

INCH-POUND

MIL-PRF-83536/16C
18 August 2009
SUPERSEDING
MIL-PRF-83536/16B
12 October 2000

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, 4PDT,
LOW LEVEL TO 10 AMPERES, PERMANENT MAGNET DRIVE, HERMETICALLY SEALED,
ALL WELDED, TRANSIENT SUPPRESSED DC COIL

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 sheet and the [MIL-PRF-83536](#).

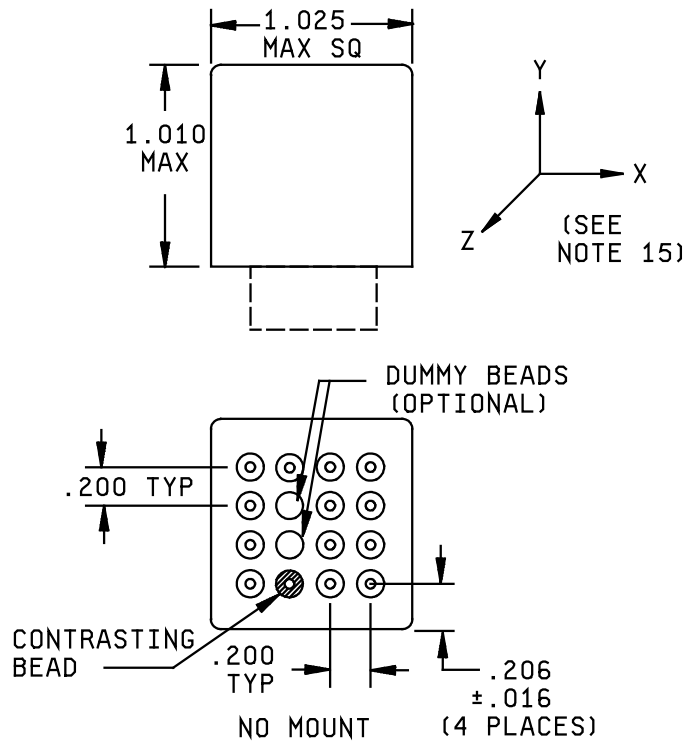
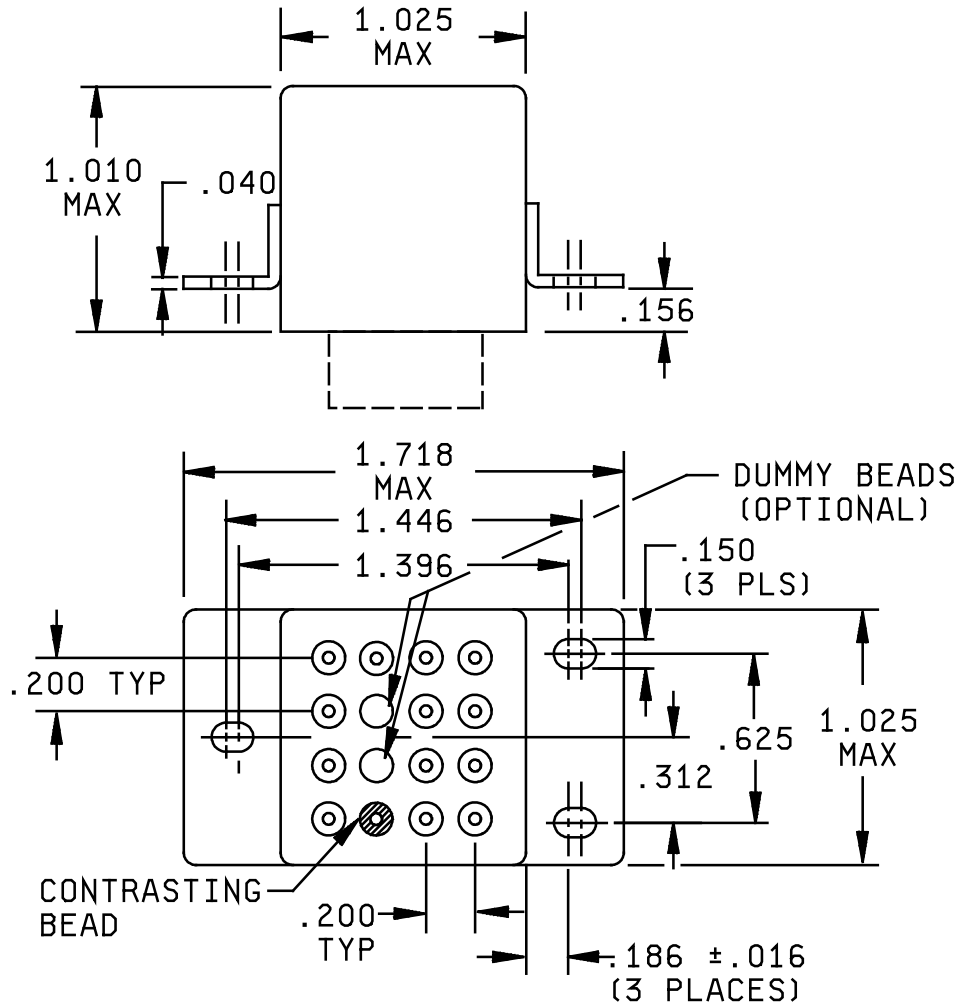
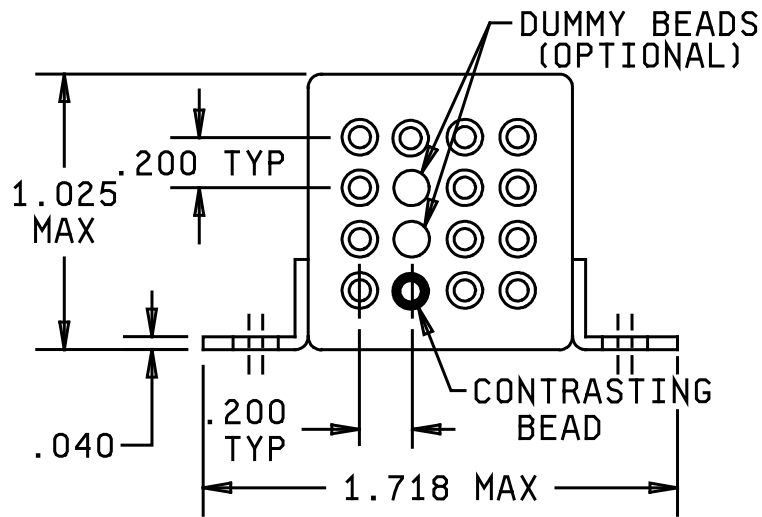
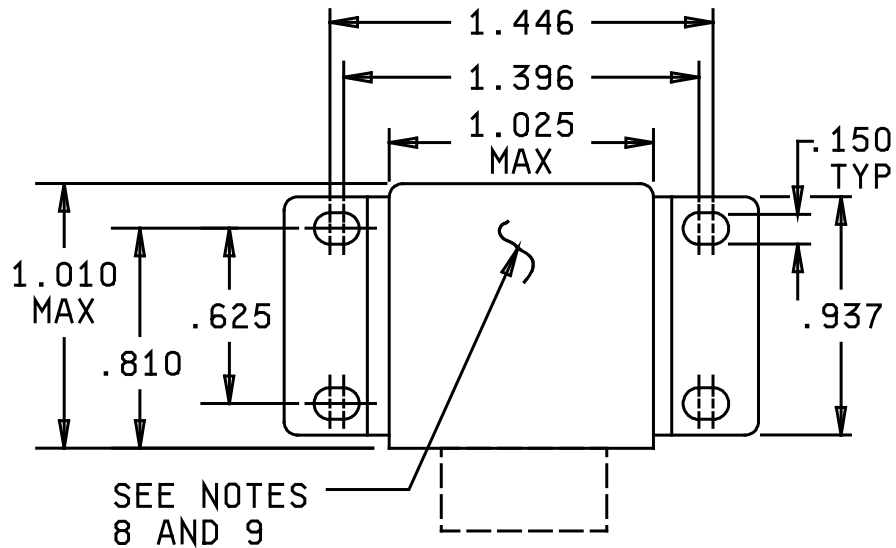


FIGURE 1. Dimensions and configurations.



RAISED VERTICAL FLANGE MOUNT (RVFM)

FIGURE 1. Dimensions and configurations - Continued.



HORIZONTAL FLANGE MOUNT (HFM)

FIGURE 1. Dimensions and configurations - Continued.

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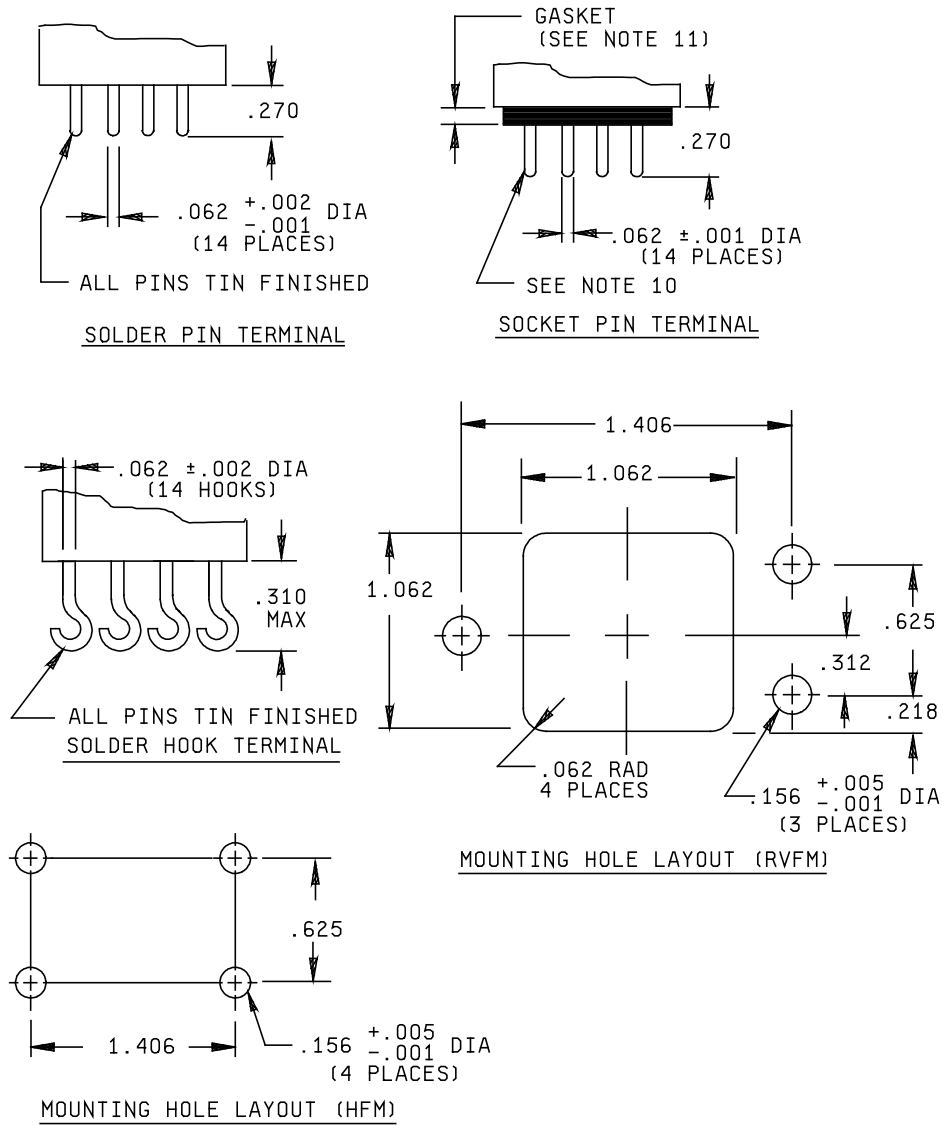
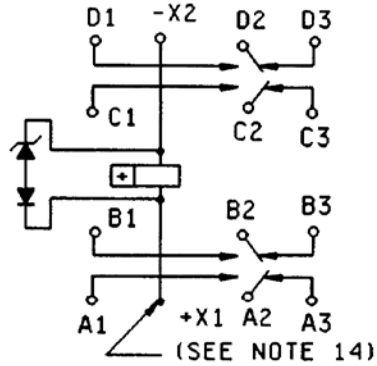
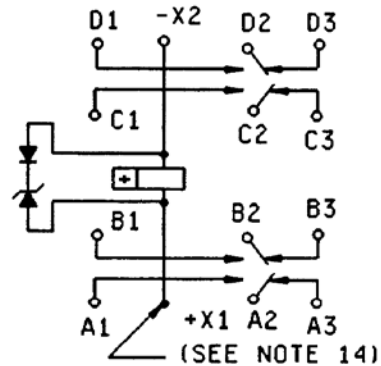


FIGURE 1. Dimensions and configurations - Continued.



CIRCUIT DIAGRAM (NO MOUNT, RVFM, AND HFM)



CIRCUIT DIAGRAM (OPTIONAL INTERNAL DIODE CONFIGURATION)

Inches	mm	Inches	mm	Inches	mm
.001	0.03	.156	3.96	.810	20.57
.002	0.05	.172	4.37	.937	23.80
.005	0.13	.186	4.72	1.010	25.65
.016	0.41	.200	5.08	1.025	26.04
.040	1.02	.218	5.54	1.062	26.97
.050	1.27	.270	6.86	1.396	35.46
.062	1.57	.310	7.87	1.406	35.71
.150	3.81	.312	7.92	1.446	36.73
		.625	15.88	1.718	43.64

FIGURE 1. Dimensions and configurations - Continued.

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. There shall be affixed to the relay a legible circuit diagram that identifies each terminal location specified.
5. These relays are polarized monostable.
6. This relay shall not operate or be damaged by reverse polarity.
7. Permanent magnet drive consists of a permanent magnet with its flux path switched and combined with the electro-magnet flux.
8. Applicable to horizontal flange mount only. The circuit diagram, manufacturer's PIN, and the military PIN shall be marked on the near side. The remaining portion of the nameplate data shall be marked on the far side.
9. Applicable to horizontal flange mount only. Relays shall be marked with the manufacturer's name or CAGE code and date code. Marking shall be with the bottom of the print adjacent to the near side.
10. Socket pin terminals shall provide the operational, environmental, and interface characteristics to provide a reliable interconnect to gold-plated contacts. Terminals, except the polarizing pin, shall be gold plated. One system for gold plating that may be used is [ASTM B488](#), type 3, class 1.25 with a nickel underplate of 50 to 150 microinches thick. The gold plating system shall enable the product to meet the performance requirements of this specification and shall be approved by the qualifying activity.
11. Gasket shall provide a reliable seal between the relay and mating socket that will meet the environmental, operational, and interface requirements of the relay with the mating socket. The gasket shall have shore hardness 15 to 35, thickness $.050 \pm .005$. Gasket material according to [SAE-AMS3332](#) has been considered acceptable.
12. Back EMF (transient voltage): 42 V dc maximum.
13. JANTX or equivalent screened semiconductors or hybrid devices shall be used for internal coil suppression. Relays using suppression devices shall continue to operate should the suppression circuit be in a failure mode. Diodes shall have a peak inverse voltage of 600 V dc minimum.
14. Indicated terminals shall be identified by contrasting beads.
15. Plane of critical motion for vibration and shock is Y-axis.

FIGURE 1. Dimensions and configurations - Continued.

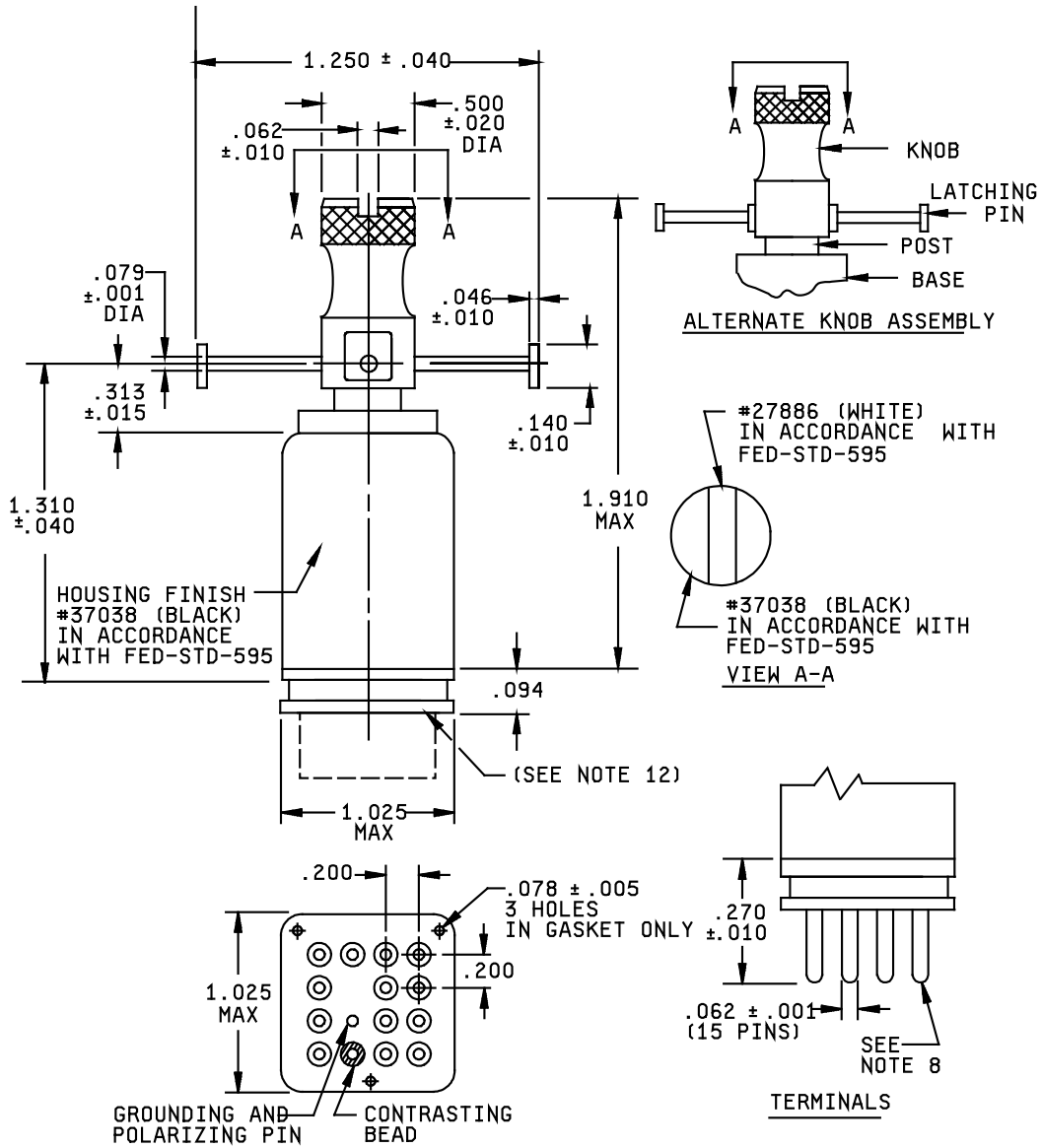
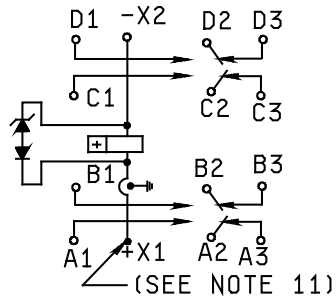
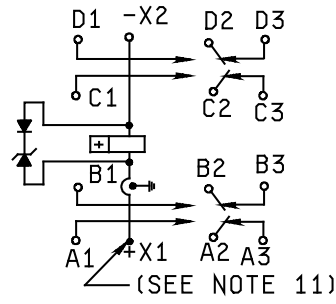


FIGURE 2. Outline dimensions and configuration, track mount (see notes 9 and 10).



CIRCUIT DIAGRAM (TRACK MOUNT)



CIRCUIT DIAGRAM (TRACK MOUNT)

(OPTIONAL INTERNAL DIODE CONFIGURATION)

Inches	mm	Inches	mm
.001	0.03	.094	2.39
.005	0.13	.140	3.56
.010	0.25	.200	5.08
.015	0.38	.270	6.86
.020	0.51	.313	7.95
.040	1.02	.500	12.70
.046	1.17	1.025	26.04
.062	1.57	1.250	31.75
.078	1.98	1.310	33.27
.079	2.01	1.910	48.51

FIGURE 2. Outline dimensions and configuration, track mount (see notes 16 and 17) – Continued.

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is $\pm .010$ (0.25mm).
4. This relay shall not operate or be damaged by reverse polarity. Semiconductors shall not be used for this purpose.
5. Permanent magnet drive consists of a permanent magnet with its flux path switched and combined with the electromagnetic flux.
6. Terminal numbers shall not appear on the header. There shall be affixed to the relay a legible circuit diagram that identifies each terminal location specified.
7. Back EMF suppression circuit: JANTX or equivalent screened semiconductors shall be used. Back EMF shall be 42 V dc maximum. Relays using suppression devices shall continue to operate should the suppression circuit be in a failure mode.
8. Socket pin terminals shall provide the operational, environmental, and interface characteristics to provide a reliable interconnect to gold-plated contacts. Terminals shall be gold plated. One system for gold plating that may be used is [ASTM B488](#), type 3, class 1.25 with a nickel underplate of 50 to 150 microinches thick. The gold plating system shall enable the product to meet the performance requirements of this specification and shall be approved by the qualifying activity.
9. Track mount base, knob, latching pin and post shall be corrosion resistant. One way of ensuring corrosion resistance is to nickel plate stainless steel 303 with 100 microinches minimum thickness in accordance with McDonnell Douglas P.S. 13112 (Deutsch Relays, Inc. Patent number 3,790,915 or equivalent 100 microinches thick minimum).
10. Track mount relay shall be capable of mating with [MIL-DTL-12883/51](#) "Bracket and Socket Assembly", configuration 1. The latching pin shall be capable of withstanding an axial pull of 35 pounds, in a direction away from the knob, without any degradation. The rotation of the knob mechanism shall be restricted such that the latching pins cannot be placed on the side opposite the [MIL-DTL-12883/50](#) bracket cutouts.
11. Indicated terminals shall be identified by contrasting beads.
12. Gasket shall provide a reliable seal between the relay and mating socket that will meet the environmental, operational, and interface requirements of the relay with the mating socket. The gasket shall have shore hardness 30 to 45. Gasket material according to [SAE-AMS3332](#) has been considered acceptable.

FIGURE 2. Outline dimensions and configuration, track mount (see notes 16 and 17) – Continued.

REQUIREMENTS:

Contact data:

Load ratings: See [table I](#).

Low level: 10 μ A to 50 μ A at 10 mV dc to 50 mV dc or peak ac.

Intermediate current: Applicable.

Mixed loads: Applicable.

Life: Unless otherwise specified (see [table I](#)), 100,000 cycles.

TABLE I. Rated contact load and cycles (amperes per pole).

Type of load (high level)	Cycles x 10 ³	28 V dc	<u>2/</u> 115 V ac 1 phase 400 Hz	<u>2/</u> 115 V ac 1 phase 50/60 Hz <u>1/</u>	<u>2/</u> 115/200 V ac 3 phase 400 Hz	<u>2/</u> 115/200 V ac 3 phase 50/60 Hz <u>1/</u>
Resistive	100	10	10	2.5	10	2.5
Inductive	20	8	8	N/A	8	N/A
Inductive	10	N/A	N/A	2.5	N/A	2.5
Motor	100	4	4	2	4	2
Lamp	100	2	2	1	N/A	N/A

1/ For 50/60 Hz rating, rupture and overload are not applicable and life for each load shall be 10,000 cycles.

2/ AC load ratings are not applicable to -034.

Contact voltage drop and resistance:

Initial contact voltage drop: 0.100 volt maximum. Rated resistive current at 6 V dc or peak ac.

Relays shall not make or break this load.

Initial contact resistance: 0.010 ohm maximum. 50 mA max at 6 V dc or peak ac.

High level life (contact voltage drop):

During life: 10 percent open circuit voltage maximum.

After life: 0.125 volt maximum.

Intermediate current (contact resistance):

During intermediate current: 3 ohms maximum.

After intermediate current: 0.150 ohm maximum.

Low level (contact resistance):

During low level: 100 ohms maximum.

After low level: 0.150 ohm maximum at 100 mA and 28 V dc.

Contact bounce: 1.0 millisecond maximum.

Contact stabilization time: 2.5 milliseconds maximum.

Break bounce (normally open contacts): 0.1 millisecond maximum.

Overload current: 40 amperes dc 60 amperes ac.

Rupture current: 50 amperes dc, 80 amperes ac.

Time current relay characteristics: See [table II](#).

TABLE II. Time current relay characteristics. [1/](#)

Successive application	Amperes	Time
1	15	1 hour
2	50	5 seconds
3	100	1.2 seconds
4	250	0.2 second
5	350	0.1 second

[1/](#) All relays shall withstand overload and fault currents. Relays must be able to sustain five applications (make and carry only) of power concurrently on adjacent poles at each of five different current levels in the sequence listed in table II. Separate relays shall be tested at 28 V dc and 115/200 V ac, 400 Hz 3-phase. Cooling time between successive applications shall be 30 minutes. Tests shall be performed on both normally open and normally closed contacts. There shall be no failures or evidence of welding or sticking and relays shall pass contact voltage drop at the conclusion.

Coil data: See table III. [1/](#), [2/](#)

Operate time: 15 milliseconds maximum with rated coil voltage over the temperature range.

Release time: 15 milliseconds maximum, 20 milliseconds maximum (track mount) from rated coil voltage over the temperature range.

Duty rating: Continuous.

Coil transient suppression: Applicable 42 V dc maximum.

Neutral screen: Not applicable.

[1/](#) CAUTION: Due to possible interaction of relay magnetic fields, the following spacing requirements, as a minimum, shall be considered in dense packaging situations:

- a. Row to row assisting fields: .125 (3.18 mm).
- b. Row to row opposing fields: .1875 (4.763 mm).
- c. Side to side alternating fields: .0625 (1.588 mm).
- d. Side to side like fields: .125 (3.18 mm).

[2/](#) Track mount relays shall have the pickup, hold, and dropout voltage, and timing tests, performed with a M6106/4 bracket placed around the relay housing.

TABLE III. Dash numbers and characteristics. 1/

Dash number 2/			Mount	Coil data										
Solder pin	Solder hook	Socket pin		At 25°C						Over temperature range			Maximum pickup voltage	
				Coil voltage (V dc) 3/		Coil resistance (ohms) minimum	Specified pickup voltage (V dc) 4/	Specified hold voltage (V dc) 4/	Specified dropout voltage (v dc) 4/	Specified pickup voltage (V dc) 4/	Specified hold voltage (V dc) 4/	Specified dropout voltage (V dc) 4/	High temperature test	Continuous current test
				Rated	Max									
001	002	003	No mount	6	7.3	16	3.2	1.6	0.4	4.5	2.3	0.25	5.0	5.7
004	005	006	RVFM	6	7.3	16	3.2	1.6	0.4	4.5	2.3	0.25	5.0	5.7
007	008	---	HFM	6	7.3	16	3.2	1.6	0.4	4.5	2.3	0.25	5.0	5.7
009	010	011	No mount	12	14.5	63	6.5	3.3	0.75	9.0	4.5	0.5	9.9	11.25
012	013	014	RVFM	12	14.5	63	6.5	3.3	0.75	9.0	4.5	0.5	9.9	11.25
015	016	---	HFM	12	14.5	63	6.5	3.3	0.75	9.0	4.5	0.5	9.9	11.25
017	018	019	No mount	28	29 5/	260	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
020	021	022	RVFM	28	29 5/	260	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
---	---	6/034												
023	024	---	HFM	28	29 5/	260	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
---	---	025	Track	28	29 5/	260	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
026	027	028	No mount	48	50	800	24.0	12.0	3.0	36.0	14.0	2.0	38.0	42.0
029	030	031	RVFM	48	50	800	24.0	12.0	3.0	36.0	14.0	2.0	38.0	42.0
032	033	---	HFM	48	50	800	24.0	12.0	3.0	36.0	14.0	2.0	38.0	42.0

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TABLE III. Dash numbers and characteristics - Continued. [1/](#)

- [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 are 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: 001L, 002R.
- [3/](#) CAUTION: The use of any coil voltages less than the rated coil voltage will compromise the operation of the relay.
- [4/](#) Pickup, hold, and dropout voltages are for test purposes only and are not to be used for design criteria.
- [5/](#) When maximum ambient temperature does not exceed +85°C, the maximum coil voltage shall be 32 V dc.
- [6/](#) Dash number -034 is supplied without internal arc barriers. This relay is not rated for ac loads.

Electrical data:

Insulation resistance:

Initial: 100 megohms minimum at 500 V dc.

After life or environmental tests: 100 megohms minimum at 500 V dc (track mount). 50 megohms minimum at 500 V dc (all others).

Dielectric withstanding voltage [3/](#):

	Track mount		All others	
	Coil to coil Coil to case	All other points	Coil to coil Coil to case	All other points
Sea level:				
Initial:	1050	1500	1000	1250
After life:	1050	1250	1000	1000
Altitude:				
At 80,000 feet:	350	350	250	350
At 300,000 feet:	N/A	N/A	500	500

Maximum leakage current for track mount only: 100 microamperes rms.

Environmental characteristics:

Temperature range: -70°C to +125°C.

Maximum altitude rating: 300,000 feet, (80,000 feet for track mount).

Shock (specified pulse): Applicable, [MIL-STD-202](#), method 213, test condition C, 200 g's for 6 ±1 ms, except horizontal flange mount peak g value shall be 100 g's, for 6 ±1 ms. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contactsVibration (sinusoidal): Applicable, [MIL-STD-202](#), method 204, 30 g's, except frequency range shall be 10 to 3,000 Hz. Horizontal flange mount shall be 20 g's, 57 to 3,000 Hz. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.[3/](#) Dielectric may be improved by suitable insulation of terminals and wiring after installation.

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Vibration (random): Applicable to qualification and group C inspection. Test in accordance with [MIL-STD-202](#), method 214, test condition IG (0.4 g²/Hz, 50 to 2000 Hz). For horizontal flange mount, test condition IE (0.2 g²/Hz) applies. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

Vibration (random): Applicable to track mount only. Applicable to qualification only. Test in accordance with [MIL-STD-202](#), method 214, test condition IG, 1.5 hours per axis. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

Acceleration: Applicable, except 15 g's.

Physical data:

Dimensions and configurations: See [figure 1](#).

| Weight: .17 pound (77 grams), 0.2 pound (90.6 grams) track mount.

Terminal strength:

Solder hook terminals:

Pull force: 10 pounds ±1.0 pound.

Bend: Not applicable to leads .047 (1.19 mm) and larger.

Twist: Not applicable.

Solder pin terminals:

Pull force: For .062 diameter terminals: 10 pounds ±1.0 pound.

Bend: Not applicable to leads .047 inch (1.19 mm) and larger.

Twist: Not applicable.

Socket pin terminals:

Pull force: For .062 diameter terminals: 10 pounds ±1.0 pound.

Bend: Not applicable to leads .047 inch (1.19 mm) and larger.

Twist: Not applicable.

Terminal solderability: Applicable to solder pin and solder hook terminals only.

Seal: Hermetic.

Marking: Applicable.

Part or Identifying Number (PIN): M83536/16 (dash number from table III and suffix letter designating failure rate level). PIN is a new term encompassing previous terms used in specifications such as part number, type designator, and identification number.

Qualification inspection:

Qualification inspection and sample size: See [table IV](#).

TABLE IV. 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	M83536/16-022	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 2 units, qualification inspection table, group II, shock, vibration, acceleration, terminal strength, and seal 2 units, qualification inspection table, group II
	M83536/16-022	
	M83536/16-022	
	M83536/16-018	
	M83536/16-023	
	M83536/16-025	
	M83536/16-028	
	M83536/16-034	
	M83536/16-002	
	M83536/16-014	
M83536/16-032		

^{1/} For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on [MIL-PRF-83536/15](#) may be used in addition to [MIL-PRF-83536/16](#) 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 shall be increased as required in group V, table II of [MIL-PRF-83536](#), 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.

Supersession data: See [table V](#).

TABLE V. Supersession data.

Superseded PIN	Replacement PIN M83536/16-
MS27400- 17	022
18	031
23	021
24	024
29	021
30	024
31	022
37	020
38	020
42	018
43	017
46	018
47	017
M6106/2- 001	025
003	025

Referenced documents. In addition to [MIL-PRF-83536](#), this document references the following:

MIL-DTL-12883/50	MIL-PRF-83536/15	MIL-STD-202
MIL-DTL-12883/51	ASTM B488	SAE- AMS3332
FED-STD-595/27886	FED-STD-595/37038	

Changes from previous issue: Marginal notations are mark with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodian:
Army - CR
Navy - EC
Air Force - 85
DLA - CC

Preparing activity:
DLA - CC

(Project 5945-2009-006)

Review activities:
Air Force - 99

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 ASSIST Online database at <http://assist.daps.dla.mil>.