

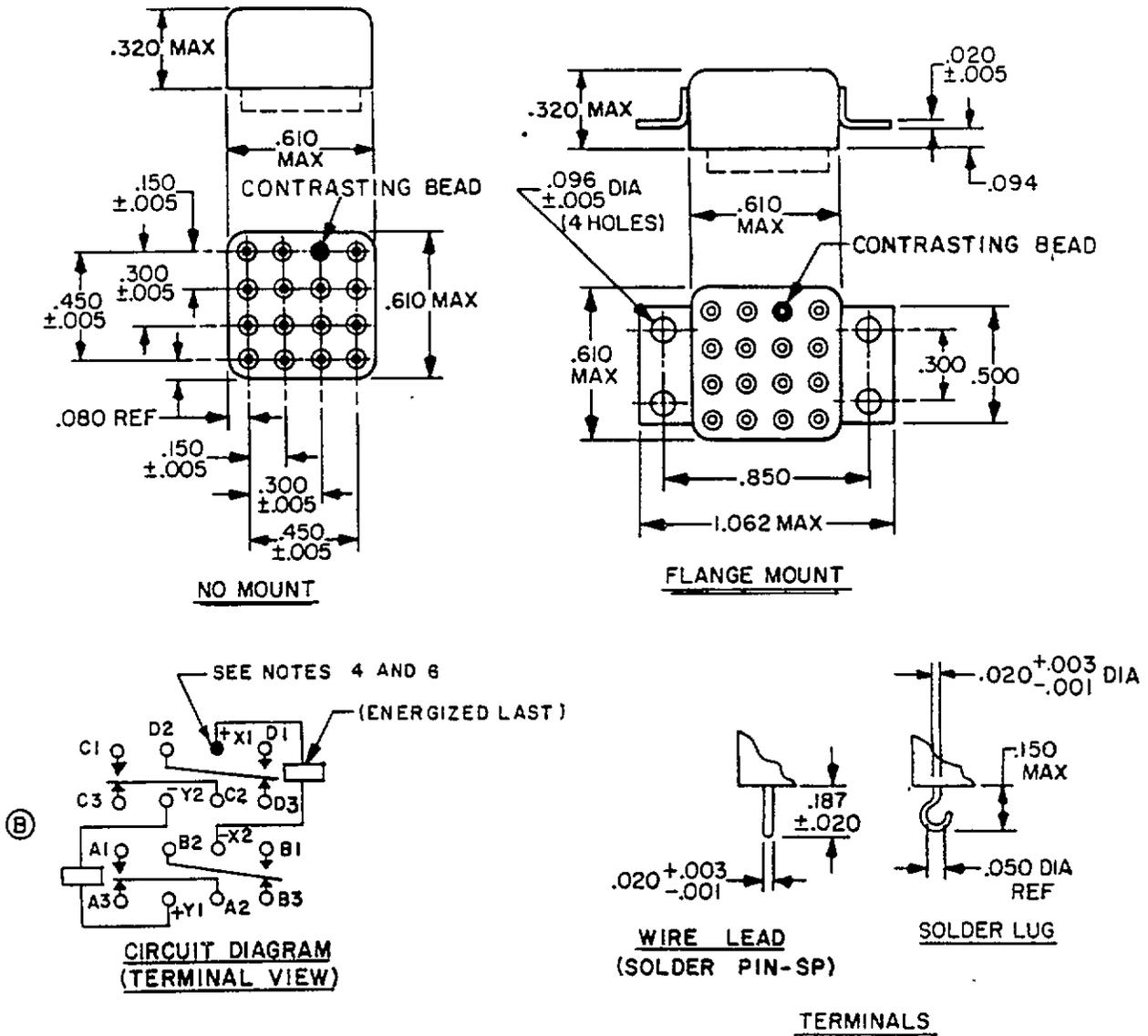
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MILITARY SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, HERMETICALLY SEALED,  
 4 PDT, LOW LEVEL TO 2 AMPERES (0.150-INCH TERMINAL SPACING), LATCHING

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-R-39016.



ⓑ FIGURE 1. Configuration and circuit diagram.

ⓑ denotes changes

Inches	mm	Inches	mm
.001	0.03	.150	3.81
.002	0.05	.187	4.75
.003	0.08	.300	7.62
.005	0.13	.320	8.13
.020	0.51	.450	11.43
.050	1.27	.500	12.70
.080	2.03	.610	15.49
.094	2.39	.850	21.59
.096	2.44	1.062	26.97

## NOTES:

1. Dimensions are in inches.
2. Unless otherwise specified, tolerance is  $\pm 0.010$  (0.25 mm).
3. Metric equivalents are given for general information only.
4. Terminal indicated shall be identified by a contrasting bead. Relays shall have (+) and (-) signs placed on the circuit diagram as shown.
5. Terminal numbers in circuit diagram are for reference only. Numbers do not appear on relay.
6. Energizing the indicated coil with the indicated polarity and voltage shall cause the relay contacts to assume the position shown.
7. Coil symbol optional in accordance with MIL-STD-1285.

Ⓑ FIGURE 1. Configuration and circuit diagram - Continued.

## REQUIREMENTS:

## CONTACT DATA:

## Load ratings:

## High level (relay case grounded):

- ⓑ Resistive: 2.0 amperes at 28 V dc; .125 ampere at 115 V ac (60 and 400 Hz). 0.5 ampere at 115 V ac (60 and 400 Hz) (case ungrounded). 400 Hz life test not required for qualification testing.
- ⓑ Inductive: 0.5 ampere at 200 millihenries inductive at 28 V dc.
- ⓑ Lamp: 0.10 ampere at 28 V dc.

Low level: 10 to 50  $\mu$ A at 10 to 50 mV dc or peak ac.

Intermediate current: Applicable.

## Contact resistance and voltage drop:

- ⓑ Initial: 0.050 ohm maximum.

## High level:

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

- ⓑ After life: 0.150 ohm maximum.

## Low level:

During life: 33 ohms maximum.

- ⓑ After life: 0.150 ohm maximum.

- ⓑ Intermediate current:

During intermediate current: 1 ohm maximum.

- ⓑ After intermediate current: 0.300 ohm maximum.

Contact bounce: 2.0 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): 4 amperes resistive at 28 V dc. 1.0 ampere inductive at 28 V dc (ac not applicable).

- ⓑ Neutral screen: Applicable.

- ⓑ COIL DATA (EACH COIL): See table I.

Operate time (latch and reset): 4.0 ms maximum over temperature range with rated coil voltage.

- ⓑ Release time: Not applicable.

## 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	750	} All terminals to case
Between case, frame, or enclosure, and coil - - - - -	500	
Between all contacts and coils- - - - -	750	
Between open contacts in the latch and reset positions - - - - -	500	
Between contact poles - - - - -	750	
Between coils of dual coil relays - - - - -	500	

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 C (100 g). 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.

PHYSICAL:

Terminals: See figure 1 and table I.

Terminal strength:

Pull test: 1.5 ±0.2 pounds.

Bend test: Not applicable.

- ⓑ Solderability: Applicable.
- Dimensions and configuration: See figure 1.
- Weight: 6.7 grams (0.24 ounce) maximum.
- Identification marking (full): Applicable.

LIFE TEST REQUIREMENTS:

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

PART NUMBER: M39016/31- (dash number from table I and suffix letter designating failure rate level).

ⓑ TABLE I. Dash numbers and characteristics. 1/ 2/

Dash number 3/	Mount	Terminal	Coil voltage		Coil resistance at +25°C tolerance ±10% (ohms)	Specified pickup (latch/reset) value (voltage) (V dc)	
			Rated V dc	Max V dc		+25°C	Over temp. range
-001	No mount	Wire lead (SP)	6.0	7.2	37	2.6	3.8
-002	No mount	Wire lead (SP)	12.0	14.5	145	5.2	7.6
-003	No mount	Wire lead (SP)	26.5	35.0	975	13.5	18.0
-004	Flange	Solder lug	6.0	7.2	37	2.6	3.8
-005	Flange	Solder lug	12.0	14.5	145	5.2	7.6
-006	Flange	Solder lug	26.5	35.0	975	13.5	18.0

- 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/ **WARNING:** When latching relays are installed in equipment, the latch and reset coils should not be pulsed simultaneously. Coils should not be pulsed with less than the nominal coil voltage and the pulse width should be a minimum of three times the specified operating time of the relay.
- 3/ 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, 001L - - - 003R.

**QUALIFICATION INSPECTION:**

Qualification inspection and sample size: See table II.

ⓑ TABLE II. Qualification inspection and sample size. 2/

Single submission	Group submission
24 units plus 1 open unit for level L at C = 0 1/	M39016/31-006 24 units plus 1 open unit for level L at C = 0 1/
33 units plus 1 open unit for level M at C = 0 1/	M39016/31-002 33 units plus 1 open unit for level M at C = 0 1/
Qualification inspection as applicable.	M39016/31-001 2 units, qualification, inspection table, group II, and terminal strength, resistance to soldering heat, and seal.

- 1/ 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 testing; the relay manufacturer shall preselect the sampling plan.
- 2/ For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on MIL-R-39016/35 and /36 may be used in addition to MIL-R-39016/31 data. Prior to performance of retention of qualification testing; the relay manufacturer shall preselect the sampling plan.

Qualification inspection (reduced testing): See table III.

If the relays produced for MIL-R-39016/31 are similar in construction and design except for the diodes to the relays produced for MIL-R-39016/35 and MIL-R-39016/36, then reduced testing for qualification of MIL-R-39016/31 relays may be performed concurrent with or subsequent to successful qualification of MIL-R-39016/35 or MIL-R-39016/36 relays.

ⓑ 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

SUPERSESSON DATA: See table IV.

ⓑ TABLE IV. Supersession data.

New part number M39016/31- <u>1</u> /	Superseded part number M5757/85-
001	001
002	002
003	003
004	004
005	005
006	006

1/ Complete part number shall contain a suffix letter L, M, P, or R to designate the failure rate level (see 3/ of table I). A part with any failure rate Level supersedes the applicable MIL-R-5757 part.

CONCLUDING MATERIAL

Custodians:

- Army - ER
- Navy - EC
- ⓑ Air Force - 85

ⓑ Review activities:

- Army - AR
- Navy - AS, OS, SH

User activities:

- Navy - MC
- ⓑ Air Force - 11, 19

Preparing activity:  
Navy - EC

Agent:  
DLA - ES

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