

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 FOR 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 THEREBY.

C 2829001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 13248	10-24-64	W.K.
A	REVISED PER TDRR 15734	1/24/65	W.K.
B	REVISED PER TDRR 17819	12/14/65	W.K.
C	REVISED PER TDRR 24588	12/14/65	W.K.

REQUIREMENTS:

1. GENERAL:

- A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
- B. THIS UNIT SHALL MEET THE APPLICABLE REQUIREMENTS OF MIL-R-5757 WITH THE EXCEPTIONS AND ADDITIONS SPECIFIED HEREIN.
- C. THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 2.
- D. THIS UNIT SHALL BE CAPABLE OF MEETING 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 EXCEPT AS STATED IN THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.

E. MARKING:

- (1) UNITS SHALL BE MARKED IN ACCORDANCE WITH ND 1002019 WITH THE FOLLOWING:
 - NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER.
 - 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 TERMINALS 1 AND 9 OR A RED DOT BETWEEN TERMINALS 2 AND 3.
- (2) UNIT PACKAGES AND SHIPPING CONTAINERS SHALL BE MARKED IN ACCORDANCE WITH MIL-STD-129, BOTH INTERNALLY AND EXTERNALLY WITH THE NASA DRAWING NUMBER, REVISION LETTER AND DASH NUMBER, SUPPLIERS NAME, LOT NUMBER OR CODE, AND DATE OF MANUFACTURE.

2. ACCEPTANCE AND INSPECTION:

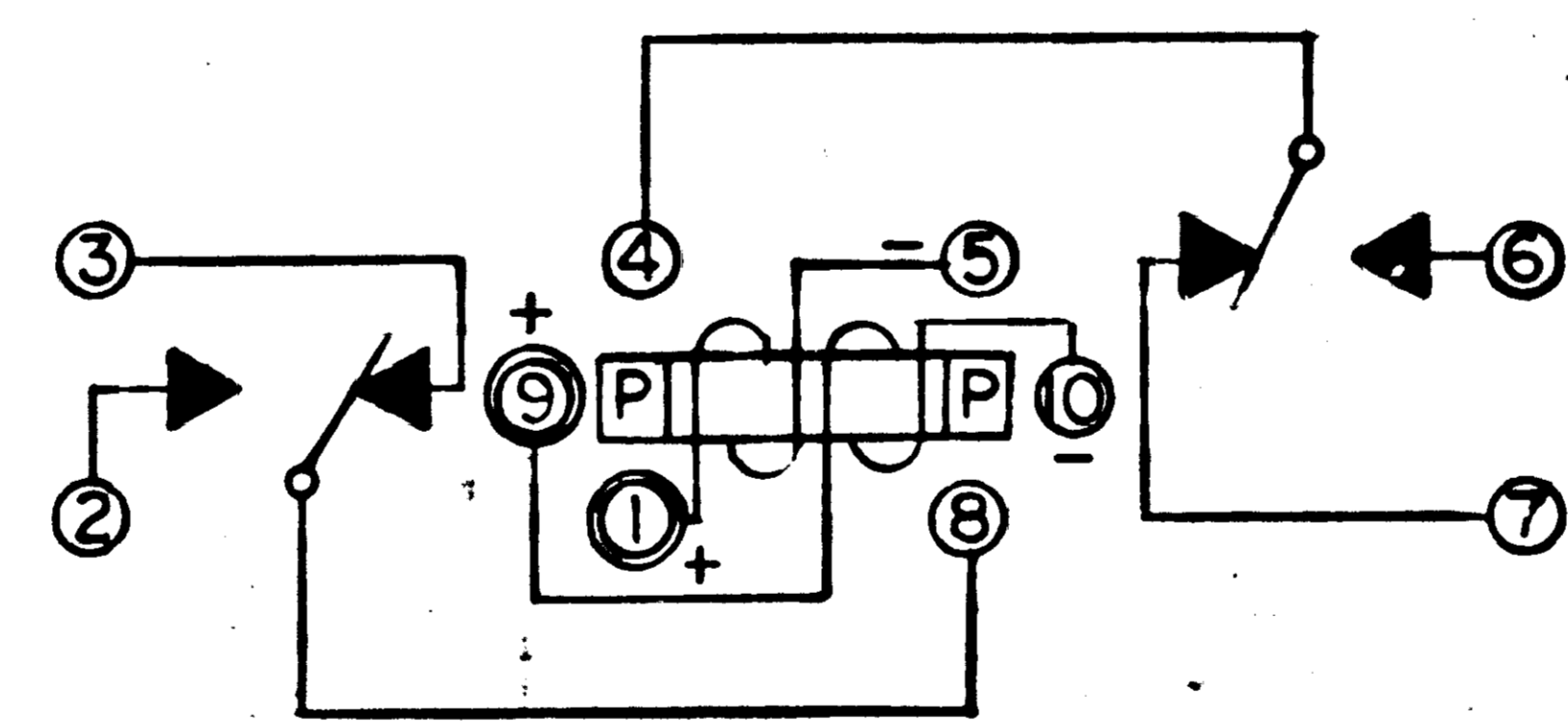
- A. SAMPLING: UNLESS OTHERWISE SPECIFIED, SAMPLING FOR ALL REQUIREMENTS UNDER ACCEPTANCE AND INSPECTION SHALL BE IN ACCORDANCE WITH MIL-STD-105, LEVEL I, AQL OF 4.0 PERCENT.
- B. MECHANICAL REQUIREMENTS:
 - (1) MATERIAL CERTIFICATION: A CERTIFICATE OF COMPLIANCE WITH MATERIAL REQUIREMENTS SHALL ACCOMPANY EACH SHIPMENT.
 - (2) DIMENSIONS: DIMENSIONS SHALL BE AS SPECIFIED HEREIN.
 - (3) MARKING: PER NOTE 1.E.
 - (4) LEAK RATE: UNITS SHALL BE DEGASSED, BACK FILLED TO ONE ATMOSPHERE PRESSURE (ABSOLUTE) WITH DRY NITROGEN (90%) AND HELIUM (10%) GASES, AND HERMETICALLY SEALED. 100 PERCENT OF THE UNITS SHALL BE TESTED PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE IV. THE LEAK RATE SHALL BE LESS THAN 10^{-8} CUBIC CENTIMETERS/SECOND AT 1 ATMOSPHERE PRESSURE DIFFERENTIAL.
 - (5) LEAD STRENGTH: UNITS SHALL WITHSTAND AN AXIAL PULL OF 3 POUNDS MINIMUM.

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

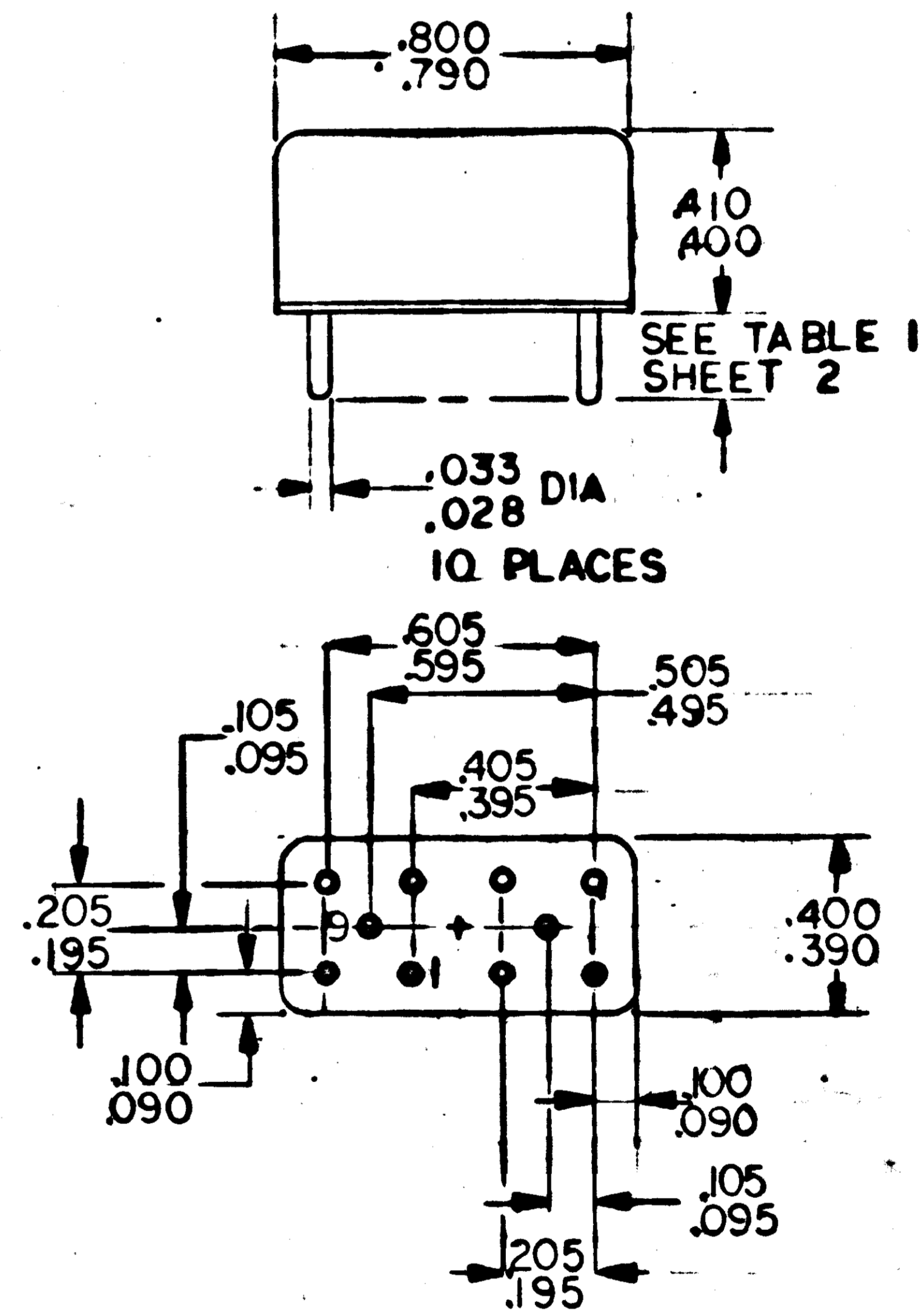
C. ELECTRICAL REQUIREMENTS:

- (1) COIL VOLTAGE : MUST LATCH (EITHER DIRECTION) IN ACCORDANCE WITH TABLE I.
- (2) COIL RESISTANCE: IN ACCORDANCE WITH TABLE I.
- (3) 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.
- (4) DIELECTRIC STRENGTH:
 - (a) AT SEA LEVEL: 1000 VOLTS RMS MINIMUM FOR 5 SECONDS MINIMUM WITHOUT DAMAGE, ARCING OR BREAKDOWN BETWEEN EACH SWITCHING CIRCUIT AND OTHER CIRCUITS. 500 VOLTS RMS MINIMUM FOR 5 SECONDS MINIMUM BETWEEN OPEN CONTACTS AND BETWEEN COILS AND BETWEEN COILS AND FRAME.
- (5) INSULATION RESISTANCE: 1,000 MEGOHMS MINIMUM AT 500 VOLTS DC BETWEEN MUTUALLY INSULATED TERMINALS. OPEN SWITCHING CONTACTS ENERGIZED OR NOT, COIL AND CASE AT PLUS 25 DEGREES CENTIGRADE (1000 MEGOHMS AT 125 DEGREES CENTIGRADE), CONTACTS AND FRAME.
- (6) OPERATE TIME, BOTH DIRECTIONS: EACH 10 MILLISECONDS MAXIMUM UNDER ALL CONDITIONS SPECIFIED IN TABLE 1
- (7) TRANSFER TIME: 1.0 MILLISECOND MAXIMUM.
- (8) CONTACT BOUNCE: 2.0 MILLISECONDS MAXIMUM.
- (9) CONTACT CHATTER: 10.0 MICROSECONDS MAXIMUM DURING VIBRATION AND SHOCK AS SPECIFIED IN ND 1002046.

SCHEMATIC AND PIN LAYOUT (FOR REFERENCE ONLY)



+ VOLTAGE ON 1 OR 9 CLOSES SWITCH AS SHOWN



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		
TOLERANCES ON FRACTIONS	DECIMALS	ANGLES
±	±	±
DO NOT SCALE THIS DRAWING		
MATERIAL SEE NOTES		
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>[Date]</i>		RELAY, ARMATURE, MAGNETIC LATCHING	
CHECKED <i>[Signature]</i>		SPECIFICATION CONTROL DRAWING	
APPROVAL <i>[Signature]</i>		CODE IDENT NO. SIZE	NASA DRAWING NO.
NASA APPROVAL <i>[Signature]</i>		80230 C	1006282
MIT APPROVAL <i>[Signature]</i>		SCALE NONE WT	SHEET 1 OF 2
MIT APPROVAL <i>[Signature]</i>			

1006282

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 13248	10-6-64	WJK
A	REVISED PER TDRR 15734	2/2/65	WJK
B	REVISED PER TDRR 17819	6/24/65	WJK
C	REVISED PER TDRR 24588	11/14/66	WJK

NOTES (CONTINUED)

3. DESIGN:

A. ELECTRICAL RATINGS:

- (1) COIL VOLTAGE (SUGGESTED SOURCE): IN ACCORDANCE WITH TABLE I.
- (2) COIL CURRENT, MAX CONTINUOUS: IN ACCORDANCE WITH TABLE I.
- (3) MAXIMUM COIL POWER: 0.60 WATTS MAXIMUM PER COIL AT PLUS 25 DEGREES CENTIGRADE DERATED TO 0.25 WATTS PER COIL AT PLUS 125 DEGREES CENTIGRADE.
- (4) SEE TABLE II

- (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) OCCURRENCE OF ANY OF THESE EVENTS SHALL CONSTITUTE A MISS AND SHALL BE CAUSE FOR REJECTION OF RELAY.
- (6) 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 BURN-IN SHALL BE SUBMITTED WITH EACH LOT.

TABLE I

COIL PARAMETERS					
DASH NO.	NORMAL RATED COIL VOLTAGE VOLTS D.C.	LATCHING VOLTAGE (VOLTS D.C.)		COIL RESISTANCE RANGE AT +25°C (OHMS)	LEAD LENGTH MAX/MIN
		MAX OVER TEMP RANGE PER NOTE 3-D-2	MIN (OVER AMBIENT TEMP RANGE)		
-1	12	10	2.0	170 TO 235	.210/.190
-2	26	18	5.0	765 TO 990	.210/.190

- (5) COIL PULL-IN POWER (SENSITIVITY): IN ACCORDANCE WITH TABLE I.
- (6) DIELECTRIC STRENGTH (AT 70,000 FEET): 450 VOLTS RMS 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, POLARIZED WITH MAGNETIC LATCHING ACTION.
- (2) CONTACT MATERIAL: APPLICABLE FOR RATED LOAD.
- (3) LEAD MATERIAL: LEAD MATERIAL SHALL BE GOLD PLATED IRON-NICKEL ALLOY (DUMET) IN ACCORDANCE WITH PS 1015401.
- (4) CASE: ALL-WELDED CONNECTIONS WITH A HERMETICALLY SEALED CASE. CASE MATERIAL SHALL BE CUPRO-NICKEL.

TABLE II

LOAD VOLTAGE	28 VDC		115V RMS, 60CPS		115V RMS, 400CPS		115/200 V RMS, 60CPS		115/200V RMS, 400CPS		SEE NOTE 2 SHEET 2
COIL VOLTAGE	NORMAL	PULL-IN	NORMAL	PULL-IN	NORMAL	PULL-IN	NORMAL	PULL-IN	NORMAL	PULL-IN	
RESISTIVE	2.0	2.0	1.0	0.6	1.0	1.0	0.5	0.3	0.75	0.5	
INDUCTIVE	0.5	0.5	0.5	0.5	0.75	0.5	0.5	0.25	0.75	0.25	SEE NOTE 1 SHEET 2
LAMP	0.5	0.5	0.5	0.2	0.5	0.2 (0.5 ³)	0.3	0.2	0.3	0.2	
MINIMUM	0.1	0.1	-	-	-	-	-	-	-	-	

* 5V RMS, 400 CPS

NOTE 1. INDUCTIVE LOAD LIMITED TO $\frac{L}{R} \leq .008 \text{ SEC } W_L = 100 \text{ MILLI JOULES POWER FACTOR } 50\% \text{ FOR A.C.}$

NOTE 2. ALL AC RATINGS ARE GIVEN FOR UNGROUNDED CASE ONLY.

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 98 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 MILLIVOLTS MAXIMUM OPEN CIRCUIT VOLTAGE.
- (2) TEST SPEED SHALL BE 5 CYCLES, OR LESS, PER SECOND.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWS. NO. CONTRACT		MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
DRAWN <i>[Signature]</i> CHECKED <i>[Signature]</i> APPROVAL <i>[Signature]</i>		RELAY, ARMATURE, MAGNETIC LATCHING SPECIFICATION CONTROL DRAWING	
DO NOT SCALE THIS DRAWING MATERIAL		SEE NOTES	
HEAT TREATMENT		NASA APPROVAL <i>[Signature]</i> MIT APPROVAL <i>[Signature]</i> MIT APPROVAL <i>[Signature]</i>	
FINAL FINISH		CODE IDENT NO. SIZE	NASA DRAWING NO.
NEXT ASSY USED ON APPLICATION		80230 C	1006282
		SCALE NONE WT	SHEET 2 OF 2