

INCH-POUND

MIL-PRF-83536/6C
 01 December 2008
 SUPERSEDING
 MIL-PRF-83536/6B
 23 September 2003

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, 4PDT,
 LOW LEVEL TO 5 AMPERES, PERMANENT MAGNET DRIVE, HERMETICALLY SEALED,
 ALL WELDED, TRANSIENT SUPPRESSED DC COILS

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 [MIL-PRF-83536](#).

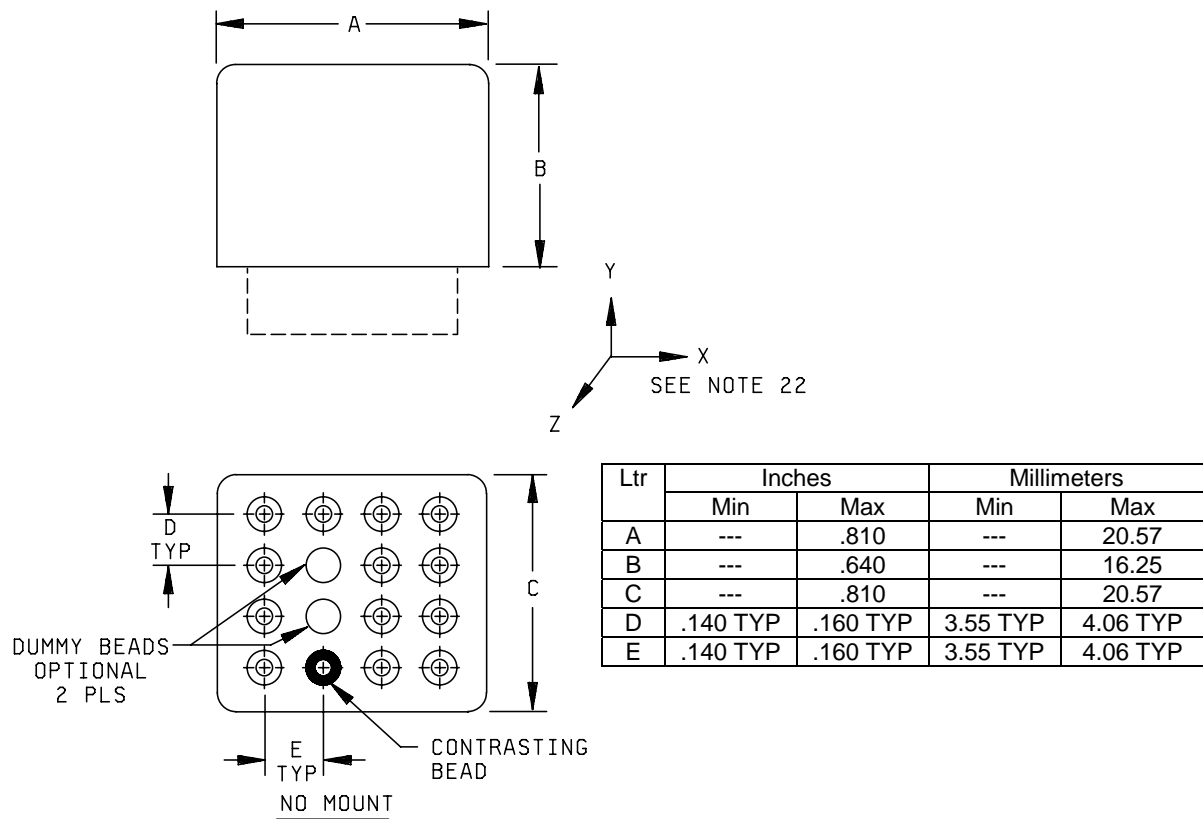


FIGURE 1. Dimensions and configurations.

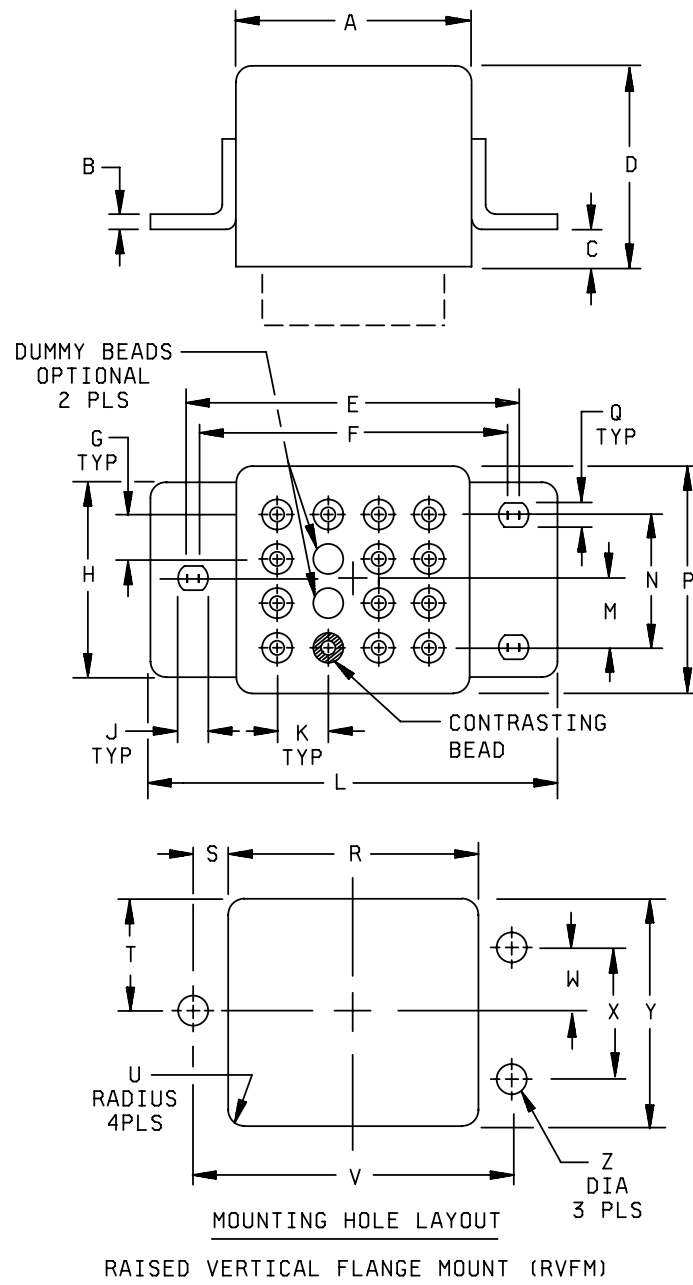
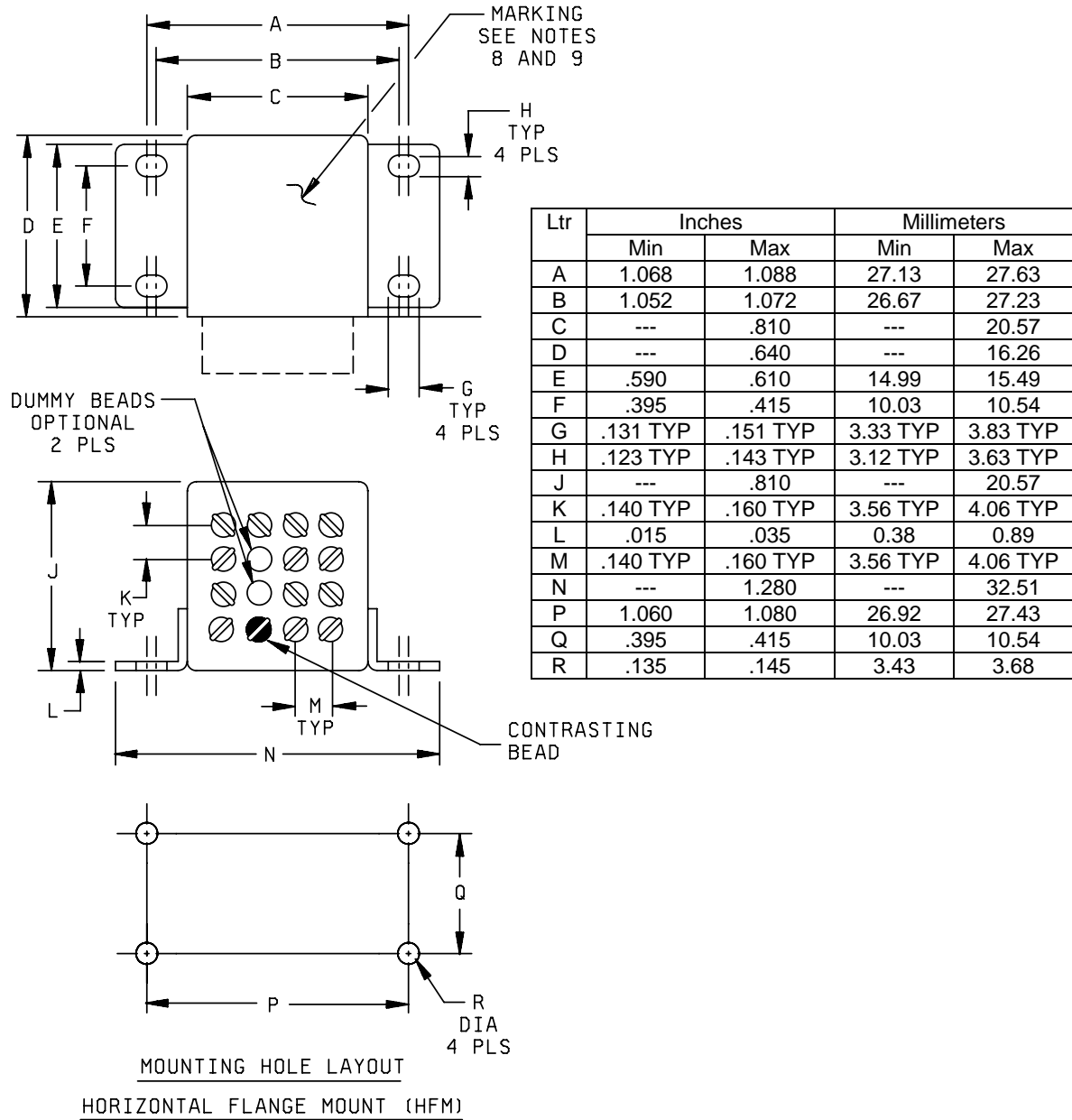
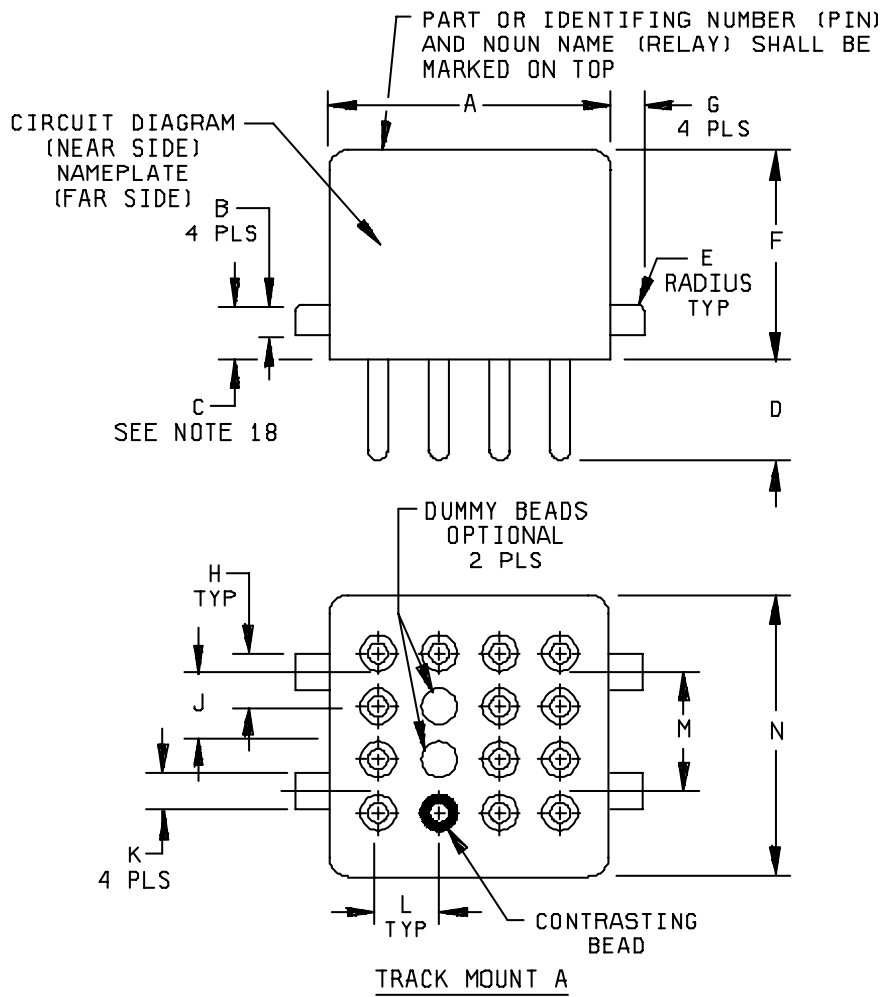


FIGURE 1. Dimensions and configurations - Continued.

Ltr	Inches		Millimeters	
	Min	Max	Min	Max
A	---	.810	---	20.57
B	.015	.035	0.38	0.89
C	.146	.166	3.71	4.22
D	---	.640	---	16.25
E	1.068	1.088	27.13	27.63
F	1.052	1.072	26.72	27.23
G	.131 TYP	.151 TYP	3.33 TYP	3.83 TYP
H	.702	.722	17.83	18.34
J	.131 TYP	.151 TYP	3.33 TYP	3.83 TYP
K	.140 TYP	.160 TYP	3.56 TYP	4.06 TYP
L	---	1.280	---	32.51
M	.240	.260	6.10	6.60
N	.490	.510	12.45	12.95
P	---	.810	---	20.57
Q	.123 TYP	.153 TYP	3.12 TYP	3.89 TYP
R	.840	.860	21.34	21.84
S	.100	.120	2.54	3.05
T	.415	.435	10.54	11.05
U	.021 R	.041 R	0.53 R	1.04 R
V	1.060	1.080	26.92	27.43
W	.240	.260	6.10	6.60
X	.490	.510	12.45	12.95
Y	.840	.860	21.34	21.84
Z	.137	.143	3.48	3.63

FIGURE 1. Dimensions and configurations - Continued.

FIGURE 1. Dimensions and configurations - Continued.



Ltr	Inches		Millimeters	
	Min	Max	Min	Max
A	---	.810	---	20.57
B	.075	.085	1.90	2.16
C	.155	.161	3.94	4.09
D	.160	.180	4.06	4.57
E	.010 R	.020 R	0.25 R	0.51
F	---	.690	---	17.53
G	.050	.060	1.27	1.52
H	.140 TYP	.160 TYP	3.56 TYP	4.06 TYP
J	.210	.220	5.33	5.59
K	.105	.115	2.67	2.92
L	.140 TYP	.160 TYP	3.56 TYP	4.06 TYP
M	.425	.435	10.80	11.05
N	---	.810	---	20.57

FIGURE 1. Dimensions and configurations - Continued.

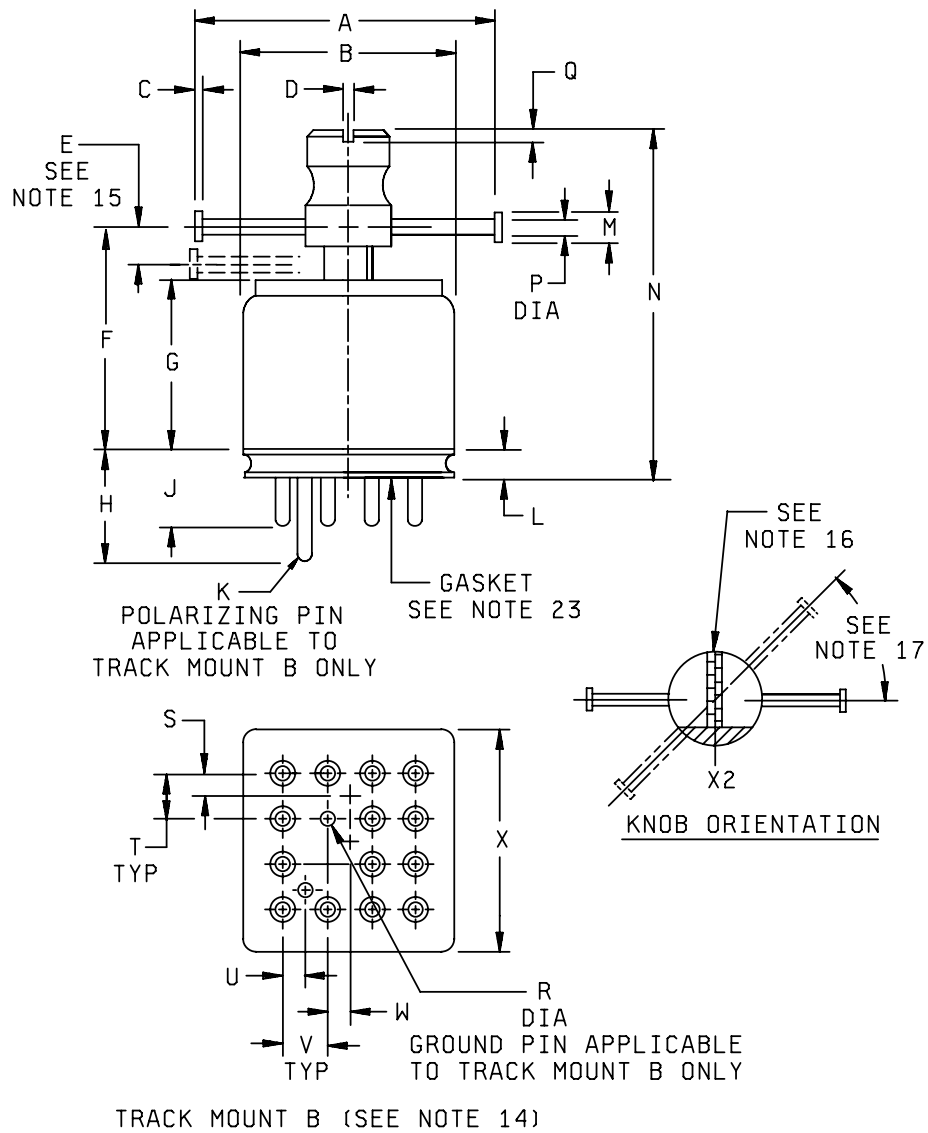
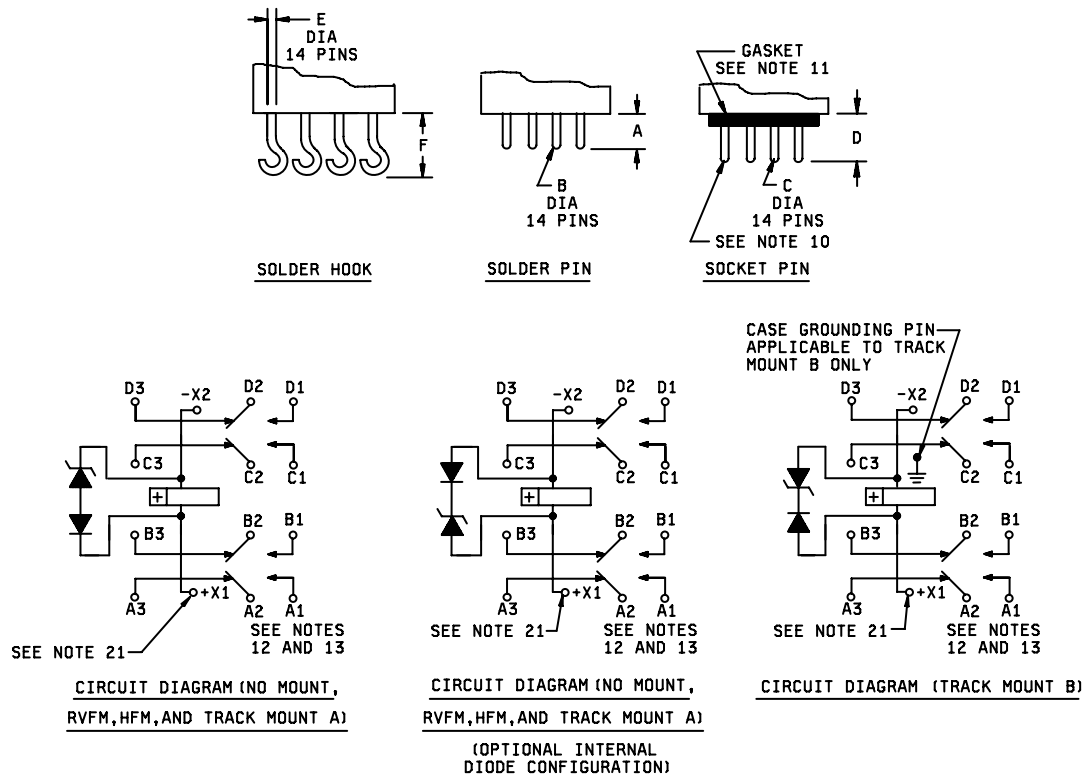


FIGURE 1. Dimensions and configurations - Continued.

Ltr	Inches		Millimeters	
	Min	Max	Min	Max
A	1.02	1.08	25.9	27.4
B	---	.810	---	20.57
C	.030	.040	0.76	1.02
D	.046	.078	1.17	1.98
E	.060	---	1.52	---
F	.090	.093	2.29	2.36
G	---	.704	---	17.88
H	.282	.302	7.16	7.67
J	.251	.271	6.37	6.88
K	.049	.051	1.24	1.29
L	.055	.085	1.40	2.16
M	.135	.145	3.43	3.68
N	.1.382	1.462	35.10	37.13
P	.070	.080	1.78	2.03
Q	.030	.050	0.76	1.27
R	.039	.041	0.99	1.04
S	.065	.085	1.65	2.16
T	.145 TYP	.155 TYP	3.68 TYP	3.93 TYP
U	.070	.080	1.78	2.03
V	.145 TYP	.155 TYP	3.68 TYP	3.93 TYP
W	.070	.080	1.78	2.03
X	---	.810	---	20.57

FIGURE 1. Dimensions and configurations - Continued.



Ltr	Inches		Millimeters	
	Min	Max	Min	Max
A	.160	.180	4.06	4.57
B	.038	.042	0.96	1.07
C	.039	.041	0.99	1.04
D	.160	.180	4.06	4.57
E	.038	.042	0.96	1.07
F	---	.210	---	5.33

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 suitable 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, date code and serial number. 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, track mount B polarizing pin and ground 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 AMS 3332 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 circuits be in a failure mode. Diodes shall have a peak inverse voltage of 600 V dc minimum and a current rating of one ampere at $+25^{\circ}\text{C}$. The zener diode shall have a power rating of one watt at $+25^{\circ}\text{C}$.
14. Track mount B is covered by Deutsch Relays, Incorporated, patent number 4,201,437.
15. Represents minimum travel required to engage locking cutout on mating socket module.
16. Track mount shall be corrosion resistant. One way of ensuring corrosion resistance is to nickel plate 303 stainless steel with 100 microinches minimum thickness. The finish on the top of the knob shall be lusterless black number 37038 in accordance with FED-STD-595 except that the slot shall be white marking color, number 27886 in accordance with FED-STD-595. The post shall be polyamide-imide in accordance with McDonnell Douglas Dwg. ST5M1454 (Deutsch Relays, Inc. Patent number 4,201,437).
17. Direction of 29° rotation to engage locking cutout on mating socket module.
18. Measure from surface of header.
19. Track mount B relay external materials and finishes shall be in accordance with McDonnell Douglas Dwg ST5M1454 (Deutsch Relays, Incorporated, patent number 4,201,437) and applicable specifications. Track mount B relay housing and header shall be corrosion resistant. One way of ensuring corrosion resistance is to nickel plate with 100 microinches minimum thickness.
20. The rotation of the knob mechanism shall be restricted such that the latching pins cannot be placed on the side opposite the McDonnell Douglas ST5M1457 (Deutsch Relays, Incorporated, patent number 3,790,915) bracket cutouts.
21. Indicated terminal shall be identified with a contrasting bead.
22. Plane of critical motion for vibration and shock is Y-axis.
23. 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 AMS 3332 has been considered acceptable.

FIGURE 1. Dimensions and configurations – Continued.

REQUIREMENTS:

Contact data:

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

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

Intermediate current: Applicable.

Mixed loads: Applicable.

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

Type of load (high level)	Cycles x 10 ³	28 V dc	115 V ac 1 phase 400Hz	115/200 V ac 3 phase 400 Hz
Resistive	100	5	5	5
Inductive	20	3	5	5
Motor	100	2	3	3
Lamp	100	1	N/A	N/A

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

Contact voltage drop or 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: 0.050 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: 20 amperes dc, 30 amperes ac.

Rupture current: 25 amperes dc, 40 amperes ac.

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

TABLE II. Time current relay characteristics. ^{1/}

Successive application	Amperes	Time
1	10	1 hour
2	15	20 seconds
3	37.5	2 seconds
4	75	.53 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 four 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 ^{1/}: See [table III](#).

Operate time: 5 milliseconds maximum at rated coil voltage at 25°C. 7 milliseconds maximum at rated coil voltage over the temperature range.

Release time: 5 milliseconds maximum from rated coil voltage at 25°C. 7 milliseconds maximum from rated coil voltage over the temperature range.

Duty rating: Continuous.

Coil transient suppression: Applicable (42 V dc maximum).

Neutral screen: Not applicable.

Electrical data:

Insulation resistance:

Initial: 100 megohms at 500 V dc.

After life or environmental tests: 50 megohms at 500 V dc.

^{1/} CAUTION: Due to possible interaction of relay magnetic fields, the following spacing requirements, as a minimum, shall be considered in dense packaging situations:

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

TABLE III. Dash numbers and characteristics. 1/

Dash number <u>2/</u>			Mount	Coil data										
Solder pin	Solder hook	Socket pin		At 25°C						Over temperature range			Maximum pickup voltage	
				Coil voltage (V dc) <u>3/</u>		Coil resist- ance (ohms) minimum	Specified pickup voltage (V dc) <u>4/</u>	Specified hold voltage (V dc) <u>4/</u>	Specified dropout voltage (v dc) <u>4/</u>	Specified pickup voltage (V dc) <u>4/</u>	Specified hold voltage (V dc) <u>4/</u>	Specified dropout voltage (V dc) <u>4/</u>	High temper- ature test	Contin- uous current test
				Rated	Max									
001	002	003	No mount	6	7.3	15	3.3	1.6	0.4	4.5	2.3	0.25	5.0	5.7
004	005	006	RVFM	6	7.3	15	3.3	1.6	0.4	4.5	2.3	0.25	5.0	5.7
007	008	---	HFM	6	7.3	15	3.3	1.6	0.4	4.5	2.3	0.25	5.0	5.7
009	010	011	No mount	12	14.5	70	6.6	3.3	0.75	9.0	4.5	0.5	9.9	11.25
012	013	014	RVFM	12	14.5	70	6.6	3.3	0.75	9.0	4.5	0.5	9.9	11.25
015	016	---	HFM	12	14.5	70	6.6	3.3	0.75	9.0	4.5	0.5	9.9	11.25
017	018	019	No mount	28	29 <u>5/</u>	360	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
020	021	022	RVFM	28	29 <u>5/</u>	360	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
023	024	---	HFM	28	29 <u>5/</u>	360	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
---	---	<u>6/ 7/</u> 025	Track A	28	29	360	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
---	---	026	Track B	28	29	360	13.5	5.5	2.3	18.0	7.0	1.5	19.8 <u>8/</u>	22.5
027	028	029	No Mount	48	50	1125	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0
030	031	032	RVFM	48	50	1125	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0
033	034	---	HFM	48	50	1125	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0

See footnotes on next page.

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 as shown 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/ Internal visual: Accomplish on a 100 percent basis prior to final encapsulation of the device to detect and eliminate devices with internal defects or foreign particles that could lead to device failure. The inspection equipment shall include optical equipment of at least 10X magnification and visual standards to permit the inspector to make objective decisions as to the acceptability of the device being examined.
- 7/ For qualification only, the relay shall meet the test requirements of this specification when installed in relay socket mount [MIL-PRF-12883/52](#) and relay bracket mount [MIL-PRF-12883/53](#) except shock shall be 50 g's for 11 ± 1 milliseconds. No contact opening or closing in excess of 10 microseconds.
- 8/ Applicable to track mount B only, high temperature test and continuous current shall be performed at +95°C and +125°C. The values for high temperature test and continuous current at +95°C shall be 18 V dc and 19.5 V dc, respectively.

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Dielectric withstanding voltage 2/:

	Track mount B		All others	
	Coil to case	All other points	Coil to case	All other points
Sea level:				
Initial:	1050	1050	1000	1000
After life:	1050	1050	750	750
Altitude:				
At 80,000 feet:	500	500	250	250
At 300,000 feet:	---	---	500	500

Maximum leakage current for track mount B 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 B.

Acceleration: Applicable, except 15 g's.

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 contacts. For track mounting, see table III, footnote 7.

Vibration (sinusoidal): Applicable, [MIL-STD-202](#), method 204, 30 g's except frequency range shall be 70 to 3,000 Hz. Horizontal flange mount shall be 20 g's, 57 Hz to 3,000 Hz. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

Vibration (sinusoidal): Applicable to track mount A only. Test in accordance with [MIL-STD-202](#), method 204. .06 inch double amplitude, 10 to 55 Hz. 10 g's, 55 to 500 Hz, 20 g's, 500 to 3,000 Hz. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

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). 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 A only. Applicable to qualification and group C inspection. Test in accordance with [MIL-STD-202](#), method 214, test condition IF (0.3 g²/Hz, 50 to 2000 Hz). 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 B only. Applicable to qualification only. Test in accordance with [MIL-STD-202](#), method 214, test condition IJ, 1.5 hours per axis. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 10 microseconds maximum closure for open contacts.

2/ Dielectric may be improved by suitable insulation of terminals and wiring after installation.

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Physical data:

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

Weight: For track mount B: 0.072 pound (32.6 grams) maximum. For all others: 0.058 pound (26.4 grams) maximum.

Terminal strength:

Solder hook terminals:

Pull force: 5 pounds ± 0.5 pound.

Bend: Applicable.

Twist: Not applicable.

Solder pin terminals:

Pull force:

For .040 diameter terminals: 5 pounds ± 0.5 pound.

Bend: Applicable.

Twist: Not applicable.

Socket pin terminals:

Pull force:

For .040 diameter terminals: 5 pounds ± 0.5 pound.

For .050 diameter terminals: 10 pounds ± 0.5 pound (applicable to track mount B polarizing pin only).

Bend: Applicable.

Twist: Not applicable.

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

Seal: Hermetic.

Marking: Applicable.

Part or Identifying Number (PIN): M83536/6 (dash number from table III and suffix letter designating failure rate level).

Qualification inspection:

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

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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	M83536/6-022	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
	M83536/6-022	
	M83536/6-022	
	M83536/6-018	
	M83536/6-023	
	M83536/6-026	
	M83536/6-002	
	M83536/6-014	
	M83536/6-033	

- [1/](#) For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on [MIL-PRF-83536/5](#) may be used in addition to [MIL-PRF-83536/6](#) 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 M6106/	Replacement PIN M83536/6-
22-003	025
28-003	017
28-004	017
28-007	018
28-008	018
28-011	019
28-012	019
28-015	020
28-016	020
28-019	021
28-020	021
28-023	022
28-024	022
28-027	023
28-028	023
28-031	024
28-032	024
28-038	012
28-040	013
28-042	014
28-044	015
28-046	016

Referenced documents. In addition to MIL-PRF-83536, this document references the following:

ASTMB488
AMS3332
FED-STD-595/27886
FED-STD-595/37038
MIL-PRF-12883/52
MIL-PRF-12883/53
MIL-STD-202
MIL-PRF-83536/5
ST5M1454
ST5M1457

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Navy - EC
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DLA - CC

Preparing activity:
DLA - CC
(Project 5945-2008-012)

Review activities:
Air Force - 99

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