NOTE: The document identifier and heading has been changed on this page to reflect that this is a performance specification. There are no other changes to this document. The document identifier on subsequent pages has not been changed, but will be changed the next time this document is revised.

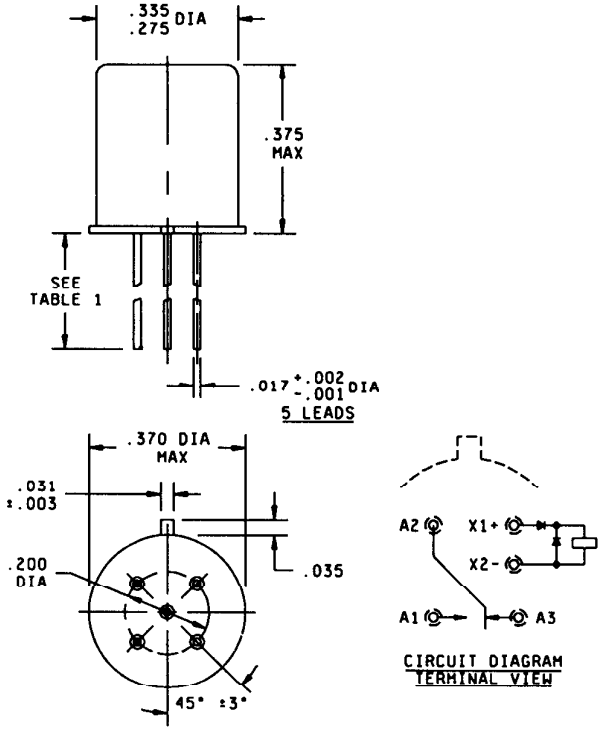
MIL-PRF-39016/26E
20 JULY 1988
SUPERSEDING
MIL-R-39016/26D
10 February 1984

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, SPDT, LOW LEVEL TO 1.0 AMPERE (SENSITIVE, 40 MILLIWATTS) WITH INTERNAL DIODES FOR COIL TRANSIENT SUPPRESSION AND POLARITY REVERSAL PROTECTION

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.

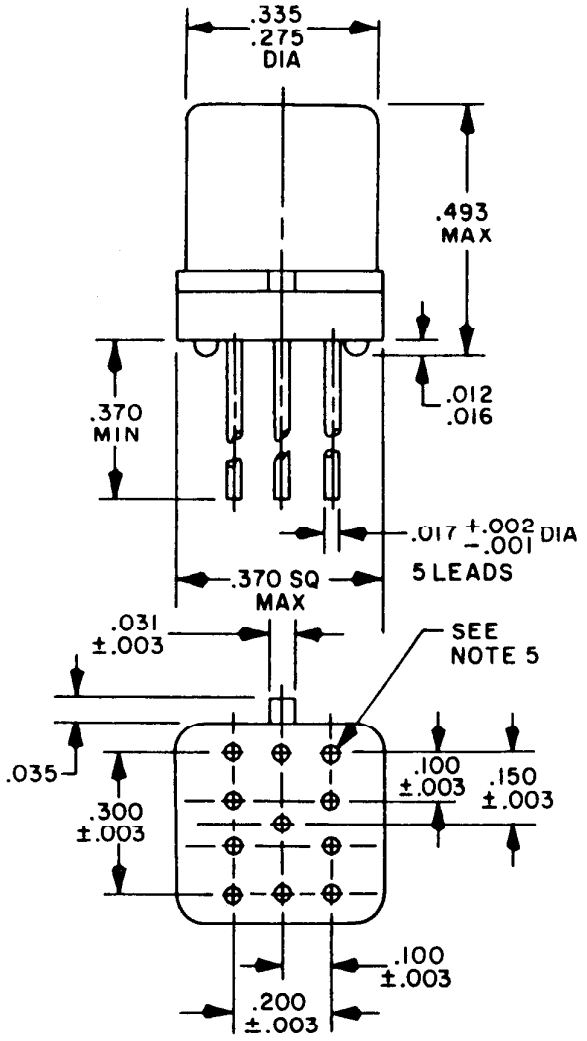


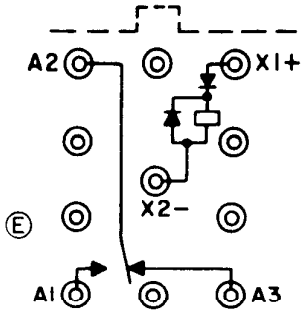
Inches	mm	Inches	mm	Inches	mm
.001	0.03	.031	0.79	.335	8.51
.002	0.05	.035	0.89	.370	9.40
.003	0.08	.200	5.09	.375	9.53
.017	0.43	.275	6.99		

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 are for reference only. Numbers do not appear on the relay.
5. Relays shall have a plus (+) sign placed on the circuit diagram as shown.
6. All leads shall be electrically insulated from the case.
7. Coil symbol optional in accordance with MIL-STD-1285.
8. Circuit diagram shown on part is the terminal view.

FIGURE 1. Dimensions and configuration.

(E) denotes changes





CIRCUIT DIAGRAM
TERMINAL VIEW

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 ±.010 (0.25 mm).
Ⓔ 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. Terminal numbers shown above for reference only. Numbers do not appear on relay.
8. Relays shall have a (+) sign placed on circuit diagram as shown.
9. All leads shall be electrically insulated from the case.
10. Coil symbol optional in accordance with Mil-STD-1285.
11. 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 µA 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: 4.0 ms maximum over temperature range with rated coil voltage.
Release time: 7.5 ms maximum over temperature range from rated coil voltage.

ELECTRICAL DATA:

Insulation resistance 1/: 10,000 megohms minimum at 500 V dc, except the resistance between coil and case at high temperature shall be 1,000 megohms minimum.

1/ Insulation resistance and dielectric withstanding voltage tests must always precede all other specified electrical measurements. Connect all coil terminals together to avoid damage to diodes.

Dielectric withstanding voltage 1/:

	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	500	
Between all contacts and coil	500	
Between open contacts in the energized and deenergized positions	500	
Between contact poles	---	
Between coils of dual coil relays	---	

DIODE CHARACTERISTICS:

(E) Coil transient suppression: Applicable.

(E) Diode breakdown and block integrity (delete coil resistance and substitute this test): With applicable voltage applied to the relay coil circuit in the reverse direction, monitor leakage current with dc microammeter or oscilloscope or qualifying activity approved test equipment. Leakage current shall not exceed the specified value.

Maximum transient voltage: 1 volt.

(E) Breakdown voltage: 100 V dc minimum at 10 microamperes (μA).

Maximum leakage current: 1 μA at 50 V dc.

(E) Semiconductor in process screening: Applicable, visual inspection of semiconductors shall be in accordance with MIL-STD-750, methods 2073 and 2074.

ENVIRONMENTAL DATA:

Temperature range: -65°C to +125°C.

(E) 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 contact.

(E) 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.

(E) 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).

Magnetic interference: Applicable.

Resistance to soldering heat: Applicable.

Acceleration: Applicable.

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

1/ Insulation resistance and dielectric withstanding voltage tests must always precede all other specified electrical measurements. Connect all coil terminals together to avoid damage to diodes.

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.
(E) Twist test: As specified in MIL-R-39016.

Solderability: Applicable.

Dimensions and configuration: See figures 1 or 2.

Weight: 2.84 grams (0.10 ounce) maximum, 3.09 grams (0.109 ounce) maximum with spreader pad attached.

Seal: Hermetic.

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

LIFE TEST REQUIREMENTS:

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

PART NUMBER: M39016/26- (dash number from table I and suffix letter designating failure rate level).

QUALIFICATION INSPECTION:

Qualification inspection and sample unit size: See table II.

(E) TABLE I. Dash numbers and characteristics. 1/

Dash numbers 2/				Coil voltage (V dc) 5/		At 25°C						Over temperature range		
Lead length 1.500 min 3/	Lead length .187 ±.010	Lead length .500 min	Spreader pads (fig. 2) 4/	Rated	Max	Coil resistance (ref. only) Ohms	Coil circuit current 6/ (mA) Max	Coil circuit current 6/ (mA) Min	Specified pick-up value (voltage) V dc	Specified hold value (voltage) V dc	Specified drop-out value (voltage) V dc	Specified pick-up value (voltage) V dc	Specified hold value (voltage) V dc	Specified drop-out value (voltage) V dc
017	025	033	041	5.0	8.0	100	50.0	36.3	3.5	1.7	0.23	4.5	2.4	0.15
018	026	034	042	6.0	11	200	30.6	22.7	4.1	2.0	0.28	5.5	2.8	0.18
019	027	035	043	12	22	1,025	12.5	9.7	8.0	4.0	0.63	10	5.6	0.40
020	028	036	044	26.5	45	4,000	7.2	5.7	15.4	8.0	1.37	19	10.4	0.89
021	029	037	045	32	57	6,500	5.4	4.3	17	9.0	1.5	21	12.6	0.95
022	030	038	046	40	75	11,000	4.0	3.2	22	11.2	2.0	27	15.7	1.28
023	031	039	047	9.0	16	630	15.0	11.5	6.3	3.0	0.54	7.8	4.2	0.35
024	032	040	048	18	33	2,300	8.5	6.7	11.6	6.0	0.91	14.5	8.4	0.58

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/ 1.500 leads are inactive for new design.
4/ Relays supplied with spreader pads (-041 through 048) shall have the pad rigidly attached.
5/ CAUTION: The use of any coil voltage less than the rated coil voltage will compromise the operation of the relay.
6/ Coil resistance not directly measurable at relay terminals. When rated voltage is applied to the coil terminals, the coil circuit current must be within the limits shown. Measure at 25°C at nominal voltage for 5 seconds, maximum.

(E) 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/ 33 units plus 1 open unit for level M at C = 0 2/ Qualification inspection as applicable	M39016/26-036	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/ Qualification inspection as applicable
	M39016/26-033 M39016/26-034 M39016/26-035 M39016/26-037 M39016/26-038 M39016/26-039 M39016/26-040	2 units each part number qualification inspection table, group I

1/ For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on MIL-R-39016/21 may be used in addition to MIL-R-39016/26 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 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 testing the relay manufacturer shall preselect the sample size.

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:

(E) 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:

(E) 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:

(E) 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 (PIND, 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 (-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-39016/26 are similar in construction and design except for the diodes and headers to the relays produced for MIL-R-39016/21, then reduced testing for qualification of MIL-R-39016/26 relays may be performed concurrent with or subsequent to successful qualification of MIL-R-39016/21 .

Ⓔ 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. M39016/26-	New part no. M39016/26-	Superseded part no. M39016/26-	New part no. M39016/26-
001	017	009	027
002	018	010	028
003	019	011	029
004	020	012	030
005	021	013	023
006	022	014	024
007	025	015	031
008	026	016	032

1/ Dash numbers -017 through -024 are inactive for new design and are for support of existing equipment designs only.

Cross reference for Government logistical support See table V.

TABLE V. Cross reference for Government logistical support.

Superseded part number M39016/26-	New part number M39016/26-	Support with part number M39016/26-	New part number M39016/26-	Support with part number M39016/26-
001	017	017	033	033
002	018	018	034	034
003	019	019	035	035
004	020	020	036	036
005	021	021	037	037
006	022	022	038	038
007	025	033	039	039
008	026	034	040	040
009	027	035	041	041
010	028	036	042	042
011	029	037	043	043
012	030	038	044	044
013	023	023	045	045
014	024	024	046	046
015	031	039	047	047
016	032	040	048	048

CONCLUDING MATERIAL

Custodians:
Army - ER
Navy - EC
(E) Air Force - 85

Review activities:
Army - AR
Navy - AS, OS, SH
(E) Air Force - 99
DLA - ES

User activities:
Army - AV, ME
Navy - MC
(E) Air Force - 11, 19

Preparing activity:
Navy - EC

Agent:
DLA - ES

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