

MERC-O-TRONIC MODEL 98 OPERATORS MANUAL 6/74

Preface

This is a cleaned up pdf version of the operating instruction for the Model 98 Merc-O-Tronic Analyzer (Serial No 15,000 and up) that was created from a pdf copy I found dated 6/74. The text for the instruction pages has been retyped and the images cleaned up to provide a cleaner and easier to read copy for those individuals who still have a Merc-O-Tronic Model 98 analyzer. As such the text in this document is searchable by using the "Ctrl" and "F" function. I have also included a clear picture of the front of the unit since the original Figure 1 is not the best in quality.

I have left the original index pages but added a new index immediately following this page. There are a few supplement sections at the end so I have listed them in the new index and added sequential page numbers for the supplement pages to make them easier to locate for a specific brand.

I have cleaned up the specification pages that were published in the copy that I found. The text in the original copy was fuzzy and as such the text in this copy is not crisp which may make the search feature miss some part numbers.

This document represents many hours of work in recreating the information in a cleaner format - it is my hope that this document will assist Merc-O-Tronic owners when using this versatile ignition analyzing tool.

Even if the reader does not possess a Merc-O-Tronic unit a lot of the tests can be made using a modern multi-meter to help determine a defective ignition or charging component.



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THIS SHEET APPLIES TO MODELS HAVING

SERIAL NO's, 15,000 AND UP

DESCRIPTION

PATENTED – OTHERS PENDING

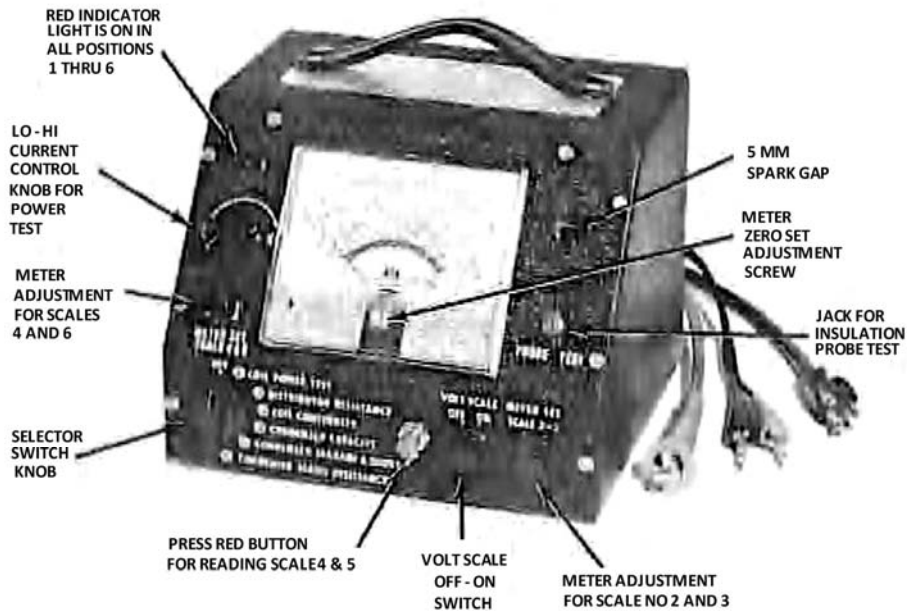


Figure 1

SERVICE NOTES

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

Your Merc-O-Tronic Ignition Analyzer is equipped with either a motor or a vibrator. The motor has 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 0.013". Pressure not to exceed 15 oz.

If vibrator fails to operate check and make sure that vibrator is in socket. When inserting vibrator, make certain pins line up with holes in socket.

NOTE: This is a special vibrator, if replacement is necessary order from your distributor or direct from factory. Merc-O-Tronic Part No. MIC # 12-191. (DO NOT ATTEMPT TO USE ANY STOCK VIBRATOR.)

Your analyzer is equipped with a Burgess 4F5H 7-1/2 volt battery. 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

For Model 98 Beginning with Serial No. 15,000

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 the battery life do the following: Move switch for volt scale No. 1 to "ON" position. Attach small black test lead to negative and red small test lead to positive lugs on battery. Then place selector switch on No. 1 position. (Red pilot will be on and vibrator will be running). Read red figures on top of scale No. 1. Battery should check not less than 6.5 volts or proper readings cannot be obtained. (Each division on volt scale equals 0.5 volt).

For bench use this analyzer can be connected to an 8 volt storage battery power supply. For 8 volts tap off 4 cells from a 12 volt storage battery.

4. 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	Mallory M903

To check low OHM resistance values see page 20.

See page 14 for Voltage Test Procedures.

CAUTION: DO NOT CONNECT TEST LEADS TOGETHER WHEN SELECTOR SWITCH IS TURNED TO POSITION NO. 1 AS THIS IS A DIRECT SHORT ON THE BATTERY.

FOR ALL TEST PROCEDURES INVOLVING SELECTOR SWITCHES 1 THRU 6 – VOLT SCALE SWITCH MUST BE IN "OFF" POSITION.

5. To check condenser leakage (on scale No. 5) and condenser capacity (on Scale No. 4), plug cord into 115-volt 60-cycle AC electrical outlet. This is the only time 115-volt 60-cycle AC is required. To read, press red button, the electrical charge placed in the condenser is automatically discharged when releasing the red button.
6. **SPECIAL NOTICE:** When checking Lauson Power Products Coils #30546, 30560 and 29632 or any coil with internal condenser the 5 m.m. pot spark will appear fuzzy. DO NOT let this fuzzy spark mislead you. If spark is steady, coil is good.

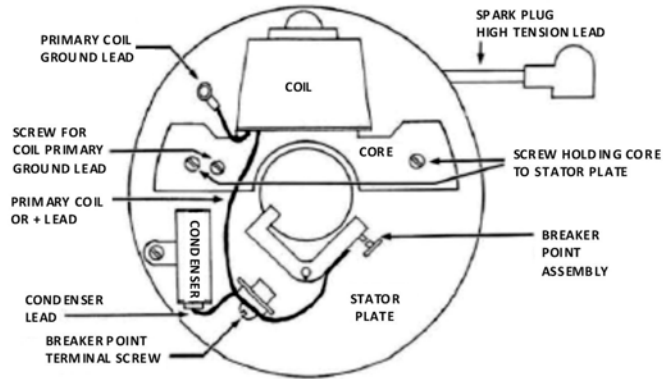


Figure 2

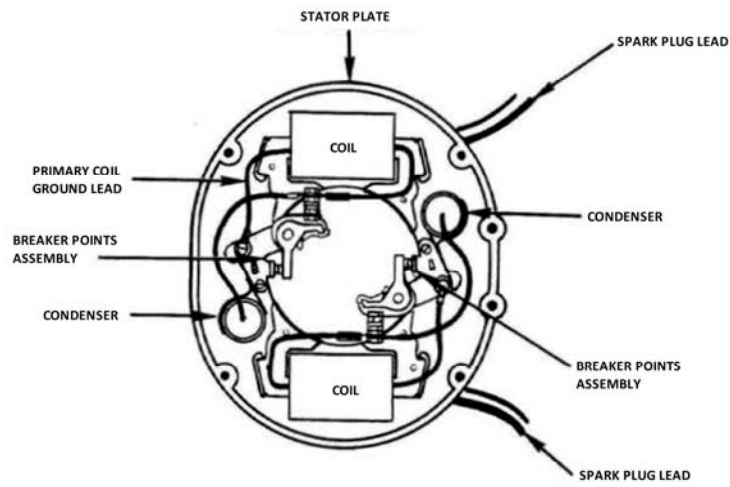


Figure 3

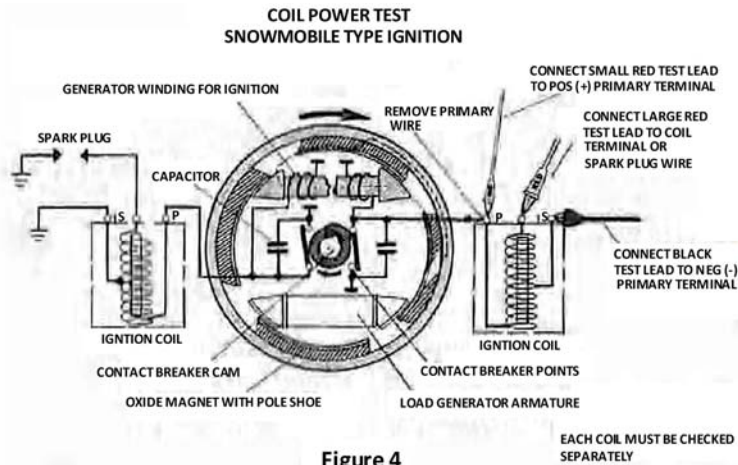


Figure 4

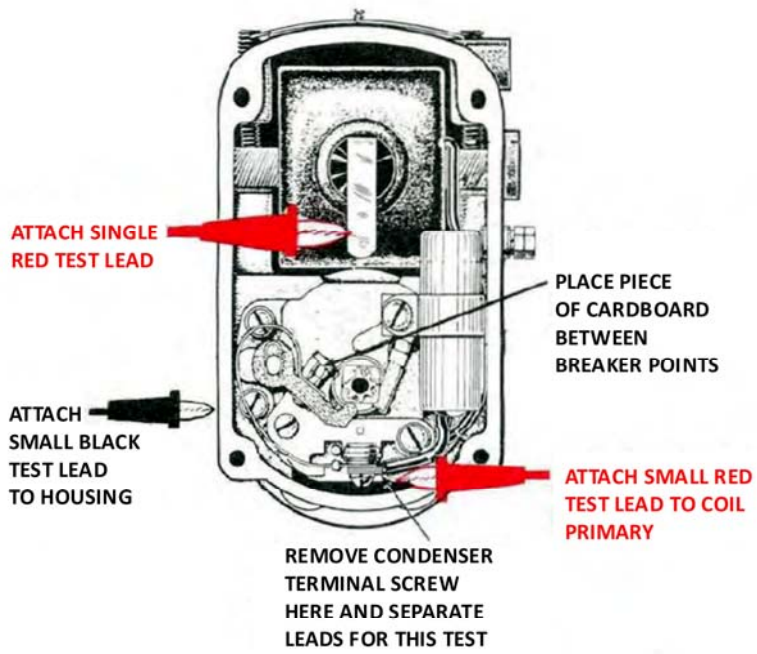


Figure 5

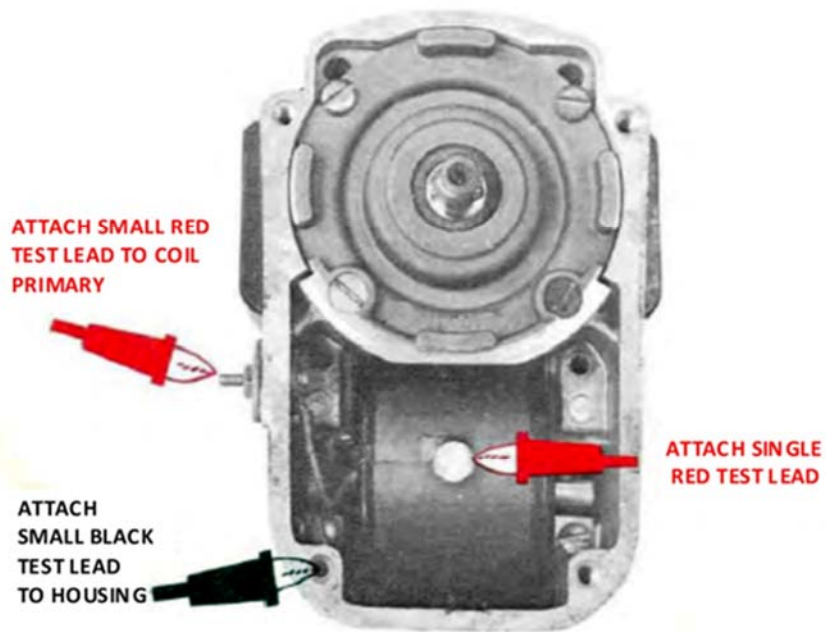
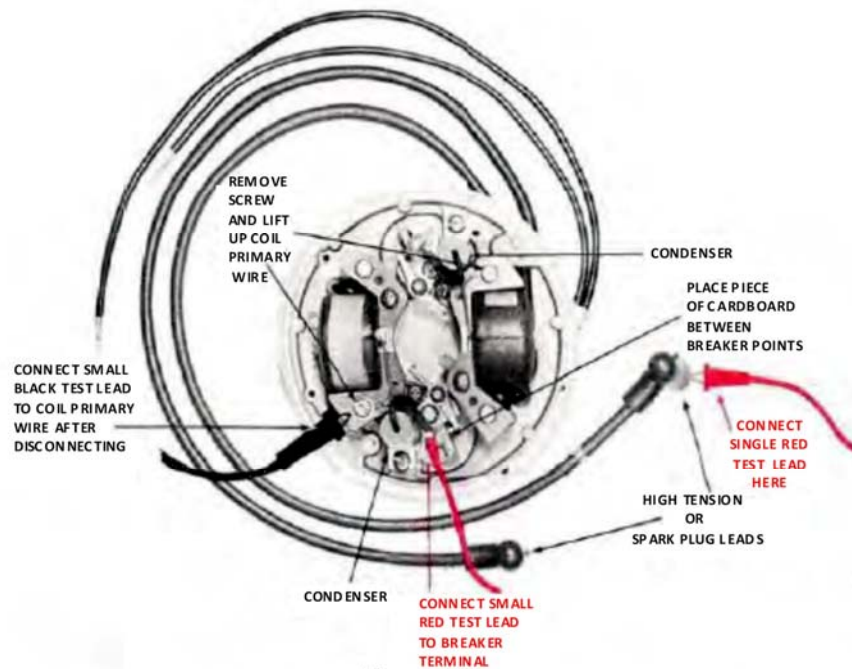


Figure 6

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 single 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 **single 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 magnet 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 23.

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

NOTE: All coils should start firing 1 to 3 divisions before rated specifications. Coils which first start to fire on "rated" specifications are considered marginal and would give considerable trouble in starting engine and should be considered defective.

COIL SURFACE INSULATION TEST

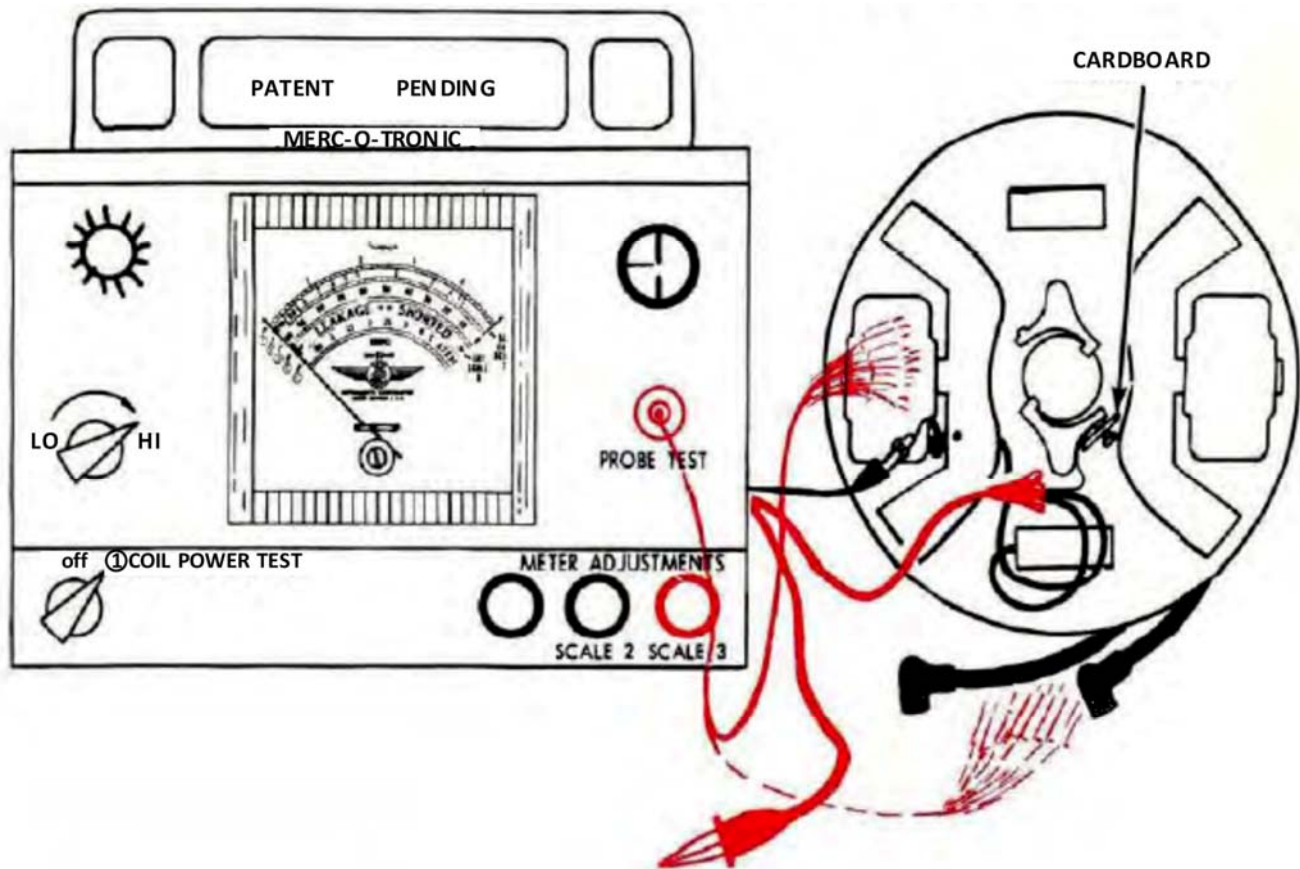


Figure 8

1. Remove single 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

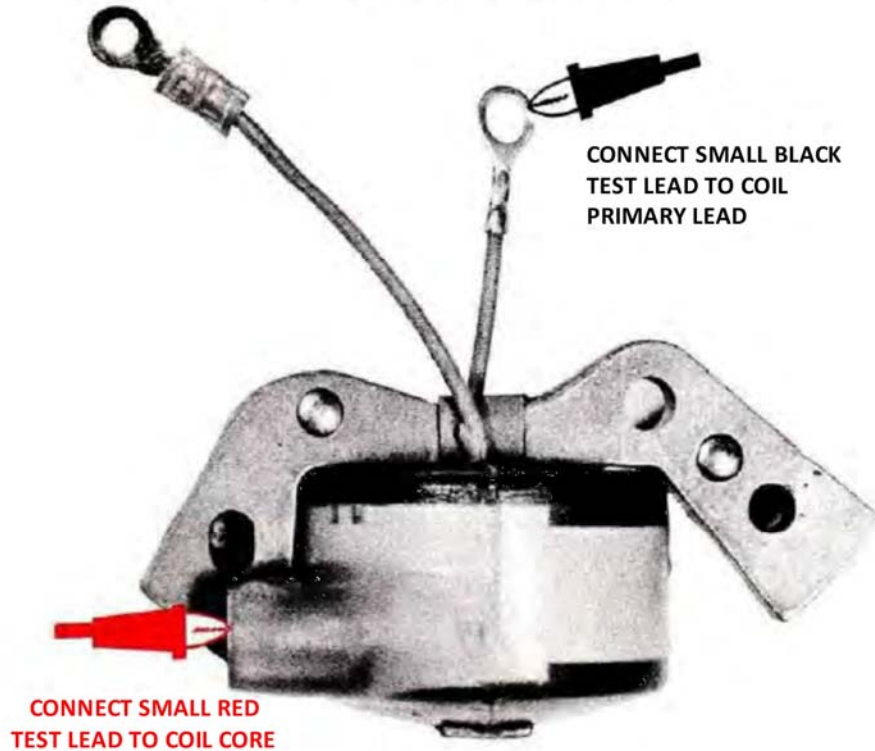


Figure 9

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.

PRIMARY RESISTANCE TEST

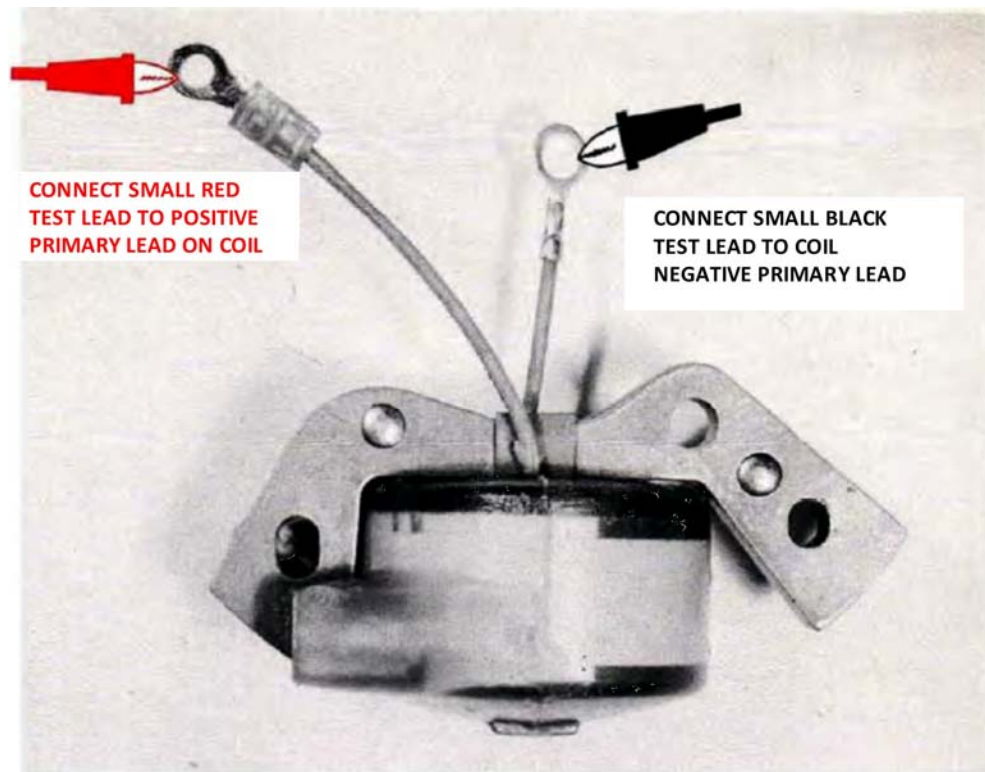


Figure 9A

1. Turn selector switch to position No. 2, Distributor Resistance for checking low **OHM** resistance values.
2. **Do not clip test leads together.** Turn meter adjustment knob for scale No. 2 until meter pointer lines up on set position on right side of scale No. 2. Your meter is now set to check all low OHM values from 0 to 30 ohms.
3. **Clip small red test lead** to primary **Positive** side of coil.
4. Connect small black test lead to primary Negative side of coil.
5. Read **Red** figures on Scale No. 2.
6. Reading must be between the two values for that particular coil shown in this manual under manufacturer's specifications.
7. Resistance in OHMS can be obtained by reading **Red** numbers in same scale.
8. Readings lower than the highest value shown in the specifications, indicate the primary winding is shorted.
9. Readings higher than the lowest value under manufacturer's specifications, indicates the primary winding is open.
10. In either case, the coil is defective and must be replaced.

COIL GROUND TEST

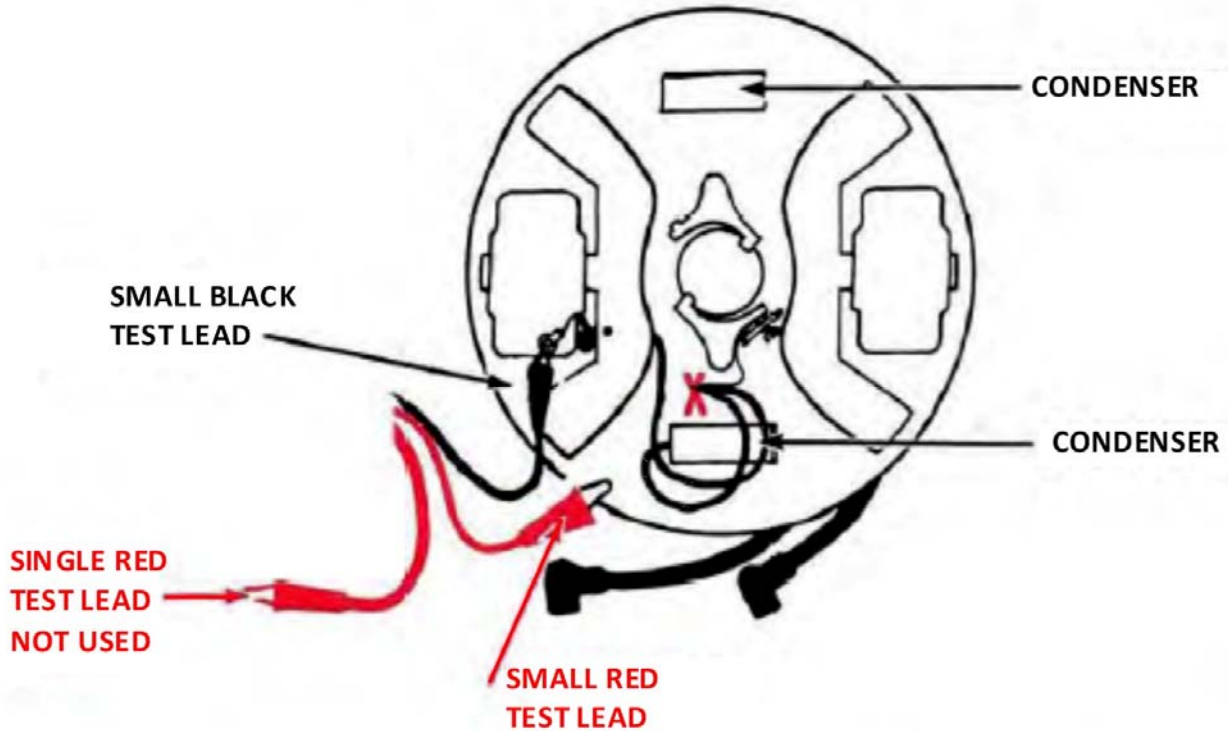


Figure 10

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 side of the meter.
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.

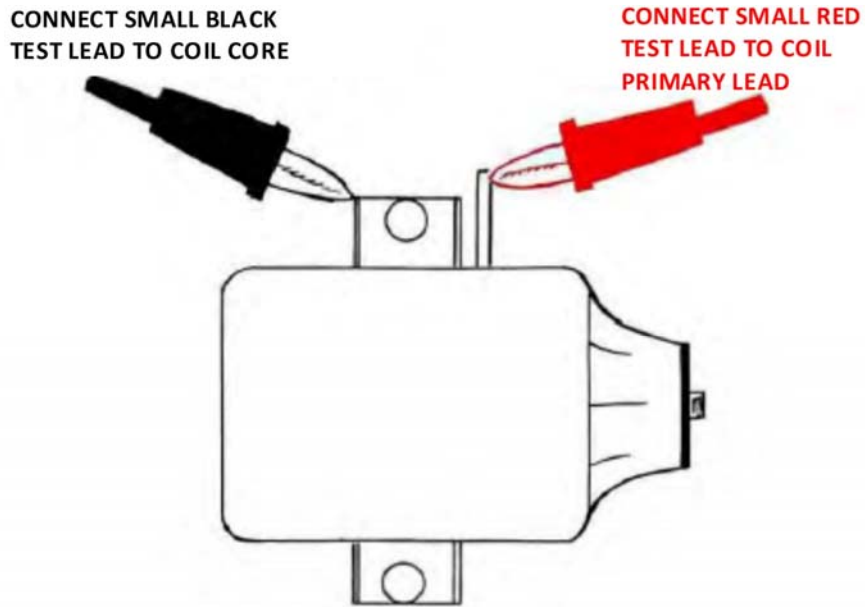


Figure 11

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.

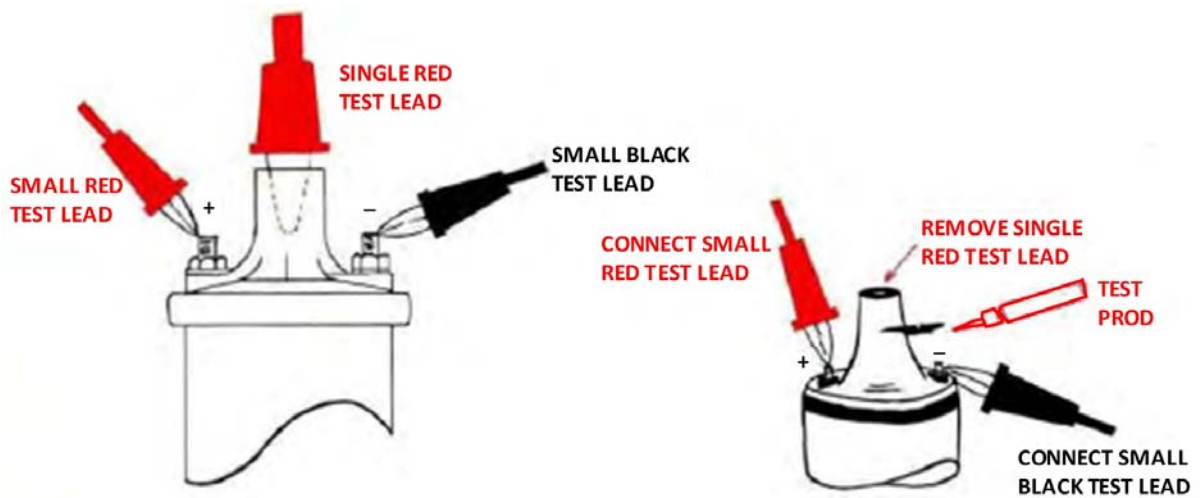


Figure 12

Figure 13

CONDENSER CAPACITY TEST

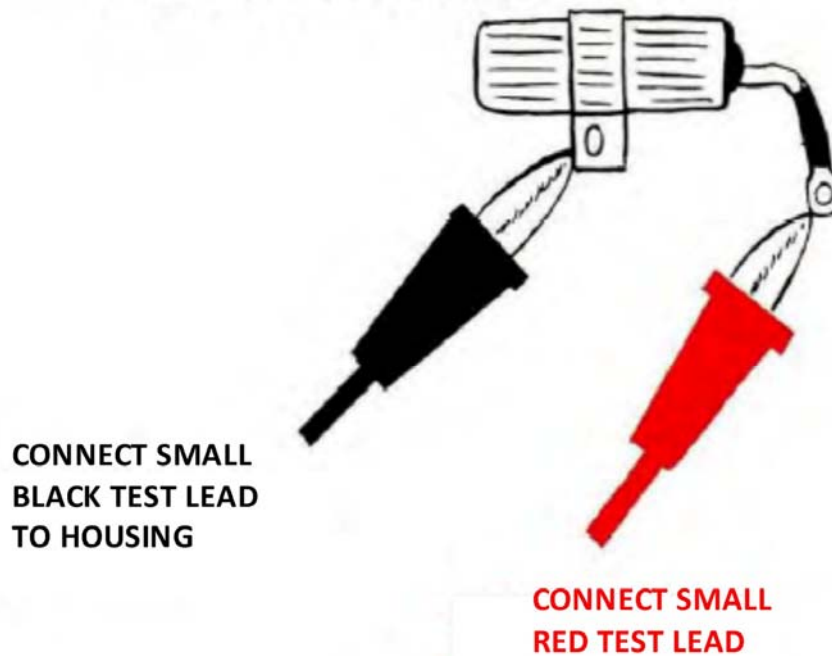


Figure 14

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. 4, Condenser Capacity.
4. Clip small red and black test leads together.
5. Depress red button, turn meter adjustment knob on scale 4 to set line on scale No. 4 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 4.)
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.

CONDENSER LEAKAGE AND SHORT TEST

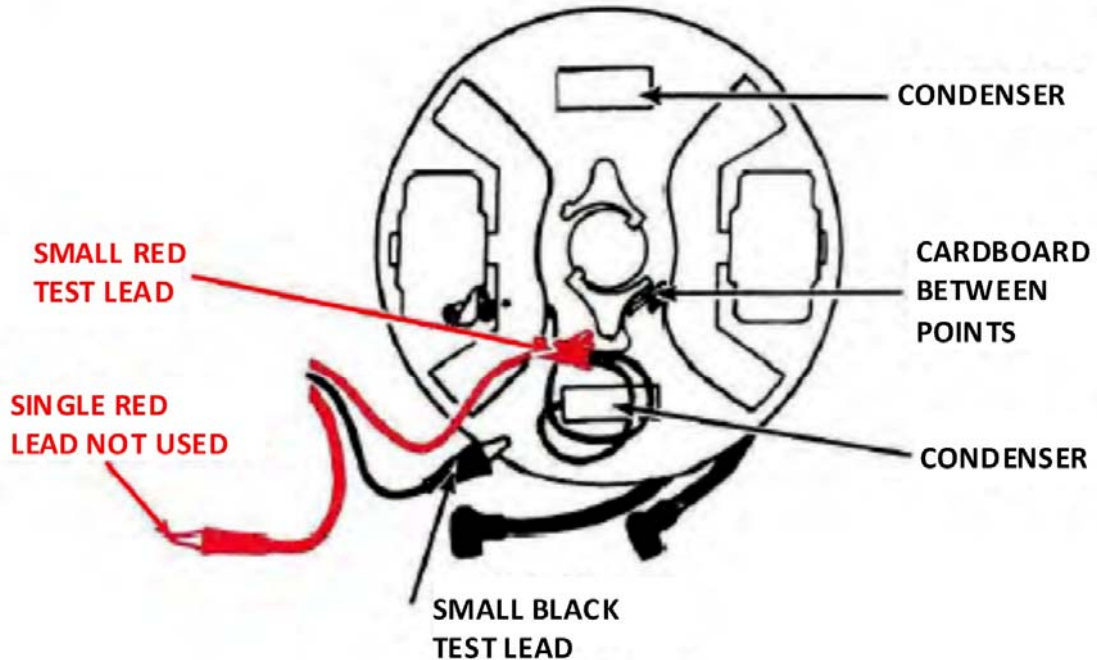


Figure 15

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. 5 "Leakage and Short."
6. Depress red button and hold a minimum of 15 seconds. Read Scale No. 5.
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 SERIES RESISTANCE TEST
FOR MODEL 98 USE ONLY**

1. Leave cardboard between breaker points.
2. Place selector switch on position No. 6 "Condenser Series Resistance".
3. Clip **small red** and black test lead together.
4. Adjust meter set scale 6 to set line on right side of dial for scale No. 6.
5. Unclip test leads.
6. **Connect small red test lead to breaker terminal or if loose to condenser lead.**
7. Connect small black test lead to stator plate if condenser is mounted, otherwise to body of condenser.
8. Meter pointer must be within ok green block on scale No. 6 on right side of meter.
9. **While testing "move" and "wiggle" the lead coming out of the condenser.**
10. Observe meter pointer for any movement.
11. **Loose connections** can cause trouble if the condenser is subjected to a great deal of vibration.
12. If meter pointer remains within ok green bar on scale No. 6 the condenser is good.
13. If meter pointer moves into the **red section** on Scale 6 or if by **wiggling the condenser lead it moves into the red section**, then the condenser is defective.
14. This test usually helps to determine the ability of the condenser to readily charge and discharge.

NOTE: This test is very sensitive, as the latest techniques are being used for this test.

DUE TO THE SENSITIVITY OF THIS TEST, MAKE CERTAIN TEST CLIPS AND PARTS THAT TEST CLIPS ARE ATTACHED TO ARE CLEAN OR FALSE READINGS WILL BE OBTAINED.

VOLTAGE AND COIL POWER TEST INFORMATION

Use the two small leads (Red and Black) for checking voltage readings from 0 – 24 volts maximum. Small red lead is positive and black lead is negative.

Scale No. 1 is actually two scales in one. The red scale is for checking voltage. Each red line or division represents 1/2 volt with a maximum reading of 24 volts. Do not attempt to check voltage if selector switch is on any other position than "OFF" except when checking battery in analyzer. Voltage can only be checked when volts Scale No. 1 switch is in the "ON" position.

THE BLACK SCALE IS FOR CHECKING AMPERAGE DURING THE COIL POWER TEST ONLY. Each black division on the scale represents 1/10 of an amp, with the black 1 representing 1 amp etc. up to maximum of 4 amperes. Amperage during coil power test can only be read when The Volts Scale No. 1 switch is in the "OFF" position.

NOTE

When voltage switch is in the "ON" position, analyzer is inoperative on all other tests. Be sure to place volt switch in "OFF" position for other tests on analyzer. Do not attempt to use volt scale for ammeter readings.

BREAKER POINT TEST

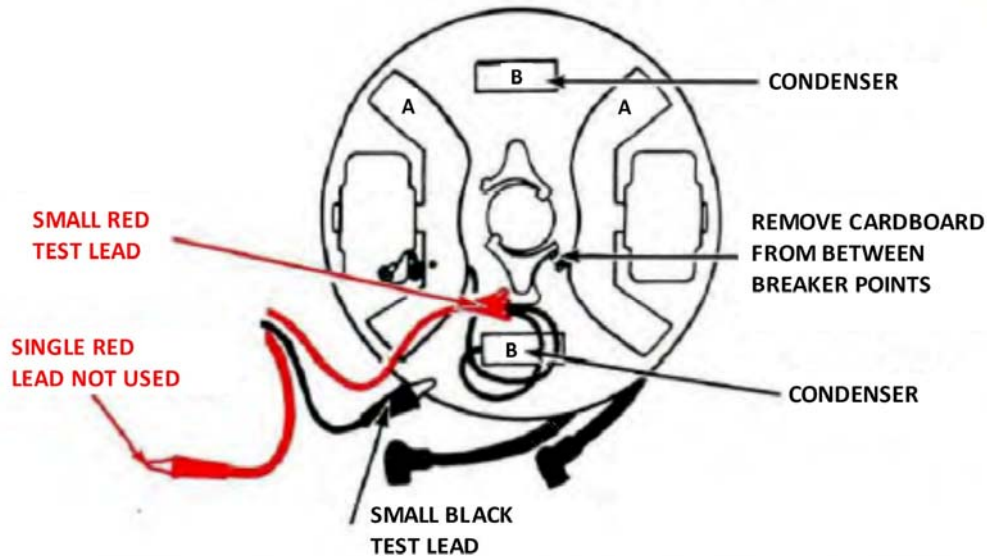


Figure 16

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 black 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

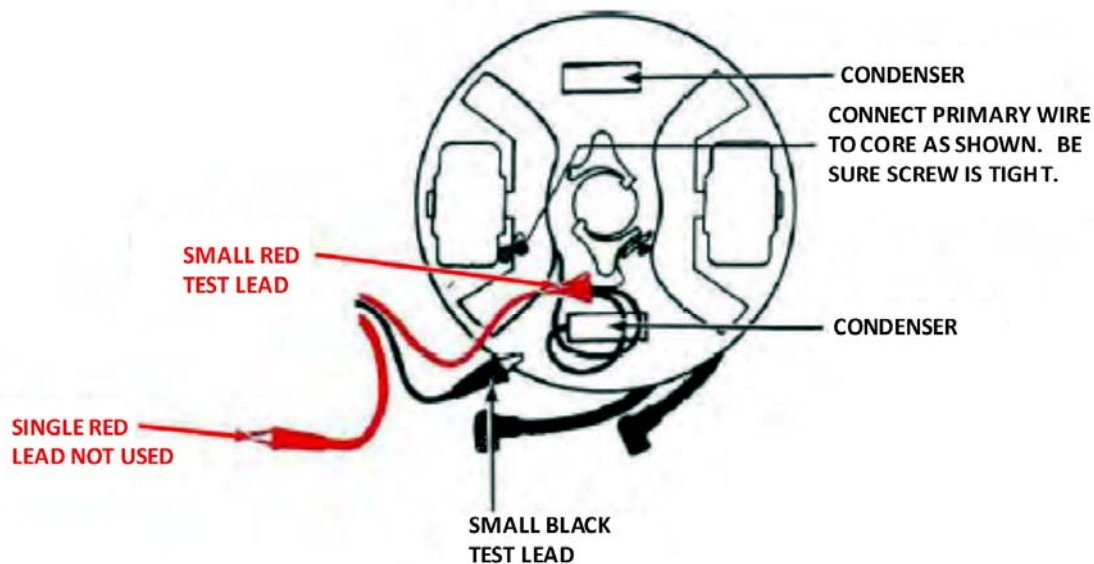


Figure 17

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.**

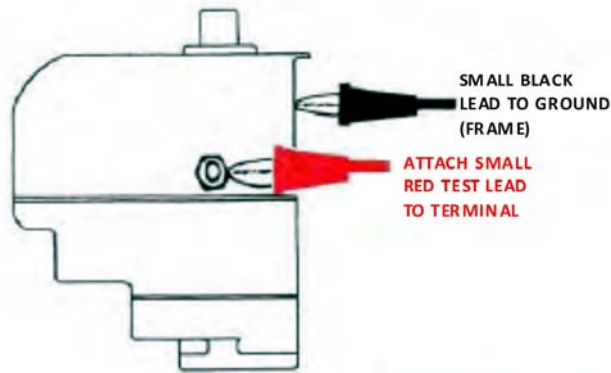


Figure 18

“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

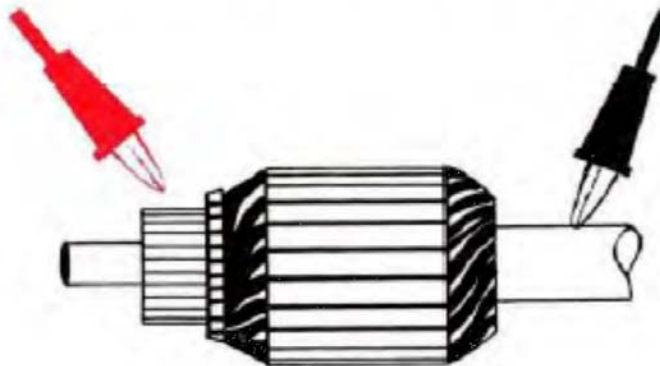


Figure 19

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

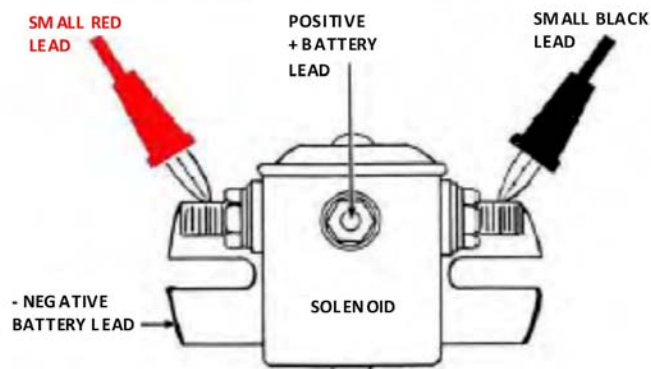


Figure 21

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.