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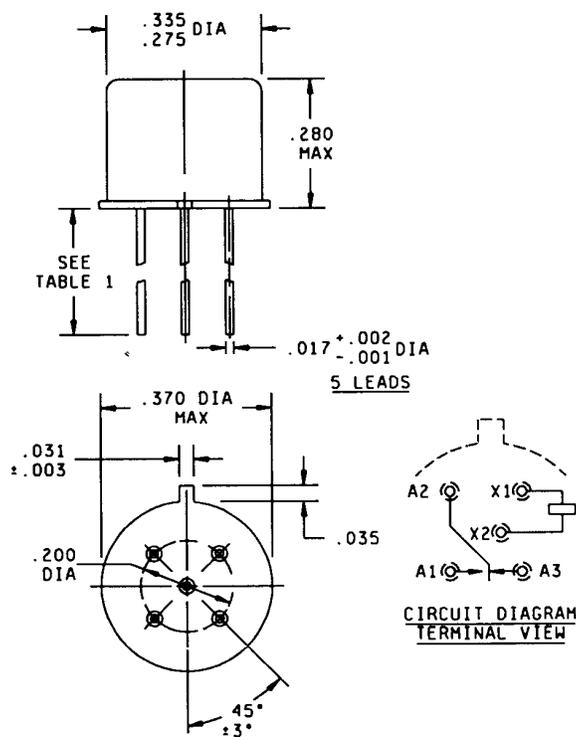
MIL-PRF-39016/7F
 20 JULY 1988
 SUPERSEDING
 MIL-R-39016/7E
 10 February 1984

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, SPDT,
 LOW LEVEL TO 1 AMPERE

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.



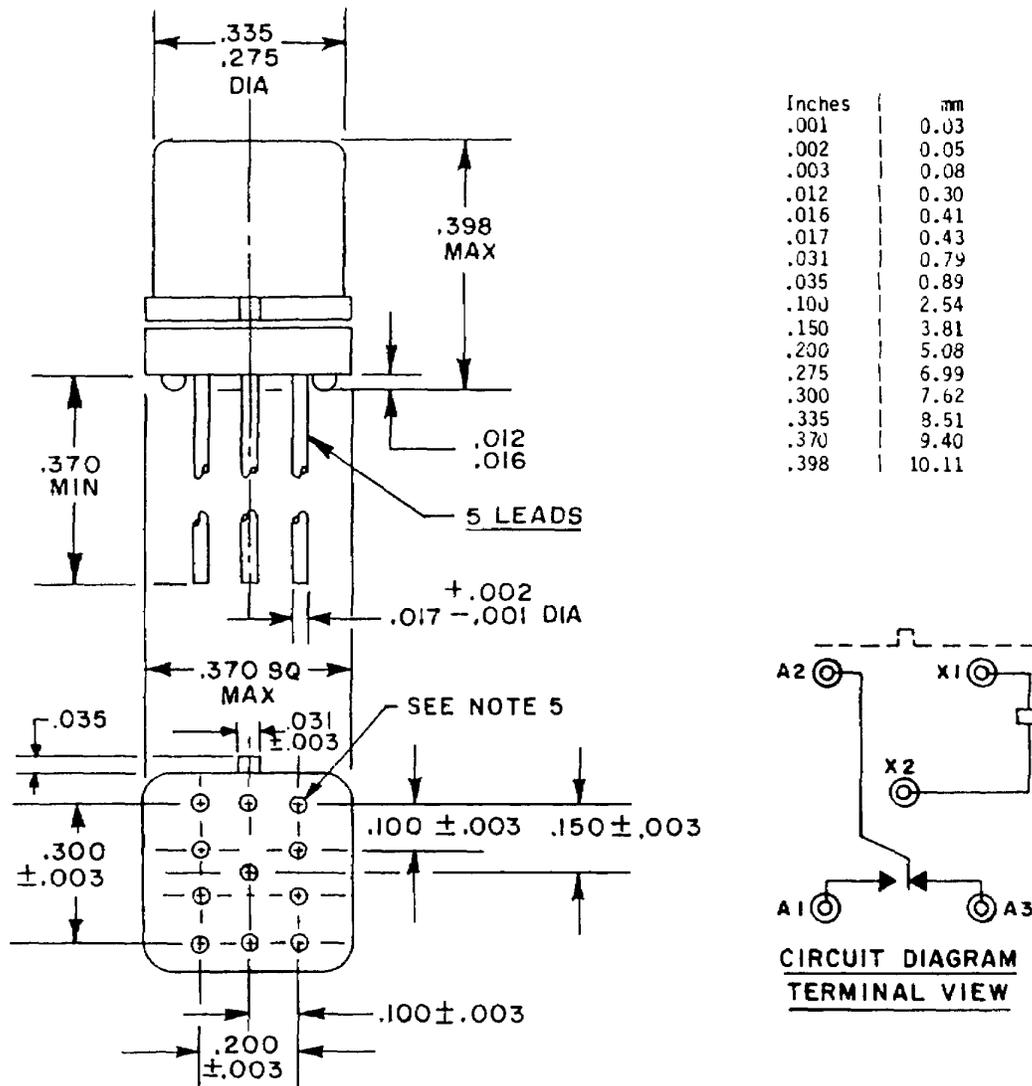
Inches	mm	Inches	mm	Inches	mm
.001	0.03	.031	0.79	.275	6.99
.002	0.05	.035	0.89	.280	7.11
.003	0.08	.055	1.40	.335	8.51
.017	0.43	.200	5.08	.370	9.40

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



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 4. Spreader pads shall be certified to MIL-M-38527, M38527/05-004.
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. Terminal numbers shown above for reference only. Numbers do not appear on relay.
9. Circuit diagram shown on part is the terminal view.

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:

Ⓕ 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: 2.0 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	300 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 - - - - - - - - - - - - - -	---	
Between coils of dual coil relays - - - - - - - - -	---	

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 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.
- Ⓕ Twist test: As specified in MIL-R-39016.

Solderability: Applicable.

Dimensions and configuration: See figures 1 and 2.

Weight: 2.27 grams (0.08 ounce) maximum, 2.52 grams (0.089 ounce) maximum with spreader pad attached.

Seal: Hermetic.

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

PART NUMBER: M39016/7- (dash number from table I and suffix letter designating failure rate level).

(F) 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 pick-up	Specified hold value	Specified drop-out value	Specified pick-up value	Specified hold value	Specified drop-out value
1.500 min 4/	.187 ±.010	.500 min	5/			ohms ±10%	(volt-age) (V dc)	(volt-age) (V dc)	(volt-age) (V dc)	(volt-age) (V dc)	(volt-age) (V dc)	(volt-age) (V dc)
013	014	025	031	5.0	6.0	63	2.8	1.7	0.23	3.7	2.4	0.15
015	016	026	032	6.0	8.0	125	3.5	2.0	0.28	4.5	2.8	0.18
017	018	027	033	9.0	12.0	280	5.3	3.0	0.54	6.8	4.2	0.35
019	020	028	034	12.0	16.0	500	7.0	4.0	0.63	9.0	5.6	0.40
021	022	029	035	18.0	24.0	1,130	10.5	6.0	0.91	13.5	8.4	0.58
023	024	030	036	26.5	32.0	2,000	14.2	8.0	1.37	18.0	10.4	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, 013L - - - - 036R.

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 (-031 through -036) shall have the pad rigidly attached.

(F) 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/	M39016/7-030 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/	33 units plus 1 open unit for level M at C = 0 2/
Qualification inspection as applicable	Qualification inspection as applicable
	M39016/7-025 2 units each part number
	M39016/7-026 Qualification inspection,
	M39016/7-027 group II.
	M39016/7-028
	M39016/7-029

- 1/ For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on MIL-R-39016/20, MIL-R-39016/21, MIL-R-39016/23, and MIL-R-39016/30 may be used in addition to MIL-R-39016/7 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 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 inspection, the relay manufacturer shall preselect the sampling plan.

QUALIFICATION INSPECTION:

Qualification inspection and sample size: See table II.

Initial qualification of relays supplied with spreader pads (-031 through -036), 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, 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 (-031 through -036): Two units of the 26.5 volt rated coil voltage (-036) 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 spreader pads (-031 through -036), 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-39016/7 are similar in construction and design except for the diodes, coils, and headers, as applicable, to the relays produced for MIL-R-39016/20, MIL-R-39016/21, MIL-R-39016/23, or MIL-R-39016/24, then reduced testing for qualification of MIL-R-39016/7 relays may be performed concurrent with or subsequent to successful qualification of MIL-R-39016/20, MIL-R-39016/21, MIL-R-39016/23, or MIL-R-39016/24. For reduced testing, see table III.

Ⓕ 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

SUPERSESION DATA:

Supersession data: See table IV.

TABLE IV. Supersession data. 1/

Superseded part no. M5757/38-	New part no. M39016/7- 2/	Superseded part no. M39016/7-	New part no. M39016/7- 2/
001	021	001	013
002	019	002	014
003	015	003	015
004	017	004	016
005	023	005	017
006	022	006	018
007	020	007	019
008	016	008	020
009	018	009	021
010	024	010	022
011	013	011	023
012	014	012	024

1/ Dash numbers -013, -015, -017, -019, -021, and -023 are inactive for new design and are for support of existing equipment design only.

Ⓕ 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. M5757/38-	New part no. M39016/7-	Support with part no. M39016/7-	Superseded part no. M39016/7-	New part no. M39016/7-	Support with part no. M39016/7-	New part no. M39016/7-	Support with part no. M39016/7-
001	021	021	001	013	013	025	025
002	019	019	002	014	025	026	026
003	015	015	003	015	015	027	027
004	017	017	004	016	026	028	028
005	023	023	005	017	017	029	029
006	022	029	006	018	027	030	030
007	020	028	007	019	019	031	031
008	016	026	008	020	028	032	032
009	018	027	009	021	021	033	033
010	024	030	010	022	029	034	034
011	013	013	011	023	023	035	035
012	014	025	012	024	030	036	036

CONCLUDING MATERIAL

Custodians:

Army - ER

Navy - EC

Ⓡ Air Force - 85

Review activities:

Army - AR, AV

Navy - AS, OS, SH

Ⓡ Air Force - 99

DLA - ES

NSA - NS

User activities:

Navy - MC

Ⓡ Air Force - 11, 19

Preparing activity:

Navy - EC

Agent:

DLA - ES

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