# LC75
# "Z METER II"

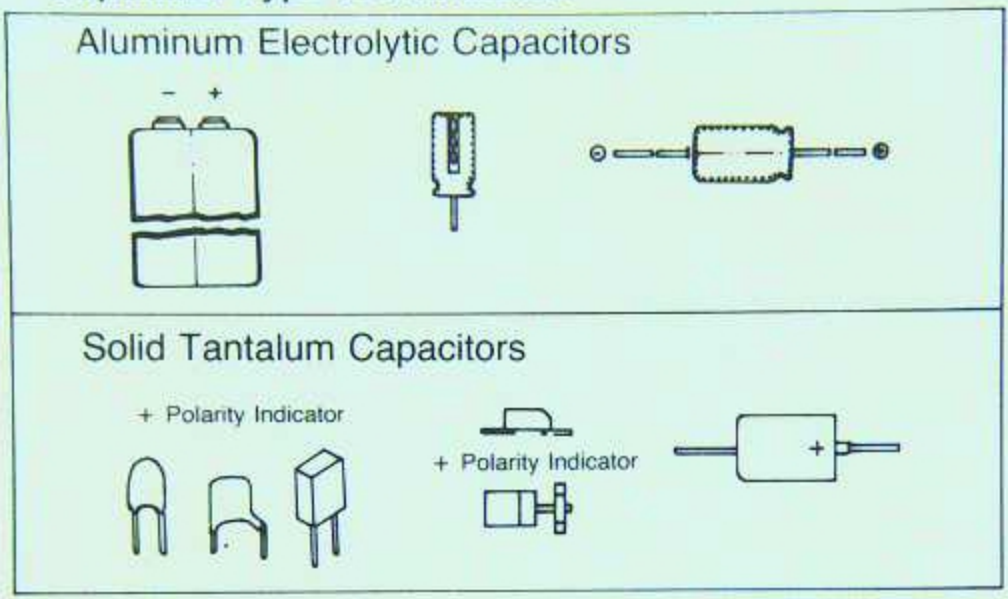
# Simplified Operating Instructions

## Leakage Charts
## ESR Charts
## Capacitor Type Reference

SENCORE
3200 Sencore Drive, Sioux Falls, South Dakota 57107
WATS FREE 1-800-843-3338

Form 3405

## 1. Capacitor Type Identification




### Capacitor Multiplier Conversion Chart

| Change to<br>From | Microfarads | Nanofarads | Picofarads |
|---|---|---|---|
| Microfarads | | Move decimal 3 places right | Move decimal 6 places right |
| Nanofarads | Move decimal 3 places left | | Move decimal 3 places right |
| Picofarads | Move decimal 6 places left | Move decimal 3 places left | |

The LC75 reads out directly in standard values of pf or uf. Use this chart to convert between multipliers.

## 2. Maximum Allowable Leakage (in Microamps)

Standard Aluminum Electrolytic Capacitors

| Capacity in uF | 3V | 6V | 10V | 15V | 25V | 50V | 100V | 200V | 400V | 500V | 600V |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 10 | 20 | 25 | 30 |
| 1.5 | 5 | 5 | 5 | 5 | 5 | 5 | 8 | 15 | 30 | 38 | 45 |
| 2.2 | 5 | 5 | 5 | 5 | 5 | 6 | 11 | 22 | 44 | 200 | 220 |
| 3.3 | 5 | 5 | 5 | 5 | 5 | 8 | 17 | 33 | 220 | 240 | 270 |
| 4.7 | 5 | 5 | 5 | 5 | 6 | 12 | 23 | 47 | 260 | 290 | 320 |
| 6.8 | 5 | 5 | 5 | 5 | 9 | 17 | 34 | 220 | 310 | 350 | 380 |
| 10 | 5 | 5 | 5 | 8 | 13 | 25 | 50 | 270 | 380 | 420 | 460 |
| 15 | 5 | 5 | 8 | 11 | 19 | 38 | 230 | 330 | 460 | 520 | 570 |
| 22 | 5 | 7 | 11 | 17 | 28 | 200 | 280 | 400 | 560 | 630 | 690 |
| 33 | 5 | 10 | 17 | 25 | 41 | 240 | 340 | 490 | 690 | 770 | 840 |
| 47 | 7 | 14 | 24 | 35 | 200 | 290 | 410 | 600 | 823 | 920 | 1010 |
| 68 | 10 | 20 | 34 | 190 | 250 | 350 | 500 | 710 | 990 | 1100 | 1210 |
| 100 | 15 | 30 | 50 | 230 | 300 | 420 | 600 | 860 | 1200 | 1340 | 1470 |
| 150 | 23 | 45 | 230 | 280 | 370 | 520 | 730 | 1040 | 1470 | 1640 | 1800 |
| 220 | 33 | 220 | 280 | 340 | 440 | 630 | 890 | 1270 | 1780 | 1990 | 2180 |
| 330 | 50 | 270 | 340 | 420 | 540 | 770 | 1090 | 1540 | 2180 | 2440 | 2670 |
| 470 | 220 | 320 | 410 | 500 | 650 | 920 | 1300 | 1890 | 2600 | 2910 | 3190 |
| 680 | 270 | 380 | 500 | 600 | 780 | 1100 | 1560 | 2250 | 3130 | 3500 | 3830 |
| 1000 | 330 | 460 | 600 | 730 | 950 | 1340 | 1900 | 2710 | 3790 | 4240 | 4650 |
| 1500 | 400 | 570 | 730 | 900 | 1160 | 1640 | 2320 | 3290 | 4650 | 5200 | 5690 |
| 2200 | 490 | 690 | 890 | 1090 | 1410 | 1990 | 2810 | 4020 | 5630 | 6290 | 6890 |
| 3300 | 600 | 840 | 1090 | 1330 | 1720 | 2440 | 3450 | 4870 | 6890 | 7700 | 8440 |
| 4700 | 710 | 1000 | 1300 | 1590 | 2060 | 2900 | 4110 | 5970 | 8230 | 9200 | |
| 6800 | 860 | 1210 | 1560 | 1920 | 2470 | 3500 | 4950 | 7120 | 9890 | | |
| 10000 | 1040 | 1470 | 1900 | 2320 | 3000 | 4240 | 6000 | 8570 | | | |
| 15000 | 1270 | 1800 | 2320 | 2850 | 3670 | 5200 | 7350 | | | | |
| 22000 | 1540 | 2180 | 2810 | 3450 | 4450 | 6300 | 8900 | | | | |
| 33000 | 1890 | 2670 | 3450 | 4220 | 5450 | 7700 | | | | | |
| 47000 | 2250 | 3190 | 4110 | 5040 | 6500 | 9200 | | | | | |
| 56000 | 2460 | 3480 | 4490 | 5500 | 7100 | | | | | | |
| 68000 | 2710 | 3830 | 4950 | 6060 | 7820 | | | | | | |
| 100000 | 3290 | 4650 | 6000 | 7350 | 9490 | | | | | | |
| 150000 | 4020 | 5690 | 7350 | 9000 | | | | | | | |
| 200000 | 4650 | 6600 | 8500 | | | | | | | | |

Use 100uA MAX LEAKAGE RANGE

Use 10KuA LEAKAGE RANGE

# 3. Maximum Allowable Leakage (in Microamps)

## Dipped Solid Tantalum Capacitors

| Capacity in uF | 3V | 6V | 10V | 15V | 25V | 50V | 100V | 200V | 300V | 400V | 500V | 600V |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 3.5 | 4.9 | 6.1 | 7.0 | 7.8 | 8.6 |
| 1.5 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 2.0 | 4.3 | 6.1 | 7.4 | 8.6 | 9.6 | 11 |
| 2.2 | 1.0 | 1.0 | 1.0 | 1.0 | 1.5 | 2.0 | 5.2 | 7.3 | 9.0 | 10 | 12 | 13 |
| 3.3 | 1.0 | 1.0 | 1.0 | 1.0 | 2.0 | 3.0 | 6.4 | 9.0 | 11 | 13 | 14 | 16 |
| 4.7 | 1.0 | 1.0 | 1.0 | 1.5 | 2.5 | 3.5 | 7.6 | 11 | 13 | 15 | 17 | 19 |
| 6.8 | 1.0 | 1.0 | 1.5 | 2.0 | 3.0 | 6.5 | 9.1 | 13 | 16 | 18 | 20 | 22 |
| 10 | 1.6 | 1.6 | 2.0 | 2.5 | 4.0 | 7.8 | 11 | 16 | 19 | 22 | 25 | 27 |
| 15 | 2.2 | 2.2 | 2.5 | 3.0 | 7.0 | 9.6 | 14 | 19 | 23 | 27 | 30 | 33 |
| 22 | 2.8 | 2.8 | 3.0 | 5.0 | 10 | 12 | 16 | 23 | 28 | 33 | 37 | 40 |
| 33 | 3.4 | 3.4 | 5.0 | 7.5 | 10 | 14 | 20 | 28 | 35 | 40 | 45 | 49 |
| 47 | 4.0 | 4.0 | 10 | 10 | 15 | 17 | 24 | 34 | 42 | 48 | 54 | 59 |
| 68 | 5.0 | 5.0 | 15 | 15 | 15 | 20 | 29 | 41 | 50 | 58 | 65 | 71 |
| 100 | 10 | 10 | 15 | 20 | 17 | 25 | 35 | 49 | 61 | 70 | 78 | 86 |
| 150 | 15 | 15 | 20 | 20 | 21 | 30 | 43 | 61 | 74 | 86 | 96 | 105 |
| 220 | 20 | 20 | 20 | 20 | 26 | 37 | 52 | 73 | 90 | 104 | 116 | 127 |
| 330 | 20 | 20 | 20 | 25 | 32 | 45 | 64 | 90 | 110 | 127 | 142 | 156 |
| 470 | 24 | 24 | 24 | 29 | 38 | 54 | 76 | 107 | 131 | 152 | 170 | 186 |
| 680 | 29 | 29 | 29 | 35 | 46 | 65 | 91 | 129 | 158 | 183 | 204 | 224 |
| 1000 | 35 | 35 | 35 | 43 | 55 | 78 | 111 | 157 | 192 | 221 | 247 | 271 |
| 1500 | 43 | 43 | 43 | 53 | 68 | 96 | 136 | 192 | 235 | 271 | 303 | 332 |
| 2200 | 52 | 52 | 52 | 64 | 82 | 116 | 164 | 232 | 284 | 328 | 367 | 402 |
| 3300 | 64 | 64 | 64 | 78 | 101 | 142 | 201 | 284 | 348 | 402 | 450 | 492 |
| 4700 | 76 | 76 | 76 | 93 | 120 | 170 | 240 | 339 | 416 | 480 | 537 | 588 |
| 6800 | 91 | 91 | 91 | 112 | 144 | 204 | 289 | 408 | 500 | 577 | 646 | 707 |
| 10000 | 111 | 111 | 111 | 136 | 175 | 247 | 350 | 495 | 606 | 700 | 783 | 857 |
| 15000 | 136 | 136 | 136 | 166 | 214 | 303 | 429 | 606 | 742 | 857 | 959 | 1050 |
| 22000 | 164 | 164 | 164 | 201 | 260 | 367 | 519 | 734 | 899 | 1040 | 1160 | 1270 |
| 33000 | 201 | 201 | 201 | 246 | 318 | 450 | 636 | 899 | 1100 | 1270 | 1420 | 1560 |
| 47000 | 240 | 240 | 240 | 294 | 379 | 537 | 759 | 1070 | 1314 | 1520 | 1700 | 1860 |
| 68000 | 289 | 289 | 289 | 353 | 456 | 645 | 913 | 1290 | 1580 | 1830 | 2040 | 2240 |
| 100000 | 350 | 350 | 350 | 429 | 553 | 783 | 1100 | 1570 | 1920 | 2210 | 2480 | 2710 |
| 150000 | 429 | 429 | 429 | 535 | 678 | 959 | 1360 | 1920 | 2350 | 2710 | 3030 | 3320 |
| 200000 | 495 | 495 | 495 | 606 | 783 | 1100 | 1570 | 2210 | 2710 | 3130 | 3500 | 3830 |

Use 100uA MAX LEAKAGE RANGE

Use 10KuA LEAKAGE RANGE

NOTE: No industry standards are available for component values in the shaded areas. These values have been extrapolated from existing standards and manufacturers data. All values outside the shaded areas are based on existing EIA industry standards.

# 4. Maximum Allowable ESR (in Ohms)

## Standard Aluminum Electolytic Capacitors

| Capacity in uF | 3V | 6V | 10V | 15V | 25V | 50V | 100V | 200V | 300V | 400V | 500V | 600V |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 663 | 663 | 663 | 464 | 464 | 332 | 265 | 265 | 265 | 265 | 265 | 265 |
| 1.5 | 442 | 442 | 442 | 310 | 310 | 221 | 177 | 177 | 177 | 177 | 177 | 177 |
| 2.2 | 302 | 302 | 302 | 211 | 211 | 151 | 121 | 121 | 121 | 121 | 121 | 121 |
| 3.3 | 201 | 201 | 201 | 141 | 141 | 101 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 |
| 4.7 | 141 | 141 | 141 | 99 | 99 | 71.0 | 56.0 | 56.0 | 56.0 | 56.0 | 56.0 | 56.0 |
| 6.8 | 98 | 98 | 98 | 68.0 | 68.0 | 49.0 | 39.0 | 39.0 | 39.0 | 39.0 | 39.0 | 39.0 |
| 10 | 66.0 | 66.0 | 66.0 | 46.0 | 46.0 | 33.0 | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 |
| 15 | 44.0 | 44.0 | 44.0 | 31.0 | 31.0 | 22.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| 22 | 30.0 | 30.0 | 30.0 | 21.0 | 21.0 | 15.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| 33 | 20.0 | 20.0 | 20.0 | 14.0 | 14.0 | 10.0 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 |
| 47 | 14.0 | 14.0 | 14.0 | 9.88 | 9.88 | 7.06 | 5.65 | 5.65 | 5.65 | 5.65 | 5.65 | 5.65 |
| 68 | 9.76 | 9.76 | 9.76 | 6.83 | 6.83 | 4.88 | 3.90 | 3.90 | 3.90 | 3.90 | 3.90 | 3.90 |
| 100 | 6.63 | 6.63 | 6.63 | 4.64 | 4.64 | 3.32 | 2.65 | 2.65 | 2.65 | 2.65 | 2.65 | 2.65 |
| 150 | 4.42 | 4.42 | 4.42 | 3.10 | 3.10 | 2.21 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 |
| 220 | 3.02 | 3.02 | 3.02 | 2.11 | 2.11 | 1.51 | 1.21 | 1.21 | 1.21 | 1.21 | 1.21 | 1.21 |
| 330 | 2.01 | 2.01 | 2.01 | 1.41 | 1.41 | 1.01 | .80 | .80 | .80 | .80 | .80 | .80 |
| 470 | 1.41 | 1.41 | 1.41 | .99 | .99 | .71 | .57 | .57 | .57 | .57 | .57 | .57 |
| 680 | .98 | .98 | .98 | .68 | .68 | .49 | .39 | .39 | .39 | .39 | .39 | .39 |
| 1000 | .66 | .66 | .66 | .46 | .46 | .33 | .27 | .27 | .27 | .27 | .27 | .27 |
| 1500 | .44 | .44 | .44 | .31 | .31 | .22 | .18 | .18 | .18 | .17 | .18 | .18 |
| 2200 | .30 | .30 | .30 | .21 | .21 | .15 | .12 | .12 | .12 | .12 | .12 | .12 |
| 3300 | .20 | .20 | .20 | .14 | .14 | .10 | .08 | .08 | .08 | .08 | .08 | .08 |
| 4700 | .14 | .14 | .14 | .10 | .10 | .07 | .06 | .06 | .06 | .06 | .06 | .06 |
| 6800 | .10 | .10 | .10 | .07 | .07 | .05 | .04 | .04 | .04 | .04 | .04 | .04 |
| 10000 | .07 | .07 | .07 | .05 | .05 | .03 | .03 | .03 | .03 | .03 | .03 | .03 |
| 15000 | .04 | .04 | .04 | .03 | .03 | .02 | .02 | .02 | .02 | .02 | .02 | .02 |
| 22000 | .03 | .03 | .03 | .02 | .02 | .02 | .01 | .01 | .01 | .01 | .01 | .01 |
| 33000 | .02 | .02 | .02 | .01 | .01 | .01 | | | | | | |
| 47000 | .01 | .01 | .01 | .01 | .01 | | | | | | | |
| 56000 | .01 | .01 | .01 | | | | | | | | | |
| 68000 | .01 | .01 | .01 | | | | | | | | | |

NOTE: No industry standards are available for component values in the shaded areas. These values have been extrapolated from existing standards and manufacturers data. All values outside the shaded areas are based on existing EIA industry standards.

# 5. Maximum Allowable ESR (in Ohms)

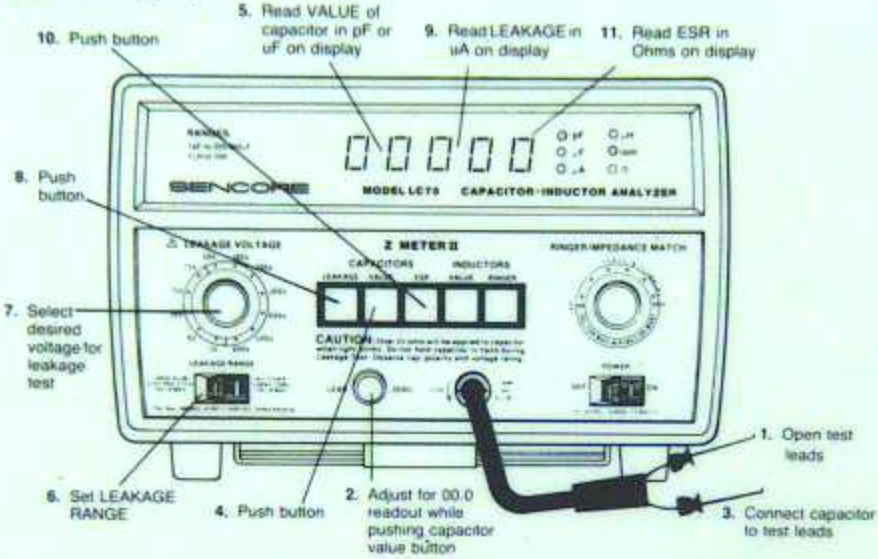
## Dipped Solid Tantalum Capacitors

| Capacity in uF | 3V | 6V | 10V | 15V | 25V | 50V | 100V | 200V | 300V | 400V | 500V | 600V |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 133 | 133 | 79.6 | 79.6 | 79.6 | 66.3 | 66.3 | 66.3 | 66.3 | 66.3 | 66.3 | 66.3 |
| 1.5 | 88.4 | 88.4 | 53.1 | 53.1 | 53.1 | 44.2 | 44.2 | 44.2 | 44.2 | 44.2 | 44.2 | 44.2 |
| 2.2 | 60.3 | 60.3 | 36.2 | 36.2 | 36.2 | 30.1 | 30.1 | 30.1 | 30.1 | 30.1 | 30.1 | 30.1 |
| 3.3 | 40.2 | 40.2 | 24.1 | 24.1 | 24.1 | 20.1 | 20.1 | 20.1 | 20.1 | 20.1 | 20.1 | 20.1 |
| 4.7 | 28.2 | 28.2 | 16.9 | 16.9 | 16.9 | 14.1 | 14.1 | 14.1 | 14.1 | 14.1 | 14.1 | 14.1 |
| 6.8 | 19.5 | 19.5 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 |
| 10 | 13.3 | 13.3 | 7.96 | 7.96 | 7.96 | 7.96 | 7.96 | 7.96 | 7.96 | 7.96 | 7.96 | 7.96 |
| 15 | 8.84 | 8.84 | 5.31 | 5.31 | 5.31 | 5.31 | 5.31 | 5.31 | 5.31 | 5.31 | 5.31 | 5.31 |
| 22 | 6.03 | 6.03 | 3.62 | 3.62 | 3.62 | 3.62 | 3.62 | 3.62 | 3.62 | 3.62 | 3.62 | 3.62 |
| 33 | 4.02 | 4.02 | 2.41 | 2.41 | 2.41 | 2.41 | 2.41 | 2.41 | 2.41 | 2.41 | 2.41 | 2.41 |
| 47 | 2.82 | 2.82 | 1.69 | 1.69 | 1.69 | 1.69 | 1.69 | 1.69 | 1.69 | 1.69 | 1.69 | 1.69 |
| 68 | 1.95 | 1.95 | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 |
| 100 | 1.33 | 1.33 | .80 | .80 | .80 | .80 | .80 | .80 | .80 | .80 | .80 | .80 |
| 150 | .88 | .88 | .88 | .88 | .88 | .53 | .53 | .53 | .53 | .53 | .53 | .53 |
| 220 | .60 | .60 | .60 | .60 | .60 | .36 | .36 | .36 | .36 | .36 | .36 | .36 |
| 330 | .40 | .40 | .40 | .40 | .40 | .24 | .24 | .24 | .24 | .24 | .24 | .24 |
| 470 | .28 | .28 | .28 | .28 | .28 | .17 | .17 | .17 | .17 | .17 | .17 | .17 |
| 680 | .20 | .20 | .20 | .20 | .20 | .12 | .12 | .12 | .12 | .12 | .12 | .12 |
| 1000 | .13 | .13 | .13 | .13 | .13 | .08 | .08 | .08 | .08 | .08 | .08 | .08 |
| 1500 | .09 | .09 | .09 | .09 | .09 | .05 | .05 | .05 | .05 | .05 | .05 | .05 |
| 2200 | .06 | .06 | .06 | .06 | .06 | .04 | .04 | .04 | .04 | .04 | .04 | .04 |
| 3300 | .04 | .04 | .04 | .04 | .04 | .02 | .02 | .02 | .02 | .02 | .02 | .02 |
| 4700 | .03 | .03 | .03 | .03 | .03 | .02 | .02 | .02 | .02 | .02 | .02 | .02 |
| 6800 | .02 | .02 | .02 | .02 | .02 | .01 | .01 | .01 | .01 | .01 | .01 | .01 |

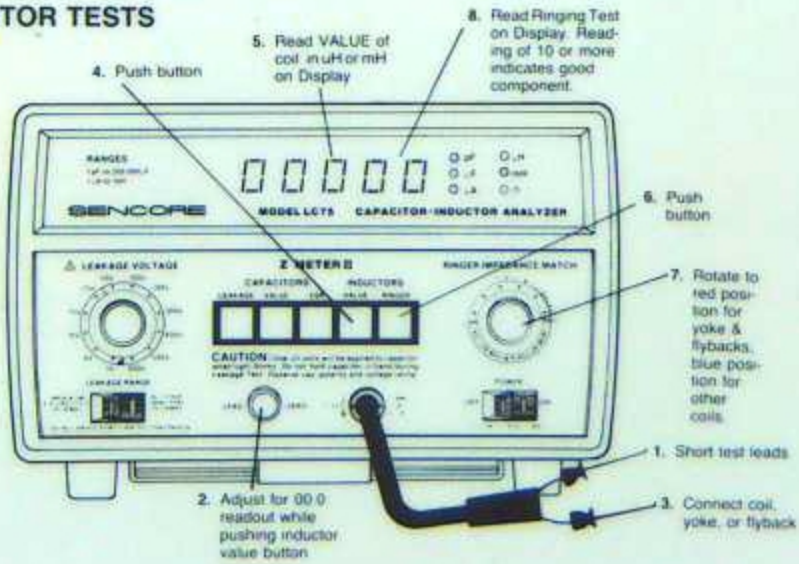
NOTE: No industry standards are available for component values in the shaded areas. These values have been extrapolated from existing standards and manufacturers data. All values outside the shaded areas are based on existing EIA industry standards.

# 6. Simplified Operations

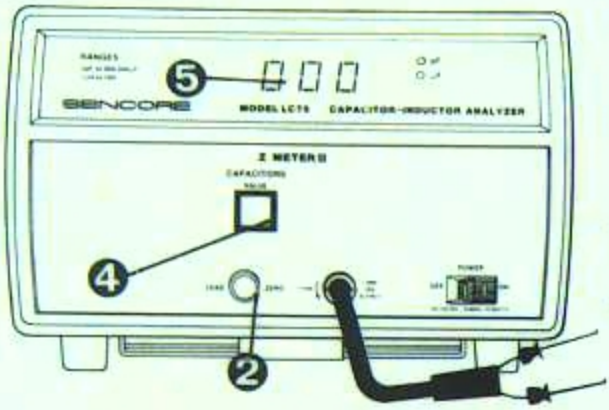
## CAPACITOR TESTS




## INDUCTOR TESTS

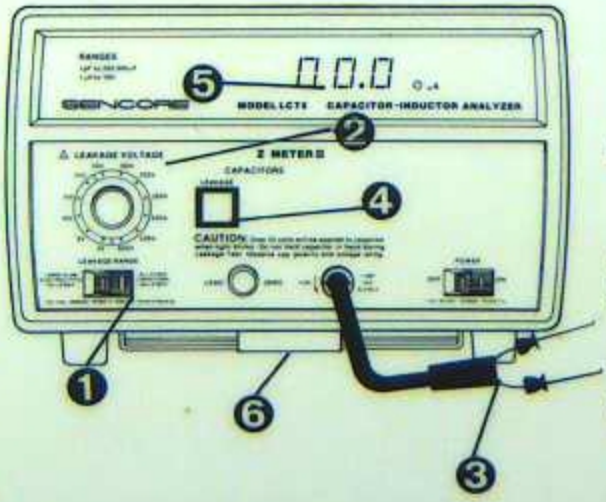


## 8. Capacitor Value Test



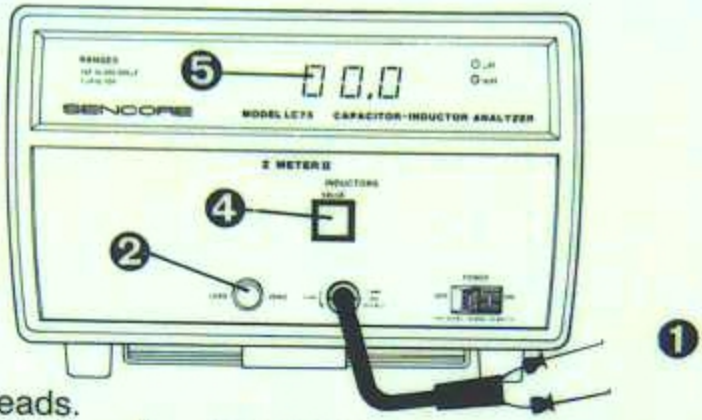

1. Open test leads.
2. Adjust LEAD ZERO for "00.0" display with CAPACITOR VALUE button pushed.
3. Connect leads to capacitor. Connect red clip to "+" if cap is polarized.
4. Push CAPACITOR VALUE button.
5. Read capacitance value on display.

## 7. Capacitor Leakage Test



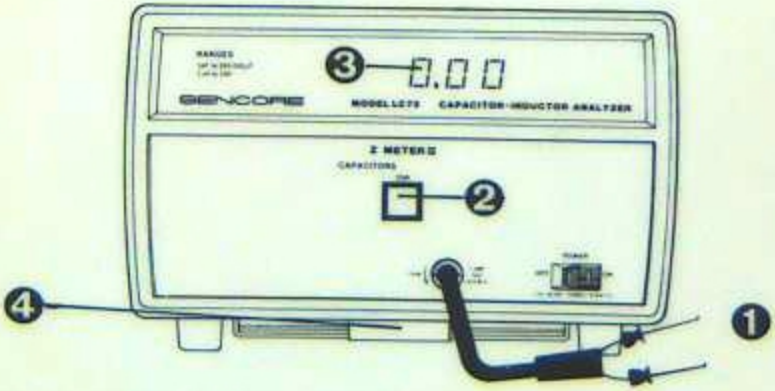

1. Set LEAKAGE RANGE to 10KuA for large value electrolytics or 100uA for all other capacitors. See leakage charts, page 2 & 3 for details.
2. Set LEAKAGE VOLTAGE to voltage rating of capacitor. Use next lowest voltage if switch doesn't match voltage rating of capacitor.
3. Connect capacitor. Connect red clip to "+" if cap is polarized.
4. Push LEAKAGE button.
5. Read leakage current on display after reading stops decreasing.
6. Measured leakage must be less than maximum leakage on pull charts, page 2 & 3.

## 10. Inductor Value Test



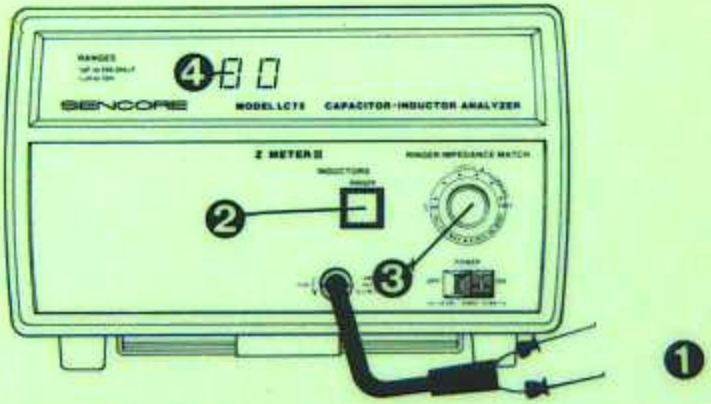

1. Short test leads.
2. Adjust for "00.0" reading with INDUCTOR VALUE button pushed.
3. Connect test leads to either end of inductor.
4. Push INDUCTOR VALUE button.
5. Read inductance value on display.

## 9. Capacitor ESR Test




1. Connect capacitor. Connect red clip to "+" if cap is polarized.
2. Push ESR button.
3. Read ESR on display.
4. Measured ESR must be less than maximum allowable ESR shown on pull chart page 4 & 5.

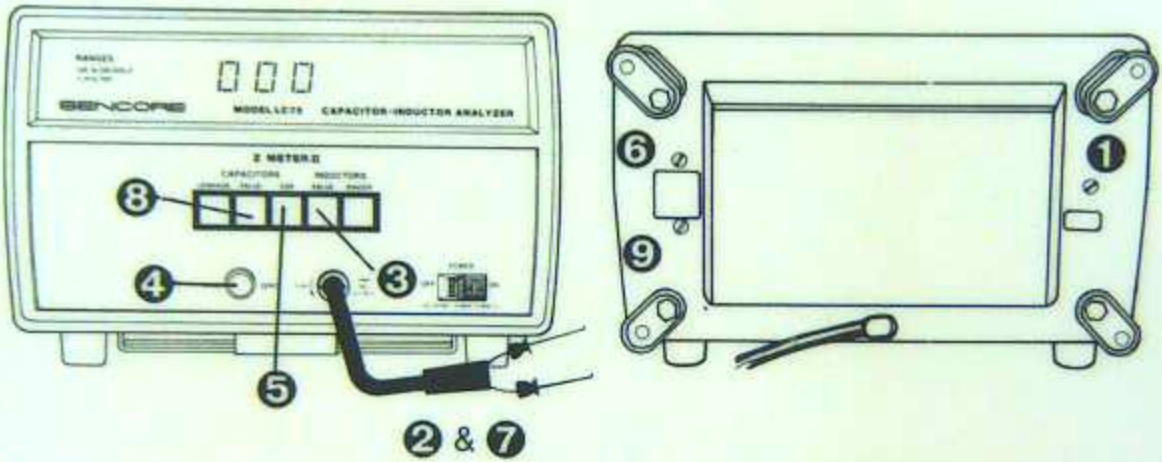
## 11. Inductor Ringer Test




1. Connect inductor, coil or flyback.
2. Push RINGER button.
3. Rotate RINGER IMPEDANCE MATCH control through red positions for yokes and flybacks, blue positions for other coils, for maximum number of rings.
4. "Ring" reading of 10 or more indicates good component.

## 12. Zeroing Adjustments

This zeroing adjustment procedure should be performed when the front panel LEAD ZERO control must be readjusted between ESR, capacitance, and inductance value tests.




1. Adjust DVM ZERO for "000" display with no buttons pushed.
2. Short test leads.
3. Press INDUCTOR VALUE button.
4. Adjust LEAD ZERO for "00.0" display.
5. Press CAPACITOR ESR button.
6. Adjust ESR ZERO for "0.00" display.
7. Open test leads.
8. Press CAPACITOR VALUE button.
9. Adjust CAP ZERO for "00.0" display.