INCH-POUND

MIL-PRF-39016/13K
12 August 2013
SUPERSEDING
MIL-PRF-39016/13J
3 December 2004

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, DPDT, LOW LEVEL TO 2 AMPERES (0.150-INCH TERMINAL SPACING)

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

The complete requirements for acquiring the relays described herein shall consist of this specification sheet and the latest issue of MIL-PRF-39016.

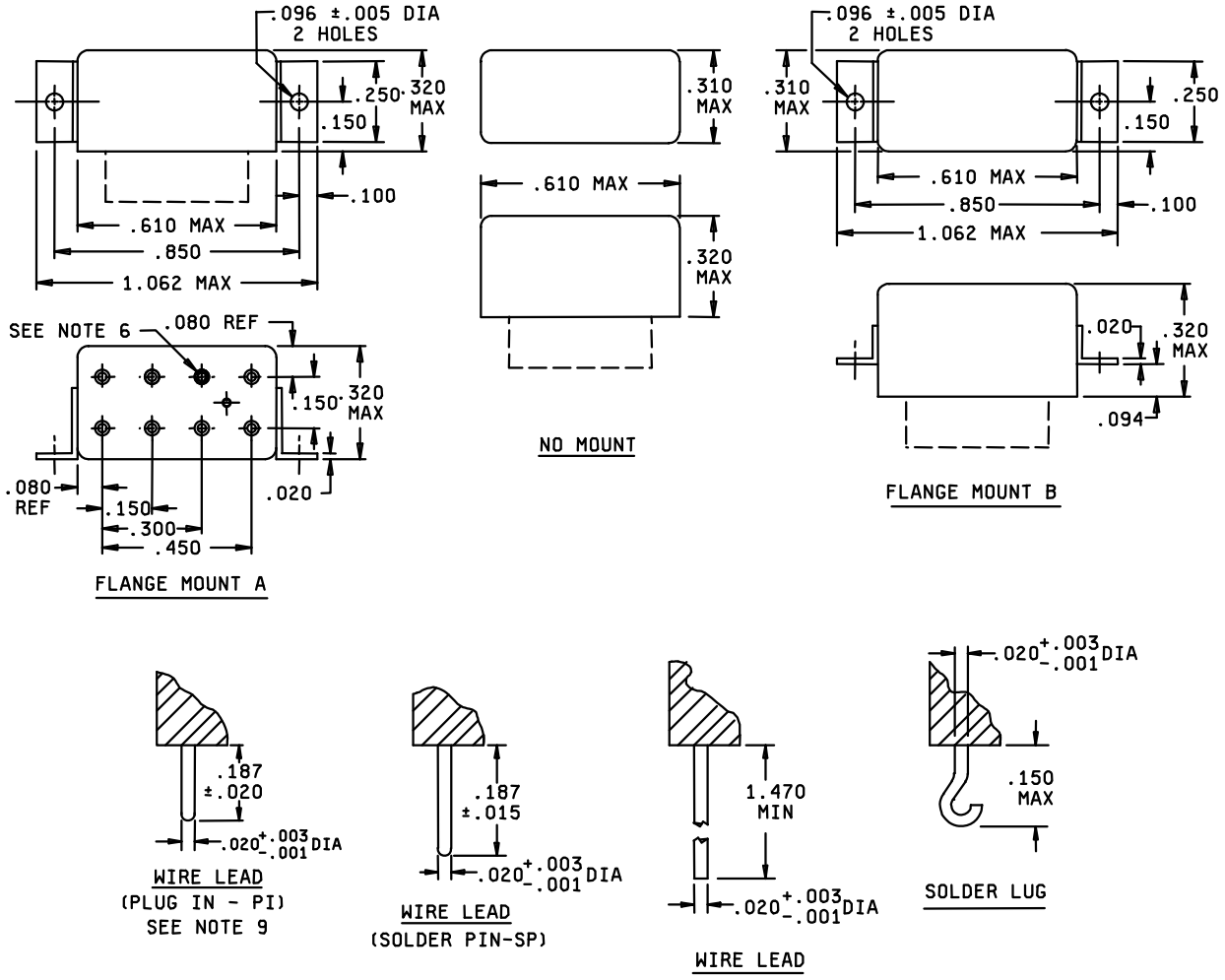
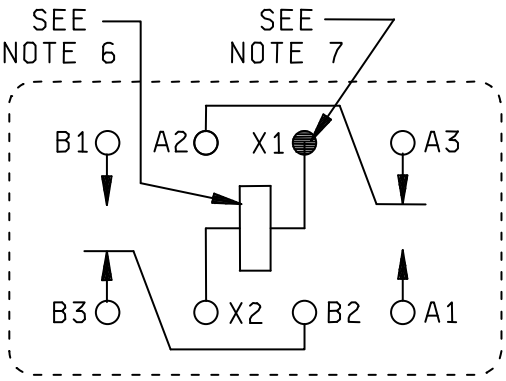


FIGURE 1. Dimensions and configuration.



CIRCUIT DIAGRAM

TERMINAL VIEW
DEENERGIZED POSITION

Inches	mm	Inches	mm	Inches	mm
.001	0.03	.096	2.44	.310	7.87
.003	0.08	.100	2.54	.320	8.13
.005	0.13	.150	3.81	.450	11.43
.020	0.51	.187	4.75	.610	15.49
.080	2.03	.250	6.35	.850	21.59
.094	2.39	.300	7.62	1.062	26.97
				1.470	37.34

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ±.010 (0.25 mm).
4. Terminal locating dimensions shown are applicable to all type mounts.
5. The shape of lug terminals is optional.
6. Coil symbol optional in accordance with MIL-STD-1285.
7. Indicated terminal shall be identified with a contrasting bead.
8. Terminal markings B1 and B3 shall appear on the circuit diagram as a minimum; other terminal markings are for reference only.
9. Terminals shall provide the operational, environmental, and interface characteristics to provide a reliable interconnect to gold-plated contacts. Terminals shall be gold plated. One system for gold plating that may be used is ASTM B488, type 3, class 1.25 with a nickel underplate of 50 to 150 microinches thick. The gold plating system shall enable the product to meet the performance requirements of this specification and shall be approved by the qualifying activity.

FIGURE 1. Dimensions and configuration Continued.

REQUIREMENTS:

CONTACT DATA:

Load ratings:

High level (case grounded 100,000 life cycles, unless otherwise specified):

Resistive:

2 amperes at 28 V dc (50,000 cycles).
1 ampere at 28 V dc.
0.125 ampere at 115 V ac, 60 and 400 Hz.
0.5 ampere at 115 V ac, 60 and 400 Hz (case not grounded).

Inductive load: 0.3 ampere at 28 V dc with 200 millihenries inductance.

Lamp: 0.10 ampere at 28 V dc. (Life test not required.)

Low level: 10 to 50 μA at 10 to 50 mV dc or peak ac.

Intermediate current: Applicable.

Contact resistance or voltage drop:

Initial: 0.050 ohm maximum.

High level:

During life: Not more than 5 percent of open circuit voltage.

After life: 0.15 ohm maximum.

Low level:

During life: 33 ohms maximum.

After life: 0.15 ohm maximum.

Intermediate current:

During: 1 ohm maximum.

After: 0.3 ohm maximum.

Contact bounce: 2.0 milliseconds (ms) maximum. (Applicable to failure rate levels “L”).

Contact stabilization time: 2.5 milliseconds maximum (applicable to failure rate levels “M”, “P”, and “R”).

Overload (high level only): (post overload life test shall be 25,000 cycles).

Resistive: 4 amperes at 28 V dc.

Inductive: 0.6 ampere at 28 V dc. (AC not applicable.)

COIL DATA: See table I.

Operate time: 4.0 ms maximum over temperature range with rated coil voltage.

Release time: 4.0 ms maximum over temperature range from rated coil voltage.

ELECTRICAL DATA:

Insulation resistance: 10,000 megohms minimum, except the resistance between coil and case at high temperature shall be 1,000 megohms minimum.

Dielectric withstanding voltage:

	Sea level V rms (60 Hz)	Altitude V rms (60 Hz)
Between case, frame, or enclosure and all contacts in the energized and de-energized positions.	750	
Between case, frame, or enclosure and coils.	500	350
Between all contacts and coils.	750	All terminals to case
Between open contacts in the energized and de-energized positions.	500	
Between contact poles.	750	

ENVIRONMENTAL DATA:

Temperature range: -65°C to +125°C.

Vibration (sinusoidal): MIL-STD-202, method 204. Contact chatter shall not exceed 10 microseconds maximum for closed contacts, and 1 microsecond maximum closure for open contacts.

Vibration (random): MIL-STD-202, method 214, test condition IG. Contact chatter shall not exceed 10 microseconds maximum for closed contacts, and 1 microsecond maximum closure for open contacts. Applicable to qualification and group C testing only.

Shock (specified pulse): MIL-STD-202, method 213, test condition B (75 g's). Contact chatter shall not exceed 10 microseconds maximum for closed contacts, and 1 microsecond maximum closure for open contacts.

Magnetic interference: Applicable.

Resistance to soldering heat: Applicable.

Acceleration: 100 G.

PHYSICAL DATA:

Terminals: See figure 1 and table I.

Terminal strength: 1.5 ±0.2 pounds (pull).

Solderability: Applicable (not applicable to -118 through -124).

Terminal twist test: Applicable for wire lead terminals and solder lug terminals only. 1/

Dimensions and configuration: See figure 1 and table I.

Weight: 4.82 grams (0.17 ounce) maximum.

Minimum marking: Applicable.

LIFE TEST REQUIREMENTS:

High level: 100,000 cycles per relay, except 50,000 cycles at 2 amperes dc resistive load rating.

Low level: 100,000 cycles plus 900,000 cycles mechanical life.

Part or Identifying Number (PIN): M39016/13- (dash number from table I and suffix letter designating failure level).

1/ For solder lug terminations only, the twist test shall consist of one 45° rotation and return in each direction, a total of 180°. The rate of rotation shall be approximately 9° per second. the subsequent lead bending shall not be performed. NOTE: Solder lug terminations must be gripped 3/64 ±1/64 inch from the point where the lug emerges from the relay header.

TABLE I. Dash numbers and characteristics. 1/

Dash number 2/ M39016/13-				Mount	Coil voltage (V dc) 3/		At 25°C				Over temperature range		
Wire lead (PI)	Wire lead (SP)	Lug	Wire lead		Rated	Max	Coil resistance ohms ±10%	Specified pickup value (voltage) (V dc)	Specified hold value (voltage) (V dc)	Specified dropout value (voltage) (V dc)	Specified pickup value (voltage) (V dc)	Specified hold value (voltage) (V dc)	Specified dropout value (voltage) (V dc)
	092	093	094	A	5	7	44	2.4	1.45	0.26	3.3	2.0	0.16
118	095	096	097	B									
	073	098	079	No mount									
	099	058	061	A	6	8	56	2.7	1.6	0.3	3.8	2.2	0.18
119	070	064	067	B									
	055	089	074	No mount									
	100	101	102	A	9	12	140	4.4	2.6	0.5	6.0	3.6	0.3
120	103	104	105	B									
	075	106	080	No mount									
	107	059	062	A	12	16	210	5.4	3.2	0.6	7.4	4.5	0.36
121	071	065	068	B									
	056	090	076	No mount									
	108	109	110	A	18	24	650	9.5	5.6	1.0	12.8	7.7	0.6
122	111	112	113	B									
	077	114	081	No mount									
	115	060	063	A	26.5	35	1350	13.5	8.1	1.5	18.0	10.8	0.9
123	072	066	069	B									
	057	091	078	No mount									
	116	084	085	A	36	46	2245	17.1	13.7	1.9	23.0	18.0	1.2
124	086	087	088	B									
	082	117	083	No mount									

1/ Each relay possesses high level and low level capabilities. However, relays previously tested or used above 10 mA resistive at 6 V dc maximum or peak ac open circuits not recommended for subsequent use in low level applications.

2/ The suffix letter L, M, P, or R, to designate the applicable failure rate level, shall be added to the applicable listed dash number. Failure rate level (percent per 10,000 cycles): L, 3.0; M, 1.0; P, 0.1; R, 0.01. Example, 055L - - - - - - - - - -069R.

3/ CAUTION: The use of any coil voltage less than the rated coil voltage will compromise the operation of the relay.

QUALIFICATION INSPECTION:

Qualification inspection and sample size: See table II.

TABLE II. Qualification inspection and sample size. 1/

Single submission	Group submission	
24 units plus 1 open unit for level L at C = 0 2/ 33 units plus 1 open unit for level M at C = 0 2/ Qualification inspection as applicable	M39016/13-060	24 units plus 1 open unit for level L at C = 0 2/ 33 units plus 1 open unit for level M at C = 0 2/ Qualification inspection as applicable
	M39016/13-073 M39016/13-055 M39016/13-075 M39016/13-077 M39016/13-082 M39016/13-123	2 units each part number, qualification inspection, Q1.
	M39016/13-068	2 units, qualification inspection table, Q1, and shock, vibration, acceleration, terminal strength, and seal.

1/ For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on MIL-PRF-39016/37 and MIL-PRF-39016/38 may be used in addition to MIL-PRF-39016/13 data. Prior to performance of retention of qualification testing, the relay manufacturer shall preselect the sampling plan.

2/ The number of units required for qualification testing shall be increased as required in Q5, MIL-PRF-39016, if the relay manufacturer elects to test the number of units permitting one or more failures. Prior to performance of qualification testing, the relay manufacturer shall preselect the sampling plan.

Qualification inspection (reduced testing) and sample size: (See table III). If the relays produced for MIL-PRF-39016/13 are similar in construction and design except for the suppressor and steering diodes to the relays produced for MIL-PRF-39016/37 and MIL-PRF-39016/38, then reduced testing for qualification of MIL-PRF-39016/13 relays may be performed concurrent with or subsequent to successful qualification of MIL-PRF-39016/37 or MIL-PRF-39016/38 relays.

TABLE III. Qualification inspection (reduced testing).

Examination or test
2 units each coil voltage – Q1 of qualification inspection table 1 unsealed sample unit for internal examination.

SUPERSESSION DATA:

Supersession data: See table IV.

TABLE IV. Supersession data. 1/

Superseded PIN M5757/37-		Superseded part number M39016/13-		New part number M39016/13- 1/
001	010	001	010	055
002	011	002	011	056
003	012	003	012	057
004	013	004	013	089
005	014	005	014	090
006	015	006	015	091
007	016	007	016	074
008	017	008	017	076
009	018	009	018	078
019	028	019	028	099
020	029	020	029	107
021	030	021	030	115
022	031	022	031	058
023	032	023	032	059
024	033	024	033	060
025	034	025	034	061
026	035	026	035	062
027	036	027	036	063
037	046	037	046	070
038	047	038	047	071
039	048	039	048	072
040	049	040	049	064
041	050	041	050	065
042	051	042	051	066
043	052	043	052	067
044	053	044	053	068
045	054	045	054	069

1/ Complete part number shall contain suffix letter L, M, P, or R to designate failure rate level (see 2/ in table I). A part with any failure rate supersedes the applicable MIL-R-5757 part.

Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue 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 and relationship to the last previous issue.

Referenced documents. In addition to MIL-PRF-39016, this document references the following:

MIL-PRF-39016/37 MIL-PRF-39016/38 MIL-STD-202 MIL-STD-1285
MIL-R-5757 ASTM B488

Custodians:
Army - CR
Navy - EC
Air Force - 85
DLA - CC

Review activities:
Army - AR
Navy - AS, OS, MC, SH
Air Force - 19, 99

Preparing activity:
DLA - CC

(Project 5945-2013-033)

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/.