sound pressure acceptance levels for machinery and equipment in decibels relative to 20 micropascals.

Noise grade	Octave band center frequency - Hz								
	31.5	63	125	250	500	1,000	2,000	4,000	8,000
A-12	66	63	60	57	54	51	48	45	42

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4.6.10.2 Selection of unit. Airborne and structureborne noise tests shall be conducted simultaneously with other quality conformance tests requiring operation of the equipment.

4.7 Test reports. The contractor shall prepare a test report in accordance with the data ordering document included in the contract or order (see 6.2.2).

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 Preservation-packaging, packing, and marking. Spinning window assembly accessories, attachments, and manuals shall be preserved-packaged level A or C; packed level A, B, or C; and marked as specified (see 6.2.1) in accordance with MIL-E-17555.

6. NOTES

6.1 Intended use. The spinning window wiper is intended for use in selected locations as a more effective and more reliable alternative to presently available ship window wiper/cleaning systems (it is not intended to replace these systems).

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type to be furnished (see 1.2).
- (c) When first article is required (see 3.1).
- (d) Frame material (see 3.4.1).
- (e) Thickness of supporting glass panel if other than that specified (see 3.4.2).
- (f) If gasket hardness is other than specified (see 3.4.3).
- (g) National stock number (see 3.15).
- (h) Component identification number (see 3.15).
- (i) Level of preservation-packaging and packing required (see 5.1).

6.2.2 Data requirements. When this specification is used in an acquisition and data are required to be delivered, the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (CDRL), incorporated into the contract. When the provisions of DoD FAR Supplement, Part 27, Sub-Part 27.410-6 (DD Form 1423) are invoked

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and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification are cited in the following paragraphs.

<u>Paragraph no.</u>	<u>Data requirement title</u>	<u>Applicable DID no.</u>	<u>Option</u>
3.16	Drawings, engineering and associated lists	DI-E-7031	Level 3 Design activity - contractor Drawing number - contractor Delivery of hard copies - contracting activity
4.3.1	First article inspection report	DI-T-4902	----
4.7	Report, test/inspection	UDI-T-23473	----

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5000.19L., Vol. II, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.2.2.1 The data requirements of 6.2.2 and any task in sections 3, 4, or 5 of this specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for an identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

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 requirements 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 be 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.

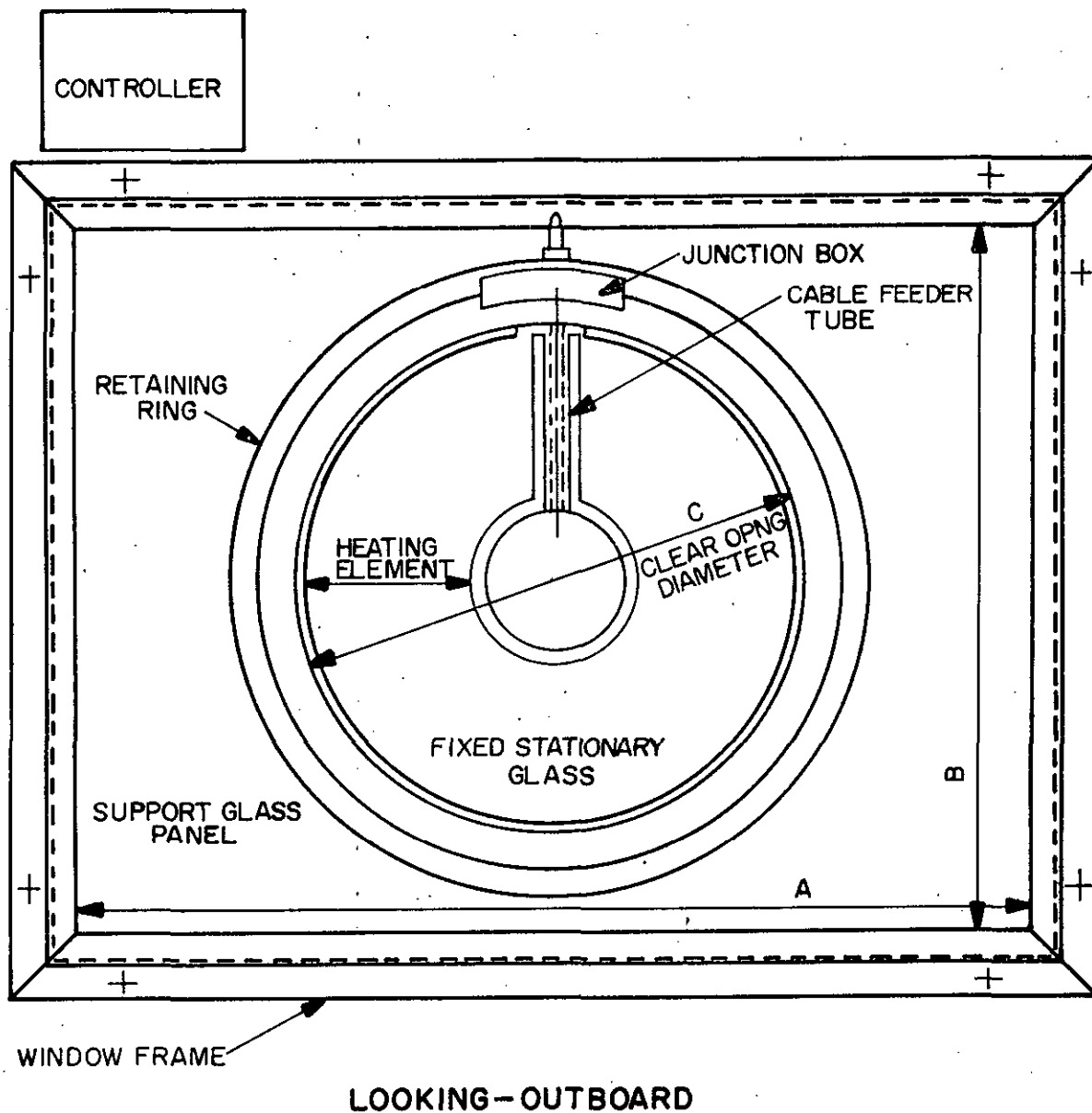
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6.4.1 When ordering spare parts or repair parts for the equipment covered by this specification, the contract should state that such spare parts and repair parts should meet the same requirements and quality assurance provisions as the parts used in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

Preparing activity:
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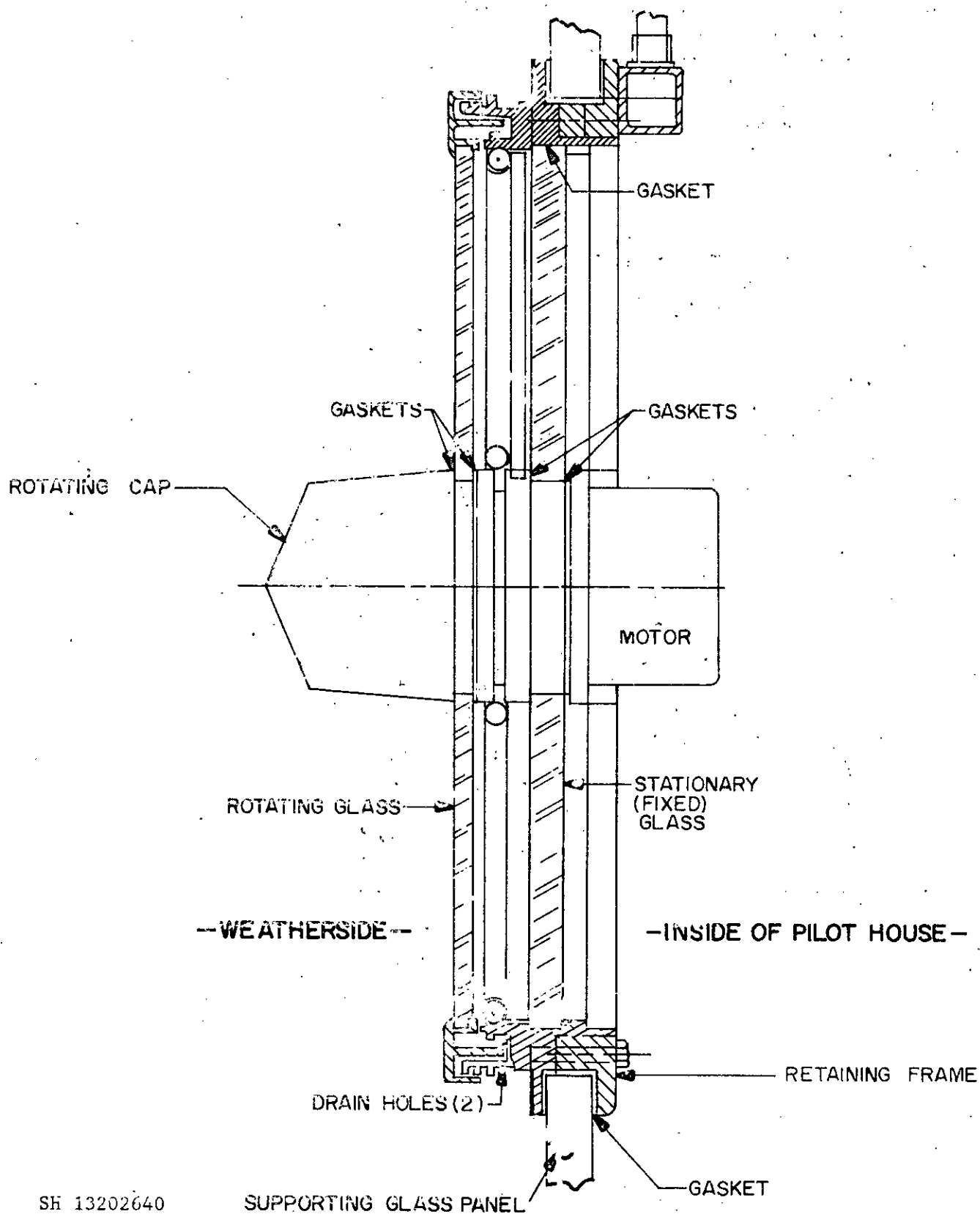
SH 13202639

NOTE:

1. Dimensions "A", "B", and "C" denote glass clear opening (see 1.2 and 3.13.2).

FIGURE 1. Spinning window wiper assembly.

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SUPPORTING GLASS PANEL

FIGURE 2. Rotary assembly spinning window wiper
(cross-sectional view).

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b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR					
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