

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 CONFIRMING 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 /28 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.
- ELECTRICAL REQUIREMENTS: @ 25°C
    - CAPACITANCE VALUE PER TABLE
    - DISSIPATION FACTOR 6% MAXIMUM FOR VOLTAGE OF 15 VDC OR LESS. 4% MAX. FOR ALL OTHER VOLTAGE RATINGS.
    - LEAKAGE CURRENT: PER TABLE II
  - 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.

NOTED

		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		

##### 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:

$$ESR = \frac{\left[ \frac{E_{C1} R_1}{E_{R1}} \right] \left[ \frac{E_{R1}^2 + E_{C1}^2 - E_A^2}{2 E_{R1} E_{C1}} \right]}{1.500 \text{ MIN } 2 \text{ LEADS}}$$

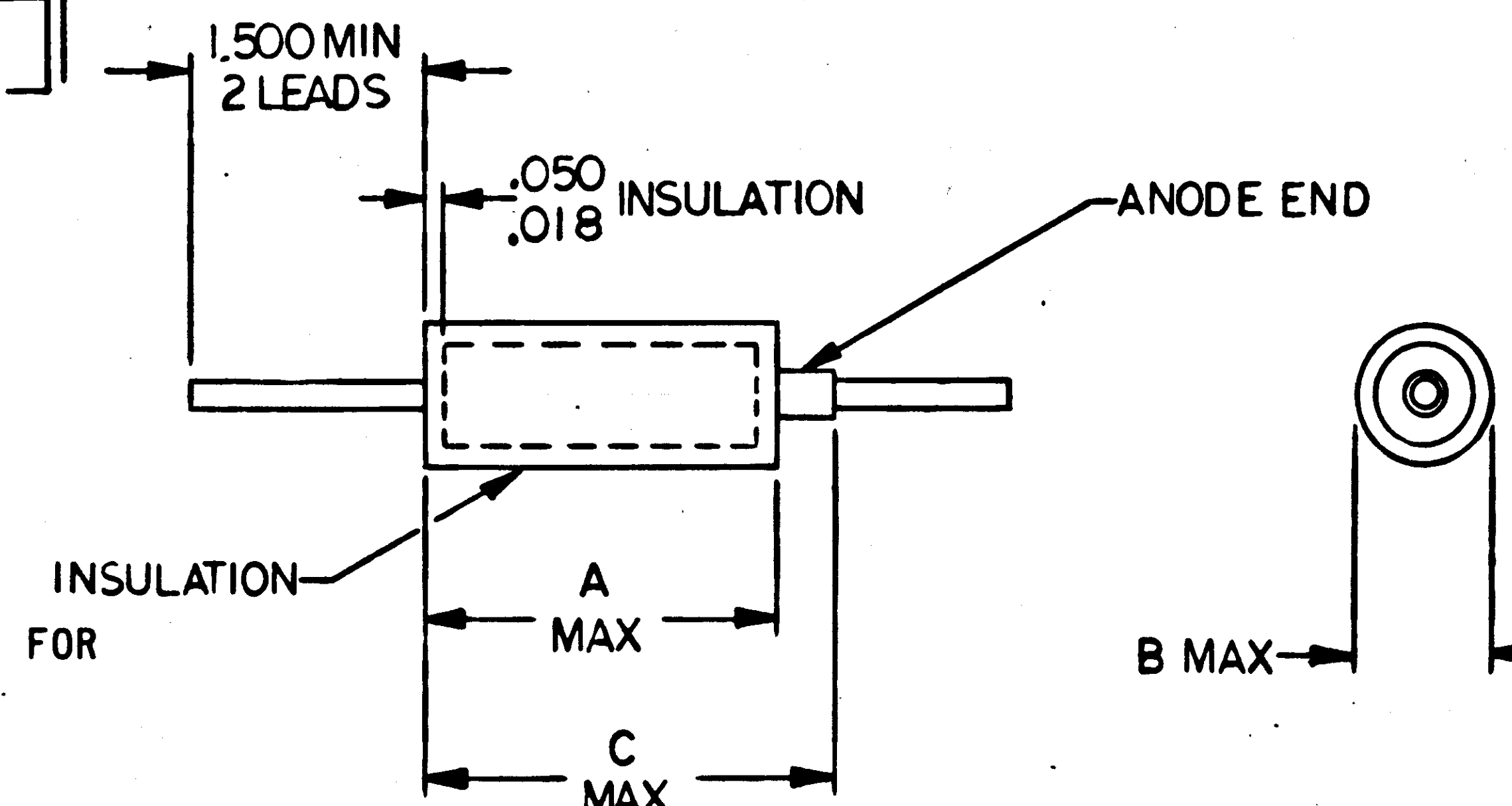
WHERE

- $E_{C1}$  = AC COMPONENT ACROSS  $C_1$  (RMS)  
 $E_{R1}$  = 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 03166	9/17/63	PH
J	REVISED PER TDRR 03705	8/28/63	WIK
K	REVISED PER TDRR 06011	2/4/64	WIK
L	REVISED PER TDRR 13664	4/10/64	WIK
M	REVISED PER TDRR 16050	2/19/65	WIK
N	REVISED PER TDRR 17479	4/1/65	WIK
P	REVISED PER TDRR 21593	8/31/65	WIK



Ⓜ REPLACES REV G WITH CHANGES

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 R. Kagey DATE 1/20/63 CHECKED J. H. H. 1/20/63		CAPACITOR FIXED, ELECTROLYTIC, SOLID TANTALUM	
APPROVAL E. C. Hall 1/20/63		SPECIFICATION CONTROL DRAWING	
NASA APPROVAL J. H. H. 1/20/63		CODE IDENT NO.	NASA DRAWING NO.
MIT APPROVAL L. N. 9/17/63		SIZE C	1006755
		SCALE NONE	WT
		SHEET 1 OF 2	



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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

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	- 74	1.4	B	- 123	2	B
3.3				- 135	.6	A	- 19	.8	A	- 75	1.7	B	- 75	1.7	B	- 124	2	B
3.9				- 9	.6	A				- 76	2	B	- 76	2	B	- 125	2	B
4.7				- 10	.7	A				- 77	2.5	B	- 77	2.5	B	- 126	3	B
5.6	- 1	.6	A							- 78	3	B	- 78	3	B	- 127	3	C
6.8	- 2	.6	A							- 79	3.5	B	- 79	3.5	B	- 128	3	C
8.2										- 80	5.5	C	- 80	5.5	C	- 129	3	C
10										- 81	3	B	- 81	4	C	- 130	3	C
12										- 82	4	C	- 82	4	C	- 131	3	C
15										- 83	6	C	- 83	6	C	- 132	6	C
18							- 20	4	B	- 84	6	C	- 84	6	C	- 133	6	C
22							- 21	5	B	- 85	7	C	- 85	7	C	- 134	6	D
27				- 11	4	B				- 86	7	D	- 86	7	D			
33				- 12	5	B				- 87	8	D	- 87	8	D			
39				- 13	5	B				- 88	10	D	- 88	10	D			
47	- 3	4	B							- 89	10	D	- 89	10	D			
56	- 4	5	B							- 36	7	C	- 36	7	C			
68							- 22	7	C	- 37	8.5	D	- 37	8.5	D			
82							- 23	9	C	- 38	10	D	- 38	10	D			
100							- 24	9	D	- 39	12	D	- 39	12	D			
120										- 40	15	D	- 40	15	D			
150	- 5	9	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

TABLE III			
C <sub>1</sub>	R <sub>1</sub>	E <sub>R1</sub>	ESR, MAX
1006755-133 & -333	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

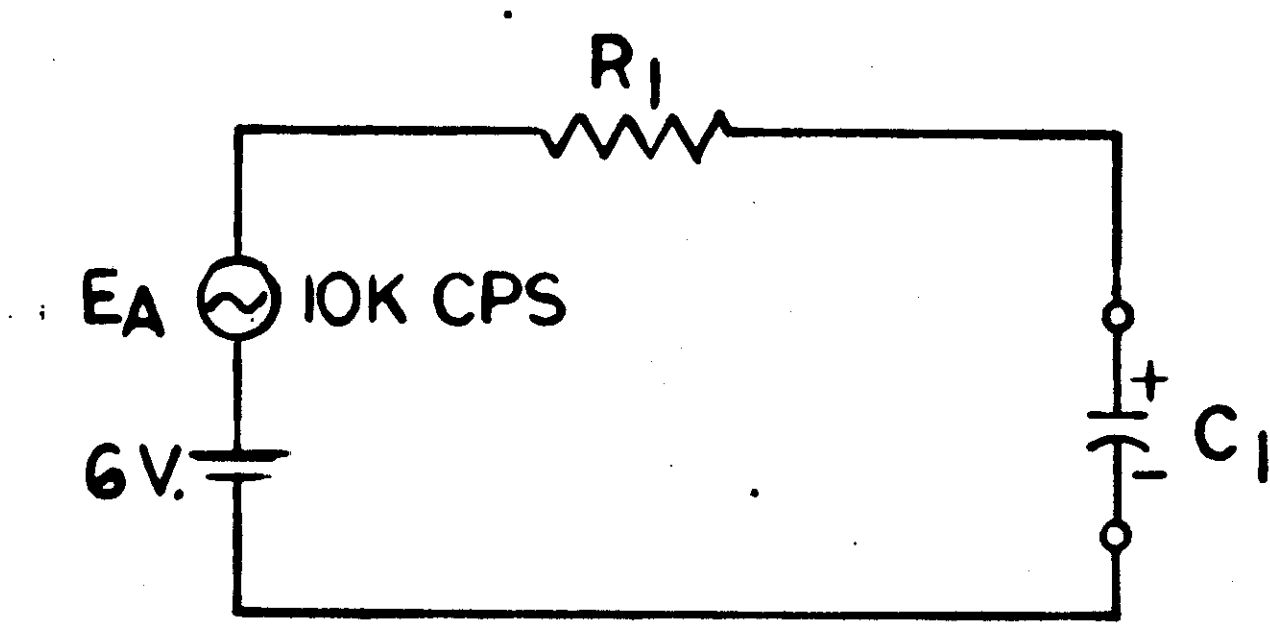


TABLE I							
CASE SIZE	NOMINAL LEAD SIZE	INSULATED CASE DIMENSIONS			UNINSULATED CASE DIMENSIONS		
		A	B	C	A	B	C
A	NO. 24 AWG	.384	.151	.422	.281	.141	.422
B	.020 DIA	.572	.201	.610	.469	.191	.610
C	NO. 22 AWG	.784	.305	.822	.681	.295	.822
D	.025 DIA	.884	.367	.922	.781	.357	.922

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FRACTIONS	DECIMALS
±	±
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CAPACITOR, FIXED, ELECTROLYTIC, SOLID TANTALUM			
SPECIFICATION CONTROL DRAWING			
DRAWN C. LaPorte 10 DATE 2 MAR 63		CODE IDENT NO. SIZE	
CHECKED D.M. Slapin 5 MAR 63		C	
APPROVAL E. H. Hall 10 June 63		NASA DRAWING NO.	
NASA APPROVAL Jacob G. Baranov		1006755	
MIT APPROVAL W. H. Pfeiffer 8 May 63		SCALE NONE WT	
		SHEET 2 OF 2	