

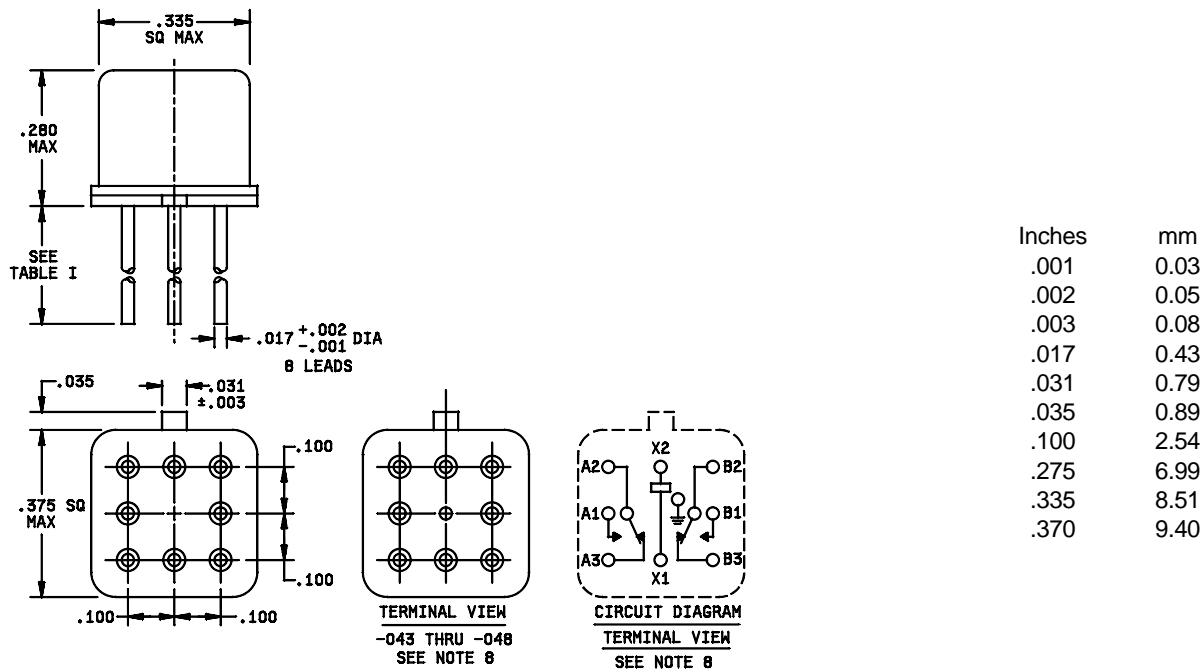
INCH-POUND
 MIL-PRF-39016/17H
 1 April 2005
 SUPERSEDING
 MIL-PRF-39016/17G
 20 July 1988

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, DPDT,
 LOW LEVEL TO 1 AMPERE TERMINALS 0.100-INCH GRID PATTERN

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

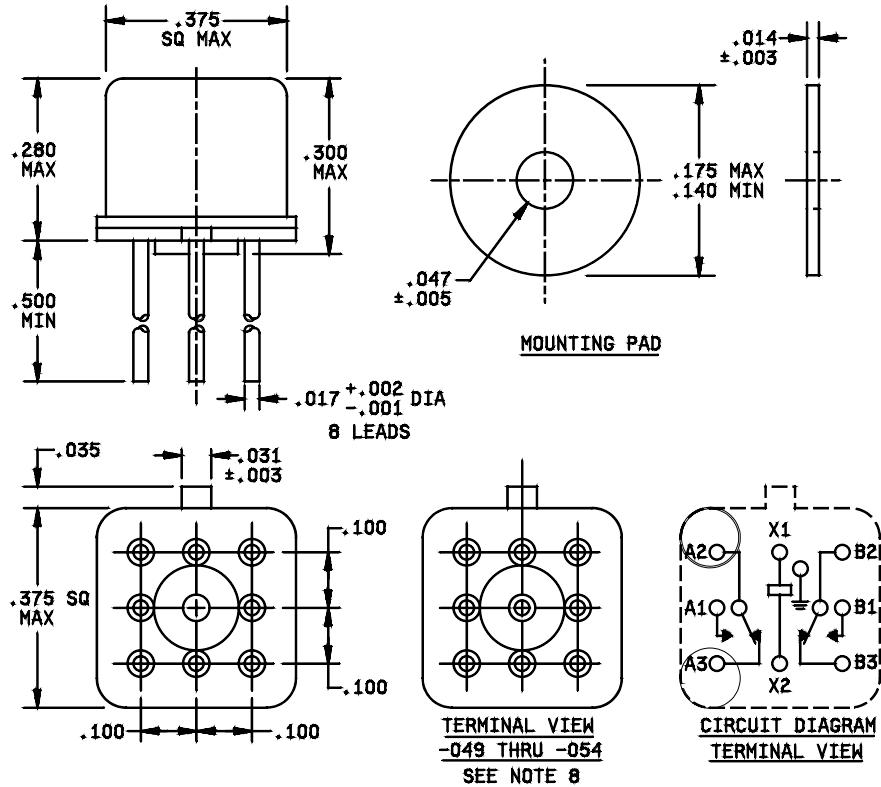
The complete requirements for acquiring the relays described herein shall
 consist of this specification sheet and the latest issue of MIL-PRF-39016.



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 numbers shown above are for reference only. Numbers do not appear on relay.
5. Coil symbol optional in accordance with MIL-STD-1285.
6. Circuit diagram shown on part is the terminal view.
7. See table I for lead lengths.
8. M39016/17-043 through M39016/17-048 shall be supplied with a case grounding pin welded to the relay header as shown.

FIGURE 1. Dimensions and configuration.



Inches	mm	Inches	mm
.001	0.03	.100	2.54
.002	0.05	.170	4.32
.003	0.08	.335	8.51
.017	0.43	.370	9.40
.031	0.79	.375	9.53
.035	0.89	.400	10.16
.047	1.93	.500	12.70

NOTES:

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4. Terminal numbers shown above for reference only. Numbers do not appear on relay.
5. Coil symbol optional in accordance with MIL-STD-1285.
6. Circuit diagram shown on part is the terminal view.
7. Spacer mounting pad shall be a polyester film per MIL-I-631, Type G, Class I.
8. M39016/17-049 through -054 shall be supplied with a case grounding pin welded to the relay header as shown.

FIGURE 2. Dimensions and configuration (relay with spacer mounting pad).

REQUIREMENTS:

CONTACT DATA:

Load ratings:

High level (relay case grounded):

Resistive:

1.0 ampere at 28 V dc.
250 milliamperes at 115 V ac 60 and 400 Hz case not grounded.
100 milliamperes at 115 V ac 60 and 400 Hz case grounded.

Inductive load: 0.2 ampere at 28 V dc with 0.32 henry inductance.

Lamp: 0.10 ampere at 28 V dc.

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: 0.10 ohm maximum (0.110 ohm maximum with spacer mounting pad).

High level:

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

After life: 0.20 ohm maximum (0.210 ohm maximum with spacer mounting pad).

Low level:

During life: 100 ohms maximum.

After life: 0.15 ohm maximum (0.160 ohm maximum with spacer mounting pad).

Intermediate current:

During: 3 ohms maximum.

After: 0.20 ohm maximum (0.210 ohm maximum with spacer mounting pad).

Contact bounce: 1.5 milliseconds maximum (applicable to failure rate level "L").

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

Overload (high level only): Two times rated current. Not applicable to ac load ratings.

COIL DATA: See table I.

Operate time: 2.0 ms maximum over temperature range with rated coil voltage.

Release time: 1.5 ms maximum over temperature range from rated coil voltage.

ELECTRICAL DATA:

Insulation resistance: 10,000 megohms minimum at 500 V dc, 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)	Post intermediate current life test 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.	500	500	
Between case, frame, or enclosure and coils.	500	500	125
Between all contacts and coils.	500	500	All terminals to case
Between open contacts in the energized and de-energized positions.	500	375	
Between contact poles.	500	500	
Between coils of dual coil relays.	N/A	N/A	

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: Applicable.

Salt atmosphere (corrosion): In accordance with method MIL-STD-750, 1041.

PHYSICAL DATA:

Terminal strength (MIL-STD-202, method 211):

Pull test: Test condition A, 1 pound pull.

Bend test: Test condition C, $\frac{1}{2}$ pound load.

Twist test: As specified in MIL-PRF-39016.

Solderability: Applicable.

Dimensions and configuration: See figures 1.

Weight: 2.55 grams (0.09 ounce) maximum.

Seal: Hermetic.

Minimum marking: Military part number, "J" with the date code (example J0430), circuit diagram, manufacturer's name or source code.

LIFE TEST REQUIREMENTS:

High level: 100,000 cycles per relay.

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

Part or Identifying Number (PIN): M39016/17- (dash number from table I and suffix letter designating failure rate level).

QUALIFICATION INSPECTION:

Qualification inspection and sample size: See table II.

TABLE I. Dash numbers and characteristics. 1/

Dash number 2/			Coil voltage 3/ (V dc)		At +25°C				Over temperature range		
Lead length .187 ±.010	Lead length .500 min	Spacer mounting pads (fig. 2) 4/	Rated	Max	Coil resist- ance ohms ±10%	Speci- fied pickup value (voltage) (V dc)	Speci- fied hold value (voltage) (V dc)	Speci- fied dropout value (voltage) (V dc)	Speci- fied pickup value (voltage) (V dc)	Speci- fied hold value (voltage) (V dc)	Speci- fied dropout value (voltage) (V dc)
025	031	037	5	5.8	50	2.7	1.4	0.22	3.5	2.3	0.14
026	032	038	6	8	98	3.5	2.0	0.28	4.5	3.2	0.18
027	033	039	9	12	220	5.3	3.0	0.54	6.8	4.9	0.35
028	034	040	12	16	390	7.0	4.0	0.63	9.0	6.5	0.41
029	035	041	18	24	880	10.5	6.0	0.91	13.5	10.0	0.59
030	036	042	26.5	32	1,560	14.2	8.0	1.37	18.0	13.0	0.89
	043 5/	049 5/	5	5.8	50	2.7	1.4	0.22	3.5	2.3	0.14
	044 5/	050 5/	6	8	98	3.5	2.0	0.28	4.5	3.2	0.18
	045 5/	051 5/	9	12	220	5.3	3.0	0.54	6.8	4.5	0.35
	046 5/	052 5/	12	16	390	7.0	4.0	0.63	9.0	6.5	0.41
	047 5/	053 5/	18	24	880	10.5	6.0	0.91	13.5	10.0	0.59
	048 5/	054 5/	26.5	32	1,560	14.2	8.0	1.37	18.0	13.0	0.89

- 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, 025L - - - - -42R.
- 3/ CAUTION: The use of any coil voltage less than the rated coil voltage will compromise the operation of the relay.
- 4/ Relays supplied with spacer mounting pads (-037 through -042 and -049 through -054) shall have the spacer mounting pad rigidly attached.
- 5/ Relays are supplied with a case grounding pin welded to the header (see figures 1 and 2).

TABLE II. Qualification inspection and sample size. 1/

Single submission	Group submission	
18 units plus 1 open unit for level L at C = 0 <u>2/</u>	M39016/17-036	18 units plus 1 open unit for level L at C = 0 <u>2/</u>
33 units plus 1 open unit for level M at C = 0 <u>2/</u>		33 units plus 1 open unit for level M at C = 0 <u>2/</u>
Qualification inspection as applicable.	M39016/17-031 M39016/17-032 M39016/17-033 M39016/17-034 M39016/17-035 M39016/17-048	Qualification inspection as applicable. 2 units each PIN Qualification inspection, table, Q2. 1 unit terminal strength and solderability

1/ For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on MIL-PRF-39016/18, /19, /41, /42, and /43, may be used in addition to MIL-PRF-39016/17 data. Prior to performance of qualification or extension 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 inspection testing the relay manufacturer shall preselect the sampling plan.

Qualification inspection (reduced testing) (sample size - 2 size each coil voltage and 1 unsealed unit). See table III.

If the relays produced for MIL-PRF-39016/17 are similar in construction and design except for the suppresser and steering diodes and coil assembly, as applicable, to the relays produced for MIL-PRF-39016/18, /19, /41, /42, and /43, then reduced testing for qualification of MIL-PRF-39016/17 relays may be performed concurrent with or subsequent to successful qualification of MIL-PRF-39016/18, /19, /41, /42, and /43 relays. For reduced testing, see table III.

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.

Initial qualification of relays supplied with spacer mounting pads (-37 through -042 and -049 through -054) shall be tested as specified below:

Perform the following tests as specified in the qualification inspection table of MIL-PRF-39016, in the order shown below:

Before installation of spacer mounting pad: Screening, visual and mechanical inspection (internal), thermal shock, resistance to solvents, vibration (sinusoidal), vibration (random), shock (specified pulse), acceleration, terminal strength, magnetic interference (when specified), capacitance (when specified), coil life (applicable to continuous duty relays only), resistance to soldering heat, salt spray (corrosion), overload (applicable to high level relays only), life, terminal strength, and intermediate current.

After installation of spacer mounting pad, perform the following tests as specified in the qualification inspection table of MIL-PRF-39016, in the order shown below:

Insulation resistance, dielectric withstanding voltage, static contact resistance, specified pickup, hold, or dropout values (voltages), coil resistance, operate and release time, contact dynamic characteristics, coil transient suppression (when specified), solderability, seal, visual and mechanical inspection (external).

Qualification inspection (reduced testing for previously qualified relays) for relays supplied with spacer mounting pads (-037 through -042): Two (2) units of the 26.5-volt rated coil voltage (-042) shall be tested as specified below:

Before installation of spacer mounting pad, perform the following tests as specified in the qualification inspection table of MIL-PRF-39016 in the order shown below:

For failure rate level L only: Screening.

For failure rate levels M, P, and R: Vibration (sinusoidal) test duration shall be 10 minutes, vibration (random), screening.

After installation of spacer mounting pad, perform the following tests as specified in the qualification inspection table of MIL-PRF-39016 in the order shown below:

Insulation resistance, dielectric withstanding voltage, static contact resistance, specified pickup, hold, and dropout values (voltages), coil resistance, operate and release time, contact dynamic characteristics, coil transient suppression (when specified), solderability, seal, visual and mechanical inspection (external).

Group A testing for relays supplied with spacer mounting pads (-037 through -042 and -049 through -054), shall be tested as specified below:

Perform seal test immediately preceding the A2 electrical tests. Relay leads shall be formed and the spacer mounting pad removed before the seal test. After the seal test, the spacer mounting pad shall be rigidly attached to the relay and the remaining group A tests performed (The seal test is not performed with group A4.).

SUPERSESSION DATA:

Supersession data: See table IV.

TABLE IV. Supersession data.

Superseded part no. M5757/89-	New part no. M39016/17- 1/	Superseded part no. M39016/17- 2/	New part no. M39016/17-
001, 025	031	001	031
002, 026	032	002	032
003, 027	033	003	033
004, 028	034	004	034
005, 029	035	005	035
006, 030	036	006	036
007, 031	025	007	025
008, 032	026	008	026
009, 033	027	009	027
010, 034	028	010	028
011, 035	029	011	029
012, 036	030	012	030
013, 037	031	013	031
014, 038	032	014	032
015, 039	033	015	033
016, 040	034	016	034
017, 041	035	017	035
018, 042	036	018	036
019, 043	025	019	025
020, 044	026	020	026
021, 045	027	021	027
022, 046	028	022	028
023, 047	029	023	029
024, 048	030	024	030

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.

2/ Dash numbers -001 through -024, .225 inch high cans have been canceled and are superseded by dash numbers -025 through -036, .280 inch high cans. The .225 inch cans are no longer manufactured.

Cross-reference for Government logistical support: See table V.

TABLE V. Cross reference for Government logistical support.

Superseded part no. M5757/89-	New part no. M39016/17-	Support with part no. M39016/17-	Superseded part no. M5757/89-	New part no. M39016/17-	Support with part no. M39016/17-
001	031	031	011	029	035
002	032	032	012	030	036
003	033	033	013	031	031
004	034	034	014	032	032
005	035	035	015	033	033
006	036	036	016	034	034
007	025	031	017	035	035
008	026	032	018	036	036
009	027	033	019	025	031
010	028	034	020	026	032
021	027	033	001	031	031
022	028	034	002	032	032
023	029	035	003	033	033
024	030	036	004	034	034
025	031	031	005	035	035
026	032	032	006	036	036
027	033	033	007	025	031
028	034	034	008	026	032
029	035	035	009	027	033
030	036	036	010	028	034
031	025	031	011	029	035
032	026	032	012	030	036
033	027	033	013	031	031
034	028	034	014	032	032
035	029	035	015	033	033
036	030	036	016	034	034
037	031	031	017	035	035
038	032	032	018	036	036
039	033	033	019	025	031
040	034	034	020	026	032
041	035	035	021	027	033
042	036	036	022	028	034
043	025	031	023	029	035
044	026	032	024	030	036
045	027	033	---	025	031
046	028	034	---	026	032
047	029	035	---	027	033
048	030	036	---	028	034
---	025	031	---	029	035
---	026	032	---	030	036
---	027	033	---	031	031
---	028	034	---	032	032
---	029	035	---	033	033
---	030	036	---	034	034
---	031	031	---	035	035

TABLE V. Cross reference for Government logistical support - Continued.

Superseded part no. M5757/89-	New part no. M39016/17-	Support with part no. M39016/17-	Superseded part no. M5757/89-	New part no. M39016/17-	Support with part no. M39016/17-
---	032	032	---	036	036
---	033	033	---	037	037
---	034	034	---	038	038
---	035	035	---	039	039
---	036	036	---	040	040
---	--	---	---	041	041
---	---	---	---	042	042

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

MIL-I-631
 MIL-PRF-39016/18, /19, /41, /42, and /43
 MIL-R-5757
 MIL-STD-202
 MIL-STD-750
 MIL-STD-1285

Changes from previous issue: Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

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

Preparing activity:
 DLA - CC

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

(Project 5945-1283)

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 <http://assist.daps.dla.mil>.