

INCH-POUND

MIL-PRF-83536/2B
w/AMENDMENT 1
6 August 2004
SUPERSEDING
MIL-PRF-83536/2B
23 September 2003

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, DPDT,
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.

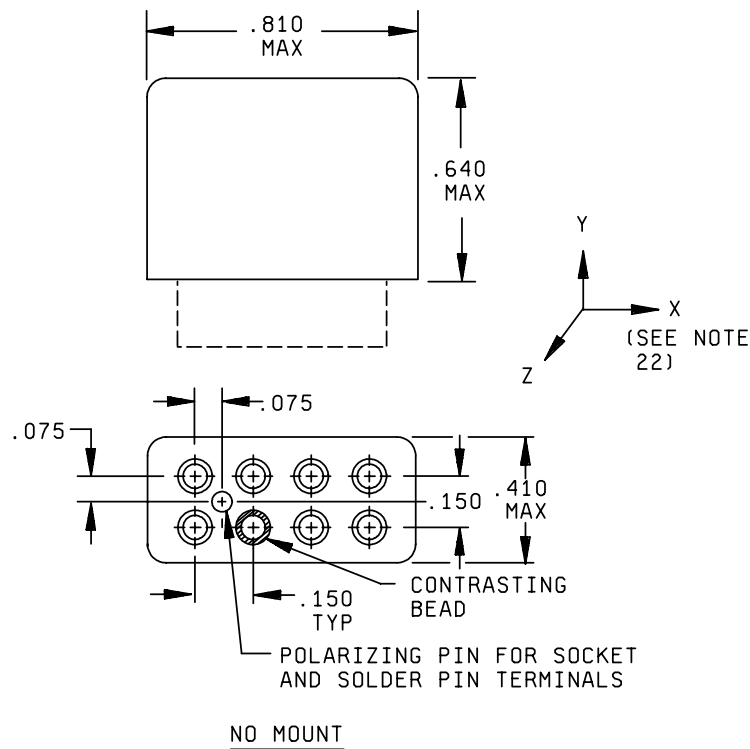
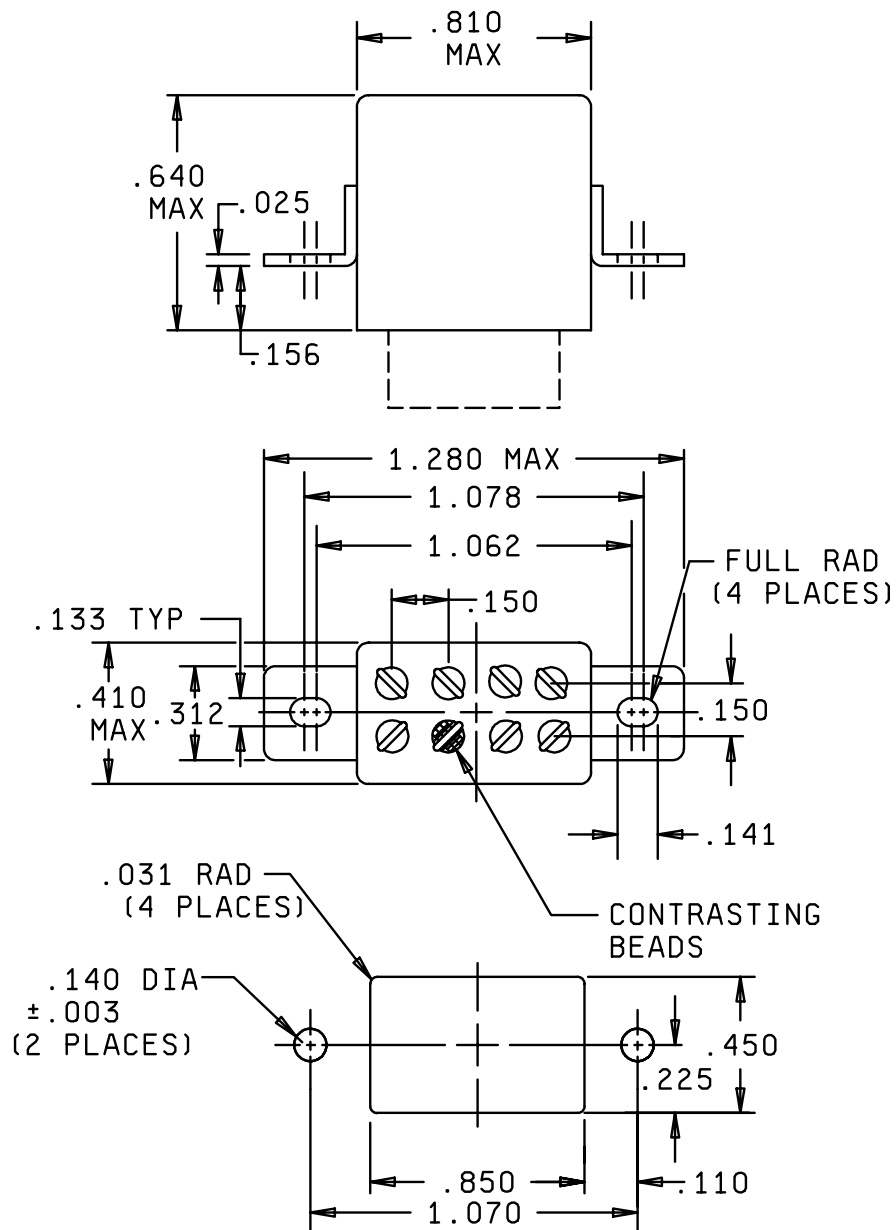


FIGURE 1. Dimensions and configurations.

AMSC N/A

FSC 5945

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MOUNTING HOLE LAYOUT

RAISED VERTICAL FLANGE MOUNT (RVFM)

FIGURE 1. Dimensions and configurations - Continued.

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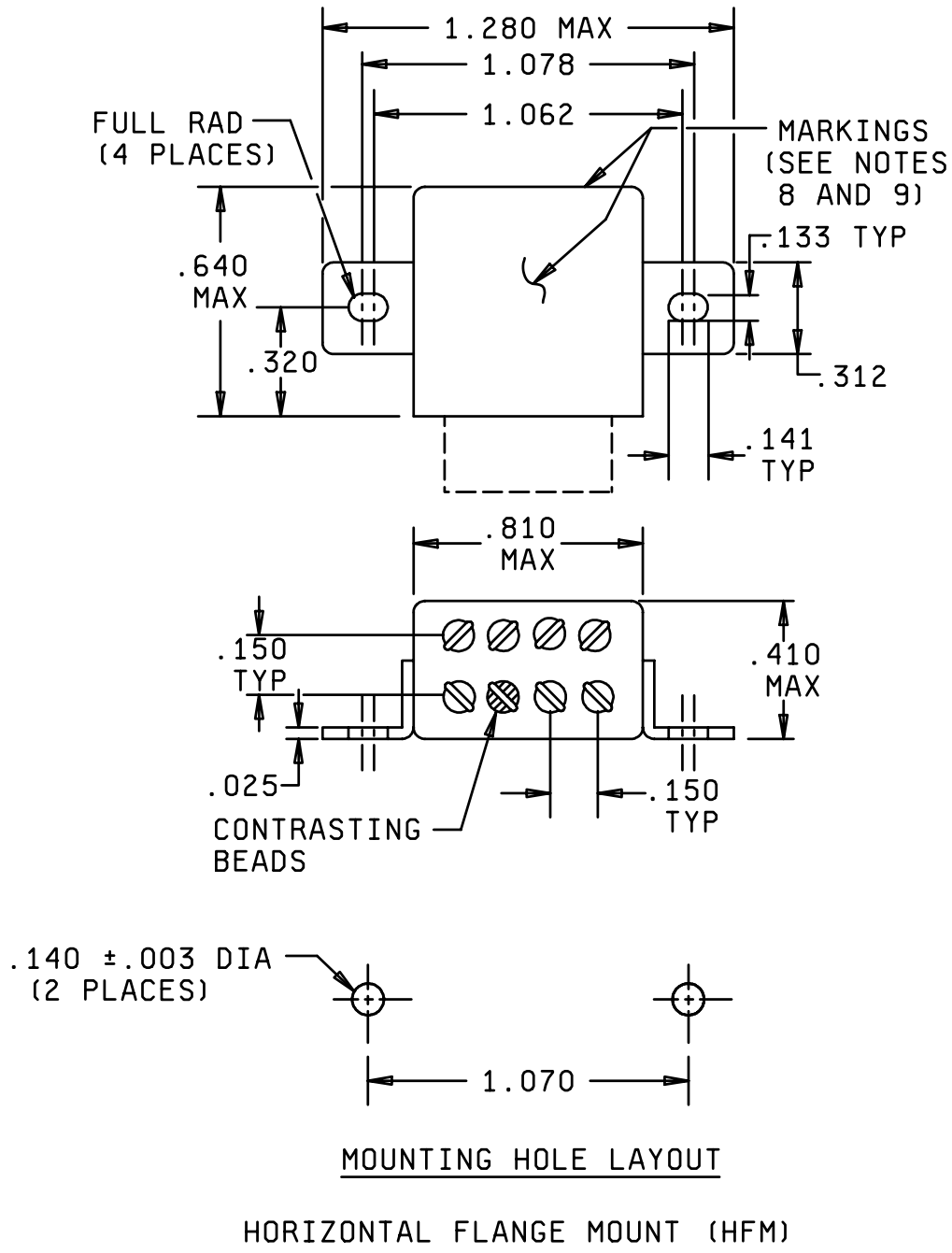
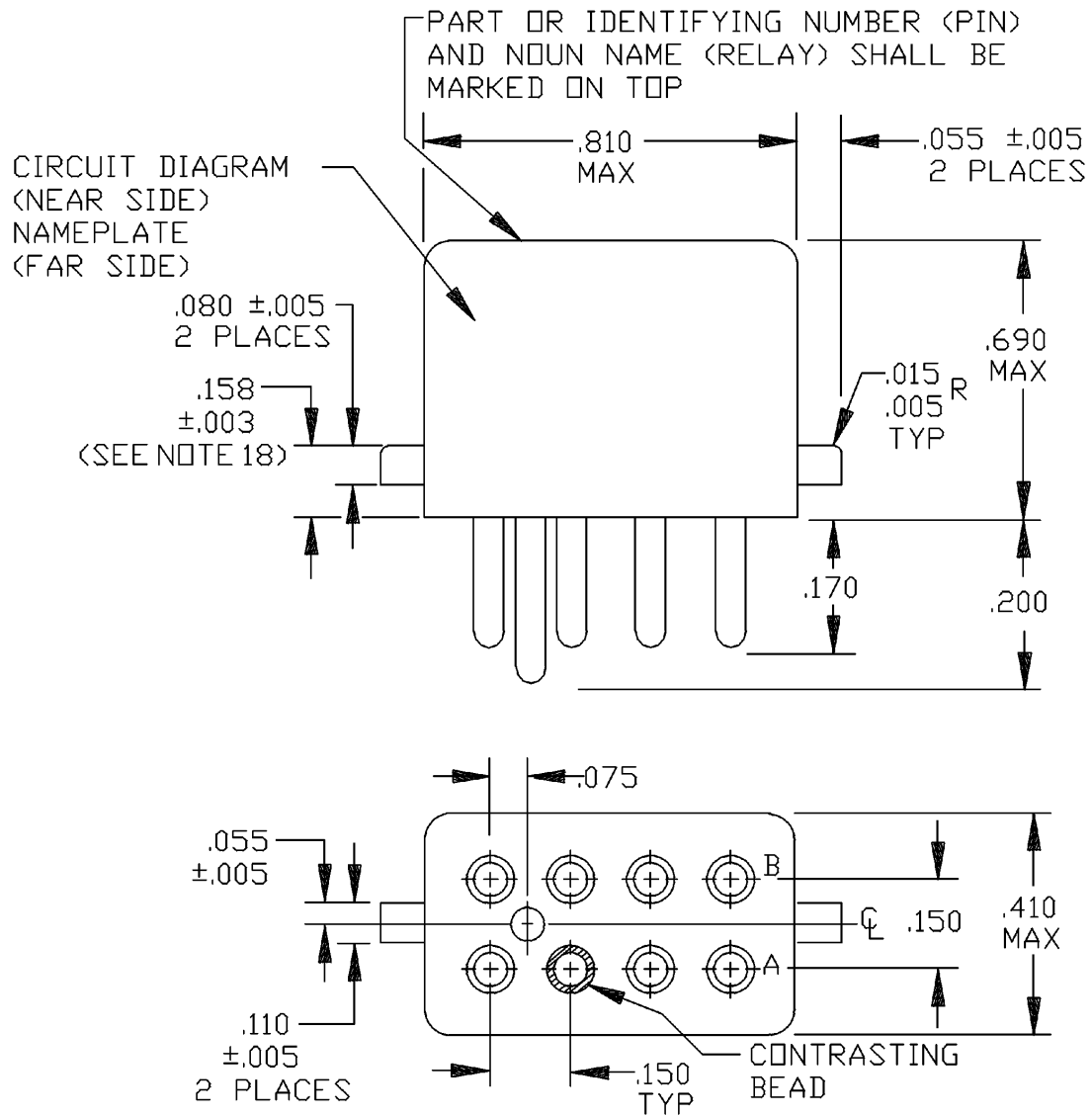


FIGURE 1. Dimensions and configurations - Continued.



TRACK MOUNT A (FOR DASH NUMBER 028)

FIGURE 1. Dimensions and configurations - Continued.

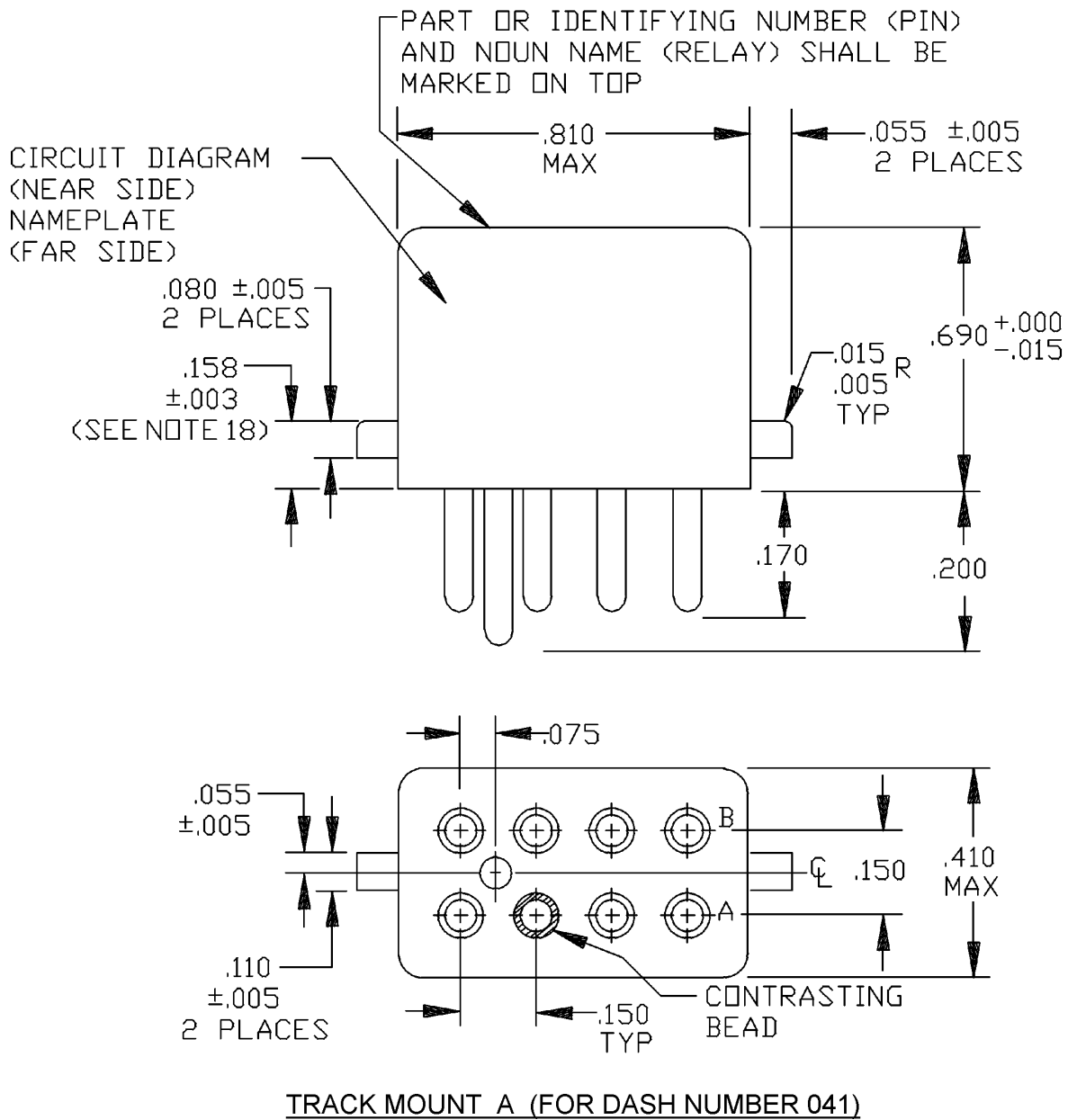


FIGURE 1. Dimensions and configurations - Continued.

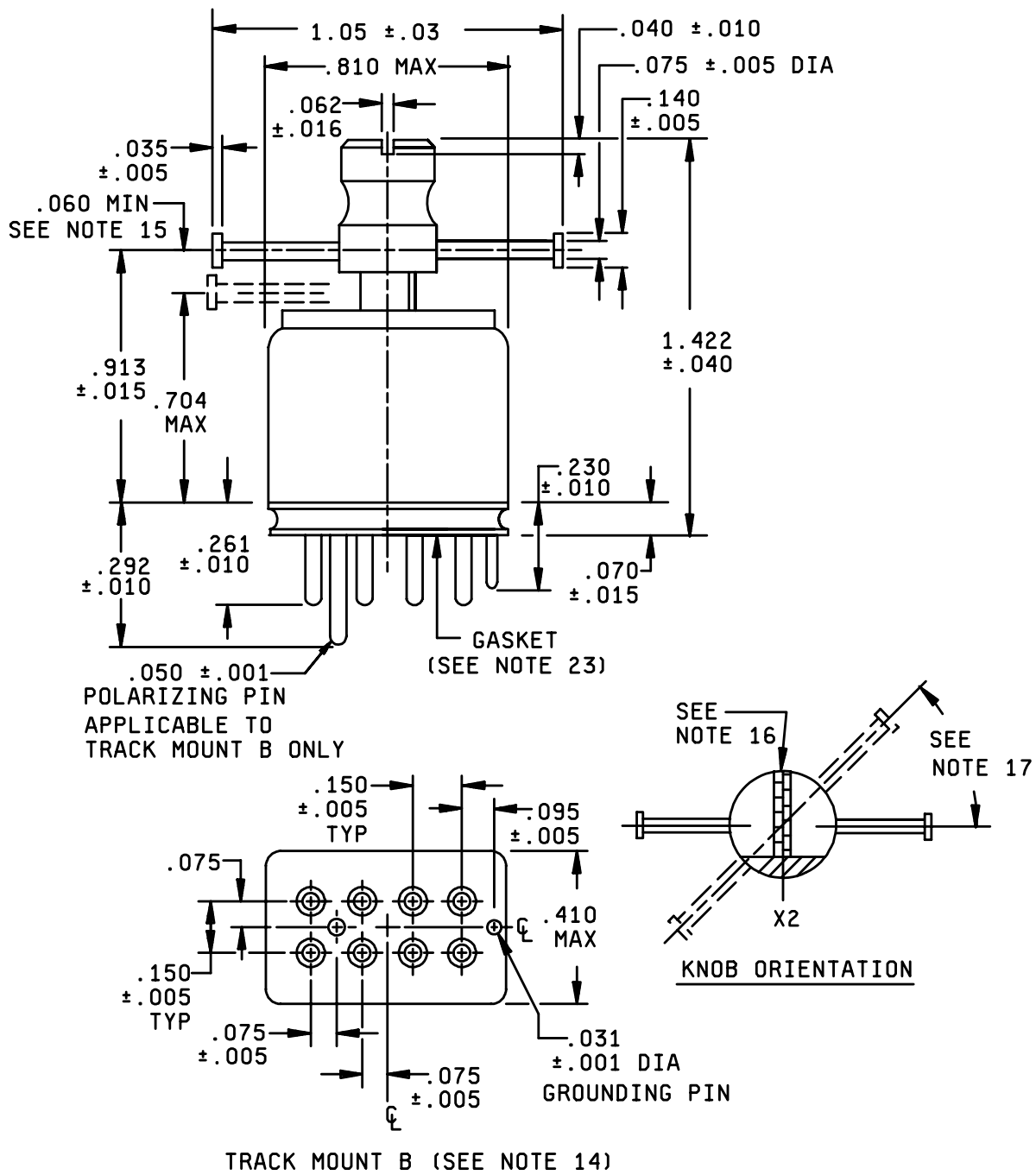


FIGURE 1. Dimensions and configurations - Continued.

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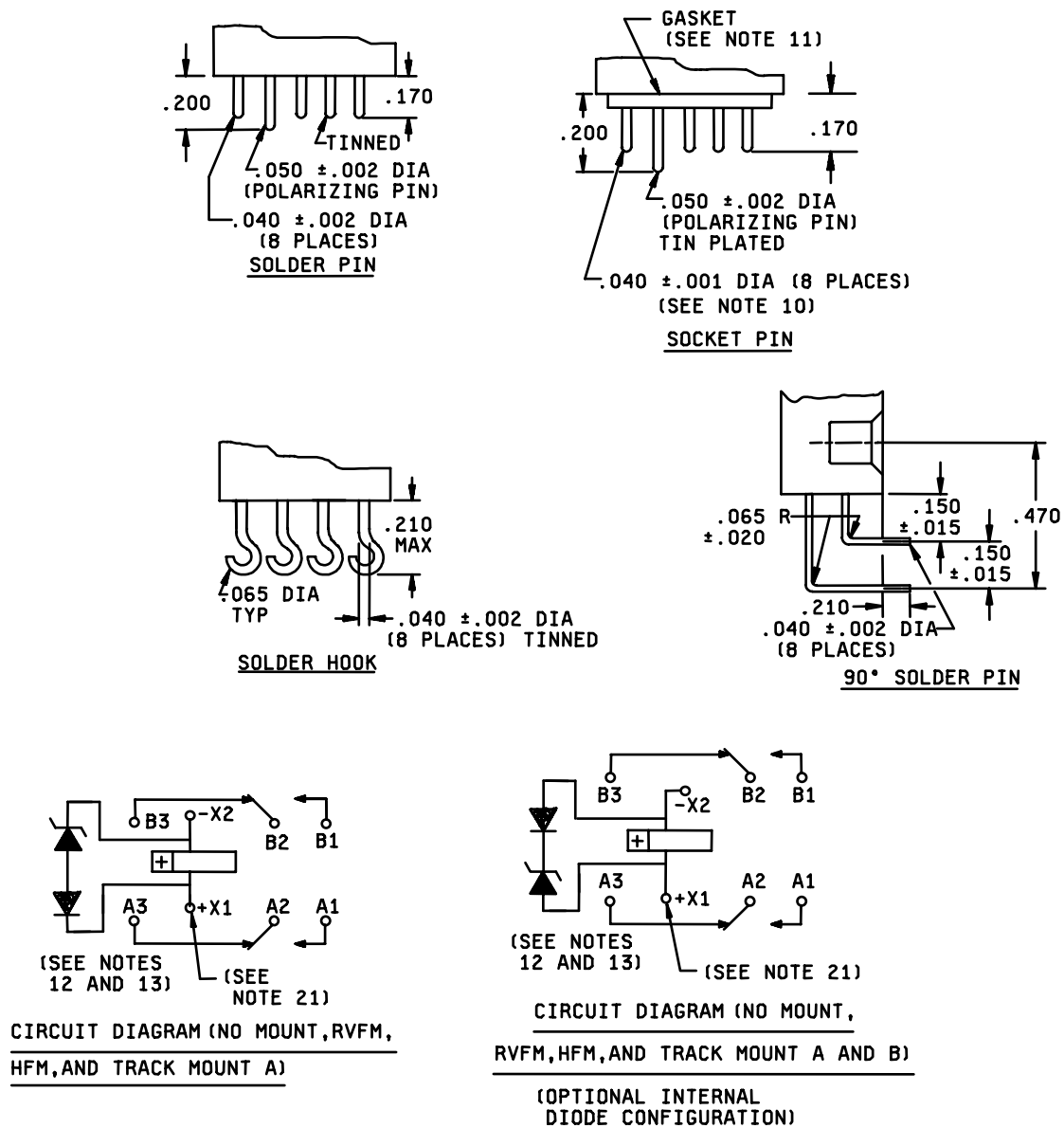


FIGURE 1. Dimensions and configurations - Continued.

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Inches	mm	Inches	mm	Inches	mm	Inches	mm
.001	0.03	.055	1.40	.156	3.96	.470	11.94
.002	0.05	.060	1.52	.158	4.01	.640	16.26
.003	0.08	.065	1.65	.170	4.32	.690	17.53
.005	0.13	.070	1.78	.200	5.08	.704	17.88
.010	0.25	.075	1.90	.210	5.33	.810	20.57
.015	0.38	.080	2.03	.225	5.72	.850	21.59
.016	0.41	.095	2.41	.230	5.84	.913	23.19
.020	0.51	.110	2.79	.261	6.63	1.05	26.7
.025	0.64	.125	3.18	.292	7.42	1.062	26.97
.03	0.76	.133	3.38	.312	7.92	1.070	27.18
.031	0.79	.140	3.56	.320	8.13	1.078	27.38
.035	0.89	.141	3.58	.410	10.41	1.280	32.51
.040	1.02	.150	3.81	.450	11.43	1.422	36.12
.050	1.27						

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. 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 and the 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, 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 SAE-AMS3332 has been considered acceptable. Silicone rubber gasket is not supplied with track mount A relays.
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.
14. Track mount B is covered by Deutsch Relays, Inc., 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 stainless steel 303 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 Drawing. 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 Drawing. ST5M1454 (Deutsch Relays, Inc. Patent number 4,201,437) and applicable specifications.
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 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 30 to 45. Gasket material according to SAE-AMS3332 has been considered acceptable.

FIGURE 1. Dimensions and configurations – Continued.

REQUIREMENTS:

Contact requirements:

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.

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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. 6 milliseconds maximum at rated coil voltage over the temperature range.

Release time: 5 milliseconds maximum from rated coil voltage at 25°C. 6 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 minimum 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 requirements										
Solder pin	Solder hook	Socket pin	90° solder pin		At 25°C						Over temperature range			Maximum pickup voltage	
					Coil voltage (V dc) <u>3/</u>		Coil resistance (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 temperature test	Continuous Current test
					Rated	Max									
001	002	003	---	No mount	6	7.3	18	3.3	1.6	0.5	4.5	2.3	0.25	5.0	5.7
004	005	006	---	RVFM	6	7.3	18	3.3	1.6	0.5	4.5	2.3	0.25	5.0	5.7
007	008	---	009-	HFM	6	7.3	18	3.3	1.6	0.5	4.5	2.3	0.25	5.0	5.7
010	011	012	---	No mount	12	14.5	85	6.5	3.3	0.75	9.0	4.5	0.5	9.9	11.25
013	014	015	---	RVFM	12	14.5	85	6.5	3.3	0.75	9.0	4.5	0.5	9.9	11.25
016	017	---	018	HFM	12	14.5	85	6.5	3.3	0.75	9.0	4.5	0.5	9.9	11.25
019	020	021	---	No mount	28	29 <u>5/</u>	440	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
022	023	024	---	RVFM	28	29 <u>5/</u>	440	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
<u>9/</u> 039	---	---	---												
025	026	---	027	HFM	28	29 <u>5/</u>	440	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
---	<u>9/</u> 040	---	---												
---	---	<u>6/</u> <u>7/</u> 028 041	---	Track A	28	29 <u>5/</u>	440	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
---	---	029	---	Track B	28	29 <u>5/</u>	440	13.5	5.5	2.3	18.0	7.0	1.5	<u>8/</u> 19.8	<u>8/</u> 22.5
030	031	032	---	No mount	48	50	1400	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0
033	034	035	---	RVFM	48	50	1400	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0
036	037	---	038	HFM	48	50	1400	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/ 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-DTL-12883/52 and relay bracket mount MIL-DTL-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.
- 9/ Dash numbers -039 and -040 are supplied without internal arc barriers. These relays are not rated for ac loads.

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 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 except peak value shall be 200 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. 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. 0.06 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 ($0.4 \text{ g}^2/\text{Hz}$, 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 A only. Applicable to qualification and group C inspection. Test in accordance with MIL-STD-202, method 214, test condition IF ($0.3 \text{ g}^2/\text{Hz}$, 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.

Physical requirements:

Dimensions and configurations: See figure 1.

Weight: For track mount B: 0.045 pound (20.4 grams) maximum. For all others: 0.034 pound (15.4 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 .031 diameter terminals: 3 pounds ± 0.3 pound.

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

For .050 diameter terminals: 10 pounds ± 1.0 pound (applicable to polarizing pin only).

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 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): M83536/2 (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	M83536/2-024	18 units plus 1 open unit for level L at C = 0 ^{2/}
	M83536/2-024	33 units plus 1 open unit for level M at C = 0 ^{2/}
	M83536/2-024	Qualification inspection as applicable
	M83536/2-020	2 units, qualification inspection table,
	M83536/2-025	Q2, shock, vibration,
	M83536/2-027	acceleration, terminal strength, and seal
	M83536/2-028	
	M83536/2-029	
	M83536/2-002	2 units, qualification inspection table, Q1
	M83536/2-015	
	M83536/2-038	

^{1/} For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on MIL-PRF-83536/1 may be used in addition to MIL-PRF-83536/2 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 Q5, 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 M83536/2
21-003	028
27-003	019
27-004	019
27-007	020
27-008	020
27-011	021
27-012	021
27-015	022
27-016	022
27-019	023
27-020	023
27-023	024
27-024	024
27-027	025
27-028	025
27-031	026
27-032	026
27-039	027
27-040	027

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Referenced documents. In addition to MIL-PRF-83536, this specification sheet references the following documents.

MIL-DTL-12883/52	MIL-DTL-12883/53	MIL-PRF-83536/1	MIL-STD-202
FED-STD-595	ASTM B488	SAE-AMS3332	

Changes from previous issue. The margins of this specification are marked 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 - 11
DLA - CC

Preparing activity:

DLA - CC

(Project 5945-1268)

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://www.dodssp.daps.mil/>.