

**MODEL 88**

**MAGNETO - IGNITION  
ANALYZER**

*Manual*

**of**

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**OPERATION AND TEST DATA**

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**INSTRUMENTS CORPORATION**

**Almont, Michigan, U.S.A.**



# - Warranty -

The manufacturer warrants each new Merc-O-Tronic Magneto Analyzer manufactured by it to be free from defects in material and workmanship for a period of 6 months from date of purchase, battery excluded. The obligation shall be limited to replacing to the original purchaser any part or parts, except battery, found upon the manufacturer's examination to be defective under normal use and service because of defects in material or workmanship.

This warranty shall not apply to any unit which has not been registered at factory, repaired or altered outside our factory which, in our judgment, affects its operation or reliability; or to any conditions beyond control of the manufacturer.

All transportation charges are to be borne by the purchaser. This warranty does not apply to any unit not registered with the manufacturer. All rights are reserved to change or improve design in later models at any time without incurring any obligation to install same on any unit previously sold.

**MERC-O-TRONIC INSTRUMENTS CORP.**

ALMONT, MICHIGAN — U.S.A.



## **PARTS AND REPAIRS**

For fast, efficient service on your Merc-O-Tronic Magneto Analyzer, send unit minus battery directly to Merc-O-Tronic Instruments Corporation. Include a letter, giving full particulars of difficulty and instrument serial number.

Manufactured and Sold by —



**4553 KIDDER ROAD — ALMONT, MICHIGAN, U.S.A.**

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**THIS SHEET APPLIES TO MODELS HAVING  
SERIAL NO's, 4050 AND UP.**

**DESCRIPTION**

(PAT. PENDING)

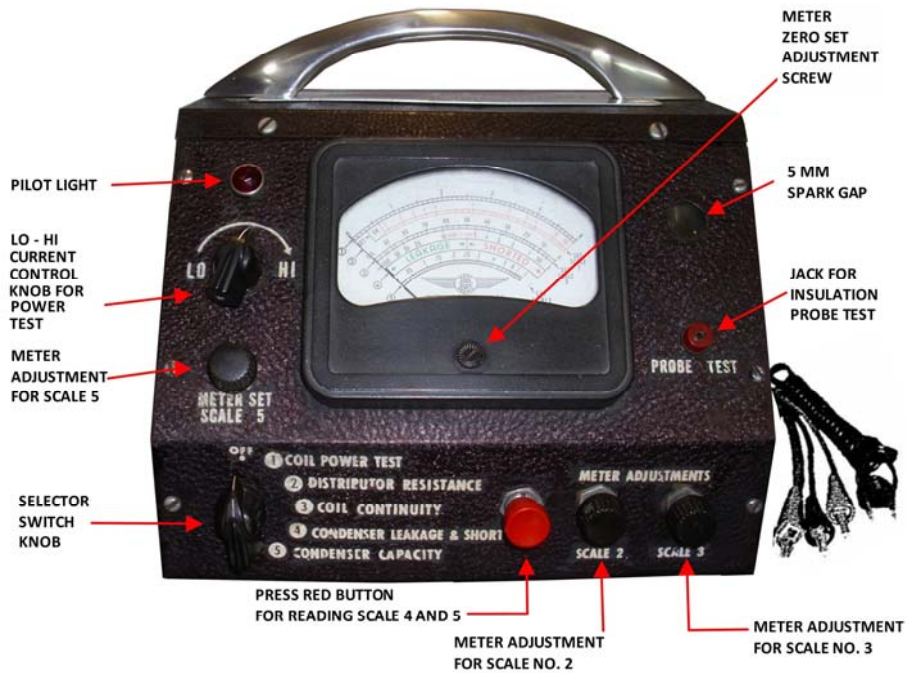


Figure 1

**SERVICE NOTES**

*May we suggest, when testing, place Magneto Analyzer as well as Component Magneto Parts on an INSULATED OR WOODEN TABLE TOP. This will prevent any leakage or shock hazards.*

The motor in your Merc-O-Tronic Ignition Analyzer is equipped with Oil Lite bearings and should be lubricated with a light oil once every six months. Lubricate cam wick at same time. (DO NOT OVER LUBRICATE.) If replacement of breaker points is required, order from Merc-O-Tronic Instruments Corporation as this is a special breaker assembly. Breaker points are to be set at 0.015".

Units equipped with 7-1/2 volt batteries use Burgess 4F-5H battery. Earlier Units equipped with 6 volt batteries use Burgess 4F4H. If unable to obtain locally, order direct from Merc-O-Tronic.

Be sure and specify type of battery required and serial number of unit.

## OPERATING INSTRUCTIONS

Before any attempt is made to use this instrument, read the following instructions. They were prepared to enable those having only a minimum of experience to test and repair the magneto ignition system equally as well as the electrical specialist. Adhere to the instructions in sequence. Do not jump from the first test to the fourth or the third to the fifth, etc.

1. Your Merc-O-Tronic Magneto Analyzer is shipped with a dry battery installed in the unit. Remove the 2 metal screws at the top of the panel. This will allow the top to swing back, and you will notice that the positive (red) battery lead is disconnected. Connect this lead to the positive (+) post of the battery. (When replacing battery, make certain positive terminal is to the right side of the tester and that the terminal nuts are tight.)
2. "Zero" meter by turning the small adjustment screw on front of meter until pointer hand lines up with zero on Scale No. 1, left side. This is set at the factory, but should be rechecked.
3. To determine low OHM resistance values, see page 18.
4. To determine coil continuity, the Merc-O-Tronic Magneto Analyzer beginning with serial number 4050 has incorporated a ohm scale combined with Scale No. 3 This will permit the user, with this combination, to make actual resistance tests so required in many applications.

**CAUTION: DO NOT CONNECT TEST LEADS TOGETHER WHEN SELECTOR SWITCH IS TURNED TO POSITION NO. 1.**

5. To check condenser leakage (on Scale No. 4) and condenser capacity (on Scale No. 5), plug cord into 115 / 125 volt 60-cycle AC electrical outlet. This is the only time 115 / 125 volt 60-cycle AC is required. The electrical charge placed in condenser is automatically discharged when releasing the red button.
6. Your Merc-O-Tronic Magneto Analyzer is now ready for use.

The following batteries can be used in place of Burgess 4F5H:

Eveready 715

Olin 5605

Ray-O-Vac 903

Neda 903

RCA VS139

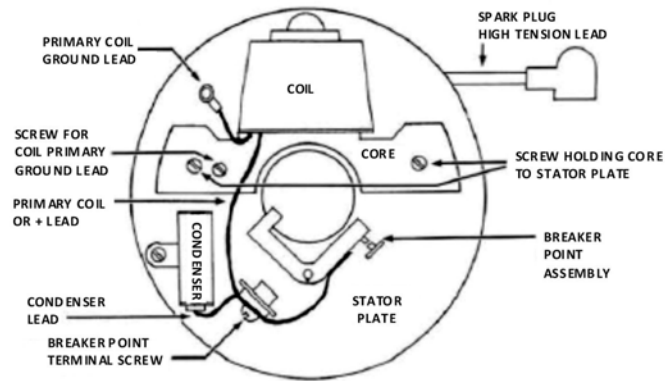


Figure 2

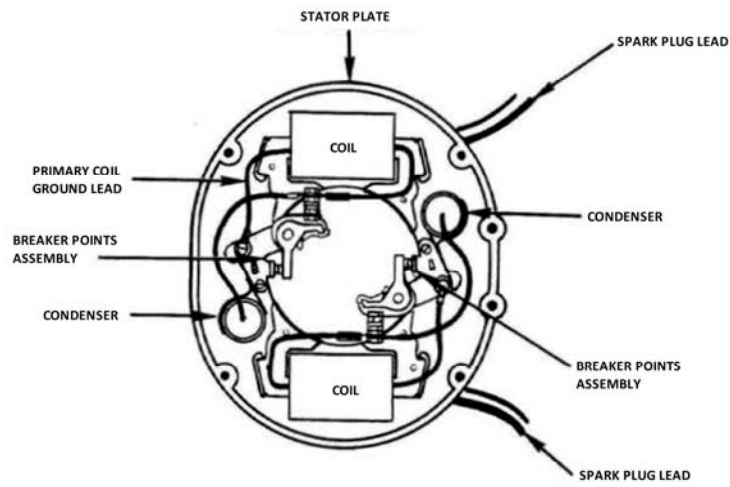


Figure 3

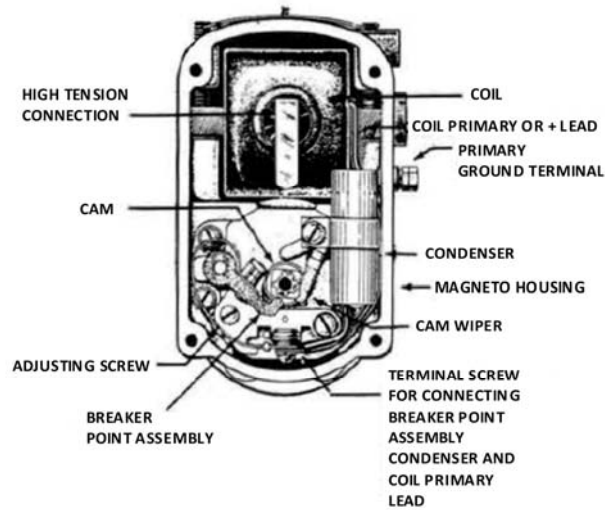


Figure 4



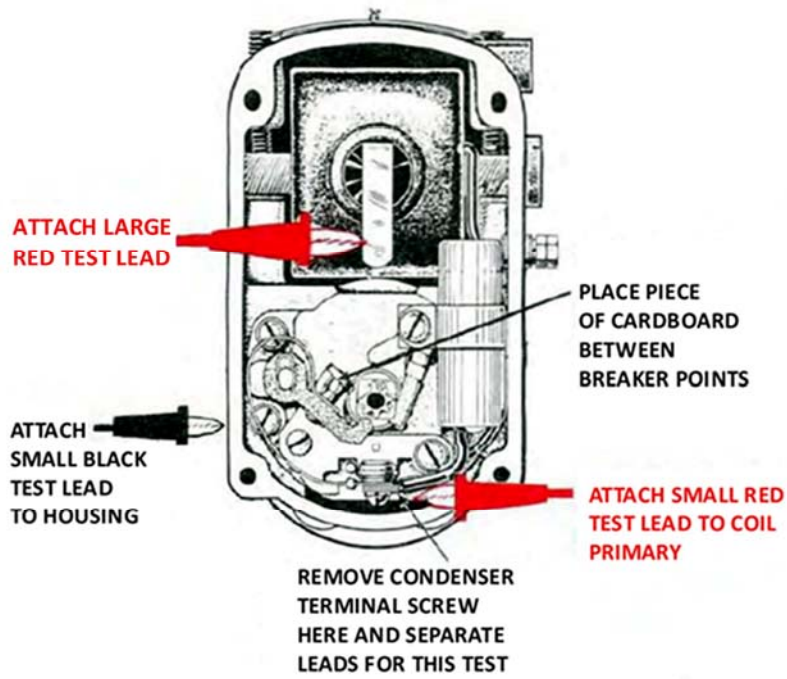


Figure 5

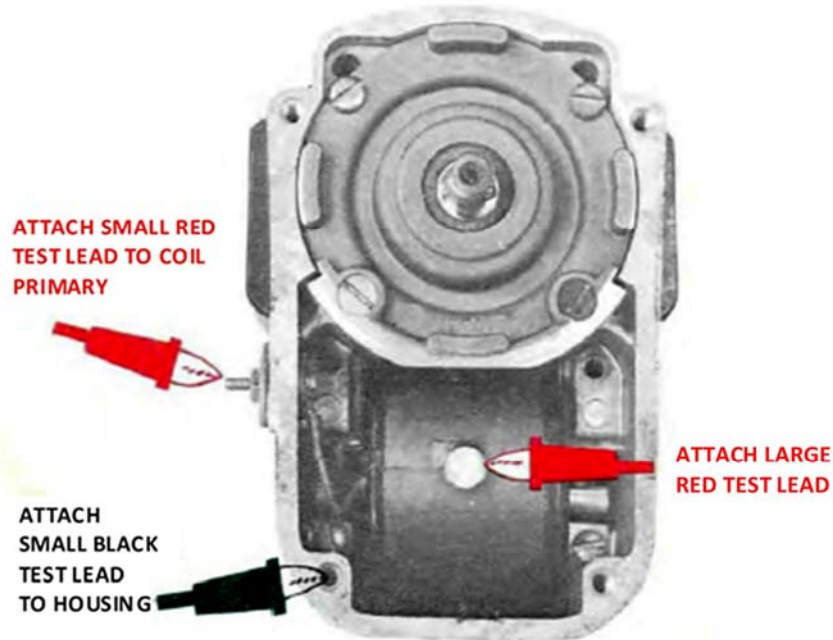
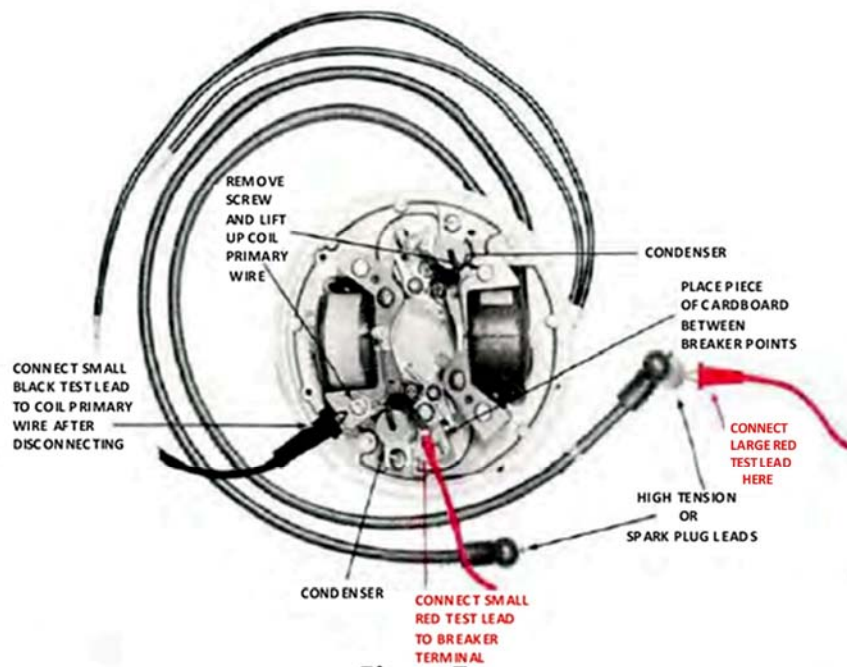


Figure 6

## COIL POWER TEST



1. It is not necessary to remove magneto assembly from engine or parts from stator plate assembly.
2. Place a piece of cardboard between breaker points to insulate.
3. Connect small black test lead to coil primary ground wire.
4. Connect small red test lead to coil primary lead or breaker point assembly terminal.
5. Connect large red test lead to terminal of spark plug wire.
6. After wiring hookup is made, as shown in illustrations 6 or 7, the current control knob should be to extreme left, beyond "LO" position.
7. Turn selector switch to position No. 1 ("Coil Power Test").
8. Slowly turn current control knob clockwise and note the current value on Scale No. 1.
9. When it reaches the operating amperage for that particular winding, shown in this manual under Manufacturer's Specifications, stop and note the 5 MM spark gap, it should fire steadily.
10. If the spark is faint, intermittent or no spark has occurred at this reading, the coil is defective and must be replaced.
11. If a steady spark occurs below Manufacturer's Specifications, this indicates a very good coil.

## COIL HIGH SPEED TEST

12. If the coil is good on Coil Power test, preceding, perform the High Speed Test.
13. Continue turning the current control knob clockwise to the right, for maximum reading of meter.
14. The spark gap should fire steadily.
15. If the spark is faint, intermittent or no spark occurs, the coil is defective at high speed and must be replaced.
16. Complete this test as quickly as possible and immediately upon completion, turn selector switch and power control to "OFF" position.

On Fairbanks-Morse and similar Magnetos, it is necessary to remove the distributor cap and end cap so **large red test lead** can be attached to secondary terminal of coil "see Fig. 5". **Small red test lead** is attached to coil primary lead after the lead has been removed from breaker point terminal. The small black test lead is attached to housing "see Fig. 5".

When checking coil on stator plate with crankshaft type high inductance rotating magnet (i.e. Wico, Scintilla and similar type magnetos), be sure rotating magneto is in **neutral position** (magnets not opposite the coil core).

**NOTE: When testing coils off stator plate, it is absolutely necessary that the laminated core be in the coil.**

NOTE: On Fairbanks-Morse and similar type magnetos, the coil primary lead must be removed from breaker point terminal during this test. This also applies to all coils which are permanently grounded to laminations. See Figure 5.

Coils with Two (2) Secondaries Testing, see Page 21.

**Stator plate with 2 coils mounted, each coil to be checked separately as noted in Fig. 7.**

## COIL SURFACE INSULATION TEST

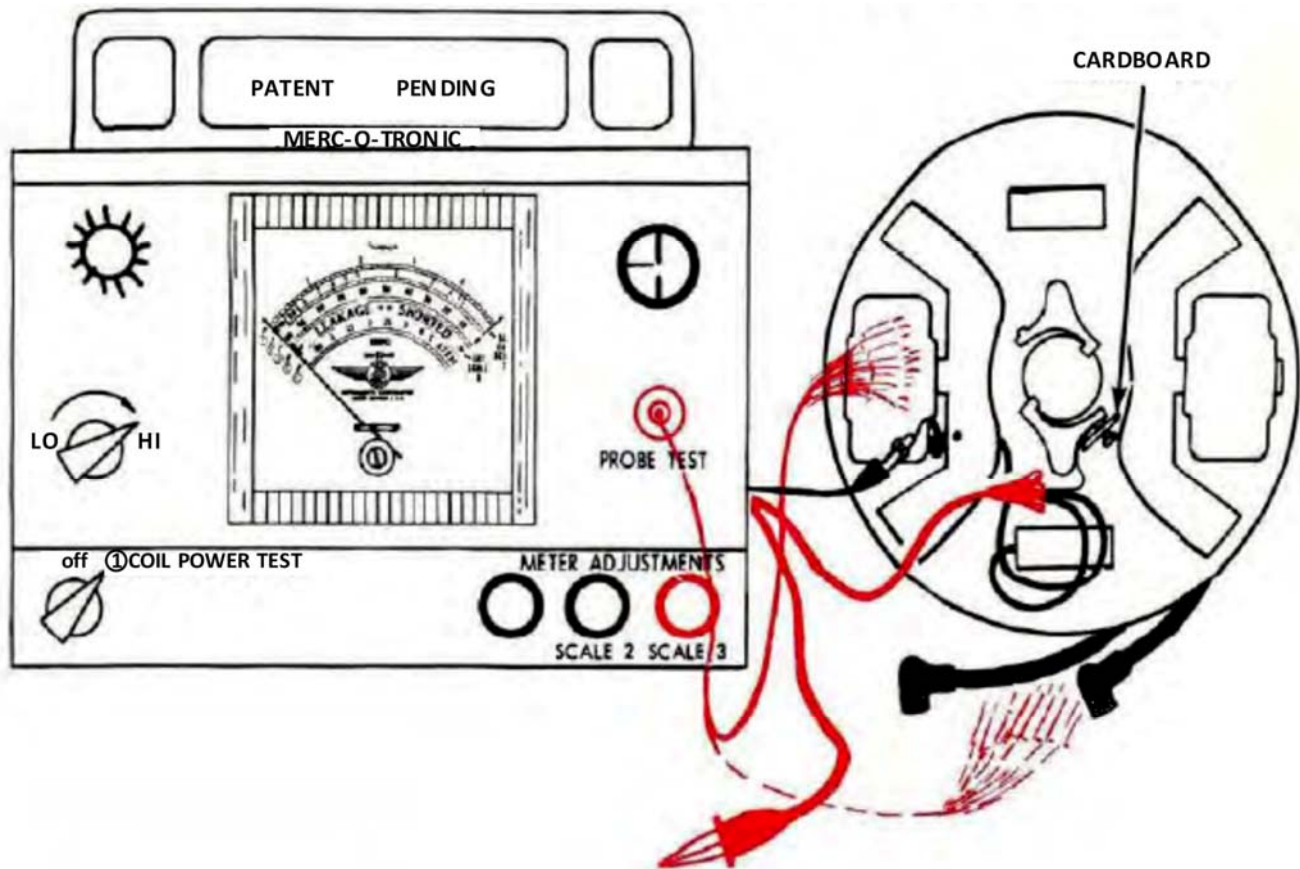


Figure 8

1. Remove large red test lead from coil secondary, (High Tension Lead) see illustration Fig. 8
2. **Small red and black test leads stay connected as previously.**
3. Plug insulation test probe into "JACK" on front of tester.
4. Turn selector switch to position No. 1.
5. Turn current control knob to "HI" position for maximum current reading on meter. **"Do not exceed meter reading."**
6. Pass end of insulation test probe over the insulating surface of the coil and spark plug wires.
7. If coil insulation is cracked, leaking or damaged, a spark discharge will be noted at the cracked or leaking surface.
8. **Do not permit test probe** to linger too long at any point while conducting this test.
9. **Complete test as rapidly as possible, as this is a severe test on a coil.**

A faint spark occurring around coil insulation during probing is a corona spark and does not illustrate a defective coil.

## COIL CONTINUITY TEST

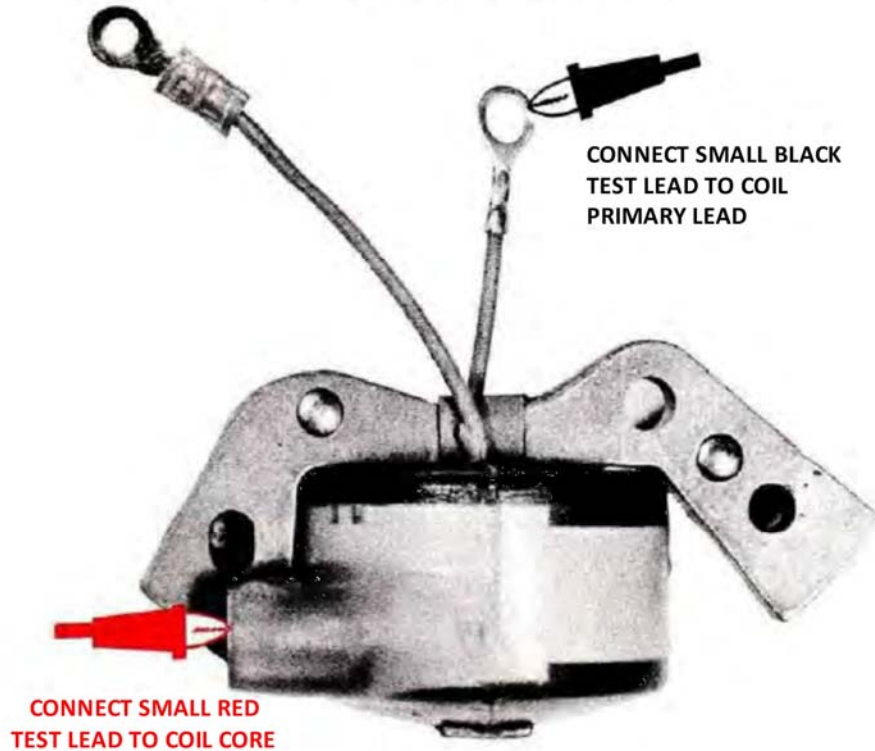


Figure 9

NOTE: Scale 3 has two scales. The upper number is the number shown on Mfg. specifications or are comparative numbers in place of actual ohm resistance "lower numbers." This is an added feature to our later model units starting with Serial No. 4050.

1. Turn selector switch to position No. 3 Coil Continuity.
2. **Clip small red and black test lead together.**
3. Turn meter adjustment knob for scale No. 3 until meter pointer lines up on set position on right side of scale No. 3.
4. Connect small black test lead to coil ground wire as in previous test.
5. **Connect small red test lead to spark plug "High Tension" lead.**
6. Reading must be between the two values for that particular coil shown in this manual under manufacturer's specifications.
7. Reading of actual resistance in ohms can be obtained by reading lower numbers in same scale.
8. Readings lower than the lowest value under manufacturer's specifications, the secondary winding is shorted.
9. Readings higher than the highest value shown in the specifications, the secondary winding is open.
10. In either case, the coil is defective and must be replaced.

## COIL GROUND TEST

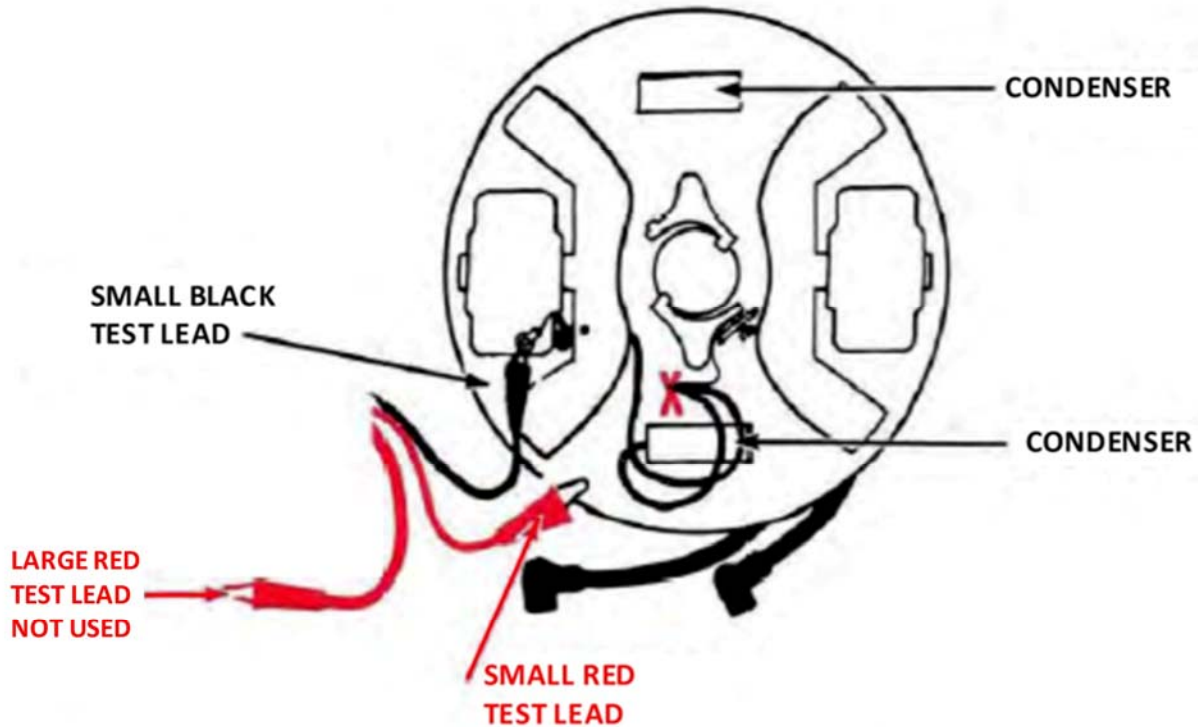


Figure 10

1. Leave small black test lead connected as in Coil Continuity Test
2. Remove small red test lead from high tension wire and connect it to ground or frame of stator plate. (See wiring hookup, Fig. 10.)
3. Turn selector switch to position No. 3 and read Scale No. 3.
4. The meter pointer hand must be on the "ZERO" line at the left.
5. Any meter movement to the right indicates a grounded coil.
6. If there is a meter pointer hand movement to the right, indicating a grounded coil, remove the breaker point screw at "X" on diagram Fig. 10.
7. Remove primary coil wire at this point. If the meter needle remains to the right the trouble is elsewhere.
8. Check condenser for short or grounded breaker points.

NOTE: When coils are permanently grounded to laminations (i.e. Fairbanks-Morse, Bendix-Scintilla), see illustrations and similar type Fig. 11, it is not possible to check for ground. This type of coil must indicate a ground (movement of meter pointer hand to full right).

NOTE: When coils are not permanently grounded to lamination, it is possible to check for ground. This type of coil must not indicate any movement of meter pointer hand.

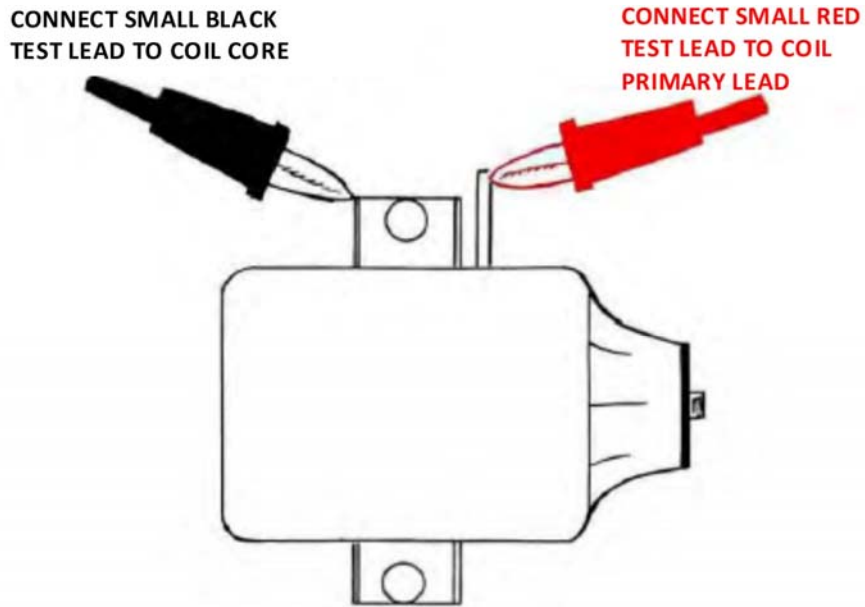


Figure 11

### AUTOMOTIVE TYPE COILS

To test automotive type coils, place small red test lead to positive (+) terminal of coil and small black test lead to ground (-) terminal of coil. Place single red test lead into secondary high tension (plug in terminal) of coil. Follow procedure for testing coils on Pages 5 and 6 and refer to illustration Fig. 13 showing insulation test on automotive coil.

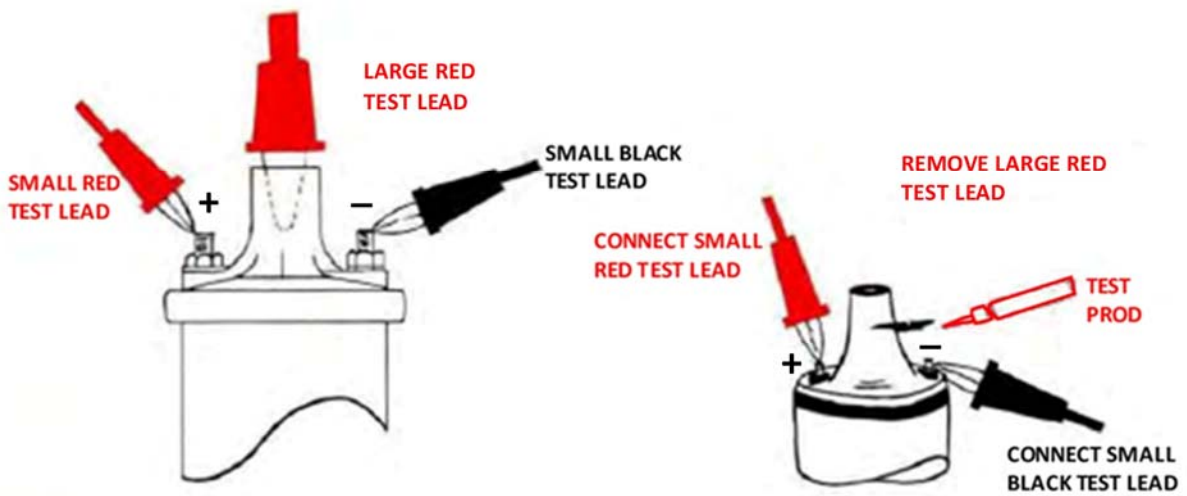


Figure 12

Figure 13

## CONDENSER TESTS

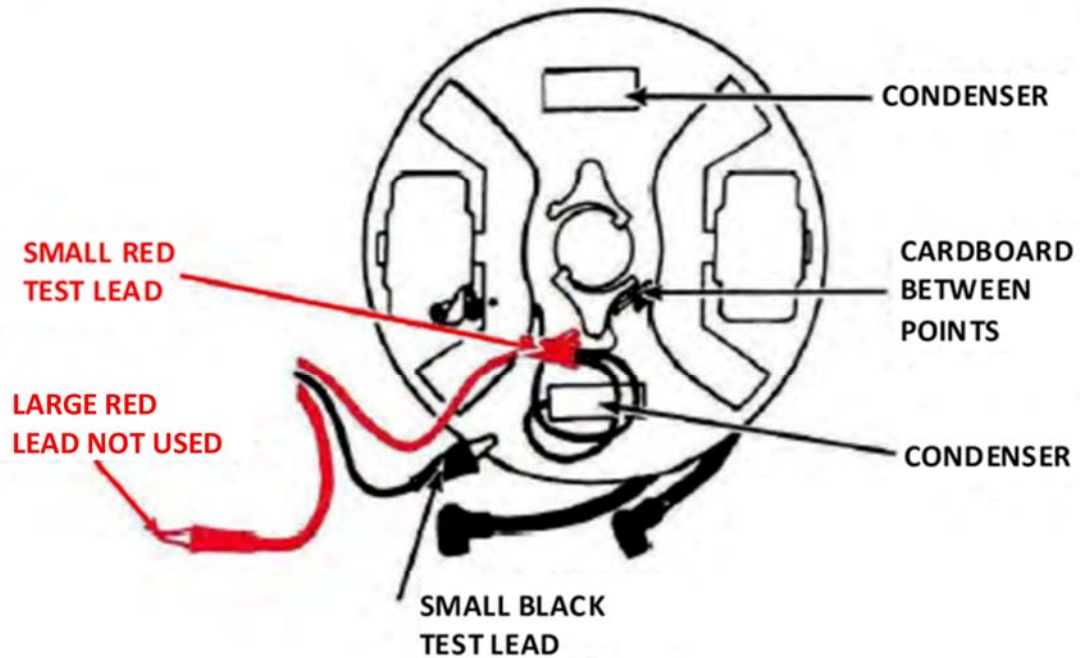


Figure 14

### CONDENSER LEAKAGE, SHORT AND RESISTANCE TEST

1. Connect small black test lead to stator plate if condenser is mounted, otherwise to body of condenser.
2. Connect small red test lead to breaker terminal, or if unmounted, to condenser lead.
3. Leave cardboard between breaker points.
4. To make condenser test, cord must be plugged into 115 volt 60-cycle AC outlet.
5. After wiring hookup is made, turn selector switch to No. 4 "Leakage and Short."
6. Depress red button and hold a minimum of 15 seconds. Read Scale No. 4.
7. The meter pointer hand will move to the right and must return within range of the narrow black bar at the left.
8. Any readings to the right of the black bar indicate the condenser is leaking or shorted and must be replaced.

**NOTE:** On Fairbanks-Morse type magnetos or equal, the condenser lead must be removed from the breaker point terminal when testing on a complete magneto. Condenser should be taped against an insulated board while testing to show up loose element.



## CONDENSER CAPACITY TEST

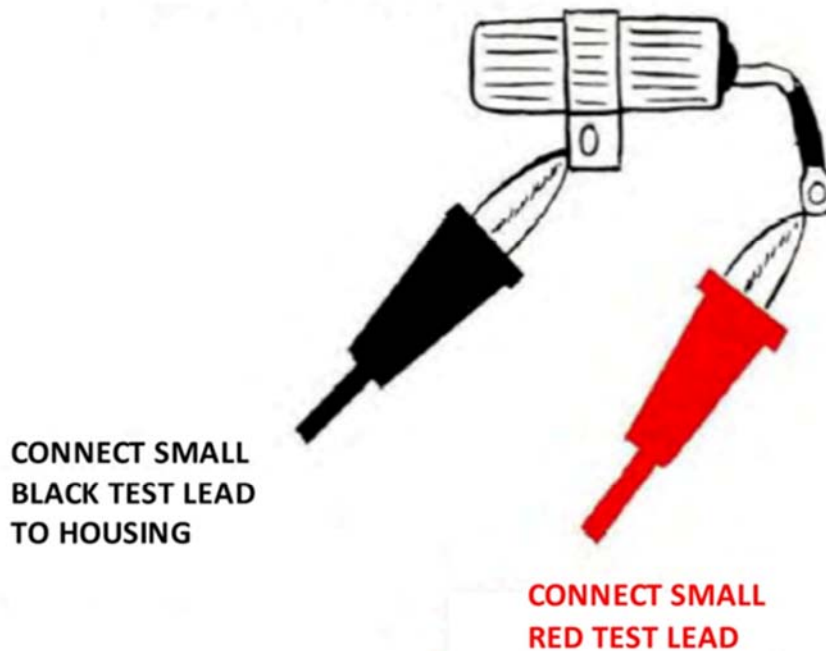


Figure 15

1. To make condenser test, cord must be plugged into 115 volt 60-cycle AC outlet.
2. Leave cardboard between breaker points.
3. Place selector switch on position No. 5, Condenser Capacity.
4. Clip small red and black test leads together.
5. Depress red button, turn meter adjustment knob on scale 5 to red set line on scale No. 5 on right side of meter. (This adjustment is for varying line voltages throughout the country.)
6. Unclip test leads.
7. Connect small red test lead to breaker terminal or if loose to condenser lead.
8. Connect small black test lead to stator plate if condenser is mounted, otherwise to body of condenser. (Depress red button to read Scale 5.)
9. Condenser must be within manufacturer's specification for this particular motor.
10. If not, replace as a condenser that is over or under capacity could cause burnt breaker points.

## BREAKER POINT TEST

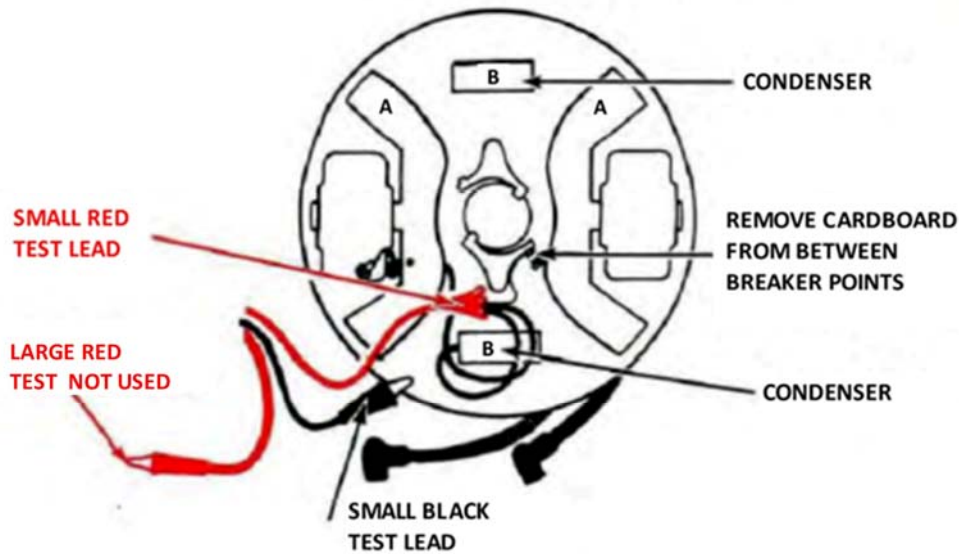


Figure 16

## TESTING FOR HIGH RESISTANCE IN PRIMARY CIRCUIT

1. Turn selector switch to position No. 2 "Distributor Resistance".
2. Clip small red and black leads together.
3. Turn meter adjustment knob for scale No. 2 until meter pointer lines up with set position on left side of "OK" block on scale No. 2.
4. Unclip small red and black test leads.
5. Connect small red test lead to breaker point terminal.
6. Connect small black test lead to stator plate or any part of engine per illustration No. 16.
7. Turn crankshaft until cam allows breaker points to close.
8. The meter pointer must return in the "OK" block.
9. If the meter pointer is in the high resistance band, this indicates that there is foreign matter between breaker points.
10. See note.
11. Breaker assemblies not meeting this test should be replaced.

NOTE: Although breaker points are made of non-corrosive metal a current resisting tough film may form after the engine stands for a period of time, especially if stored in a damp place. This film will cause hard starting of the engine. By running a piece of stiff paper (such as a business card) between the points under tension several times, the film will wear and dirt or oil will be removed from between the breaker points. After cleaning points in the above manner, the meter should be in the "OK" block. If not, replace breaker points.

## TO CHECK CONDENSER FOR PROPER GROUNDING

1. Connect small red test lead to stator plate
2. **Connect small red test lead to body of condenser.** Point B see illustration Fig. 16
3. Read Scale No. 2.
4. The meter pointer must be in the **“OK” band.**
5. If meter pointer reads in the high resistance band this indicates that the condenser is not properly grounded to the plate.
6. Check points in the same manner.

## TIMING

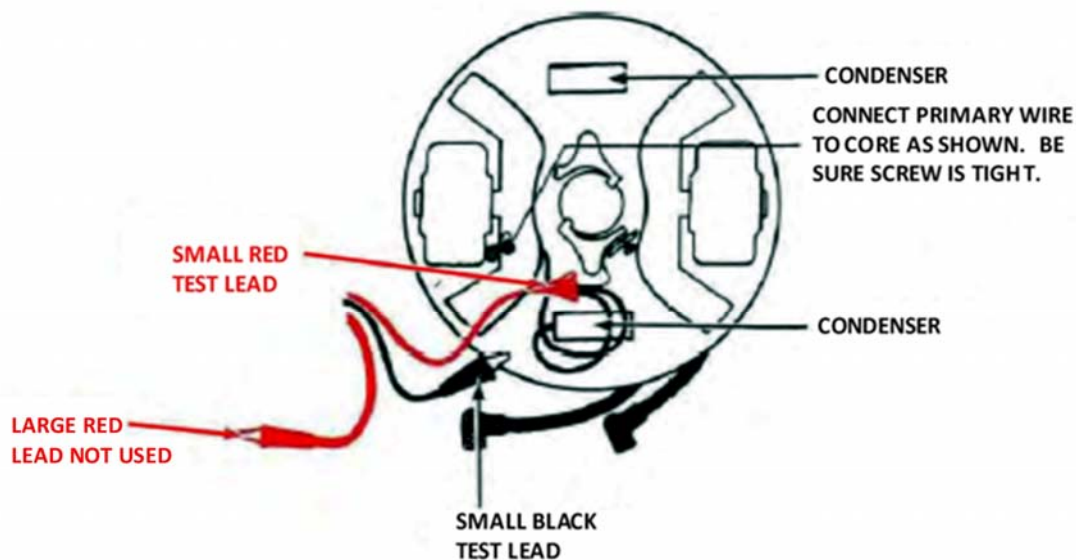


Figure 17

## BEFORE TIMING

Preliminary to timing motor, set the breaker points to the manufacturer's specifications. **Use a feeler gauge – don't guess.** Be sure the breaker rubbing block is on the highest part of the cam when setting points. (Refer to "Breaker Point Test", preceding.) Lubricate the cam oiler wick of the breaker arm with fibre grease (as specified by manufacturers). Be sure the moveable arm is free on pin and lubricate pivot pin with fibre grease. Be sure all screws are tight and that all wires are in their proper place.

## TIMING

1. Remove paper from between breaker points and clean points before test. **DO NOT FILE.**
2. Connect small black test lead to the stator plate frame.
3. **Connect small red lead to the breaker point terminal screw.**

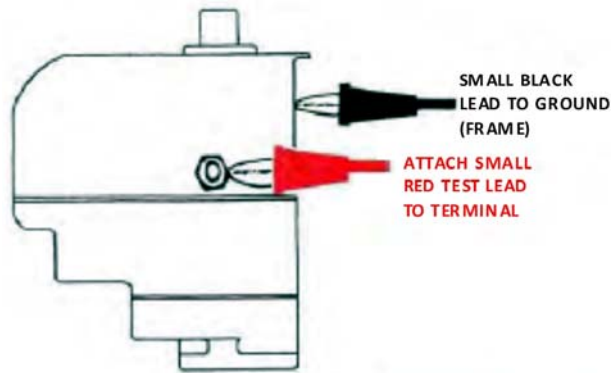


Figure 18

“See your manufacturer’s service manual for the particular motor specification relative to piston movement with timing of magneto.” Set this first.

Again, be certain that the breaker points are making perfect contact. Refer to “High Resistance Test in Primary Circuit”, preceding. After wiring hookup is made, as shown in illustration preceding, turn selector switch to position No. 2, “Distributor Resistance”, and read **Scale No. 2**. Rotate magneto or distributor in the advance direction. It will be noted, when points are closed, that the meter pointer hand will be in the “OK” block. The moment that the breaker points start to open, the meter pointer hand will move into the high resistance band. In this manner, the timing can be set in relation to movement of the piston.

On magnetos, such as Fairbanks-Morse or Kiekhaefer type, connect the small red test lead to the exposed primary ground terminal and the black lead to the frame or ground. See Fig. 18.

#### ARMATURE GROUND TEST

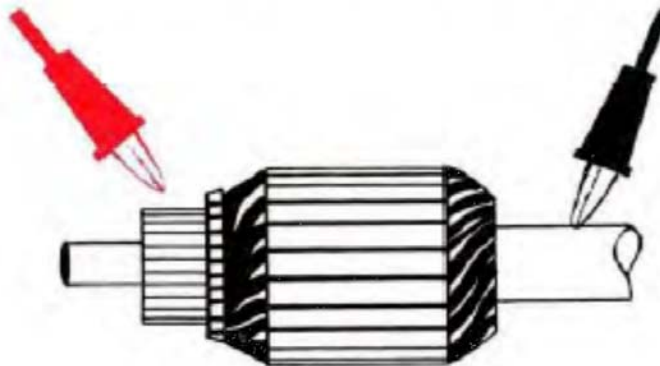


Figure 19

Turn selector switch to position **No. 3, “Coil Continuity”**. Attach small black test lead to armature shaft, as shown in illustration above, and use small red test lead to probe the commutator copper divisions. If the pointer hand moves across the meter to the right, as the divisions are contacted, the armature is grounded and must be replaced or commutator must be cut down and mica must be undercut. Meter pointer hand should not move during this test.

## SPARK TEST



Figure 20

With the selector switch in “OFF” position, disconnect the high tension lead from the spark plug and clip **single red test lead to spark plug lead**. Place test probe into red jack and attach opposite end to cylinder block to form ground. Crank engine over and view spark jump through tester’s small window. If no spark, indications are that some part of the magneto is defective or lead wire is broken. Repeat process for each spark plug lead wire.

**NOTE: IF SELECTOR SWITCH IS IN ANY OTHER POSITION, DAMAGE TO THE METER WILL RESULT.**

## STARTER SOLENOID TEST

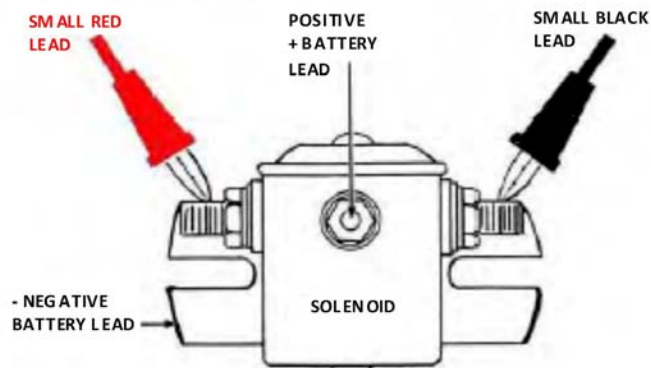


Figure 21

1. Turn selector switch to position No. 3, “Coil Continuity”.
2. **Connect small red test lead to one large terminal of solenoid**, as shown in illustration above.
3. Connect small black test lead to other large terminal of solenoid.
4. With a battery of the capacity of the solenoid (6 or 12 volts), place two jumper leads on battery terminals.
5. **Connect positive lead to small terminal of solenoid.**
6. Connect negative lead to case or bracket of solenoid for ground.  
NOTE: On solenoids with two small terminals, one is usually a ground terminal and one an **energized terminal**.
7. Meter pointer hand must move fully to right of meter.
8. If no movement or only partial movement is indicated, the solenoid is defective and must be replaced.

**CAUTION: DO NOT CONNECT BATTERY LEADS TO LARGE TERMINALS OF SOLENOID OR METER WILL BE DAMAGED.**

## CONTINUITY TEST



Figure 22

To test ignition or electrical wires and harness or parts for “open circuits”, turn selector switch to position No. 3, “Coil Continuity” and Zero out meter. Connect small black test lead to one end of wire and **small red test lead** to opposite end of same wire, as shown in illustration above. Meter pointer hand must move fully to the right of the meter. If the meter pointer hand stays at left, this indicates a broken wire. Move lead wire back and forth while making test.

## RESISTANCE TEST

To check an electrical harness and wire terminal to determine if the part is OK, place selector switch on Scale No. 2, “Distributor Resistance”. **Attach small red test lead** to terminal of one end of lead and small black lead to other end. Meter pointer needle must return to “OK” block. If needle favours right side **away from “OK” band** it indicates a defective connection inducing a resistance. Repair connection or replace part.

### RESISTOR TEST

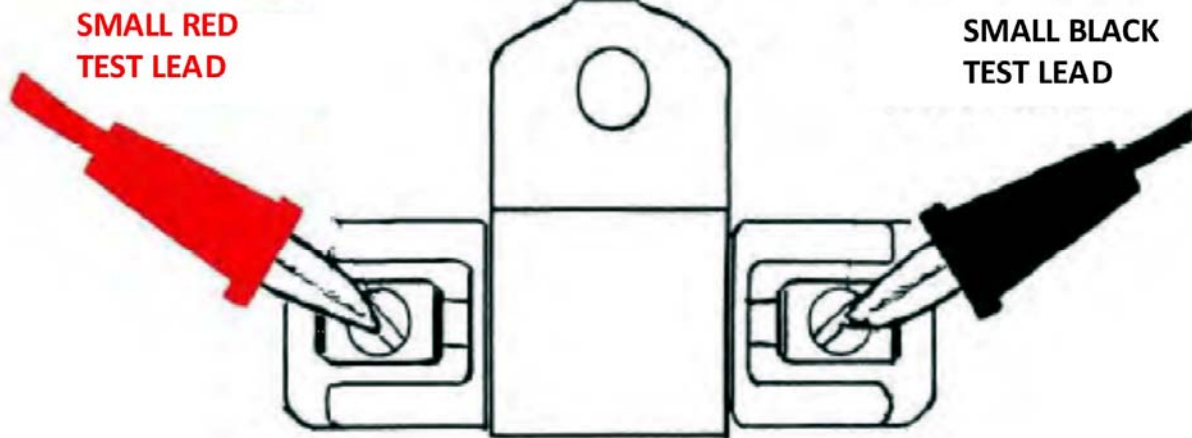


Figure 23

Use scale No. 2 for checking low OHM resistance values. Set selector switch on No. 2, “Distributor Resistance”, position. Do not clip test leads together. Turn No. 2 scale meter adjustment knob to adjust meter needle with red line on right side of Scale No. 2. Your meter is now set to check all low OHM values from 0 to 30 OHMS. Clip small red and black test leads to terminals of resistor, as shown in illustration above, and read red figures on Scale No. 2. Replace resistor not meeting the manufacturer’s specifications.

Manufacturer	Part No.	Resistance Reading	
		Min	Max
Keikhaefer Mercury	393-1286	1.3	1.7
Keikhaefer Mercury	393-1482	2.0	2.4
Keikhaefer Mercury	393-1572	3.0	3.4
McCulloch (Scott)	332-196	1.7	1.9

## HIGH TENSION LEAKAGE - CRACK TEST

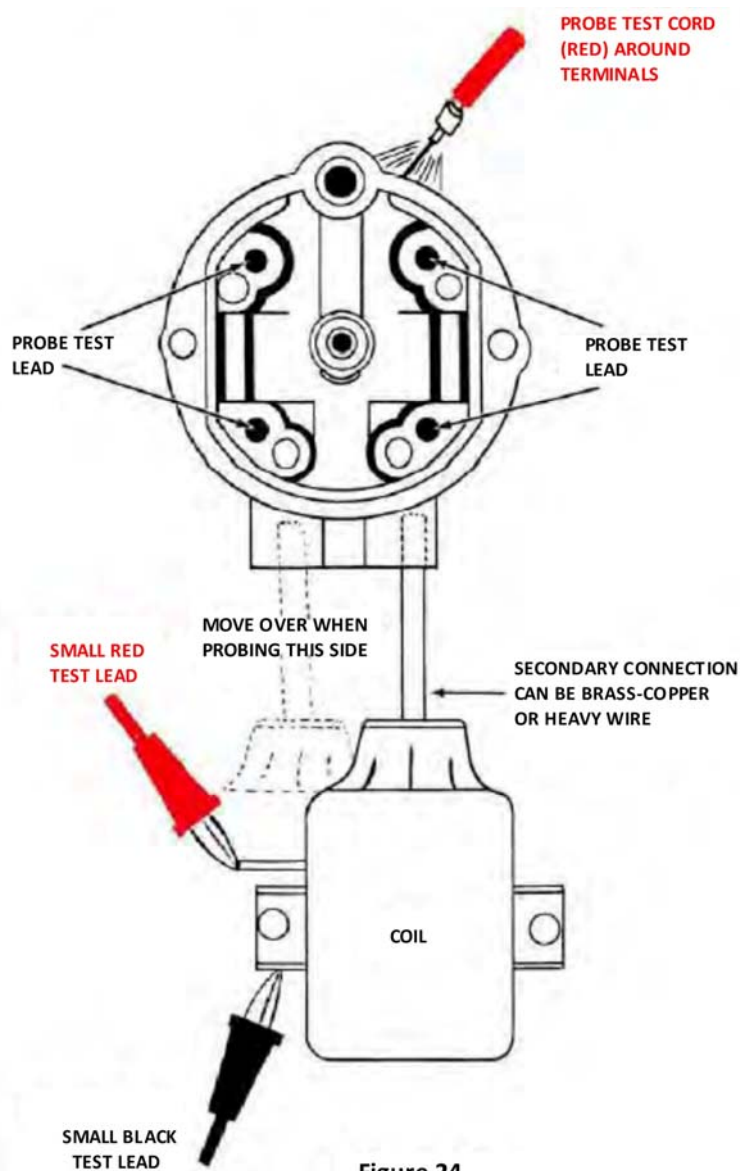


Figure 24

To check for cracks or leakage paths in ignition distributor caps or distributor rotors, clip small red test lead to coil primary lead and black test lead to coil core, as shown in illustration above. A used coil is best for this test, since the coil will be used for inducing a high secondary voltage. The secondary coil terminal must have a brass or copper lead attached so that it will extend fully into the distributor cap spark plug lead wire outlet to provide the spark for this test. Turn selector switch to position No. 1, "Coil Power Test", and turn "LO-HI" current control knob to the "HI" position. Place test probe into jack in tester and pass other end of test probe over area around distributor contact post. If there is a crack or leakage path, it will show up by the spark following a path in the cap rather than sparking directly to the correct terminal. If the spark path occurs, the cap is defective and must be replaced. There should be no spark jump to any other distributor post other than the one being tested. Repeat procedure on each post of distributor cap.



## DISTRIBUTOR ROTOR TEST

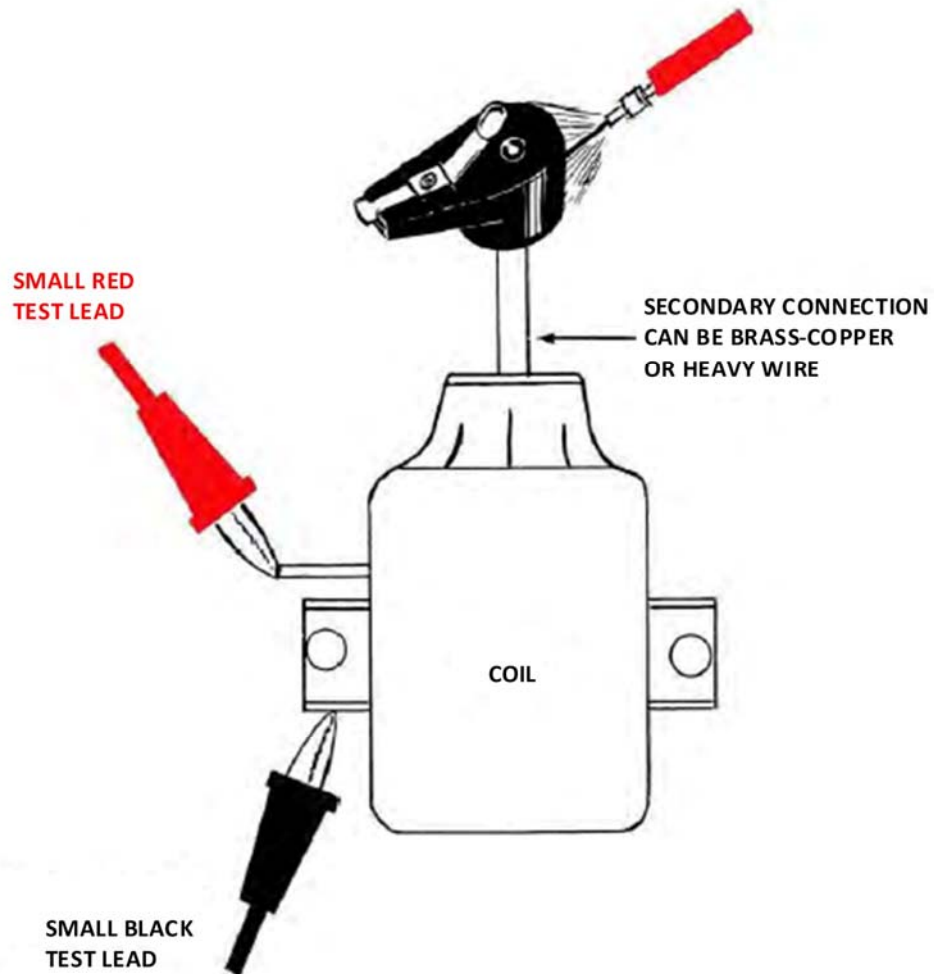


Figure 25

Follow distributor cap leakage test procedure, preceding. Place distributor rotor on high tension terminal of coil so that rotor shaft hole rests on coil terminal as shown in Figure 25. Search around distributor rotor with ground test probe. There should be no spark jump at any point. If a heavy spark does occur, it indicates a defective distributor rotor. Replace defective part.

### TESTING COILS WITH TWO SECONDARIES

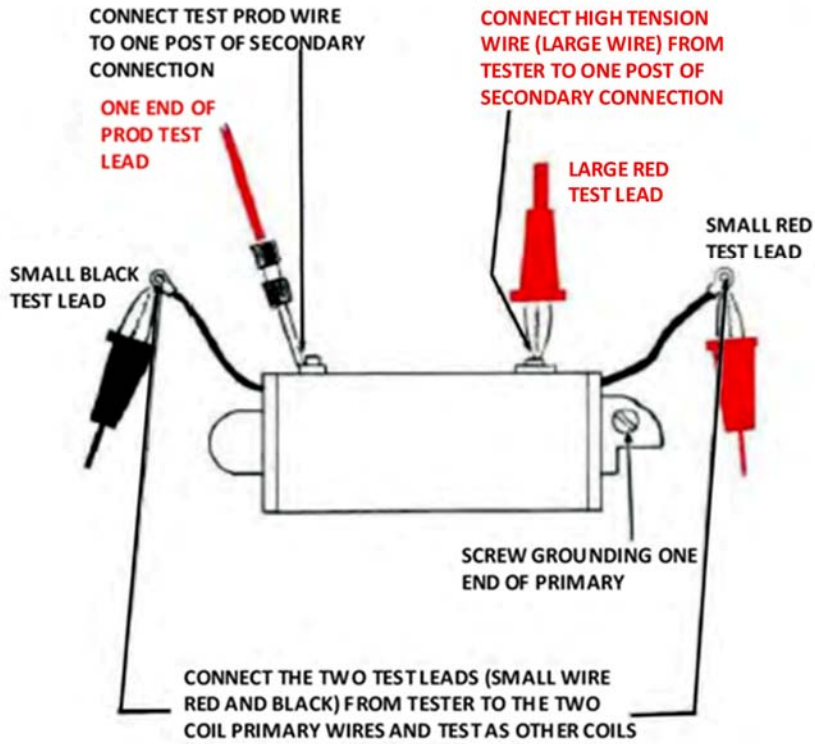


Figure 26

### TESTING CONVENTIONAL TYPE MAGNETO

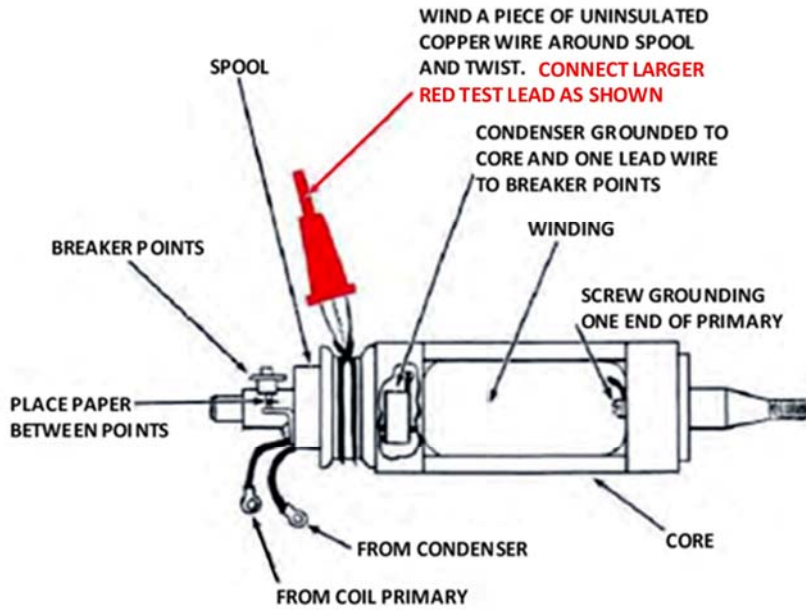


Figure 27



Figure 28



Figure 29

### TESTING SELENIUM RECTIFIERS

#### BY MEASURING DIRECT CURRENT RESISTANCE

1. Set selector switch on position No. 3, "Continuity".
2. Clip **small red** and black test leads together and turn meter adjustment knob for Scale No. 3 until meter pointer lines up on set position on Scale No. 3, right side.
3. **Connect small red test lead to positive lead on rectifiers. Figure 28.**
4. Connect small black test lead to ground stud or lead on rectifier. Figure 28.
5. Note reading of figures on **lower band, Scale No. 3.**
6. Reverse test leads on rectifier and note readings again.
7. **Ratio of two readings should be 10:1 or greater.**
8. Remove analyzer test leads and connect to the two alternator leads or lead terminals on rectifier. Figure 29.
9. Note reading on figures on **lower band, Scale No. 3.**
10. Reverse test leads on rectifier and note readings again.
11. **The ratio of the two readings should be no more than 2:1.**
12. This is only a **preliminary** test to determine condition of rectifier. If questionable, as a final test, rectifier should be installed on engine and checked with ammeter while engine is running.

NOTE: This is a true ohm scale, 0 – 200,000 ohms and can be used to test ohm resistance of other electrical components.

## FIELD WINDING GROUND TEST



**STARTER MOTOR DISASSEMBLED**

1. Turn selector switch to position No. 3, "Coil Continuity".
2. Attach small red test lead to insulated terminal on outside of starter motor and small black test lead to starter motor frame.
3. Meter hand should not move. If it does it indicates the field is grounded.
4. On starter motors having two fields 1) forward winding 2) reverse windings, test both insulated terminals.

## GROUND BRUSH TEST



**STARTER MOTOR DISASSEMBLED**

1. Turn selector switch to No. 3, "Coil Continuity".
2. Attach small black test lead to the grounded brush and small red test lead to frame to which brush is fastened. (End cap housing or field frame.)
3. Meter hand must move to the right, if not, there is a poor ground connection.
  - a) replace the ground brush and lead or
  - b) check that the lead connection is secure to the frame.
4. There is also a possibility of the brush holder having a poor ground to the frame or end cap, test by following steps 1, 2, 3 above.

## GROUNDING ARMATURE OR FIELD WINDING



### STARTER MOTOR ASSEMBLED

1. Raise ground brushes from commutator and insulate them from commutator with cardboard. Make sure brush is not touching commutator.
2. Turn selector switch to position No. 3, "Coil Continuity".
3. Attach small red test lead to insulated terminal on outside of starter motor and small black test lead to starter motor frame.
4. On starter motors having two fields 1) forward winding 2) reverse windings, test both insulated terminals. While making test move brush lead, making sure there is a solid connection.
5. If analyzer shows continuity (meter hand moves to the right) there is a ground, check individually (a) and (b) below:
  - a) Check armature - Page 15 Armature Ground Test.
  - b) Check Field Winding separately – Page 23 Field Winding Ground Test.

## SERVICE HINTS

### Ignition Failures

#### **I. Engine Misfires at Idle or High Speed, Presuming Carburetion and Fuel are OK, Check For:**

- Incorrect spark plug gap
- Defective or loose spark plugs
- Spark plugs of incorrect heat range
- Spark plug gap set incorrectly
- Sticking or weak breaker arm spring
- Incorrect breaker point gap
- Breaker points not synchronized
- Breaker points not properly adjusted
- Loose wire in primary circuit
- Defective distributor rotor
- Corroded or pitted breaker points
- Cracked distributor cap
- Leaking or broken high tension wires
- Weak armature magnets
- Worn cam lobes on distributor or magneto shaft
- Worn distributor or magneto shaft bushings
- Defective coil or condenser
- Defective ignition switch
- Spark timing out-of-adjustment

#### **II. Engine Backfires Through Exhaust, Check For:**

- Cracked spark plug porcelain
- Carbon path in distributor cap
- Crossed spark plug wires
- Air leak at intake deflector
- Improper timing

#### **III. Engine Pre-Ignition, Check for Ignition Causes:**

- Spark advanced too far
- Incorrect type spark plugs
- Burned spark plug electrodes
- Incorrect breaker setting

#### **IV. Starter Motor – If There Is Excessive Current Draw, Check for:**

- Broken, jammed starter drive
- Dirty, gummed armature
- Shorted armature
- Grounded armature or field
- Resistance from engine
- Misaligned starting motor
- Worn armature shaft bearings
- Misaligned armature shaft
- Loose field pole pieces

## SERVICE HINTS – Cont'd.

### IV. Starter Motor (Cont'd)

#### **If Starter Fails to Operate, Check For:**

- Poor battery ground
- Jammed drive
- Broken teeth on flywheel
- Direct ground in switch
- Solenoid dead or shorted
- Burned contact points in switch
- Improper seating brushes
- High mica between commutator segments
- Shorted armature
- Shorted field or brushes

### V. Distributor System Failures – With Ignition System as Guide, If There Is Breaker Point Oxidation, Check For:

- High battery voltage
- Resistor of incorrect capacity
- High resistance in condenser circuit
- Incorrect type ignition coil
- Extremely high voltage
- Moisture formation
- Excessive heat from engine

### VI. Electrical Failures – If Frequent Battery Charge Is Necessary, Check For:

- Corroded battery terminals
- Alternator grounded or shorted
- Worn out, inefficient battery
- Rectifier defective
- Short circuit in charging system
- Excessive use of electrical units
- Short circuit in ignition switch

**MANUFACTURER'S SPECIFICATIONS  
FOR COIL AND CONDENSER  
TESTS ON MERC-O-TRONIC  
MAGNETO ANALYZER.**

**TESTS MADE MUST  
BE WITHIN THE SPECIFIED  
TOLERANCES OR THE PART  
SHOULD BE REPLACED AS IT  
IS DEFECTIVE AND NOT UP  
TO MANUFACTURER'S  
SPECIFICATIONS.**