

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 ORIGIN, REVISION, OR FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REPRODUCED BY IMITATION 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:

- INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
  - THESE CAPACITORS SHALL CONFORM TO THE REQUIREMENTS OF MIL-C-26655 /2B FOR STYLE CS-13, WITH THE EXCEPTIONS AND ADDITIONS SPECIFIED IN THIS DRAWING.
  - SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS IN ND 1015404, CLASS 2. PERIODIC INSPECTIONS MAY BE SATISFIED BY THE SUBMISSION AND ACCEPTANCE OF CERTIFIED TEST DATA FOR PURCHASED PRODUCTION LOTS.
  - CAPACITORS SHALL BE PACKAGED IN ACCORDANCE WITH SUPPLIERS NORMAL COMMERCIAL PRACTICE PER LEVEL C AS DEFINED IN MIL-C-26655.
2. INSPECTION AND ACCEPTANCE:
- MECHANICAL DIMENSIONS AND TOLERANCES PER DRAWING.
  - LEAD MATERIAL SHALL BE NICKEL IN ACCORDANCE WITH ND PS 1015400.
  - EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURERS NAME AND/OR SYMBOL, TYPE NUMBER, CAPACITANCE VALUE AND TOLERANCE, VOLTAGE RATING AND POLARITY. EACH UNIT PACKAGE AND SHIPPING CONTAINER SHALL ALSO INCLUDE THE NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER. PER MIL-STD-129.
  - ALL PARTS SHALL BE SERIALIZED.

PARTS WHICH HAVE FAILED NEED NOT BE FORWARDED.

- E. ELECTRICAL REQUIREMENTS: @ 25°C
- CAPACITANCE VALUE PER TABLE II AND IV
  - DISSIPATION FACTOR 6% MAXIMUM FOR VOLTAGE OF 15 VDC OR LESS, 4% MAX. FOR ALL OTHER VOLTAGE RATINGS.
  - LEAKAGE CURRENT: PER TABLE II AND IV
- F. UNITS SHALL BE SUPPLIED FROM A PRODUCT LINE WHICH IS CONTINUOUSLY MONITORED FOR AND EXHIBITS A FAILURE RATE OF LESS THAN 0.15% PER THOUSAND HOURS AT A 60% CONFIDENCE LEVEL WHEN PLACED ON LIFE TEST UNDER THE FOLLOWING CONDITIONS:
- TEMPERATURE: 85°C
  - VOLTAGE: FULL RATED VOLTAGE
  - SERIES RESISTANCE (EXTERNAL): 10 OHMS, 1/10 WATT, FUSIBLE
  - POWER SUPPLY: 25 AMPERES FOR 1 MINUTE CAPABILITY.

FAILURE RATE DATA FROM A PRODUCT LINE WHOSE ONLY DIFFERENCES ARE:

- (a) THE TYPE OF INSULATION SLEEVING OR (b) LEAD MATERIAL WILL BE ACCEPTABLE FOR THIS REQUIREMENT.

##### 3. DESIGN REQUIREMENTS:

- UNITS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF MIL-C-26655. FOR CONSTRUCTION AND ENVIRONMENT.
- OPERATING TEMPERATURE RANGE: -55°C TO +85°C AT FULL RATED VOLTAGE; DERATED TO 2/3 RATED VOLTAGE AT +125°C.
- SURGE VOLTAGE: 130% OF RATED VOLTAGE.
- STABILITY AT HIGH AND LOW TEMPERATURE: CAPACITANCE SHALL CHANGE FROM 25°C VALUE BY NO MORE THAN -15% AT -55°C AND BY NO MORE THAN +15% AT +85°C.
- LEAD BEND AND PULL TEST (DESTRUCTIVE):
  - LEADS SHALL WITHSTAND A 4 POUND AXIAL PULL MINIMUM WITHOUT IMPAIRMENT OF PERFORMANCE.
  - LEADS SHALL WITHSTAND THE BEND TEST AS SPECIFIED IN MIL-C-26655 EXCEPT THE WEIGHT SHALL BE 2 POUNDS.

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

NOTES

##### 4. SPECIAL CONDITIONING BY SUPPLIER: (100%)

- ALL UNITS SHALL BE X-RAYED PER MIL-STD-202, METHOD 209, PERPENDICULAR TO THE MAJOR AXIS OF THE CAPACITOR. ALL X-RAYS SHALL BE INSPECTED FOR LOOSE SOLDER PARTICLES, INADEQUATE ANODE ANCHORAGE, OR POOR ALIGNMENT.
- BURN-IN: EACH UNIT SHALL BE CONNECTED IN SERIES WITH A 3 OHM RESISTOR AND A ONE AMP FUSE. UNITS SHALL BE TESTED AT RATED VOLTAGE AT +85°C FOR A MINIMUM OF 250 HOURS. ALL UNITS WHICH HAVE A BLOWN FUSE OR WHICH ARE OUTSIDE OF ALLOWABLE TOLERANCE FOR CAPACITANCE, DISSIPATION FACTOR, OR LEAKAGE CURRENT WHEN TESTED AT 25°C ON COMPLETION OF BURN-IN SHALL BE DISCARDED.

##### C. EQUIVALENT SERIES RESISTANCE AT 25°C:

UNITS SPECIFIED IN TABLE III SHALL BE SCREENED FOR MAXIMUM ESR BY PLACING UNITS IN TEST CIRCUIT AND CALCULATING ESR BY THE FORMULA:

$$ESR = \frac{E_C R_1}{E_R} \left[ \frac{E_R^2 + E_C^2 - E_A^2}{2 E_R E_C} \right]$$

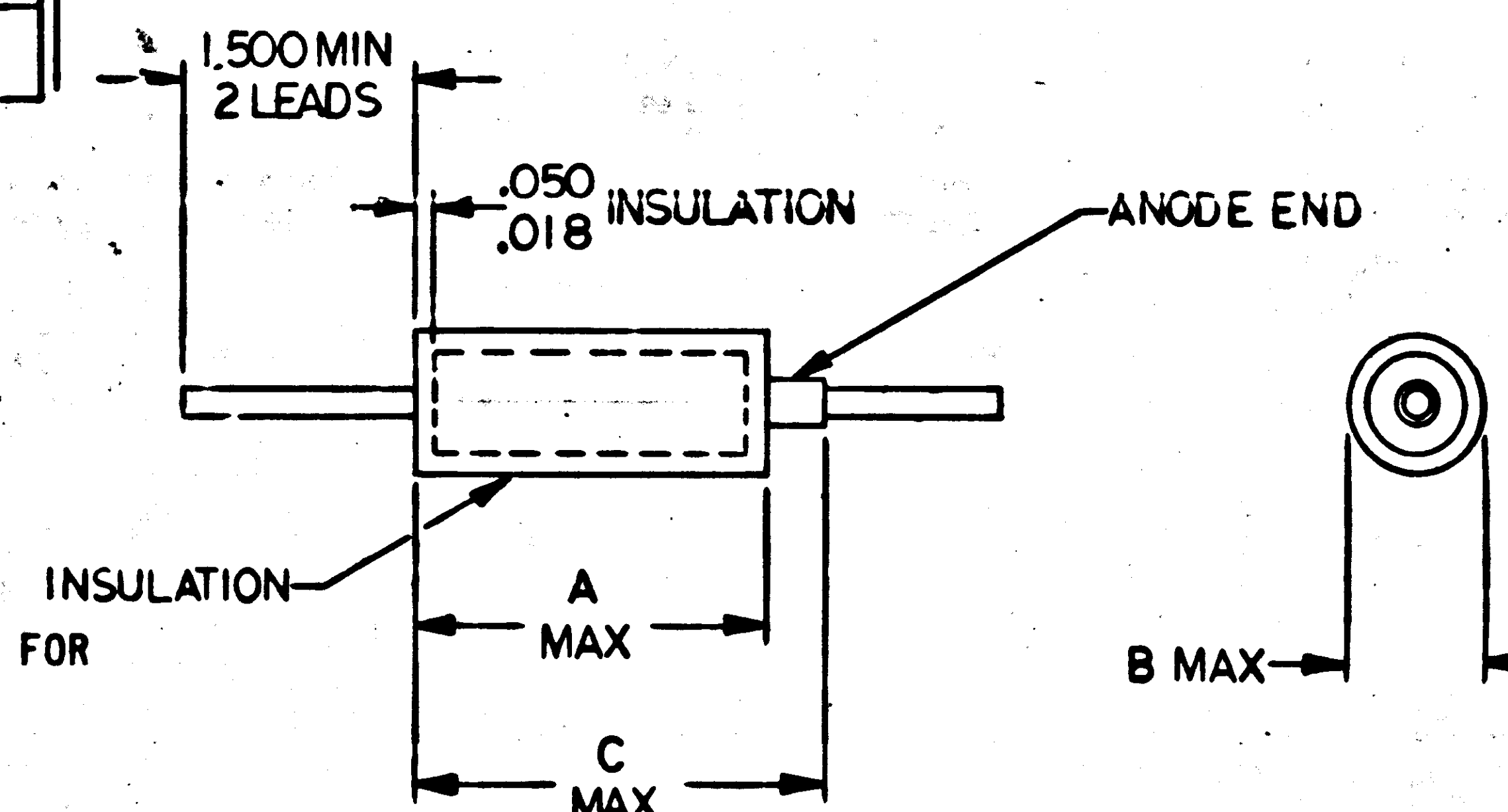
WHERE

- $E_C$  = AC COMPONENT ACROSS  $C_1$  (RMS)  
 $E_R$  = AC COMPONENT ACROSS  $R_1$  (RMS)  
 $E_A$  = AC VOLTAGE APPLIED (RMS)  
 $R_1$  = VALUE FROM TABLE I

##### 5. VENDOR SUPPLIED DOCUMENTATION:

- CERTIFICATE OF COMPLIANCE WITH PS1015400.
- BEFORE-AND-AFTER BURN-IN READINGS FOR
  - CAPACITANCE
  - DISSIPATION FACTOR
  - LEAKAGE CURRENT
- X-RAY NEGATIVES OF SHIPPED PARTS.
- TEST DATA TO SUBSTANTIATE REQUIRED FAILURE RATE.
- CERTIFICATE OF COMPLIANCE SHOULD CONTAIN THE FOLLOWING INFORMATION
  - PURCHASE ORDER NUMBER
  - NASA PART NUMBER
  - QUANTITY AND DATE OF SHIPMENT
  - ANY REFERENCED SPECIFICATION REQUIRED TO BE CERTIFIED BY THIS DRAWING OR PURCHASE ORDER

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
H	REPLACES REV G WITH CHANGES PER TDRR 03168	9/1/63	PH
J	REVISED PER TDRR 03705	8/28/63	WIK
K	REVISED PER TDRR 06011	2/14/64	WIK
L	REVISED PER TDRR 13664	4/1/64	WIK
M	REVISED PER TDRR 16050	2/9/65	WIK
N	REVISED PER TDRR 17479	4/1/65	WIK
P	REVISED PER TDRR 21593	8/31/65	WIK
R	REVISED PER TDRR 23469	12/26/65	WIK
S	REVISED PER TDRR 25530	2/5/66	WIK



Ⓜ REPLACES REV G WITH CHANGES

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS      DECIMALS      ANGLES ± _____ ± _____ ± _____
		DO NOT SCALE THIS DRAWING
		MATERIAL
		SEE NOTES
		HEAT TREATMENT
		_____
NEXT ASSY	USED ON	FINAL FINISH
		_____
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>R. Kays</i> DATE <i>10/2/63</i>		CAPACITOR FIXED, ELECTROLYTIC, SOLID TANTALUM SPECIFICATION CONTROL DRAWING	
CHECKED <i>W. J. Hall</i> DATE <i>10/2/63</i>			
APPROVAL <i>Edm C Hall</i> DATE <i>12 Sept 63</i>		NASA DRAWING NO. <b>1006755</b>	
NASA APPROVAL <i>John D. ...</i>		CODE IDENT NO. <b>80230</b>	SIZE <b>C</b>
MIT APPROVAL <i>L. N. ...</i> DATE <i>9/17/63</i>		SCALE <b>NONE</b>	WT <b>WT</b>
		SHEET <b>1</b>	OF <b>3</b>



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.

NOTE: DASH NUMBERS SHOWN ARE FOR CAPACITORS WITH INSULATED CASES (PLASTIC OVERSLEEVING). FOR UNINSULATED EQUIVALENTS, ADD 200 TO THE DASH NO.  
E.G. 5.6 uf, 6V DC INSULATED CASE = -1  
5.6 uf, yV DC UNINSULATED CASE = -201

TABLE II

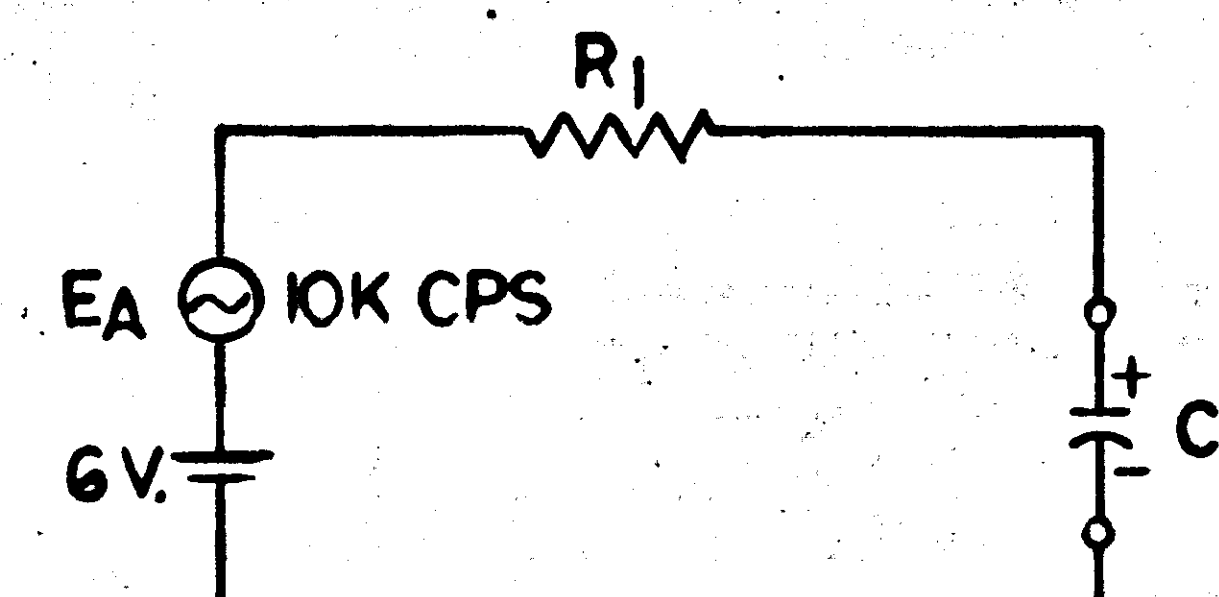
CAP VALUE UF ±10%	RATED CONTINUOUS DC VOLTAGE AT 25°C																	
	6 VDC			10 VDC			15 VDC			20 VDC			35 VDC			50 VDC		
	DASH NO.	I <sub>L</sub>	S <sub>C</sub>	DASH NO.	I <sub>L</sub>	S <sub>C</sub>	DASH NO.	I <sub>L</sub>	S <sub>C</sub>	DASH NO.	I <sub>L</sub>	S <sub>C</sub>	DASH NO.	I <sub>L</sub>	S <sub>C</sub>	DASH NO.	I <sub>L</sub>	S <sub>C</sub>
.0047													- 41	.6	A	- 90	0.1	A
.0056													- 42	.6	A	- 91	0.1	A
.0068													- 43	.6	A	- 92	0.1	A
.0082													- 44	.6	A	- 93	0.1	A
.010													- 45	.6	A	- 94	0.1	A
.012													- 46	.6	A	- 95	0.1	A
.015													- 47	.6	A	- 96	0.1	A
.018													- 48	.6	A	- 97	0.1	A
.022													- 49	.6	A	- 98	0.1	A
.027													- 50	.6	A	- 99	0.1	A
.033													- 51	.6	A	- 100	0.1	A
.039													- 52	.6	A	- 101	0.1	A
.047													- 53	.6	A	- 102	0.1	A
.056													- 54	.6	A	- 103	0.1	A
.068													- 55	.6	A	- 104	0.1	A
.082													- 56	.6	A	- 105	0.1	A
.10													- 57	.6	A	- 106	1.0	A
.12													- 58	.6	A	- 107	1.0	A
.15													- 59	.6	A	- 108	1.0	A
.18													- 60	.6	A	- 109	1.0	A
.22													- 61	.6	A	- 110	1.0	A
.27													- 62	.6	A	- 111	1.0	A
.33													- 63	.6	A	- 112	1.0	A
.39													- 64	.6	A	- 113	1.0	A
.47													- 65	.6	A	- 114	1.0	A
.56													- 66	.6	A	- 115	1.0	A
.68													- 67	.6	A	- 116	2	A
.82													- 68	.6	A	- 117	2	A
1.0													- 69	.6	A	- 118	2	A
1.2										- 26	.6	A	- 70	.6	B	- 119	2	B
1.5										- 27	.6	A	- 71	.8	B	- 120	2	B
1.8										- 28	.6	A	- 72	1	B	- 121	2	B
2.2										- 29	.7	A	- 73	1.2	B	- 122	2	B
2.7													- 74	1.4	B	- 123	2	B
3.3				- 135	.6	A	- 18	.6	A				- 75	1.7	B	- 124	2	B
3.9				- 9	.6	A	- 19	.8	A				- 76	2	B	- 125	2	B
4.7				- 10	.7	A							- 77	2.5	B	- 126	3	B
5.6	- 1	.6	A										- 78	3	B	- 127	3	C
6.8	- 2	.6	A										- 79	3.5	B	- 128	3	C
8.2										- 30	2.5	B	- 80	3.5	C	- 129	3	C
10										- 31	3	B	- 81	4	C	- 130	3	C
12										- 32	3.5	B	- 82	4	C	- 131	3	C
15										- 33	4	B	- 83	6	C	- 132	6	C
18							- 20	4	B				- 84	6	C	- 133	6	C
22							- 21	5	B				- 85	7	C	- 134	6	D
27				- 11	4	B							- 86	7	D			
33				- 12	5	B				- 34	5	C	- 87	8	D			
39				- 13	5	B				- 35	6	C	- 88	10	D			
47	- 3	4	B							- 36	7	C	- 89	10	D			
56	- 4	5	B							- 37	8.5	D						
68							- 22	7	C	- 38	10	D						
82							- 23	9	C									
100							- 24	9	D	- 39	12	D						
120				- 14	10	C				- 40	15	D						
150	- 5	9	C	- 15	12	C				- 25	15	D						
180	- 6	11	C	- 16	18	D												
220				- 17	20	D												
270	- 7	16	D															
330	- 8	20	D															

\* I<sub>L</sub> = MAX LEAKAGE CURRENT AT 25°C IN MICROAMPERES  
\*\* S<sub>C</sub> = CASE SIZE - SEE TABLE I

S 9929001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
E	REPLACES REV D WITH CHANGES PER TDRR 01161	8/14/63	WK
F	REVISED PER TDRR 01560	12/1/63	P.B.
H	REVISED PER TDRR 03168	9/17/63	W
J	REVISED PER TDRR 03705	8/24/63	WK
K	REVISED PER TDRR 06011	2/4/64	W
L	REVISED PER TDRR 13664	4/24/64	W
M	REVISED PER TDRR 16050	2/4/65	W
N	REVISED PER TDRR 17479	11/16/65	W
P	REVISED PER TDRR 21593	8/31/65	W
R	REVISED PER TDRR 23469	4/12/65	W
S	REVISED PER TDRR 25530	2/1/66	W

TABLE III			
C <sub>1</sub>	R <sub>1</sub>	E <sub>R1</sub>	ESR, MAX
1006755-134 & -334	1Ω ± 1%	1.0 VRMS	0.5Ω
1006755-128 & -328	5Ω ± 1%	0.5 VRMS	1.0Ω
1006755-118 & -318	15Ω ± 1%	1.5 VRMS	5.0Ω



TEST CIRCUIT

TABLE I							
CASE SIZE	NOMINAL LEAD SIZE	INSULATED CASE DIMENSIONS			UNINSULATED CASE DIMENSIONS		
		A	B	C	A	B	C
A	NO. 24 AWG .020 DIA	.384	.151	.422	.281	.141	.422
B		.572	.201	.610	.469	.191	.610
C	NO. 22 AWG .025 DIA	.784	.305	.822	.681	.295	.822
D		.884	.367	.922	.781	.357	.922

CAPACITOR VALUE UF ± 10%	RATED CONTINUOUS DC VOLTAGE AT 25°C		
	20 VDC		
	DASH NO.	I <sub>L</sub> AT 75°C	S <sub>C</sub>
33	135	1UA MAX	C

Ⓔ REPLACES REV D WITH CHANGES

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

QTY REQ	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. CONTRACT		MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
DRAWN C. La Cote 10/2/63 CHECKED D. M. Slapin 5 MAR 63 APPROVAL APPROVAL E. H. Hall 10 June 63		CAPACITOR, FIXED, ELECTROLYTIC, SOLID TANTALUM SPECIFICATION CONTROL DRAWING	
NASA APPROVAL Jack Baranoff MIT APPROVAL W. H. Hall 8 May 63		CODE IDENT NO. 80230 SIZE C	NASA DRAWING NO. 1006755
SCALE NONE		WT	SHEET 2 OF 3



REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
S		THIS SHEET ADDED PER TDRR 25530	W FH		2/15/86	WR

75 VDC			
CAP VALUE uF $\pm$ 10%	DASH NO.	I <sub>L</sub>	S <sub>C</sub>
.0047	-136	.6	A
.0056	-137	↓	↓
.0068	-138		
.0082	-139		
.010	-140		
.012	-141		
.015	-142		
.018	-143		
.022	-144		
.027	-145		
.033	-146		
.039	-147		
.047	-148		
.056	-149		
.068	-150		
.082	-151		
.10	-152		
.12	-153		
.15	-154		
.18	-155		
.22	-156		
.27	-157		
.33	-158		
.39	-159		
.47	-160		
.56	-161		
.68	-162	.6	A
.82	-163	.7	B
1.0	-164	.8	↑
1.2	-165	.9	
1.5	-166	1.1	
1.8	-167	1.4	
2.2	-168	1.7	
2.7	-169	2.0	
3.3	-170	2.5	
3.9	-171	3.0	
4.7	-172	4.0	
5.6	-173	4.0	
6.8	-174	6.0	
8.2	-175	6.0	
10.0	-176	8.0	
12.0	-177	10.0	
15.0	-178	12.0	

⑤ THIS SHEET ADDED

		QTY REQ		PART OR IDENTIFYING NO.		MATERIAL OR NOTES		NOMENCLATURE OR DESCRIPTION		FIND NO.	
		LIST OF MATERIALS									
		MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.				MANNED SPACECRAFT CENTER HOUSTON, TEXAS					
		DRAWN <u>R. KINGSBURY</u> 2-14-66				CAPACITOR FIXED, ELECTROLYTIC SOLID TANTALUM SPECIFICATION CONTROL DRAWING					
		CHECKED <u>almar</u> 2-16-66									
		APPROVED _____									
		APPROVED <u>R. Kingsbury</u> 2/15/66 <u>FOR G. C. HALL</u>									
		APPROVED MIT <u>W. J. Giffen</u> <u>K. G. Giffen</u>				CODE IDENT NO.		SIZE		DRAWING NO.	
		APPROVED MSC <u>A. C. MEYER</u>				80230		C		1006755	
						DATE		SCALE NONE		SHEET 3 OF 3	
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES CAPACITOR VALUES ARE IN $\mu$ f RESISTOR VALUES ARE IN OHMS TOLERANCES ON FRACTIONS    DECIMALS    ANGLES $\pm$ — $\pm$ — $\pm$ — DO NOT SCALE THIS DRAWING MATERIAL _____ _____ NEXT ASSY    USED ON APPLICATION									