

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 SUPPORTED 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 CONFERRING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1006715

REVISIONS 03038

SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 03038	12/6/63	WJK
A	REVISED PER TDRR 04399		WJK
B	REVISED PER TDRR 06436	2/12/64	WJK
C	REVISED PER TDRR 08861	6/1/64	WJK
D	REVISED PER TDRR 13252	12/1/64	WJK

NOTES:

1. GENERAL REQUIREMENTS:

- A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
- B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS 2.
- C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS AS LISTED IN TABLE III WITH REFERENCES TO MIL-T-23648 AND ND 1002057. ANY UNIT WILL BE CONSIDERED A FAILURE IF ITS ZERO-POWER RESISTANCE CHANGES BY MORE THAN 1.0% AS A RESULT OF HAVING BEEN SUBJECTED TO ANY OF THE ENVIRONMENTAL TESTS SPECIFIED.
- D. MARKING: UNIT PACKAGES SHALL BE LEGIBLY MARKED PER MIL-STD-129, WITH THE NASA PART NUMBER (DRAWING NUMBER, REVISION LETTER, AND DASH NUMBER), MANUFACTURER'S NAME AND/OR SYMBOL, LOT CODE, AND DATE OF MANUFACTURE AND SERIAL NUMBER.

SPECIAL CONDITIONING (CONT'D)

- C. FOLLOWING BURN-IN THE ZERO-POWER RESISTANCE OF EACH UNIT SHALL BE MEASURED AT (3) THREE TEMPERATURES: 0°±0.1°C, 25°±0.1°C AND 50°±0.1°C. THE RESISTANCE MEASURED AT THESE TEMPERATURES SHALL BE SUPPLIED FOR EACH UNIT. A CERTIFICATE OF COMPLIANCE TO THE REQUIREMENTS OF PARA 4A AND 4B ABOVE SHALL ALSO BE SUPPLIED WITH EACH LOT SHIPPED.

2. ACCEPTANCE AND INSPECTION REQUIREMENTS (100%)

A. MECHANICAL REQUIREMENTS:

- (1) LEAD MATERIAL: NICKEL (GRADE A) PER ND PS 1015400.
- (2) PROTECTIVE VARNISH: MOISTURE AND FUNGUS PROOF VARNISH PER MIL-V-173.
- (3) CERTIFICATE OF COMPLIANCE: COMPLIANCE WITH THE LEAD AND VARNISH MATERIAL REQUIREMENT SHALL BE CERTIFIED WITH EACH SHIPMENT.

B. ELECTRICAL CHARACTERISTICS (AT 25° ± 0.1°C):

- (1) ZERO-POWER RESISTANCE VALUE: TABLE I VALUE.
- (2) RESISTANCE-TEMPERATURE CHARACTERISTIC: $R_T = R_{298} \cdot K \cdot e^{\left(\frac{A}{T} - \frac{A}{298}\right)}$
SEE TABLE II FOR β AND TABULATED VALUES OF R_T . BETA VALUES ARE BASED ON READINGS TAKEN AT 0° & 50°C.

3. DESIGN REQUIREMENTS:

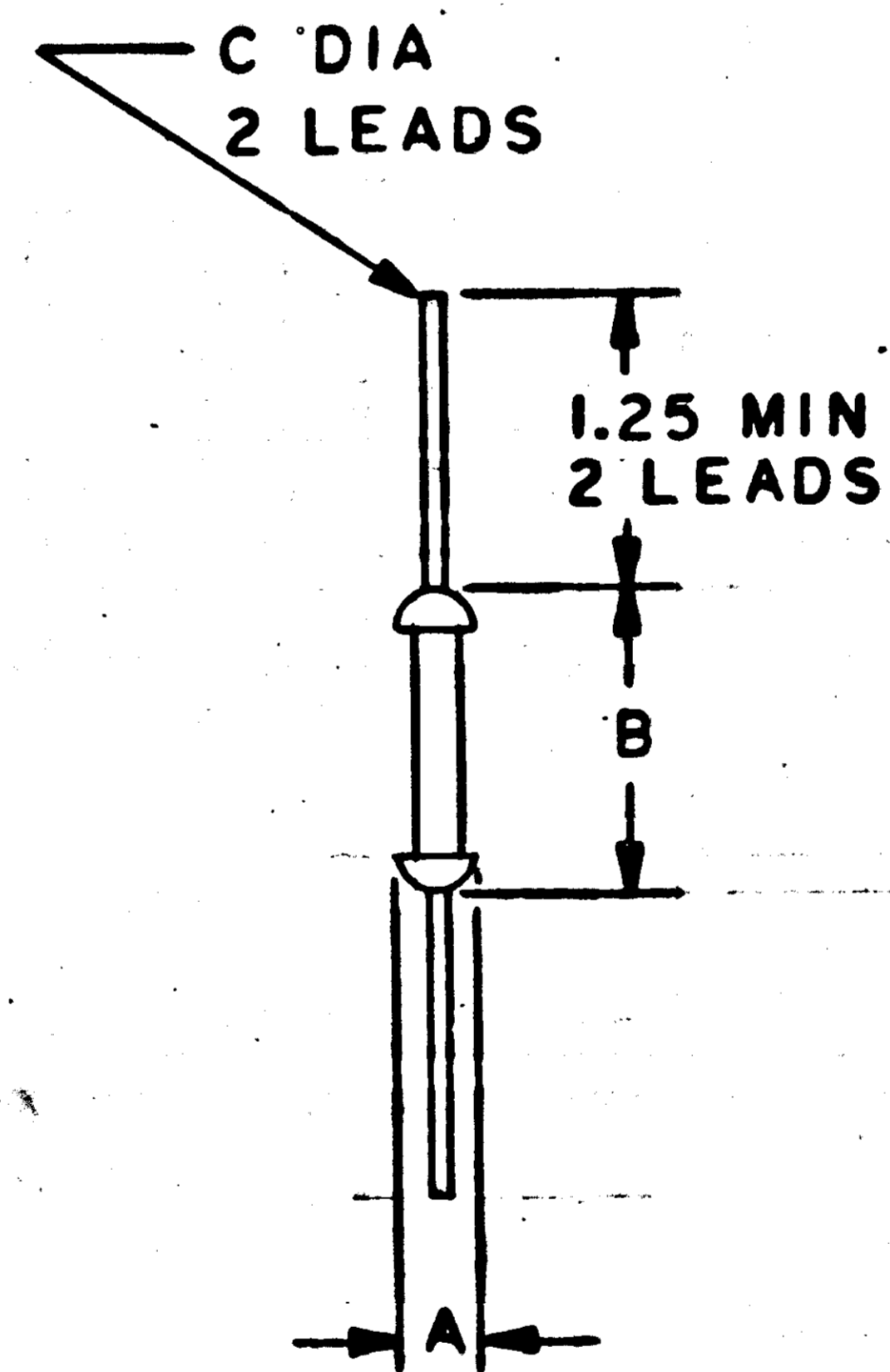
- A. DISSIPATION CONSTANT: SEE TABLE I FOR THE AMOUNT OF POWER WHICH WILL RAISE THE THERMISTOR ONE DEGREE CENTIGRADE ABOVE AMBIENT.
- B. TIME CONSTANT: SEE TABLE I FOR THE TIME REQUIRED FOR THE THERMISTOR TEMPERATURE TO CHANGE 63% INTERNALLY FOR A CERTAIN CHANGE IN AMBIENT TEMPERATURE. THE THERMISTOR WILL REACH 98% OF TEMPERATURE CHANGE IN APPROX 5 TIMES THE CONSTANT LISTED.

- C. STORAGE LIFE: 1 YEAR MINIMUM AT ROOM TEMPERATURE AND HUMIDITY WHEN STORED IN UNOPENED CONTAINERS.
- D. CONSTRUCTION: RESISTIVE WAFER MATERIAL WITH LEADS SOLDERED IN PLACE.
- E. ENVIRONMENTAL: CAPABLE OF OPERATION OVER THE AMBIENT TEMPERATURE RANGE OF -55°C TO +105°C.
- G. LEAD MATERIAL: UNCOATED, RELEASABLE NICKEL (GRADE A)
- H. FINISH: ...

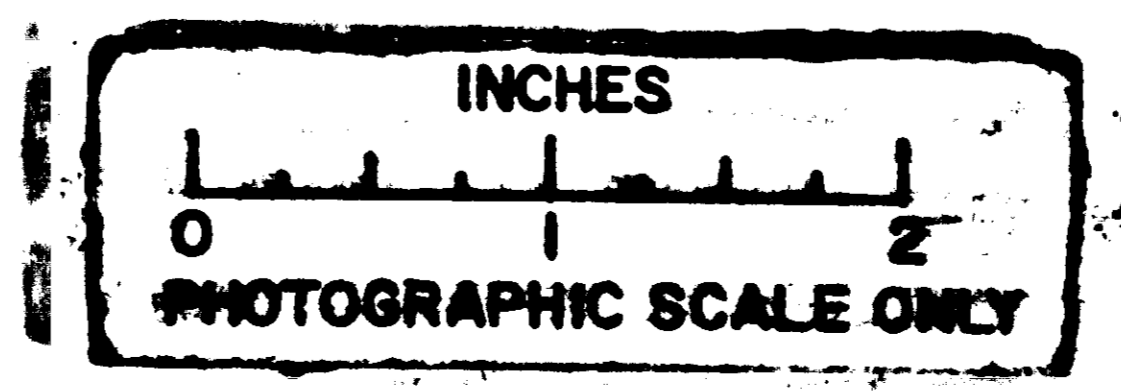
4. SPECIAL CONDITIONING:

- A. TEMPERATURE CYCLING: RESISTORS SHALL BE TESTED PER MIL-STD-202, METHOD 102, CONDITION C EXCEPT TEMPERATURE EXTREMES OF -55°C AND +105°C. RESISTANCE, ONE HOUR AFTER TESTING, SHALL NOT VARY MORE THAN ± 1% FROM THE INITIAL MEASUREMENT. THERE SHALL BE NO MECHANICAL DAMAGE.
- B. BURN-IN: RESISTORS SHALL BE BURNED IN NON-OPERATING AT 50°C FOR 100 HOURS. RESISTANCE, ONE HOUR AFTER TESTING SHALL NOT VARY MORE THAN ± 1% FROM THE INITIAL MEASUREMENT. THERE SHALL BE NO MECHANICAL DAMAGE.

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



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>J. Cooper</i> DATE 1/30/63		RESISTOR, TEMPERATURE VARIABLE, NEGATIVE COEF SPECIFICATION CONTROL DRAWING	
CHECKED <i>J. Cooper</i> DATE 1/30/63			
APPROVAL <i>G. Mayo</i> 7/7/63		CODE IDENT NO.	NASA DRAWING NO.
APPROVAL <i>Edmond Hall</i> 9/24/63		SIZE C	100 6715
HEAT TREATMENT		SCALE NONE	WT
FINAL FINISH		SHEET 1 OF 2	
NEXT ASSY.	USED ON	MIT APPROVAL <i>W. K. ...</i> 10/1/63	
APPLICATION			



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1006715

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 03038	10/26/63	LWK
A	REVISED PER TDRR 04399		RK WK
C	REVISED PER TDRR 08861	6/2/64	WK
D	REVISED PER TDRR 13252	10/17	EM

TABLE I

DASH NO.	NOMINAL ZERO-POWER RESISTANCE OHMS	RESISTANCE +TEMPERATURE CHARACTERISTIC AT 25°C NOTE 2.B(2)	DISSIPATION CONSTANT MW/°C	TIME CONSTANT SECONDS	DIMENSIONS		
					A MAX	B MAX	C
-1	100K ± 1%	CURVE D	2.3 MIN	12 MIN	.120	.625	.017 .015
-2	10K ± 10%	CURVE B	2.3 MIN	12 MIN	.120	.625	.017 .015

TABLE II

NOMINAL RATIO R _T /R ₂₅ °C		
TEMP °C	CURVE "D" β = 3900 ± 55	CURVE "B" β = 3450 ± 80
-60	145.2	77.0
-50	68.9	40.2
-40	34.3	22.0
-30	17.9	12.5
-20	9.79	7.42
-10	5.56	4.54
0	3.27	2.85
+10	1.99	1.84
+20	1.25	1.22
+25	1.000	1.000
+30	.805	.825
+40	.532	.570
+50	.360	.402
+60	.248	.289
+70	.175	.212
+88	.125	.157
+90	.091	.119
+100	.0675	.0910
+118	.0508	.0705

TABLE III

EXAMINATION OR TEST	REQUIREMENT PARAGRAPHS
GENERAL QUALIFICATION REQUIREMENTS	PARAGRAPHS 3.2 THROUGH 3.9.2 OF ND -1002057
GROUP I (ALL SAMPLES) VISUAL & MECHANICAL ZERO-POWER RESISTANCE DISSIPATION CONSTANT THERMAL TIME CONSTANT MAXIMUM POWER RATING	PARA 4.2.1 OF ND 1002057 PARA 4.5.2 OF MIL-T-23648 EXCEPT MEASURE AT +25 & 50°C PARA 4.5.4 OF MIL-T-23648 PARA 4.5.5 OF MIL-T-23648 PARA 3.3.7 OF MIL-T-23648 EXCEPT MEASURE POWER THAT PRODUCES TEMP. RISE OF +80°C
GROUP II (1/3 OF SAMPLES) RESISTANCE - TEMPERATURE CHARACTERISTICS TEMPERATURE CYCLING THERMAL STABILITY	PARA 4.5.11 OF MIL-T-23648 EXCEPT SEQUENCE 7 WILL BE 105°C & SEQUENCE 8 WILL NOT BE USED PARA 4.5.8 OF MIL-T-23648 EXCEPT USE TEST CONDITION A OF MIL-STD-202 PARA 4.5.6 OF MIL-T-23648 EXCEPT TEMPERATURE IN PARA 4.5.6.2 WILL BE +105 ± 2°C
LOW TEMPERATURE STORAGE TERMINAL STRENGTH	PARA 4.5.7 OF MIL-T-23648 EXCEPT LOW TEMP WILL BE -55 ± 3°C PARA 4.5.10 OF MIL-T-23648
GROUP III (1/3 OF SAMPLES) VIBRATION SHOCK MOISTURE RESISTANCE	PARA 4.2.11 OF ND 1002057 (SEE NOTE 1) PARA 4.2.12 OF ND 1002057 (SEE NOTE 1) PARA 4.5.13 OF MIL-T-23648 (SEE NOTE 2)
GROUP IV (1/3 OF SAMPLES) LOAD LIFE LEAD COMPOSITION	PARA 4.5.15 OF MIL-T-23648 EXCEPT INITIAL RESISTANCE MAY BE MEASURED PRIOR TO START OF LIFE. MAX OPERATING TEMP IS +105°C PARA 4.2.16 OF ND 1002057

NOTE 1

THE AMOUNT OF POWER TO BE APPLIED WILL BE THAT NECESSARY TO RAISE THE THERMISTOR TEMP. TO APPROX. +65°C UNDER NORMAL FREE AIR CONDITIONS. ZERO POWER RESISTANCE WILL BE MEASURED BEFORE & AFTER TEST PER PARA 4.5.2 OF MIL-T-23648.

NOTE 2

INDICATED STEPS (a), (d), & (f) REPLACED BY (1), (4), & (7) RESPECTIVELY.

MASTER

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>Ray Wheeler</i> DATE <i>20 Aug 63</i>		RESISTOR, TEMPERATURE VARIABLE, NEGATIVE COEF SPECIFICATION CONTROL DRAWING	
CHECKED <i>J. Pappas</i> DATE <i>10/1/63</i>			
APPROVAL <i>W. C. Hall</i> DATE <i>9/24/63</i>			
HEAT TREATMENT		NASA APPROVAL <i>W. C. Hall</i> DATE <i>7/1/63</i>	CODE IDENT NO. SIZE
FINAL FINISH		MIT APPROVAL <i>W. C. Hall</i> DATE <i>10/1/63</i>	NASA DRAWING NO. 1006715
APPLICATION		SCALE NONE WT	SHEET 2 OF 2

