

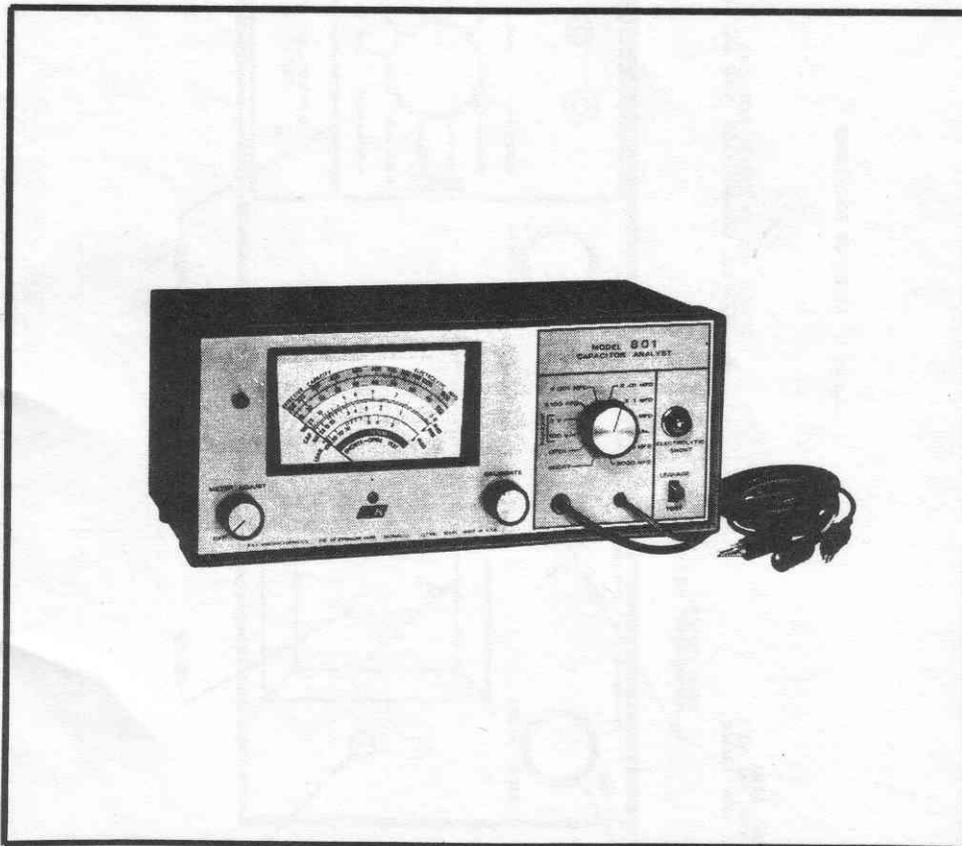
INSTRUCTION
MANUAL



MODEL 801

ManualsPlus.com

CAPACITY ANALYZER



BK PRECISION

DYNASCAN CORPORATION

6460 W. Cortland St. • Chicago, IL 60635

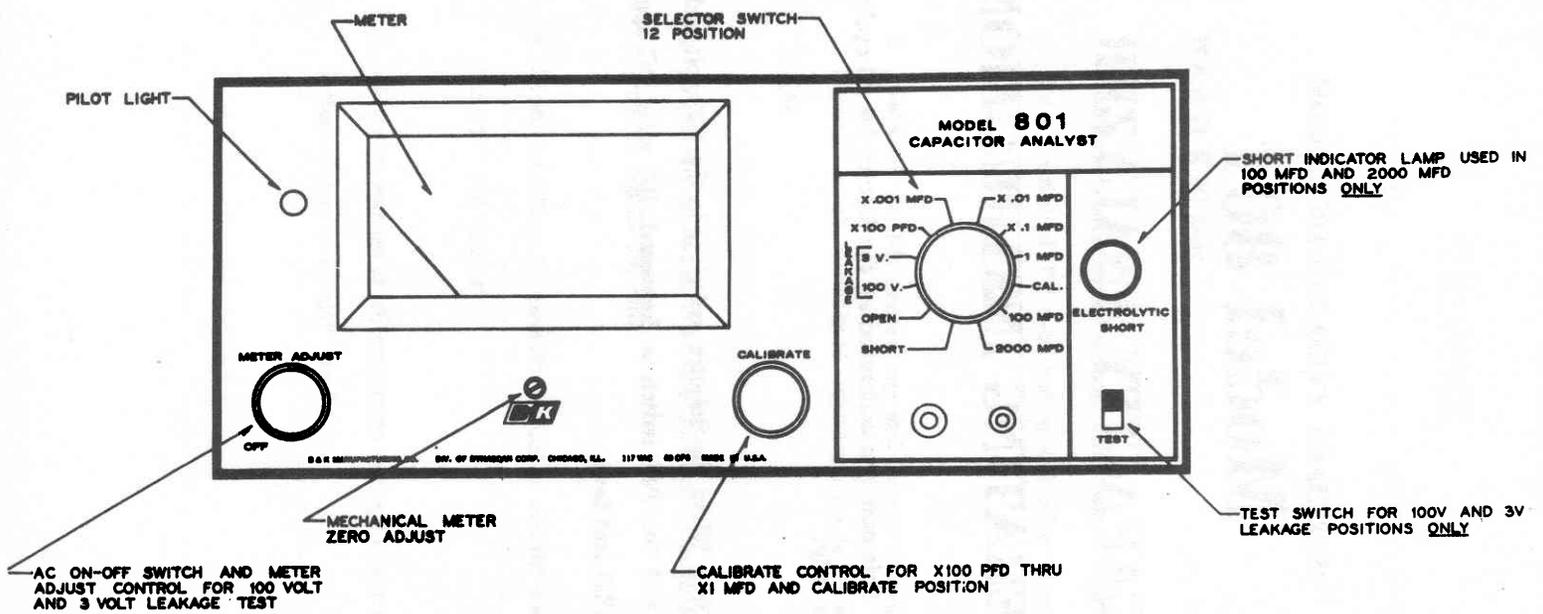


FIGURE 1. CONTROL LOCATIONS

Model 801

CAPACITY ANALYZER

OPERATING INSTRUCTIONS

NOTE: This unit was calibrated at the factory for 60 cycle AC operation only.

CAUTION: When the Selector switch is in the 100 volt leakage position and the Test switch is depressed, 100 volts DC appears on the RED test lead.

MODEL 801 CAPACITY ANALYZER

What It Will Do:

1. Analyzes capacitors for defects which would affect the operation of TV sets, radios and other forms of electronic equipment.
2. Evaluates the life expectancy and energy storing capabilities of electrolytic capacitors up to 2000 mfd.
3. Accurately measures the value of other capacitors from 25 pfd to 100 mfd.
4. Tests capacitors "in circuit" or "out of circuit" for "shorts" and "opens".
5. Measures leakage of all capacitors (except electrolytics) under "in circuit" conditions.

MODEL 801

CONDENSED OPERATING INSTRUCTIONS

Read your instruction manual thoroughly before using these condensed operating instructions. If a test result is questionable, refer back to your instruction manual for more detailed information.

Disconnect all power from equipment to be checked.

TESTS 1, 2, 3 & 4 DO NOT APPLY TO ELECTROLYTICS.

CAUTION: This unit was factory calibrated for 60 cycle AC operation only. When the Selector switch is in the 100 volt leakage position and the test switch is depressed, 100 volts DC appears on the RED test lead.

1. **SHORT TEST:** (in or out of circuit) Rotate selector to SHORT—Connect BLUE & BLACK leads to capacitor—Read GOOD-BAD scale—See page 4 in manual.

2. **OPEN TEST:** (in or out of circuit) Rotate selector to OPEN—Connect BLUE & BLACK leads to capacitor, close to body—Read GOOD-BAD scale—See page 5 in manual.

3. **LEAKAGE TEST:** (out of circuit) Disconnect one capacitor lead if in circuit—Rotate selector to appropriate LEAKAGE position—Connect RED & BLUE leads to capacitor—Rotate meter adjust for Inf. (Infinity) on leakage scale of meter—Depress test switch and read leakage resistance, in megohms, on leakage scale.

NOTE: for "in circuit" leakage measurements see pages 6, 7 & 8 in manual.

4. **CAPACITY VALUE TEST:** (out of circuit) Disconnect one capacitor lead if in circuit—Rotate selector to desired capacity range—Adjust calibrate control for full scale on meter (test leads must not be touching)—Connect BLUE & BLACK leads to capacitor, close to body—Read value on scale marked PFD or MFD—See page 9 in manual.

5. **ELECTROLYTIC CAPACITOR TEST:** (out of circuit) Disconnect one capacitor lead if in circuit—Rotate selector to CALIBRATE—Adjust calibrate control for full scale—Connect BLUE lead to positive side of capacitor—Connect BLACK lead to negative side—Rotate selector to desired range—Read value on blue meter scales.

If electrolytic short lamp glows brightly with no meter reading, capacitor is SHORTED. If the lamp does not glow and there is no meter reading, capacitor is OPEN. See pages 10 & 11 in manual.

SHORTS TEST

"IN CIRCUIT" MEASUREMENT

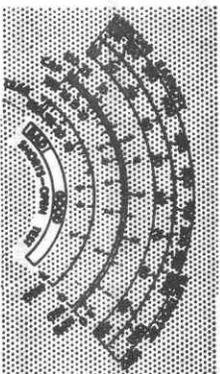
NOTE: This test is accurate for all normal television and electronic circuits. In the rare case where the capacitor being tested is shunted by less than 25 ohms (practically a short), the capacitor should be tested out of the circuit.

1. Remove all power from the circuit in which the capacitor to be tested is located.
2. Rotate the Selector switch to the SHORT position. See Figure 1.
3. Connect the BLUE and BLACK test leads to the leads of the capacitor.
4. Read GOOD-BAD scale. If the meter pointer is in the blue (good) area of the scale, the capacitor is not shorted. If the meter pointer is in the red (bad) area, the capacitor is shorted.

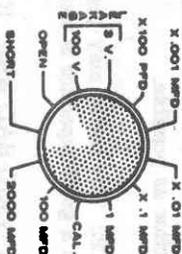
NOTE: A good capacitor may peg the meter to the right.

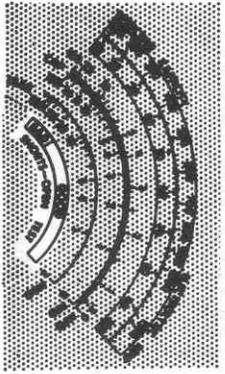
"OUT OF CIRCUIT" MEASUREMENT

Disconnect one lead of the suspected capacitor and perform the above steps.

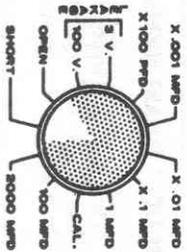


SCALE & SELECTOR LOCATION FOR SHORTS TEST



OPENS TEST

SCALE & SELECTOR LOCATION FOR OPENS TEST

"IN CIRCUIT" MEASUREMENT

NOTE: This test is accurate for all normal television and electronic circuits with the following exceptions: If the capacitor is less than 25 pfd, the meter will show open (or bad)—If the shunting resistance is less than 50 ohms, the capacitor will show open. If either of these conditions exist the capacitor should be tested out of the circuit. **DO NOT TEST CAPACITORS BELOW 25 pfd in circuit. THEY WILL TEST "BAD" EVEN THOUGH THEY MAY BE PERFECTLY GOOD.**

1. Remove all power from the circuit in which the capacitor to be tested is located.
2. Rotate the Selector switch to the OPEN position.
3. Connect the BLUE and BLACK test leads to the leads of the capacitor. Be sure the test leads are connected securely and as close to the body of the capacitor as possible.

NOTE: The meter may peg to the right with the test leads unconnected or when a good capacitor is tested.

4. Read GOOD-BAD scale. If the meter pointer is in the red (bad) area, the capacitor is open. If the meter pointer is in the blue (good) area, the capacitor is not open.

"OUT OF CIRCUIT" MEASUREMENT

Disconnect one lead of the suspected capacitor and perform the above steps.

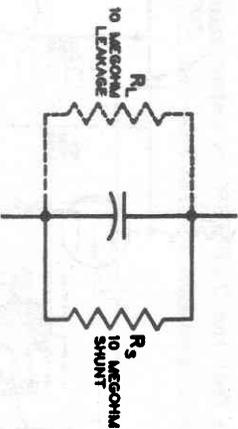
LEAKAGE TEST

NOTE: To test leakage of Electrolytics see page 10.

A capacitor that is neither shorted nor open will indicate some leakage resistance, but it is the amount of leakage that determines whether or not a capacitor should be replaced. Generally, a capacitor whose leakage has dropped below 100 megohms should be replaced as a safety precaution because it is deteriorating or has become marginal. If the leakage resistance is 20 to 25 megohms or less, the capacitor is defective and should be replaced. Ceramic capacitors are the exception to this rule because of their inherent low leakage resistance.

In using the Model 801 for "in circuit" leakage resistance measurements, a resistance should not be connected across the capacitor under test because this instrument cannot distinguish between leakage resistance in a capacitor and a shunting resistance connected externally across the capacitor.

EXAMPLE: If a capacitor shunted by a 10 meg resistor indicates a reading of 5 megohms on the meter, its actual leakage resistance is 10 megs because two 10 megohm resistors in parallel result in 5 megohms of total resistance. If a shunting resistor does exist, its effect must be treated as though the capacitor leakage resistance and shunting resistor R_s formed a parallel resistive circuit.



CAUTION: When the Selector switch is in the 100 VOLT LEAKAGE position and the Test switch is depressed, 100 Volts DC appears on the RED test lead. Proper safety precautions should be taken while performing this test. A discharge circuit has been incorporated into the 801 to discharge capacitors after they have been tested in this position.

LEAKAGE TEST

COUPLING CAPACITORS. See Figure 2.

1. Remove all power from the circuit in which the capacitor to be tested is located.
2. Connect the RED test lead to the input or plate side of the capacitor. Connect the BLACK test lead to Ground.
3. Rotate the Selector switch to 100 VOLT LEAKAGE if the voltage rating of capacitor is 100 volts or greater, or to 3 VOLT LEAKAGE if voltage rating of capacitor is between 3 volts and 100 volts (capacitors with less than 3 volt rating should not be tested).
4. Adjust Meter Adjust control (on front panel) until meter pointer is at INFINITY line (left side of meter).
5. Connect the BLUE test lead to the output or grid side of the capacitor.
6. Depress Test switch and read leakage resistance directly from meter in megohms on leakage scale.

NOTE: See Figure 2. When operating at 100 volts, if R2 is below 130K and/or R1 is less than 10K, meter accuracy will be slightly off. When operating at 3 volts, R2 should be several megohms to attain accurate results. The important concern here is whether enough leakage exists in a capacitor to cause trouble in a circuit and the Model 801 will always indicate this.

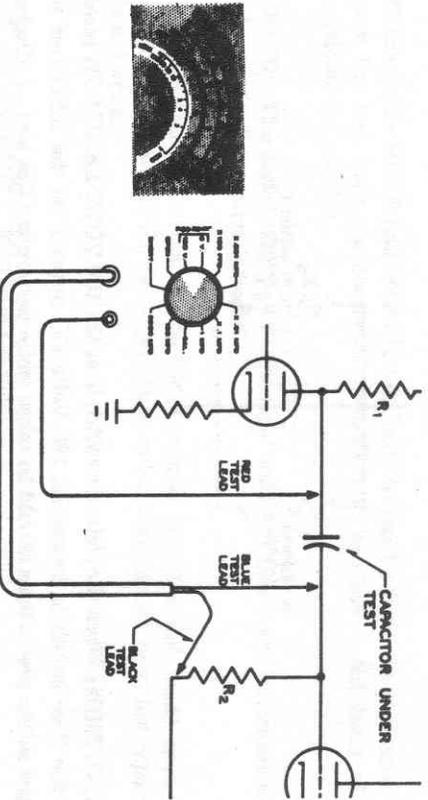


FIGURE 2. LEAKAGE TEST FOR COUPLING CAPACITORS.

LEAKAGE TEST

"IN CIRCUIT" TEST FOR BY-PASS OR OTHER CAPACITORS WITH ONE SIDE GROUNDED. See Figure 3.

- NOTE:** If the capacitor under test is by-passing a resistor going to B+ then one lead must be disconnected.
- The BLACK test lead is not used in this test.
1. Remove all power from the circuit in which the capacitor to be tested is located.
 2. Connect the BLUE test lead to the ground side of the capacitor. Connect the RED test lead to the side above ground.
 3. Set Selector switch to 100 VOLT LEAKAGE if voltage rating of capacitor is above 100 volts, or to 3 VOLT LEAKAGE if rating of capacitor is between 3 volts and 100 volts.
 4. Adjust Meter Adjust control (on front panel) until meter pointer is at INFINITY line (left side of meter).
 5. Depress Test switch and read leakage resistance directly in megohms on Leakage scale.

TESTING CAPACITORS "OUT OF CIRCUIT"

NOTE: The BLACK test lead is not used in this test.

1. Disconnect one capacitor lead if in circuit.
2. Connect the BLUE and RED test leads to the leads of the capacitor.
3. Rotate Selector switch to 100 VOLT LEAKAGE if voltage rating of capacitor is above 100 volts, or to 3 VOLT LEAKAGE, if rating of capacitor is between 3 volts and 100 volts.
4. Rotate Meter Adjust control to INFINITY line (left side of meter).
5. Depress Test switch and read leakage resistance directly in megohms on Leakage scale.

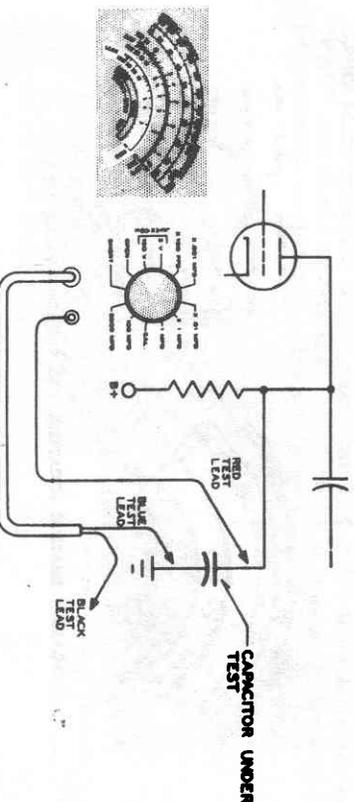


FIGURE 3. LEAKAGE TEST FOR BY-PASS CAPACITORS.

CAPACITY VALUE TEST

(from 25 pfd to 100 mfd)

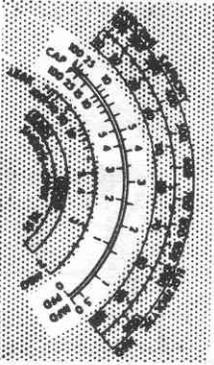
NOTES: The capacitor to be measured must be out of the circuit or have one end disconnected for this test. The RED test lead is not used in this test.

1. Set the Selector switch to the appropriate multiplier range.
2. Adjust Calibrate control for (zero) full scale reading on the meter face. Be sure the test leads are not in contact with each other. Do not hold the test leads on very low capacity measurement because hand capacity will cause an inaccurate reading.
3. Connect the BLUE and BLACK test leads to the leads of the capacitor.
4. Read the value indicated on the meter face and multiply by the value of the range.

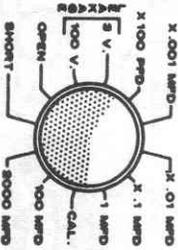
Capacity measurements may be made on any type of capacitor (except electrolytics which are evaluated in another test) as long as it falls within the range of the Model 901 and has a working voltage of 3 volts or more. This permits testing low voltage transistor circuit capacitors as well as those used in vacuum tube circuits.

INTERPRETING THE METER SCALES:

Capacitors whose values range between 0 and 10,000 pfd may be read on the PFD scale. Capacitor with values between 0 and 100 mfd are read on the MFD scale. For greatest accuracy, it is recommended that capacitor values greater than 1500 pfd be read on the MFD scale with the selector switch in the X .001 range. A picofarad (PFD) is equivalent to a micromicrofarad.



SCALE & SELECTOR LOCATION FOR CAPACITY VALUE TEST



EXAMPLES: If the meter indicates 3 on the microfarads scale with the Selector switch in the X .001 MFD position, the capacitor has a value of $3 \times .001 = .003$ mfd.

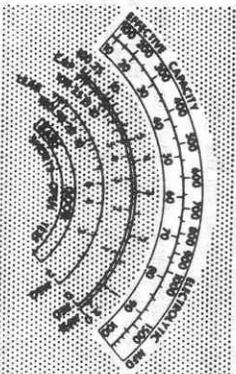
If the meter reads 30 on the same scale, the value of the capacitor will be $30 \times .001 = .03$ mfd.

If the meter reads 4 on the picofarads scale with the Selector switch in the X 100 pfd position, the capacitor has a value of $4 \times 100 = 400$ pfd.

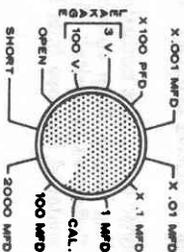
ELECTROLYTIC CAPACITY TEST

NOTE: All electrolytic capacitors must be checked out of circuit. If the rated value of the electrolytic is less than 10 MFD, make the value test on the XI MFD range.

1. Disconnect one end of the capacitor to be tested if it is in circuit.
2. Set the Selector switch to CALIBRATE, and adjust the Calibrate control on the front panel for full scale reading on the meter.
3. Connect the BLUE test lead to the + terminal of the capacitor. Connect the BLACK lead to the - terminal of the capacitor. The RED lead is not used.
4. Set the Selector switch to the desired capacity range (100 mfd or 2000 mfd).
5. Read capacity directly on one of the top scales. If the capacitor has been properly formed, the reading will be an accurate indication of the actual storage ability of the capacitor. If it is more than 20% below the rated capacity, it is "BAD" and should be replaced. The amount of leakage in the capacitor is automatically computed into the meter reading.



SCALE & SELECTOR LOCATION FOR ELECTROLYTIC TEST



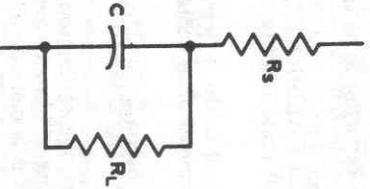
If no reading is observed on the meter, and the *Electrolytic Short lamp* glows very brightly, the capacitor is shorted.

If no reading is observed on the meter, and the *Electrolytic Short lamp* does not light at all, the capacitor is open.

This test should especially be made whenever new rectifiers are installed, as they tend to place a heavy load on the filter capacitors which will shorten their useful life.

The Model 801 actually tests the ability of an electrolytic capacitor to perform the function for which it was designed—store up energy on one half cycle and return it to the circuit on the other half cycle. How well an electrolytic does this job is determined by its capacity size, leakage resistance (dielectric resistance), and its equivalent series resistance (internal resistance of plate and lead material and lead connections).

From the diagram it is obvious that the equivalent series resistance (R_s) reduces the amount of energy the capacitor can absorb during the charging half cycle. Also, the limited energy that was stored is further attenuated on the discharge half cycle by the leakage resistance (R_L). The end result is a reduction in the capacity of the electrolytic.



The capacity, leakage resistance and equivalent series resistance are all measured in one reading by a unique test circuit in the Model 801. This reading tells you the "effective capacity" actually available to do the job.

Electrolytic capacitors normally have a tolerance of -20% to $+100\%$, therefore a reading higher than anticipated may be observed. If the meter indicates a value of "effective capacity" 20% below capacitor's rated value, that capacitor should be replaced because it is less than marginal and cannot do a proper job of filtering.

You may notice that some of the higher value capacitors cause the *Electrolytic Short lamp* to glow dimly. This should not be interpreted as a "short" condition. When "shorted," the meter will indicate zero capacitance.

Model 801

CALIBRATION AND CIRCUIT DESCRIPTION

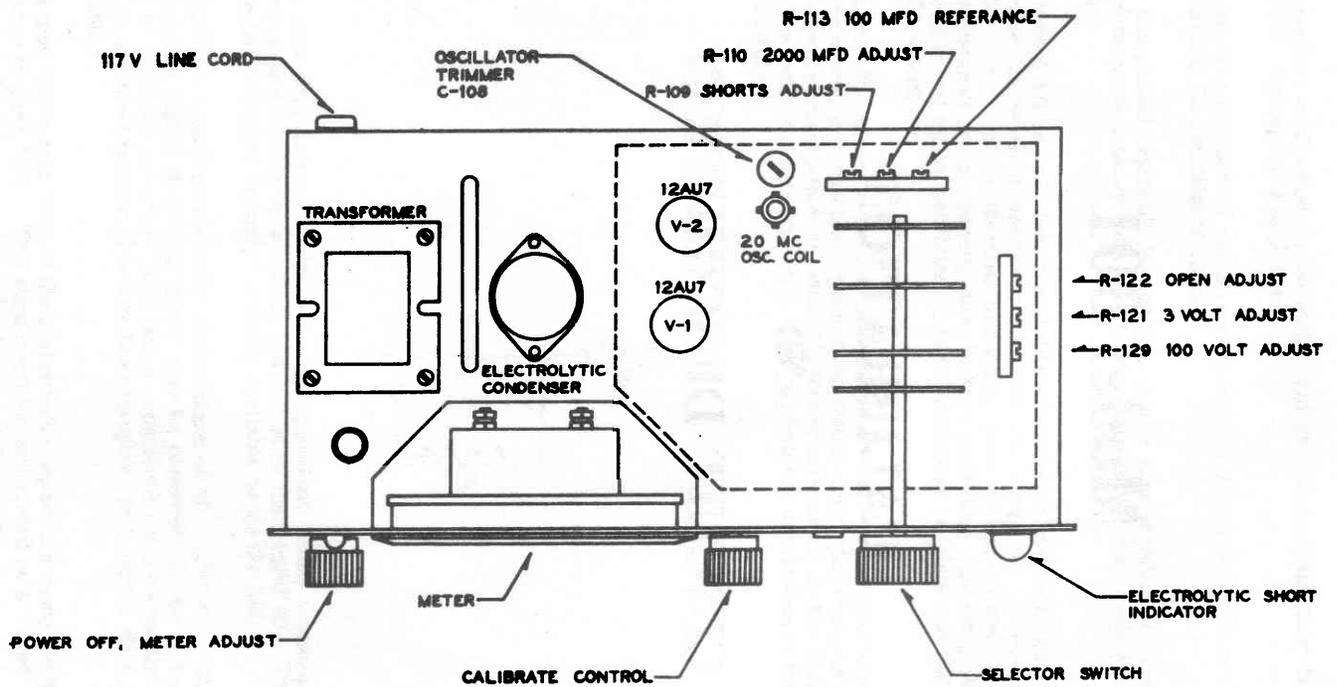


FIGURE 4. INTERNAL ADJUSTMENT LOCATIONS.

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“SHORTS” TEST

CALIBRATION. See Figure 4.

1. To calibrate the meter accurately, place a precision 25 ohm resistor across the BLUE and BLACK test leads and adjust the *Shorts Adjust* control until the meter pointer rests on the line separating the red and blue areas of the GOOD-BAD scale.
2. Remove the resistor.

DESCRIPTION. See Figure 5.

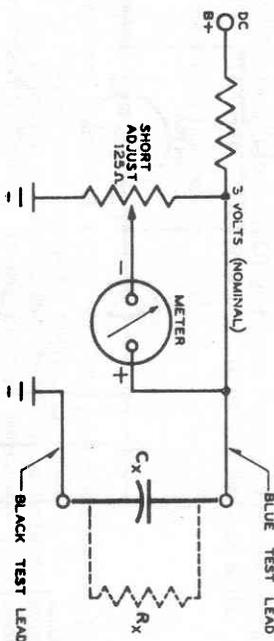


FIGURE 5. SIMPLIFIED SCHEMATIC OF SHORTS TEST.

The capacitor (C_x) under test is virtually placed across the terminals of the meter (M). The voltage at the meter terminals is then shunted by the internal resistance of the capacitor (R_x). If this shunting resistance is less than 25 ohms, the voltage across the meter is reduced to a point where the meter indicates “bad”. If the shunting resistance is greater than 25 ohms, the meter will indicate “good”. In this test we are assuming anything under 25 ohms is a short.

“OPENS TEST”

CALIBRATION. See Figure 4.

1. Turn control R-122 (open adjust) fully counter-clockwise.
2. Separate BLUE and BLACK test leads. Do not hold onto them during adjustment.
3. Adjust C-108 (oscillator trimmer) for minimum reading on 801 meter (bottom of dip).
If the dip cannot be observed, rotate R-122 a few degrees clockwise and repeat step 3.
5. Connect a 50 ohm 1% resistor between the BLUE and BLACK test leads. Connect as close to the body of the resistor as possible.
6. Adjust R-122 to the line between BAD and GOOD.
7. Verify that the addition of a 25 pfd capacitor connected in parallel with the 50 ohm resistor causes the needle to read in the GOOD region.

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DESCRIPTION. See Figure 6.

The BLUE and BLACK test leads along with L1, C1, and C2 form approximately a quarter wave transmission line at 20 MC that terminates across the secondary of L2. The characteristics of this transmission line are such that a low impedance connected across the open end of the line will be reflected back as a high impedance across L2 secondary. Conversely, a high impedance will be reflected back as a low impedance.

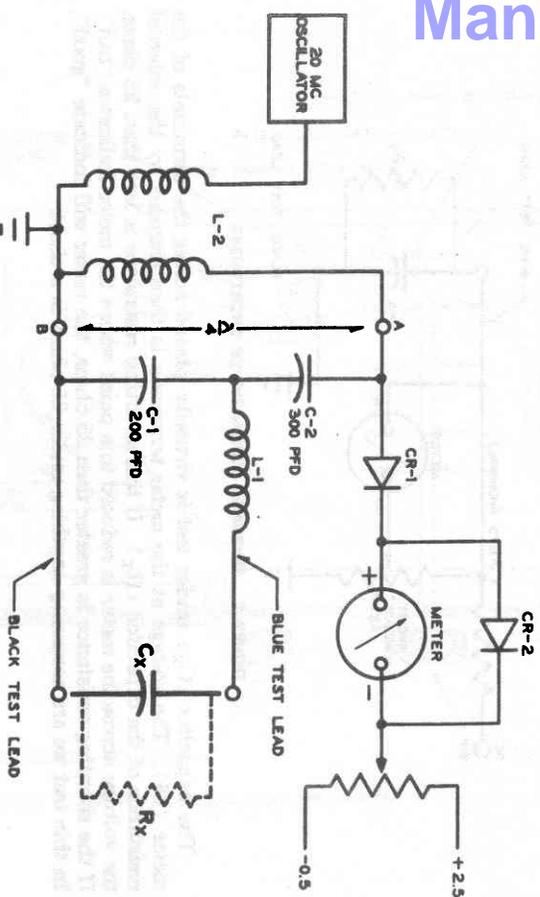


FIGURE 4. SIMPLIFIED SCHEMATIC OF OPENS TEST.

From this it can be seen that if C_x is open (infinite impedance) little or no voltage will be developed across the tank (points A and B) and the meter will register "BAD".

When a capacitor whose value is higher than 25 pfd shunted by 50 ohms is placed across the transmission line (low impedance), it is reflected back through the transmission line as a relatively high impedance across points A and B. This increased impedance causes a like increase in voltage across points A and B. CR₁ rectifies this voltage to drive the meter. The meter will now indicate some value in the "GOOD" area.

LEAKAGE TEST

CALIBRATION. See Figure 4.

1. Rotate the Selector switch to the 100 VOLT position.
2. Connect a 5 megohm resistor between the BLUE and RED test leads.
3. Rotate Meter Adjust (front panel) control until the meter pointer is at INFINITY at the left of the leakage scale.
4. Depress Test switch and adjust 100 Volt Adjust (R129) for a 5 megohm reading on the leakage scale.
5. Release Test switch to see if meter is still at left hand INF. Readjust Meter Adjust if necessary.
6. Rotate selector switch to 3 VOLT position. Depress Test switch and rotate 3 Volt adjust (R121) for 5 megohm reading on the leakage scale.
7. Remove the 5 megohm resistor.

DESCRIPTION. See Figure 7.

The leakage test consists of a D.C. VTVM which measures the D.C. voltage drop across the internal resistance of C_x and a series resistor, R1. If the internal resistance of the capacitor is infinite, the meter will so indicate when the Test switch is depressed (0 volts). As the internal resistance (R_2) decreases, the voltage across the meter increases proportionately.

The meter is calibrated to give full scale deflection when the internal resistance of the capacitor is 2 megohms or less. This is approximately 0.65 volts. In the 3 volt Leakage position, R1 is 820K. In the 100 volt Leakage position R1 is 12K.

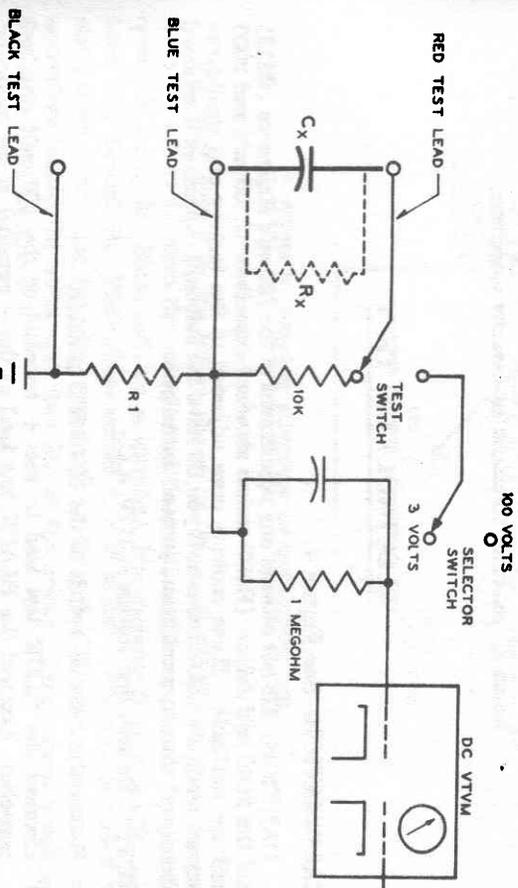


FIGURE 7. SIMPLIFIED SCHEMATIC OF LEAKAGE TEST

Between charging cycles, a portion of the capacitor charge is discharged by R_2 (and the parallel circuit of R_1 in series with the meter resistance). This lowers the average voltage across the capacitor. See Figure 9A. The average voltage (or charge stored in the capacitor) is proportional to the capacity of C_x providing there are no series or shunt leakage paths in the capacitor, thus the voltage difference from A to B may be calibrated in capacity.

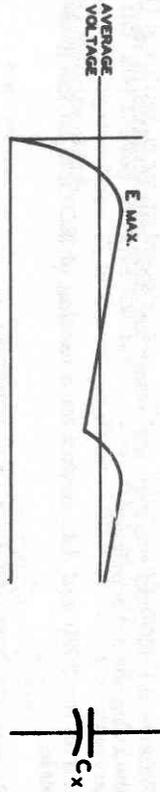


FIGURE 9A.

If a series resistance is present in the capacitor, the capacitor will not charge to as high a voltage as it would without the limiting resistance; or, if the leakage resistance is low, the capacitor discharges to a lower value. In either case, the potential difference from A to B is lower, and the observed capacity is lower. This is shown in Figures 9B and 9C.

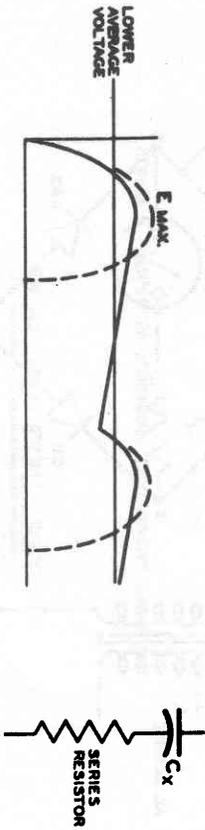


FIGURE 9B

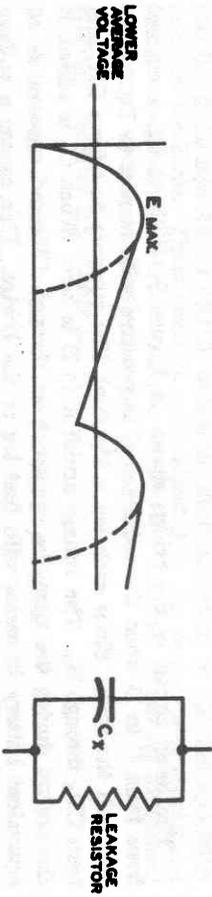


FIGURE 9C.

WARRANTY SERVICE INSTRUCTIONS

1. Refer to the maintenance section of the instruction manual for adjustments that may be applicable.
2. Defective parts removed from units which are within the warranty period should be sent to the factory prepaid with model and serial number of product from which removed and date of product purchase. These parts will be exchanged at no charge.
3. If the above-mentioned procedures do not correct the difficulty, pack the product securely (preferably in original carton or double-packed). A detailed list of troubles encountered must be enclosed as well as your name and address. Forward prepaid (express preferred) to the nearest B & K-Precision authorized service agency.

Contact your local B & K-Precision Distributor for the name and location of your nearest service agency, or write to

B & K-Precision, Dynascan Corporation
 Factory Service Operations
 6460 West Cortland Street
 Chicago, Illinois 60635
 Tel (312) 889-8870
 Telex: 25-3475

B & K MODEL 801 PARTS LIST

488-017-9-002B

| SCHEMATIC SYMBOL | DESCRIPTION | PART No. |
|------------------|-------------|----------|
|------------------|-------------|----------|

MISCELLANEOUS

| | |
|---------------------------------------|---------------|
| Case | 272-007-9-902 |
| Foot, Rubber | 381-002-9-001 |
| Knob, Large | 751-005-9-005 |
| Knob, Small | 751-005-9-003 |
| Knob, Small W/Marker | 751-005-9-002 |
| Lamp, Indicator | 401-001-9-002 |
| Cap, Lamp Red Plastic w/Tinnerman Nut | 750-003-9-001 |
| Lens, Red | 750-001-9-001 |
| Line Cord | 420-001-9-009 |
| Meter, 200 μ a. | 320-002-9-001 |
| Manual, Instruction | 480-007-9-001 |
| Panel, Front | 255-007-9-902 |
| Plug Button, Meter | 738-001-9-902 |
| Schematic & Parts List | 488-017-9-001 |
| #41 Lamp | 400-008-9-001 |
| RF Test Lead Assembly | ASM-B 228 |
| Red Test Lead Assembly | ASM-B 229 |
| Carton & Fillers (503-007-9-001) | 500-007-9-001 |

Minimum charge \$2.00 per invoice. Orders will be shipped C.O.D. unless previous open account arrangements have been made or remittance accompanies order. Advance remittance must cover postage or express.

| SCHEMATIC SYMBOL | DESCRIPTION | PART No. |
|------------------|-------------|----------|
|------------------|-------------|----------|

RESISTORS

| | | |
|-------|---|---------------|
| R-2 | 1K/250 Ohm Dual Control | 008-002-9-002 |
| R-7 | 2.5K Ohm Control W/S-3 Attached | 008-001-9-014 |
| R-103 | 1.3K 1/2 Watt 1% Deposited Carbon | 002-102-3-132 |
| R-104 | 13K 1/2 Watt 1% Deposited Carbon | 002-102-3-133 |
| R-105 | 130K 1/2 Watt 1% Deposited Carbon | 002-102-3-134 |
| R-106 | 1.3 Megohm 1/2 Watt 1% Deposited Carbon | 002-102-3-135 |
| R-107 | 14.28 Megohm 1 Watt 1% Deposited Carbon | 004-050-9-001 |
| R-109 | 500/150/100 Ohm Triple Control | 010-001-9-004 |
| R-117 | 130 Ohm 1/2 Watt 1% Deposited Carbon | 002-102-3-131 |
| R-121 | 5K/250/250 Ohm Triple Control | 010-001-9-003 |

CAPACITORS

| | | |
|-------|--|---------------|
| C-3 | 80/80 MF, 250 Volt Electrolytic W/ins. Cover | 021-005-9-001 |
| C-105 | 200 MF, 6.4 Volt Electrolytic | 022-001-9-007 |
| C-106 | 12.5 MF, 25 Volt Electrolytic | 022-001-9-004 |
| C-108 | 8-60 PF, Trimmer | 028-001-9-004 |

COILS AND TRANSFORMERS

| | | |
|-------|-----------------------|---------------|
| L-101 | Series Test Lead Coil | 041-001-9-015 |
| L-102 | 20 MC Oscillator Coil | 066-002-9-001 |
| T-1 | Power Transformer | 065-010-9-001 |

SWITCHES

| | | |
|-----------|----------------------------------|---------------|
| S-2 | Test Switch | 084-002-9-002 |
| S-3 (A&B) | Power and Meter Switch (See R-7) | |

TUBES AND DIODES

| | | |
|-------------------|-----------------------------------|---------------|
| V-1 & V-2 | 12AU7 | 235-120-1-217 |
| D-1 & D-102 | Silicon Diode, 100 MA. 350 P.I.V. | 112-351-0-101 |
| D-2, D-104, D-105 | Silicon Diode, 500 MA. 50 P.I.V. | 112-500-0-501 |
| D-106 | 1N48 Diode | 150-001-9-002 |
| D-103 | 1N48 Diode (Selected) | 150-001-9-001 |

COMPOSITE
499-045-9-001

WARRANTY SERVICE INSTRUCTIONS

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BK PRECISION
DYNASCAN CORPORATION

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