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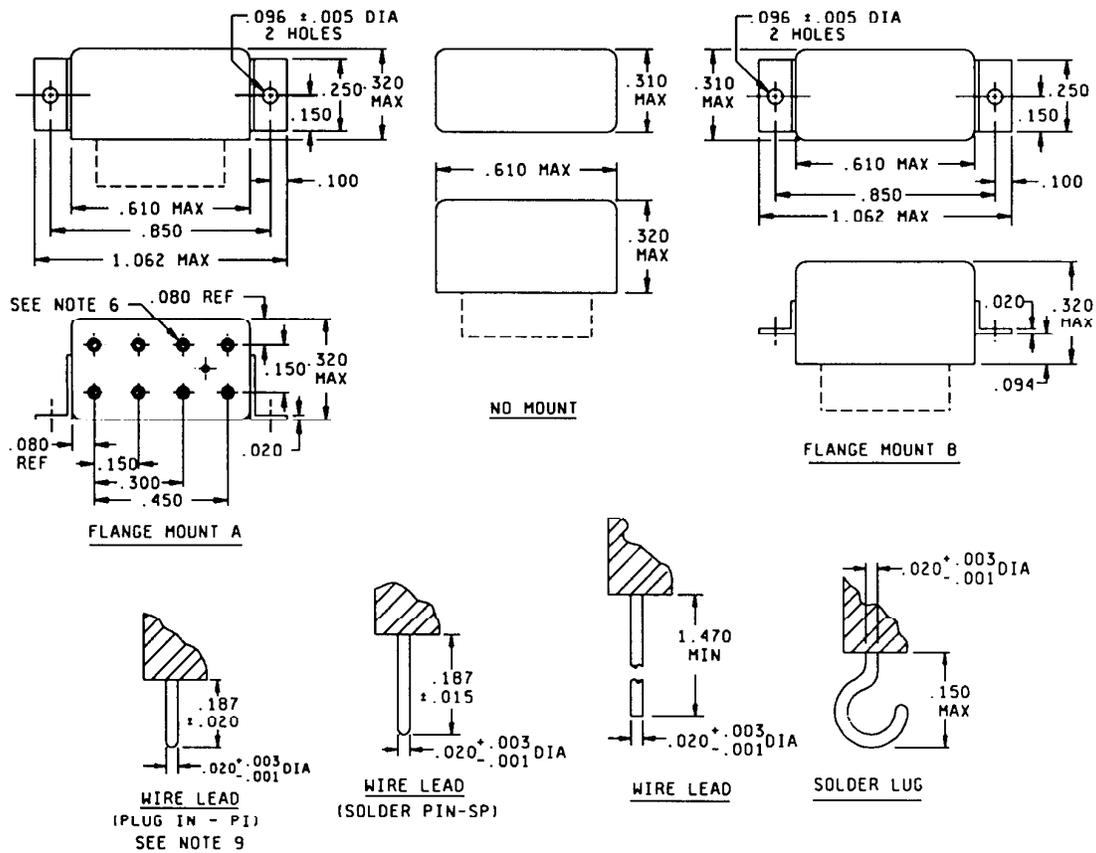
MIL-PRF-39016/13H
 13 May 1987
 SUPERSEDING
 MIL-R-39016/13G
 7 November 1985

PERFORMANCE SPECIFICATION SHEET

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

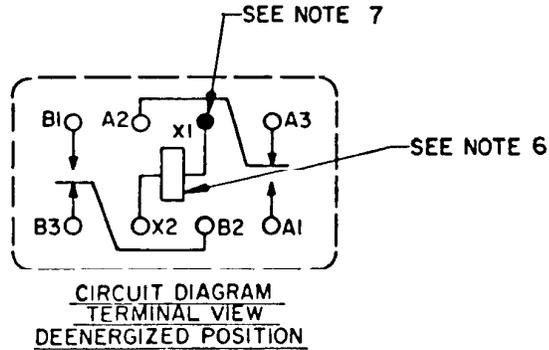
This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the relays described herein shall consist of this specification and the latest issue of MIL-R39016.



(H) FIGURE 1. Dimensions and configuration.

(H) denotes changes



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

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, the 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 is optional per 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. Finish gold plate per MIL-G-45204, type II, class 1, grade C, except knoop hardness shall be 130 to 240, underplating nickel 50 to 150 microinches thick.

(H) 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 to 400 Hz. 1/

0.5 ampere at 115 V ac, 60 to 400 Hz (case not grounded). 1/

Inductive: 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 μ A at 10 to 50 mV dc or peak ac.

Intermediate current: Applicable.

Contact resistance or voltage drop:

Initial: 0.05 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: .3 ohm maximum.

Contact bounce: 2.0 milliseconds (ms) maximum. (Applicable to failure rate level "L".)

Contact stabilization time: 2.5 ms maximum. (Applicable to failure rate levels "M", "P", and "R").

Overload (high level only):

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.

1/ 400 Hz life test not required for qualification testing.

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 deenergized position - - - - -	750	} 350 All terminals to case
Between case, frame, or enclosure and coil - -	500	
Between all contacts and coil - - - - -	750	
Between open contacts in the energized and deenergized 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 for open contacts.

(H) 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 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 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).

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

Terminal twist test: Applicable for wire lead terminals and solder lug terminals only. 2/

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.

2/ 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.

PART NUMBER: M39016/13- (dash number from table I and suffix letter designating failure level).

(H) TABLE I. Dash number 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%	Speci- fied pickup value (volt- age) (V dc)	Speci- fied hold value (volt- age) (V dc)	Speci- fied dropout value (volt- age) (V dc)	Speci- fied pickup value (volt- age) (V dc)	Speci- fied hold value (volt- age) (V dc)	Speci- fied dropout value (volt- age) (V dc)
	092	093	094	A									
118	095	096	097	B	5	7	44	2.4	1.45	0.26	3.3	2.0	0.16
	073	098	079	No mount									
	099	058	061	A									
119	070	064	067	B	6	8	56	2.7	1.6	0.3	3.8	2.2	0.18
	055	089	074	No mount									
	100	101	102	A									
120	103	104	105	B	9	12	140	4.4	2.6	0.5	6.0	3.6	0.3
	075	106	080	No mount									
	107	059	062	A									
121	071	065	068	B	12	16	210	5.4	3.2	0.6	7.4	4.5	0.36
	056	090	076	No mount									
	108	109	110	A									
122	111	112	113	B	18	24	650	9.5	5.6	1.0	12.8	7.7	0.6
	077	114	081	No mount									
	115	060	063	A									
123	072	066	069	B	26.5	35	1350	13.5	8.1	1.5	18.0	10.8	0.9
	057	091	078	No mount									
	116	084	085	A									
124	086	087	088	B	36	46	2245	17.1	13.7	1.9	23.0	18.0	1.2
	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 circuit are 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.

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QUALIFICATION INSPECTION:

Qualification inspection and sample size: See table II.

(H) 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/	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/		33 units plus 1 open unit for level M at C = 0 2/
Qualification inspection as applicable.		Qualification inspection as applicable.
	M39016/13-073	2 units each part number, qualification inspection table, group II.
	M39016/13-055	
	M39016/13-075	
	M39016/13-077	
	M39016/13-082	
	M39016/13-123	
	M39016/13-068	2 units, qualification inspection table, group II, 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-R-39016/37 and MIL-R-39016/38 may be used in addition to MIL-R-39016/13 data. Prior to retention of qualification testing, the relay manufacturer shall preselect the sampling plan.
- 2/ The number of units required for qualification testing will be increased as required in group V, table II, MIL-R-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-R-39016/13 are similar in construction and design except for the suppressor and steering diodes to the relays produced for MIL-R-39016/37 and MIL-R-39016/38, then reduced testing for qualification of MIL-R-39016/13 relays may be performed concurrent with or subsequent to successful qualification of MIL-R-39016/37 and MIL-R-39016/38.

(H) TABLE III. Qualification inspection (reduced testing).

Examination or test
2 units each coil voltage
Group II of qualification inspection table.
(1 unsealed sample unit)
Internal examination.

SUPERSESSSION DATA:

Supersession data: See table IV.

TABLE IV. Supersession data.

Superseded part number M5757/37-		Superseded part number M39016/13-		New part number M39016/13- <u>1/</u>
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/ of table I). A part with any failure rate supersedes the applicable MIL-R-5757 part.

Custodians:

Army - ER
Navy - EC
Air Force - 85

Review activities:

Air Force - 17
DLA - ES

User activities:

Army - AR
Navy - AS, MC, OS, SH
Air Force - 11, 19

Preparing activity:

Navy - EC

Agent:

DLA - ES

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