

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 LIABILITY FOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FINISHED, 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.

REQUIREMENTS:

- 1. GENERAL:**
- A. UNITS SHALL BE CAPABLE OF MEETING THE APPLICABLE REQUIREMENTS OF MIL-R-93 CHARACTERISTIC C; EXCEPT AS AND IN ADDITION TO THE REQUIREMENTS SPECIFIED HEREIN.**
- B. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND1002215 CLASS 1, CODE 2.**
- C. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS OF ND 1015404 CLASS 2.**
- D. INTERPRET DRAWING IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.**
- 2. INSPECTION AND ACCEPTANCE:**
- A. RESISTANCE VALUES: SEE TABLE.**
- B. RESISTANCE TOLERANCE: SEE TABLE.**
- C. TEMPERATURE COEFFICIENT: ABOVE 10Ω 15 PPM/°C, (EXCEPT AS SPECIFIED IN NOTE 2) 10Ω TO 1Ω 30 PPM/°C, 1Ω AND BELOW 40 PPM/°C.**
- D. LEAD DATA: WELDABLE GRADE A GOLD PLATED NICKEL PER ND PS 1015400. A CERTIFICATE OF COMPLIANCE TO I THIS REQUIREMENT SHALL ACCOMPANY EACH LOT SHIPPED.**
- E. MARKING: MARK UNITS PER ND 1002019 WITH THE NASA PART NUMBER AND REVISION LETTER AND THE MANUFACTURER'S NAME AND/OR SYMBOL. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE. MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL INCLUDE NASA PART NUMBER AND REVISION LETTER PER MIL-STD-129**
- 3. DESIGN REQUIREMENTS:**
- A. POWER RATING: 1/10 WATT AT +125°C DERATED TO ZERO AT 145°C**
- B. MAXIMUM VOLTAGE RATING: 150 VOLTS.**
- C. STABILITY: 100 PPM/YEAR AT +25°C AT 1/2 RATED POWER. (SEE NOTE 2)**
- D. TEMPERATURE RANGE: MINUS 65°C TO PLUS 125°C.**
- E. EACH LEAD SHALL BE CAPABLE OF WITHSTANDING TWO (2) BENDS UNDER A TWO (2) POUND VERTICAL PULL (LEADS VERTICAL WITH RESPECT TO UNIT BODY). TWO (2) BENDS SHALL BE ACCOMPLISHED BY MOVING THE BODY OF THE UNIT, WHILE IN THE PLANE, THROUGH 90° IN ONE DIRECTION, THEN BACK 180° TO THE OPPOSITE DIRECTION AND BACK 90° TO THE ORIGINAL POSITION. NO MECHANICAL DAMAGE OR LACK OF PERFORMANCE SHALL BE EVIDENCED AFTER THE TEST.**
- F. EACH LEAD SHALL BE CAPABLE OF WITHSTANDING AN AXIAL PULL OF FOUR (4) POUNDS MINIMUM.**

- 4. SPECIAL CONDITIONING BY SUPPLIER:**
- A. BURN IN: 100 HOURS @ 125°C @ 1/10 WATT (AC OR DC). REJECT ANY PART WHICH CHANGES MORE THAN 0.1% OR CANNOT MEET PURCHASE TOLERANCE.**

NOTES:

1. RESISTANCE VALUES ABOVE 35K ARE NOT AVAILABLE, PER THE REQUIREMENTS OF THIS DRAWING AND MIL-R-93, USING .001 MIN. DIA. WIRE.

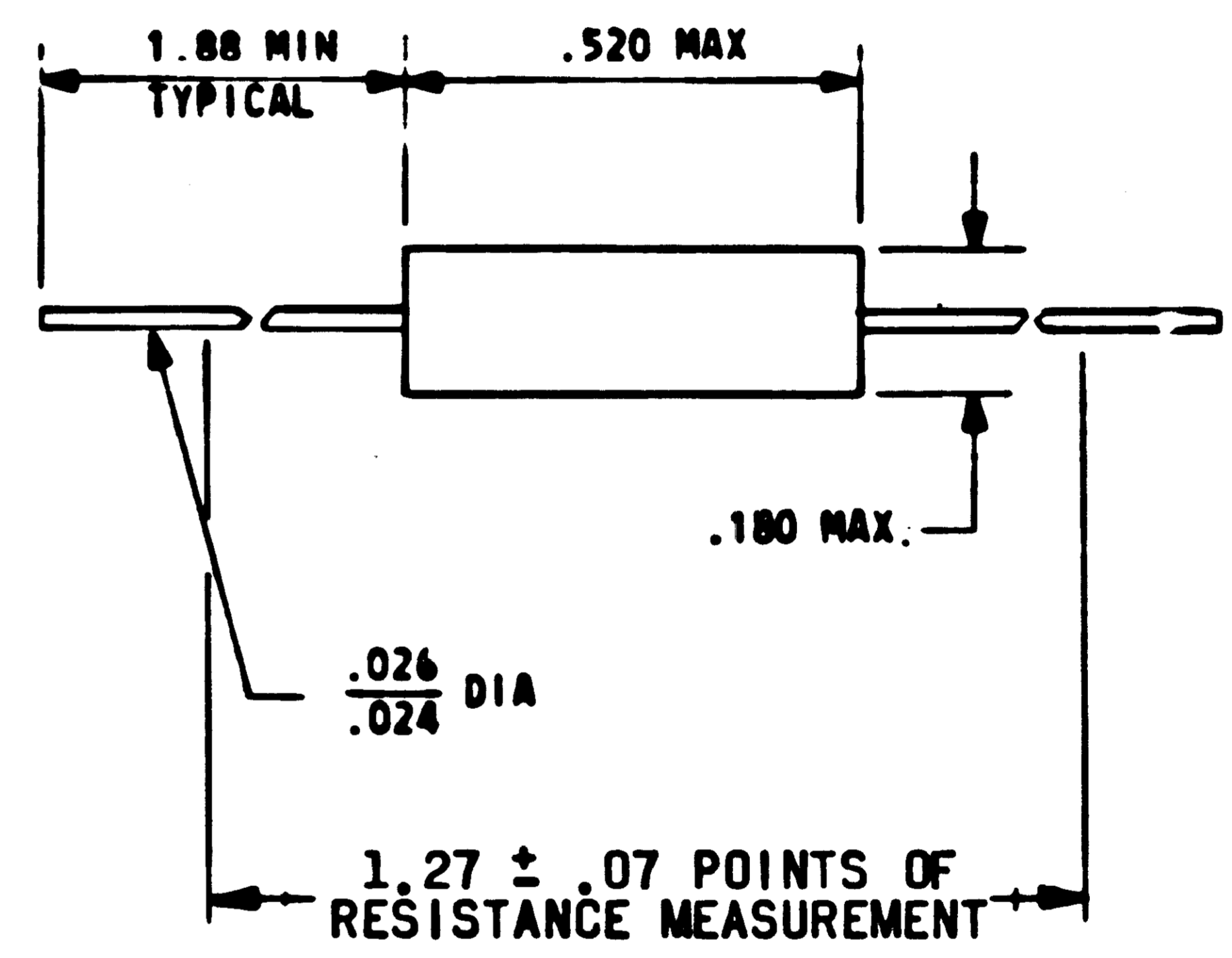
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING

SEE NOTE 1.

| DASH NO. | NOMINAL RES OHMS | RES TOL | DASH NO. | NOMINAL RES OHMS | RES TOL |
|----------|------------------|---------|----------|------------------|---------|
| 1 | 4,000 | ±0.1% | 53 | 25,000 | ±0.1% |
| 2 | 87,500 | | 54 | 12,500 | |
| 3 | 88,750 | | 55 | 8,330 | |
| 4 | 90,000 | | 56 | 6,250 | |
| 5 | 91,250 | | 57 | 1 | ±0.5% |
| 6 | 92,500 | | 58 | 2 | |
| 7 | 93,750 | | 59 | 3 | |
| 8 | 95,000 | | 60 | 4 | |
| 9 | 96,250 | | 61 | 5 | |
| 10 | 97,500 | | 62 | 6 | |
| 11 | 98,750 | | 63 | 7 | |
| 12 | 100,000 | | 64 | 8 | |
| 13 | 101,250 | | 65 | 9 | |
| 14 | 102,500 | | 66 | 10 | |
| 15 | 103,750 | | 67 | 11 | |
| 16 | 105,000 | | 68 | 12 | |
| 17 | 106,250 | | 69 | 13 | |
| 18 | 107,500 | | 70 | 14 | |
| 19 | 108,750 | | 71 | 15 | |
| 20 | 110,000 | | 72 | 16 | |
| 21 | 111,250 | | 73 | 17 | |
| 22 | 112,500 | ±0.1% | 74 | 18 | |
| 23 | 50 | ±1% | 75 | 19 | |
| 24 | 374 | | 76 | 82,500 | |
| 25 | 400 | | 77 | 83,750 | |
| 26 | 600 | | 78 | 85,000 | |
| 27 | 650 | | 79 | 86,250 | |
| 28 | 700 | | 80 | 87,500 | |
| 29 | 750 | | 81 | 88,750 | |
| 30 | 775 | | 82 | 90,000 | |
| 31 | 850 | | 83 | 91,250 | |
| 32 | 925 | | 84 | 92,500 | |
| 33 | 1,000 | | 85 | 93,750 | |
| 34 | 1,100 | | 86 | 95,000 | |
| 35 | 1,200 | | 87 | 96,250 | |
| 36 | 3,300 | | 88 | 97,500 | ±1.0% |
| 37 | 10,000 | | 89 | 98,750 | |
| 38 | 22,500 | | 90 | 100,000 | |
| 39 | 35,000 | | 91 | 101,250 | |
| 40 | 45,000 | | 92 | 102,500 | |
| 41 | 67,500 | | 93 | 103,750 | |
| 42 | 90,000 | | 94 | 105,000 | |
| 43 | 112,000 | | 95 | 106,250 | |
| 44 | 134,500 | | 96 | 107,500 | |
| 45 | 157,000 | | 97 | 108,750 | |
| 46 | 179,500 | | 98 | 110,000 | |
| 47 | 202,500 | | 99 | 111,250 | |
| 48 | 225,000 | | 100 | 112,500 | |
| 49 | 39,000 | | 101 | 113,750 | |
| 50 | 20,000 | | 102 | 115,000 | |
| 51 | 5,000 | | 103 | 116,250 | |
| 52 | 25,000 | | 104 | 117,500 | |

AA 7730101

| REVISIONS | | | |
|-----------|--|----------|----------|
| SYM | DESCRIPTION | DATE | APPROVAL |
| K | REPLACES REV J WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02103 | 7/17/63 | WIL |
| L | REVISED PER TDRR 02478 | 8-2-63 | WIL |
| M | REVISED PER TDRR 03382 | 7/24/63 | WIL |
| N | REVISED PER TDRR 03968 | 10/21/63 | WIL |
| P | REVISED PER TDRR 07311 | 3/31/64 | WIL |
| R | REVISED PER TDRR 08175 | 4/28/64 | WIL |
| S | REVISED PER TDRR 08941 | 6/26/64 | WIL |
| T | REVISED PER TDRR 10045 | 4/9/64 | WIL |
| U | REVISED PER TDRR 11508 | 8/12/64 | WIL |
| V | REVISED PER TDRR 12608 | 9/12/64 | WIL |
| W | REVISED PER TDRR 13388 | 1/24/65 | WIL |
| Y | REVISED PER TDRR 16598 | 4/24/65 | WIL |
| Z | REVISED PER TDRR 18746 | 8/18/66 | WIL |
| AA | REVISED PER TDRR 20878 | 7-20-65 | WIL |



K REPLACES REV J WITH CHANGE

| | | | |
|---|-------------------------|--|--------------|
| QTY REQD | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION | FIND NO. |
| LIST OF MATERIALS | | | |
| MIT INSTRUMENTATION LAB CAMBRIDGE MASS CONTRACT 437 | | MANNED SPACECRAFT CENTER HOUSTON, TEXAS | |
| DRAWN: [Signature] DATE: 7 JUN 63 | | RESISTORS, FIXED, WW,PRECISION | |
| CHECKED: [Signature] DATE: 11 JUN 63 | | | |
| APPROVAL: [Signature] DATE: 15 JUL 63 | | SPECIFICATION CONTROL DRAWING | |
| NASA APPROVAL: [Signature] DATE: 7/17/63 | | CODE IDENT NO. 80230 | SIZE C |
| MIT APPROVAL: [Signature] DATE: 7/17/63 | | NASA DRAWING NO. 1010377 | |
| SCALE | | WT | SHEET 1 OF 2 |

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± — ± — ± —

DO NOT SCALE THIS DRAWING MATERIAL

SEE NOTES

HEAT TREATMENT **NONE**

FINAL FINISH **NONE**

NEXT ASSY USED ON APPLICATION

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 MANNER 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.

7730101

| REVISIONS | | | |
|-----------|--|----------|----------|
| SYM | DESCRIPTION | DATE | APPROVAL |
| K | REPLACES REV J WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02103 | 7/7/63 | WJ |
| L | REVISED PER TDRR 02478 | 8-7-63 | WJ |
| M | REVISED PER TDRR 033F2 | 7/21/63 | WJ |
| N | REVISED PER TDRR 03968 | 10/1/63 | WJ |
| P | REVISED PER TDRR 07311 | 3/31/64 | WJ |
| R | REVISED PER TDRR 08175 | 7/28/64 | WJ |
| S | REVISED PER TDRR 08941 | 6/2/64 | WJ |
| T | REVISED PER TDRR 10045 | 6/19/64 | WJ |
| U | REVISED PER TDRR 11508 | 8/12/64 | WJ |
| V | REVISED PER TDRR 12608 | 7/22/64 | WJ |
| W | REVISED PER TDRR 13388 | 10/20/64 | WJ |
| Y | REVISED PER TDRR 16598 | 2/12/65 | WJ |
| Z | REVISED PER TDRR 18746 | 5/18/65 | WJ |
| AA | REVISED PER TDRR 20878 | 7-21-65 | WJ |

NOTE 2: DASH 301 TO 313 AND DASH 315, 316, 345 SHALL HAVE TEMP COEFFICIENT OF 3 PPM/°C BETWEEN THE TEMPERATURES OF 0°C TO +65°C. AND SHALL HAVE SPECIAL STABILITY FEATURE OF 50 PPM/YR @ 25°C AT 1/2 RATED POWER

| DASH NO. | NOMINAL RES OHMS | RES TOL |
|----------|------------------|---------|
| 325 | 740 | ±1% |
| 326 | 810 | ↓ |
| 327 | 890 | ↓ |
| 328 | 960 | ↓ |
| 329 | 1050 | ↓ |
| 330 | 1150 | ↓ |
| 331 | 42 | ±1% |
| 332 | 125.842K | ±.01% |
| 333 | 25.708K | ±.01% |
| 334 | 25.009K | ±.01% |
| 335 | 1740 | ±1% |
| 336 | 82.250K | ±0.1% |
| 337 | 82.500K | ↓ |
| 338 | 83.750K | ↓ |
| 339 | 85.000K | ↓ |
| 340 | 113.750K | ↓ |
| 341 | 115.000K | ↓ |
| 342 | 116.250K | ↓ |
| 343 | 117.500K | ↓ |
| 344 | 86.250K | ↓ |
| 345 | 125.796K | ±.01% |
| 346 | 25.013K | ±.01% |
| 347 | 125.500K | ±.01% |

| DASH NO. | NOMINAL RES OHMS | RES TOL | DASH NO. | NOMINAL RES OHMS | RES TOL |
|----------|------------------|---------|----------|------------------|---------|
| 105 | 16,000 | ±1.0% | 165 | 119 | ±0.1% |
| 106 | 6,200 | ↓ | 166 | 121 | ↓ |
| 107 | 100 | ↓ | 167 | 123 | ↓ |
| 108 | 150 | ↓ | 168 | 125 | ↓ |
| 109 | 7,500 | ↓ | 169 | 127 | ↓ |
| 110 | 4,700 | ↓ | 170 | 129 | ↓ |
| 111 | 91,000 | ↓ | 171 | 131 | ↓ |
| 112 | 1 | ↓ | 172 | 133 | ↓ |
| 113 | 15 | ±0.1% | 173 | 135 | ↓ |
| 114 | 17 | ↓ | 174 | 137 | ↓ |
| 115 | 19 | ↓ | 175 | 139 | ↓ |
| 116 | 21 | ↓ | 176 | 141 | ↓ |
| 117 | 23 | ↓ | 177 | 143 | ↓ |
| 118 | 25 | ↓ | 178 | 145 | ↓ |
| 119 | 27 | ↓ | 179 | 147 | ↓ |
| 120 | 29 | ↓ | 180 | 149 | ↓ |
| 121 | 31 | ↓ | 181 | 151 | ↓ |
| 122 | 33 | ↓ | 182 | 153 | ↓ |
| 123 | 35 | ↓ | 183 | 155 | ↓ |
| 124 | 37 | ↓ | 184 | 157 | ↓ |
| 125 | 39 | ↓ | 185 | 159 | ↓ |
| 126 | 41 | ↓ | 186 | 161 | ↓ |
| 127 | 43 | ↓ | 187 | 163 | ↓ |
| 128 | 45 | ↓ | 188 | 165 | ↓ |
| 129 | 47 | ↓ | 189 | 167 | ↓ |
| 130 | 49 | ↓ | 190 | 169 | ↓ |
| 131 | 51 | ↓ | 191 | 171 | ↓ |
| 132 | 53 | ↓ | 192 | 173 | ↓ |
| 133 | 55 | ↓ | 193 | 175 | ↓ |
| 134 | 57 | ↓ | 194 | 177 | ↓ |
| 135 | 59 | ↓ | 195 | 179 | ↓ |
| 136 | 61 | ↓ | 196 | 181 | ↓ |
| 137 | 63 | ↓ | 197 | 183 | ↓ |
| 138 | 65 | ↓ | 198 | 185 | ↓ |
| 139 | 67 | ↓ | 199 | 187 | ↓ |
| 140 | 69 | ↓ | 200 | 189 | ↓ |
| 141 | 71 | ↓ | 201 | 191 | ↓ |
| 142 | 73 | ↓ | 202 | 193 | ↓ |
| 143 | 75 | ↓ | 203 | 195 | ↓ |
| 144 | 77 | ↓ | 204 | 197 | ↓ |
| 145 | 79 | ↓ | 205 | 199 | ↓ |
| 146 | 81 | ↓ | 206 | 201 | ↓ |
| 147 | 83 | ↓ | 207 | 700 | ↓ |
| 148 | 85 | ↓ | 208 | 710 | ↓ |
| 149 | 87 | ↓ | 209 | 720 | ↓ |
| 150 | 89 | ↓ | 210 | 730 | ↓ |
| 151 | 91 | ↓ | 211 | 740 | ↓ |
| 152 | 93 | ↓ | 212 | 750 | ↓ |
| 153 | 95 | ↓ | 213 | 760 | ↓ |
| 154 | 97 | ↓ | 214 | 770 | ↓ |
| 155 | 99 | ↓ | 215 | 780 | ↓ |
| 156 | 101 | ↓ | 216 | 790 | ↓ |
| 157 | 103 | ↓ | 217 | 800 | ↓ |
| 158 | 105 | ↓ | 218 | 810 | ↓ |
| 159 | 107 | ↓ | 219 | 820 | ↓ |
| 160 | 109 | ↓ | 220 | 830 | ↓ |
| 161 | 111 | ↓ | 221 | 840 | ↓ |
| 162 | 113 | ↓ | 222 | 850 | ↓ |
| 163 | 115 | ↓ | 223 | 860 | ↓ |
| 164 | 117 | ↓ | 224 | 870 | ↓ |

| DASH NO. | NOMINAL RES OHMS | RES TOL |
|----------|------------------|---------|
| 225 | 880 | ±0.1% |
| 226 | 890 | ↓ |
| 227 | 900 | ↓ |
| 228 | 910 | ↓ |
| 229 | 920 | ↓ |
| 230 | 930 | ↓ |
| 231 | 940 | ↓ |
| 232 | 950 | ↓ |
| 233 | 960 | ↓ |
| 234 | 970 | ↓ |
| 235 | 980 | ↓ |
| 236 | 990 | ↓ |
| 237 | 1000 | ↓ |
| 238 | 1010 | ↓ |
| 239 | 1020 | ↓ |
| 240 | 1030 | ↓ |
| 241 | 1040 | ↓ |
| 242 | 1050 | ↓ |
| 243 | 1060 | ↓ |
| 244 | 1070 | ↓ |
| 245 | 1080 | ↓ |
| 246 | 1090 | ↓ |
| 247 | 1100 | ↓ |
| 248 | 1110 | ↓ |
| 249 | 1120 | ↓ |
| 250 | 1130 | ↓ |
| 251 | 1140 | ↓ |
| 252 | 1150 | ↓ |
| 253 | 1160 | ↓ |
| 254 | 1170 | ↓ |
| 255 | 1180 | ↓ |
| 256 | 1190 | ↓ |
| 257 | 1200 | ↓ |
| 258 | 1210 | ↓ |
| 259 | 1220 | ↓ |
| 260 | 1230 | ↓ |
| 261 | 1240 | ↓ |
| 262 | 1250 | ↓ |
| 263 | 1260 | ↓ |
| 264 | 1270 | ↓ |
| 265 | 1280 | ↓ |
| 266 | 1290 | ↓ |
| 267 | 1300 | ↓ |
| 268 | 1310 | ↓ |
| 269 | 1320 | ↓ |
| 270 | 1330 | ↓ |
| 271 | 1340 | ↓ |
| 272 | 1350 | ↓ |
| 273 | 1360 | ↓ |
| 274 | 1370 | ↓ |

| DASH NO. | NOMINAL RES OHMS | RES TOL |
|----------|------------------|---------|
| 275 | 1380 | ±0.1% |
| 276 | 1390 | ↓ |
| 277 | 1400 | ↓ |
| 278 | 500 | ±1% |
| 279 | 2100 | ↓ |
| 280 | 1620 | ↓ |
| 281 | 53K | ±1% |
| 282 | 64K | ↓ |
| 283 | 73K | ↓ |
| 284 | 127K | ↓ |
| 285 | 136K | ↓ |
| 286 | 145K | ↓ |
| 287 | 154K | ↓ |
| 288 | 163K | ↓ |
| 289 | 172K | ↓ |
| 290 | 181K | ↓ |
| 291 | 190K | ↓ |
| 292 | 199K | ↓ |
| 293 | 208K | ↓ |
| 294 | 217K | ↓ |
| 295 | 226K | ↓ |
| 296 | 235K | ↓ |
| 297 | 244K | ↓ |
| 298 | 253K | ↓ |
| 299 | 262K | ↓ |
| 300 | 271K | ↓ |
| 301 | 866.98Ω | ±.01% |
| 302 | 1.9638K | ↓ |
| 303 | 2.6027K | ↓ |
| 304 | 4.000K | ↓ |
| 305 | 8.000K | ↓ |
| 306 | 12.500K | ↓ |
| 307 | 25.000K | ↓ |
| 308 | 25.490K | ↓ |
| 309 | 30.000K | ↓ |
| 310 | 30.067K | ↓ |
| 311 | 44.999K | ↓ |
| 312 | 100.000K | ↓ |
| 313 | 128.146K | ↓ |
| 314 | 80K | ±1% |
| 315 | 25.760K | ±.01% |
| 316 | 125.574K | ±.01% |
| 317 | 16.5Ω | ±1% |
| 318 | 21.4Ω | ↓ |
| 319 | 27.0Ω | ↓ |
| 320 | 33.7Ω | ↓ |
| 321 | 43.0Ω | ↓ |
| 322 | 20.7Ω | ↓ |
| 323 | 18.8Ω | ↓ |
| 324 | 44.0Ω | ±1% |

K REPLACES J WITH CHANGE

| | | | |
|---|-------------------------|---|---------------|
| QTY REQD | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION | FIND NO. |
| LIST OF MATERIALS | | | |
| MIT INSTRUMENTATION LAB CAMBRIDGE MASS CONTRACT 497 | | MANNED SPACECRAFT CENTER HOUSTON, TEXAS | |
| DRAWN <i>Chick</i> DATE <i>6 JUN 63</i> | | RESISTORS, FIXED, WW, PRECISION SPECIFICATION CONTROL DRAWING | |
| CHECKED <i>William Humel</i> DATE <i>15 JUL 63</i> | | | |
| APPROVAL <i>G.A. Test</i> | | NASA APPROVAL <i>G.A. Test</i> DATE <i>7/17/63</i> | |
| MATERIAL | | NASA DRAWING NO. 1010377 | |
| HEAT TREATMENT | | CODE IDENT NO. 80230 | SIZE C |
| FINAL FINISH | | SCALE | WT |
| NEXT ASSY | USED ON | SHEET 2 OF 2 | |
| APPLICATION | | | |