Cuyuna
Service Manual

Electric Start
Section

ELECTRICAL

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General - Magneto Ignition

The Cuyuna two-cycle engine electrical system consists of two, somewhat separate, systems; the ignition system and the magneto alternator system. Electrical current for both systems is produced by the flywheel magneto generator assembly.

The flywheel magneto generator assembly, consists of the components listed below:

1. Flywheel w/magnets
2. Base plate
3. Lighting coil
4. Generator coil
5. Breaker points
6. Condenser
7. Felt lubricator
8. External coil
9. Spark plug

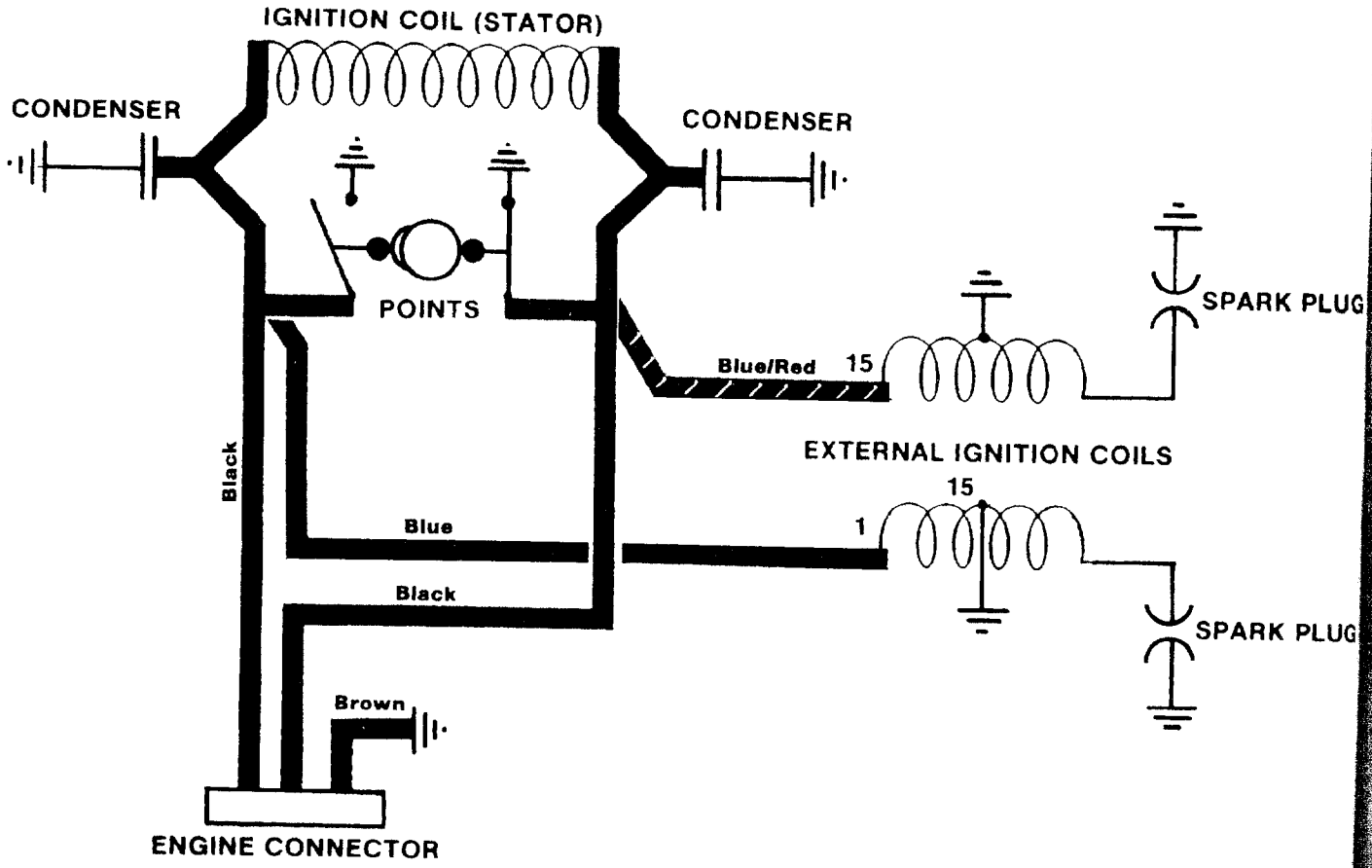
Another component that functions in the ignition system is the ignition switch.

Magneto Alternator System - Ignition

The magneto alternator system produces current that provides the spark necessary to ignite the fuel/air mixture in the combustion chamber, and also, current which allows for operation of the lights and electrical accessories. To produce and control the necessary voltage required for ignition, a number of electrical components are used in conjunction with each other.

FLYWHEEL-MOUNTED PERMANENT MAGNETS

Provide a moving magnetic field when the flywheel is rotating around the generating coil and lighting coils.



IGNITION SCHEMATIC

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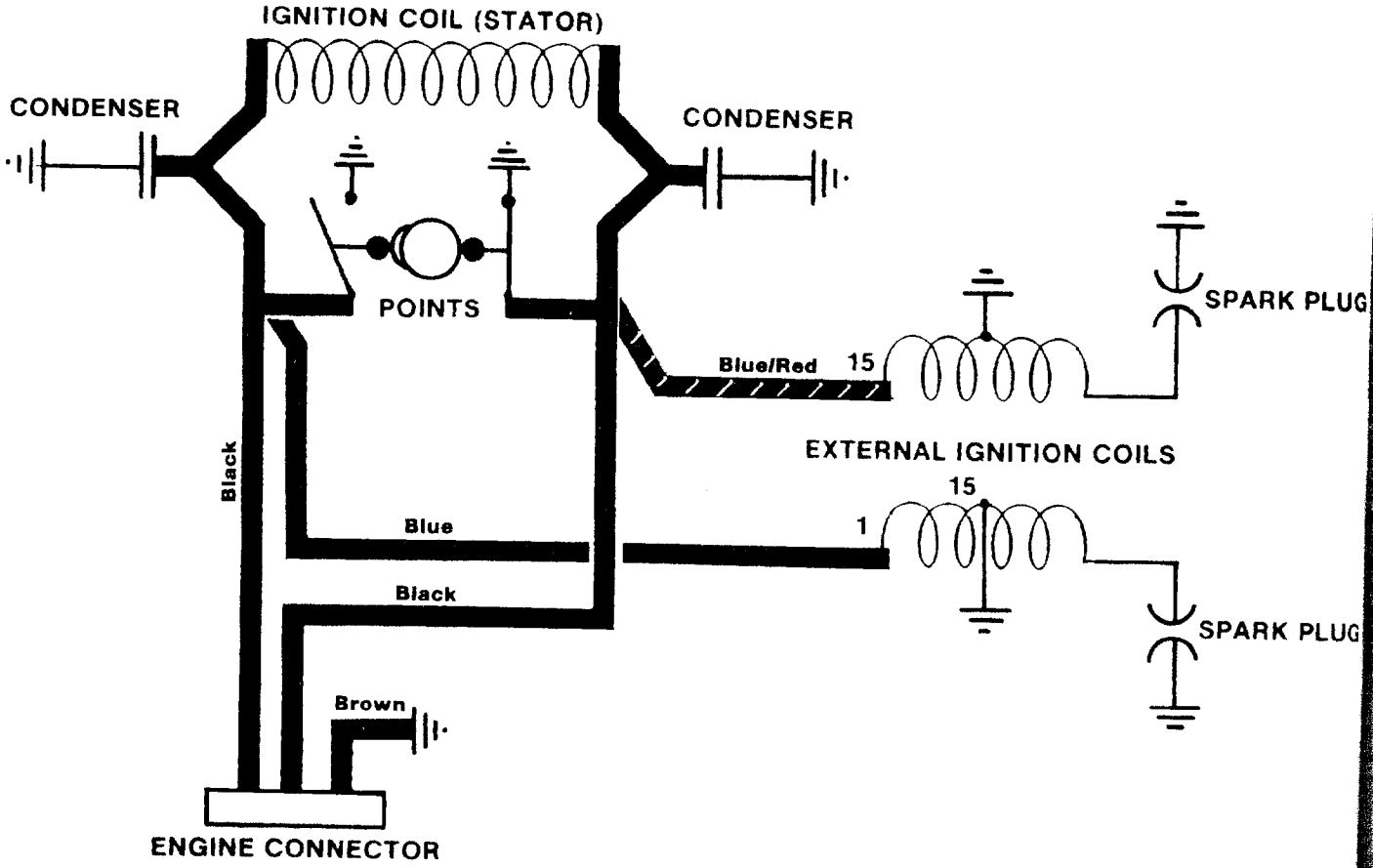
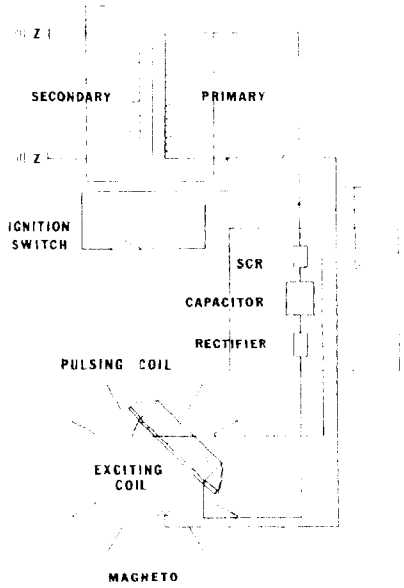


IGNITION SCHEMATIC

the SCR switch is closed or triggered by a pulse from the pulser coil. The position of this pulser coil, in relation to the magnets and the piston, triggers the SCR at the precise moment to ensure the most efficient combustion. When the SCR switch closes, a circuit is completed from the capacitor to the ignition coil primary. As a result, current flows through the external ignition coil primary.



As previously stated, the external ignition coil is made of two separate windings; a low voltage "primary" and high voltage "secondary". As current flows through the "primary" the magnetic field builds up, resulting in the induction of the "secondary". Because of the required high voltage current that is needed to jump the air gap between the center and side electrodes of the spark plug, a considerable increase in voltage must take place.

But how is this increase in voltage generated? The wire turn ratio of the secondary is considerably more than that of the primary, which accounts for the increased secondary output. Because the secondary has a high voltage output, it is wound above the primary, which prevents a short circuit of the coil. Because the secondary is wound above the primary, the magnetic force lines of the primary are broken, resulting in the induction of an eletromotive force (EMF) in the secondary.

Therefore, the secondary allows high voltage current to flow to the spark plug and jump the air gap between the center and side electrode. At the moment of spark, the compressed fuel/air mixture in the combustion chamber is ignitied, causing expansion and a single power pulse.

The timing of the ignition spark, as previously stated, is accomplished by a trigger impulse to the CDI unit and SCR switch. The trigger impulse is induced in the pulser coil by the flywheel magnets. The SCR requires a certain voltage to actuate it. At cranking speeds and low RPM there is enough voltage to actuate the SCR when the piston is a few degrees before top dead center (BTDC). Advancing the timing by electronic means insures easy starting and maximum efficiency at high RPM. The most important advantages of CDI are: stronger ignition at cranking speeds, no maintenance requirements of breaker points, and simpler adjustment of timing. These result in easier starting, peak performance and low maintenance.

Other components that function in the ignition system, but are not mounted on the engine, include: the ignition switch. The ignition is called a "closed circuit" CDI system. This means the circuit must be complete between the yellow/black ignition wire and ground, using a switch, before the igntion will function.

Point Ignition - Specifications

Description	Part Number	Resistance Test	Test Connections
Ignition Coil-Primary	000-43-056-060	1.9 ohms ± 10%	(+) Blue term. (−) Ground
Ignition Coil-Secondary	000-43-056-060	5100 ohms ± 15%	(+) High Ten Lead (−) Ground
Generating Coil	000-43-211-000	3.7 ohms ± 7%	(+) Black (−) Black
Lighting Coil-30 watt	000-43-207-000	2.2 ohms ± 10%	(+) Green (−) Green/Black
Lighting Coil-120 watt	000-43-206-000	1.5 ohms ± 10%	(+) Yellow (−) Yellow/Black
Points	000-43-062-240	1 ohm	(+) Blue-Blue/Red (−) Ground
Condenser	000-43-065-160	Open	(+) Terminal (−) Case
Spark Plug Cap	002-44-224-200	1000 ohms ± 10%	(+) Plug Term. End (−) Wire End
Ignition Timing	18° BTDC, .070"-.078" BTDC, 1.8mm-2.0mm (Full Advance)		

C.D.I. Ignition - Specifications

Description	Part Number	Resistance Test	Test Connections
Ignition Coil-Primary	000-43-209-000	.33 ohm ± 15%	(+) Blue/White (−) Black
Ignition Coil-Secondary	000-43-209-000	3900 ohms ± 20%	Between High Tension Leads with caps removed
Charge Coil	000-43-205-000ASM	180 ohms ± 10%	(+) Red/Black (−) Black/Red
Trigger Coil	000-43-205-000ASM	2.2 ohms ± 10%	(+) Black/White (−) Black/Red
Lighting Coil	000-43-205-000ASM	.18 ohms ± 10%	(+) Yellow (−) Yellow
Spark Plug Cap	002-44-443-000	5000 ohms ± 10%	(+) Plug. Term. End (−) Wire End
Ignition Timing	28° or .174 at 1800 RPM - 18° or .078 at 6000 RPM		

Testing Point Ignition Components

Before any disassembly of the ignition components is started, a few simple test procedures should be carried out to determine if the ignition system is truely the problem. Many times, time and money are both wasted in replacement of ignition components, when the problem is elsewhere.

Below is a test procedure that has proven to cut time in troubleshooting ignition problems. It will first assist you in pinpointing the problem area and then if electrical, finding the problem.

ENGINE FAILS TO START

1-42 Remove the spark plug (plugs) from the engine and inspect them to determine if they are fouled.

2-42 Place new spark plugs into the spark plug caps and ground the spark plugs to the cylinder. Be sure the plugs are properly gapped.

3-42 Grasp the recoil handle and crank the engine over briskly. Observe the spark plug firing tip for spark. Be sure the ignition switch is in the "ON" position.

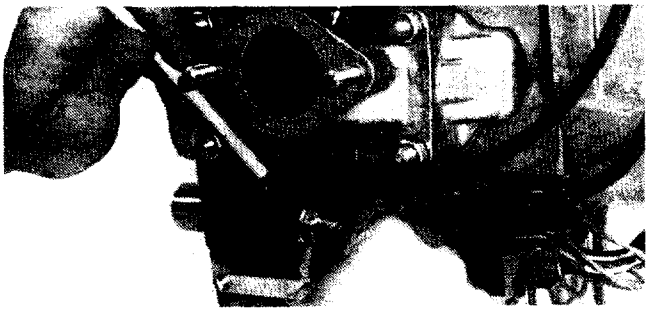
4-42 If no spark is seen, inspect the two black leads to make sure they are in good condition. Inspect the outer rubber coating of these wires, from the engine to the ignition switch to make sure the insulation isn't rubbed through anywhere, causing a short circuit.

5-42 If the ignition switch leads are in good condition, disconnect them from the ignition switch and isolate the wire ends to prevent them from grounding. Grasp the recoil handle and once again crank the engine over while observing the spark plugs for spark. If spark is now present, the ignition switch is faulty. If there isn't any spark noted, the problem is with one of the ignition components. Follow the procedure below, using an ohmmeter.

Ignition Coil Resistance Test (External)

PRIMARY WINDING

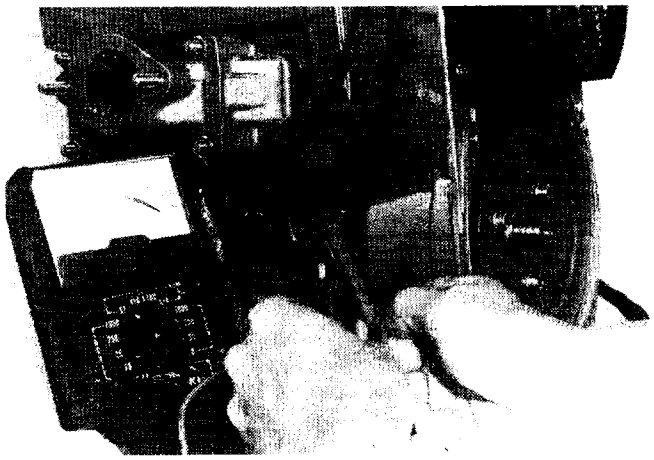
1-43 Disconnect both the ground lead (brown wire) and the blue or blue/red lead from the ignition coil.



2-43 Set the ohmmeter scale selector knob to the X1 scale.

3-43 Touch the meter leads together and zero the needle.

4-43 Touch the ohmmeter leads to each of the spade connectors of the ignition coil. If the primary winding is in good condition the meter should read 1.9 ohms ± 10%.



SECONDARY WINDING

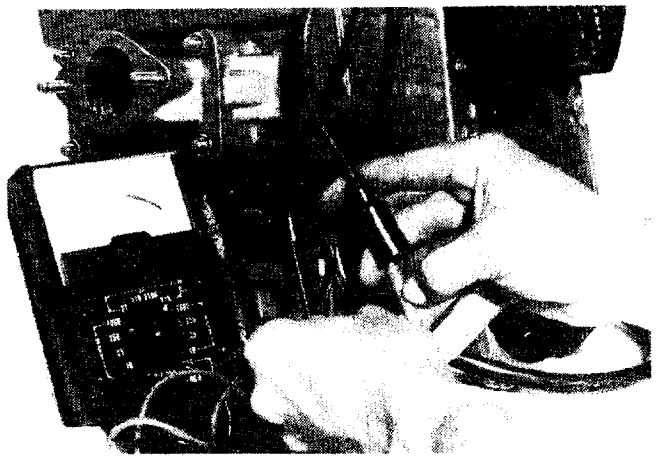
1-44 Remove the spark plug cap from the spark plug wire by rotating the cap counter-clockwise.

2-44 Disconnect both the blue and brown ground leads from the ignition coil.

3-44 Set the ohmmeter selector knob on the X1K scale.

4-44 Touch the ohmmeter leads together and zero the meter needle.

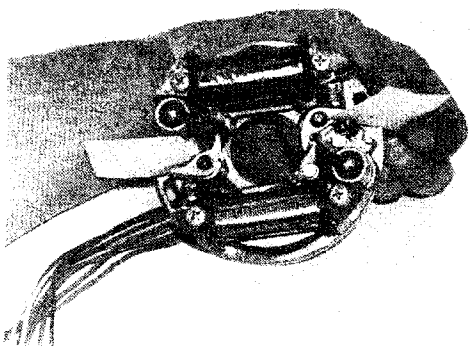
5-44 Connect the red ohmmeter lead to the spark wire. Touch the remaining black ohmmeter lead to either of the spade connectors of the ignition coil. The ohmmeter should read 5100 ohms ± 15%.



Ignition Generator Coil Resistance Test

1-45 Remove the recoil starter. Remove the starter cup and belt pulleys from the flywheel.

2-45 Insert a small piece of cardboard between the points to prevent them from making contact. Do this on both sets if you are working on a twin-cylinder model.



3-45 Remove the blue lead from each ignition coil and make sure they are isolated from the engine. Note their location so they can be re-installed correctly. Also remove the two black leads from the ignition switch and isolate them, make sure they do not touch the air frame or engine.

4-45 Set the ohmmeter selector knob on the X1 position. Touch the tester leads together and zero the meter needle.

5-45 Touch the ohmmeter lead to each of the black ignition leads. The ohm reading should be 3.7 ohms ± 10%.

Condenser Test

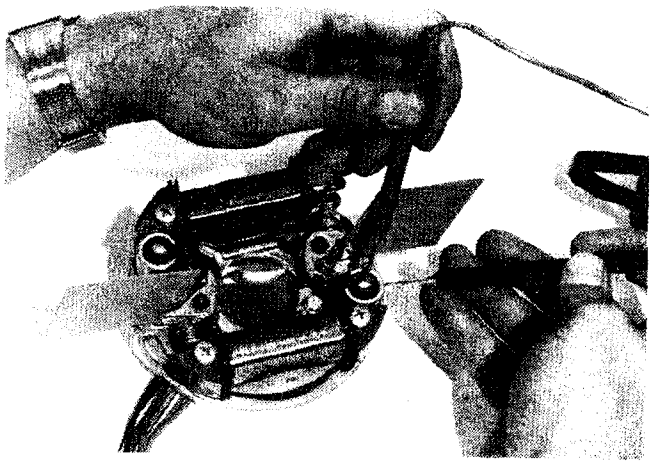
1-46 Disconnect the blue lead from each ignition coil and isolate them so they do not touch the engine.

2-46 Remove the recoil, starter cup and belt pulleys. Using a couple of small cardboard pieces, block both sets of points open.

NOTE: On the 215 single cylinder model, you must block the points open and remove the screw securing the remaining generating coil lead to the stator plate. Make sure this ground lead doesn't touch any part of the engine during the test procedure.

3-46 Touch the red lead of the ohmmeter (set on X1) to the center post of the condenser and ground the black ohmmeter lead to the condenser case. The ohmmeter must read open. If the ohmmeter shows continuity, the condenser must be replaced.

4-46 Set the ohmmeter on X1K and repeat test. With the meter set on X1K, you should note a slight jump in the needle as the condenser takes on a small charge from the ohmmeter. Reverse the tester leads and you will again observe a slight needle movement. This indicates the condenser is good.

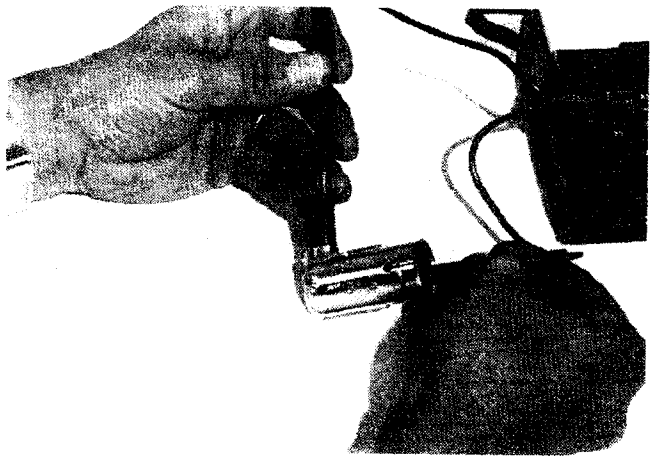


Spark Plug Cap

1-47 The Bosch spark plug cap is a 1000 ohm resistor type cap. To test this component, first remove it from the spark plug wire by turning it counter-clockwise. Continue this rotation until the cap is free of the spark plug wire.

2-47 Set the ohmmeter selector knob on X1K scale and zero the needle.

3-47 Touch the two ohmmeter leads to either end of the spark plug cap, making a good connection at each end. The ohmmeter should register 1000 ohms ± 10%.

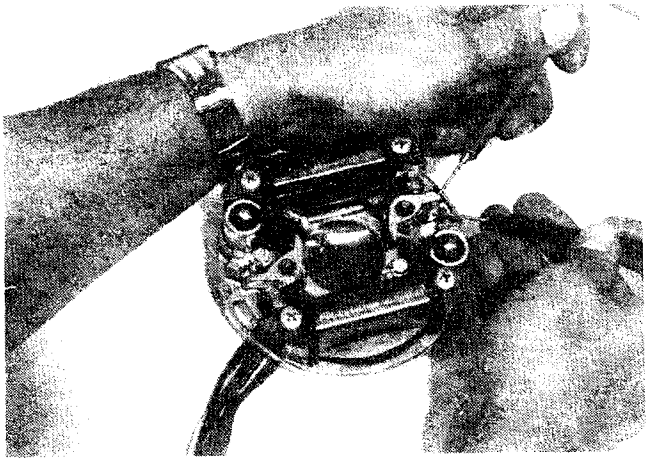


Ignition Points

1-48 The ignition points can also be tested using the ohmmeter to determine their condition. If the points have been blocked open with cardboard during previous test, remove the cardboard allowing the points to make good contact. If the points appear to be dirty pass the cardboard between the contacts several times to remove any oil or any traces of dirt.

2-48 Set the ohmmeter selector knob on the X1 scale and zero the needle.

3-48 Touch the two ohmmeter leads to either side of the contact points. If more than 1 ohm resistance is registered, the points should be replaced. Do not try filing the point contacts to restore them. Always install new points if the present set doesn't meet the above specification or if they are burnt or pitted.



Charge Coils Resistance Test

● CAUTION ● If the charging system is being used to charge a battery, disconnect the battery to prevent damage to the ohmmeter.

1-49 Disconnect the four charge coil wires from the electrical system. These would be the two (2) green and two (2) yellow wires. The two (2) green wires are from the small 30 watt coil and the two (2) yellow leads are from the 120 watt coil.

2-49 Set the ohmmeter scale selector on the X1 position. Touch the tester leads together and zero the meter.

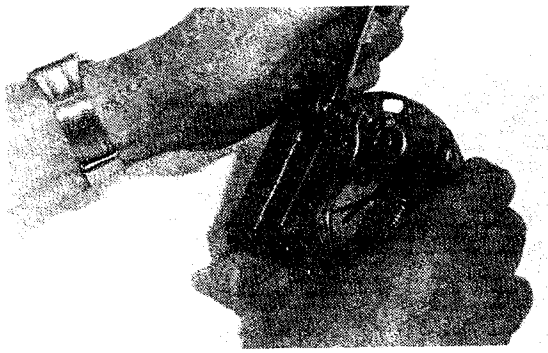
3-49 Touch the red ohmmeter lead to the green wire and the black ohmmeter lead to the green/black wire. Your tester should read 2.2 ohms ± 10%.

4-49 Next, locate the solid yellow and yellow/black wires. Touch the red tester lead to the solid yellow wire and the black tester lead to the yellow/black wire. The resistance should be 1.5 ohms ± 10%.

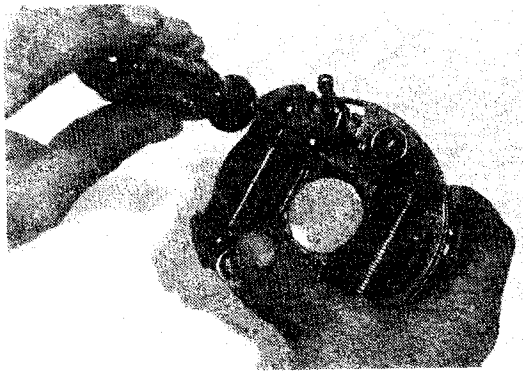
Ignition Points Replacement

1-50 Remove the recoil starter cup, belt pulley and flywheel from the engine. Refer to the engine disassembly section of this manual for instructions covering removal of these components. To aid in taking better photographs, the stator plate has been removed from the engine. However, during ignition point replacement, it can be left in place.

2-50 Using a small ignition wrench, remove the nut and lockwasher securing the blue and black leads to the point set. Remove the wires.

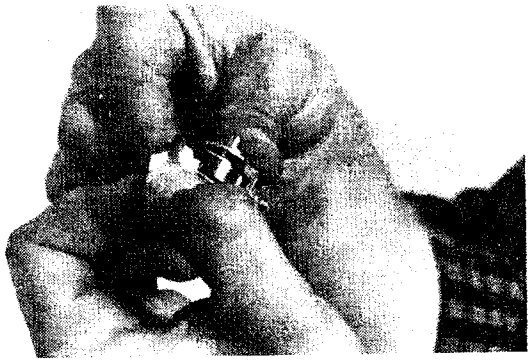


3-50 Remove the single screw securing the point set to the stator plate. Lift the point set free of the stator plate.

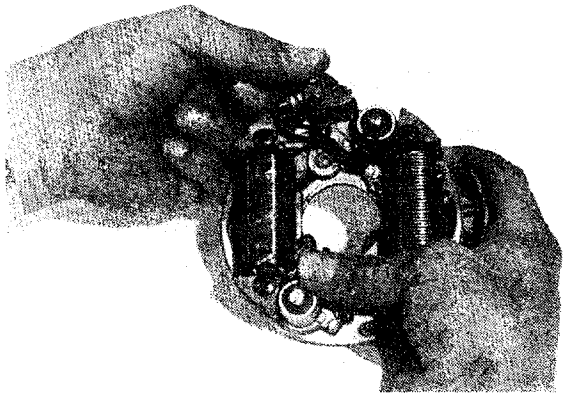


4-50 Remove the new point set from its package and account for the small tube of grease sent with each set.

5-50 Apply the grease behind the point set rubbing block as shown. Only a small amount is required.



6-50 Set the points into position on the stator plate and secure with the single attaching screw. Be sure the wires are routed properly under the point plate before tightening the attaching screw. If any of these wires are pinched, a short circuit of the ignition system will result.



7-50 Position the blue and black wires onto the small securing screw, next to the white nylon insulating washer. Secure with nut and lockwasher. Be sure that neither of the wire brass eyelets touch any metal surfaces or the ignition will be grounded. Hold the brass eyelets with a needle nose pliers as the securing nut is tightened to prevent them from turning or twisting.

8-50 After installing new points, pre-set the point gap to .015. This can be done easiest by removing the cam from the flywheel and installing it on the crankshaft. Rotate the cam until its lobe comes in contact with the point rubbing block. Continue to rotate the cam until the points open to their widest gap. At this point, adjust the gap to .015. Final point gap adjustment will be done during engine timing.

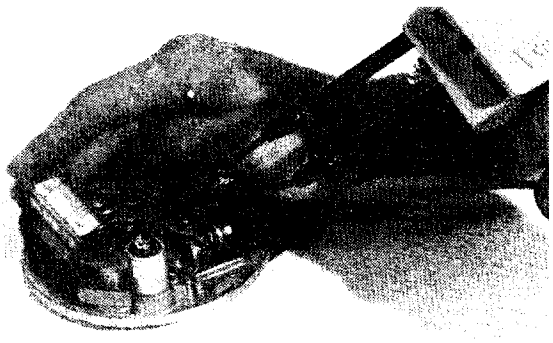
Condenser Replacement

1-51 Remove the recoil, starter cup, belt pulley, flywheel and fan housing from the engine. Refer to the engine disassembly section of this manual for instructions covering removal of these components.

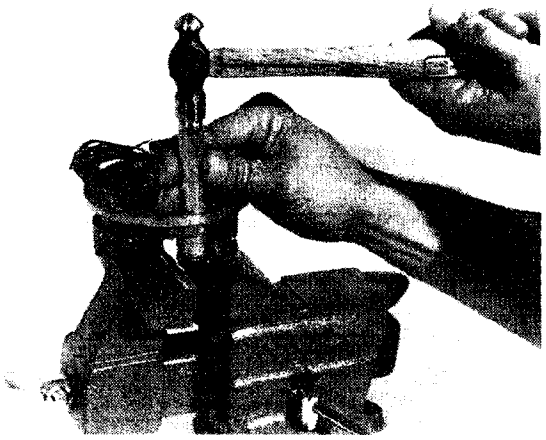
2-51 Scribe a reference line on the stator plate and fan housing for assembly purposes.

3-51 Remove the two screws that secure the stator plate to the fan housing and remove the stator plate.

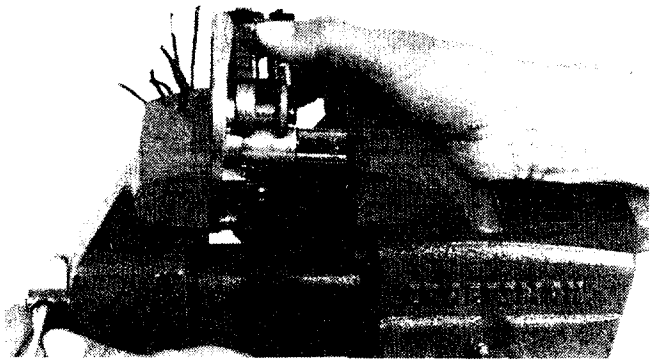
4-51 Using a soldering gun, remove the black wires from the top of the defective condenser.



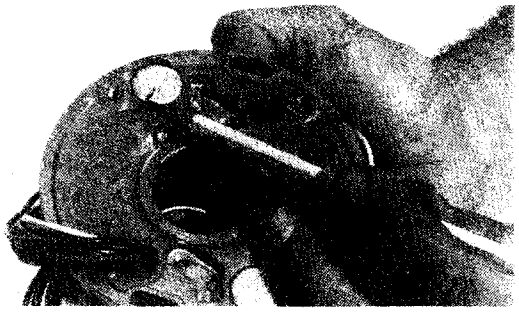
5-51 From the backside of the stator plate, drive the condenser free of its mounting position.



6-51 Using a socket that is the same diameter as the condenser, position socket, condenser and stator plate between the jaws of a small vise. Using the vise as a press, slowly close the vise jaws, pressing the condenser into place.



7-51 Only press the condenser into the stator plate until its flat bottom surface is flush with the bottom edge of the mounting bore. Be careful not to kink or bulge the sides of the condenser case.



8-51 Using resin core solder, re-solder the two black leads to the top of the new condenser. Make certain that these wires do not come in contact with the condenser case or the ignition will be shorted.

9-51 Install the stator back into the fan housing, making sure none of the wires are pinched on the backside. Align the two scribe marks and secure with the two screws and lockwashers. Engine timing must be checked when engine is reassembled.

Ignition Timing Procedure (Points)

1-52 Remove the recoil, starter cup, belt pulleys and spark plugs from the engine.

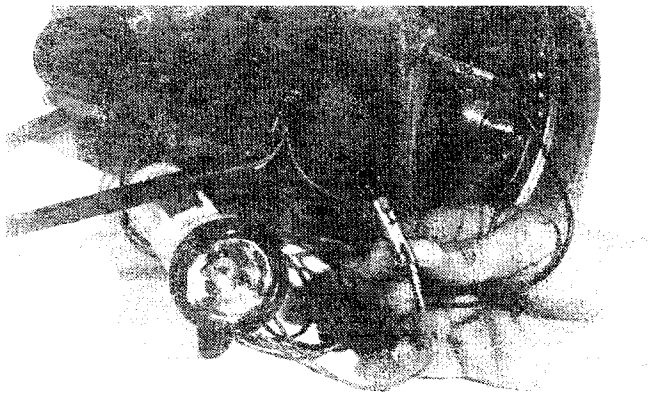
NOTE: Inspect the flywheel to determine if the advance arm spring has been removed. If it hasn't, remove it using a needle nose pliers, working through the opening in the flywheel face. Grasp the spring at either end and carefully stretch it out through the opening until it unhooks from the advance arm and the stationary mounting post and discard it. In using this method, there is no need to remove the flywheel. Inspect the spring once removed to be sure it hasn't broken off, leaving part of the spring inside the flywheel. The spring isn't used with the new timing specification.

2-52 Locate the two screws securing the stator plate to the fan housing. Loosen these screws and rotate the stator plate full clockwise (full retarded) and re-tighten screws, securing the stator plate in the full retardec position.

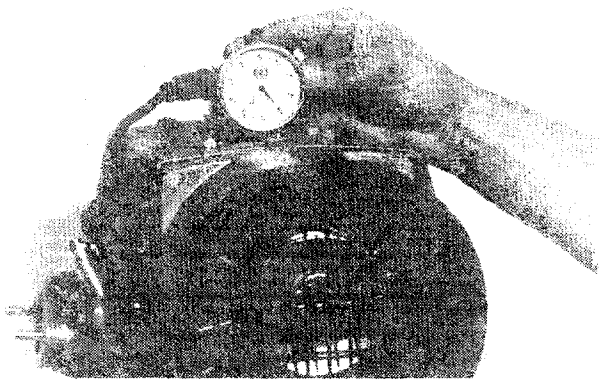
NOTE: When adjusting the timing to the new specifications (.070 - .078 or 1.8 - 2.0mm), timing on both cylinders is set by adjusting the point gap on each set of points. As pointed out above, the advance spring must be removed to assure easier starting. If the spring isn't removed, starting becomes very difficult.

3-52 Install a dial indicator assembly into the spark plug hole of the Number two (2) cylinder (fan side).

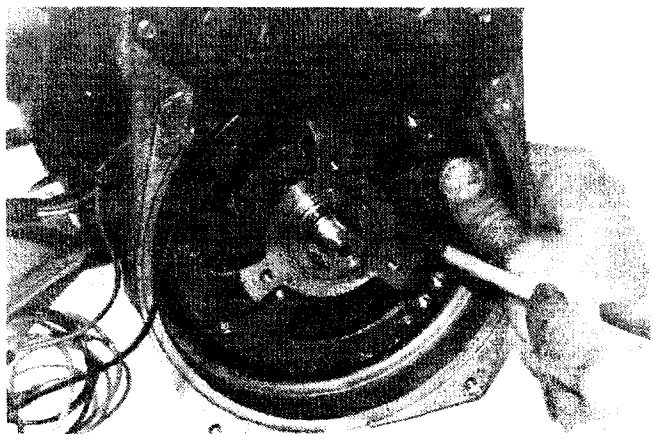
4-52 Attach a continuity light or ohmmeter with one lead to ground, the other lead to the blue/red coil wire. Disconnect the wire from the coil.



5-52 Rotate the flywheel clockwise and observe the dial indicator needle movement. Continue to rotate the flywheel clockwise until the indicator needle changes direction. Rotate the indicators outer face until the zero on the dial, coincides exactly at the point of direction change. Where the indicator changes direction is known as (T.D.C.) top dead center.



6-52 Rotate the flywheel counter-clockwise from (T.D.C.) top dead center, until the indicator needle indicates .070 to .078, or 1.8 to 2.0mm. At this point, make sure the advance arm is pushed fully open or out against its stop.

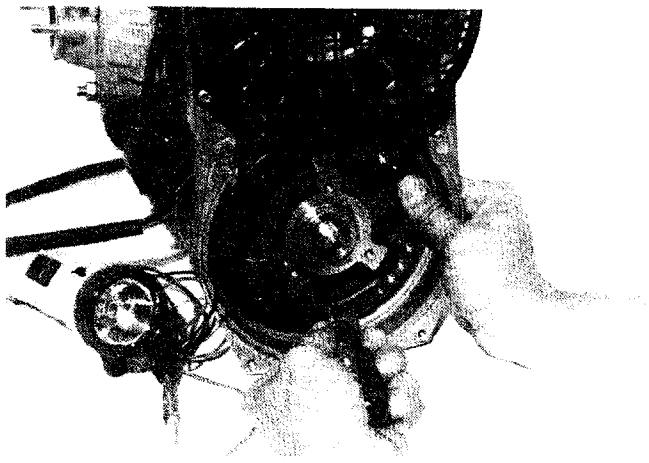


7-52 With the advance arm in the full advance position, the continuity light should dim in the range of .070 to .078 or 1.8 to 2.0mm. If you are using a ohmmeter, you should observe a needle deflection if timing is correct. If neither of these are observed, you must adjust the point gap to correct timing.

8-52 Position the flywheel, so that the indicator needle indicates .078 or 2.0mm. While holding the flywheel in this position with one hand, insert a screwdriver blade into the adjustment notch of the point plate and between the two aluminum post of the stator plate.

NOTE: There is no need to loosen the screw securing the point set to the stator plate. Leave it tight during this procedure and you will save considerable time.

9-52 While holding the flywheel at .078 or 2.0 mm. twist the screwdriver left or right while observing the continuity light or ohmmeter. As soon as you note a light intensity change or needle deflection, remove the screwdriver and recheck timing. Rotate the flywheel counter-clockwise until the needle indicates .100 (B.T.D.C.) before top dead center. Next, rotate the flywheel clockwise until you see the light change intensity, or the ohmmeter needle deflect. Stop at that exact point and note the indicator reading. It must be between .070 to.078 or 1.8 to 2.0 mm. If the indicator needle is out of these specification, again repeat all of step 8-52 &9-52.



After you have the timing set on the #2 cylinder, install the dial indicator into the #1 cylinder spark plug hole (P.T.O. side) and repeat the same procedure. Both cylinders must be timed within .002 or .05 mm of each other.

11-52 When timing the number one cylinder, attach the continuity tester lead to the solid blue wire. It is found attached to the ignition coil nearest the P.T.O. side or number one cylinder. Reinstall the blue/red wire on the number two ignition coil.

NOTE: After the timing procedure is completed, rotate the flywheel counter-clockwise until the points are on the high side of the cam or at their maximum open position, observed through the largest opening in the flywheel. Check gap using a feeler gauge. Point gap must be between .012 to .016 or 0.71 to 0.81 mm.

Correct ignition timing will ignite the compressed fuel/air mixture in the combustion chamber, just before the piston reaches the top of its stroke. Timing is measured in distance from top dead center or in degrees of crankshaft rotation.

Correct timing greatly influences performance. Improper timing causes a decrease in horsepower, overheating and increased fuel consumption, and can also shorten engine life.

In the point ignition system, the breaker points on the magneto stator plate work as a switch that interrupts current flow from the generating coil to the primary winding of the external ignition coil. If the point gap is too small, current flow cannot be interrupted totally because a small amount will jump the close gap. If the gap is too large, the quantity of current decreases because the breaker points will interrupt the flow to the primary, before the winding of the generating coil are fully saturated. In either case, performance is influenced because high voltage cannot be produced consistently.

Troubleshooting CD Ignition

The troubleshooting procedure for the close circuit ignition system, is much different than what is used for the standard open circuit type systems. In the standard open circuit ignitions, the ignition depends on an open ignition switch to operate. In the "closed" circuit ignition system, the ignition lead must be grounded before the ignition will operate. To troubleshoot the "closed " ignition system, use the following procedure:

1-53 Remove the spark plugs and visually check electrod condition. Replace any fouled plug. Attach the spark plugs to the high tension leads and ground them on the cylinder heads.

NOTE: Make sure the ignition switch is in the "ON" position, and both spark plugs are grounded to the cylinder head.

2-53 Crank the engine over quickly and check for spark. If no spark is seen, check to make sure the ignition switch is "ON", and that the there is a good connection from the yellow/black ignition wire to the switch and a good ground from the switch to the engine. After making these checks, again crank the engine over. If no spark is present, proceed to step 3.

● CAUTION ● Spark plugs must be installed and grounded to engine. Never crank the engine over without having the spark plugs attached to the high tension leads and grounded, as damage to the C.D.I. unit may result.

3-53 Disconnect the yellow/black lead from the ignition switch, then using a short piece of wire, ground the yellow/black wire to the engine (any clean, unpainted metal surface). Crank the engine over. If spark is now present, the problem is either one or more of the following: A. Defective ignition switch. B. Corroded or loose wire connection at the ignition switch connector. C. Poor ground connection.

To check these possible causes, proceed to "Ignition Switch Test."

Ignition Switch Test

1-54 Remove both the ground and ignition leads from the ignition switch.

2-54 Using an ohmmeter or continuity light, attach the two tester leads to either wire terminal of the switch.

3-54 With the switch in the closed position, your tester must show full continuity. If the tester shows an open circuit, double check your test connections. If the connections are correct, replace the switch.

Ignition Ground

1-55 As stated before, this ignition system will not function unless it is first properly grounded. To test for this, attach a short jumper lead to the single yellow and black ignition wire. Ground the jumper lead to any clean unpainted surface on the engine.

2-55 With the spark plugs grounded to the cylinder heads, grasp the recoil rope and crank the engine over sharply. If spark is present at the spark plug electrods, check the wiring harness to and from the ignition switch for both a good ground and tightness.

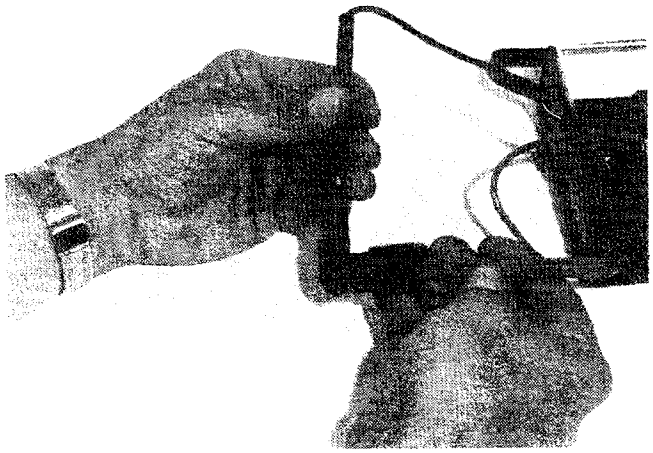
If no spark is present, proceed to checking the electrical system components, using an ohmmeter. When testing the electrical system, always start by testing the easier components first. When testing the different electrical components, there is one that cannot be tested accurately. It is the C.D.I. box or amplifier. If all the other components test "good", the C.D.I. unit can then be assumed to be the problem. All resistance specifications and test connections are given in an easy-to-follow test procedure.

Spark Plug Cap Resistance Test

1-56 Remove the spark plug caps from the high tension leads by turning them counter-clockwise.

2-56 Set the ohmmeter selector on the X1K position, then touch the leads together and zero the meter.

3-56 In turn, on each cap, connect one meter lead to one end of the cap, connect the other meter lead to the other end of the cap.

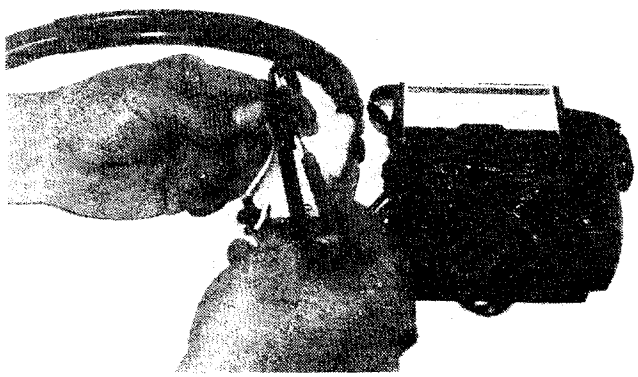


4-56 Spark plug cap resistance must be 5000 ohms ± 10%.

External Coil (Primary Winding Resistance)

1-57 Set the ohmmeter scale selector on the X1K scale and zero the meter.

2-57 Test between the white/blue and black leads in the double plug connector.

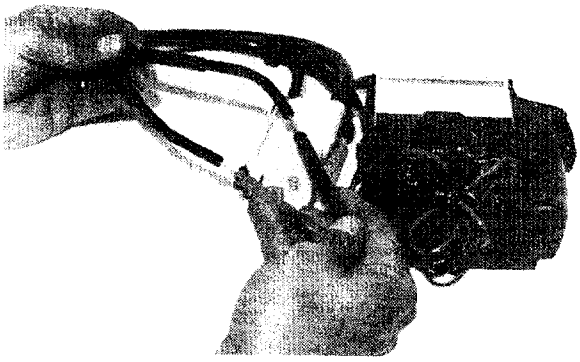


3-57 The resistance must be .33 ohms ± 15%.

External Coil (Secondary Winding Resistance)

1-58 Set the ohmmeter scale selector on the X1K position and zero the meter.

2-58 Remove the spark plug caps and perform the test between the two high tension leads.

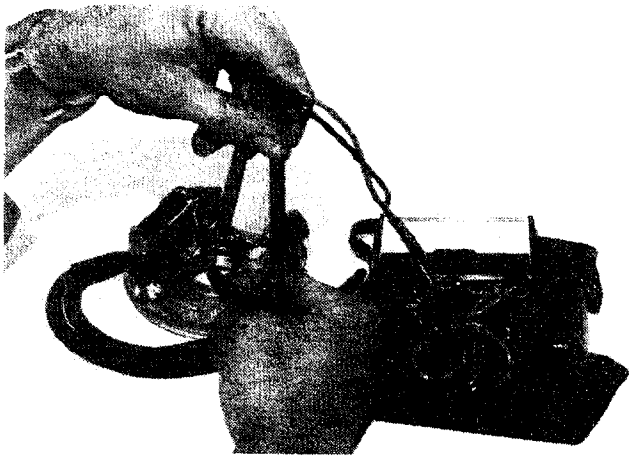


3-58 The resistance must be 3900 ohms ± 20%.

Charge Coil Resistance Test

1-59 Set the ohmmeter scale selector on the X100 scale.

2-59 Disconnect the triple and the double plug connectors from the engine magneto to the C.D.I. unit. Test between the black/red lead in the triple plug and the red/black lead in the double plug connectors from the engine wiring harness.



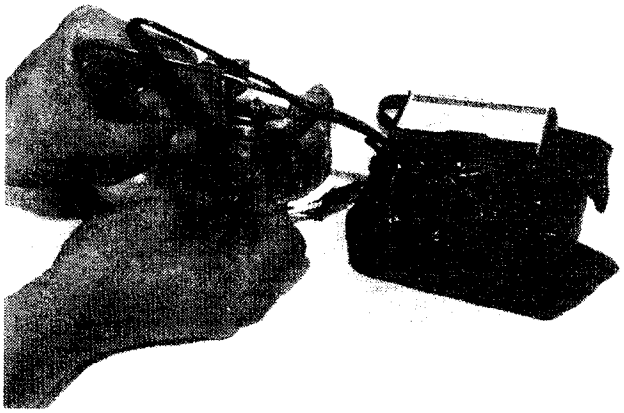
3-59 The resistance must read 180 ohms ± 10%.

Trigger Coil Resistance Test

1-60 Set the ohmmeter scale selector on the X1 position and zero the meter.

2-60 Disconnect the triple and double plug connectors from the C.D.I. unit. Perform test on wires leading into the engine magneto.

3-60 Test between the black/white and black/red leads in the triple plug.



4-60 The resistance must be 2.2 ohms ± 10%.

Lighting Coil Resistance Test

1-61 Set the ohmmeter scale selector on the X1 position and zero the meter.

2-61 Test between the two solid yellow leads found in the double plug connector from the engine magneto.

3-61 The resistance must be .18 ohms ± 10%.

Checking Ignition Timing

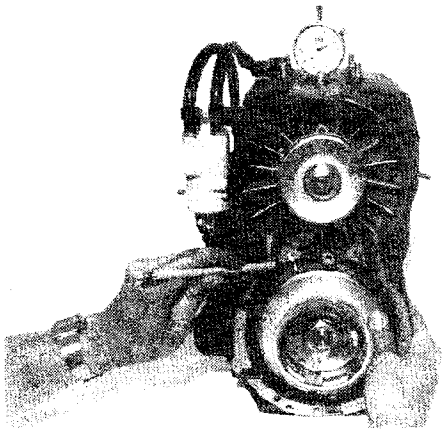
C.D.I. ignition timing must be checked with the engine running, using a good automotive timing light.

The closed circuit C.D.I. ignition used on the Cuyuna engine has a retarding timing curve. As the engine RPM increases, you will note that timing actually retards instead of advancing as is so commonly seen. With this type of retarding curve, the engine has improved torque at lower engine speeds. To check engine timing, follow the procedure below.

■ NOTE: With the C.D.I. ignition, each spark plug fires twice per revolution and the ignition advance mechanism is controlled electrically. Because both spark plugs fire at the same time, it is only necessary to time one of the two cylinders as the other will also be correct. Engine timing must be checked at the specified RPM, called out in the instructions.

1-62 Remove the spark plugs from the engine.

2-62 Install a dial indicator into the number two cylinder (magneto side). Locate top dead center (T.D.C.) and rotate the flywheel counter-clockwise from top dead center .174 or 4.4mm before top dead center (B.T.D.C.). While holding the flywheel at .174 or 4.4mm, place a mark on the flywheel that aligns with the long stationary "run" indicator line of the fan housing.



3-62 Remove the dial indicator and install spark plugs, torquing them to 20 ft. lbs. Secure spark plug wires to the spark plugs.

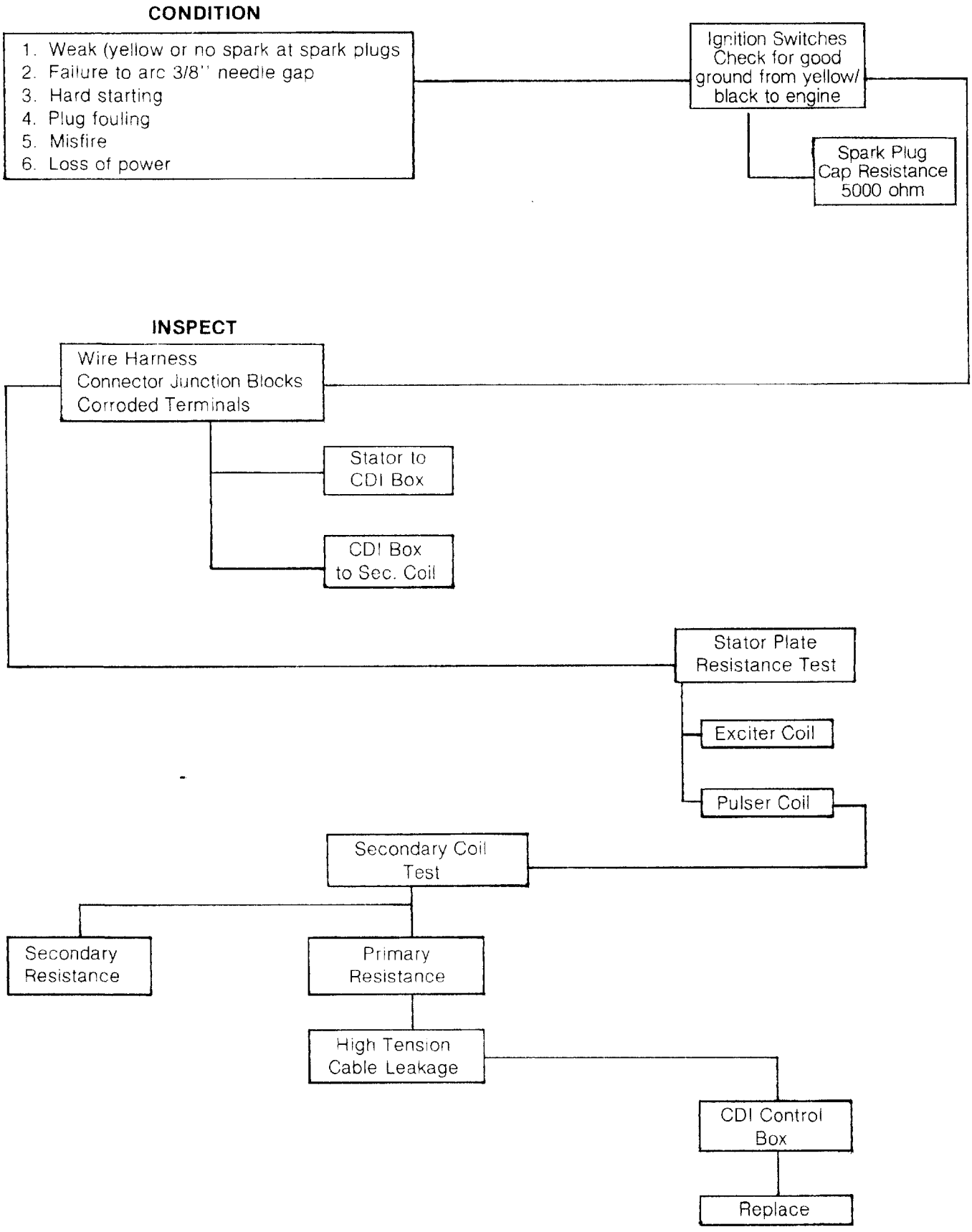
▲ WARNING ▲ To avoid injury, stake aircraft stationary while checking engine timing. Be extremely careful around the propeller area.

4-62 Connect positive and negative leads from timing light to power source and clamp the remaining lead to either spark plug wire. Start engine and run at 1800 RPM. Direct the timing light towards the timing mark on the fan housing. At 1800 RPM, the scribed mark on the flywheel must align with the stationary mark on the fan housing.

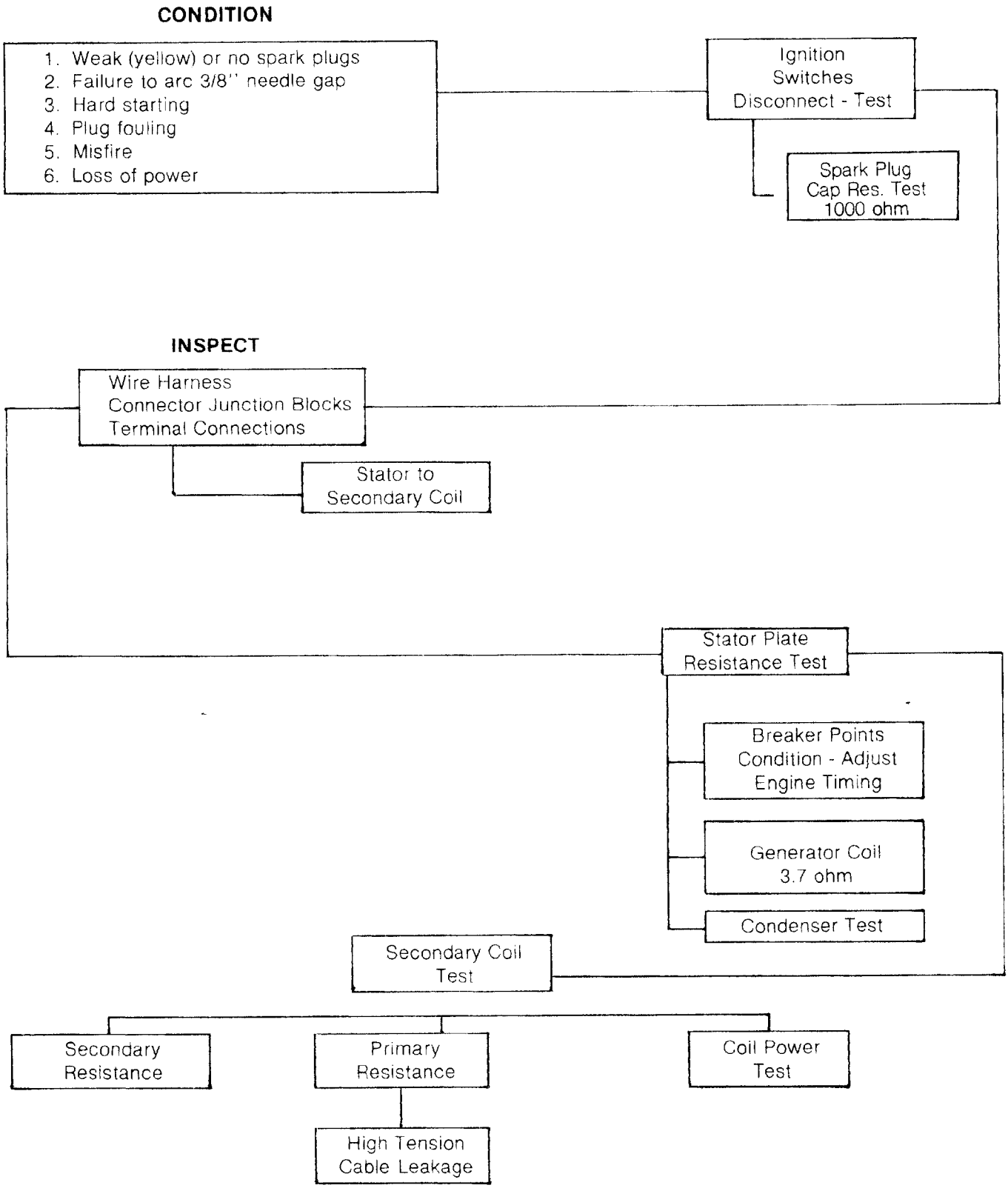
5-62 If timing needs to be adjusted, remove the recoil starter, starter cup and belt pulleys.

6-62 Working through the openings provided in the flywheel face, loosen the two stator plate fastening screws. Rotate the stator plate clockwise to retard the timing and counter-clockwise to advance timing. Re-tighten the two stator plate screws and assemble starter assembly to engine. Run the engine and re-check timing.

CDI Diagnostic Test Sequence



Magneto Point Ignition
Diagnostic Test Sequence



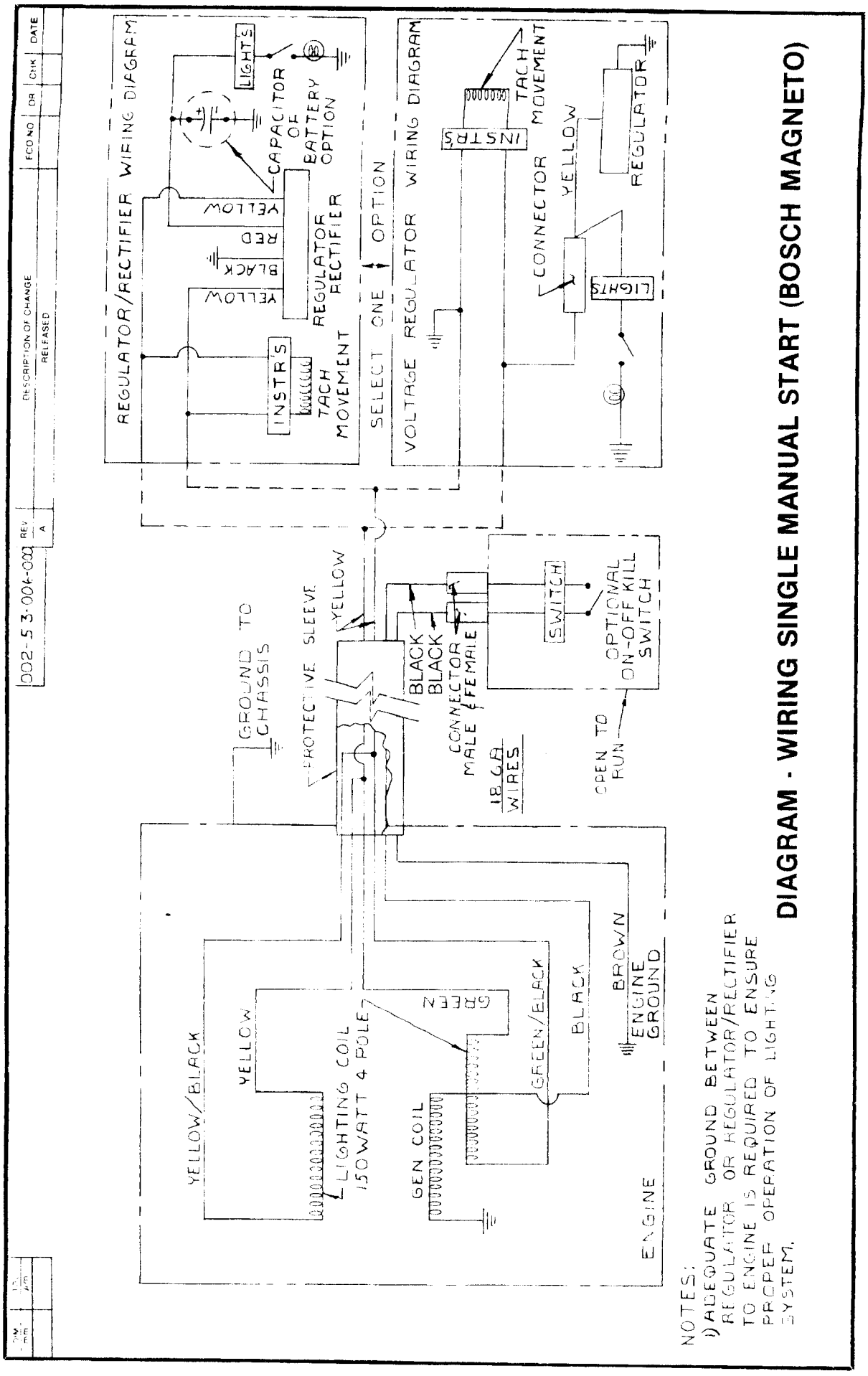


DIAGRAM - WIRING SINGLE MANUAL START (BOSCH MAGNETO)
REGULATOR/RECTIFIER WIRING DIAGRAM
LIGHTS
CAPACITOR OF BATTERY OPTION
YELLOW
RED
BLACK
YELLOW
REGULATOR RECTIFIER
INSTR'S
TACH MOVEMENT
SELECT ONE OPTION
VOLTAGE REGULATOR WIRING DIAGRAM
INSTRS
TACH MOVEMENT
CONNECTOR
YELLOW
REGULATOR
LIGHTS
GROUND TO CHASSIS
PROTECTIVE SLEEVE
YELLOW
BLACK
BLACK
CONNECTOR MALE FEMALE
18 GA WIRES
SWITCH
OPTIONAL ON-OFF KILL SWITCH
OPEN TO RUN
YELLOW/BLACK
YELLOW
LIGHTING COIL 150WATT 4 POLE
GEN COIL
GREEN
GREEN/BLACK
BLACK
BROWN
ENGINE GROUND
ENGINE
002-53-004-00 REV A
DESCRIPTION OF CHANGE
RELEASED
ECO NO
DR
CHK
DATE
NOTES:
1) ADEQUATE GROUND BETWEEN REGULATOR OR REGULATOR/RECTIFIER TO ENGINE IS REQUIRED TO ENSURE PROPER OPERATION OF LIGHTING SYSTEM.

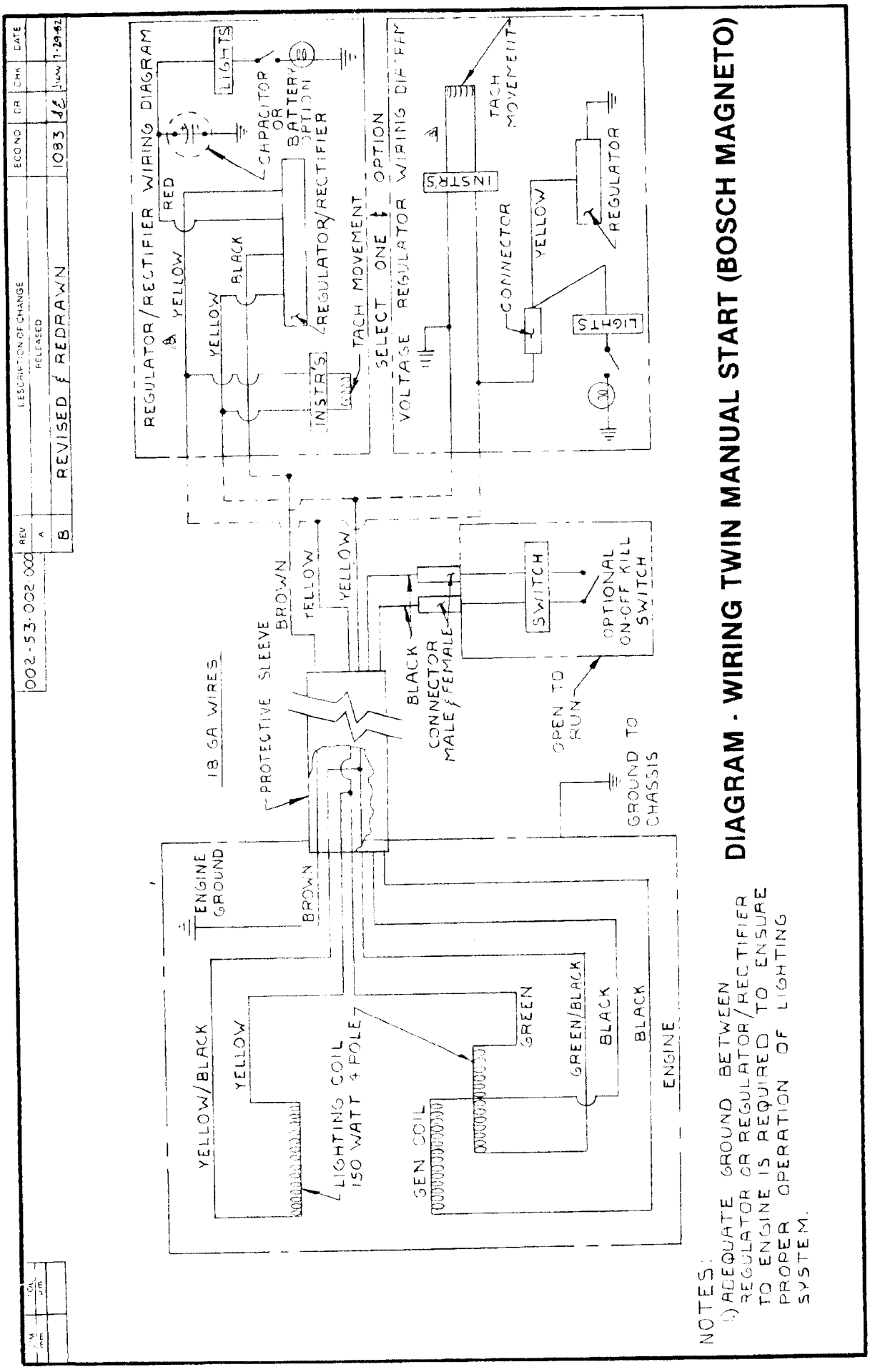


DIAGRAM - WIRING TWIN MANUAL START (BOSCH MAGNETO)

NOTES:
1) ADEQUATE GROUND BETWEEN REGULATOR OR REGULATOR/RECTIFIER TO ENGINE IS REQUIRED TO ENSURE PROPER OPERATION OF LIGHTING SYSTEM.

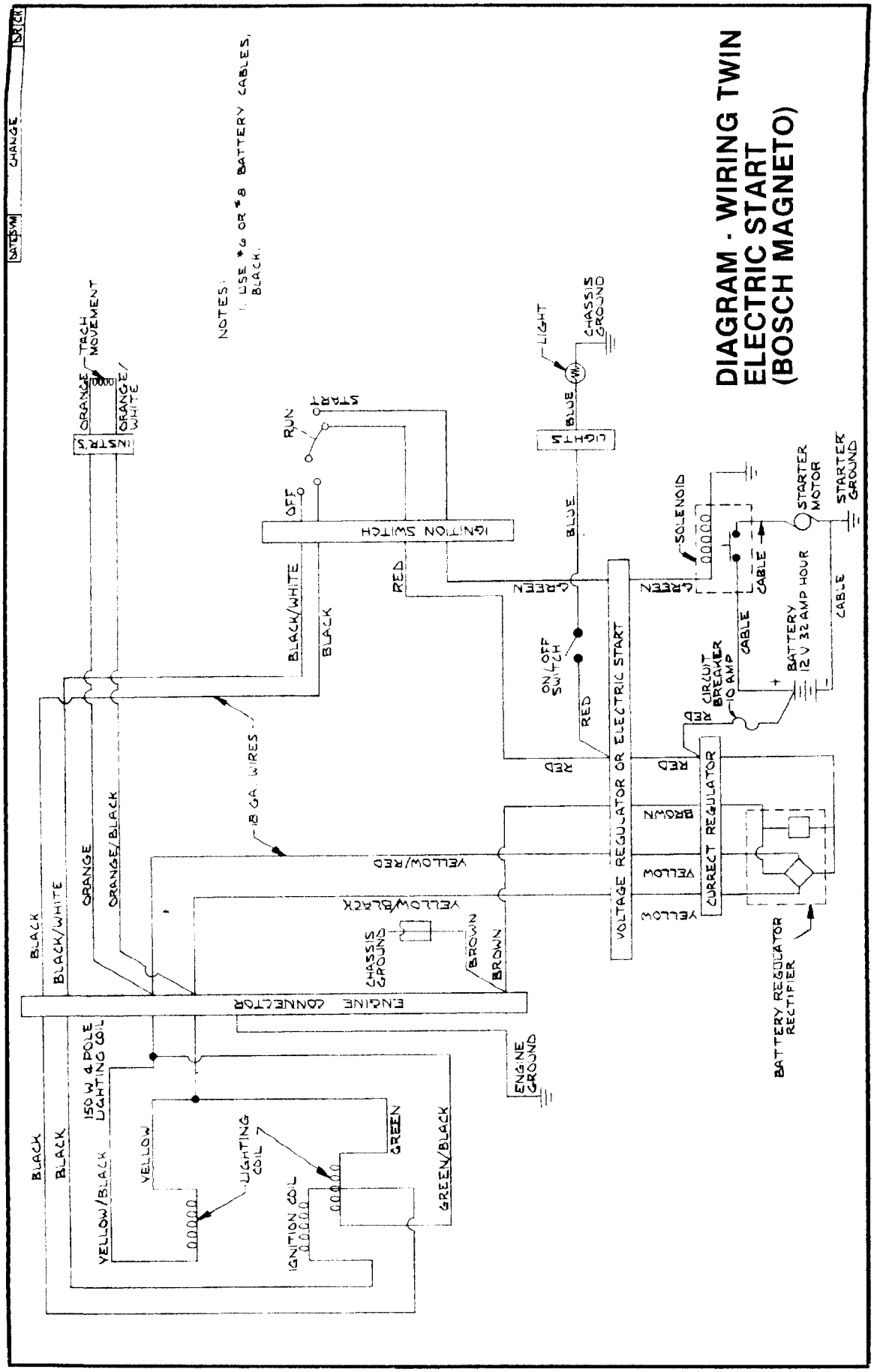


DIAGRAM - WIRING TWIN
ELECTRIC START
(BOSCH MAGNETO)
NOTES:
1. USE #6 OR #8 BATTERY CABLES, BLACK.
DATE/M CHANGE
TACH MOVEMENT
ORANGE
ORANGE/WHITE
INSTR'S
RUN
START
OFF
IGNITION SWITCH
LIGHT
CHASSIS GROUND
BLUE
LIGHTS
STARTER MOTOR
STARTER GROUND
SOLENOID
CABLE
BATTERY 12 V 32 AMP HOUR
CIRCUIT BREAKER 10 AMP
ON/OFF SWITCH
VOLTAGE REGULATOR OR ELECTRIC START
CURRECT REGULATOR
BATTERY REGULATOR RECTIFIER
BLACK/WHITE
BLACK
RED
GREEN
YELLOW
BROWN
ORANGE/BLACK
18 GA WIRES
YELLOW/RED
YELLOW/BLACK
ENGINE CONNECTOR
ENGINE GROUND
150 W 4 POLE LIGHTING COIL
LIGHTING COIL
IGNITION COIL
GREEN/BLACK
YELLOW/BLACK

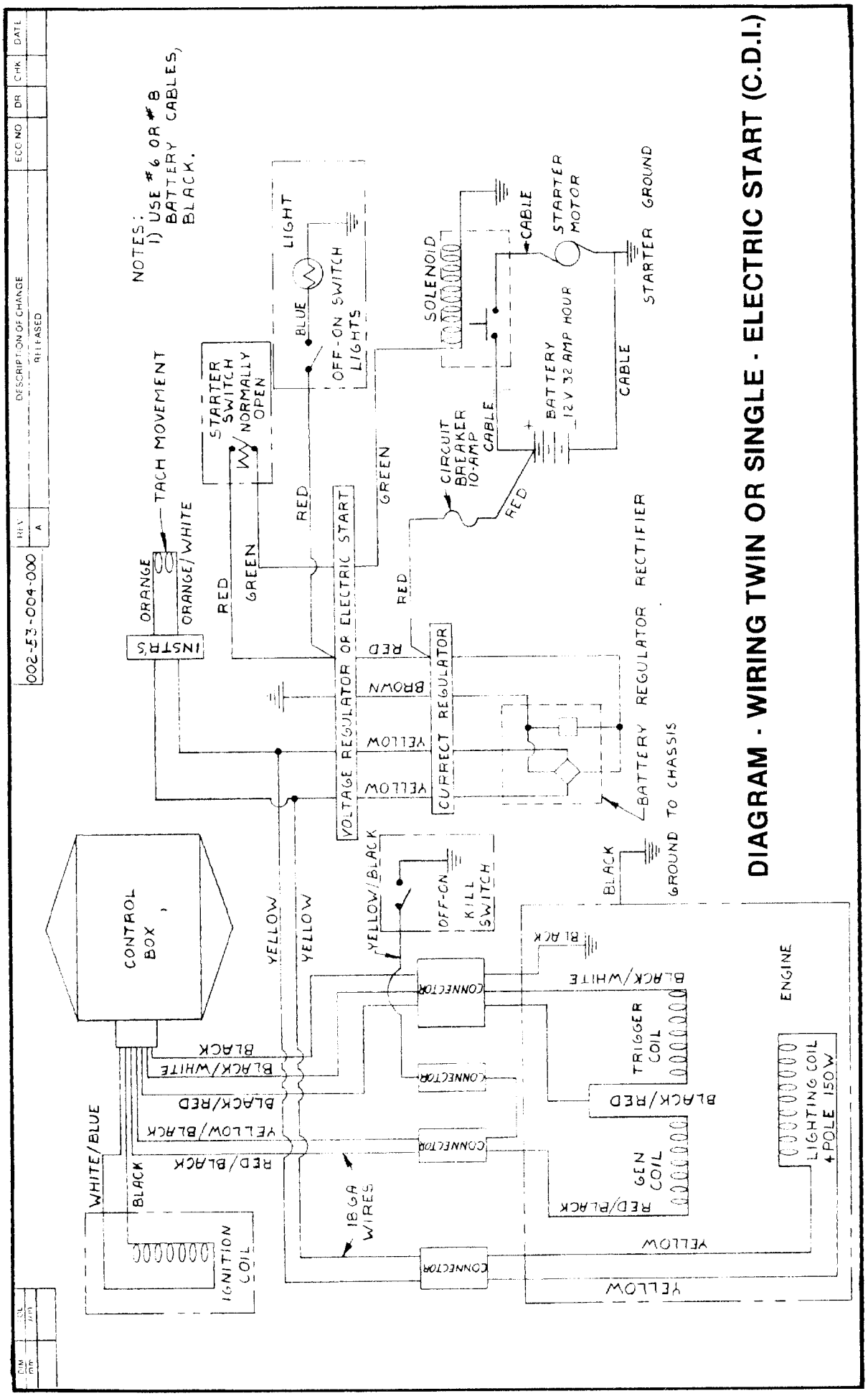


DIAGRAM - WIRING TWIN OR SINGLE - ELECTRIC START (C.D.I.)
NOTES:
1) USE #6 OR #8 BATTERY CABLES, BLACK.
002-53-004-000
REV
A
DESCRIPTION OF CHANGE
RELEASED
ECO NO
DR
CHK
DATE
TACH MOVEMENT
ORANGE
ORANGE/WHITE
INSTRS
STARTER SWITCH NORMALLY OPEN
LIGHT
BLUE
OFF-ON SWITCH LIGHTS
SOLENOID
CABLE
STARTER MOTOR
STARTER GROUND
CIRCUIT BREAKER 10-AMP
CABLE
BATTERY 12 V 32 AMP HOUR
CABLE
RED
GREEN
RED
GREEN
RED
VOLTAGE REGULATOR OR ELECTRIC START
CURRECT REGULATOR
RED
BROWN
YELLOW
YELLOW
BATTERY REGULATOR RECTIFIER
GROUND TO CHASSIS
BLACK
CONTROL BOX
YELLOW
YELLOW
YELLOW/BLACK
OFF-ON KILL SWITCH
BLACK
CONNECTOR
BLACK/WHITE
TRIGGER COIL
BLACK/RED
GEN COIL
RED/BLACK
ENGINE
LIGHTING COIL 4 POLE 150W
BLACK
BLACK/WHITE
BLACK/RED
YELLOW/BLACK
RED/BLACK
WHITE/BLUE
BLACK
IGNITION COIL
18GA WIRES
CONNECTOR
YELLOW
YELLOW

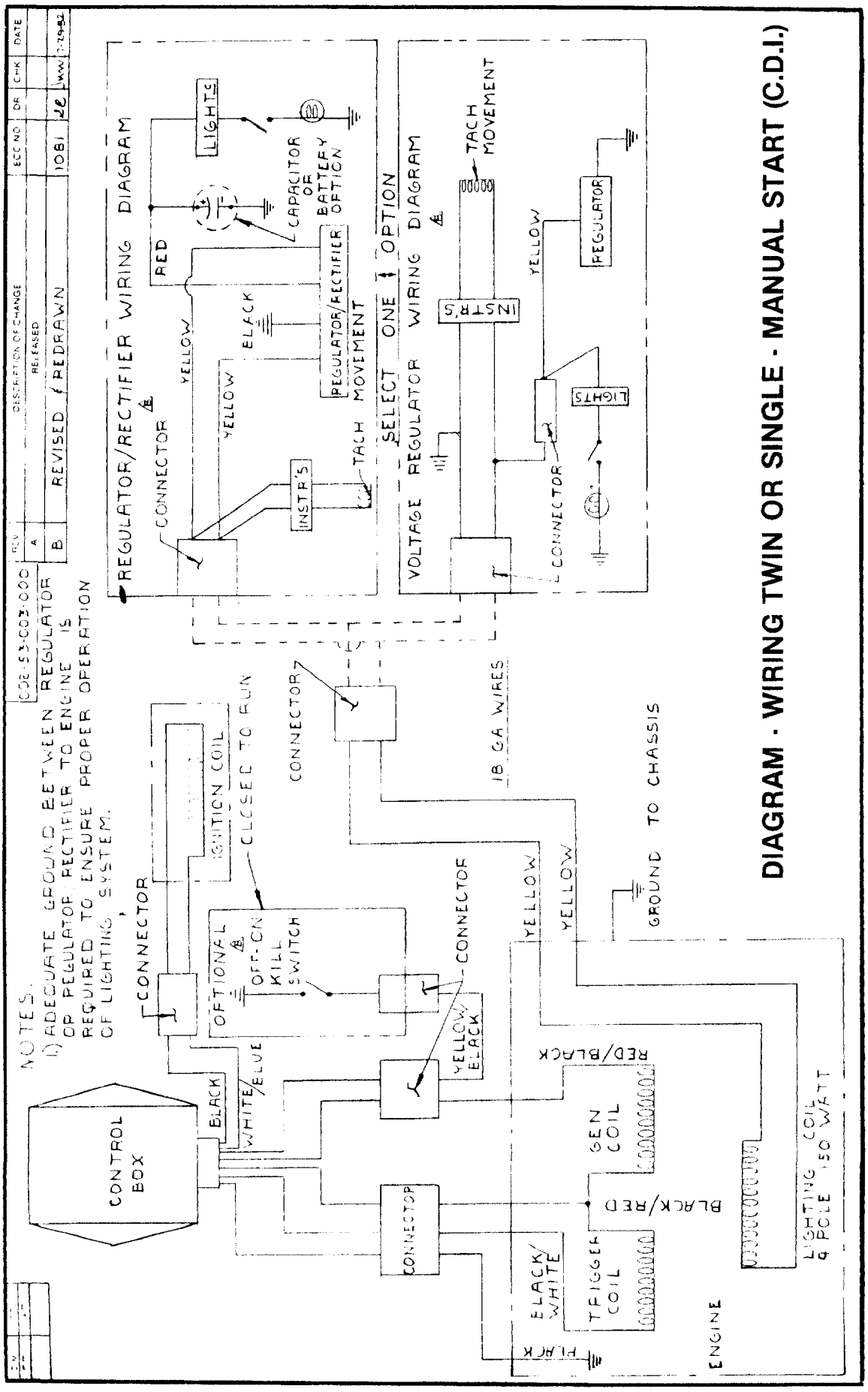


DIAGRAM - WIRING TWIN OR SINGLE - MANUAL START (C.D.I.)
NOTES:
1) ADEQUATE GROUND BETWEEN REGULATOR OR REGULATOR RECTIFIER TO ENGINE IS REQUIRED TO ENSURE PROPER OPERATION OF LIGHTING SYSTEM.
REGULATOR/RECTIFIER WIRING DIAGRAM
SELECT ONE OPTION
VOLTAGE REGULATOR WIRING DIAGRAM
CONTROL BOX
CONNECTOR
IGNITION COIL
CLOSED TO RUN
OPTIONAL
OFF-ON KILL SWITCH
CONNECTOR
YELLOW/BLACK
BLACK
WHITE/BLUE
CONNECTOR
YELLOW
YELLOW
GROUND TO CHASSIS
18 GA WIRES
RED/BLACK
GEN COIL
BLACK/RED
CONNECTOR
BLACK/WHITE
TRIGGER COIL
ENGINE
LIGHTING COIL 4 POLE 150 WATT
RED
YELLOW
BLACK
CONNECTOR
INSTR'S
TACH MOVEMENT
REGULATOR/RECTIFIER
CAPACITOR OR BATTERY OPTION
LIGHTS
YELLOW
TACH MOVEMENT
INSTR'S
CONNECTOR
LIGHTS
REGULATOR
DESCRIPTION OF CHANGE
ECC NO
DR
CHK
DATE
REV
A
RELEASED
B
REVISED & REDRAWN
1081

Troubleshooting

(ELECTRICAL)

TROUBLE	PROBABLE CAUSE	REMEDY
No lights.	1. Open Circuit: Faulty Switch Separated Connector Cut Wiring.	1. Repair or replace faulty or damaged element.
	2. Wiring shorted to ground: Damaged Insulation.	2. Repair or replace damaged or faulty element.
	3. Faulty Regulator (Shorted SCR).	3. Replace regulator.
Dim lights.	1 Shorted lighting coil.	1. Replace armature plate or coil.
	2. Faulty regulator - Incorrect regulator set point (too low).	2. Replace regulator.
Burned out lights (all).	1. Faulty regulator - Incorrect set point (too high).	1. Replace regulator and failed bulbs.
Burned out lights (individual).	2. Failed bulb.	2. Replace bulb.
Burned out lights.	3. Intermittent short in wire harness.	3. Repair or replace wire harness.
Engine won't run.	1 Open or shorted windings in ignition coils (stator).	1. Replace armature plate.
Weak or no spark.	2. Open or shorted windings in external ignition coil.	2. Replace external coil.
	3. Shorted condenser - dirty or worn.	3. Replace condenser.
	4. Damaged (burned) points.	4. Replace points.
Engine won't run - Adequate spark.	1. Burned or fouled plugs.	1. Replace plugs. Determine that correct plugs are being used. CHECK ENGINE TROUBLESHOOTING.
	2. See Engine Trouble-shooting Section.	
Unacceptable Engine Performance.	3. See Engine Trouble-shooting Section.	