

INCH-POUND

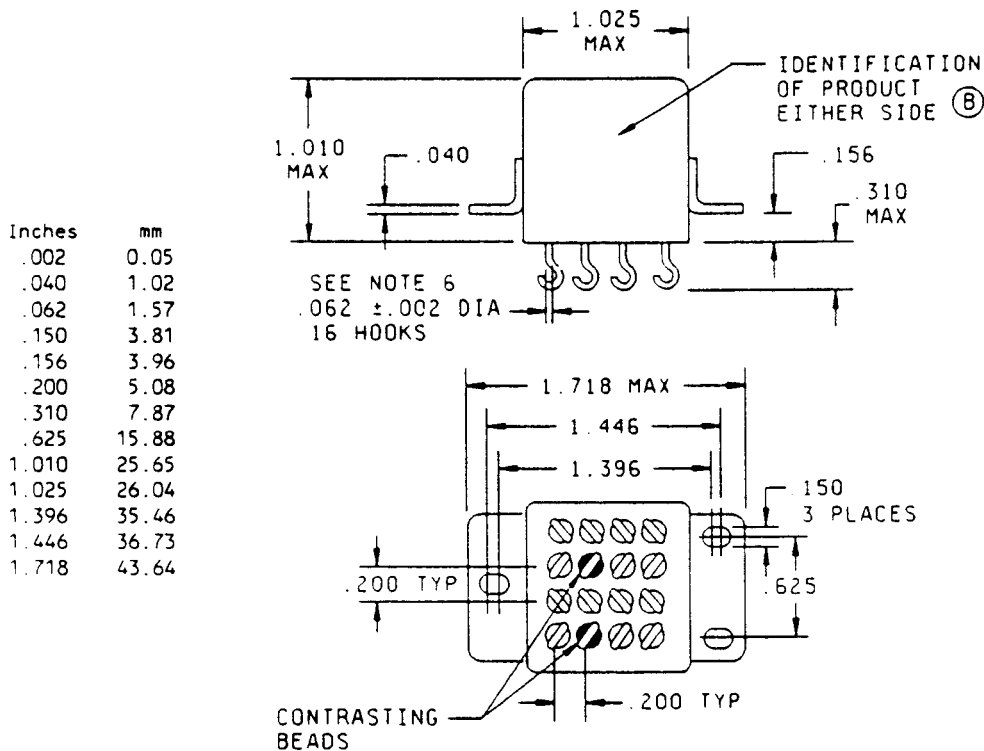
MIL-R-6106/51B
12 July 1993
 SUPERSEDING
 MIL-R-6106/51A
 21 July 1992

MILITARY SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, TYPE I, MAGNETIC LATCH, LOW LEVEL TO 10 AMPERES, 4 PDT,
 HERMETICALLY SEALED

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 issue of the following specification listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation: MIL-R-6106.



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ± 0.010 inch (0.25 mm).
4. There shall be affixed to the relay a legible circuit diagram that identifies each terminal location specified (see figure 4).
5. Relay is magnetically latched in both positions.
6. All hooks shall be tin finished.

FIGURE 1. Raised vertical flange with solder hooks.

(B) denotes changes on this revision

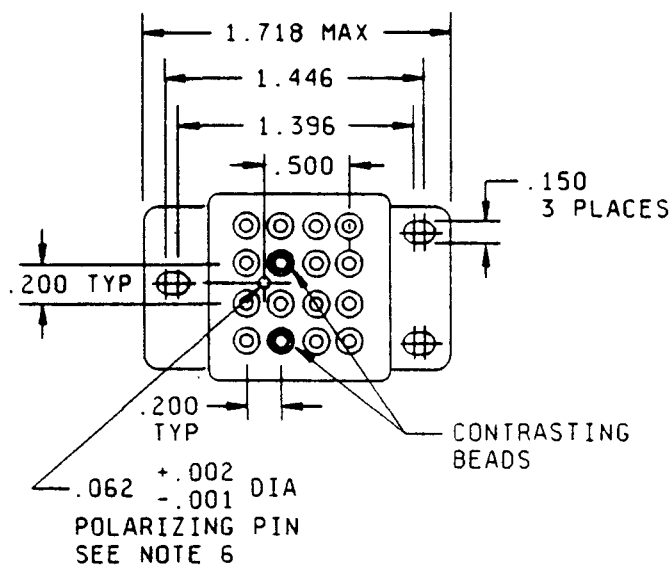
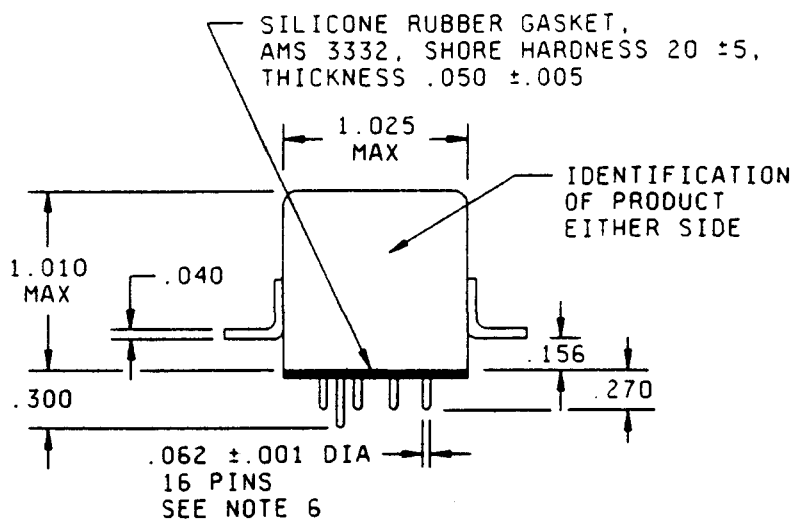
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FSC 5945

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

Inches	mm
.001	0.03
.002	0.05
.005	0.13
.040	1.02
.050	1.27
.062	1.58
.156	3.96
.200	5.08
.270	6.86
.300	7.62
.500	12.7
1.010	25.65
1.025	26.04
1.396	35.46
1.446	36.73
1.718	43.64

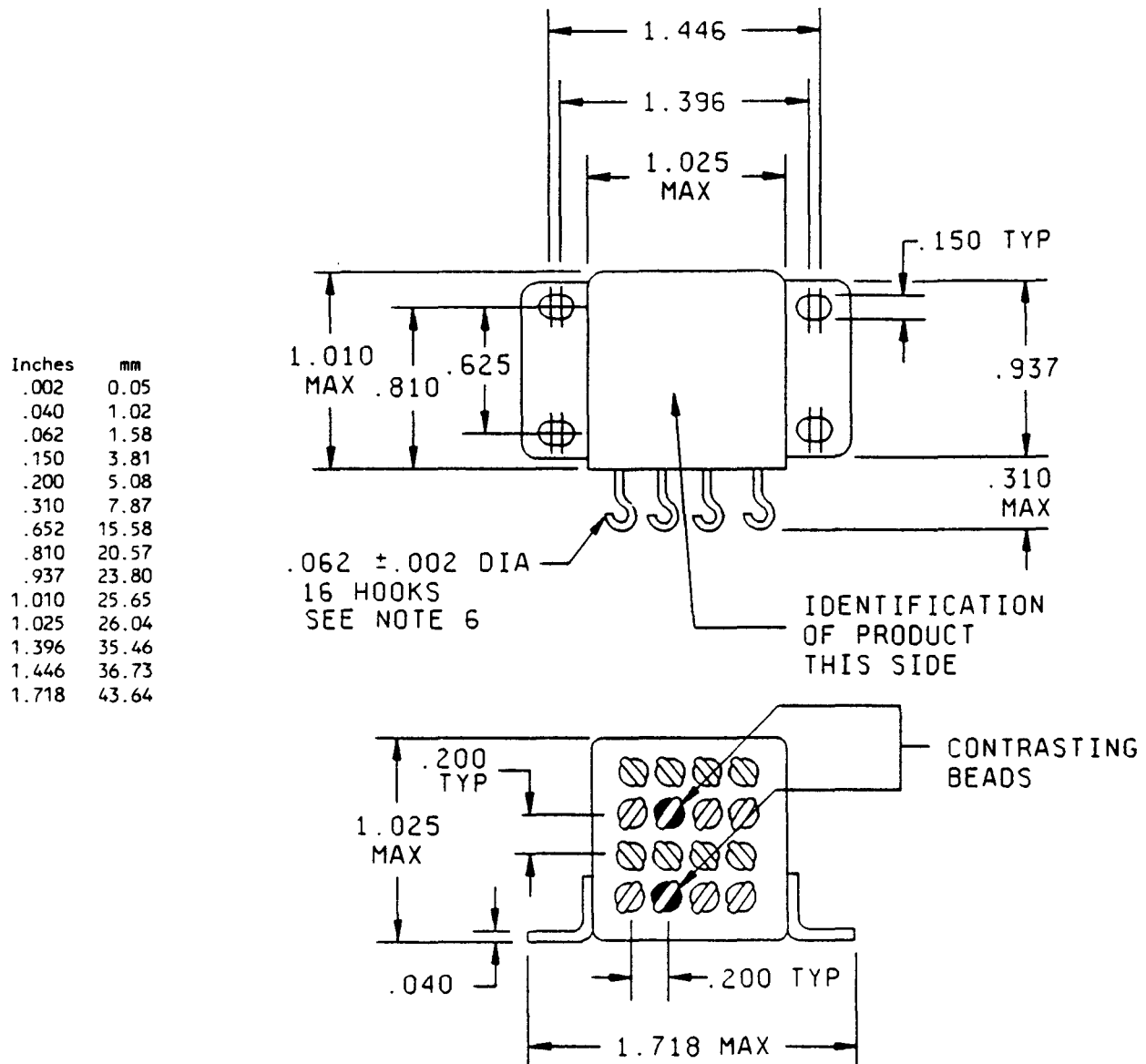


NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is $\pm$.010 inch (0.25 mm).
4. There shall be affixed to the relay a legible circuit diagram that identifies each terminal location specified (see figure 4).
5. Relay is magnetically latched in both positions.
6. Pins shall be gold plated in accordance with MIL-G-45204 type II, class I. Underplating shall be nickel, 50 to 150 microinches thick (gold plating of polarizing pin optional).

(B)

FIGURE 2. Raised vertical flange mount with socket pins.



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is $\pm .010$ inch (0.25 mm).
4. There shall be affixed to the relay a legible circuit diagram that identifies each terminal location specified (see figure 4).
5. Relay is magnetically latched in both positions.
6. All hooks shall be tin finished.

FIGURE 3. Horizontal flange mount with solder hooks.

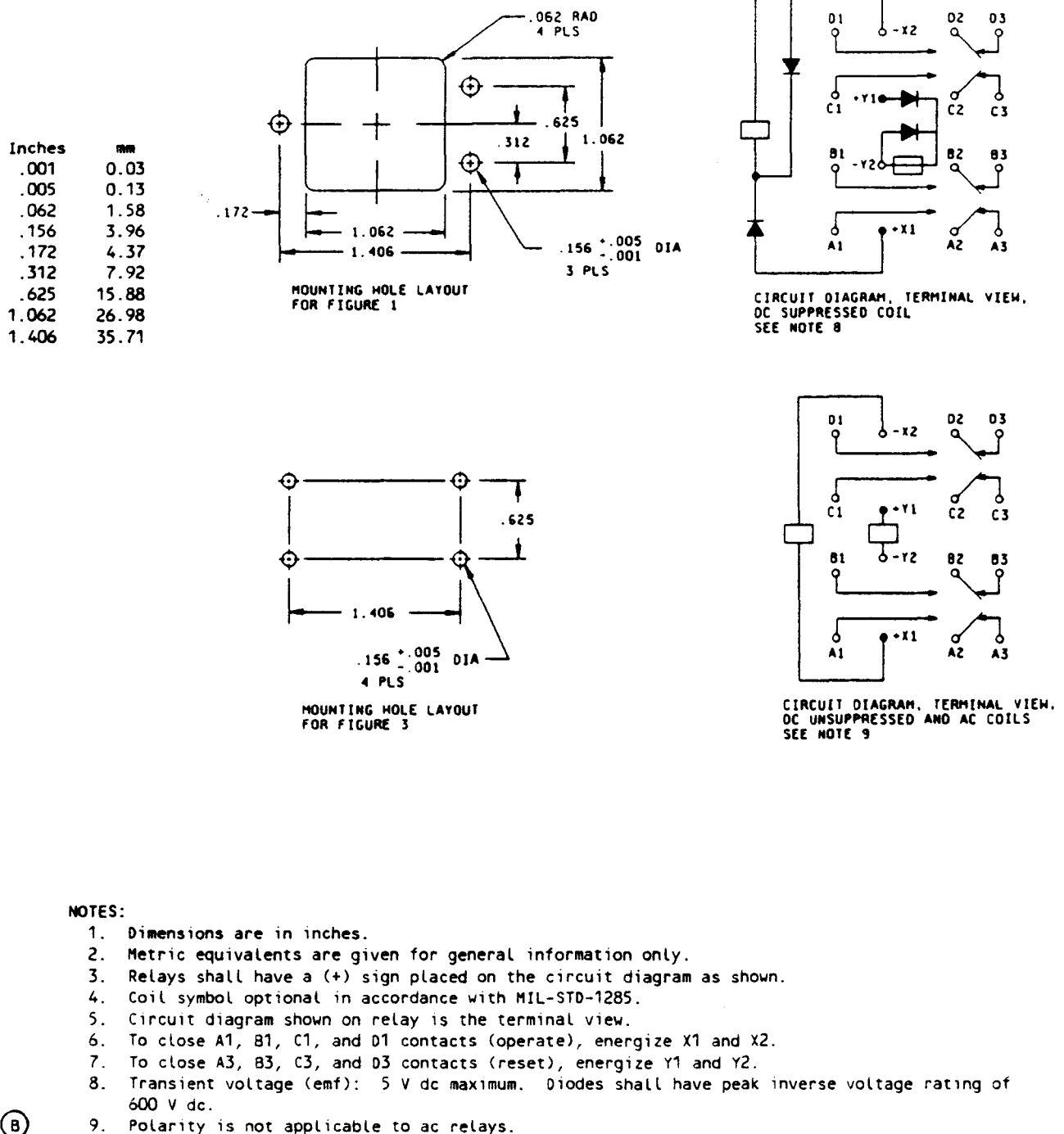


FIGURE 4. Circuit diagrams and mounting hole layouts.

REQUIREMENTS:

CONTACT DATA:

Load ratings:

High level (relay case grounded).

Resistive: 10 A at 28 V dc; 115 V ac, 400 Hz, 1 phase and 3 phase.

Inductive: 8 A at 28 V dc; 115 V ac, 400 Hz, 1 phase and 3 phase (life: 20,000 cycles).

Motor: 4 A at 28 V dc; 115 V ac, 400 Hz, 1 phase and 3 phase.

Lamp: 2 A at 28 V dc; 115 V ac, 400 Hz, 1 phase.

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

- (B) Mechanical life (reduced current): 2.5 A at 28 V dc, 115 V ac, 400 Hz, 1 phase and 3 phase (life: 400,000 cycles).

Intermediate current: Applicable.

Load transfer: Not applicable.

Overload current: 40 A dc, 60 A ac.

Rupture current: 50 A dc, 80 A ac.

Contact voltage drop or resistance: 1/ 2/.

High level:

Initial: 0.150 volt.

After life: 0.175 volt.

Low level: 3/.

Initial: 0.050 Ω maximum.

After life: 0.150 Ω maximum.

Contact bounce: 1.0 ms maximum.

COIL DATA: See table I.

Operate time: 15 ms maximum for dc coils with rated coil voltage.
20 ms maximum for ac coils with rated coil voltage.

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- 1/ The alternate low level test of operational reliability shall be used for group A inspection.
2/ For group A contact voltage drop test, high level testing shall be performed first, followed by low level testing. The contact shall not make or break the high level load.
3/ For low level, the following shall apply:
a. During endurance, contact load shall be 10 μ A to 50 μ A; 10 mV to 50 mV open circuit voltage, 100 ohms maximum contact resistance.
b. Static contact resistance shall be performed at 50 mA maximum, 50 mV maximum.

ELECTRICAL DATA:

Insulation resistance, initial: 100 M Ω .

After life or environmental tests: 50 M Ω .

Dielectric withstanding voltage (sea level):	Initial	After life tests
	V rms (60 Hz)	V rms (60 Hz)
Coil to coil	1,000	1,000
Coil to case	1,000	1,000
All other points	1,250	1,000

Dielectric withstanding voltage (altitude) <u>4/</u>	80,000 ft	300,000 ft
	V rms (60 Hz)	V rms (60 Hz)
Coil to coil	350	500
Coil to case	350	500
All other points	350	500

ENVIRONMENTAL CHARACTERISTICS:

Temperature range: -70°C to +125°C.

Maximum altitude rating: 300,000 ft.

Shock (specified pulse): MIL-STD-202, method 213, test condition C for 6 ± 1 ms. Contact chatter shall not exceed 10 μ s for closed contacts and 1 μ s maximum for open contacts (200 g's except -003, -006, -009 peak shock level shall be 100 g's).

Vibration (sinusoidal): Applicable; frequency range shall be 10 to 3,000 Hz. Contact chatter shall not exceed 10 μ s for closed contacts and 1 μ s maximum for open contacts (30 g's except for -003, -006, -009 peak value shall be 20 g's).

- ⑧ Vibration (random): MIL-STD-202, method 214. Contact chatter shall not exceed 10 μ s maximum for closed contacts and 1 μ s maximum for open contacts.
 Dash numbers -001, -002, -004, -005, -007, -008: Test condition IG, 15 minutes each plane, (0.4 G²/Hz 50 to 2,000 Hz).
 Dash numbers -003, -006, -009: Test condition IE, 15 minutes each plane, (0.2 G²/Hz 50 to 2,000 Hz).

Acceleration: Applicable (15 g's maximum).

PHYSICAL DATA:

Terminal strength:

Solder-hook terminals:

- ⑧ Twist test: Applicable to all terminals.
 Pull force: 10 $\pm$ 1 pounds.

Plug-in terminals:

- ⑧ Bend test: Applicable to all terminals.
 Pull force: 10 $\pm$ 1 pounds.

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

Terminal solderability: Applicable to solder terminals only.

- Ⓑ Dimensions and configuration: See figures 1, 2, and 3.

Weight: 2.72 ounces (77.2 grams) maximum.

Seal: Hermetic; relays are sealed by welding (laser, TIG (tungsten inert gas) or other suitable means as approved by the qualifying activity).

- Ⓑ Identification of product: Applicable.

Construction (internal and external): All welded except coil magnet wire to coil lead wire is soldered.

Identification of product: Applicable.

LIFE TEST REQUIREMENTS:

High level: 100,000 cycles, unless otherwise specified (see contact data).

Low level: 100,000 cycles, unless otherwise specified (see contact data).

Part or Identifying Number (PIN): M6106/51- (plus dash number from table I).

TABLE I. Dash numbers and characteristics. 1/

Dash number	Coil data							Figure Ⓑ	Terminals
	Rated voltage 2/	Maximum voltage	Res. Ω min	Max. coil current (A)	Pickup voltage				
					Normal 3/	High temp. test	Cont. cur- rent test		
M6106/51-									
Unsuppressed									
001	28 V dc	29 V dc	405	.075	18	19.8	22.5	1	Solder hook
002	"	"	"	"	"	"	"	2	Socket pin
003	"	"	"	"	"	"	"	3	Solder hook
Suppressed dc coils 4/ 5/									
004	28 V dc	29 V dc	405	.075	18	19.8	22.5	1	Solder hook
005	"	"	"	"	"	"	"	2	Socket pin
006	"	"	"	"	"	"	"	3	Solder hook
AC coils (400 Hz)									
007	115 V ac	122 V ac	N/A	.04	90	95.4	103.5	1	Solder hook
008	"	"	"	"	"	"	"	2	Socket pin
009	"	"	"	"	"	"	"	3	Solder hook

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/ Caution: Use of any coil voltage less than the rated coil voltage will compromise the operation of the relay.

3/ Pickup voltage over the temperature range (dropout voltage is not applicable to latching relays).

4/ Back emf is 5 V dc maximum.

5/ DC coil resistance is not directly measurable at coil terminals.

TABLE II. Time current relay characteristics at 25°C. 1/ 2/

1	15 A - 1 hour
2	50 A - 5.0 seconds
3	100 A - 1.2 seconds
4	250 A - 0.2 second
5	350 A - 0.1 second

- 1/ Caution: Compare with time current characteristics of the associated circuit protective device.
- 2/ Time-current relay characteristics at +25°C. Relays shall sustain five applications (make and carry only) of power concurrently on adjacent poles at each of five different current levels for the time durations shown in table II. Separate relays shall be tested at 28 V dc and 115/200 V dc, 400 Hz, 3 phase. Cooling time between successive applications shall be 30 minutes. The test shall be performed on both normally open and normally closed contacts of each relay. There shall be no failures or evidence of welding or sticking and relays shall pass contact voltage drop at conclusion.

Qualification by similarity: See table III.

TABLE III. Qualification by similarity. 1/

PIN M6106/51-	Basic qual.		Dynamics						Environmental	
	Loads		Sockets/pins (B)							
	A	B	A	B	C	D	E	F	A	B
	DC	AC	DC	DC	DC	AC	AC	AC	DC	AC
	(400) 2/ 3/	(400) 2/ 3/	fig 1 2/ 3/	fig 2 2/ 3/	fig 3 2/ 3/	(400) 2/ 3/	(400) 2/ 3/	(400) 2/ 3/		(400) 2/ 4/ 5/
001	4		2						4	
002	4			2					4	
003	4				2				4	
004	1,2,3		1						1,2,3	
005	1,2,3			1					1,2,3	
006	1,2,3				1				1,2,3	
007		1,2,3				1,2				1,2,3
008		1,2,3					1,2			1,2,3
009		1,2,3						1,2		1,2,3

- 1/ See MIL-R-6106 for guidelines for determining how relays are to be grouped and ranked within each subgroup.
- 2/ Coils (dc suppressed and ac networks). Discretes qualify only discretes. Hybrids qualify only hybrids. DC standard coils can be qualified by suppressed coils.
- 3/ Terminals: Socket pin type terminals are considered worst case. Solder hooks may be qualified by similarity.
- 4/ Socket pins (with gasket seals), are considered nonsimilar to solder hooks and each must be tested.
- 5/ Electromagnetic interference (emi) test must be performed on each type of ac network.

Supersession data: See table IV.

TABLE IV. Supersession data.

Superseded PIN MS27745-	New PIN M6106/51-
1	001
2	002
3	007
4	008
5	005
6	003
7	009
8	006

CONCLUDING MATERIAL

Custodians:

Army - ER
Navy - AS
Air Force - 85

Review activities:

Navy - EC
Air Force - 99
DLA - ES

Preparing activity:

Air Force - 85

Agent:

DLA - ES

(Project 5945-0901-02)