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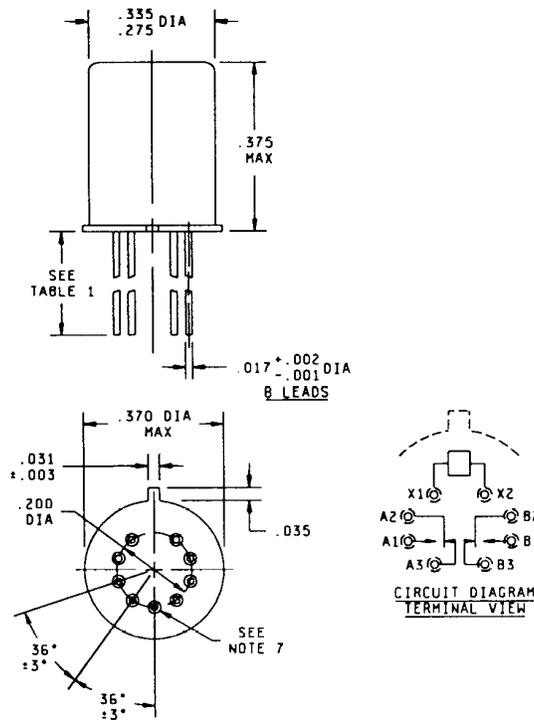
MIL-PRF 39016/11F
20 JULY 1988
 SUPERSEDING
 MIL-R-39016/11E
 10 February 1984

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, DPDT,
 LOW LEVEL TO 1.0 AMPERE
 (SENSITIVE, 60 MILLIWATTS, COIL OPERATE POWER AT 25°C)

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 the latest issue of MIL-R-39016.



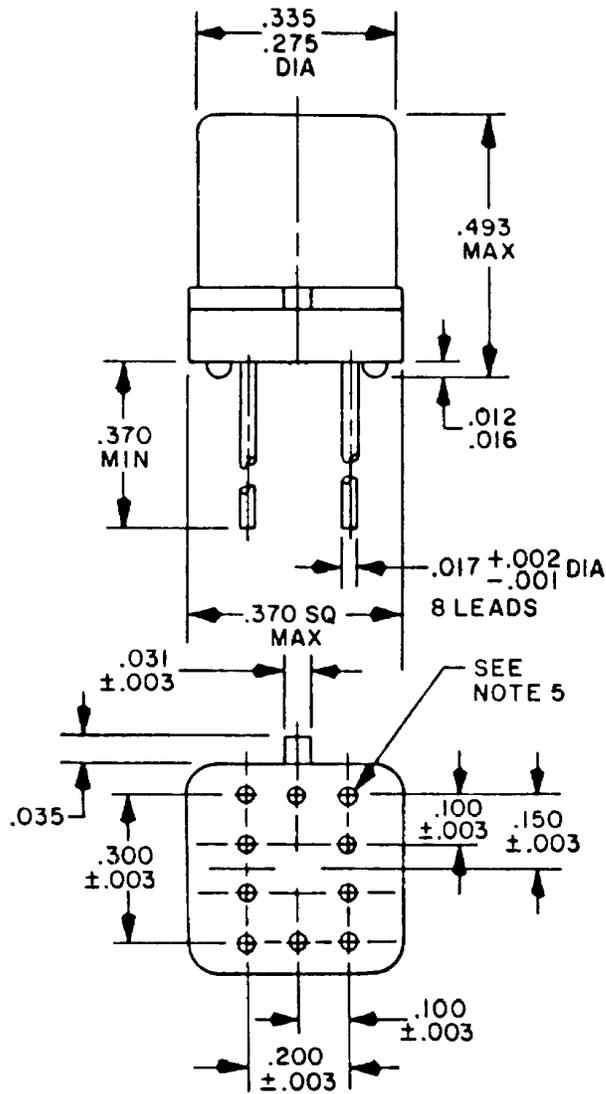
Inches	mm	Inches	mm	Inches	mm
.001	0.03	.031	0.79	.335	8.51
.002	0.05	.035	0.89	.370	9.40
.003	0.08	.200	5.08	.375	9.53
.017	0.43	.275	6.99		

NOTES:

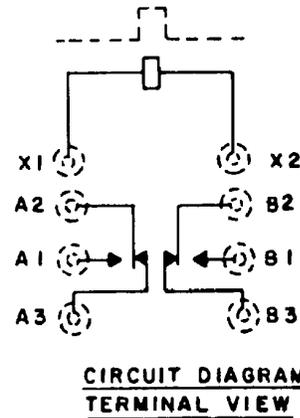
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ±.010 (0.25 mm).
4. Terminal numbers shown above for reference only. Numbers do not appear on relays.
5. Coil symbol optional in accordance with MIL-STD-1285.
6. Circuit diagram shown on part is the terminal view.

FIGURE 1. Dimensions and configuration.

(F) denotes changes



Inches	MM
.001	0.03
.002	0.05
.003	0.08
.012	0.30
.016	0.41
.017	0.43
.031	0.79
.035	0.89
.100	2.54
.150	3.81
.200	5.08
.275	6.99
.300	7.62
.335	8.51
.370	9.40
.493	12.52



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is $\pm .010$ (0.25 mm).
4. Spreader pads shall be certified to MIL-M-38527, M38527/05-003, or M38527/05-013.
5. Dimensions and tolerance shown for the bottom view of the spreader pad are for the center to center locations of the holes in the spreader pad.
6. Shape optional within the envelope dimension.
7. Coil symbol optional in accordance with MIL-STD-1285.
8. Circuit diagram shown on part is the terminal view.
9. Terminal numbers shown above for reference only. Numbers do not appear on relay.

FIGURE 2. Dimensions and configuration relay with spreader pad attached.

REQUIREMENTS:

CONTACT DATA:

Load ratings:

High level (relay case grounded):

Resistive: 1.0 ampere at 28 V dc.
500 milliamperes at 115 V ac 400 Hz case not grounded.
250 milliamperes at 115 V ac 60 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:

(F) Initial: 0.10 ohm maximum (0.125 ohm maximum with spreader pad attached).

High level:

During life: Not more than 5 percent of open circuit voltage.
After life: 0.20 ohm maximum (0.225 ohm maximum with spreader pad attached).

Low level:

During life: 33 ohms maximum.
After life: 0.15 ohm maximum (0.175 ohm maximum with spreader pad attached).

Intermediate current:

During: 1 ohm maximum.
After: 0.20 ohm maximum (0.225 ohm maximum with spreader pad attached).

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

Contact stabilization time: 2.0 milliseconds maximum (applicable to failure rate levels "M", "P", and "R").

Overload (high level only): Two times rated current.

COIL DATA: See table I.

Operate time: 4.0 ms maximum over temperature range with rated coil voltage.
Release time: 2.0 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)	Altitude V rms (60 Hz)
Between case, frame, or enclosure and all contacts both in the energized and deenergized positions - -	500	} 125 All terminals to case
Between case, frame, or enclosure and coil(s) - - - -	500	
Between all contacts and coil(s) - - - - - - - - - -	500	
Between open contacts in the energized and deenergized positions - - - - - - - - - - - - - - - -	500	
Between contact poles - - - - - - - - - - - - - - - -	500	
Between coils of dual coil relays - - - - - - - - - -	---	

ENVIRONMENTAL DATA:

Temperature range: -65°C to +125°C.

- (F) 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.
- (F) 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.
- (F) 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 1041, MIL-STD-750.

PHYSICAL DATA:

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

- Pull test: Test condition A, 1 pound pull.
- Bend test: Test condition C, 1/2 pound load.
- (F) Twist test: As specified in MIL-R-39016.

- (F) Solderability: Applicable.

Dimensions and configuration: See figures 1 or 2.

Weight: 3.40 grams (0.12 ounce) maximum, 3.45 grams (0.129 ounce) maximum with spreader pad attached.

Seal: Hermetic.

- (F) Minimum marking: Military part number, "J" with the date code (example J8530), circuit diagram, manufacturer's name or source code.

LIFE TEST REQUIREMENTS:

- High level: 100,000 cycles per relay.
- (F) Low level: 100,000 cycles plus 900,000 cycles mechanical life.

PART NUMBER: M39016/11- (dash number from table I and suffix letter designating failure rate level).

ⓕ TABLE I. Dash numbers and characteristics. 1/

Dash numbers 2/				Coil voltage (V dc) 3/		At 25°C				Over temperature range		
Lead length	Lead length	Lead length	Spreader pads	Rated	Max	Coil resistance	Specified pickup value	Specified hold value	Specified drop-out value	Specified pickup value	Specified hold value	Specified drop-out value
1.500 min 4/	.187 ±.010	.500 min	(fig. 2) 5/			ohms ±10%	(volt- age) (V dc)					
017	018	033	041	5.0	7.5	100	2.6	1.4	0.23	3.5	2.5	0.12
019	020	034	042	6.0	10.0	200	3.4	2.0	0.28	4.5	3.2	0.18
021	022	035	043	12.0	20.0	850	7.0	4.0	0.64	9.0	6.5	0.41
023	024	036	044	26.5	40.0	3,300	14.0	8.0	1.4	18.0	13.0	0.89
025	026	037	045	36.0	57.0	6,500	20.0	10.0	1.8	27.0	19.0	1.25
027	028	038	046	48.0	75.0	11,000	25.8	13.0	2.4	36.0	26.0	1.60
029	030	039	047	9.0	15.0	400	4.85	3.0	0.55	6.8	4.9	0.35
031	032	040	048	18.0	30.0	1,600	9.8	6.0	0.92	13.5	10.0	0.59

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, 017L - - - - 048R.

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

4/ 1.500 leads are inactive for new design.

5/ Relays supplied with spreader pads (-041 through -048) shall have the pad rigidly attached.

QUALIFICATION INSPECTION:

Qualification inspection and sample size: See table II.

ⓕ TABLE II. Qualification inspection and sample size. 1/

Single submission	Group submission
18 units plus 1 open unit for level L at C = 0 2/	M39016/11-036 18 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/	M39016/11-033 33 units plus 1 open unit for level M at C = 0 2/
Qualification inspection as applicable	M39016/11-034 2 units each part number Qualification inspection, group II
	M39016/11-035
	M39016/11-037
	M39016/11-038
	M39016/11-039
	M39016/11-040

1/ For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on MIL-R-39016/16 and MIL-R-39016/21 may be used in addition to MIL-R-39016/11 data. Prior to 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 group V, table II, MIL-R-39016, if the contractor 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.

MIL-R-39016/11F

Initial qualification of relays supplied with spreader pads (-041 through -048), shall be tested as specified below:

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

- Ⓕ Before installation of pad, screening, visual and mechanical examination (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 pad perform the following tests as specified in the qualification inspection table of MIL-R-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).

Qualification inspection (reduced testing for previously qualified relays) for relays supplied with spreader pads (-041 through -048), two (2) units of the 26.5 volt rated coil voltage (-044) shall be tested as specified below:

Before installation of pad perform the following tests as specified in the qualification inspection table of MIL-R-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), particle impact noise detection (P.I.N.D., when specified), screening.

After installation of pad perform the following tests as specified in the qualification inspection table of MIL-R-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 spread pads (-041 through -048), shall be tested as specified below:

Before installation of pad perform subgroup 2 of group A tests.

After installation of pad perform subgroups 3 and 4 of group A tests.

Qualification inspection (reduced testing) and sample size: See table III. If the relays produced for MIL-R-39016/11 are similar in construction and design except for the diodes and coils to the relays produced for MIL-R-39016/16 and MIL-R-39016/21, then reduced testing for qualification of MIL-R-39016/11 relays may be performed concurrent with or subsequent to successful qualification of MIL-R-39016/16 or MIL-R-39016/21.

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

Examination or test
2 units each coil voltage Group II of qualification inspection table 1 unsealed sample unit for internal examination

SUPERSESSION DATA:

Supersession data: See table IV.

TABLE IV. Supersession data. 1/

Superseded part no. M5757/70-	New part no. M39016/11- 2/	Superseded part no. M39016/11-	New part no. M39016/11- 2/
001	019	001	017
002	021	002	018
003	023	003	019
004	025	004	020
005	027	005	021
006	020	006	022
007	022	007	023
008	024	008	024
009	026	009	025
010	028	010	026
011	017	011	027
012	018	012	028
013	029	013	029
014	030	014	030
015	031	015	031
016	032	016	032

1/ Dash numbers -017, -019, -021, -023, -025, -027, -029, and -031 are inactive for new design and are for support of existing equipment designs only.

(F) 2/ 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.

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

TABLE V. Cross-reference for Government logistical support.

Superseded part no. M5757/70-	New part no. M39016/11	Support with part no. M39016/11-	Superseded part no. M39016/11-	New part no. M39016/11-	Support with part no. M39016/11-	New part no. M39016/11	Support with part no. M39016/11
001	019	019	001	017	017	033	033
002	021	021	002	018	033	034	034
003	023	023	003	019	019	035	035
004	025	025	004	020	034	036	036
005	027	027	005	021	021	037	037
006	026	037	006	022	035	038	038
007	022	035	007	023	023	039	039
008	024	036	008	024	036	040	040
009	026	037	009	025	025	041	041
010	028	038	010	026	037	042	042

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

Superseded part no.	New part no.	Support with part no.	Superseded part no.	New part no.	Support with part no.	New part no.	Support with part no.
M5757/70-	M39016/11	M39016/11-	M39016/11-	M39016/11	M39016/11-	M39016/11	M39016/11
011	017	017	011	027	027	043	043
012	018	033	012	028	038	044	044
013	029	029	013	029	029	045	045
014	030	039	014	030	039	046	046
015	031	031	015	031	031	047	047
016	032	040	016	032	040	048	048

CONCLUDING MATERIAL

Custodians:

Army - ER

Navy - EC

(F) Air Force - 85

Review activities:

Army - AR

Navy - AS, OS, SH

(F) Air Force - 99

DLA - ES

NSA - NS

User activities:

Navy - MC

(F) Air Force - 11, 19

Preparing activity:

Navy - EC

Agent:

DLA - ES

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