INCH-POUND
MIL-DTL-83731/16D
w/Amendment 1
10 January 2017

SUPERSEDING
MIL-DTL-83731/16D
7 March 2007

DETAIL SPECIFICATION SHEET

SWITCHES, TOGGLE, MINIATURE, RIGHT ANGLE (HORIZONTAL), PCB MOUNT, DOUBLE POLE, LEVER SEAL, FLUX SEAL

This specification is approved 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 and MIL-DTL-83731.

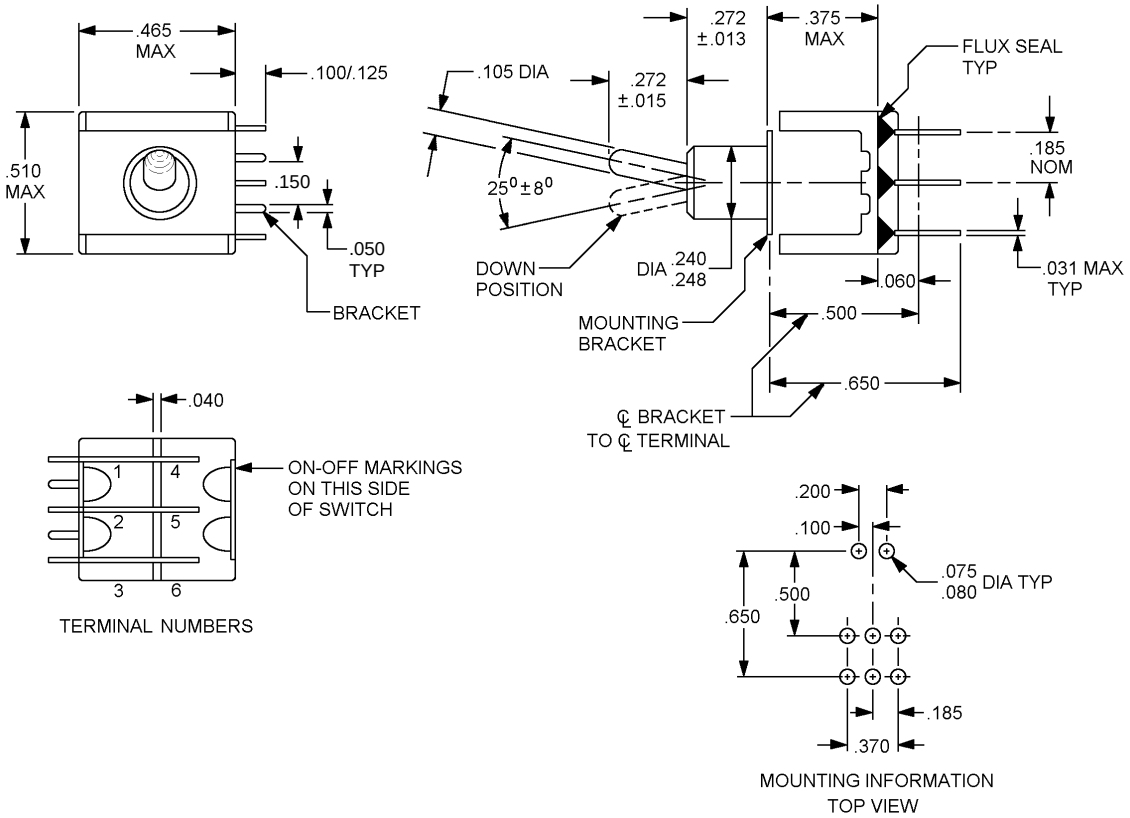

FIGURE 1. Configuration and dimensions.

Inches	mm	Inches	mm	Inches	mm	Inches	mm
.005	0.13	.075	1.91	.125	3.18	.265	6.73
.010	0.25	.080	2.03	.154	3.91	.272	6.91
.013	0.33	.093	2.36	.190	4.83	.280	7.11
.015	0.38	.095	2.41	.200	5.08	.375	9.53
.040	1.02	.100	2.54	.240	6.10	.465	11.81
.046	1.17	.105	2.67	.245	6.22	.500	12.70
.060	1.52	.120	3.05	.248	6.30	.510	12.95

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ± .005 (0.13 mm).
4. Direction of internal mechanism movement is opposite to direction of toggle movement.

FIGURE 1. Configuration and dimensions - Continued.

REQUIREMENTS:

Design and construction: See figure 1.

Material and finish: Bushings shall be brass, nickel plated. Toggle lever shall be brass, bright chrome plated. Frame shall be stainless steel. The contacts shall be gold plate over nickel over silver over brass.

Weight: 0.023 pound maximum.

Electrical ratings: See table I.

Strength of terminals: MIL-STD-202-211, test condition A. The applied force shall be one pound.

Strength of toggle lever, pivot, and lever stop: Test (a) shall use a 10 pound load; test (b) shall use an 8 pound load.

Dielectric withstanding voltage: Test at atmospheric pressure only.

Mechanical endurance: 10,000 cycles at -25°C +0°C, -4°C, and 10,000 cycles at 71°C +4°C, -0°C.

Electrical endurance, electrical overload, intermediate current, logic level life, and temperature rise. Multipole switches are to be tested with a load on each pole and with the same polarity on adjacent poles in accordance with figure 2.

FIGURE 2. Test circuit.

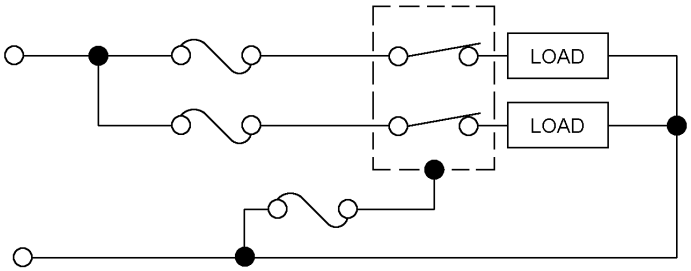

TABLE I. Electrical ratings.

Type of load	High level (current in amperes)			Logic level
	28 V dc	125 V ac, 60 Hz	115 V ac, 400 Hz	5 V dc
Resistive	5	5	5	0.010 ampere
Inductive	2	2	2	- - -
Lamp	1	1	1	- - -

Resistive load (dc and ac): Switches shall make and break the rated resistive load for 10,000 operating cycles at room ambient pressure and a temperature of 71°C +4°C -0°C.

Inductive load (dc and ac): Switches shall make and break the rated inductive load for 10,000 operating cycles at room ambient temperature and pressure.

Lamp load: Switches shall make and break the rated lamp load for 10,000 operating cycles.

Logic level load: 10,000 cycles at an actuation rate of 10-18 cycles per minute with no “stick” or “misses” allowed when tested in accordance with ECIA-RS-448-4, method 17 as follows:

Each pair of switch contacts shall be tested using a 5.0 ±0.05 V dc, 10 ± 1 mA resistive load. During each closure of the contacts, the voltage drop across the switch terminals shall be monitored for a duration of no less than 50 percent of each contact static closure. The switch contacts need not be monitored until 10 ms after the initial contact closure to exclude any contact bounce. During each opening of the contacts, the voltage drop across the switch terminals shall be monitored for a duration of no less than 50 percent of each contact opening.

A voltage of 2.1 volts or greater across the switch terminals shall constitute a contact “miss”, (failure to properly close the circuit). A voltage drop of less than 90 percent of the open-circuit voltage shall constitute a contact “stick” (failure to properly open the circuit).

The monitoring device shall either record the contact closures at which “sticks” or “misses” occur, or discontinue the test when “sticks” or “misses” occur.

Operating temperature:

a. 50 percent of the test cycle at room ambient conditions.

b. 50 percent of the test cycle at 71 +4°C or -0°C.

Short circuit: Use 100 amperes at 28 V dc.

Flux sealed: The sealing is obtained when the base is sealed to prevent flux from entering the switch case during the wave soldering process.

Flux seal test: Three switches shall be tested as follows during qualification and group B inspection: Measure and record initial contact resistance. Place switches, terminals down, into a shallow pan. Pour flux at 80°F ±5°F, type RMA of J-STD-004, specific gravity 0.896, into pan without splashing until level of flux is approximately .062 inch (1.58 mm) above the bottom of the plastic switch case and let switches soak for ten minutes. Remove switches from flux, clean with flux cleaning solvent and immediately put into oven for drying at 175°F for two hours. After switches have cooled at room temperature, repeat initial measurement. Contact resistance shall not increase by more than 10 milliohms over the initial reading. Disassemble and visually examine the contact area for evidence of flux shall be cause for rejection.

Military Part or Identifying Number (PIN): The PIN shall consist of the prefix M83731/16 followed in order by the appropriate three-digit number from table II and the number of table III as shown in the following example:

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                          M      83731/16      -  211
                          |        |                |
Military designation  _____|        |                |
                                   |                |
Specification sheet number_________|                |_______________Number from table II denotes
                                                                     Switch has ON-OFF-ON circuit. 1/
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1/ Listed dash numbers, ending with the number 1, are interchangeable with and supersede canceled dash numbers ending with the numbers 2 and 3.

TABLE II. Circuit for switching characteristic.

Circuit	Circuit with toggle in		
	Down position	Center position	Up position
211	1-2 ON 4-5	OFF	2-3 ON 5-6
231	1-2 ON 4-5	NONE	2-3 ON 5-6
261	1-2 MOM-ON 4-5	NONE	2-3 ON 5-6
271	1-2 MOM-ON 4-5	OFF	2-3 MOM-ON 5-6
311	1-2 MOM-ON 4-5	OFF	2-3 ON 5-6
321	1-2 ON 4-5	2-3 ON 4-5	2-3 ON 5-6
331	1-2 MOM-ON 4-5	2-3 ON 4-5	2-3 ON 5-6
341	1-2 MOM-ON 4-5	2-3 ON 4-5	NONE
351	1-2 MOM-ON 4-5	2-3 ON 4-5	2-3 MOM-ON 5-6

Changes from previous issue: The margins of this specification are marked with vertical lines to indicate where modifications were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

Referenced Documents:
MIL-DTL-83731 MIL-STD-202-211 J-STD-004 ECIA-RS-448-4

Custodians:
Army - CR
Air force - 85
DLA - CC

Review activities:
Army - AR
Air force - 99

Preparing activity:
DLA - CC

(Project 5930-2016-027)

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 https://assist.dla.mil/.