

INCH-POUND

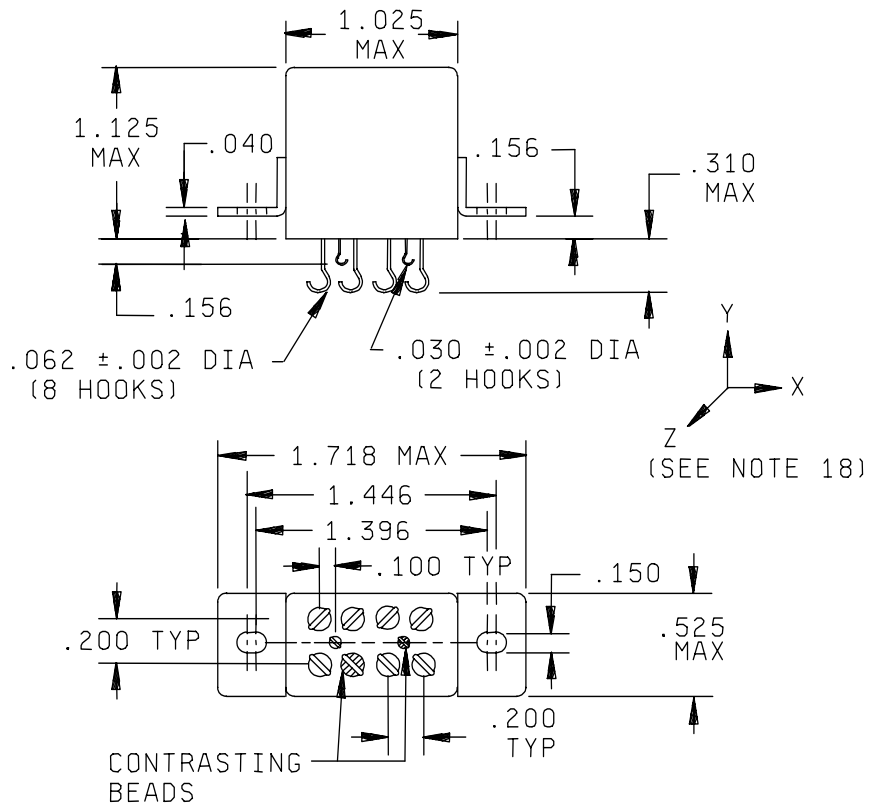
MIL-PRF-83536/13B
15 April 2002
SUPERSEDING
MIL-PRF-83536/13A
12 October 2000

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, DPDT,
LOW LEVEL TO 10 AMPERES, MAGNETIC LATCH, HERMETICALLY SEALED,
ALL WELDED, TRANSIENT SUPPRESSED DC COILS

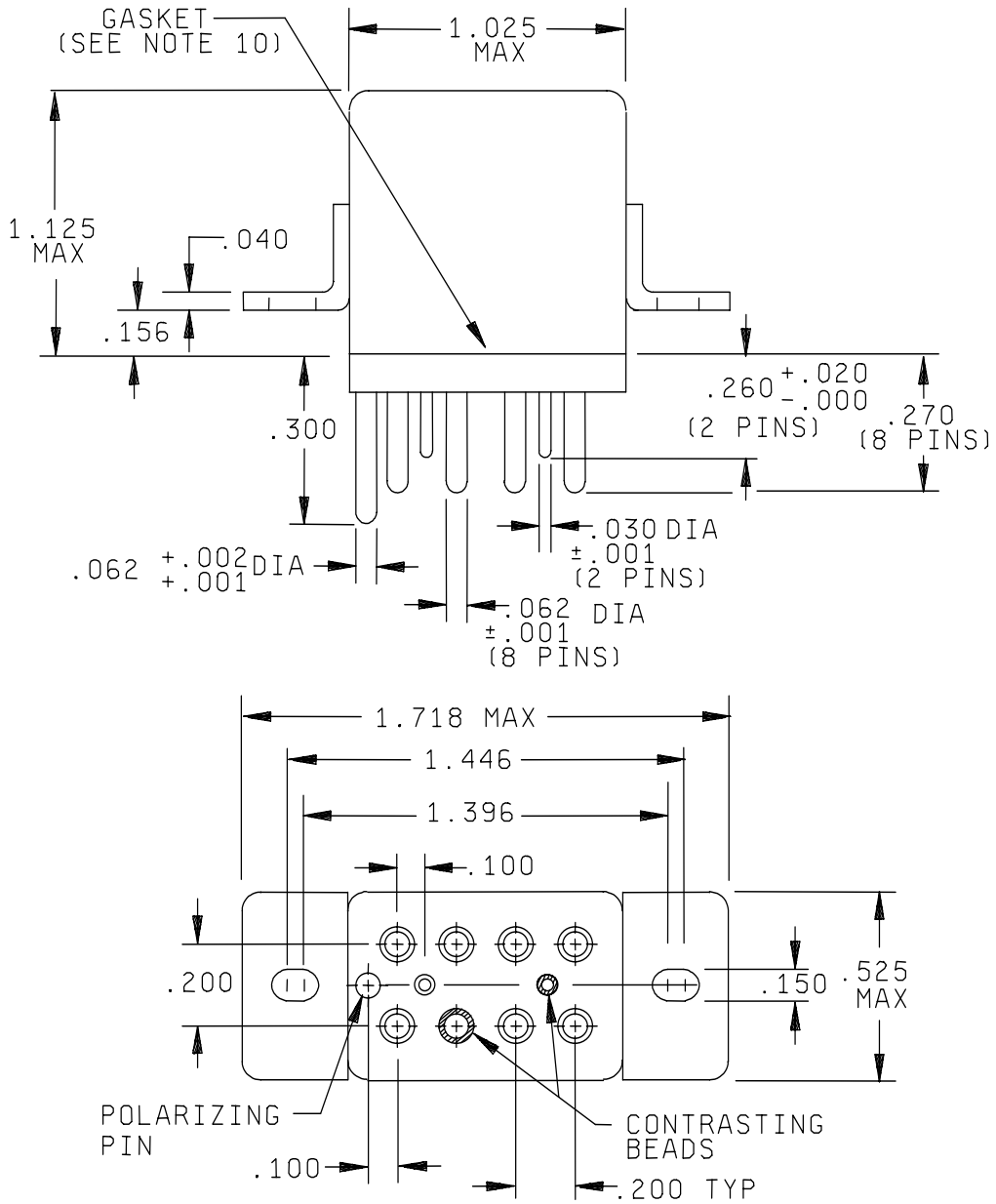
This specification is approved for use by all Departments and Agencies
of the Department of Defense.

The requirements for acquiring the product described herein shall
consist of this specification sheet and MIL-PRF-83536.



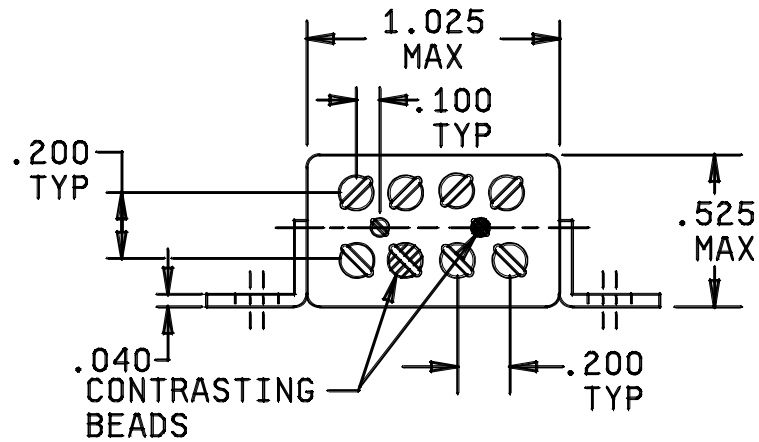
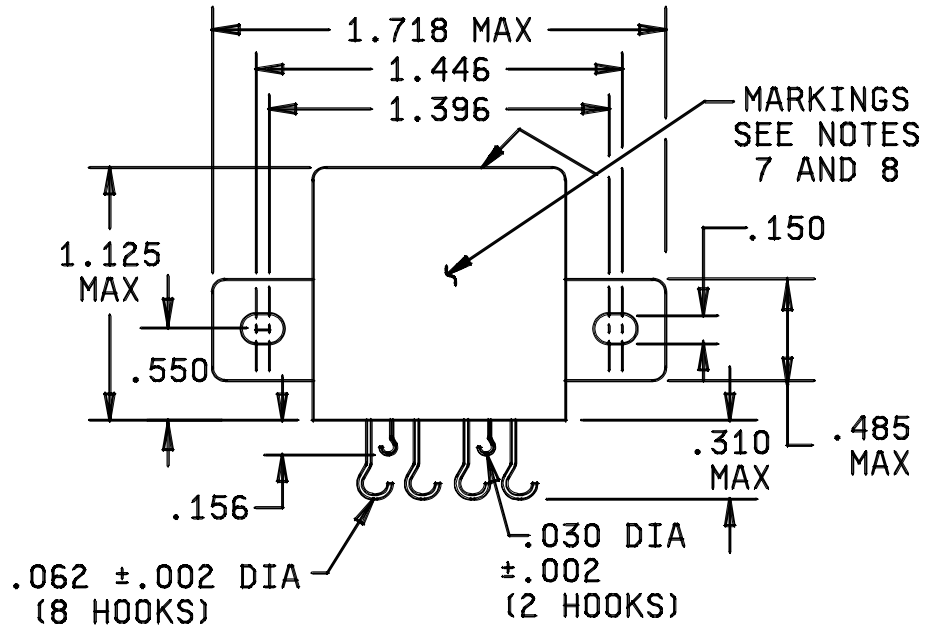
RAISED VERTICAL FLANGE MOUNT (RVFM) WITH SOLDER HOOKS

FIGURE 1. Dimensions and configurations.



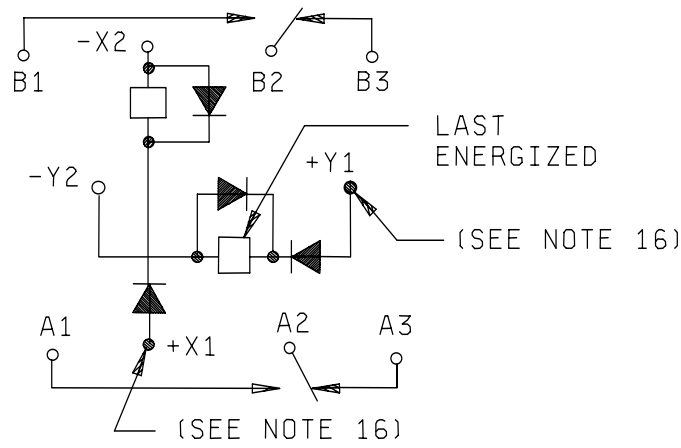
RAISED VERTICAL FLANGE MOUNT (RVFM) WITH SOCKET PINS

FIGURE 1. Dimensions and configurations - Continued.

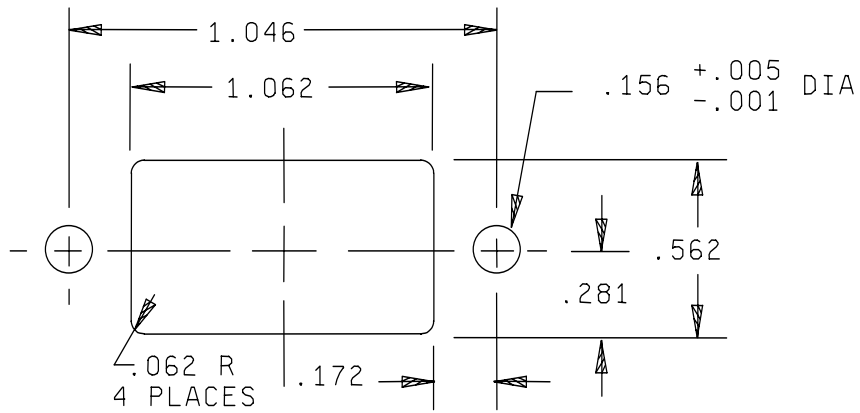


HORIZONTAL FLANGE MOUNT (HFM) WITH SOLDER HOOKS

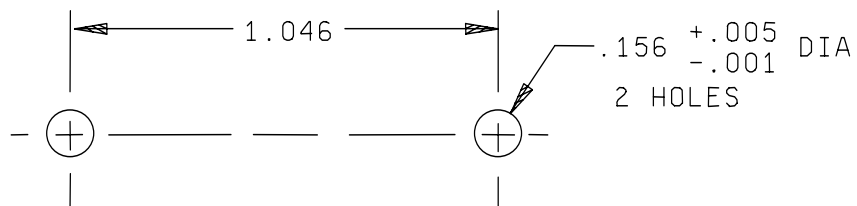
FIGURE 1. Dimensions and configurations - Continued.



CIRCUIT DIAGRAM (RVFM AND HFM)



MOUNTING HOLE LAYOUT (RVFM)



MOUNTING HOLE LAYOUT (HFM)

FIGURE 1. Dimensions and configurations - Continued.

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Inches	mm	Inches	mm	Inches	mm
.000	0.00	.156	3.96	.525	13.34
.001	0.03	.172	4.37	.562	14.27
.002	0.05	.200	5.08	1.025	26.04
.005	0.13	.260	6.60	1.062	26.98
.020	0.51	.270	6.86	1.125	28.58
.030	0.76	.281	7.14	1.396	35.46
.040	1.02	.300	7.62	1.406	35.71
.062	1.57	.310	7.87	1.446	36.73
.100	2.54	.485	12.32	1.718	43.64
.150	3.81	.500	12.70		

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 bistable.
6. This relay shall not be damaged by reverse polarity.
7. 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.
8. 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.
9. 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.
10. 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 $\pm .050$ $.005$ ($1.27 \pm .13$ mm). Gasket material according to AMS 3332 has been considered acceptable.
11. Relay is magnetically latched in both positions.
12. All hooks shall be tin finished.
13. Relays shall have a (+) sign placed on the circuit diagram as shown.
14. Coil symbol optional in accordance with MIL-STD-1285.
15. Transient voltage (back EMF) 5 V dc maximum. Diodes shall have peak inverse voltage rating of 600 V dc.
16. Indicated terminals shall be identified by a contrasting bead.
17. Direction of hook openings is optional.
18. Plane of critical motion for vibration and shock is Y-axis.

FIGURE 1. Dimensions and configurations - Continued.

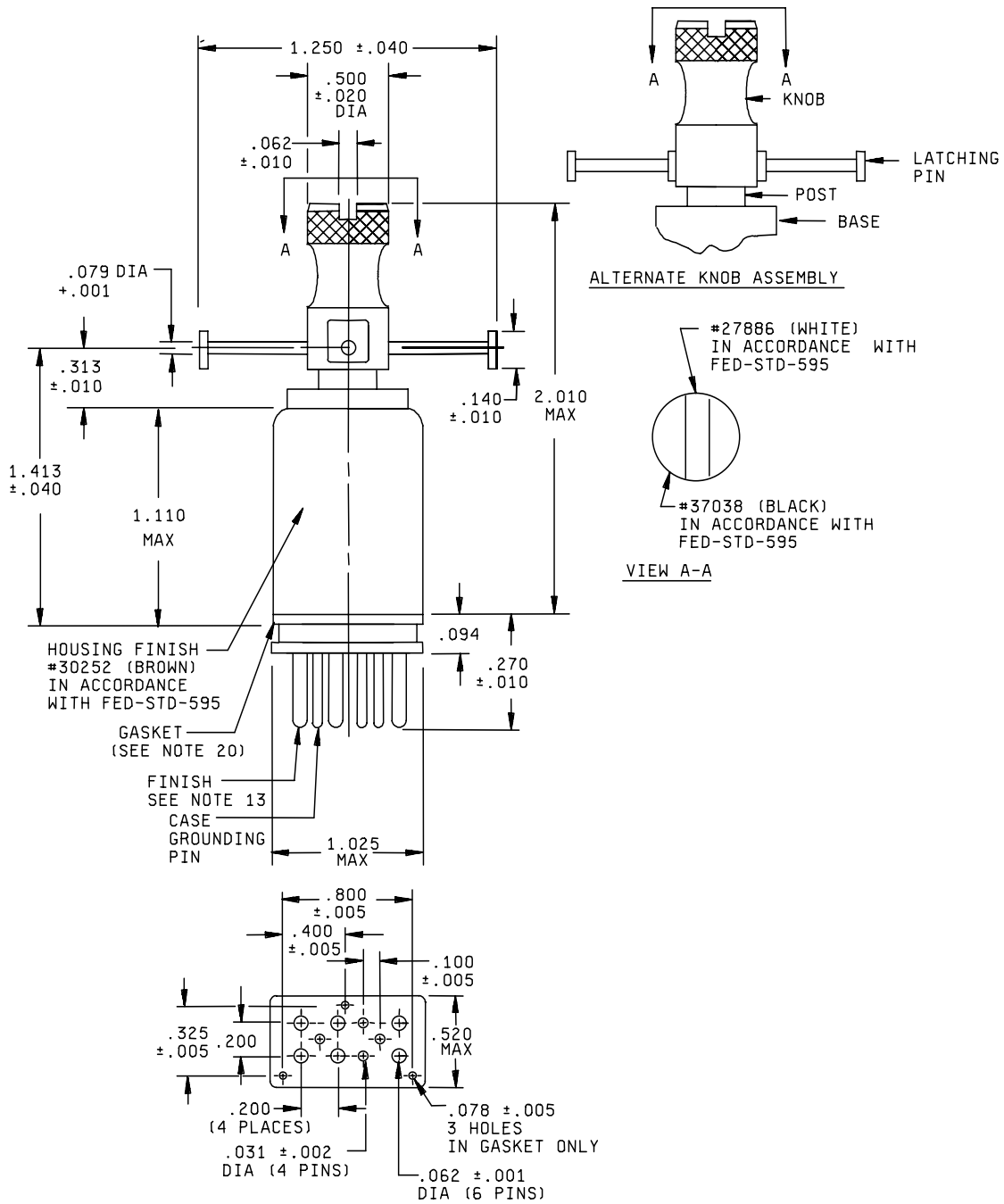
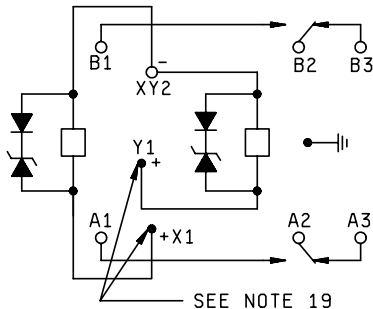
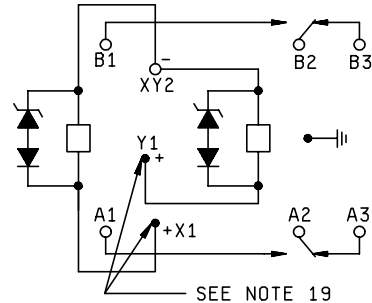


FIGURE 2. Outline dimensions and configuration, track mount (see notes 16 and 17).



SEE NOTES 4, 5 AND 6

CIRCUIT DIAGRAM (TRACK MOUNT)



SEE NOTES 4, 5 AND 6

CIRCUIT DIAGRAM (TRACK MOUNT)
(OPTIONAL INTERNAL
DIODE CONFIGURATION)

Inches	mm	Inches	mm
.001	0.03	.200	5.08
.005	0.13	.270	6.86
.010	0.25	.325	8.26
.020	0.51	.400	10.16
.031	0.79	.500	12.70
.040	1.02	.52	13.2
.062	1.57	.800	20.32
.078	1.98	1.025	26.04
.079	2.01	1.110	28.19
.094	2.39	1.250	31.75
.100	2.54	1.413	35.89
.140	3.56	2.010	51.05

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance are $\pm .010$ (0.25mm) for three place decimals and $\pm .03$ (0.8 mm) for two place decimals.
4. Relay is magnetically latched in both positions.
5. Caution note to observe polarity must appear on relays with dc coils.
6. Terminal numbers shall not appear on the header or on the gasket. There shall be affixed to the relay a suitable legible circuit diagram that identifies each terminal location specified.
7. Enclosure shall be brown 30252 in accordance with FED-STD-595.
8. With voltage applied to terminals X1-XY2 only, the relay contacts shall transfer and remain transferred regardless of whether the coil voltage is maintained beyond the operate time or removed.
9. With voltage applied to terminal Y1-XY2 only, the relay contacts shall transfer back to the condition existing before the voltage was applied to X1-XY2 and shall remain in this "retransferred" condition regardless of whether the coil voltage is maintained beyond the operate time or removed.
10. With the same magnitude and polarity voltage applied to terminals X1-XY2 and Y1-XY2 simultaneously, the relay contacts shall not transfer from the condition existing prior to the application of voltage to both coils.
11. With 20 V dc maximum applied initially to terminals X1-XY2, the subsequent application of 28 V dc minimum to terminals Y1-XY2 (while the voltage is maintained on terminals X1-XY2) shall not cause the relay contacts to transfer from the condition resulting from the application of voltage to terminals X1-XY2 prior to the application of voltage to terminals Y1-XY2. Removal of voltage from terminals X1-XY2 (while voltage is maintained on terminals Y1-XY2) shall cause the relay contact transfer described in note 9.
12. With 20 V dc maximum applied initially to terminals X1-XY2, the subsequent application of 28 V dc minimum to terminals X1-XY2 (while the voltage is maintained on terminals X1-XY2) shall not cause the relay contacts to transfer from the condition resulting from the application of voltage to terminals Y1-XY2 (while the voltage is maintained on terminals X1-XY2) shall cause the contact transfer described in note 8.

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13. 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.
14. To close A1 and B1 contacts (operate/latch) energize X1/XY2 coil. To close A3 and B3 contacts (reset) energize Y1/XY2 coil.
15. Back EMF (transient voltage): 42 V dc maximum.
16. Track mount knob, post, and base shall be 303 Cres nickel plated in accordance with McAir P.S. 13112 or equivalent, 100 microinches thick minimum. The latching pin shall be 300 Cres 13112 or equivalent, 100 microinches thick minimum. The latching pin shall be 300 Cres passivated or nickel plated in accordance with McAir P.S. 13112 or equivalent, 100 microinches thick minimum.
17. Track mount relay shall be capable of mating with M12883/50 Socket configuration III. The latching pin shall be capable of withstanding an axial pull of 35 pounds, in a direction away from the knob, without degradation. The rotation of the knob mechanism shall be restricted such that the latching pins cannot be placed on the side opposite the M12883/50 bracket cutouts.
18. JANTX or equivalent screened semiconductors shall be used for internal coil suppression. Relays using suppression devices shall continue to operate should the suppression circuit be in failure mode. Diodes shall have a peak inverse voltage of 600 V dc minimum.
19. Indicated terminals shall be identified by contrasting beads.
20. 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 AMS 3332 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 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 400 Hz	115 V ac 1 phase 50/60 Hz <u>1/</u>	115/200 V ac 3 phase 400 Hz	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.

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

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.

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 1/ 2/: See table III.

Operate time: 10 milliseconds maximum (each coil), 15 milliseconds maximum (each coil) (track mount) with rated coil voltage over the temperature range.

Duty rating: Continuous.

Coil transient suppression: Applicable (42 V dc maximum for track mount and 5 V dc maximum for all others).

Neutral screen: 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 latch and reset voltage, and timing tests, performed with a M12883/50 bracket placed around the relay housing.

TABLE III. Dash numbers and characteristics. 1/

Dash number 2/		Mount	Coil data						
			At 25°C				Over temperature range	Maximum latch/reset voltage	
Solder hook	Socket pin		Coil voltage (V dc) 3/		Coil current amperes minimum	Specified latch/reset voltage (V dc) 4/	Specified latch/reset voltage (V dc) 4/	High temperature test	Continuous current test
		Rated	Max						
001	002	RVFM	6	7.3	0.22	3.2	4.5	5.0	5.7
003	---	HFM	6	7.3	0.22	3.2	4.5	5.0	5.7
004	005	RVFM	12	14.5	0.11	6.5	9.0	9.9	11.25
006	---	HFM	12	14.5	0.11	6.5	9.0	9.9	11.25
007	008	RVFM	28	29 5/	0.075	14.5	18.0	19.8	22.5
009	---	HFM	28	29 5/	0.075	14.5	18.0	19.8	22.5
---	010	Track	28	29 5/	0.075	14.5	18.0	19.8	22.5
011	012	RVFM	48	50	0.040	24.0	36.0	38.0	42.0
013	---	HFM	48	50	0.040	24.0	36.0	38.0	42.0

- 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 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 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 voltage as shown is for test purposes only and is 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.

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, 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.

Vibration (sinusoidal): Applicable, MIL-STD-202, method 204, 30 g's, except frequency range shall be 10 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 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.

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.

Acceleration: Applicable, except 15 g's.

Physical data:

Dimensions and configurations: See figure 1.

Weight: .090 pound (40.9 grams), 0.120 pound (54.5 grams) track mount.

Terminal strength:

Solder hook terminals:

Pull force:

For .030 diameter terminals: 3 pounds ± 0.3 pound.

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

Bend: Applicable.

Twist: Applicable to coil terminals Y1 and Y2 only.

Solder pin terminals:

Pull force:

For .031 diameter terminals: 3 pounds ± 0.3 pound (applicable to track mount).

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

Bend: Applicable.

Twist: Applicable to coil terminals Y1 and Y2 only.

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

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Socket pin terminals:

Pull force:

For .031 diameter terminals: 3 pounds ± 0.3 pound (applicable to track mount).

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

Bend: Applicable.

Twist: Applicable to coil terminals Y1 and Y2 only.

Terminal solderability: Applicable to solder hook terminals only.

Seal: Hermetic.

Marking: Applicable.

Part or Identifying Number (PIN): M83536/13 (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/}	M83536/13-008	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/}	M83536/13-008	33 units plus 1 open unit for level M at C = 0 ^{2/}
Qualification inspection as applicable	M83536/13-008	Qualification inspection as applicable
	M83536/13-009	2 units, qualification inspection table,
	M83536/13-010	group II, shock, vibration, acceleration, terminal strength, and seal
	M83536/13-002	2 units, qualification inspection table,
	M83536/13-006	group II
	M83536/13-012	

^{1/} For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on MIL-PRF-83536/12 may be used in addition to MIL-PRF-83536/13 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 M83536/13-
M6106/50- 004	007
005	008
006	009
M6106/36- 001	010

Custodian:
Army - CR
Navy - EC
Air Force -11
DLA - CC

Preparing activity:
DLA - CC
(Project 5945-1150)