INCH-POUND
MIL-DTL-3786/39D
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SUPERSEDING
MIL-S-3786/39C
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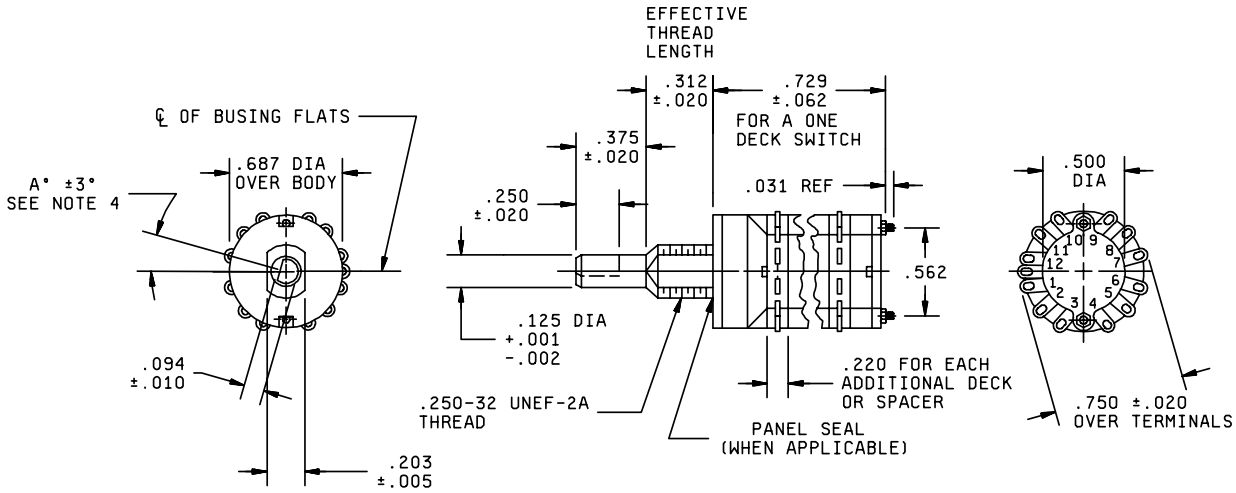
DETAIL SPECIFICATION SHEET

SWITCH, ROTARY, CLOSED CONSTRUCTION, EXPLOSION PROOF, 400 MILLIAMPERES, STYLE SR39

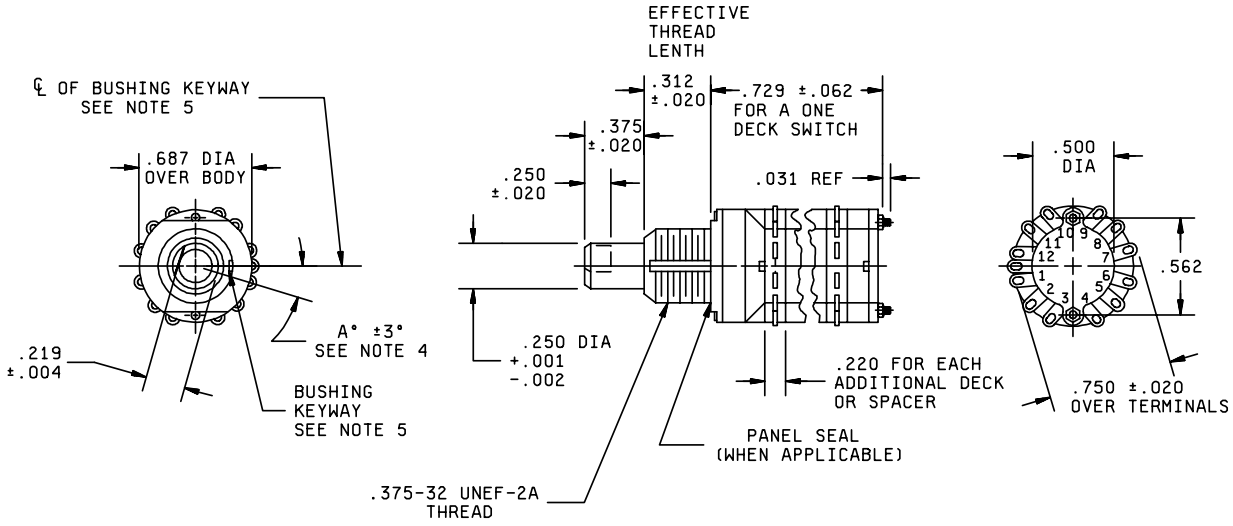
This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and the issue of the following specification listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation: MIL-S-3786.



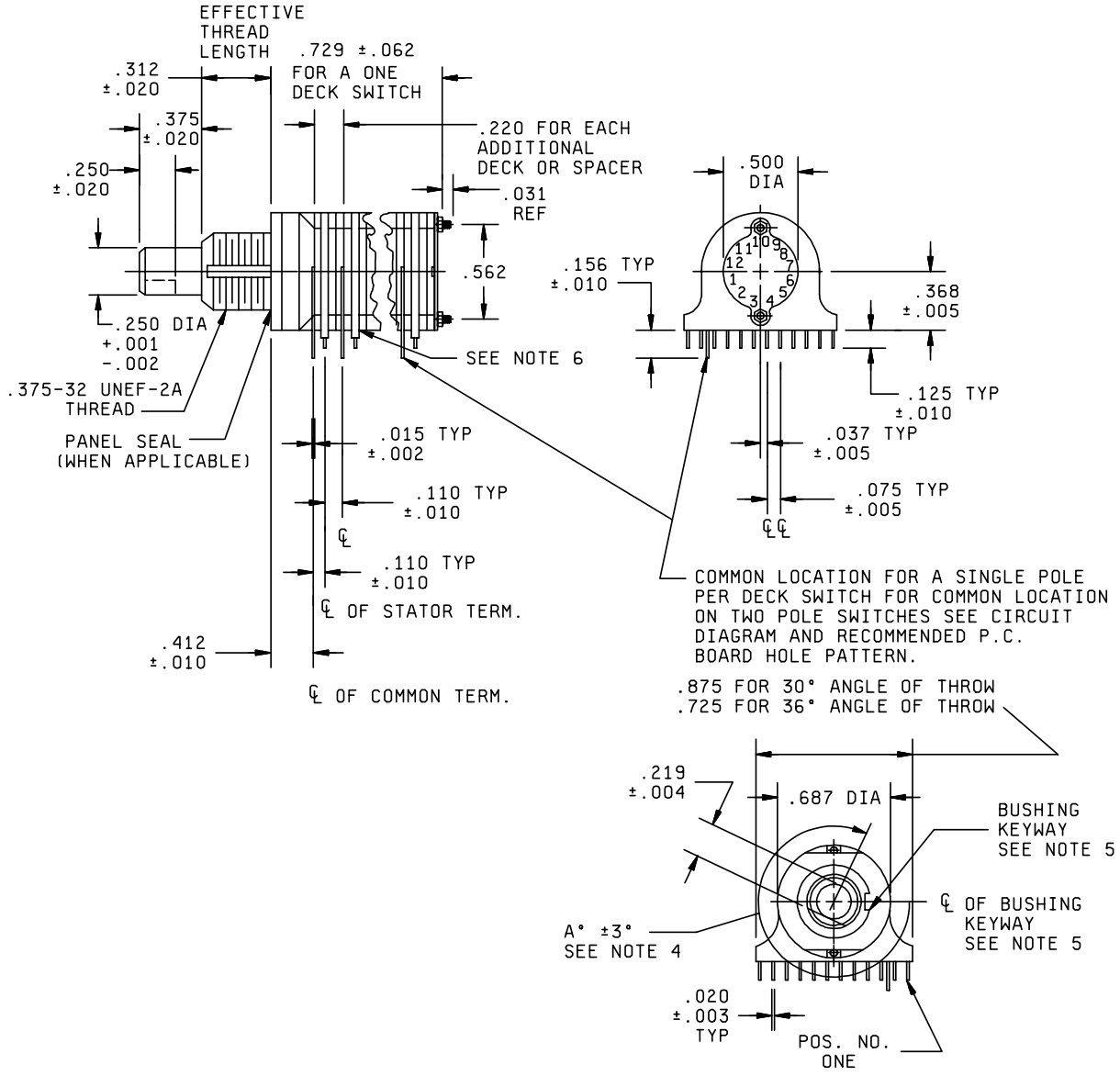
SWITCH WITH SOLDER LUG TERMINATIONS AND .250 MOUNTING BUSHING
30° ANGLE OF THROW SHOWN, SIMILAR 36° ANGLE OF THROW NOT SHOWN

FIGURE 1. Dimensions and configurations.



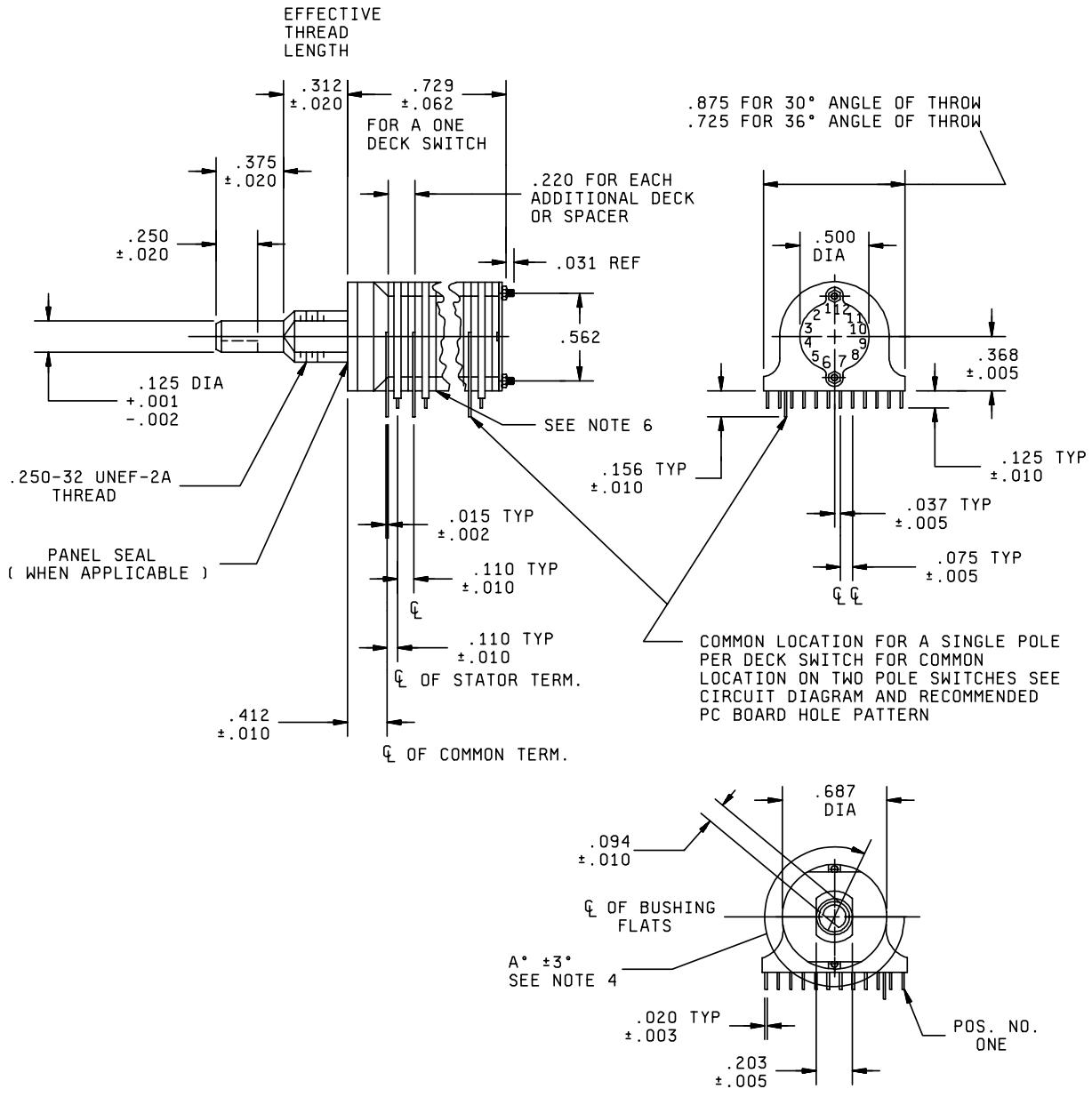
SWITCH WITH SOLDER LUG TERMINATIONS AND .375 MOUNTING BUSHING
30° ANGLE OF THROW SHOWN, SIMILAR 36° ANGLE OF THROW NOT SHOWN

FIGURE 1. Dimensions and configurations - Continued.



SWITCH WITH PRINTED CIRCUIT TERMINATIONS AND .375 MOUNTING BUSHING
30° ANGLE OF THROW SHOWN, SIMILAR 36° ANGLE OF THROW NOT SHOWN

FIGURE 1. Dimensions and configurations - Continued.



SWITCH WITH PRINTED CIRCUIT TERMINATIONS AND .250 MOUNTING BUSHING
30° ANGLE OF THROW SHOWN, SIMILAR 36° ANGLE OF THROW NOT SHOWN

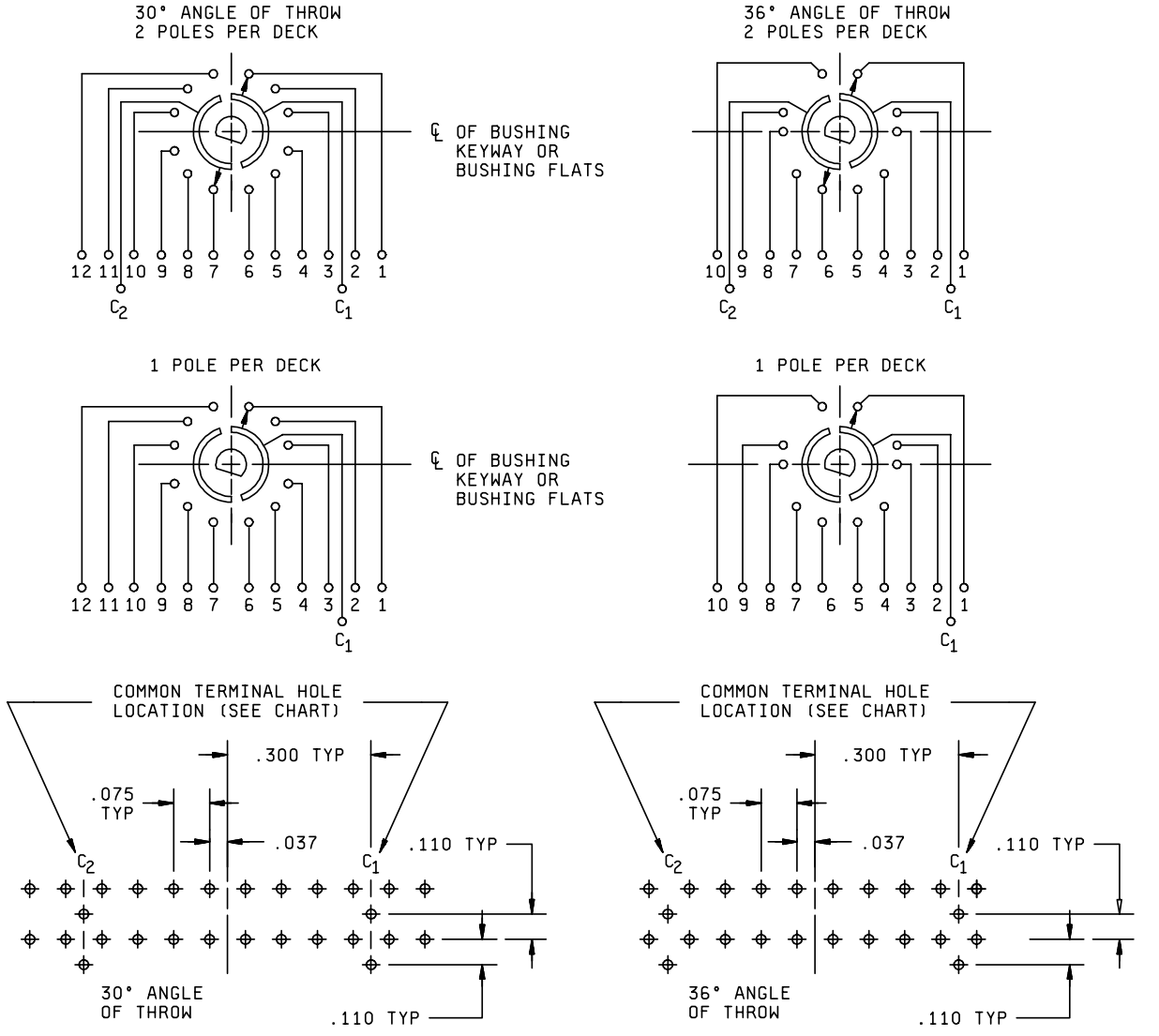
FIGURE 1. Dimensions and configurations - Continued.

Termination type	Angle of throw	Angle "A" ±3°
Solder lug	30°	15°
Solder lug	36°	36°
PC	30°	285°
PC	36°	288°

Inches	mm	Inches	mm	Inches	mm
.001	0.03	.062	1.57	.368	9.35
.002	0.05	.066	1.68	.375	9.53
.003	0.08	.075	1.91	.412	10.46
.004	0.10	.094	2.39	.500	12.70
.005	0.13	.110	2.79	.562	14.27
.010	0.25	.125	3.18	.687	17.45
.015	0.38	.156	3.96	.725	18.42
.020	0.51	.203	5.16	.729	18.52
.022	0.56	.219	5.56	.750	19.05
.031	0.79	.220	5.59	.875	22.23
.0361	0.917	.250	6.35		
.037	0.94	.312	7.92		

NOTES:
1. Dimensions are in inches.
2. Unless otherwise specified, tolerance is ±.015.
3. Metric equivalents are given for general information only.
4. Shaft flat angle "A" is the angle between a line through the center of the shaft and center of the bushing keyway or bushing flats and another line through the center of the shaft and perpendicular to the shaft flat, with switch in position 1 (full counterclockwise position).
5. Bushing keyway is .066 ± .022 wide by .0361 ± .003 deep measured from a .375 diameter.
6. In order to provide room for connecting conductors between decks or printed circuit terminals switches, a spacer may be specified between decks 2 and 3, as determined by the Part or Identifying Number (PIN).

FIGURE 1. Dimensions and configurations - Continued.

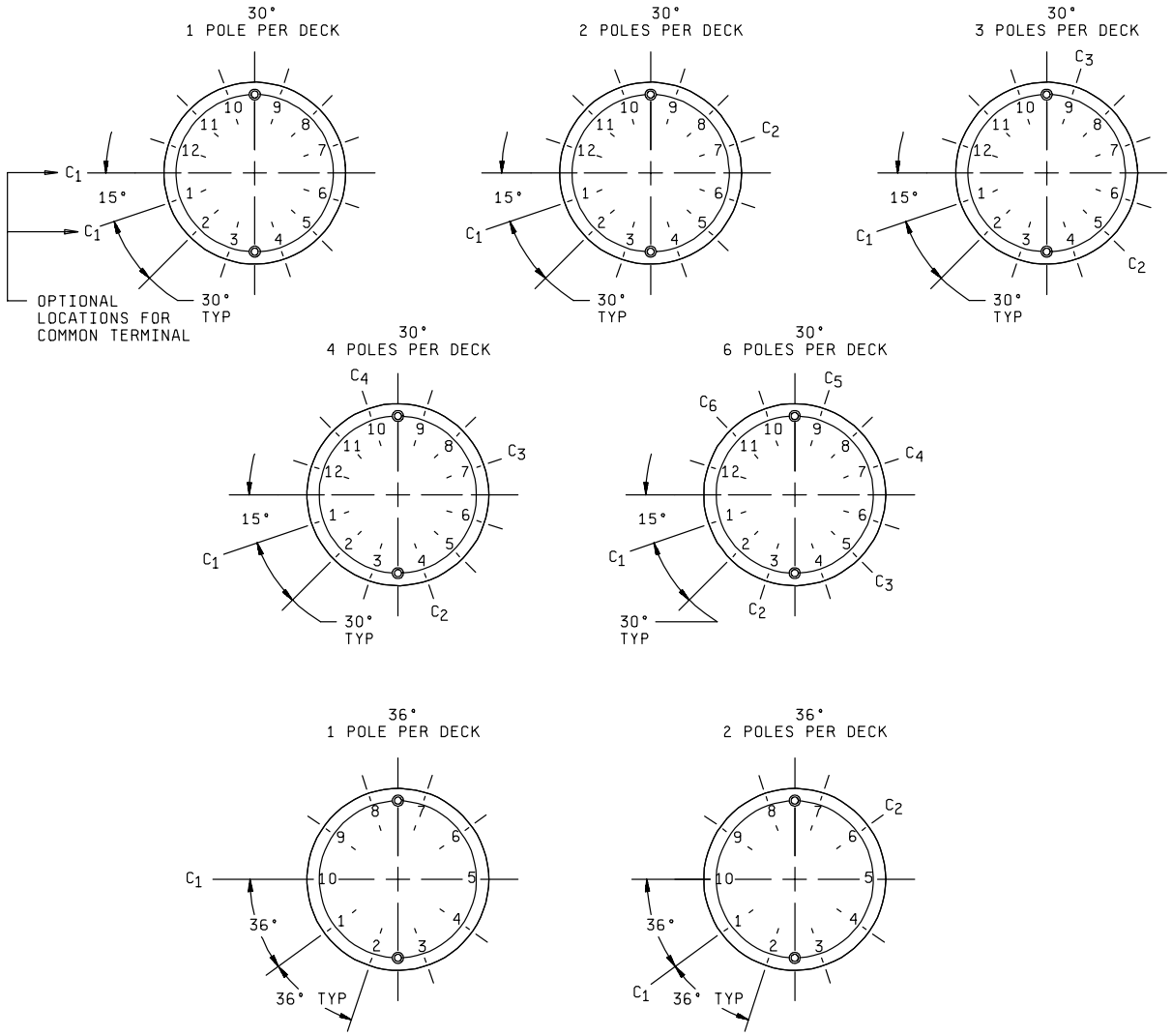


Inches	mm
.015	0.38
.037	0.94
.075	1.91
.110	2.79
.300	7.62

Number of poles per deck	Common terminal hole location
1	C_1
2	C_1 and C_2

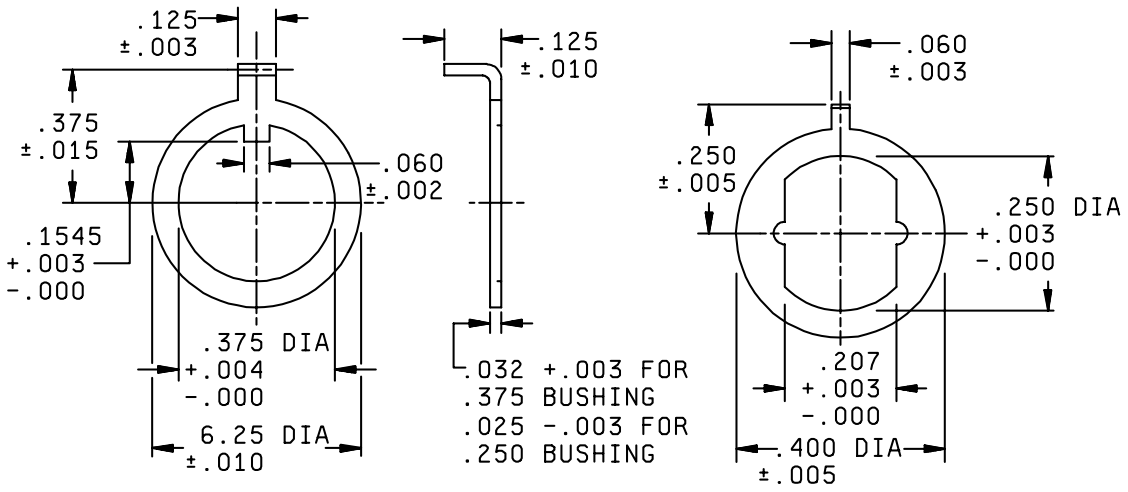
NOTES:
1. Dimensions are in inches.
2. Unless otherwise specified, tolerance is ±.015.
3. Metric equivalents are given for general information only.

FIGURE 2. Front view of printed circuit terminal switch circuit diagram.

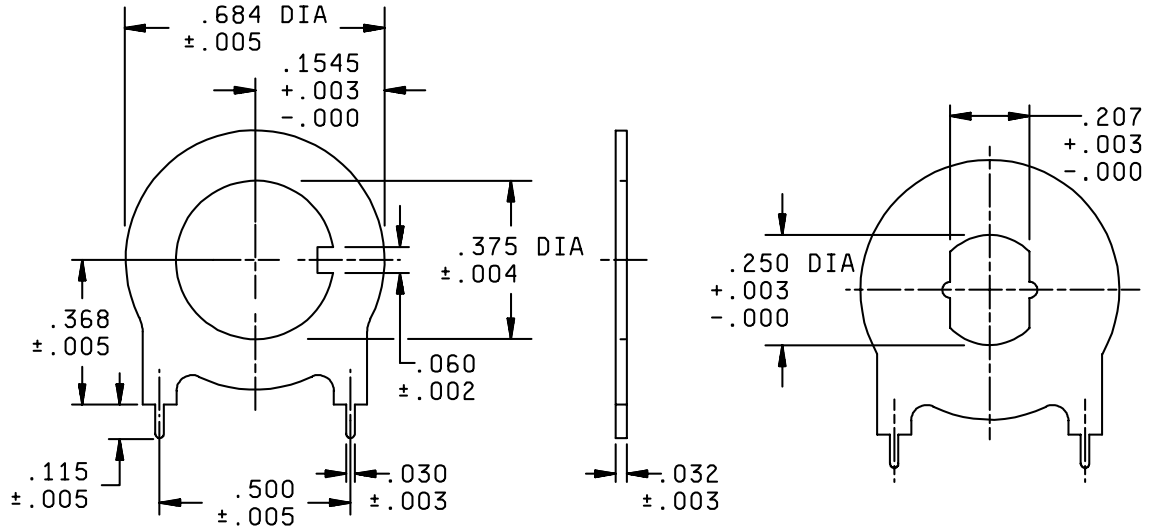


NOTES:
1. Switch is viewed from rear with bushing keyway at the none o'clock position.
2. "C" represents the common terminal.

FIGURE 3. Rear view of solder lug terminal configuration.



NON-TURN WASHER



NON-TURN WASHER

MOUNTING BUSHING WASHER (APPLICABLE TO PRINTED CIRCUIT TYPE WHEN SWITCH IS NOT BUSHING MOUNTED)

Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
.002	0.05	.010	0.25	.032	0.81	.1545	3.924	.375	9.53
.003	0.08	.015	0.38	.060	1.52	.207	5.26	.400	10.16
.004	0.10	.025	0.64	.125	3.18	.250	6.35	.500	12.70
.005	0.13	.030	0.76	.130	3.30	.368	9.35	.625	15.88
								.684	17.37

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 4. Mounting hardware.

REQUIREMENTS:

Dimensions and configuration: See figures 1 through 4.

Construction type: E, F, J, or K, see PIN.

Angle of throw and maximum number of poles per deck:

Switches with solder lug termination:
30°: 6 poles.
36°: 2 poles.

Switches with printed circuit termination:
30°: 2 poles.
36°: 2 poles.

Insulation material: Symbol P (plastic).

Temperature life characteristic: B or C, see PIN.

Vibration grade: Symbol 3 (10 to 2,000 Hz).

Shock type: Symbol B (both high impact and medium impact .

Altitude: Symbol C (70,000 feet.)

Weight: 20 grams maximum for one deck switch; 3 grams maximum additional for each additional deck or spacer.

Mounting hardware: Alternative base metals and protective finishes, as approved by the qualifying activity, may be utilized for mounting nut, lock washer, and nonturn washer material. Dimensions shall be in accordance with the referenced hardware specifications.

Switches with solder lug termination and .250 inch (6.35 mm) diameter threaded bushing: Each switch shall be supplied with one hexagon nut, .062 ±.010 inch (1.57 ±±0.25 mm) thick and .312 inch (7.92 mm) nominal across flats, or in accordance with MS25082-C13; one internal-tooth lock washer, .415 inch (10.54 mm) maximum outside diameter; and one nonturn washer (see figure 4.)

Switches with solder lug termination and .375 inch (9.53 mm) diameter threaded bushing: Each switch shall be supplied with one hexagon in accordance with MS25082-C20; one internal-tooth lock washer in accordance with AA55609-76 or -134, and one nonturn washer (see figure 4.)

Printed circuit termination: Each switch shall be supplied with mounting bushing washer (see figure 4) in addition to the hardware supplied on solder lug termination switches.

Moisture resistance: Insulation resistance, measured immediately after conclusion of the moisture test and while the switches are still in the humidity chamber, shall be greater than .5 megohm. At the end of the drying period, the insulation resistance shall be not less than 10 megohms.

Mounting bushing strength: Strength of mounting bushing test shall be 10 inch-pounds.

Stop strength: Stops shall be set in a clockwise direction from position number 1, when viewed from shaft end. Stops, when supplied, shall withstand a 10 inch-pound torque.

Terminal strength (pull): A force of 2 pounds minimum shall be applied to solder lug terminals. A force of 1 pound minimum shall be applied to printed circuit terminals.

Contact resistance: Initial contact resistance shall not exceed 10 milliohms for switches with solder lug terminations and 20 milliohms for switches with printed circuit terminations. After life (rotational), contact resistance shall not exceed 50 milliohms for switches with solder lug terminations and 60 milliohms for switches with printed circuit terminations.

Rotational torque: The minimum and maximum values of torque determined for shaft rotation shall be within the limits specified in table I. The rotational torque shall not change more than 50 percent from its initial value and shall not be less than the minimum value specified.

Life (rotational): The test loads for the applicable circuit conditions shall be as specified in table II. Each of the loads specified for the applicable environmental condition shall be switched by at least one rotor contact of the switch.

Flux seal: applicable to type J and K construction switches, see PIN.

Qualification: To qualify all switches identified by military part number, the basic sample shall consist of M3786/39-UMR switches. In addition, the following switches shall be added to the samples subjected to the inspection groups specified: Four M3786/39-SME switches to groups I and IV., two M3786/39-CMS switches to groups I and VII, and two each M3786/39-TZP to groups I and VIII.

TABLE I. Rotational torque limits.

Total number of switch poles	Temperature	Torque (inch-ounces)	
		Minimum	Maximum
Less than 6	Room	5	20
	Minimum	5	22
6 through 12	Room	10	25
	Minimum	10	27
More than 12	Room	15	30
	Minimum	15	32

TABLE II. Circuit values for life (rotational) test.

Environmental condition	Inductive load (250 henries)		Resistive load	
	Milliamperes	V dc	Milliamperes	V dc
At atmospheric pressure (sea level) and elevated temp. (85°C or 125°C). 25,000 cycles	50	28	125	28 dc
			75	115 V rms, 60 Hz
At reduced barometric pressure and room temp. (approximately 25°C). 25,000 cycles	10	28	50	28 dc
			20	115 V rms, 60 Hz
At atmospheric pressure (sea level) and room temp. (approximately 25°C). 10,000 cycles 1/	250	28	500	28 dc
			500	115 V rms, 60 Hz

1/ Three additional samples will be run for qualification. Switch to be tested shall be PIN M3786/39-UMR.

Dielectric withstanding voltage: The applicable voltage specified in table III shall be applied.

TABLE III. Dielectric test voltages.

Altitude	Test voltages V rms (60 Hz)
At atmospheric pressure	500
At reduced barometric pressure	350

Application note: To conserve material, space, and weight, particularly for multi-deck switches, the following is suggested:

a. Two-position switches with 30° angle of throw should have 6 poles per deck.

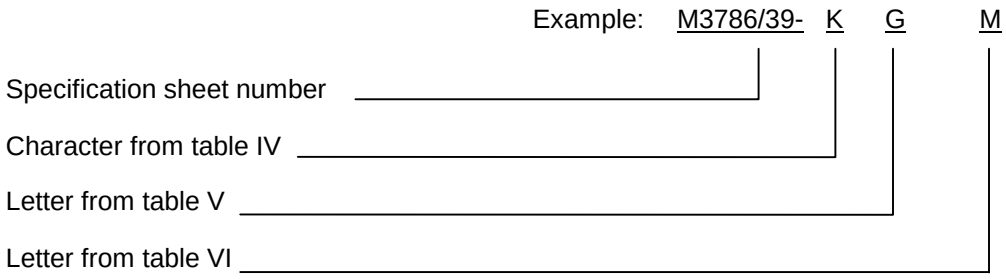
b. Three-position switches with 30° angle of throw should have 4 poles per deck.

c. Four-position switches with 30° angle of throw should have 3 poles per deck.

d. Five- and six-position switches with 30° angle of throw should have 2 poles per deck.

e. Two-, three-, four-, and five-position switches with 36° angle of throw should have 2 poles per deck.

PIN: The PIN shall consist of the prefix M3786/39- followed in order by three appropriate characters from tables IV, V, and VI as shown in the following example:



In the preceding example, M3786/39-KGM identifies a switch on construction type J (flux sealed), shorting switching, 30° angle of throw, temperature-life characteristic B, .375 inch (9.53 mm) diameter mounting bushing, 1 pole per deck, 8 positions per pole (with stops), 1 deck, and solder lug termination.

TABLE IV. First code character for PIN.

Code character	Construction type	Switching characteristic	Angle of throw	Temperature/life characteristic	Mounting bushing dia.
A	E or J	NS	30°	C	.375
B	E or J	S	30°	C	.375
C	F or K	NS	30°	C	.375
D	F or K	S	30°	C	.375
E	E or J	NS	36°	C	.375
F	E or J	S	36°	C	.375
G	F or K	NS	36°	C	.375
H	F or K	S	36°	C	.375
J	E or J	NS	30°	B	.375
K	E or J	S	30°	B	.375
L	F or K	NS	30°	B	.375
M	F or K	S	30°	B	.375
N	E or J	NS	36°	B	.375
P	E or J	S	36°	B	.375
Q	F or K	NS	36°	B	.375
R	F or K	S	36°	B	.375
S	E or J	NS	30°	C	.250
T	E or J	S	30°	C	.250
U	F or K	NS	30°	C	.250
V	F or K	S	30°	C	.250
W	E or J	NS	36°	C	.250
X	E or J	S	36°	C	.250
Y	F or K	NS	36°	C	.250
Z	F or K	S	36°	C	.250
2	E or J	NS	30°	B	.250
3	E or J	S	30°	B	.250
4	F or K	NS	30°	B	.250
5	F or K	S	30°	B	.250
6	E or J	NS	36°	B	.250
7	E or J	S	36°	B	.250
8	F or K	NS	36°	B	.250
9	F or K	S	36°	B	.250

TABLE V. Second code character for PIN.

Code letter	Poles per deck	Number of positions	Rotation
A	1	2	With stops
B	1	3	With stops
C	1	4	With stops
D	1	5	With stops
E	1	6	With stops
F	1	7	With stops
G	1	8	With stops
H	1	9	With stops
J	1	10	With stops
K 1/	1	10	Continuous
L 2/	1	11	With stops
M 2/	1	12	With stops
N 2/	1	12	Continuous
P	2	2	With stops
Q	2	3	With stops
R	2	4	With stops
S	2	5	With stops
T 2/	2	6	With stops
U 2/ 3/	3	2	With stops
V 2/ 3/	3	3	With stops
W 2/ 3/	3	4	With stops
X 2/ 3/ 4/	4	2	With stops
Y 2/ 3/ 4/	4	3	With stops
Z 2/ 3/ 5/	6	2	With stops

1/ Applicable only to switches with 36° angle of throw.

2/ Applicable only to switches with 30° angle of throw.

3/ Applicable only to switches with solder lug termination.

4/ 4 decks maximum.

5/ 3 decks maximum.

TABLE VI. Third code character for PIN.

Code letter	Number of decks	Termination type	Flux seal (Construction type J or K)
A	1	Solder lug	No
B	2	Solder lug	No
C	3	Solder lug	No
D	4	Solder lug	No
E	5	Solder lug	No
F	1	Printed circuit	No
G	2	Printed circuit	No
H 1/	3	Printed circuit	No
J 1/	4	Printed circuit	No
K	3	Printed circuit	No
L	4	Printed circuit	No
M	1	Solder lug	Yes
N	2	Solder lug	Yes
P	3	Solder lug	Yes
Q	4	Solder lug	Yes
R	5	Solder lug	Yes
S	1	Printed circuit	Yes
T	2	Printed circuit	Yes
U 1/	3	Printed circuit	Yes
V 1/	4	Printed circuit	Yes
W	3	Printed circuit	Yes
X	4	Printed circuit	Yes

1/ The 3 and 4 deck switches identified with these code characters are provided with a spacer between decks 2 and 3. The spacer is the same thickness as 1 deck.

Custodians:
Army - CR
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

(Project 5930-1729-03)