

1. SCOPE

1.1 Scope. This drawing describes the requirements for a snap action, fiber optic, transmissive type switch and switch assembly supplied to the requirements given within.

1.2 Part number. The complete part number shall be the drawing number plus a dash number as shown in table II.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this drawing 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.

SPECIFICATIONS

MILITARY

- MIL-S-28786 - Switches, Packaging of.
- MIL-C-83522 - Connector, Fiber Optic, Plug-Receptacle-Adapter Style Fixed Single Terminus, General Specification For.

STANDARD

MILITARY

- MIL-STD-202 - Test Methods for Electronic And Electrical Component Parts.
- MIL-STD-45662 - Calibration Systems Requirements.

(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 publication. The following document forms a part of this drawing 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 the documents not listed in the DODISS shall be the issue of the non-Government document which is current on the date of the solicitation.

ELECTRONIC INDUSTRIES ASSOCIATION (EIA)

- EIA-RS-455 - Standard Test Procedures for Fiber Optic Fibers, Cables, Transducers, Connecting and Terminating Devices

(Application for copies should be addressed to the Electronic Industries Association, Engineering Department, 2001 Eye Street, N.W., Washington, D.C. 20006.)

(Non-Government standards and other publications are normally available from the organization that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

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3. REQUIREMENTS

3.1 Detail requirements. The individual detail requirements for a specific fiber optic switch shall be as specified herein.

3.2 Material. Material shall be as specified herein.

3.2.1 Metals. All metal parts shall be of corrosion resistant materials, of beryllium copper alloy, of brass alloy or shall be suitably protected to resist corrosion.

3.2.2 Plastics. The plastic material shall be in accordance with MIL-M-14 SDG-F.

3.3 Design and construction. The switch shall conform to the dimensional requirements of figures 1, 2, and 3.

3.3.1 Workmanship. The switch shall be uniform in quality and shall be manufactured in a workmanlike manner.

3.4 Operating characteristics.

3.4.1 Operating temperature. -25°C to 65°C.

3.4.2 Storage temperature. -40°C to 80°C.

3.4.3 Operating force. When measured at the operating point, the force required to operate the switch shall be as specified in table I.

3.4.4 Release force. When measured at the operating point, the force required to release the switch to its deactivated position shall be not less than the value specified in table I. Following the test, insertion loss shall be within the limits specified in 3.7.1.

3.4.5 Movement differential. The movement differential shall be as specified in table I when measured at the actuating pin. Following the test, insertion loss shall be within the limits specified in 3.7.1.

3.4.6 Pretravel. The pretravel prior to operation, as measured at the actuating pin shall be as specified in table I. Following the test, insertion loss shall be within the limits specified in 3.7.1.

3.4.7 Overtravel. The overtravel after the operating point has been achieved shall equal or exceed the value specified in table I. Following the test, insertion loss shall be within the limits specified in 3.7.1.

3.4.8 Fiber optic connector. Mates with MIL-C-83522 type with knurled nut - 2 required.

TABLE I. Operating characteristics.

Characteristic	Pin type actuator	Lever type actuator	Hinge roller leaf actuator
Operating force	13 oz	12.5 oz	3.5 oz max
Release force	4 oz min	.5 oz min	.75 oz min
Movement differential	.0004 - .002	.078 max	.062 max
Pretravel	.020 max	.125 - .375	.094 - .313
Overtravel	.005 min	.188 min	.156 ± .015

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TABLE II. Operating point and configuration.

Dash no.	Configuration 1/	Actuator type	Horizontal OP position	Vertical OP position
-01	NO	PIN	.92 ±.015	.625 ±.010
-02	NC	PIN	.92 ±.015	.625 ±.010
-03	NO	LEVER	1.469 ±.030	.719 ±.062
-04	NC	LEVER	1.469 ±.030	.719 ±.062
-05	NO	LEVER	.860 ±.030	1.125 ±.062
-06	NC	ROLLER	.860 ±.030	1.125 ±.062
		LEVER	.860 ±.030	1.125 ±.062

1/ See 6.2.

3.4.9 Operating point. See table II.

3.4.10 Configuration. See table II. All switches are single pole.

3.5 Environmental requirements.

3.5.1 Thermal shock. When tested in accordance with MIL-STD-202, method 107, test condition A (-55°C to 80°C), there shall be no resulting mechanical damage. Following the test, insertion loss shall be within the limits specified in 3.7.1.

3.5.2 Vibration. When tested in accordance with MIL-STD-202, method 204, test condition A (10 g's, 10 - 500 Hz), momentary discontinuity is permitted in the unactuated position. In the actuated position, there shall be no discontinuity in the light path in excess of 1 dB or more for a duration of one microsecond (μs) or more. Following the test, insertion loss shall be within the limits specified in 3.7.1.

3.5.3 Mechanical shock. When tested in accordance with MIL-STD-202, method 213, test condition C (100 g's 6 ms, half sine), momentary discontinuity is permitted in the unactuated position. In the actuated position, there shall be no discontinuity in the light path in excess of 1 dB or more for a duration of one microsecond (μs) or more. Following the test, insertion loss shall be within the limits specified in 3.7.1.

3.6 Mechanical requirements.

3.6.1 Termination. Each switch shall be terminated in a fiber optic connector, the type and number as specified by 3.4.8.

3.6.2 Mechanical life. One million operations minimum. Following the test, insertion loss shall be within the limits specified in 3.7.1.

3.7 Fiber optic requirements.

3.7.1 Attenuation. When measured in accordance with 3.4.3 through 3.6.2, the maximum insertion loss under all conditions shall be 9.0 dB.

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3.7.2 Optical requirements. See table III.

TABLE III. Optical requirements.

Fiber type	D49291/3-01
50/125	D49291/4-01
100/140	600 to 1600 nm
Wavelength	9.0 dB
Attenuation	

3.8 Certification as an approved source of supply. In order to be listed as an approved source for fiber optic switches, the contents shall:

- a. Agree to make available to DESC, upon request, all pertinent test data on its production of the subject part, including, but not limited to, test data in accordance with the quality conformance inspection of table IV herein.
- b. Provide to DESC-EMD or its designated agent, upon request, free of charge and without obligation, a current production sample from its production of the subject part.
- c. Be in current production of the subject part.

3.9 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply (see 6.5).

3.10 Marking. Part to be marked with DESC drawing number and dash number, manufacturer's name or logo, manufacturer's part number and date code.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the manufacturer is responsible for the performance of all inspections, as specified herein. The contractor may use his own or any other facility suitable for the performance of the inspection requirements specified herein unless specifically disapproved by the Government. The Government reserves the right to perform any inspections set forth in the specification where such inspections are deemed necessary to assure that the switches conform to the prescribed requirements.

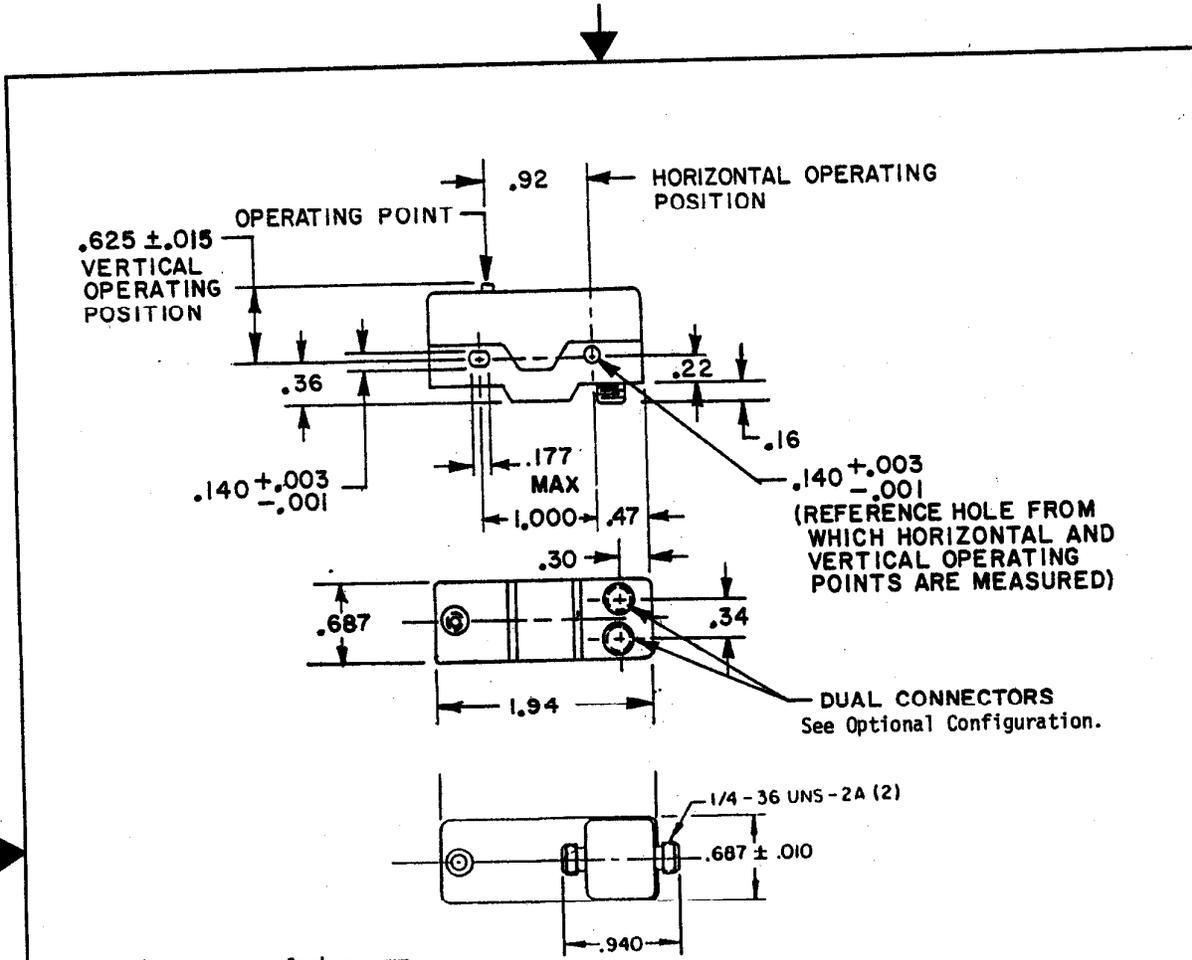
4.1.1 Equipment calibration. All test equipment and inspection facilities used in the performance of any test shall be maintained in a calibration system in accordance with MIL-STD-45662.

4.2 Inspection conditions. Unless otherwise specified herein, or the item detail drawing, all inspections shall be performed under the following ambient conditions:

Temperature	25°C ±5°C
Relative humidity	50 ±2%

4.3 Qualification inspection. Qualification inspection for these switches shall not be required.

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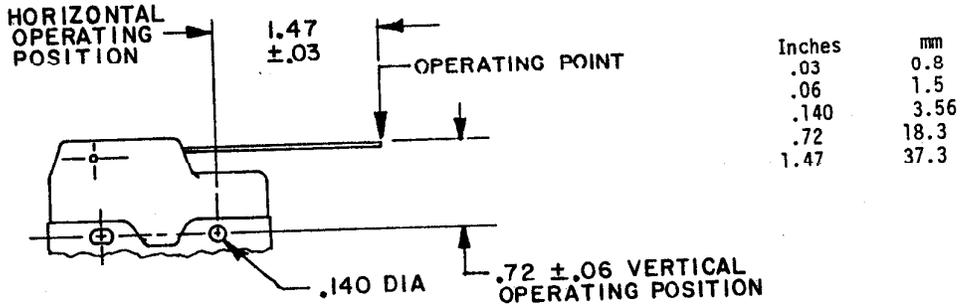
Inches	mm	Inches	mm
.001	0.03	0.34	8.6
.002	0.05	0.36	9.1
.003	0.08	0.47	11.9
.015	0.38	.625	15.88
.140	3.56	.687	17.45
.177	4.49	.92	23.4
.16	4.1	1.000	25.40
.30	7.6	1.94	49.3

Optional Configuration.

- NOTES:
1. Dimensions are in inches.
 2. Metric equivalents are given for general information only.
 3. Unless otherwise specified, tolerances are $\pm .015$ (0.38 mm)

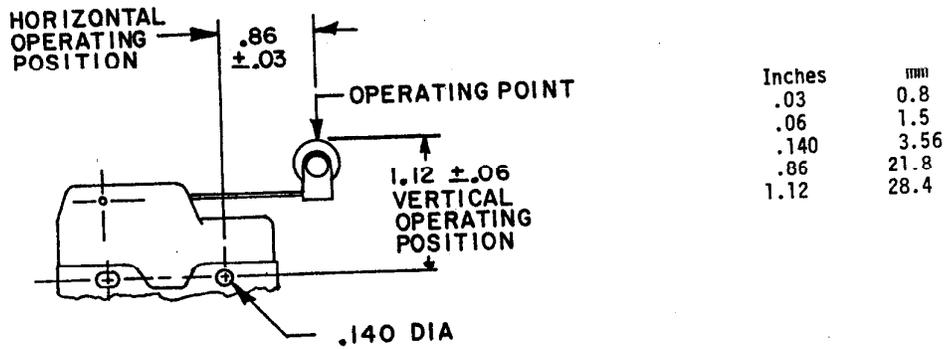
FIGURE 1. Pin type actuator.

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- NOTES:
1. Dimensions are in inches.
 2. Metric equivalents are given for general information only.
 3. Unless otherwise specified, tolerances are ± 0.010 (0.25 mm).

FIGURE 2. Lever actuation.



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FIGURE 3. Lever roller actuation.

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4.4 Quality conformance inspection. Quality conformance inspection shall be performed on sample units produced with equipment and procedures normally used for production. Manufacturers shall keep lot records for three years minimum, monitor for compliance to the prescribed procedures, and observe that satisfactory manufacturing conditions and records on lots are maintained for these switches. The records, including as a minimum an attributes summary of all quality conformance inspections conducted on each lot, shall be available for Government review at all times.

4.4.1 Samples. Four of the switches of a particular dash number for a specific item description drawing shall be selected at random, and subjected to the quality conformance inspection.

4.4.2 Test sequence. The sample switches shall be subjected to the inspections specified by table IV, in the order shown.

4.4.3 Failure. If a switch fails to pass quality conformance inspection, appropriate corrective action shall be taken on the material or processes and additional sample units shall be subjected to the quality conformance inspection to verify the effectiveness of the action.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-S-28786.

TABLE IV. Quality conformance inspection.

Test	Paragraph	Sample or unit number			
		1	2	3	4
Design and construction	3.3	X	X	X	X
Operating force	3.4.3	X	X	X	X
Release force	3.4.4	X	X	X	X
Movement differential	3.4.5	X	X	X	X
Pretravel	3.4.6	X	X	X	X
Overtravel	3.4.7	X	X	X	X
Attenuation	3.7.1	X	X	X	X
Thermal shock	3.5.1	X	X		
Vibration	3.5.2			X	
Mechanical shock	3.5.3				X
Mechanical life	3.6.2	X			X

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6. NOTES

6.1 Intended use. This drawing is intended to prevent the proliferation of unnecessary duplicate specifications, drawings and stock catalog listings.

6.2 Application. Units are available normally open (NO), where light path is completed upon actuation, or normally closed (NC), where light path is complete until actuated. There is one fiber optic connector on the side of the switch. The two fibers are terminated on a single SMA (MIL-C-83522) connector.

6.3 Ordering data. The contract or purchase order should specify the following:

- a. Complete part number (see 1.2).
- b. One copy of the quality conformance inspections as required in 4.4, to be shipped with each lot.
- c. Requirements for packaging and packing.

6.4 Comments. Comments to this drawing should be directed to DESC-EMD, Dayton, Ohio 45444.

6.5 Submission of certificate of compliance. The certificate of compliance submitted to DESC-EMD prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of this drawing and the applicable item requirements drawing.

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