

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NOTES:

1. GENERAL REQUIREMENTS:

- INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
- THIS UNIT SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-R-5757 WITH THE EXCEPTIONS AND ADDITIONS SPECIFIED HEREIN.
- THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 2.
- THIS UNIT SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND 1002046 UNLESS OTHERWISE SPECIFIED HEREIN. ELECTRICAL REQUIREMENTS CONTAINED HEREIN SHALL TAKE PRECEDENCE OVER THOSE LISTED IN ND 1002046.
- THE CLASSIFICATION OF THIS RELAY SHALL BE LOW-LEVEL AS STATED IN THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
- PREPARATION FOR DELIVERY: PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND 1002215, CLASS I, CODE 1.

2. ACCEPTANCE AND INSPECTION:

- SAMPLING: UNLESS OTHERWISE SPECIFIED, SAMPLING FOR ALL REQUIREMENTS UNDER ACCEPTANCE AND INSPECTION SHALL BE IN ACCORDANCE WITH MIL-STD-105, LEVEL I, AQL OF 4.0 PERCENT.

B. MECHANICAL REQUIREMENTS:

- LEAD MATERIAL: LEAD MATERIAL SHALL BE PER TABLE I

A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT. THE COMPONENT LEAD SHALL BE UNIFORM IN QUALITY AND TEMPER, CLEAN, SOUND, SMOOTH, AND FREE FROM INJURIOUS FOREIGN MATERIAL, SCRAPS, COLD SHOTS, LAPS, CRACKS, TWISTS, SCALE, DAMAGED ENDS, WELDS, SCORES, PITS, GALLS, AND OTHER DEFECTS WHICH ARE NOT IN ACCORDANCE WITH THE BEST PRACTICE. LEADS SHALL HAVE NO BENDS WITHIN .06 OF HEADER SEAL.

(2) MARKING:

- UNITS SHALL BE MARKED IN ACCORDANCE WITH ND 1002019 WITH THE FOLLOWING: NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER; DATE CODE (SHALL CONSIST OF A FOUR DIGIT NUMBER, THE FIRST TWO DIGITS OF WHICH SHALL BE THE LAST TWO DIGITS OF THE YEAR, AND THE SECOND TWO DIGITS SHALL BE THE NUMBER OF THE WEEK OF THE YEAR); DC COIL RESISTANCE AT 25 DEGREES CENTIGRADE; MUST OPERATE CURRENT, MAXIMUM; SCHEMATIC DIAGRAM; BLUE BEADING AROUND TERMINAL 1.
- INTERMEDIATE AND EXTERIOR PACKAGING AND PACKING SHALL BE MARKED IN ACCORDANCE WITH MIL-STD-129, BOTH INTERNALLY AND EXTERNALLY WITH THE NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER, SUPPLIER'S NAME, LOT NUMBER, AND DATE OF MANUFACTURE.

- DIMENSIONS: DIMENSIONS SHALL BE AS SPECIFIED HEREIN. LEADS SHALL BE SYMMETRICALLY POSITIONED WITH RESPECT TO ϕ OF HEADER WITHIN .010 INCH.

- SEAL: UNITS SHALL BE HERMETICALLY SEALED. SEAL TEST III (EXCEPT 10^{-8} CC/SEC) PER MIL-R-5757 SHALL BE PERFORMED ON 100 PERCENT OF UNITS PROCURED.

C. ELECTRICAL REQUIREMENTS:

- COIL CURRENT: PULL-IN AND DROP-OUT IN ACCORDANCE WITH TABLE I.
- COIL RESISTANCE: IN ACCORDANCE WITH TABLE I.
- CONTACT RESISTANCE: SHALL BE 1.0 OHM MAXIMUM WHEN MEASURED WITH 100 MILLIAMPERES FROM A 6 VDC OPEN CIRCUIT VOLTAGE (CONTACTS SHALL NOT SWITCH THE MEASURING LOAD). 100 PERCENT OF UNITS PROCURED SHALL BE INSPECTED FOR THIS CHARACTERISTIC.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

(4) DIELECTRIC STRENGTH:

- AT SEA LEVEL: 1000 VOLTS DC MINIMUM FOR 5 SECONDS MINIMUM WITHOUT DAMAGE, ARCING OR BREAKDOWN BETWEEN EACH SWITCHING CIRCUIT AND OTHER CIRCUITS, THE COIL AND THE FRAME. 500 VOLTS DC MINIMUM FOR 5 SECONDS MINIMUM BETWEEN OPEN CONTACTS.

- INSULATION RESISTANCE: 1000 MEGOHMS MINIMUM AT 500 VOLTS DC BETWEEN MUTUALLY INSULATED TERMINALS, OPEN SWITCHING CONTACTS ENERGIZED OR NOT, COIL AND CASE AT PLUS 25 DEGREES CENTIGRADE (500 MEGOHMS AT 125 DEGREES CENTIGRADE), CONTACTS AND FRAME.

- OPERATE AND RELEASE TIME: EACH 7 MILLISECONDS MAXIMUM AT SUGGESTED SOURCE VOLTAGE OF TABLE I, WHEN TESTED PER THE APPLICABLE CIRCUIT OF MIL-R-5757.

- TRANSFER TIME: 1.0 MILLISECOND MAXIMUM.

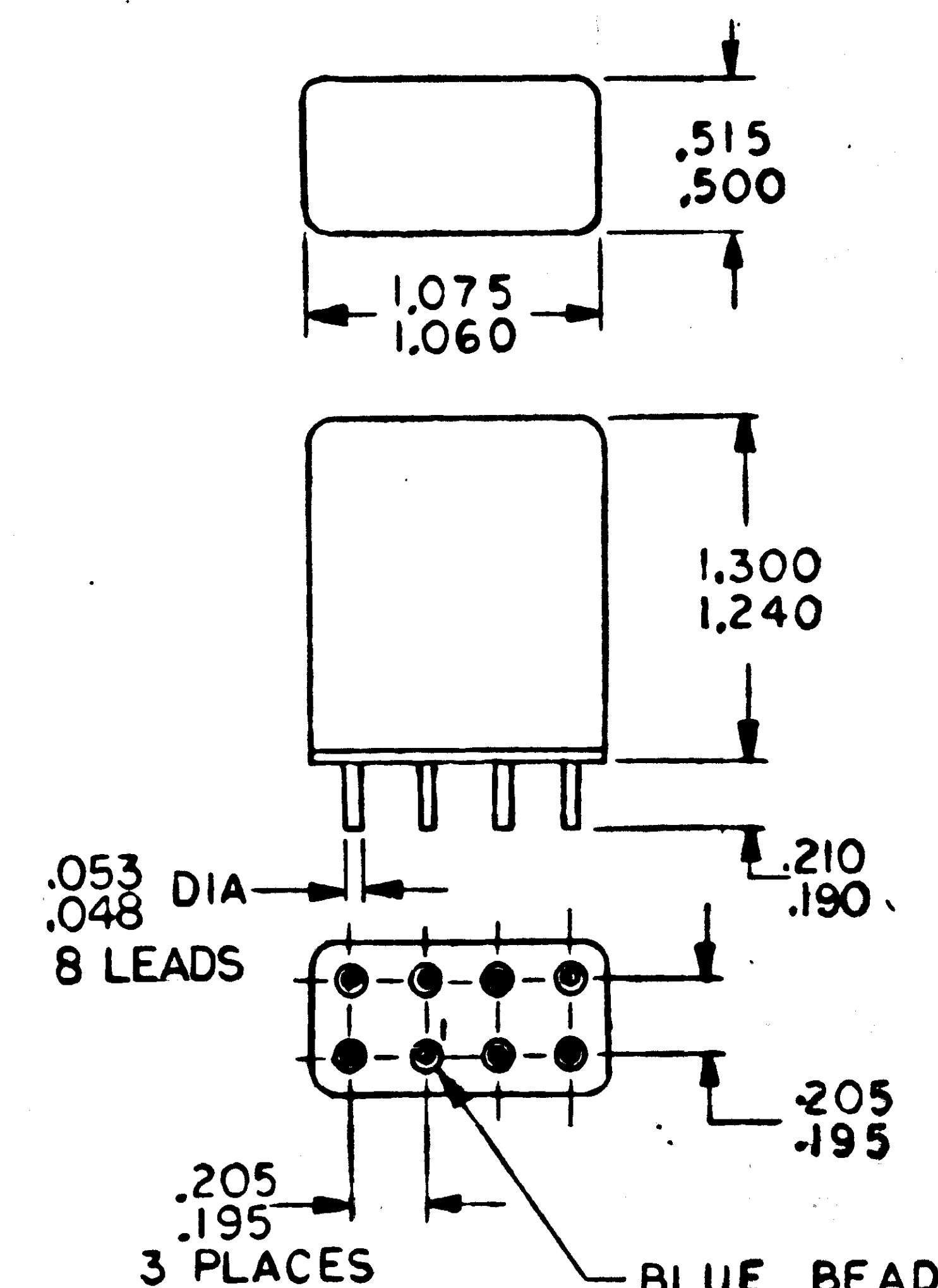
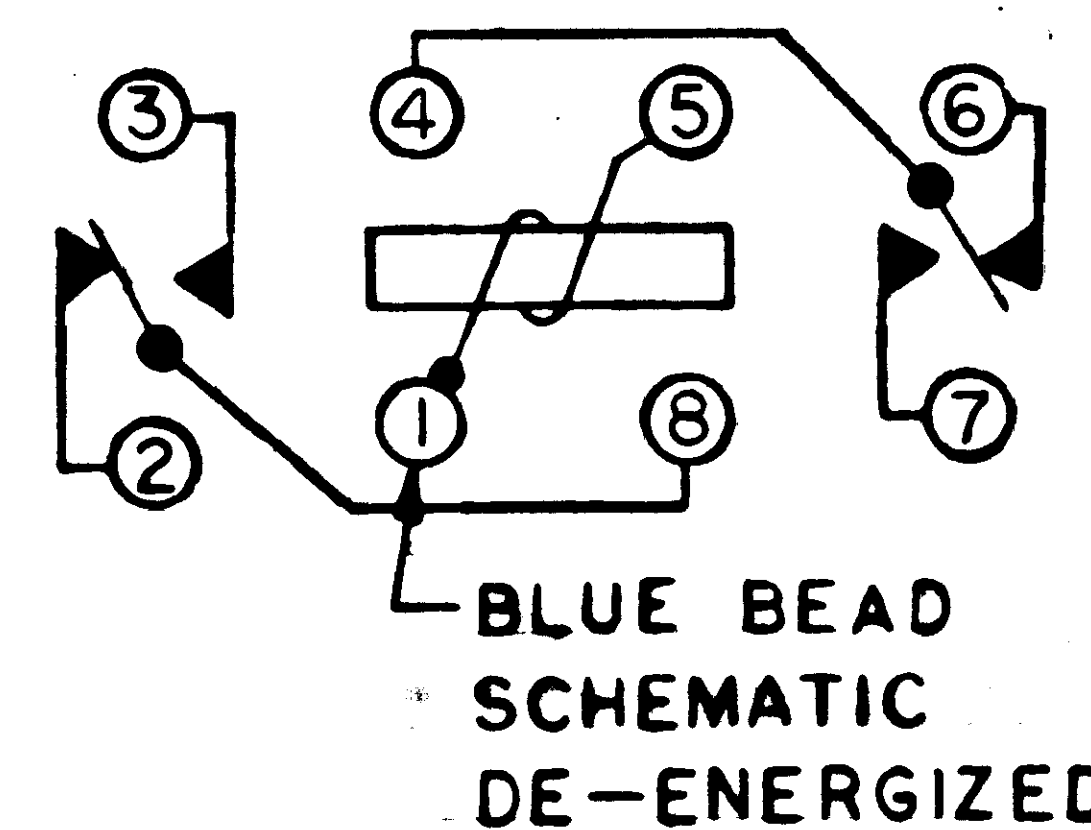
- CONTACT BOUNCE: 2.0 MILLISECOND MAXIMUM.

- CONTACT CHATTER: 10.0 MICROSECONDS MAXIMUM DURING VIBRATION AND SHOCK AS SPECIFIED IN ND 1002046.

D. VENDOR SUPPLIED DATA: EACH SHIPMENT OF PARTS SHALL BE ACCOMPANIED BY THE FOLLOWING DOCUMENTATION.

- CERTIFICATE OF ANALYSIS FOR LEAD MATERIAL
- CERTIFICATE OF COMPLIANCE TO ND 1015404, CLASS 2.
- CERTIFICATE OF COMPLIANCE WITH 100% MISS TEST.
- CERTIFIED TEST DATA (FOR EACH RELAY) OF MISS TEST.

FOR REFERENCE ONLY



-001 CONFIGURATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON		
FRACTIONS	DECIMALS	ANGLES
±	±	±
DO NOT SCALE THIS DRAWING		
MATERIAL		
SEE NOTE		
HEAT TREATMENT		
FINAL FINISH		
NEXT ASSY	USED ON	
APPLICATION		

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.		MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
DRAWN <i>[Signature]</i> DATE <i>9/11/65</i> CHECKED <i>R.T. Dromm</i> 9/11/65		RELAY, ARMATURE (13 AMP) SPECIFICATION CONTROL DRAWING	
APPROVAL <i>[Signature]</i> 11/11/65		CODE IDENT NO. 80230 SIZE C NASA DRAWING NO. 1006304	
NASA APPROVAL <i>[Signature]</i> 11/11/65		SCALE NONE WT	
MIT APPROVAL <i>[Signature]</i> 11/11/65		SHEET 1 OF 2	

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NOTES (CONTINUED)

3. DESIGN REQUIREMENTS:

A. ELECTRICAL RATINGS:

- (1) COIL VOLTAGE (SUGGESTED SOURCE): IN ACCORDANCE WITH TABLE I.
- (2) COIL POWER: 2.2 WATTS MAXIMUM AT PLUS 25 DEGREES CENTIGRADE DERATED TO 1.4 WATT AT PLUS 125 DEGREES CENTIGRADE.
- (3) CONTACT RATING (PER POLE): 13 AMPERES AT 3 VOLTS DC OR 10 AMPERE AT 115 VOLTS RMS, 60 OR 400 CPS, WITH RESISTIVE LOAD.
- (4) CONTINUOUS COIL CURRENT, MAXIMUM: IN ACCORDANCE WITH TABLE I.
- (5) CONTACTS SHALL BE CAPABLE OF SWITCHING DRY-CIRCUIT CONDITIONS WITH THE STIPULATION THAT NO LOAD GREATER THAN 100 MILLIAMPERES HAD BEEN SWITCHED PRIOR TO DRY-CIRCUIT LOAD.
- (6) LEAD STRENGTH: UNITS SHALL WITHSTAND AN AXIAL PULL OF 3 POUNDS MIN.
- (7) COIL PULL-IN POWER (SENSITIVITY) IN ACCORDANCE WITH TABLE I.
- (8) DIELECTRIC STRENGTH:
 - (a) AT 70,000 FEET: 300 VOLTS DC MINIMUM FOR 5 SECONDS MINIMUM WITHOUT DAMAGE, ARCING, OR BREAKDOWN BETWEEN EACH SWITCHING CIRCUIT AND ALL OTHER CONNECTIONS INCLUDING THE FRAME.

B. CONSTRUCTION:

- (1) CONTACT FORM AND SWITCHING ACTION: 2 FORM C CONTACTS (BREAK BEFORE MAKE) DOUBLE POLE, DOUBLE THROW.
- (2) CONTACT MATERIAL: SILVER-MAGNESIUM-NICKEL ALLOY, GOLD PLATED.
- (3) CASE MATERIAL: CUPRO NICKEL

C. QUALIFICATION REQUIREMENTS:

- (1) LIFE: LIFE OF THIS UNIT SHALL BE 100,000 CYCLES MINIMUM WHEN TESTED PER ND 1002046. FOR THE LIFE TESTS, THE CLASSIFICATION OF THIS RELAY MAY BE GENERAL PURPOSE OR LOW-LEVEL WITH THE STIPULATION AS STATED UNDER CONTACT RATING.

D. ENVIRONMENTAL REQUIREMENTS:

- (1) HUMIDITY (MOISTURE RESISTANCE): UNITS SHALL BE CAPABLE OF WITHSTANDING RELATIVE HUMIDITY UP TO 100 PERCENT.
- (2) OPERATING TEMPERATURE RANGE: UNITS SHALL BE CAPABLE OF OPERATING WITHIN THE ELECTRICAL REQUIREMENTS OF THIS SPECIFICATION WHEN EXPOSED TO AMBIENT TEMPERATURES FROM MINUS 65 DEGREES CENTIGRADE TO PLUS 125 DEGREES CENTIGRADE.
- (3) THERMAL SHOCK: UNITS SHALL BE CAPABLE OF WITHSTANDING THERMAL SHOCK FROM MINUS 65 DEGREES CENTIGRADE TO PLUS 125 DEGREES CENTIGRADE.
- (4) THE SALT SPRAY TEST PER MIL-R-5757 IS NOT APPLICABLE.

4. SPECIAL CONDITIONING:

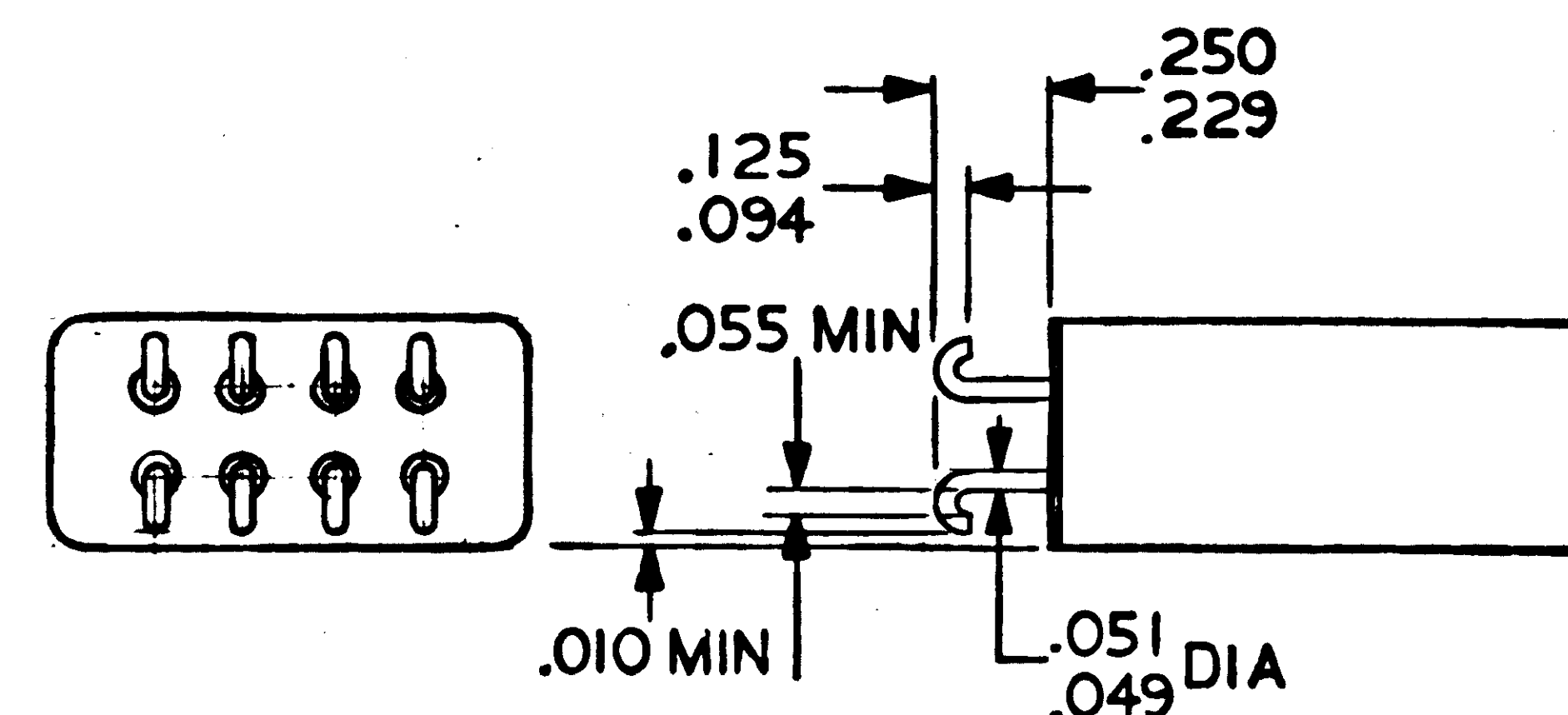
A. THE MANUFACTURER SHALL SUBJECT EACH RELAY TO THE MISS TEST AS FOLLOWS:

- (1) LOAD SHALL BE 20 MICROAMPERES MAXIMUM (RESISTIVE) AT 20 MILLI-VOLTS MAXIMUM OPEN CIRCUIT VOLTAGE.
- (2) TEST SPEED SHALL BE 5 CYCLES, OR LESS, PER SECOND.
- (3) EACH RELAY SHALL OPERATE FOR 5,000 CYCLES.
- (4) EACH RELAY SHALL BE MONITORED FOR OPENS, SHORTS AND CONTACT RESISTANCE WHICH SHALL NOT EXCEED 1000 OHMS.
- (5) OCCURANCE OF ANY OF THESE EVENTS SHALL CONSTITUTE A MISS AND SHALL BE CAUSE FOR REJECTION OF RELAY.

- (6) CONTACT RESISTANCE AND MAXIMUM PULL-IN CURRENT, SHALL BE MEASURED BY THE MANUFACTURER AFTER THE 5,000 CYCLE TEST AND JUST PRIOR TO SHIPMENT. CERTIFICATION OF THESE MEASUREMENTS SHALL ACCOMPANY EACH SHIPMENT. ONE COPY OF A TABULATION, SHOWING THE NUMBER OF RELAYS SUBJECTED TO THE 5,000 CYCLE TEST, THE NUMBER OF RELAYS FAILING THE 5,000 CYCLE TEST AND THE TIME (OR CYCLE) OF FAILURE SHALL ACCOMPANY EACH SHIPMENT.
- (7) TEST READINGS FOR REQUIREMENTS SPECIFIED IN NOTES 2C1, 3, 6, 7, 8 FOR EACH RELAY TAKEN BEFORE AND AFTER MISS TEST SHALL BE SUBMITTED WITH EACH LOT.

TABLE I

DASH NO.	COIL RESISTANCE OHMS @ 25°C MIN - MAX	PULL-IN CURRENT MADC MAX POSITIVE	CONTINUOUS CURRENT @ 125°C MADC MAX	SUGGESTED SOURCE VOLTAGE VDC	OPERATE SENSITIVITY MW NOM.	DROP-OUT CURRENT MADC MIN POSITIVE	LEAD MATERIAL
-001	65 ± 10%	88.0	176	12.0	500	8.8	DUMET PER PS1015401
-002	65±10%	88.0	176	12.0	500	8.8	CORE: COPPER 22% OF TOTAL VOLUME. SLEEVE: NICKEL-42%, CHROME-6%, IRON-52%



-002 LEAD CONFIGURATION

MASTER

1006304

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 15506	1/18/65	WK
A	REVISED PER TDRR 19725	8/24/65	WK

QTY REQ	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.		MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
DRAWN <i>R. Thompson</i> DATE <i>11/18/64</i> CHECKED <i>R.T. Donahue</i> 9 NOV 64		RELAY, ARMATURE (13 AMP) SPECIFICATION CONTROL DRAWING	
APPROVAL <i>Edmund Hall</i> 11/18/64		CODE IDENT NO. 80230 SIZE C	
NASA APPROVAL <i>W. J. Hall</i> 11/18/64		NASA DRAWING NO. 1006304	
MIT APPROVAL <i>W. J. Hall</i> 11/18/64		SCALE NONE WT	
MIT APPROVAL <i>W. J. Hall</i> 11/18/64		SHEET 2 OF 2	