

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.

# REQUIREMENTS:

## 1. GENERAL:

A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.

D. PACKAGING AND PACKING: FOR DASH NUMBERS 1 THRU 32 UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH ND 1002129, FOR DASH NUMBERS 33 THRU 38 UNITS SHALL BE PACKED IN SUCH A MANNER AS TO INSURE THE FOLLOWING:

- 1.) EACH INDIVIDUAL PART SHALL BE SEPARATED FROM ALL OTHERS AND PACKED SECURELY TO PREVENT CONTACT DURING TRANSIT.
- 2.) LEADS SHALL BE SECURED AGAINST WHIPPING OR VIBRATION DURING TRANSIT.
- 3.) BODY MOUNTING SHALL BE SUCH THAT CAPACITORS CAN BE EASILY GRIPPED BY THE BODY AND REMOVED FROM THE PACKAGE. HANDLING OF LEADS IS TO BE HELD TO A MINIMUM.

E. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-11015 EXCEPT AS SPECIFIED HEREIN.

## 2. INSPECTION AND ACCEPTANCE:

### A. MECHANICAL REQUIREMENTS:

1.) DIMENSIONS PER OUTLINE AND TABLE I

2.) LEAD DATA: LEADS PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

3.) MARKING: PER ND1002019, EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE NASA PART NUMBER AND REVISION LETTER AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. CAPACITANCE, CAPACITANCE TOLERANCE AND VOLTAGE RATING MAY ALSO BE MARKED ON PART. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING AND DASH NUMBER TOGETHER WITH THE REVISION LETTER. MANUFACTURERS PART OR TYPE NUMBER MAY APPEAR ON THE PART AND PACKAGE.

### B. ELECTRICAL REQUIREMENTS:

1.) CAPACITANCE: PER TABLE I AT +25°C AND 1MC/SEC ± 100 KC/SEC FOR CAPACITANCE VALUES OF 100 UUF OR LESS AND AT 1KC/SEC ± 100 CPS FOR CAPACITANCE VALUES GREATER THAN 100 UUF.

2.) CAPACITANCE TOLERANCE: ± 10% AT +25°C AND 1MC/SEC ± 100 KC/SEC FOR CAPACITANCE VALUES OF 100 UUF OR LESS AND AT 1KC/SEC ± 100 CPS FOR CAPACITANCE VALUES GREATER THAN 100 UUF.

3.) INSULATION RESISTANCE: THE PRODUCT OF MEGOHM AND MICROFARADS SHALL BE 100 MEGOHM-MICROFARADS MIN, NEED NOT EXCEED 10,000 MEGOHMS.

4.) POWER FACTOR: 0.025 MAX. MEASURED AT +25°C AND 1MC/SEC ± 100 KC/SEC FOR CAPACITANCE VALUES OF 100 UUF OR LESS AND AT 1KC/SEC ± 100 CPS FOR CAPACITANCE VALUES GREATER THAN 100 UUF.

## 3. DESIGN REQUIREMENTS:

A. PER MIL-C-11015/20 IN ADDITION TO THE REQUIREMENTS SPECIFIED HEREIN.

B. DC WORKING VOLTAGE: 100 VOLTS AT +85°C. DERATED TO 50 VOLTS AT +125°C.

C. OPERATING AND STORAGE TEMPERATURE RANGE: -55°C TO +125°C WITH DERATING. ALLOWANCE SHOULD BE MADE FOR CAPACITANCE CHANGE DUE TO HIGH TEMPERATURE EXPOSURE AS INDICATED IN TABLE II.

D. LEAD STRENGTH: LEADS SHALL WITHSTAND A 4 POUND AXIAL PULL FOR ONE MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE-WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK TO THE STARTING POSITION. THE LEAD SHALL BE BENT AT THE POINT OF EGRESS FROM THE CAPACITOR BODY AROUND A 1/16 INCH RADIUS. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

### E. ENVIRONMENTAL:

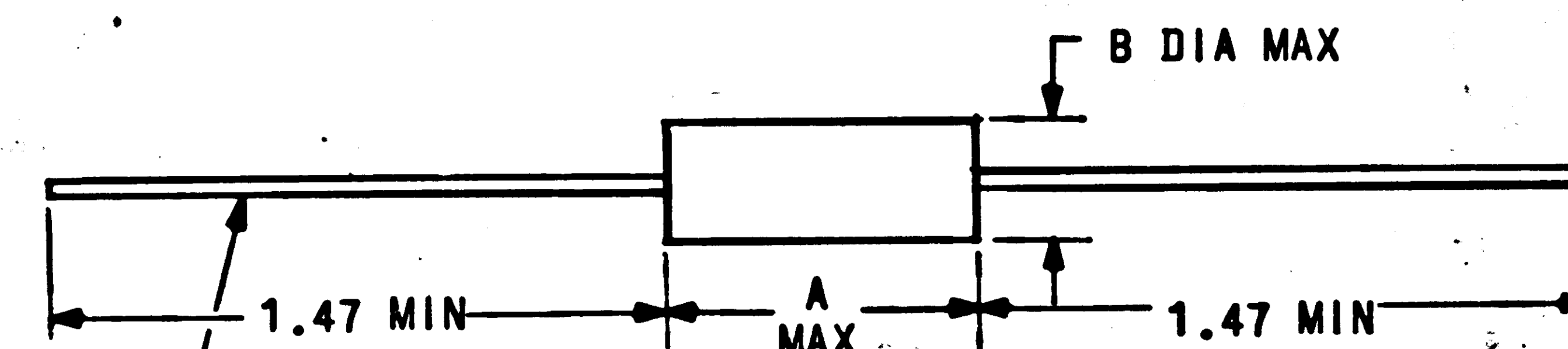
1.) REDUCED PRESSURE: UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10<sup>-4</sup> MM OF MERCURY FOR 96 HOURS.

2.) LIFE: MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST PER ND 1002045 SHALL BE ± 10%.

N 7779001

## REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
E	REPLACES REV D WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02FF5	8/24/63	20
F	REVISED PER TDRR 03962	10/24/63	WHL
G	REVISED PER TDRR 06749	3/19/64	PPK-WHL
H	REVISED PER TDRR 07590	4/24/64	PPK-WHL
J	REVISED PER TDRR 10373	6/24/64	WHL
K	REVISED PER TDRR 18629	5/4/65	WHL
L	REVISED PER TDRR 22281	9-8-65	WHL
M	REVISED PER TDRR 25134	1/18/66	WHL
N	REVISED PER TDRR 28635	5-17-66	WHL



FOR ALL CAPACITANCE VALUES  
.016 DIA (NO. 26 AWG) OF 5000 PF OR LESS  
.025 DIA (NO. 22 AWG) FOR ALL CAPACITANCE VALUES  
GREATER THAN 5000 PF

REPLACES REV (D) WITH CHANGE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			
MIT INSTRUMENTATION LAB CAMBRIDGE MASS DWG NO. 9-497		MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
DRAWN BY <i>W. J. Wilson</i> DATE <i>10/24/63</i> CHECKED BY <i>WILSON</i> DATE <i>10/24/63</i> APPROVAL <i>Edwin C. Hall 28 Aug 63</i>		CAPACITOR, FIXED, CERAMIC DIELECTRIC	
NASA APPROVAL <i>W. J. Wilson 8/24/63</i> MIT APPROVAL <i>W. J. Wilson 8/24/63</i>		SPECIFICATION CONTROL DRAWING	
CODE IDENT NO. 80230 SCALE NONE		SIZE C	NASA DRAWING NO. 1006777
WT		SHEET 1 OF 2	



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4. SPECIAL CONDITIONING BY SUPPLIER:  
A. BURN-IN: ALL UNITS SHALL BE SUBJECTED TO 2 TIMES RATED VOLTAGE AT  $+85^{\circ}\text{C}$  FOR A MINIMUM OF 100 HOURS AND A MAXIMUM OF 300 HOURS. THE LAST 48 HOURS SHALL BE FREE OF CATASTROPHIC FAILURES. (i.e. SHORTS OR OPENS)

B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN.

CAPACITANCE  
POWER FACTOR  
INSULATION RESISTANCE

C. BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

LIMITS:

CAPACITANCE:  $\pm 5\%$  OF INITIAL READING

POWER FACTOR: INITIAL LIMIT

INSULATION RESISTANCE: INITIAL LIMIT

NOTES:

1.\* THESE DASH NUMBERS ARE NONSTANDARD VALUES PER MIL-C-11015/20.

TABLE II  
MAXIMUM CAPACITANCE CHANGE DUE  
TO HIGH TEMPERATURE EXPOSURE

DASH NO.	CAPACITANCE CHANGE (%) WITH EXPOSURE TO INDICATED TEMPERATURES ( $^{\circ}\text{C}$ )			
	+55	+75	+85	+125
1 THRU 10	<1.0	<1.0	1.0	1.5
11 THRU 18	2.3	4.5	7.5	9.0
19 THRU 24	6.0	12.5	15.0	25.0
25 THRU 39	3.8	7.5	10.0	15.0

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

TABLE I

DASH NO.	CAPACITANCE (UUF)	DIMENSIONS	
		A	B
-1	10	.318	.090
* -2	20		
-3	22		
-4	33		
* -5	36		
* -6	37		
-7	47		
* -8	50		
* -9	56		
* -10	68		
* -11	75		
* -12	82		
-13	100		
* -14	130		
* -15	150		
-16	220		
* -17	270		
-18	330		
* -19	360		
-20	470		
* -21	560		
* -22	680		
* -23	820		
-24	1000	.318	.090
* -25	2000	.498	.120
-26	2200		
-27	3300		
-28	4700		
* -29	5000	.498	.120
* -30	6800	.498	.160
	UF		
-31	.010	.498	.160
* -32	.020	.498	.200
-33	.022	.698	.240
* -34	.033	.648	.240
-35	.047	.648	.240
* -36	.050	.648	.240
* -37	.068	.748	.280
-38	.100	.748	.280
-39	.015	.498	.200

DASH NO.	CAPACITANCE (UUF)	DIMENSIONS	
		A	B
-40	5600	.498	.160
-41	8200	.498	.160

THIS SHEET ADDED

THE COMPLETE PART NUMBER IS THE DRAWING NUMBER  
PLUS THE APPLICABLE DASH NUMBER.

N 1006777

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
E	THIS SHEET ADDED AND UPGRADED TO CLASS A RELEASE PER TDRR 02FF5	1/15/63	JW
F	REVISED PER TDRR 03962	10/13	W
G	REVISED PER TDRR 06749	2/10/64	W
H	REVISED PER TDRR 07590	4/21/64	W
J	REVISED PER TDRR 10373	6/2/64	W
K	REVISED PER TDRR 18629	6/4/65	W
L	REVISED PER TDRR 22281	9/8/65	W
M	REVISED PER TDRR 25134	1/19/66	W
N	REVISED PER TDRR 28635	5-17-66	W

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LIST OF MATERIALS			
MIT INSTRUMENTATION LAB CAMBRIDGE MASS CONTRACT 9-497		MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
DRAWN BY <i>Booster</i> DATE 13 AUG 63 CHECKED <i>Wilson</i> 14 AUG 63		CAPACITOR, FIXED, CERAMIC DIELECTRIC	
APPROVAL <i>Eden C Hall</i> 28 AUG 63		SPECIFICATION CONTROL DRAWING	
NASA APPROVAL <i>Michael</i> 1/24/63		CODE IDENT NO. 80230	NASA DRAWING NO. 1006777
MIT APPROVAL <i>W. H. Hall</i> 1/24/63		SCALE NONE	WT
		SHEET 2 OF 2	