CDI Electronics®

PRACTICAL OUTBOARD IGNITION
TROUBLESHOOTING GUIDE

5th Edition

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961-0002

KEEPING YOUR BOAT ON THE WATER

CDI Electronics TECHNICAL INSTITUTE

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 Troubleshooting Guide – 08/2012

Introduction

The information contained in this Troubleshooting Guide has been compiled from various sources within the marine industry. Any reference to a specific product or brand is not intended for commercial purposes. References to test equipment and products are based upon the information available to the staff of CDI Electronics. **This information is designed for use as a reference guide by a professional marine technician.** CDI Electronics cannot be held liable for the misuse or abuse of the information contained herein. The staff tries to make the information as accurate as possible. However, CDI Electronics cannot assume responsibility for either the data accuracy or the consequences of the data's application.

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Safety Issues

Always remember to treat the outboard engine with respect. The engine uses high voltage for ignition and contains several moving components. Always be aware of moving mechanical parts, the surrounding area, and the position of your hands and body near the engine.

- **Never touch electrical components with wet hands.**
- **Whenever the power source is not needed, disconnect the cable from the negative terminal.**
- **Never reverse the battery leads when you connect the battery or disconnect the terminals while the engine is running as severe damage to the electrical system can result.**
- **Never touch high-tension leads (spark plug leads) with any ungrounded tools while the engine is running.**
- **Never install equipment with requirements exceeding the generating power of the engine. Reference the service manual for values.**
- **Attempt to protect the electronic components from water.**
- **Insure fuel lines, harnesses, and oil lines are properly routed. Failure to follow this rule could result in a fire hazard.**
- **Make sure all ground leads are clean and tight.**

NOTICE: The DVA readings in this book were compiled using the CDI DVA Adapter (511-9773 or 511-9773NL) with a shielded Digital Multimeter. A Digital multimeter with peak voltage scale cannot be used without the DVA as the meter is expecting a 60 hertz signal where the outboard can have an equivalent frequency of over 1000 hertz.

(NOTE) The resistance readings are given for a room temperature of 68°F. Higher temperatures will cause a slightly higher resistance reading.
Normally, DVA readings should always be taken with everything hooked up with the exception of the stop circuit.

The CDI DVA adapter is specifically designed to work with shielded Digital Multimeters. This adapter will simplify the testing of electronic ignition systems, stators, sensors and charging systems. The DVA readings will be approximately the same as any other DVA meter and the specifications listed in the service manuals can be followed without problems (Hopefully a little easier to you).

DVA Explained

DVA stands for Direct Voltage Adapter, which is used to measure peak AC voltage. This type of measurement of AC voltage takes the absolute peak or highest value of the fluctuating AC voltage signal. Peak readings will be substantially higher than standard or RMS AC values and are typically used when testing marine CD (capacitor discharge) ignition systems due to their high variance in frequency as RPM increases and decreases.

An example would be that the typical RMS AC reading of a wall outlet in North America is 120V. However, a DVA measurement of this same AC voltage would reveal that the peak of the AC sine wave is typically between 160-170V.

Some meters are capable of reading DVA or peak voltage pulses. Many ignition system components produce short AC voltage pulses. A peak-reading analog meter or DVA adapter plugged into a digital meter captures and holds the peak value of an AC sine wave long enough for the human eye to see it displayed on the meter. A conventional meter is incapable of accurately measuring these short-duration voltage pulses. A peak-reading voltmeter has special circuits that allow the meter to capture the maximum voltage produced during these short duration pulses and display the voltage as DVA or peak voltage. Failure to measure DVA can cause good ignition components to be incorrectly diagnosed as faulty.

The only meters that have built-in peak reading capabilities are analog meters with built-in DVA. Digital meters do not have built-in peak reading capabilities. In order for a digital meter to read peak voltage, one will need a DVA adapter, such as CDI part# 511-9773 or 511-9773NL.

Using a DVA adapter, a digital meter must be set to its DC voltage scale. Peak AC voltage is the measurement, but the DVA adapter has a built-in bridge rectifier, which converts AC to DC. The DC voltage setting on a digital meter is required to accurately read DVA.

CDI part# 511-9773 has built-in test leads.

CDI part# 511-9773NL has banana jacks, which uses your meter's test leads.

CDI Electronics Marine Shop Recommended Tool List

Part Number	Description	Remarks/Use
511-4017	Optical Sensor Tester	Used to set timing on a 4 or 6 Cyl engine or test optical sensors on the bench and on the engine. Unique buzzer allows you to set timing without having to see the LED.
511-4019	Optical Sensor Tester	Unique tester is used to test 3 Cyl optical sensors on the bench and on the engine.
511-5207A 1	CDM Test Harness	Test the CDM Module DVA on the engine and isolate the kill circuit.
511-6996	Remote Starter	Controls most Johnson/Evinrude engines from 1969 thru 2006.
511-7800	Remote Starter	Controls most Mercury engines from 1970 thru 1978.
511-7900	Remote Starter	Controls most Mercury engines from 1979 thru 2000.
511-9764	Neon Spark Tester (1 Cyl)	Sealed single cylinder tester can be used in-line to the spark plug for engine running tests. (With removable ground clip.)
511-9766	Sealed Spark Gap Tester	Allows you to test up to 8 cylinders for cranking speed tests. Sealed design reduces the chances of injury and fire.
511-9770	Piercing Probes (Highly Recommended)	Allows access to wires for testing without removing the connector. Tiny hole usually reseals itself when wire heats.
511-9772	Ammeter Adapter	Used with most Digital multimeters to measure amperage output of the charging system or starter draw amperage.
511-9773NL	DVA (Peak Voltage) Adapter	Unit automatically compensates for polarity. Can be used with most quality multimeters.
511-9775	Load Resistor	To load the output of ignition modules when testing ignition coils.
511-60A	CDI Electronics Meter	Most cost effective meter for marine use. Has voltage, temperature, amperage, ohms, and DVA readings (includes the 511-9773-NL DVA Adapter).
520-ST80	DC Inductive Timing Light	DC powered timing light with a very bright strobe light.
531-0118T 3	Marine Engine Diagnostic Software (M.E.D.S.)	Software operates with Windows Microsoft™ operating systems. Reads and monitors failure codes on Mercury 1994 and newer EFI, 1997 and newer Optimax, Verado, 2001-2006 4 Stroke Yamaha, Built Mercury, Yamaha HPDI 1998 & up, 4 Stroke V6 2000 & up, I3 & I4 4 Stroke 2008 & up engines, Yamaha PWCs, Plus Mercruiser I/O engines using the 555 ECM module, Johnson/Evinrude Ficht/E-TEC engines, Suzuki 4 Stroke, and MEFI 1-4 Sterndrives.
551-33-1	Gearcase Filler With Check Valve	New design prevents tipping over, and EZ-Fill calibrated check valve creates air-lock to keep lube from running out while installing drain plug. Makes filling lower units easier.
551-34PV	Pressure/Vacuum Tester	Repairable metal unit does both vacuum and pressure testing.
551-5110	Flywheel Holder	New design has a high tensile strength poly coated woven belt for a more secure grip of flywheel. Longer handle provides a more comfortable grip for more leverage with less effort.
553-2700	Amphenol Pin Tool Set	Set contains one each of 553-2697 (insertion), 553-2698 (pin removal), and 553-2699 (socket removal) tools.
553-4994	Gauge Ring	Used to set stator and trigger air gap on Johnson/Evinrude 2 Cyl / 2 Stroke engines from 1977-2006.
911-9783	Bullet Connector Kit	Contains 10 pieces each of the male, female connectors and sleeves.
912-9708	Marine Terminal Kit	Contains 100+ pieces of hard to find terminals and heat shrink.
961-0002	Troubleshooting Guide	Manual has detailed troubleshooting information and DVA charts.
991-9705	Dielectric Grease	Used to keep water and corrosion out of connectors.

Optional Equipment Upgrades

511-0300	Infrared Temperature Meter	Used to read engine, spark plug, lower unit, and hull temperature. Ideal for quickly measuring engine temperature.
518-88-5	Fluke 88 Automotive Meter	Used to check engine DVA, ohms, amps, pulse width, frequency, Temperature, Capacitance, diodes and engine RPM.
520-ST84	Timing Light w/Tach	Easily check engine timing in bright sunlight. Change the switch and read the engine RPM.

Tricks to Testing with Minimal Test Equipment

All Engines

- Please keep detailed records when you repair an engine. If an engine comes in with one cylinder not firing, mark which one on the work order/history.
- Remember to check the compression of all cylinders! It does not make any sense to fix an ignition problem if the engine has a blown cylinder. Don't forget low compression can be caused by something as simple as a bad starter, a low or weak battery.
- An engine requires air, fuel and spark (at the correct time) in order to run. Make sure the engine has all three.
- If the engine has no spark on any cylinder, make sure to disconnect the stop circuit AT THE IGNITION PACK! If the harness or ignition switch is bad, the pack will start firing when you do this.

Intermittent Firing: This problem can be very hard to isolate. A good inductive tachometer can be used to compare the RPM on all cylinders up through WOT (wide-open throttle). A significant difference in the RPM readings can help pinpoint a problem quickly.

Visually Check the Stator, Trigger, Rectifier/Regulator and Flywheel: Cracks, burned areas and bubbles in or on the components indicate a problem. If the battery charge windings on the stator are dark brown, black or burned on most or all of the posts, the rectifier/regulator is likely shorted as well. Any sign of rubbing on the outside of the stator indicates a problem in the upper or lower main bearings. A cracked trigger or outer charging magnets can cause many problems ranging from misfiring to no spark at all. Loose flywheel magnets can be dangerous, check the tightness of the bonding adhesive.

Rectifier/Regulators can cause problems ranging from a high-speed miss to a total shutdown. An easy check is to disconnect the stator leads to the rectifier (Make sure to insulate them) and retest. If the problem is gone – replace the rectifier/regulator.

Johnson/Evinrude

Open Timer Bases: When all cylinders spark with the spark plugs out, but will not with them installed, try re-gapping the sensors using P/N: 553-9702 Gap Gauge. (See the section on OMC ADI Ignitions).

Engines with S.L.O.W. Features: If the customer is complaining that the engine won't rev up and shakes real bad, the S.L.O.W. function could be activating. If the engine is NOT overheating, a temperature sensor or VRO sensor failing early can cause this problem. Disconnect the TAN wires *at the power pack* and retest. If the engine performs normally, reconnect the tan wires one at a time until the problem recurs, then replace the last sensor you connected. Make sure that all of the TAN wires are located as far as possible from the spark plug wires. Also check the blocking diode in the engine harness.

Mercury 6 Cylinder Engines with ADI Ignitions

If more than one cylinder is not firing: Replace BOTH switch boxes unless you can pin the problem down to the trigger. Replacing just one switch box can result in damage to the engine if the remaining switch box on the engine has a problem in the bias circuit.

Always check the bias circuit: Disconnect the White/Black jumper between the switch boxes and check the resistance from the White/Black terminal on each switch box to engine ground. You should read 12-15,000 ohms on stock switch boxes, and 9,000-9,800 ohms on racing switch boxes. MAKE SURE THE READING IS THE SAME ON BOTH SWITCH BOXES! Any problem with the bias circuit and BOTH switch boxes must be replaced as a set.

No Spark on 1, 3, 5 or 2, 4, 6: Swap the stator leads from one switch box to the other. If the problem moves, replace the stator. If the problem remains on the same cylinders, replace the switch box. If the stator is replaced and the problem is still present, try another flywheel.

No Spark on One Cylinder: This can be caused by a defective blocking diode in the other switch box. Disconnect the White/Black jumper between the switch boxes and retest. If all cylinders are now firing, replace the switch box that was originally firing all three cylinders. To verify this condition, swap the trigger leads on the switch box that was originally firing all three cylinders. If the miss moves to another cylinder, the switch box is bad.

Voltage Drop Measurement

Start by using a good digital auto-ranging voltmeter capable of reading 1/10th of a volt. The use of an auto-ranging meter will allow for more accurate testing without damaging the meter due to an incorrect range setting.

Remove the spark plug wires form the spark plugs and connect them to a spark gap tester and remove the emergency stop clip as well. This prevents the engine from starting and also reduces the chance of getting shocked by the ignition system.

The use of an ohmmeter to test a conductor or switch contact for their condition is not the best tool to use. In most cases, it is preferable to use a volt drop test to make sure the conductor, as well as the connection, is in good condition.

Before testing, remove and clean all battery cables and connection points.

Testing the Positive Battery Cable to the Engine

1. Select the DC Volts position on the meter.
2. Connect the Red (Positive) lead on the meter to the positive battery *POST*.
3. Connect the Black (Negative) lead on the meter to the starter solenoid terminal where the positive battery cable is connected.
4. Using a remote start switch, activate the starter solenoid to spin the engine and observe the reading on the meter. A reading above 0.6V indicates a bad cable or bad connection.
   A. If the meter reads above 0.6V, move the Black lead on the meter to the positive battery cable terminal on the starter solenoid and retest. If the reading drops to below 0.6V, the cable connection is bad.
   B. If the meter still reads above 0.6V, move the Black lead on the meter to the positive battery cable terminal on the battery and retest. If the reading drops to below 0.6V, the cable is bad or undersized.

(Service Note) A bad power connection to the ignition or battery charging system can be found by connecting the Black lead on the meter to the power connection of the ignition system or charging system; then working your way back to the battery positive post. At no time should you see a reading above 1V.

Testing the Negative Battery Cable to the Engine

1. Select the DC Volts position on the meter.
2. Connect the Black (Negative) lead on the meter to the negative battery *POST*.
3. Connect the Red (Positive) lead on the meter to the engine block where the negative battery cable is connected.
4. Using a remote start switch, activate the starter solenoid to spin the engine and observe the reading on the meter. A reading above 0.6V is an indicator of a bad cable or bad connection.
   A. If the meter reads above 0.6V, move the Red lead on the meter to the negative battery cable terminal on the engine block and retest. If the reading drops to below 0.6V, the cable connection is bad.
   B. If the meter still reads above 0.6V, move the Red lead on the meter to the negative battery cable terminal on the battery and retest. If the reading drops to below 0.6V, the cable is bad or undersized.

A bad ground connection to the ignition and battery charging system can be found by connecting the Red lead on the meter to the ground connection of the ignition or battery charging system; then working your way back to the battery negative post. At no time should you see a reading above 1V.

Johnson/Evinrude Model to Year Identification for 1980 and newer Engines

"INTRODUCES"

I	N	T	R	O	D	U	C	E	S
1	2	3	4	5	6	7	8	9	0

Example: J150TTL<u>CE</u> would be a 1989 150 HP Johnson and aE175ST<u>EU</u> would be a 1997 175 HP Evinruide.

Battery Differences

Maintenance-free batteries (gel cells / AGM / closed-case) have thin plates. They're ideal for a charging system that maintains a typical charge between 12.5V – 14.4V, but not for outboards, where batteries are commonly drained by accessories while fishing, etc. i.e. when there is no charge applied to a battery while the battery is in use. Its thin plates cannot withstand constant discharging and charging. It will develop weak and/or dead cells due to this behavior.

Maintenance-free batteries should not be used because their life span is shortened when used on an outboard application. A new fully-charged, maintenance-free battery will work fine at first, but under constant discharging and charging, something that style battery is not designed for, it will eventually become weak and/or develop dead cells, thus unable to accept a full charge, thus putting a rectifier/regulator at extreme risk of failure.

Non-maintenance-free batteries (lead-acid flooded cell; has vent caps on its top) have heavy, thick plates. They're ideal for outboards, where batteries are commonly drained by accessories while fishing, etc. i.e. when there is no charge applied to a battery while the battery is in use. Its heavy plates can withstand constant discharging and charging. These batteries have much more reserve time and are much more suited for this behavior.

The recommended type of battery for outboards is a single (NOT more than one) 850+ CCA dual purpose or cranking/starting non-maintenance-free battery. Make sure to charge any battery off of a battery charger BEFORE installing. NEVER allow the stator to charge a battery. The stator is designed to maintain the battery's voltage at an optimum charge. It's not designed to charge a dead or weak battery. Make sure the battery is always charged off of a battery charger before each use of the boat to maintain optimum performance and life of the battery, stator and regulator. If multiple accessories are used, a 2nd battery, NOT connected to the starting battery, is recommended. If desired, a make-before-break switch can be used between the two batteries. Make sure to also charge this battery off of a battery charger before each use.

NEVER jump-start a battery while an outboard engine is running. This can cause damage to the rectifier/regulator. Always use a battery charger to charge a battery. If no battery charger is available, the rectifier/regulator's Red wire may be disconnected while jump-starting to avoid damaging the rectifier/regulator.

Troubleshooting Battery Charging Issues

Regardless if the charging issue is overcharging or not charging at all, the #1 cause of all charging issues is the battery often due to improper style and/or charging neglect. #2 is the battery's connections. #3 is the rectifier/regulator. #4 is the stator.

The battery and/or its connections often cause the rectifier/regulator (and in rare cases, the stator) to become faulty, thus often creating more than one faulty component (Example: Bad battery causing the rectifier/regulator to become faulty). The rectifier/regulator is more susceptible to failure than the stator because its diodes are more fragile than the stator's typical 12-18 gauge wire encompassing its frame.

A rectifier's job is to convert the stator's AC signal into DC to charge the battery. In non-regulated applications (rectifier only), the battery acts as its own regulator, which is not designed to do. When it can no longer self-regulate proper voltage from the rectifier, usually due to dead and/or weak cells, it poses a serious threat to rectifier failure and thus needs replacing. This is why a regulator is crucial to a healthy charging system. A regulator's job is to regulate battery voltage between 12.5 – 14.4V.

In this case, it is recommended to replace the rectifier with a combination rectifier/regulator and replace the battery with a dual purpose or cranking/starting non-maintenance-free battery. This way, the battery will no longer have to self-regulate. The rectifier/regulator will take that responsibility, thus giving the entire charging system optimum life.

1. Check all battery connections, particularly at engine ground. Make sure all connections are corrosion-free and tight. Do NOT use wing nuts. They will loosen over time due to vibration, causing battery and/or rectifier/regulator failures.
2. If no change, remove all batteries and try a single (NOT more than one), known-good, fully-charged off a battery charger, 850+ CCA dual purpose or cranking/starting non-maintenance-free battery (NOT a closed-case battery). Make sure the battery is a lead-acid flooded cell (has vent caps on its top). Make sure to charge any battery off of a battery charger BEFORE installing. NEVER allow the stator to charge a battery. The stator is designed to maintain the battery's voltage at an optimum charge. It's not designed to charge a dead or weak battery. Recheck all connections, making sure they are corrosion-free and tight. NEVER jump-start a battery while an outboard engine is running. This can cause damage to the rectifier/regulator. Always use a battery charger to charge a battery. If no battery charger is available, the rectifier/regulator's red wire may be disconnected while jump-starting to avoid damaging the rectifier/regulator.

3. If no change, measure DVA voltage across the stator's battery charge wires (typically Yellow wires) while connected to the regulator/rectifier. At idle, DVA should be between 17-25V DVA. If not, disconnect the Yellow wires from the regulator/rectifier and retest for 17-50V DVA at idle. If not, the stator is possibly faulty. Visually inspect the stator for browning, varnish dripping and any signs of overheating. If the stator shows any signs of overheating, replace the stator.
4. If the stator DVA checks and visually looks good, test the regulator/rectifier as given below.

Regulator/Rectifiers Tests

1. With all wires connected and the engine running at approximately 1500 RPM, check the DVA voltage from each battery charge wire (typically Yellow wire) to engine ground. The two readings must be within 1.5 volts of each other (i.e. if one is reading 20 volts, the other has to read between 18.5 and 21.5 volts). If the readings are not equal, go to step 3. If they are equal, go to step 2.
2. Check DVA voltage from each of the Yellow wires to the Red wire going to the solenoid. The two readings must be within 1.5 volts of each other. If the readings are unequal, go to step 3. If they are equal on both this step and step 1, the regulator/rectifier and battery charging portion of the stator are good.
3. If the readings are unequal, place a mark across the connection between the stator and regulator/rectifier that measured low. Turn the engine off and swap the stator leads. Crank the engine up and retest. The component (stator or regulator/rectifier) that has the marked wire with the low reading is bad.
4. Disconnect the regulator's Gray wire. At 800-1000 RPM, check the DVA voltage on the Gray wire FROM THE REGULATOR measured to engine ground. The reading should be at least 8V DVA. If below 8V DVA, see TACHOMETER TESTS below.

Regulator/Rectifier Bench Tests

1. *Diode plate check:* With all wires disconnected from the regulator/rectifier, using a meter set on its Diode scale, test the diodes from each of the two battery charge wires/terminals (typically Yellow wires/terminals) to the Red wire/terminal. You should get a reading one way but not the other. Check the resistance from each of the Yellow wires/terminals to case ground. You should have a high reading, typically in the M range. The Red wire/terminal should not read to ground, but may show a very high reading (25M ohms or more).
2. *Tachometer Circuit:* With all wires disconnected from the regulator/rectifier, check resistance between the Gray wire and engine ground. You should read approximately 10K (10,000) ohms. Both (Gray to Red) and (Gray to each of the Yellow) wires should be a high reading, typically in the M range.

Tachometer Tests

1. Disconnect the regulator's Gray wire. At 800-1000 RPM, check the DVA voltage on the Gray wire FROM THE REGULATOR measured to engine ground. The reading should be 8V+ DVA. If not, replace the regulator.
2. If at least 8V DVA, run a jumper wire from the Gray wire out of the harness to one of the stator's Yellow wires.
3. If still no tachometer signal, try a known-good tachometer.
4. If still no tachometer signal, replace the stator.

Checking Maximum Battery Output

1. Install an ammeter capable of reading the maximum output in line on the Red wire connected to the starter solenoid.
2. Connect a load bank to the battery.
3. In the water or on a Dynamometer, start the engine and bring the RPM up to approximately 3500.
4. Turn on the load bank switches to increase the battery load to match the rated output of the stator.
5. Check the ammeter. If the amperage is low:
   A. Check the Purple wire for voltage while the engine is running. You should see the same voltage as the battery.
   B. Connect a jumper wire from the Positive battery cable to the Purple wire and recheck the ammeter. If the amperage is now correct, there is a problem in the harness or key switch.
6. If the amperage is correct, but the battery voltage remains low, replace the battery.

Engine Wiring Cross Reference Chart for Most Outboards

Circuit	Mercury PRE- 1978	Mercury 1978 & UP	OMC	Yamaha	Force PRE- 1994	Force 1994 & UP	Suzuki
Power	Red	Red	Red	Red	Red	Red/Purple	White
Ign Switch	White	Purple	Purple	Yellow	Blue	Red/Blue	Gray
Eng Gnd	Black	Black	Black	Black	Black	Black	Black
Stop Circuit	Orange Salmon White	Blk/Yellow	Blk/Yellow	White	White	Blk/Yellow	Green Red Blue
Eng Start	Yellow	Yellow/Red	Yellow/Red	Brown	Yellow	Yellow/Red	Brown Yellow/Red
Tach	Brown	Gray	Gray	Green	Purple	Gray	Yellow
Battery Charge	Yellow/Red	Yellow Yellow/Blk	Yellow Yellow/Gry	Green	Yellow	Yellow Yellow/Blk	Yellow/Red
Stator CDI Power	Red White Blue(a)	Blue Blue/White Red Red/White Green/Wht Wht/Green	Brown Brown/Yel Brown/Blk Brown/Wht	Blue Brown Red Blk/Red	Blue Yellow Brown/Blue Brown/Yel	Blue Blue/ White Red Red/White Green/Wht Wht/Green	Green Black/Red
Choke	Gray Blue	Yellow/Blk	Purple/Wht	Blue	Green	Yellow/Blk	Orange
Overheat Eng Temp	Tan	Tan	Tan (b) White/Blk(c)	Pink	Orange	Tan	Green/Yel

(a) Ignition Driver systems only, all others were battery driven systems.
(b) The stripe color on the Tan wire indicates the temperature at which the sensor trips.
(c) The White/Black wire is the cold engine temp indicator and shorts to Gnd at approx 105 deg F.

Blk = Black
Yel = Yellow
Wht = White
Blk = Black
Gry = Gray

ABYC Recommended Boat Wiring Color Codes		
Color	**Function**	**Comments**
Yellow/Red Stripe (YR)	Engine Start Circuit	
Brown/Yellow Stripe (BY)	Bilge Blower	Alternate color is Yellow (Y)
Yellow Stripe (Y)	Bilge Blower	If used for DC negative, blower MUST be Brown/Yellow Stripe.
Dark Gray (Gy)	Navigation Lights	Fuse or Switch to lights
Dark Gray (Gy)	Tachometer	
Brown (Br)	Generator/Alternator	Charge Indicator Lights, Fuse or switch to pumps.
Orange (O)	Accessory Power	Ammeter to alternator output and accessory fuse or switches. Distribution Panel accessory switch.
Purple (Pu)	Ignition Instrument power	Ignition switch to coil and electrical instruments , Distribution Panel to electric instruments.
Dark Blue	Cabin and instrument lights	Fuse or switch to lights.
Light Blue (Lt Bl)	Oil Pressure	Oil sender to gauge.
Tan	Water Pressure	Temperature sender to gauge.
Pink (Pk)	Fuel Gauge	Fuel sender to gauge.
Green/White Stripe	Tilt/Trim down or in	Tilt and Trim circuits
Blue/White Stripe	Tilt/Trim up or out	Tilt and Trim circuits

Chrysler

Points Type Ignitions with Amplifiers (With 115-3301/523301-1/6CB2012 Power Pack)

(Preamps are electronic replacements for points)

DANGER!! DO NOT USE AUTOMOTIVE OIL FILLED IGNITION COILS ON AN OUTBOARD ENGINE USING POINTS AND CONDENSOR IGNITION AS THE OIL FILLED COILS CAN EXPLODE!!!! If the OEM coil is not available, you can substitute Johnson/Evinrude P/N: 389569.

A large proportion of the problems with the battery CD units are caused by low battery voltage or bad ground connections. Low voltage symptoms are weak spark or erratic firing of cylinders. Maintenance free batteries are NOT recommended for this application.
WARNING!! Battery reversal will cause severe damage to the CD module and rectifier.

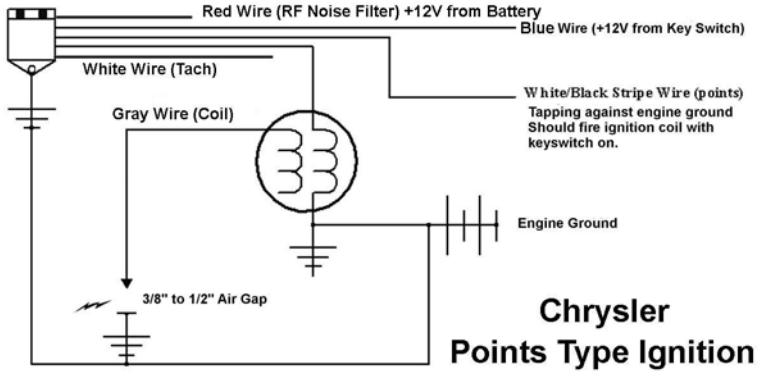
(NOTE) The Chrysler CD modules are similar to the OMC CD modules with the exception of wire colors. The chart below will assist you as a general guideline for the Chrysler units:

Red	+12V from battery (RF Noise Filter)
Blue	+12V from the Key Switch
Gray	+ Terminal of ignition coil
White	OEM Tachometer signal
White/Black Stripe	Points or Preamp Module
Black	Engine ground

No Spark at all:

1. Clean all battery connections and engine grounds.
2. Make sure the CD module is grounded. Units using rubber shock mounts require a ground wire fastened from the pack to the engine block.
3. Connect a spark gap tester to the high tension lead coming from the ignition coil and set it to approximately ½". If it sparks when you crank the engine over, there is a problem in the distributor cap, rotor button or spark plug wires. Remember the distributor cap is a two piece design and may not shows the arcing until it is disassembled.

Wiring Connection for Testing CD Module



(NOTE) Preamps are an electronic version of points and the ignition module will test the same for both.

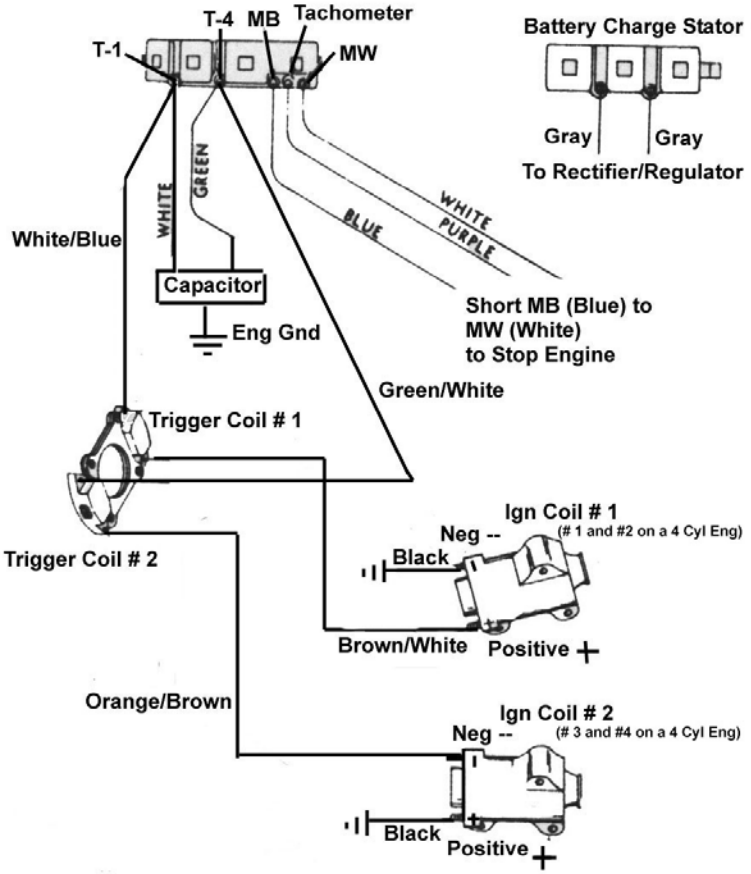
4. Check the DC voltage present on the Blue wire at cranking. It MUST be at least 9.5 volts. If not, the problem is likely in the harness, key switch, starter or battery.
5. Connect a DC voltmeter to the White/Black wire (while it is connected to the distributor) and slowly rotate the engine. There should be some fluctuation in the meter reading. If the reading is high, and fails to move up and down, there is definitely a problem inside the distributor. If the reading is low, disconnect the White/Black wire from the distributor and with the key switch turned on, strike the White/Black wire against engine ground. The unit should spark each time. If it does, then the CD module is usually good and the points (or Preamp) require checking. If the CD module fails to spark with this test, then the CD module is usually bad.
6. Check DVA voltage on the Gray wire while connected to the coil, it should be approximately 200 volts at cranking. If the voltage is correct, replace the coil with another coil and retest or use a load resister if another coil is not available. A coil that is shorted internally will give a low reading. In this case replace the coil and retry.

After repairing the engine, check the battery voltage at approximately 3500 RPM, The MAXIMUM allowable voltage reading is 16 volts and the minimum is 12V. Running below 12V or over 16 volts will damage the ignition. Check for loose connections or a bad battery.

Chrysler

Magnapower II Systems

1. Make sure the timing arm is in the full retarded position as the ignition will not spark if the arm is advanced at cranking.
2. The Wide Open Timing (WOT) must be set at the top engine RPM. Do not set at cranking speed.
3. Disconnect the White and Blue stop wires from the CD Module and retest. If the engine starts and runs, the key-switch or stop circuit is bad.
4. Disconnect the stop wires from the CD. Measure DC voltage from the stop wires (from the harness) to engine ground. Turn the ignition switch on and off several times. DC voltage should never exceed 2V. If it does, the stop circuit has a fault. Check the key switch, harness and shift switch.
5. Connect a spark gap tester to all cylinders and test with the spark plugs in and out. If the coils will not spark with the spark plugs in, check compression with the spark plugs removed from all cylinders. A blown head gasket on these engines can prevent the coils from firing with the spark plugs installed. This is caused by a hard to explain problem with the triggering circuit.
6. Crank the engine with the starter and then stop. Check the DVA voltage on terminals T1 and T4 while connected. You should read between 170 and 270 volts Positive on terminal T1 and between 170, and 270 volts Negative on terminal T4. (Remember that some DVA adapters are not polarized and will read the same regardless of the polarity). If there is a low reading on one of the terminals, disconnect the White/Blue and Green/White trigger wires, then retest. If the readings are now correct, one of the trigger modules is bad. A continued low reading may be caused by a bad capacitor. To test, use a couple of jumper wires and swap the Green and White capacitor wires going to terminals T1 and T4. If the low reading remains on the same terminal, the CD is bad. If it moves when you move the capacitor wires, the capacitor is shorted.
7. Disconnect the trigger wires from the T1 and T4 terminals and the ignition coils. Connect a jumper wire to the T1 and T4 terminals. Using the starter, spin the engine over. Touch the jumper wire from T1 to the positive terminal of #1 ignition coil. If the coil now has spark, the trigger is bad (if still no spark, the CD is likely bad). Touch the jumper wire from T4 to the negative terminal of #2 ignition coil. If the coil now has spark, the trigger is bad (if still no spark, the CD is likely bad). On a 4 cylinder engine, T1 should be tested to both # 1 and #2 cylinders coils positive terminals while the T4 must be tested to the negative terminal of #3 and #4 ignition coils.
8. Check to see if the ignition coils are wired correctly. The #1 coil on a two cylinder engine and the #1 & 2 cylinder on a four cylinder engine are wired as NEGATIVE GROUND. The #2 coil on a two cylinder engine and the #3 & 4 cylinder on a four cylinder engine are wired as POSITIVE GROUND.



Chrysler

Capacitive Discharge Module with Alternator (ADI – Alternator Driven Ignition)

GENERAL:

1. Disconnect the stop wires from the CD. Measure DC voltage from the stop wires (from the harness) to engine ground. Turn the ignition switch on and off several times. DC voltage should never exceed 2V. If it does, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Check the flywheel for a broken or loose magnet.
3. Check for broken wires and terminals, especially inside the plastic plug-in connectors. We recommend that you remove the pins from the connectors using the CDI 511-9706 pin removal tool and visually inspect them.
4. Visually inspect the stator for burned or discolored areas. If found, replace the stator. If the areas are on the battery charge windings, it indicates a possible problem with the rectifier.

NO SPARK ON ANY CYLINDER:

1. Disconnect all stop wires AT THE POWER PACK.
2. Disconnect the rectifier. If the engine sparks, replace the rectifier.
3. Check for broken or bare wires on the unit, stator and trigger.
4. Check the stator and trigger resistance and DVA voltage as follows:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA
Brown/Blue (or Blue)	Brown/Yellow (or Yellow)	680-900	250-350	180-400 V Connected
Brown/Blue (or Blue)	Engine GND	Open	Open	< 2 V Disconnected
Brown/Yellow (or Yellow)	Engine GND	Open	Open	< 2 V Disconnected
White/Orange (or Orange)	White/Yellow (or Green)	45-55	45-55	0.5 V + Connected
White/Red (or Red)	White/Green	45-55	45-55	0.5 V + Connected

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the stator and trigger resistance and DVA voltage (see NO SPARK ON ANY CYLINDER above).
2. If readings are good, disconnect stop wire from one pack. If the dead cylinder starts firing, the problem is likely the blocking diode in the opposite pack.

POWER PACK OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

NO SPARK ON TWO CYLINDERS:

1. If two cylinders from the same CD unit will not spark, the problem is usually in the stator. Test per above.
2. If the engine has a CDI stator installed:
   A. If #1 and #3 are the ones not firing, disconnect the Yellow stator wire from the # 1 pack and see if the #3 cylinder starts firing. Is so, replace the #1 pack. If not, then reconnect the Yellow stator wire to the # 1 pack and disconnect the Yellow stator wire from the # 2 pack and see if the #1 cylinder starts firing. If so, replace the # 2 pack.
   B. If #2 and #4 are the ones not firing, disconnect the Blue stator wire from the # 1 pack and see if the #4 cylinder starts firing. Is so, replace the #1 pack. If not, then reconnect the Blue stator wire to the # 1 pack and disconnect the Blue stator wire from the # 2 pack and see if the #2 cylinder starts firing. If so, replace the # 2 pack.

ENGINE WILL NOT SHUT OFF:

Disconnect all stop wires at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

COILS ONLY SPARK WITH THE SPARK PLUGS OUT:

Check for dragging starter or low battery causing slow cranking speed. DVA test stator and trigger.

MISS AT ANY RPM:

1. Disconnect the rectifier from the stator and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output from the power pack outputs while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Chrysler/Force

Prestolite Capacitive Discharge Module with Alternator (ADI – Alternator Driven Ignition)

Two Cylinder Engines Using a Separate Switch Box and Ignition Coils

1. Disconnect the stop wires from the CD. Measure DC voltage from the stop wires (from the harness) to engine ground. Turn the ignition switch on and off several times. DC voltage should never exceed 2V. If it does, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Check the flywheel for a broken or loose magnet.
3. Check for broken wires and terminals, especially inside the plastic plug-in connectors. We recommend that you remove the pins from the connectors using the CDI 511-9706 pin removal tool and visually inspect them.
4. Visually inspect stator for burned or discolored areas. If found, replace the stator. If the areas are on the battery charge windings, it indicates a possible problem with the rectifier.

NO SPARK ON ANY CYLINDER:

1. Disconnect all stop wires AT THE POWER PACK and retighten the terminal screw. If you then have spark, use jumper wires and connect the two stop wires together. A loss of spark means the pack is defective. If the pack still has spark, connect the stop wires together using one end of the jumper wire. Remove the stop wires from the terminal strip and connect the other end of the jumper wire to the stop wires. If the pack still has spark, the terminal strip has a fault (check the screw length). If there is still no spark, check the harness and stop circuit.
2. Disconnect the rectifier. If the engine now has spark, replace the rectifier.
3. Check for broken or bare wires on the ignition module, stator and trigger.
4. Check the stator and trigger resistance and DVA voltage as follows:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA
Brown/Blue (or Blue)	Brown/Yellow (or Yellow)	680-900	250-350	180-400 V Connected
Brown/Blue (or Blue)	Engine GND	Open	Open	< 2 V Disconnected
Brown/Yellow (or Yellow)	Engine GND	Open	Open	< 2 V Disconnected
White/Orange (or Orange)	White/Yellow (or Green)	45-55	45-55	0.5 V + Connected
White/Red (or Red)	White/Green	45-55	45-55	0.5 V + Connected

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the stator and trigger resistance and DVA voltage (see NO SPARK ON ANY CYLINDER above).
2. If readings are good, disconnect stop wire from one pack. If the dead cylinder starts sparking, the problem is likely the blocking diode in the pack.
3. Bypass the terminal strip using jumper wires and see if spark comes back. If so, the terminal strip has a problem.

POWER PACK OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect all stop wires at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

COILS ONLY HAVE SPARK WITH SPARK PLUGS OUT:

Check for dragging starter or low battery causing slow cranking speed. DVA test stator and trigger.

MISS AT ANY RPM:

1. Disconnect the rectifier from the stator and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output from the power pack outputs while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Connections

Pack #1 (Firing #1 and #2 Cylinders)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow		White/Yellow (a)
	White/Red		White/Red(a)
	White/Green Stripe		White/Green Stripe
Pack:	Brown/Yellow Stripe	**Stator:**	Brown/Yellow Stripe
	Brown/Blue Stripe		Brown/Blue Stripe
Pack:	Orange/Blue	**Coil:**	White
	Blue/Red		White

Color Code Cross Reference

FUNCTION	OLD	NEW
Trigger	Orange	White/Orange Stripe
Trigger	Green	White/Yellow Stripe
Trigger	Red	White/Red Stripe
Trigger	White/Green Stripe	White/Green Stripe
Stator	Blue	Brown/Blue Stripe
Stator	Yellow	Brown/Yellow Stripe
Ignition Coil	White	Orange/Blue
Stop Circuit	White	Black/Yellow

Chrysler/Force

Capacitive Discharge Module with Alternator (ADI – Alternator Driven Ignition)
Three and Four Cylinder Engines Using Separate Switch Boxes and Ignition Coils

1. Check for broken wires and terminals, especially inside the plastic plug-in connectors. We recommend that you remove the pins from the connectors using the CDI 511-9706 pin removal tool and visually inspect them.
2. Check the flywheel for a broken or loose magnet.
3. Disconnect the stop wires from the CD. Measure DC voltage from the stop wires (from the harness) to engine ground. Turn the ignition switch on and off several times. DC voltage should never exceed 2V. If it does, the stop circuit has a fault. Check the key switch, harness and shift switch.
4. Visually inspect stator for burned or discolored areas. If found, replace the stator. If the areas are on the battery charge windings, it indicates a possible problem with the rectifier.

NO SPARK ON ANY CYLINDER:

1. Disconnect stop wire AT THE POWER PACK.
2. Disconnect the rectifier. If the engine sparks, replace the rectifier.
3. Check for broken or bare wires on the unit, stator and trigger. Check the stator and trigger as follows:
4. Check the stator and trigger resistance and DVA voltage as follows:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA
Brown/Blue (or Blue)	Brown/Yellow (or Yellow)	680-900	250-350	180-400 V Connected
Brown/Blue (or Blue)	Engine GND	Open	Open	< 2 V Disconnected
Brown/Yellow (or Yellow)	Engine GND	Open	Open	< 2 V Disconnected
White/Orange (or Orange)	White/Yellow (or Green)	45-55	45-55	0.5 V + Connected
White/Red (or Red)	White/Green	45-55	45-55	0.5 V + Connected

(NOTE) Remember that the stator may use Brown/Yellow or Brown/Black/Yellow for Yellow and Brown/Blue or Brown/Black/Blue for Blue.

A. The DVA reading to engine ground is checking a circuit inside the power pack. If the readings are not fairly equal, swap the stator wires going to the power pack and recheck. If the low reading stays on the same wire from the stator, replace the stator. Otherwise, replace the power pack.

B. Most meters will pick up a small amount of voltage due to inductive pick-up. As long as the voltage is very low, it will not indicate a problem.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the stator and trigger resistance and DVA voltage (see NO SPARK ON ANY CYLINDER above).
2. If readings are good, disconnect the stop wire from one pack. If the dead cylinder starts sparking, the problem is likely the blocking diode in the opposite pack. Remember the terminal strip can short and cause a cylinder to not have spark.

POWER PACK OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

NO SPARK ON TWO CYLINDERS:

1. If two cylinders from the same CD unit will not spark, the problem is usually in the stator. Test per above.
2. If the engine has a CDI stator installed:

A. If #1 and #3 are the ones not firing, disconnect the Yellow stator wire from the # 1 pack and see if the #3 cylinder starts firing. Is so, replace the #1 pack. If not, then reconnect the Yellow stator wire to the # 1 pack and disconnect the Yellow stator wire from the # 2 pack and see if the #1 cylinder starts firing. If so, replace the # 2 pack.

B. If #2 and #4 are the ones not firing, disconnect the Blue stator wire from the # 1 pack and see if the #4 cylinder starts firing. Is so, replace the #1 pack. If not, then reconnect the Blue stator wire to the # 1 pack and disconnect the Blue stator wire from the # 2 pack and see if the #2 cylinder starts firing. If so, replace the # 2 pack.

ENGINE WILL NOT SHUT OFF:

Disconnect all stop wires at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

COILS ONLY HAVE SPARK WITH SPARK PLUGS OUT:
Check for dragging starter or low battery causing slow cranking speed. DVA test stator and trigger.

MISS AT ANY RPM:
1. Disconnect the rectifier from the stator and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output from the power pack outputs while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Connections

Pack #1 (Firing #1 and #2 Cylinders)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow		White/Yellow (a)
	White/Red		White/Red (a)
	White/Green Stripe		White/Green Stripe
Pack:	Brown/Yellow Stripe	**Stator:**	Brown/Yellow Stripe
	Brown/Blue Stripe		Brown/Blue Stripe
Pack:	Orange/Blue	**Coil:**	White
	Blue/Red		White

Pack #3 (Firing #3 and #4 Cylinders)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow		White/Yellow (a)
	White/Red		White/Red (a)
	White/Green Stripe		White/Green Stripe
Pack:	Brown/Yellow Stripe	**Stator:**	Brown/Yellow Stripe
	Brown/Blue Stripe		Brown/Blue Stripe
Pack:	Orange/Blue	**Coil:**	White
	Blue/Red		White

Pack #2 (Firing #3 Cylinder)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow		White/Yellow (a)
	White/Red		No Connection
	White/Green Stripe		No Connection
Pack:	Brown/Yellow Stripe	**Stator:**	Brown/Yellow Stripe
	Brown/Blue		No Connection (must be connected to the blue terminal on pack 1)
Pack:	Orange/Blue	**Coil:**	White
	Blue/Red		No Connection

(a) CDI replacement triggers do not have a connection for this wire from the power pack as the new trigger uses a common ground wire. This allows the wires going to the power pack from the trigger to be larger and more durable. The power pack uses that color as a ground wire for the trigger.

Sample Connection for a 4 Cylinder Using New Design CDI Trigger

Pack #1 (Firing #1 and #2 cylinders)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow		No Connection
	White/Red		No Connection
	White/Green Stripe		White/Green Stripe
Pack:	Yellow	**Stator:**	Yellow
	Blue		Blue
Pack:	Orange/Blue	**Coil #1:**	White
Pack:	Blue/Red	**Coil #2:**	White

Pack #2 (Firing #3 and #4 cylinders)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow Stripe		No Connection
	White/Red		No Connection
	White/Green Stripe		White/Green Stripe
Pack:	Yellow	**Stator:**	Yellow
	Blue		Blue
Pack:	Orange/Blue	**Coil #3:**	White
Pack:	Blue/Red	**Coil #4:**	White

Color Code Cross Reference

FUNCTION	OLD	NEW
Trigger	Orange	White/Orange Stripe
Trigger	Green	White/Yellow Stripe
Trigger	Red	White/Red Stripe White/Green Stripe
Trigger	White/Green Stripe	White/Green Stripe
Stator	Blue	Brown/Blue Stripe
Stator	Yellow	Brown/Yellow Stripe
Pack Output to Coil	Orange	Orange/Blue
Pack Output to Coil	Red	Blue/Red
Ignition Coil	White	Orange/Blue
Stop Circuit	White	Black/Yellow

Chrysler/Force

Two Cylinder Engines using Combination CD Module with Built-in Ignition Coils (1978-1988)

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

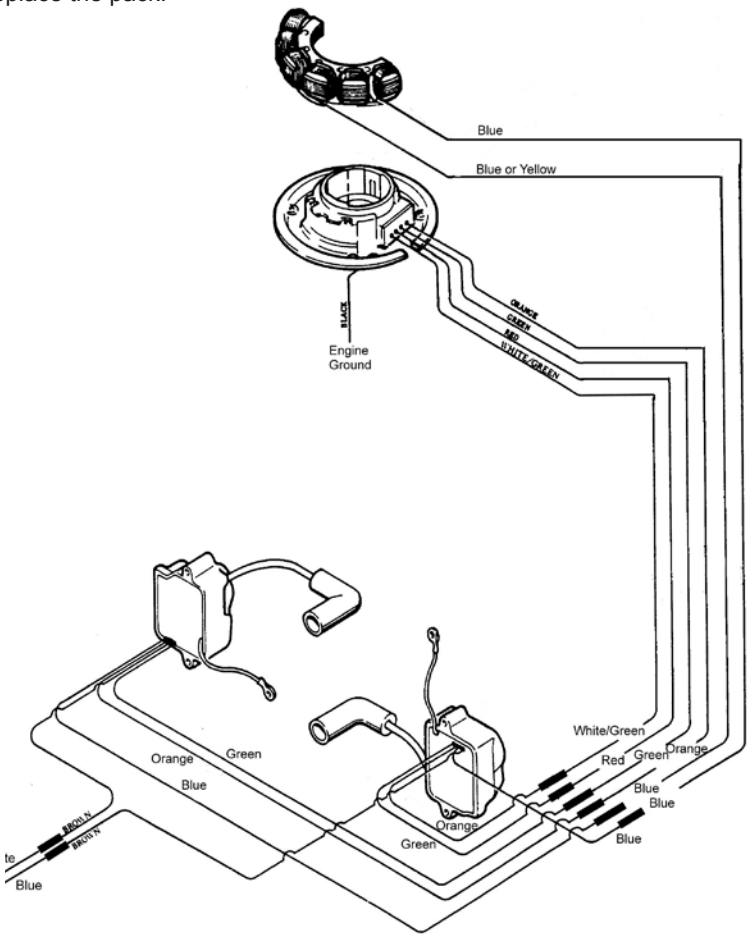
1. Check the Brown stop wires. They MUST be separated from each other. THIS SYSTEM SHORTS THE BROWN WIRES TOGETHER TO STOP THE ENGINE. The common practice of connecting the stop wires together and shorting them to ground in order to stop the engine will not work on this engine. Disconnect the Brown stop wires and retest. If you have spark, check the ignition switch's "M" terminals if using remote start. You should have a White wire on one terminal and a Blue wire on the other terminal. If both the Blue and White wires are connected together, correct the wiring. If the engine has a tiller handle, check the push button stop switch.
2. Check the stator and trigger resistance and DVA voltage as follows:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA
Brown/Blue	Brown/Yellow	680-900	250-350	180-400 V Connected
Brown/Blue	Engine GND	Open	Open	< 2 V Disconnected
Brown/Yellow	Engine GND	Open	Open	< 2 V Disconnected
Orange	Green	45-55	45-55	0.5 V + Connected
Red	White/Green	45-55	45-55	0.5 V + Connected

3. If readings are good and the #2 cylinder is the one not firing, swap the Red and White/Green trigger wires. If both cylinders now have spark, the trigger is not wired for this engine. However, you may leave the wires as they are and the engine will be run normally.
4. Disconnect the stop wire from one pack. If that cylinder starts firing, the stop circuit in the harness or on the boat is bad, possibly the ignition switch.
5. If readings are good, disconnect stop wire from one pack. If the dead cylinder starts sparking, the problem is likely the blocking diode in the opposite pack.

ENGINE WILL NOT SHUT OFF:

Disconnect the Brown stop wires. Connect a jumper wire to ONE of the stop wires from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the pack.



Force

Prestolite ADI Ignitions 1984-1992

1. Disconnect the stop wires from the CD. Measure DC voltage from the stop wires (from the harness) to engine ground. Turn the ignition switch on and off several times. DC voltage should never exceed 2V. If it does, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Check the flywheel for a broken or loose magnet.
3. Check for broken wires and terminals, especially inside the plastic plug-in connectors. We recommend that you remove the pins from the connectors using the CDI 511-9706 pin removal tool and visually inspect them.
4. Visually inspect stator for burned or discolored areas. If found, replace the stator. If the areas are on the battery charge windings, it indicates a possible problem with the rectifier.

NO SPARK ON ANY CYLINDER:

1. Disconnect the stop wire AT THE POWER PACK.
2. Disconnect the rectifier. If the engine sparks, replace the rectifier.
3. Check for broken or bare wires on the CD Module, stator and trigger.
4. Check the stator and trigger resistance and DVA voltage as follows:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA
Brown/Blue (or Blue)	Brown/Yellow (or Yellow)	680-900	250-350	180-400 V Connected
Brown/Blue (or Blue)	Engine GND	Open	Open	< 2 V Disconnected
Brown/Yellow (or Yellow)	Engine GND	Open	Open	< 2 V Disconnected
White/Orange (or Orange)	White/Yellow (or Green)	45-55	45-55	0.5 V + Connected
White/Red (or Red)	White/Green	45-55	45-55	0.5 V + Connected

(NOTE) Remember that the stator may use Brown/Yellow or Brown/Black/Yellow for Yellow and Brown/Blue or Brown/Black/Blue for Blue.

A. The DVA reading to engine ground is checking a circuit inside the power pack. If the readings are not fairly equal, swap the stator wires going to the power pack and recheck. If the low reading stays on the same wire from the stator, replace the stator. Otherwise, replace the power pack.

B. Most meters will pick up a small amount of voltage due to inductive pick-up. As long as the voltage is very low, it will not indicate a problem.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the stator and trigger resistance and DVA voltage (see NO SPARK ON ANY CYLINDER above).
2. If readings are good, disconnect stop wire from one pack. If the dead cylinder starts sparking, the problem is likely the blocking diode in the opposite pack.

POWER PACK OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

NO SPARK ON TWO CYLINDERS:

1. If two cylinders from the same CD unit will not spark, the problem is usually in the stator. Test per above.
2. If the engine has a CDI stator installed:

A. If #1 and #3 are the ones not firing, disconnect the Yellow stator wire from the # 1 pack and see if the #3 cylinder starts firing. Is so, replace the #1 pack. If not, then reconnect the Yellow stator wire to the # 1 pack and disconnect the Yellow stator wire from the # 2 pack and see if the #1 cylinder starts firing. If so, replace the # 2 pack.

B. If #2 and #4 are the ones not firing, disconnect the Blue stator wire from the # 1 pack and see if the #4 cylinder starts firing. Is so, replace the #1 pack. If not, then reconnect the Blue stator wire to the # 1 pack and disconnect the Blue stator wire from the # 2 pack and see if the #2 cylinder starts firing. If so, replace the # 2 pack.

ENGINE WILL NOT SHUT OFF:

Disconnect all stop wires at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

COILS ONLY HAVE SPARK WITH SPARK PLUGS OUT:

Check for dragging starter or low battery causing slow cranking speed. DVA test stator and trigger.

MISS AT ANY RPM:

1. Disconnect the rectifier from the stator and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output from the power pack outputs while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem.

Check the trigger DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Force

Prestolite ADI Ignitions 1984-1992

Two Cylinder Engines Using Separate Switch Boxes and Ignition Coils

GENERAL:

1. Disconnect the stop wires from the CD. Measure DC voltage from the stop wires (from the harness) to engine ground. Turn the ignition switch on and off several times. DC voltage should never exceed 2V. If it does, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Check the flywheel for a broken or loose magnet.
3. Check for broken wires and terminals, especially inside the plastic plug-in connectors. We recommend that you remove the pins from the connectors using the CDI 511-9706 pin removal tool and visually inspect them.
4. Visually inspect the stator for burned or discolored areas. If found, replace the stator. If the areas are on the battery charge windings, it indicates a possible problem with the rectifier.

NO SPARK ON ANY CYLINDER:

1. Disconnect all stop wires AT THE POWER PACK.
2. Disconnect the rectifier. If the engine sparks, replace the rectifier.
3. Check for broken or bare wires on the switch box, stator and trigger.
4. Check the stator and trigger resistance and DVA voltage as follows:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA
Brown/Blue (or Blue)	Brown/Yellow (or Yellow)	680-900	250-350	180-400 V Connected
Brown/Blue (or Blue)	Engine GND	Open	Open	< 2 V Disconnected
Brown/Yellow (or Yellow)	Engine GND	Open	Open	< 2 V Disconnected
White/Orange (or Orange)	White/Yellow (or Green)	45-55	45-55	0.5 V + Connected
White/Red (or Red)	White/Green	45-55	45-55	0.5 V + Connected

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the stator and trigger resistance and DVA voltage (see NO SPARK ON ANY CYLINDER above).
2. If readings are good, swap the power pack output from the ignition coil that works to the one that does not. If the coil that had spark stops sparking, replace the power pack.

POWER PACK OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect all stop wires at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

COILS ONLY HAVE SPARK WITH SPARK PLUGS OUT:

Check for dragging starter or low battery causing slow cranking speed. DVA test stator and trigger.

MISS AT ANY RPM:

1. Disconnect the rectifier from the stator and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output from the power pack outputs while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Connections

Pack #1 (Firing #1 and #2 Cylinders)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow		White/Yellow (a)
	White/Red		White/Red (a)
	White/Green Stripe		White/Green Stripe
Pack:	Brown/Yellow Stripe	**Stator:**	Brown/Yellow Stripe
	Brown/Blue Stripe		Brown/Blue Stripe
Pack:	Orange/Blue	**Coil:**	White
	Blue/Red		White

Color Code Cross Reference

FUNCTION	OLD	NEW
Trigger	Orange	White/Orange Stripe
Trigger	Green	White/Yellow Stripe
Trigger	Red	White/Red Stripe
Trigger	White/Green Stripe	White/Green Stripe
Stator	Blue	Brown/Blue Stripe
Stator	Yellow	Brown/Yellow Stripe
Ignition Coil	White	Orange/Blue
Stop Circuit	White	Black/Yellow

Force

Prestolite ADI Ignitions 1984-1992

Three and Four Cylinder Engines Using Separate Switch Boxes and Ignition Coils

NO SPARK ON ANY CYLINDER:

1. Disconnect the stop wire AT THE POWER PACK.
2. Disconnect the rectifier. If the engine sparks, replace the rectifier.
3. Check for broken or bare wires on the unit, stator and trigger.
4. Check the stator and trigger resistance and DVA voltage as follows:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA
Brown/Blue (or Blue)	Brown/Yellow (or Yellow)	680-900	250-350	180-400 V Connected
Brown/Blue (or Blue)	Engine GND	Open	Open	< 2 V Disconnected
Brown/Yellow (or Yellow)	Engine GND	Open	Open	< 2 V Disconnected
White/Orange (or Orange)	White/Yellow (or Green)	45-55	45-55	0.5 V + Connected
White/Red (or Red)	White/Green	45-55	45-55	0.5 V + Connected

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the stator and trigger resistance and DVA voltage (see NO SPARK ON ANY CYLINDER above).
2. If readings are good, disconnect stop wire from one pack. If the dead cylinder starts sparking, the problem is likely the blocking diode in the opposite pack.
3. If #2 on a three cylinder engine is the one not firing and the engine has a CDI stator installed, disconnect the Blue wire going to the #2 pack and see if the #2 cylinder starts firing. If so, reconnect the Blue wire with the Blue wire going to the #1 pack.

POWER PACK OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

NO SPARK ON TWO CYLINDERS:

1. If two cylinders from the same CD unit will not spark, the problem is usually in the stator. Test per above.
2. If the engine has a CDI stator installed:
   - A. If #1 and #3 are the ones not firing, disconnect the Yellow stator wire from the # 1 pack and see if the #3 cylinder starts firing. Is so, replace the #1 pack. If not, then reconnect the Yellow stator wire to the # 1 pack and disconnect the Yellow stator wire from the # 2 pack and see if the #1 cylinder starts firing. If so, replace the # 2 pack.
   - B. If #2 and #4 are the ones not firing, disconnect the Blue stator wire from the # 1 pack and see if the #4 cylinder starts firing. Is so, replace the #1 pack. If not, then reconnect the Blue stator wire to the # 1 pack and disconnect the Blue stator wire from the # 2 pack and see if the #2 cylinder starts firing. If so, replace the # 2 pack.

ENGINE WILL NOT SHUT OFF:

Disconnect all stop wires at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

COILS ONLY HAVE SPARK WITH SPARK PLUGS OUT:

Check for dragging starter or low battery causing slow cranking speed. DVA test stator and trigger.

MISS AT ANY RPM:

1. Disconnect the rectifier from the stator and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output from the power pack outputs while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK ON ANY CYLINDER above).

4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Pack #1 (Firing #1 and #2 Cylinders)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow		White/Yellow (a)
	White/Red		White/Red (a)
	White/Green Stripe		White/Green Stripe
Pack:	Brown/Yellow Stripe	**Stator:**	Brown/Yellow Stripe
	Brown/Blue Stripe		Brown/Blue Stripe
Pack:	Orange/Blue	**Coil:**	White
	Blue/Red		White

Pack #2 (Firing #3 and #4 Cylinders)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow		White/Yellow (a)
	White/Red		White/Red (a)
	White/Green Stripe		White/Green Stripe
Pack:	Brown/Yellow Stripe	**Stator:**	Brown/Yellow Stripe
	Brown/Blue Stripe		Brown/Blue Stripe
Pack:	Orange/Blue	**Coil:**	White
	Blue/Red		White

Pack #2 (Firing #3 Cylinder)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow		White/Yellow (a)
	White/Red		No Connection
	White/Green Stripe		No Connection
Pack:	Brown/Yellow Stripe	**Stator:**	Brown/Yellow Stripe
	Brown/Blue		No Connection (must be connected to the blue terminal on pack 1)
Pack:	Orange/Blue	**Coil:**	White
	Blue/Red		No Connection

(a) CDI replacement triggers do not have a connection for this wire from the power pack as the new trigger uses a common ground wire. This allows the wires going to the power pack from the trigger to be larger and more durable. The power pack uses that color as a ground wire for the trigger.

Color Code Cross Reference

FUNCTION	OLD	NEW
Trigger	Orange	White/Orange Stripe
Trigger	Green	White/Yellow Stripe
Trigger	Red	White/Red Stripe White/Green Stripe
Trigger	White/Green Stripe	White/Green Stripe
Stator	Blue	Brown/Blue Stripe
Stator	Yellow	Brown/Yellow Stripe
Pack Output to Coil	Orange	Orange/Blue
Pack Output to CoiL	Red	Blue/Red
Ignition Coil	White	Orange/Blue
Stop Circuit	White	Black/Yellow

Sample Connection for a 4 Cylinder Using New Design CDI Trigger

Pack #1 (Firing #1 and #2 cylinders)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow		No Connection
	White/Red		No Connection
	White/Green Stripe		White/Green Stripe
Pack:	Yellow	**Stator:**	Yellow
	Blue		Blue
Pack:	Orange/Blue	**Coil #1:**	White
Pack:	Blue/Red	**Coil #2:**	White

Pack #2 (Firing #3 and #4 cylinders)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow Stripe		No Connection
	White/Red		No Connection
	White/Green Stripe		White/Green Stripe
Pack:	Yellow	**Stator:**	Yellow
	Blue		Blue
Pack:	Orange/Blue	**Coil #3:**	White
Pack:	Blue/Red	**Coil #4:**	White

Force

Prestolite ADI Ignitions 1984-1992

Five Cylinder Engines Using Separate Switch Boxes and Ignition Coils

NO SPARK ON ANY CYLINDER:

1. Disconnect the stop wire AT THE POWER PACK.
2. Disconnect the rectifier. If the engine now has spark, replace the rectifier.
3. Check for broken or bare wires on the CD Modules, stator and trigger.
4. Check the stator and trigger resistance and DVA voltage as follows:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Yellow	Blue	680-850	250-350	180-400 V	180-400 V
Yellow	Engine GND	Open	Open	180-400 V (a)	2 V + (b)
Blue	Engine GND	Open	Open	180-400 V (a)	2 V + (b)

(NOTE) Remember that the stator may use Brown/Yellow or Brown/Black/Yellow for Yellow and Brown/Blue or Brown/Black/Blue for Blue.

A. The DVA reading to engine ground is checking a circuit inside the power pack. If the readings are not fairly equal, swap the stator wires going to the power pack and recheck. If the low reading stays on the same wire from the stator, replace the stator. Otherwise, replace the power pack.

B. Most meters will pick up a small amount of voltage due to inductive pick-up. As long as the voltage is very low, it will not indicate a problem.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the stator and trigger resistance; the trigger wire sets should read approximately 50 ohms between the wire sets (DVA-.5V or more), the stator should read 680-800 ohms (factory) and 250-350 ohms (CDI) DVA 180-400V from Blue to Yellow.
2. If readings are good, disconnect stop wire from one pack. If the dead cylinder starts sparking, the problem is likely the blocking diode in the pack you disconnected.

POWER PACK OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

NO SPARK ON TWO OR THREE CYLINDERS:

1. If two cylinders from the same CD unit will not spark, the problem is usually in the stator. Test per above.
2. If the engine has a CDI stator installed:

A. If #1, #3 and #5 are the ones not firing, disconnect the Yellow stator wire from the # 1 pack and see if the #3 and #5 cylinders start firing. Is so, replace the #1 pack. If not, then reconnect the Yellow stator wire to the # 1 pack and disconnect the Yellow stator wire from the # 2 pack and see if the #1 and #5 cylinders start firing. If so, replace the # 2 pack. If not, then reconnect the Yellow stator wire to the # 2 pack and disconnect the Yellow stator wire from the #3 pack and see if the #1 and #3 cylinders start firing. If so, replace the # 3 pack.

B. If #2 and #4 are the ones not firing, disconnect the Blue stator wire from the # 1 pack and see if the #4 cylinder starts firing. Is so, replace the #1 pack. If not, then reconnect the Blue stator wire to the # 1 pack and disconnect the Blue stator wire from the # 2 pack and see if the #2 cylinder starts firing. If so, replace the # 2 pack.

ENGINE WILL NOT SHUT OFF:

Disconnect all stop wires at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

COILS ONLY HAVE SPARK WITH SPARK PLUGS OUT:

Check for dragging starter or low battery causing slow cranking speed. DVA test stator and trigger.

MISS AT ANY RPM:

1. Disconnect the rectifier from the stator and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output from the power pack outputs while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Connections: 5 Cylinder

Pack #1 (Firing #1 and #2 Cylinders)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow		White/Yellow (a)
	White/Red		White/Red(a)
	White/Green Stripe		White/Green Stripe
Pack:	Brown/Yellow Stripe	**Stator:**	Brown/Yellow Stripe
	Brown/Blue Stripe		Brown/Blue Stripe
Pack:	Orange/Blue	**Coil:**	White
	Blue/Red		White

Pack #3 (Firing #4 and #5 Cylinders)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow		White/Yellow (a)
	White/Red		White/Red(a)
	White/Green Stripe		White/Green Stripe
Pack:	Brown/Yellow Stripe	**Stator:**	Brown/Yellow Stripe
	Brown/Blue Stripe		Brown/Blue Stripe
Pack:	Orange/Blue	**Coil:**	White
	Blue/Red		White

Pack #2 (Firing #3 Cylinder)

Pack:	White/Orange Stripe	**Trigger:**	White/Orange Stripe
	White/Yellow		White/Yellow (a)
	White/Red		No Connection
	White/Green Stripe		No Connection
Pack:	Brown/Yellow Stripe	**Stator:**	Brown/Yellow Stripe
	No Connection		Blue (must be connected to the blue terminal on pack 1)
Pack:	Orange/Blue	**Coil: #3**	White
	Blue /Red		No Connection

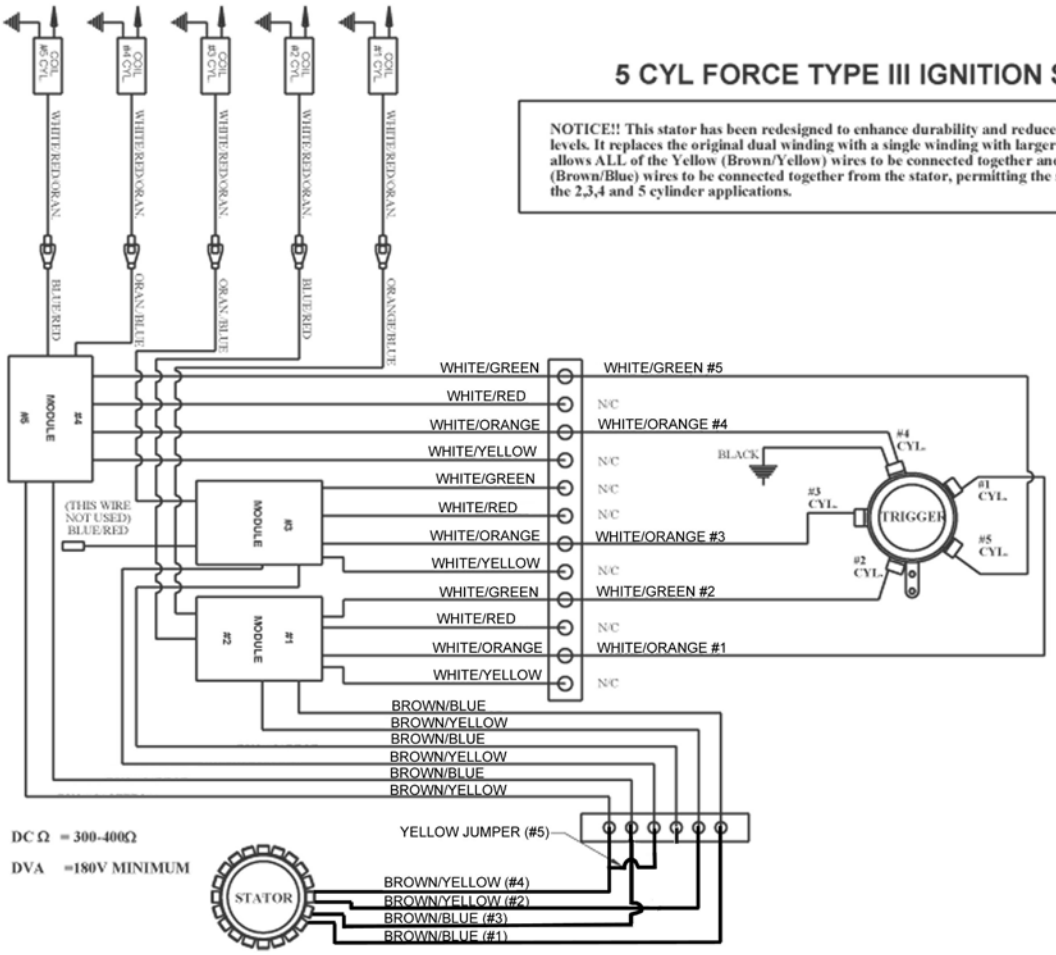
(a) CDI replacement triggers do not have a connection for this wire from the power pack as the new trigger uses a common ground wire. This allows the wires going to the power pack from the trigger to be larger and more durable. The power pack uses that color as a ground wire for the trigger.

Color Code Cross Reference

FUNCTION	OLD	NEW
Trigger	Orange	White/Orange Stripe
Trigger	Green	White/Yellow Stripe
Trigger	Red	White/Red Stripe White/Green Stripe
Trigger	White/Green Stripe	White/Green Stripe
Stator	Blue	Brown/Blue Stripe
Stator	Yellow	Brown/Yellow Stripe
Pack Output to Coil	Orange	Orange/Blue
Pack Output to Coil	Red	Blue/Red
Ignition Coil	White	Orange/Blue
Stop Circuit	White	Black/Yellow

5 CYL FORCE TYPE III IGNITION SYSTEM

NOTICE!! This stator has been redesigned to enhance durability and reduce inventory stock levels. It replaces the original dual winding with a single winding with larger wire. This design allows ALL of the Yellow (Brown/Yellow) wires to be connected together and ALL of the Blue (Brown/Blue) wires to be connected together from the stator, permitting the stator to be used for the 2,3,4 and 5 cylinder applications.



Force

Mercury Designed Ignitions 1991-1996

Two Cylinder Engines using a Separate Switch Box and Two Ignition Coils

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire AT THE POWER PACK and retest. If the engine's ignition sparks, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator resistance and DVA output as follows:

Black Stator

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Blue	Blue/White	3250-3650	500-600	180-400 V	180-400 V (*)
Red	Red/White	75-90	28-32	25-100 V	25-100 V (*)

Red Stator Kit

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
White/Green	Green/White	500-700	500-600	180-400 V	180-400 V (*)
Blue	Engine GND	OPEN	OPEN	180-400 V	180-400 V (*)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the trigger resistance and DVA output as shown below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	White	800-140	4 V +	4 V + (#)
Brown	Engine GND	Open	1 V +	N/A
White	Engine GND	Open	1 V +	N/A

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the pack is bad.

2. Check the DVA output on the Green wires from the switch box while connected to the ignition coils. Check the reading on the switch box terminal AND on the ignition coil terminal. You should have a reading of at least 150V or more (while connected) at both places. If the reading is low on one cylinder, disconnect the Green wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.
3. If the cylinders are only misfiring above an idle, connect an inductive tachometer to each cylinder in turn and try to isolate the problem cylinder.
4. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
5. Swap the ignition coil with one that is sparking correctly.
6. Rare causes include a weak trigger magnet. If possible, try another flywheel.

SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the switch box.
2. In contrast, a shorted SCR inside the switch box can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repeat test as necessary for additional switch boxes.

WILL NOT ACCELERATE BEYOND 3000-4000 RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has good spark, replace the rectifier.
2. Connect a DVA meter between the stator's Blue and Blue/White wires. Run the engine up to the RPM where the problem is occurring. DVA voltage should increase with RPM. A sharp drop in DVA right before the problem occurs usually indicates a bad stator. (Read from Blue to engine ground if the engine has a Red stator kit installed).
3. Connect a DVA meter between the stator's Red and Red/White wires. The DVA voltage should show a smooth climb in voltage and remain high through the RPM range. A reading lower than on the Blue wire reading indicates a bad stator.

4. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A single cylinder dropping spark will likely be a bad switch box or ignition coil. All cylinders not sparking properly usually indicates a bad stator.
5. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
6. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Green wires from the switch box while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Force

Mercury Designed Ignitions 1991-1996

Three Cylinder Engines using a Single Switch Box and Three Ignition Coils

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire AT THE POWER PACK and retest. If the engine's ignition sparks, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator resistance and DVA output as follows:

Black Stator

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Blue	Engine GND	3250-3650	500-600	180-400 V	180-400 V (*)
Red	Engine GND	75-90	28-32	25-100 V	25-100 V (*)

Red Stator Kit

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
White/Green	Green/White	500-700	500-600	180-400 V	180-400 V (*)
Blue	Engine GND	OPEN	OPEN	180-400 V	180-400 V (*)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the trigger resistance and DVA output as shown below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	White/Black	800-140	4 V +	4 V + (#)
White	White/Black	800-140	4 V +	4 V + (#)
Purple	White/Black	800-1400	4 V +	4 V + (#)
Brown	Engine GND	Open	1 V +	N/A
White	Engine GND	Open	1 V +	N/A
Purple	Engine GND	Open	1 V +	N/A

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the pack is bad.

2. Check the DVA output on the Green wires from the switch box while connected to the ignition coils. Check the reading on the switch box terminal AND on the ignition coil terminal. You should have a reading of at least 150V or more (while connected) at both places. If the reading is low on one cylinder, disconnect the green wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.

3. If the cylinders are only misfiring above an idle, connect an inductive tachometer to each cylinder in turn and try to isolate the problem cylinder.
4. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
5. Swap the ignition coil with one that is sparking correctly.
6. Rare causes include a weak trigger magnet. If possible, try another flywheel.

SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the switch box.
2. In contrast, a shorted SCR inside the switch box can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repeat test as necessary for additional switch boxes.

WILL NOT ACCELERATE BEYOND 3000-4000 RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has good spark, replace the rectifier.
2. Connect a DVA meter between the stator's Blue wire and engine ground. Run the engine up to the RPM where the problem is occurring. DVA voltage should increase with RPM. A sharp drop in DVA right before the problem occurs usually indicates a bad stator. (Read from Blue to engine ground if the engine has a Red stator kit installed).
3. Connect a DVA meter between the stator's Red wire and engine ground. The DVA voltage should show a smooth climb in voltage and remain high through the RPM range. A reading lower than on the Blue wire reading indicates a bad stator.
4. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A single cylinder dropping spark will likely be a bad switch box or ignition coil. All cylinders not sparking properly usually indicates a bad stator.
5. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
6. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Green wires from the switch box while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Force

Mercury Designed Ignitions 1991-1996

Four Cylinder Engines using a Single Switch Box and Four Ignition Coils

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire AT THE POWER PACK and retest. If the engine's ignition sparks, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator resistance and DVA output where applicable:

Black Stator

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Blue	Blue/White	3250-3650	500-600	180-400 V	180-400 V (*)
Red	Red/White	75-90	28-32	25-100 V	25-100 V (*)

Red Stator Kit

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
White/Green	Green/White	500-700	500-600	180-400 V	180-400 V (*)
Blue	Blue/White	OPEN	OPEN	180-400 V	180-400 V (*)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the trigger resistance and DVA output as shown below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Purple	White	800-140	4 V +	4 V + (#)
Brown	White/Black	800-1400	4 V +	4 V + (#)
Purple	Engine GND	Open	1 V +	N/A
White	Engine GND	Open	1 V +	N/A
Brown	Engine GND	Open	1 V +	N/A
White/Black	Engine GND	Open	1 V +	N/A

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one or two cylinders and the trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the pack is bad.

2. Check the DVA output on the Green wires from the switch box while connected to the ignition coils. Check the reading on the switch box terminal AND on the ignition coil terminal. You should have a reading of at least 150V or more (while connected) at both places. If the reading is low on one cylinder, disconnect the Green wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.
3. If the cylinders are only misfiring above an idle, connect an inductive tachometer to each cylinder in turn and try to isolate the problem cylinder.
4. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
5. Swap the ignition coil with one that is sparking correctly.
6. Rare causes include a weak trigger magnet. If possible, try another flywheel.

SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the switch box.
2. In contrast, a shorted SCR inside the switch box can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repeat test as necessary for additional switch boxes.

WILL NOT ACCELERATE BEYOND 3000-4000 RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has good spark, replace the rectifier.
2. Connect a DVA meter between the stator's Blue and Blue/White wires. Run the engine up to the RPM where the problem is occurring. DVA voltage should increase with RPM. A sharp drop in DVA right before the problem occurs usually indicates a bad stator. (Read from Blue to engine ground if the engine has a Red stator kit installed).
3. Connect a DVA meter between the stator's Red and Red/White wires. The DVA voltage should show a smooth climb in voltage and remain high through the RPM range. A reading lower than on the Blue wire reading indicates a bad stator.
4. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A single cylinder dropping spark will likely be a bad switch box or ignition coil. All cylinders not sparking properly usually indicates a bad stator.
5. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
6. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Green wires from the switch box while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Force
Five Cylinder Engines using a Single Switch Box (1991-1992)

(NOTE) This engine uses a battery powered inverter box to provide 250V power to the switch box. The inverter is in a 332-4797 CD module case. This unit is easily identified as the inverter has four terminals instead of the seven used on the 332-4797 CD module. The original stator's only function is to charge the battery. CDI Electronics offers a replacement for the inverter (part# 176-4796K1), which combines the functions of the inverter box with the stator. The stator has a high voltage output in addition to the battery charging output, allowing the inverter box to be removed.

NO SPARK ON ANY CYLINDER:

1. Check the Red wire on the converter box from the battery at cranking; Minimum voltage is 9.5V.
2. Check the DVA voltage on the Purple/White terminal on the converter box at cranking. A minimum of 0.3V is needed to trigger the inverter box. If the voltage is low, check the DVA voltage from the White/Black trigger to the Yellow, Black, Brown, White and Purple trigger wires. If you read 4V or more, the inverter box is likely bad.
3. Check the DVA voltage on the Blue terminal on the converter box at cranking, reading should be approximately 250V.
4. *CDI Electronics replacement stator only (part# 176-4796K1):* Check the DVA output and resistance from the Blue wire to engine ground. You should read a minimum of 160V DVA and 80 ohms resistance.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the DVA voltage from the White/Black trigger to the Yellow, Black, Brown, White and Purple trigger wires. If you read 4V or more, the trigger is likely good.
2. Check the DVA voltage from the switch box. You should have the same reading on all of the Green-striped output wires to the ignition coils. If one cylinder reads low, swap the locations of the Green-striped wire not firing with one that has spark. If the problem moves, replace the power pack. If the no spark condition remains on the same cylinder, replace the ignition coil.

SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repeat test as necessary for additional switch boxes.

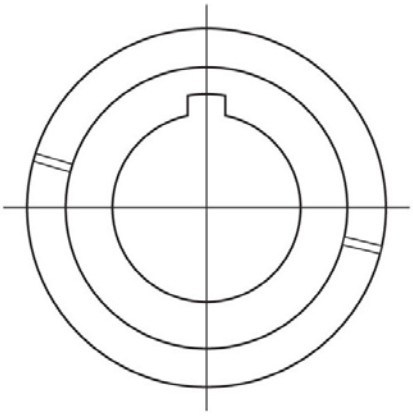
ALL CYLINDERS HAVE SPARK, BUT ENGINE WILL NOT RUN:

Disconnect the White/Black wire from the switch box and check the resistance from the switch box's White/Black wire to engine ground. The reading should be approximately 8400 ohms. A low reading indicates a bad bias circuit and the switch box needs to be replaced.

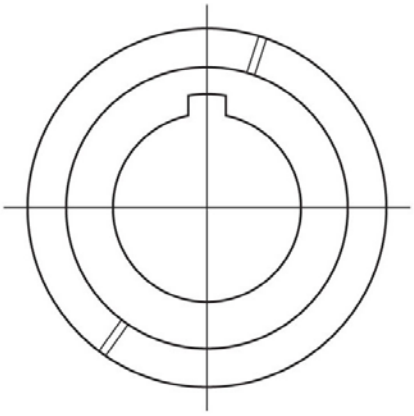
JOHNSON/EVINRUDE
Flywheel Trigger Magnet Location

This drawing is to be used to determine if the flywheel sensor magnet has moved from it's original location only.

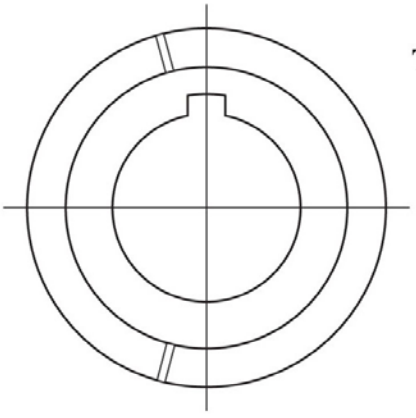
2 Cyl Loop Charged



V4 Cross-Flow

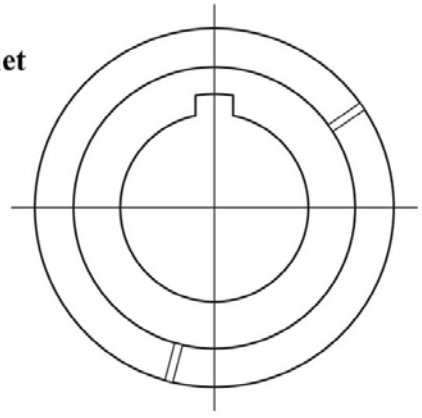


V4 & V6 Loop Charged 1986-1987

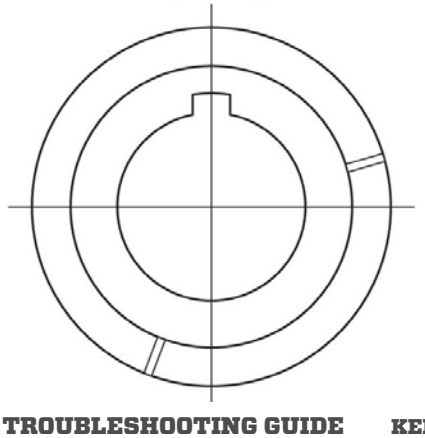


Flywheel Triggering Magnet Loctions

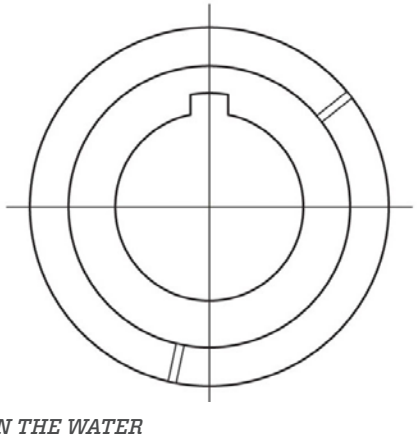
150/175 V6 Cross-Flow 1988-1992



185/200/225 V6 1988-2001 Loop Charged



V4 & V8 Loop Charged 1988-1999



Johnson/Evinrude

Battery CD Ignitions with Points

1968-1972 55, 60, 65, 85 and 100 HP Battery-Powered Models (With 113-7123 Power Pack)

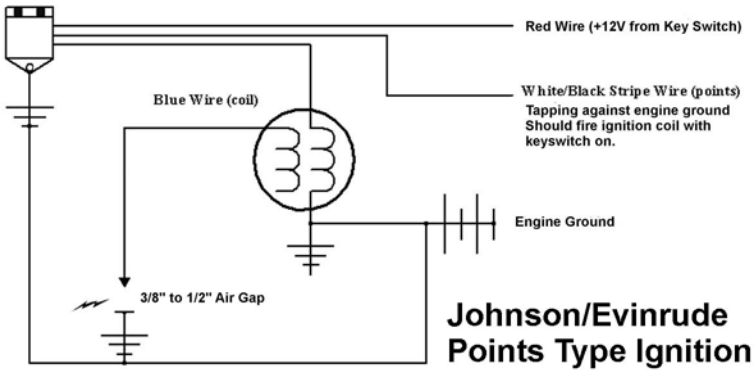
DUE TO THE CONSTRUCTION OF THE BATTERIES, DO NOT USE AUTOMOTIVE, MAINTAINENCE FREE OR LOW MAINTAINENCE BATTERIES FOR THIS APPLICATION! OVERCHARGING CAN CAUSE SEVERE DAMAGE TO THE IGNITION MODULE.

(NOTE) All clipper modules, surge suppressors and safety circuits should be removed. After removing, the ignition wire (Red or Purple) must be connected directly to the ignition switch terminal (providing 12V from ignition switch).

1. Clean all battery connections and engine grounds.
2. Check wiring as follows:

Pack Wire Color	Function
Red or Purple	12V from key switch
Blue	Positive to ignition coil
Black/White	To points
Black	Engine Ground
Not Used	Gray Tach Wire (Connect with one of the Yellow stator wires)

Engine Wiring Connections for Testing Ignition Module



3. Connect a spark gap tester to the high tension lead coming from the ignition coil and set it to approximately ½".
4. Crank the engine over, if it sparks while the spark gap tester is connected to the coil and does not spark through the spark plug wires – there is a problem in the distributor cap, rotor button or spark plug wires.
5. Check DC voltage present on the Purple wire at cranking. It MUST be at least 9.5 volts. If not, there is a problem in the harness, key switch, starter or battery.
6. Check DVA voltage on the Blue wire going to the coil while connected, it should be approximately 200 volts at cranking.
7. Disconnect the White/Black points wire. Turn the ignition switch on and strike the White/Black points wire against engine ground. The unit should spark each time. If it does, this usually means the CD module is good. Check the points, points plate and grounding wire for the points.
8. Check the Anti-reverse spring around the crankshaft. Make sure it is not shorting out the points set.
9. Connect a spark gap tester to the high-tension leads coming from the distributor cap and set the gap to approximately 7/16". Align the rotor with #1 spark plug wire. Turn the ignition switch on and strike the White/Black points wire against engine ground. Only the #1 spark plug wire should spark. If another spark plug wire has spark, there is a problem in the distributor cap. Repeat the test for the other cylinders.
10. Check the battery voltage at approximately 3500-RPM, MAXIMUM reading allowable is 16 volts. Over 16 volts will damage the ignition. Check for loose connections or a bad battery.

(NOTE) The CDI Electronics power pack may have a high pitched whine coming from it when the key switch is in the on position. This is normal and does not indicate a problem.

Johnson/Evinrude

Prestolite Battery Ignitions with Pickup Sensors

1968-1972 100, 115 and 125 HP Battery-Powered Models (With 113-8362 Power Pack)

DUE TO THE CONSTRUCTION OF THE BATTERIES, DO NOT USE AUTOMOTIVE, MAINTAINENCE FREE OR LOW MAINTAINENCE BATTERIES FOR THIS APPLICATION! OVERCHARGING CAN CAUSE SEVERE DAMAGE TO THE IGNITION MODULE.

(NOTE) All clipper modules, surge suppressors and safety circuits should be removed. After removing, the ignition wire (Red or Purple) must be connected directly to the ignition switch terminal (providing 12V from ignition switch).

1. Clean all battery connections and engine grounds.
2. Check wiring as follows:

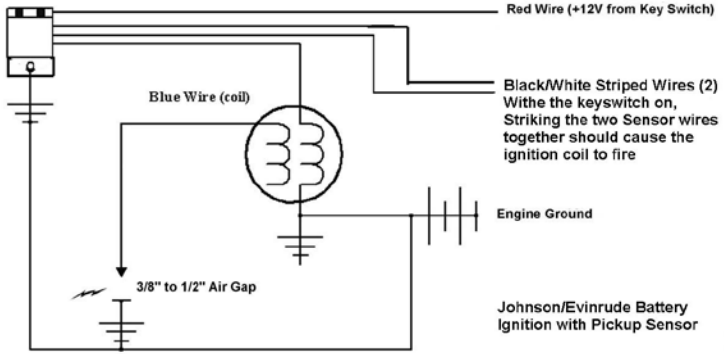
Except 1967

Pack Wire Color	Function
Red or Purple	12V from key switch
Blue	Positive to ignition coil
Black/White (2)	To trigger sensor
Black	Engine Ground
Green/Black*	Anti-reverse Spring

* (1972 models only)

1967

Pack Wire Color	Function
Red or Purple	12V from key switch
Green	Positive to ignition coil
Blue (2)	To trigger sensor
Black	Engine Ground



NO SPARK ON ANY CYLINDER:

1. Connect a spark gap tester to the high tension lead coming from the ignition coil and set it to approximately ½". When you crank the engine over, if it sparks while the spark gap tester is connected to the coil and does not spark through the spark plug wires – there is a problem in the distributor cap, rotor button or spark plug wires.
2. Check the DC voltage present on the Purple (or Red) wire at cranking. It MUST be at least 9.5 volts. If not, there is a problem in the harness, key switch, starter or battery.
3. Check the Anti-reverse spring around the crankshaft. Make sure it is not shorting out the sensor pickup.
4. Check DVA voltage on the Blue (or Green) wire going to the coil while connected, it should be approximately 200 volts at cranking.
5. Disconnect the sensor wires. Turn the ignition switch on and strike the sensor wires together. The unit should spark each time. If it does, this usually means the CD module is good. Check the sensor and sensor air gap.
6. Make sure the triggering ring is the correct one for the type ignition being used. Phase II ignitions require the silver rotor for 1967 models and the Phase II Rotor with wide gaps between the lobes for 1968-1971 engines.

Phase One Rotor 133-5107 Phase Two Rotor

1967 Belt Driven Rotor (must be silver color for Phase II packs)

7. Reset the Phase II Rotor air gap to 0.020 in. If this allows the pack to spark, leave the gap at that setting.

SPARKS OUT OF TIME:

1. 1967 Models- Check the rotor inside the distributor cap. It should be the Silver colored one – NOT the Brass colored one.
2. Connect a spark gap tester to the high-tension leads coming from the distributor cap and set the gap to approximately 7/16". Align the rotor with #1 spark plug wire. Turn the ignition switch on and strike the sensor's wires together. Only the #1 spark plug wire should spark. If any of the other spark plug wires have spark, there is a problem in the distributor cap. Repeat the test for the other cylinders.

MID-RANGE MISS:

1. Check the battery voltage at approximately 3500-RPM, MAXIMUM reading allowable is 16 volts. Over 16 volts will damage the ignition. Check for loose connections or a bad battery.
2. 1968-1972 Models – Check the Rotor. It should be the Phase II. The Phase I can cause this problem.
3. Connect a spark gap tester to the high-tension leads coming from the distributor cap and set the gap to approximately 7/16". Align the rotor with #1 spark plug wire. Turn the ignition switch on and strike the sensor's wires together. Only the #1 spark plug wire should spark. If any of the other spark plug wires have spark, there is a problem in the distributor cap. Repeat the test for the other cylinders.

Johnson/Evinrude

Alternator Driven CD Ignitions 1971-1978

Two Cylinder Engines

1971-1977 50-55 HP Models (With Screw Terminal Power Packs)

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire AT THE POWER PACK and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the engine now sparks, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Engine GND	400-600	400-600	150-400 V	150-400 V (*)
Black/White	White/Black	10-20	30-40	0.6 V +	0.6 V + (#)
Black/White	Engine GND	Open	Open	150-400 V (a)	N/A
White/Black	Engine GND	Open	Open	150-400 V (a)	N/A

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.
(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.
(a) The trigger signal rides on top of the high voltage on these timer bases. Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty.

6. If the timer base output is low, you may try to reset the air gap between the timer base sensor and the triggering magnet. See below for resetting the air gap:
   a) Loosen the two mounting screws on the sensor and the nut located in the epoxy on the outside of the heat shield of the timer base.
   b) Slide the sensor in toward the crankshaft approximately 0.005" at a time.
   c) Coat the face of the sensor with machinists bluing or equivalent.
   d) Install the flywheel according to the service manual and crank the engine over.
   e) Remove the flywheel and check to see if the trigging magnet struck the sensor face.
   f) If the ignition sparked, finger tight the nut on the outside of the heat shield and coat it with RTV.
   g) If still no spark, slide the sensor in another 0.005" and repeat steps c through f until the sensor strikes the triggering magnet. Then back the sensor off 0.005". A continued problem can indicate a bad sensor.
7. With another person's help, verify the triggering circuit inside the power pack as follows: Disconnect the timer base wires and using a good 1-1/2 volt battery (AA or larger), connect a jumper wire to each timer base terminal. Hold one jumper wire to the negative side of the battery. Have the other person crank the engine over and tap the remaining jumper wire to the positive side of the battery. **(Be careful not to touch the engine or stand in water as the triggering circuit is 'riding high' on the high voltage inside the power pack).** You should get a spark from the ignition coil with each tap. Reverse the connections to the battery and test again. If you get sparks from both tests, the power pack should be OK.
8. Check the DVA voltage on each timer base wire to engine ground. You should have a reading of at least 150V or more from the Black/White wire and the White/Black wire to engine ground (while connected to the pack). If the reading is low, disconnect the timer base wires from the pack and recheck the terminals ON THE PACK. If the voltage jumps up to an acceptable reading, the timer base may have a problem in its internal wiring (a thin spot in the insulation on one wire).
9. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
10. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
2. Check the timer base per steps #7 & #8 above.
3. Check the DVA output from the power pack. You should read at least 150V DVA while connected.
4. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
5. Swap the ignition coil with one that is sparking correctly.
6. Rare causes include a weak trigger magnet. If possible, try another flywheel.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Three Cylinder Engines

1972-1978 65-75 HP Models (With Screw Terminal Power Packs)

NO SPARK ON ANY CYLINDER:

(Note) If the ignition only sparks with the spark plugs out, the timer base is likely weak or the engine is not spinning fast enough. See steps #3 and #7 below.

1. Disconnect the Black/Yellow stop wire AT THE POWER PACK and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the engine now sparks, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow	400-600	400-600	150-400 V	150-400 V (*)
Black/White	White/Black (all)	10-20	30-40	0.6 V +	0.6 V + (#)
Black/White	Engine GND	Open	Open	150-400 V (a)	N/A
White/Black	Engine GND	Open	Open	150-400 V (a)	N/A

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

(a) The trigger signal rides on top of the high voltage on these timer bases. Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty.

6. If the timer base output is low, you may try to reset the air gap between the timer base sensor and the triggering magnet using a Sensor Gap Gauge (553-9702) or use the following procedure outlined below.
   a) Loosen the two mounting screws on the sensors and the nuts located in the epoxy on the outside of the heat shield of the timer base and slide the sensors in toward the crankshaft until the sensor touches the stop boss located at the base of the sensor mounting area. Tighten the mounting screws.
   b) Coat the face of the sensor with machinists bluing or equivalent and install the flywheel without the key and rotate the flywheel at least one full turn.
   c) Remove the flywheel and check to see if the trigging magnet struck the sensor face. If it did, back the sensor out approximately 0.005".
   d) If the ignition has spark, finger tight the nut on the outside of the heat shield and coat it with RTV.
   e) If still no spark, replace the timer base.
7. Check the DVA voltage on the Black/White wire to engine ground. You should have a reading of at least 150V or more (while connected to the pack). If the reading is low, disconnect the timer base wires from the pack and recheck the Black/White terminal ON THE PACK. If the voltage jumps up to an acceptable reading, the timer base may have a problem in the internal wiring (A thin spot in the insulation on one wire).
8. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
9. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Disconnect the Yellow wires from the rectifier and retest. If the engine has good spark, replace the rectifier.
2. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Swap the timer base wires and see if the no spark problem follows a timer base wire.

4. Disconnect the timer base from the pack and check the resistance in the pack as follows:

Red meter lead	Black meter lead	Reading
Black/White terminal	Sensor 1	100-200 ohms
Black/White terminal	Sensor 2	100-200 ohms
Black/White terminal	Sensor 3	100-200 ohms

   All readings should be fairly even. If the sensor reading in the pack for the cylinder not firing shows over a 10% different reading compared to the other sensors, the pack needs replacing.
5. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.
6. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
7. Swap the ignition coil with one that is sparking correctly.
8. Rare causes include a weak trigger magnet. If possible, try another flywheel.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Four Cylinder Engines

1973-1977 85-140 HP Models (With Screw Terminal Power Packs)

NO SPARK ON ANY CYLINDER:

(Note) If the engine has spark with the spark plugs out but not with them installed, the timer base is either weak or the engine is not spinning fast enough. See steps #3 and #7 below.

1. Disconnect the Black/Yellow stop wire AT THE POWER PACK and retest. If the engines' ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the engine has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow	400-600	400-600	150-400 V	150-400 V (*)
Black/White (#1)	White/Black (#3)	10-20	30-40	0.6 V +	0.6 V + (#)
Black/White (#2)	White/Black (#4)	10-20	30-40	0.6 V +	0.6 V + (#)
Black/White (all)	Engine GND	Open	Open	150-400 V (a)	N/A
White/Black (all)	Engine GND	Open	Open	150-400 V (a)	N/A

   (*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

   (#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

(a) The trigger signal rides on top of the high voltage on these timer bases. Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty.

6. If the timer base output is low, you may try to reset the air gap between the timer base sensor and the triggering magnet using a Sensor Gap Gauge (553-9702) or use the following procedure:
   a) Loosen the two mounting screws on the sensors and the nuts located in the epoxy on the outside of the heat shield of the timer base.
   b) Slide the sensors in toward the crankshaft until the sensor touches the stop boss located at the base of the sensor mounting area. Tighten the mounting screws.
   c) Coat the face of the sensors with machinists bluing or equivalent.
   d) Install the flywheel without the key and rotate the flywheel at least one full turn.
   e) Remove the flywheel and check to see if the trigging magnet struck the face of the sensors. If it did, back the sensor out approximately 0.005" and repeat steps c, d and e.
   f) If the ignition sparked, finger tight the nuts on the outside of the heat shield and coat them with RTV.
   g) If still no spark, replace the sensor.
7. Check the DVA voltage on each Black/White wire to engine ground. You should have a reading of at least 150V or more (while connected to the pack). If the reading is low, disconnect the timer base wires from the pack and recheck the Black/White terminals ON THE PACK. If the voltage jumps up to an acceptable reading, the timer base may have a problem in the internal wiring (possibly a thin spot in the insulation on one wire).
8. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
9. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE BANK:

1. Swap the timer base wire sets (swap the #1 & #3 pair with the #2 & #4 pair) and see if the no spark problem follows a timer base wire.
2. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above). If the DVA output is low, you may try to reset the air gap between the timer base sensor and the triggering magnet using a sensor gap gauge or use the procedure outlined in Step #6 (see NO SPARK ON ANY CYLINDER above).
3. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and connect a load resistor to that terminal. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Disconnect the Yellow wires from the rectifier and retest. If the engine has good spark, replace the rectifier.
2. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Swap the timer base wire sets (swap the #1 & #3 pair with the #2 & #4 pair) and see if the no spark problem follows a timer base wire.
4. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.
5. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
6. Swap the ignition coil with one that is sparking correctly.
7. Rare causes include a weak trigger magnet. If possible, try another flywheel.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.

5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Six Cylinder Engines

1976-1978 150-235 HP Models (With Screw Terminal Power Packs)

NO SPARK ON ANY CYLINDER:

(Note) If the engine has spark with the spark plugs out but not with them installed, the timer base is likely weak or the engine is not spinning fast enough. See steps #3 and #6 below.

1. Disconnect the Black/Yellow stop wires AT THE POWER PACKS and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the engine has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow (b)	400-600	400-600	150-400 V	150-400 V (*)
White	Blue (c)	10-20	30-40	0.6 V +	0.6 V + (#)
White	Purple (c)	10-20	30-40	0.6 V +	0.6 V + (#)
White	Green (c)	10-20	30-40	0.6 V +	0.6 V + (#)
White	Engine GND	Open	Open	150-400 V (a)	N/A
Blue	Engine GND	Open	Open	150-400 V (a)	N/A
Purple	Engine GND	Open	Open	150-400 V (a)	N/A
Green	Engine GND	Open	Open	150-400 V (a)	N/A

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

(a) The trigger signal rides on top of the high voltage on these timer bases. Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty.

(b) Check both pairs of stator charge coils.

(c) Check both sides of the timer base.

6. Check the DVA voltage on the White wire to engine ground. You should have a reading of at least 150V or more (while connected to the pack). If the reading is low, disconnect the timer base wires from the pack and recheck the White terminal ON THE PACK. If the voltage jumps up to an acceptable reading, the timer base may have a problem in the internal wiring (possibly a thin spot in the insulation on one wire).
7. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
8. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE BANK:

1. Disconnect the stop wires from both power packs and retest. If the spark comes back, swap the power packs from side to side and reconnect the stop circuit. If the no spark problem remains on the same bank, the stop circuit is bad. Check the key switch, harness and shift switch. If the problem moves, replace the power pack that was firing correctly due to a bad blocking diode in the pack.
2. Swap the stator wire pairs from one side of the engine to the other side and see if the problem moves. If it does, the stator is bad.
3. Check the stator and timer base resistance and DVA output on BOTH banks (see NO SPARK ON ANY CYLINDER above).

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Disconnect the Yellow wires from the rectifier and retest. If the engine has good spark, replace the rectifier.
2. Check the timer base resistance and DVA output on BOTH banks (see NO SPARK ON ANY CYLINDER above).
3. Check the DVA output from the timer base. A reading of at least 0.6V or more from the White wire to the Blue, Green and Purple wires (while connected to the pack) is needed to spark the pack.
4. Disconnect the timer base from the pack and check the resistance in the pack as follows:

Red meter lead	Black meter lead	Reading
Black/White terminal	Sensor 1	100-200 ohms
Black/White terminal	Sensor 2	100-200 ohms
Black/White terminal	Sensor 3	100-200 ohms

All readings should be fairly even. If the sensor reading in the pack for the cylinder not firing shows over a 10% different reading compared to the other sensors, the pack needs replacing.

5. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a

reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.

6. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
7. Swap the ignition coil with one that is sparking correctly.
8. Rare causes include a weak trigger magnet. If possible, try another flywheel.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Johnson/Evinrude

Alternator Driven CD Ignitions 1977-2006

Two Stroke/Except Direct Injected Engines

Two Cylinder Engines

1977-2006 4-60 HP Models

Service Note: Please use the Factory recommended spark plug (currently Champion QL77JC4) gapped at 0.030".

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire AT THE POWER PACK and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the engine has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow	450-550	150-400 V	150-400 V (*)
Brown	Engine GND	Open	150-400 V	< 2 V (c)
Brown/Yellow	Engine GND	Open	150-400 V	< 2 V (c)
Orange	Orange/Black	450-550 (CDI 45-55)	11-22 V	45-120 V (*)
Black/White	White/Black	15-50	0.6 V +	0.6 V + (#)
Black/White	Engine GND	Open	150-400 V (b)	< 2 V (c)
White/Black	Engine GND	Open	150-400 V (b)	< 2 V (c)
Some engines use the following wiring on the timer base:				
White	Blue	25-30	100-400 V (a)	0.6 V + (#)
White	Green	25-30	100-400 V (a)	0.6 V + (#)
White	Engine GND	Open	N/A	N/A
Blue	Engine GND	Open	100-400 V (a)	N/A
Green	Engine GND	Open	100-400 V (a)	N/A

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

(a) Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty. If below 0.6 V or 2.6 - 99 V, the timer base is faulty.

(b) The trigger signal rides on top of the high voltage on these timer bases. Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty.

(c) Some meters will pickup static/stray electricity up to 2 volts.

6. **1988 and newer models:** Check the power pack resistance given below:

WIRE	(CYL)	READ TO	RESISTANCE
Orange/Blue	(#1)	Blue	110 (a)
Orange/Green	(#2)	Green	110 (a)
White		Black (Engine Ground)	Shorted
Brown & Brown/Yellow		Black (Engine Ground)	Open or M range

(a) Use a comparison reading as different brands of meters will give different readings. The typical range is 90 to 150 ohms for the Orange wires. You should have approximately the same ohm reading on all six tests with the Orange wires. If one of the SCR's inside the power pack is shorted or open, the readings will be quite a bit different.

7. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the readings are low, disconnect the Orange wires from the ignition coils and reconnect them to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.
8. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
9. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK ON ONE CYLINDER:

1. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
2. Swap the timer base wires and see if the problem follows a timer base wire.
3. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more while connected. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.
4. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
5. Swap the ignition coil with one that is sparking correctly.
6. Rare causes include a weak trigger magnet. If possible, try another flywheel.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

WILL NOT ACCELERATE BEYOND 3000 RPM (Runs smooth below that RPM):

1. Disconnect the Yellow wires from the rectifier and retest. If the engine has good spark, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more, increasing with engine RPM until it reaches 300-400 volts. A sharp drop in voltage right before the miss becomes apparent will normally be caused by a bad stator. A drop on only one Orange wire will normally be the power pack.
3. Check the stator resistance. If it reads approximately 900 ohms, replace it with the 500 ohm design.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Models with S.L.O.W.

ENGINE WILL NOT ACCELERATE BEYOND 2500 RPM:

1. Use a temperature probe and verify that the engine is not overheating.
2. Disconnect the Tan temperature wire from the pack and retest. If the engine now performs properly, check the temperature switch, harness and vacuum sensor.
3. Make sure the Tan temperature switch wire is not located next to a spark plug wire (RF interference can activate the SLOW function).
4. Check the stator resistance. If it reads approximately 900 ohms, replace it with the 500 ohm design.

Three Cylinder Engines (Without Quick-Start)

1979-2001 60-75 HP Models

Service Note: Please use the Factory recommended spark plug (currently Champion QL77JC4) gapped at 0.030".

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire AT THE POWER PACK and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the ignition now has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow	450-550	150-400 V	150-400 V (*)
Orange	Orange/Black	450-550 (CDI 45-55)	11-22 V	45-120 V (*)
White	Purple	38-42	0.6 V + {1988 & newer 100-400 V (a)}	0.6 V + (#)
White	Blue	38-42	0.6 V + {1988 & newer 100-400 V (a)}	0.6 V + (#)
White	Green	38-42	0.6 V + {1988 & newer 100-400 V (a)}	0.6 V + (#)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

(a) Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty. If below 0.6 V or 2.6 - 99 V, the timer base is faulty.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
2. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a pack load resistor and retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack if the timer base checks good.
3. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
4. Swap the ignition coil with one that is sparking correctly.
5. Rare causes include a weak trigger magnet. If possible, try another flywheel.
6. **1988 and newer models:** Check the power pack resistance given below:

WIRE	(CYL)	READ TO	Resistance
Orange/Blue	(#1)	Blue	110 (a) (1988 & newer only)
Orange	(#2)	Green	110 (a) (1988 & newer only)
Orange/Green	(#3)	Purple	110 (a) (1988 & newer only)
White		Black (Engine Ground)	Shorted
Brown & Brown/Yellow		Black (Engine Ground)	Open or M range

(a) Use a comparison reading as different brands of meters will give different readings. The typical range is 90 to 150 ohms for the Orange wires. You should have approximately the same ohm reading on all six tests with the Orange wires. If one of the SCR's inside the power pack is shorted or open, the readings will be quite a bit different.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Models with S.L.O.W.

ENGINE WILL NOT ACCELERATE BEYOND 2500 RPM (Runs smooth below that RPM):

1. Clean all engine and power pack ground connections.
2. Use a temperature probe and verify that the engine is not overheating.
3. Disconnect the Tan temperature wire from the pack and retest. If the engine now performs properly, the temperature switch is likely bad. Reconnect the Tan wire to the pack if it goes into the harness and disconnect the Tan wire from the temperature switch in the cylinder head. If the engine now performs normally, the temperature switch is defective. If it does not perform correctly, there is likely a problem in the engine harness, VRO (if equipped) or the boat harness.
4. Make sure the Tan temperature switch wire is not located next to a spark plug wire (RF interference can activate the SLOW function).

Three Cylinder Engines
(1993-2001 40-70 HP Quick-Start Models)

Service Note: Please use the Factory recommended spark plug (currently Champion QL77JC4) gapped at 0.030".

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire AT THE POWER PACK and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the ignition now has spark, replace the rectifier.

3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow	450-550	150-400 V	150-400 V (*)
Orange	Orange/Black	450-550 (CDI 45-55)	11-22 V	45-120 V (*)
White	Purple	(c)	100-400 V (a)	0.6 V + (#)
White	Blue	(c)	100-400 V (a)	0.6 V + (#)
White	Green	(c)	100-400 V (a)	0.6 V + (#)
White	Black/White	400-500	6-12 V (b)	6-12 V (from pack)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

(a) Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty. If below 0.6 V or 2.6 - 99 V, the timer base is faulty.

(b) DVA will drop below 1 V when the engine drops out of Quick-Start (engine is over 104 Degrees or 1200 RPM).

(c) This reading will vary according to the meter used. Do a comparison reading and if there is a difference of over 10%, replace the timer base. Typically, use the Red meter lead to the White wire and the Black meter lead to the other wires. The Fluke series meters will typically read 1 MΩ to 2.4 MΩ while the CDI 511-60 meter will read about 5 MΩ.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the stator and timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
2. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack if the timer base checks good.
3. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
4. Swap the ignition coil with one that is sparking correctly.
5. Rare causes include a weak trigger magnet. If possible, try another flywheel.
6. Check the power pack resistance given below:

WIRE	(CYL)	READ TO	Resistance
Orange/Blue	(#1)	Blue	110 (a)
Orange	(#2)	Purple	110 (a)
Orange/Green	(#3)	Green	110 (a)
White		Black (Engine Ground)	Shorted
Brown & Brown/Yellow		Black (Engine Ground)	Open or M range

(a) Use a comparison reading as different brands of meters will give different readings. The typical range is 90 to 150 ohms for the Orange wires. You should have approximately the same ohm reading on all six tests with the Orange wires. If one of the SCR's inside the power pack is shorted or open, the readings will be quite a bit different.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.

5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

ENGINE WILL NOT ACCELERATE BEYOND 2500 RPM (Runs smooth below that RPM):

1. Use a temperature probe and verify that the engine is not overheating.
2. Disconnect the tan temperature wire from the pack and retest. If the engine now performs properly, the temperature switch is likely bad. Reconnect the Tan wire to the pack if it goes into the harness and disconnect the Tan wire from the temperature switch in the cylinder head. If the engine now performs normally, the temperature switch is defective. If it does not perform correctly, there is likely a problem in the engine harness, VRO (if equipped) or the boat harness.
3. Make sure the Tan temperature switch wire is not located next to a spark plug wire (RF interference can activate the SLOW function).

ENGINE DIES WHEN QUICK-START DROPS OUT:

Check ignition timing at idle with the White/Black temperature wire disconnected. Remember to allow for the drop in ignition timing when Quick-Start disengages. Verify ignition timing after engine has warmed up.

ENGINE STAYS IN QUICK-START:

1. With the engine idling, check the Yellow/Red wire for DC voltage. If there is DC voltage over 2 volts on this wire while the engine is running, the Quick-Start will not disengage. A voltage of 5 to 7 volts will not engage the starter solenoid, yet will engage Quick-Start.
2. Short the White/Black temperature switch wire FROM the power pack to engine ground. Start the engine, if the Quick-Start drops out after approximately 5 seconds, replace the White/Black temperature switch.
3. Disconnect the Black/White wire from the power pack. If the Quick-Start feature is not now working, replace the power pack.

ENGINE WILL NOT ENGAGE QUICK-START:

1. Disconnect the White/Black wire from the temperature sensor.
2. With the engine idling, check the Black/White timer base wire for DC voltage. There should be about 6 to 10 volts DC voltage on this wire while the engine is running for the Quick-Start to engage.
3. Short the White/Black temperature switch wire FROM the power pack to engine ground. If the voltage on the Black/White wire drops out after approximately 5 seconds but the engine timing does not change, replace the timer base. If the voltage remains present, disconnect the Yellow/Red wire to the pack and repeat the test. If the voltage still remains, replace the pack.

ENGINE TIMING TOO HIGH:

1. Check the flywheel center hub magnet to make sure it's tight. Look for signs of cracks and bulges in the Brown ferret magnet material.
2. Short the White/Black temp wire to engine ground and see if the timing drops back to normal.
3. Check the DC voltage on the Black/White wire going to the timer base. With the White/Black temp wire disconnected, the voltage should be 6 to 10 volts. When the White/Black temp wire is shorted to engine ground, the voltage should drop out. If the voltage on the Black/White wire stays in the 6-10 volt range, disconnect the Yellow/Red wire from the power pack. The voltage should drop out on the Black/White wire. If it does, the harness or starter solenoid is likely defective. If the voltage on the Black/White wire stays in the 6-10 volt range with the Yellow/Red wire disconnected and the White/Black wire shorted to engine ground, the power pack is defective.

Four Cylinder Engines (Without Quick-Start)

1978-1987 85-140 HP Dual Power Pack Engines

Service Note: Please use the Factory recommended spark plug (currently Champion QL77JC4) gapped at 0.030".

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire(s) AT THE POWER PACK(S) and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the engine has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below for BOTH banks:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow	450-550	150-400 V	150-400 V (*)
White	Blue	11-45	0.6 V +	0.6 V + (#)
White	Green	11-45	0.6 V +	0.6 V + (#)
White/Black	Blue/White	11-45	0.6 V +	0.6 V + (#)
White/Black	Green/White	11-45	0.6 V +	0.6 V + (#)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER OR ONE BANK:

1. Disconnect the stop wires from both power packs and retest. If spark returns, swap the power packs and reconnect the stop circuit. If the no spark problem remains on the same bank, the stop circuit has a fault. If the problem moves, replace the power pack that was firing correctly due to a bad blocking diode in the pack.
2. Swap the stator wire pairs from one side of the engine to the other side and see if the problem moves. If it does, the stator is bad.
3. Check the stator and timer base resistance and DVA output on BOTH banks (see NO SPARK ON ANY CYLINDER above).
4. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.
5. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
6. Swap the ignition coil with one that is sparking correctly.
7. Rare causes include a weak trigger magnet. If possible, try another flywheel.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

ENGINE MISSES OR HAS ERRATIC TIMING:

1. Disconnect the Black/Yellow stop wire(s) AT THE POWER PACK(S) and retest. If the engine runs normally, the stop circuit could have a fault. Check the key switch, harness and shift switch. If all check good, replace the power pack. (For engines with dual power packs, replace BOTH power packs at the same time).
2. Check the stator and timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).

Four Cylinder Engines (Without Quick-Start)

1985-1998 65-140 HP Single Power Pack Engines

Service Note: Please use the Factory recommended spark plug (currently Champion QL77JC4) gapped at 0.030".

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire(s) AT THE POWER PACK(S) and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the engine has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.

5. Check the stator and timer base resistance and DVA output as given below for BOTH banks:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow	450-550	150-400 V	150-400 V (*)
White	Purple	11-45	0.6 V + {1988 & newer 100-400 V (a)}	0.6 V + (#)
White	Blue	11-45	0.6 V + {1988 & newer 100-400 V (a)}	0.6 V + (#)
White	Green	11-45	0.6 V + {1988 & newer 100-400 V (a)}	0.6 V + (#)
White	Pink	11-45	0.6 V + {1988 & newer 100-400 V (a)}	0.6 V + (#)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

(a) Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty. If below 0.6 V or 2.6 - 99 V, the timer base is faulty.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER OR ONE BANK:

1. Swap the stator's Brown for Brown/Yellow and see if the problem moves. If it does, the stator is bad.
2. Check the stator and timer base resistance and DVA output on BOTH banks (see NO SPARK ON ANY CYLINDER above).
3. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.
4. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
5. Swap the ignition coil with one that is sparking correctly.
6. Rare causes include a weak trigger magnet. If possible, try another flywheel.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

ENGINE MISSES OR HAS ERRATIC TIMING:

1. Disconnect the Black/Yellow stop wire(s) AT THE POWER PACK(S) and retest. If the engine runs normally, the stop circuit could have a fault. Check the key switch, harness and shift switch. If all check good, replace the power pack. (For engines with dual power packs, replace BOTH power packs at the same time).
2. Check the stator and timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).

Four Cylinder Engines

(1988-2001 120-140 HP Quick-Start Models)

Service Note: Please use the Factory recommended spark plug (currently Champion QL77JC4) gapped at 0.030".

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire AT THE POWER PACK and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.

2. Disconnect the Yellow wires from the rectifier and retest. If the engine has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow	450-550 (9 Amp)	150-400 V	150-400 V (*)
Brown	Brown/Yellow	950-1100 (35 Amp)	150-400 V	150-400 V (*)
Orange	Orange/Black	93-100 (CDI 45-55)	11-22 V	45-120 V (*)
White	Purple	35-55	0.6 V +	0.6 V + (#)
White	Blue	35-55	0.6 V +	0.6 V + (#)
White	Green	35-55	0.6 V +	0.6 V + (#)
White	Pink	35-55	0.6 V +	0.6 V + (#)
White	Purple/White	120-130	1.5 V +	1.5 V + (#)
White	Blue/White	120-130	1.5 V +	1.5 V + (#)
White	Green/White	120-130	1.5 V +	1.5 V + (#)
White	Pink/White	120-130	1.5 V +	1.5 V + (#)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Disconnect the stop wire and retest (remember you will have to choke the engine to stop it). If the engine runs normally, the stop circuit has a fault.
2. Disconnect the White/Black temperature switch sensor and retest. If all cylinders now have spark, replace the timer base.
3. Check the stator and timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
4. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.
5. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
6. Swap the ignition coil with one that is sparking correctly.
7. Rare causes include a weak trigger magnet. If possible, try another flywheel.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

ENGINE WILL NOT ACCELERATE BEYOND 2500 RPM:

1. Use a temperature probe and verify that the engine is not overheating.

2. Disconnect the tan temperature wire from the pack and retest. If the engine now performs properly, the temperature switch is likely bad. Reconnect the Tan wire to the pack if it goes into the harness and disconnect the Tan wire from the temperature switch in the cylinder head. If the engine now performs normally, the temperature switch is defective. If it does not perform correctly, there is likely a problem in the engine harness, VRO (if equipped) or the boat harness.
3. Make sure the tan temperature switch wire is not located next to a spark plug wire.

ENGINE DIES WHEN QUICK-START DROPS OUT:

Check ignition timing at idle with the White/Black temperature wire disconnected. Remember to allow for the drop in ignition timing (approximately 10-15 degrees) when Quick-Start disengages. Verify ignition timing after engine has warmed up, according to the service manual.

ENGINE STAYS IN QUICK-START:

1. With the engine idling, check the Yellow/Red wire for DC voltage. If there is DC voltage over 2 volts on this wire while the engine is running, the Quick-Start will not disengage. A voltage of 5 to 7 volts will not engage the starter solenoid, yet will engage Quick-Start.
2. Short the White/Black temperature switch wire FROM the power pack to engine ground. Start the engine, if the Quick-Start drops out after approximately 5 seconds, replace the White/Black temperature switch.
3. Disconnect the Black/White wire from the power pack. If the Quick-Start feature is not now working, replace the power pack.

ENGINE WILL NOT ENGAGE QUICK-START:

1. Disconnect the White/Black wire from the temperature sensor.
2. With the engine idling, check the Black/White timer base wire for DC voltage. There should be about 6 to 10 volts DC voltage on this wire while the engine is running for the Quick-Start to engage.
3. Short the White/Black temperature switch wire FROM the power pack to engine ground. If the voltage on the Black/White wire drops out after approximately 5 seconds but the engine timing does not change, replace the timer base. If the voltage remains present, disconnect the Yellow/Red wire to the pack and repeat the test. If the voltage still remains, replace the pack.

Six Cylinder Engines (Without Quick-Start)

1979-1988 150-235 HP Dual Power Pack Engines

Service Note: Please use the Factory recommended spark plug (currently Champion QL77JC4) gapped at 0.030".

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wires AT THE POWER PACKS and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the engine now has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below for BOTH banks:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow	450-550 (9 Amp)	150-400 V	150-400 V (*)
Brown	Brown/Yellow	950-1100 (35 Amp)	150-400 V	150-400 V (*)
White	Purple	15-50 (a)	0.6 V +	0.6 V + (#)
White	Blue	15-50 (a)	0.6 V +	0.6 V + (#)
White	Green	15-50 (a)	0.6 V +	0.6 V + (#)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

(a) Use a comparison reading as the values for different years used different coils in the timer base. As long as you have approximately the same ohm reading on all three tests and the correct output with the DVA meter for both sides, the timer base should be good. The exception would be if the insulation is breaking down while the engine is running.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE BANK:

1. Swap the stator wire pairs from one side of the engine to the other side and see if the problem moves. If it does, the stator is bad.
2. Disconnect the stop wires from both power packs and retest. If the spark returns, swap the power packs and reconnect the stop circuit. If the no spark problem remains on the same bank, the stop circuit has a fault. If the problem moves, replace the power pack that was firing correctly due to a bad blocking diode in the pack.
3. Check the stator and timer base resistance and DVA output for BOTH banks (see NO SPARK ON ANY CYLINDER above).

4. Check the DVA voltage to engine ground on the White timer base wire while connected to the pack. You should see approximately the same reading as you do between the Brown & Brown/Yellow wires for that bank. A low reading usually indicates a bad timer base.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.
2. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack or timer base.
3. Check the timer base resistance and DVA output for BOTH banks (see NO SPARK ON ANY CYLINDER above).
4. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
5. Swap the ignition coil with one that is sparking correctly.
6. Rare causes include a weak trigger magnet. If possible, try another flywheel.
7. Swap banks with the power packs and see if the problem moves. If it does, replace the power pack. If not, replace the timer base.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

ENGINE MISSES OR HAS ERRATIC TIMING:

1. Disconnect the Black/Yellow stop wires AT THE POWER PACKS and retest. If the engine runs normally, the stop circuit could have a fault. Check the key switch, harness and shift switch. If all check good, replace BOTH power packs at the same time.
2. Check the stator and timer base resistance and DVA output for BOTH banks (see NO SPARK ON ANY CYLINDER above).

Six Cylinder Engines (Without Quick-Start)

1989-1991 150 HP Single Power Pack Engines (With 583816/584044 Power Pack)

Service Note: Please use the Factory recommended spark plug (currently Champion QL77JC4) gapped at 0.030".

NO SPARK ON ANY CYLINDER:

1. Disconnect BOTH of the Black/Yellow stop wires AT THE POWER PACK and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the engine now has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below for BOTH banks:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow (1st Pair) (c)	450-550 (9 Amp)	150-400 V	150-400 V (*)
Brown/White	Brown/Black (2nd Pair) (c)	450-550 (9 Amp)	150-400 V	150-400 V (*)
Black	Purple	15-50 (b)	100-400 V (a)	0.6 V + (#)
Black	Blue	15-50 (b)	100-400 V (a)	0.6 V + (#)
Black	Green	15-50 (b)	100-400 V (a)	0.6 V + (#)
Black	Purple/White	15-50 (b)	100-400 V (a)	0.6 V + (#)
Black	Blue/White	15-50 (b)	100-400 V (a)	0.6 V + (#)
Black	Green/White	15-50 (b)	100-400 V (a)	0.6 V + (#)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

(a) Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty. If below 0.6 V or 2.6 - 99 V, the timer base is faulty.

(b) Use a comparison reading as the values for different years used different coils in the timer base. As long as you have approximately the same ohm reading on all three tests and the correct output with the DVA meter for both sides, the timer base should be good. The exception would be if the insulation is breaking down while the engine is running.

(c) Wires must be paired correctly. If the wires are crossed between pairs, the resulting feedback will destroy the power pack.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE BANK:

1. Disconnect BOTH of the Black/Yellow stop wires AT THE POWER PACK and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Swap the stator wire pairs from one side of the engine to the other side and see if the problem moves. If it does, the stator is bad.
3. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.
4. Check the stator resistance and DVA output for BOTH banks (see NO SPARK ON ANY CYLINDER above).
5. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one bank, disconnect the Orange wires from the ignition coil for that bank and reconnect them to a load resistor. Retest. If the reading is now good, one or all of the ignition coils are likely bad. A continued low reading indicates a bad power pack.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.
2. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack or timer base.
3. Check the stator and timer base resistance and DVA output for BOTH banks (see NO SPARK ON ANY CYLINDER above).
4. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
5. Swap the ignition coil with one that is sparking correctly.
6. Rare causes include a weak trigger magnet. If possible, try another flywheel.
7. Identify the timer base wire responsible for the problem cylinder {remember that the color codes are Blue (sky) is up and Green (grass) is down} and swap it with one that is operating correctly. In order to run the engine, you will have to also swap the corresponding spark plug wire.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wires at the power pack. Connect a jumper wire to the stop wires from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Six Cylinder Engines

(1989-1992 150-175 HP GT Cross-Flow Quick-Start Models)

Service Note: Please use the Factory recommended spark plug (currently Champion QL77JC4) gapped at 0.030".

(Note) These engines usually have a 35 Amp battery charging capacity. Due to the size and weight of the flywheel magnets, it is highly recommended that you check to make sure both the triggering and charge magnets are still secure in the flywheel before you service the engine. A loose or broken magnet can be deadly to you or your pocketbook. It is a recommended you index the flywheel and check the timing on all cylinders when servicing these engines. Also check for static firing and intermittent spark.

NO SPARK ON ANY CYLINDER:

1. Disconnect BOTH of the Black/Yellow stop wires AT THE POWER PACK and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below for BOTH banks:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow (1st Pair) (d)	900-1100 (35 amp)	150-400 V	150-400 V (*)
Brown/White	Brown/Black (2nd Pair) (d)	900-1100 (35 amp)	150-400 V	150-400 V (*)
Orange	Orange/Black	93-103	11-22 V	45-120 V (*)
White	Purple	(c)	100-400 V (a)	0.6 V + (#)
White	Blue	(c)	100-400 V (a)	0.6 V + (#)
White	Green	(c)	100-400 V (a)	0.6 V + (#)
White	Purple (2nd connector)	(c)	100-400 V (a)	0.6 V + (#)
White	Blue (2nd connector)	(c)	100-400 V (a)	0.6 V + (#)
White	Green (2nd connector)	(c)	100-400 V (a)	0.6 V + (#)
White	Black/White (2nd connector)	215-225	6-12 V (b)	6-12 V (from pack)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

(a) Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty. If below 0.6 V or 2.6 - 99 V, the timer base is faulty.

(b) DVA will drop below 1 V when the engine drops out of Quick-Start (engine is over 104 Degrees or 1200 RPM).

(c) Use a comparison reading as different brands of meters will give different readings. The typical range is 1M to 5M ohms. As long as you have approximately the same ohm reading on all six tests and the correct output with the DVA meter, the timer base should be good. Remember that temperature will affect the readings. The exception would be if one of the SCR's inside the timer base is breaking down while the engine is running. This can be found indexing the flywheel and checking the timing on all cylinders. If the readings are off, reverse the meter leads and retest to see if the readings are corrected.

(d) Wires must be paired correctly. If the wires are crossed between pairs, the resulting feedback will destroy the power pack.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE BANK:

1. Disconnect BOTH of the Black/Yellow stop wires AT THE POWER PACK and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Swap the stator wire pairs from one side of the engine to the other side and see if the problem moves. If it does, the stator is bad.
3. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
4. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually

caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.

5. Check the stator resistance and DVA output for BOTH banks (see NO SPARK ON ANY CYLINDER above).
6. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one bank, disconnect the Orange wires from the ignition coil for that bank and reconnect them to a load resistor. Retest. If the reading is now good, one or all of the ignition coils are likely bad. A continued low reading indicates a bad power pack.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.
2. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad.
3. Check the timer base resistance and DVA output for BOTH banks (see NO SPARK ON ANY CYLINDER above).
4. Check the power pack resistance given below:

Wire Color	(CYL)	Check to Wire Color	Resistance
Orange/Blue	(#1)	Blue (in male 4 pin connector with White wire)	110 (a)
Orange	(#3)	Purple (in male 4 pin connector with White wire)	110 (a)
Orange/Green	(#5)	Green (in male 4 pin connector with White wire)	110 (a)
Orange/Blue	(#2)	Blue (in female 4 pin connector with Black/White wire)	110 (a)
Orange	(#4)	Purple (in female 4 pin connector with Black/White wire)	110 (a)
Orange/Green	(#6)	Green (in female 4 pin connector with Black/White wire)	110 (a)
White		Black (Engine Ground)	Shorted
Brown, Brown/Yellow		Black (Engine Ground)	Open or M range
Brown/White, Brown/Black		Black (Engine Ground)	Open or M range
Orange, Orange/Black		Black (Engine Ground)	Open or M range

(a) Use a comparison reading as different brands of meters will give different readings. The typical range is 90 to 150 ohms. You should have approximately the same ohm reading on all six tests. If one of the SCR's inside the power pack is shorted or open, the readings will be quite a bit different.

5. Check the spark plug wires for breaks and abrasions.
6. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
7. Swap the ignition coil with one that is sparking correctly.
8. Rare causes include a weak trigger magnet. If possible, try another flywheel.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wires at the power pack. Connect a jumper wire to the stop wires from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

ENGINE WILL NOT ACCELERATE BEYOND 2500 RPM (Runs smooth below that RPM):

1. Use a temperature probe and verify that the engine is not overheating.
2. Disconnect the tan temperature wire from the pack and retest. If the engine now performs properly, the temperature switch is likely bad. Reconnect the Tan wire to the pack if it goes into the harness and disconnect the Tan wire from the temperature switch in the cylinder head. If the engine now performs normally, the temperature switch is defective. If it does not perform correctly, there is likely a problem in the engine harness, VRO (if equipped) or the boat harness.

3. Make sure the tan temperature switch wire is not located next to a spark plug wire.
4. Disconnect the VRO sensor from the engine harness and retest. If the engine performs correctly, replace the VRO or sensor.

ENGINE DIES WHEN QUICK-START DROPS OUT:

Check ignition timing at idle with the White/Black temperature wire disconnected. Remember to allow for the drop in ignition timing when Quick-Start disengages. Verify ignition timing after engine has warmed up, according to the service manual.

ENGINE STAYS IN QUICK-START:

1. With the engine idling, check the Yellow/Red wire for DC voltage. If there is DC voltage over 2 volts on this wire while the engine is running, the Quick-Start will not disengage. A voltage of 5 to 7 volts will not engage the starter solenoid, yet will engage Quick-Start.
2. Short the White/Black temperature switch wire FROM the power pack to engine ground. Start the engine, if the Quick-Start drops out after approximately 5 seconds, replace the White/Black temperature switch.
3. Disconnect the Black/White wire from the power pack. If the Quick-Start feature is not now working, replace the power pack.

ENGINE WILL NOT ENGAGE QUICK-START:

1. Disconnect the White/Black wire from the temperature sensor.
2. With the engine idling, check the Black/White timer base wire for DC voltage. There should be about 6 to 10 volts DC voltage on this wire while the engine is running for the Quick-Start to engage.
3. Short the White/Black temperature switch wire FROM the power pack to engine ground. If the voltage on the Black/White wire drops out after approximately 5 seconds but the engine timing does not change, replace the timer base. If the voltage remains present, disconnect the Yellow/Red wire to the pack and repeat the test. If the voltage still remains, replace the pack.

ENGINE TIMING TOO HIGH:

1. Check the flywheel center hub magnet to make sure it's tight. Look for signs of cracks and bulges in the Brown ferret magnet material.
2. Short the White/Black temp wire to engine ground and see if the timing drops back to normal.
3. Check the DC voltage on the Black/White wire going to the timer base. With the White/Black temp wire disconnected, the voltage should be 6 to 10 volts. When the White/Black temp wire is shorted to engine ground, the voltage should drop out. If the voltage on the Black/White wire stays in the 6-10 volt range, disconnect the Yellow/Red wire from the power pack. The voltage should drop out on the Black/White wire. If it does, the harness or starter solenoid is likely defective. If the voltage on the Black/White wire stays in the 6-10 volt range with the Yellow/Red wire disconnected and the White/Black wire shorted to engine ground, the power pack is defective.

Six Cylinder Engines
(1988-2001 185-250 HP Quick-Start Models)

Service Note: Please use the Factory recommended spark plug (currently Champion QL77JC4) gapped at 0.030".

(Note) These engines usually have a 35 Amp battery charging capacity. Due to the size and weight of the flywheel magnets, it is highly recommended that you check to make sure both the triggering and charge magnets are still secure in the flywheel before you service the engine. A loose or broken magnet can be deadly to you or your pocketbook. It is a recommended you index the flywheel and check the timing on all cylinders when servicing these engines. Also check for static firing and intermittent spark.

NO SPARK ON ANY CYLINDER:

1. Disconnect BOTH of the Black/Yellow stop wires AT THE POWER PACK and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below for BOTH banks:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow	900-1100 (35 amp)	150-400 V	150-400 V (*)
Orange	Orange/Black	93-103	11-22 V	45-120 V (*)
White	Purple	(c)	100-400 V (a)	0.6 V + (#)
White	Blue	(c)	100-400 V (a)	0.6 V + (#)
White	Green	(c)	100-400 V (a)	0.6 V + (#)
White	Purple (2nd connector)	(c)	100-400 V (a)	0.6 V + (#)
White	Blue (2nd connector)	(c)	100-400 V (a)	0.6 V + (#)
White	Green (2nd connector)	(c)	100-400 V (a)	0.6 V + (#)
White	Black/White (2nd connector)	215-225	6-12 V (b)	6-12 V (from pack)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

(a) Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty. If below 0.6 V or 2.6 - 99 V, the timer base is faulty.

(b) DVA will drop below 1 V when the engine drops out of Quick-Start (engine is over 104 Degrees or 1200 RPM).

(c) Use a comparison reading as different brands of meters will give different readings. The typical range is 1M to 5M ohms. As long as you have approximately the same ohm reading on all six tests and the correct output with the DVA meter, the timer base should be good. Remember that temperature will affect the readings. The exception would be if one of the SCR's inside the timer base is breaking down while the engine is running. This can be found indexing the flywheel and checking the timing on all cylinders. If the readings are off, reverse the meter leads and retest to see if the readings are corrected.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE BANK:

1. Disconnect BOTH of the Black/Yellow stop wires AT THE POWER PACK and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Swap the stator wire pairs from one side of the engine to the other side and see if the problem moves. If it does, the stator is bad.
3. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
4. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.
5. Check the stator resistance and DVA output for BOTH banks (see NO SPARK ON ANY CYLINDER above).
6. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one bank, disconnect the Orange wires from the ignition coil for that bank and reconnect them to a load resistor. Retest. If the reading is now good, one or all of the ignition coils are likely bad. A continued low reading indicates a bad power pack.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.
2. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack or timer base.
4. Check the power pack resistance given below:

Wire Color	(CYL)	Check to Wire Color	Resistance
Orange/Blue	(#1)	Blue (in 4 pin connector with Black/White wire)	110 (a)
Orange	(#3)	Purple (in 4 pin connector with Black/White wire)	110 (a)
Orange/Green	(#5)	Green (in 4 pin connector with Black/White wire)	110 (a)
Orange/Blue	(#2)	Blue (in 4 pin connector with White wire)	110 (a)
Orange	(#4)	Purple (in 4 pin connector with White wire)	110 (a)
Orange/Green	(#6)	Green (in 4 pin connector with White wire)	110 (a)
White		Black (Engine Ground)	Shorted
Brown		Black (Engine Ground)	Open or M range
Brown/Yellow		Black (Engine Ground)	Open or M range
Brown/White		Black (Engine Ground)	Open or M range
Brown/Black		Black (Engine Ground)	Open or M range

(a) Use a comparison reading as different brands of meters will give different readings. The typical range is 90 to 150 ohms for the Orange wires. You should have approximately the same ohm reading on all six tests with the Orange wires. If one of the SCR's inside the power pack is shorted or open, the readings will be quite a bit different.

5. Check the spark plug wires for breaks and abrasions.
6. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
7. Swap the ignition coil with one that is sparking correctly.
8. Rare causes include a weak trigger magnet. If possible, try another flywheel.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wires at the power pack. Connect a jumper wire to the stop wires from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.

2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

ENGINE WILL NOT ACCELERATE BEYOND 2500 RPM (Runs smooth below that RPM):

1. Use a temperature probe and verify that the engine is not overheating.
2. Disconnect the tan temperature wire from the pack and retest. If the engine now performs properly, test and replace the defective temperature switch.
3. Make sure the tan temperature switch wire is not located next to a spark plug wire.
4. Disconnect the VRO sensor from the engine harness and retest. If the engine performs correctly, replace the VRO or sensor.

ENGINE DIES WHEN QUICK-START DROPS OUT:

Check ignition timing at idle with the White/Black temperature wire disconnected. Remember to allow for the drop in ignition timing when Quick-Start disengages. Verify ignition timing after engine has warmed up, according to the service manual.

ENGINE STAYS IN QUICK-START:

1. With the engine idling, check the Yellow/Red wire for DC voltage. If there is DC voltage over 2 volts on this wire while the engine is running, the Quick-Start will not disengage. A voltage of 5 to 7 volts will not engage the starter solenoid, yet will engage Quick-Start.
2. Short the White/Black temperature switch wire FROM the power pack to engine ground. Start the engine, if the Quick-Start drops out after approximately 5 seconds, replace the White/Black temperature switch.
3. Disconnect the Black/White wire from the power pack. If the Quick-Start feature is not now working, replace the power pack.

ENGINE WILL NOT ENGAGE QUICK-START:

1. Disconnect the White/Black wire from the temperature sensor.
2. With the engine idling, check the Black/White timer base wire for DC voltage. There should be about 6 to 10 volts DC voltage on this wire while the engine is running for the Quick-Start to engage.
3. Short the White/Black temperature switch wire FROM the power pack to engine ground. If the voltage on the Black/White wire drops out after approximately 5 seconds but the engine timing does not change, replace the timer base. If the voltage remains present, disconnect the Yellow/Red wire to the pack and repeat the test. If the voltage still remains, replace the pack.

ENGINE TIMING TOO HIGH:

1. Check the flywheel center hub magnet to make sure it's tight. Look for signs of cracks and bulges in the Brown ferret magnet material.
2. Short the White/Black temp wire to engine ground and see if the timing drops back to normal.
3. Check the DC voltage on the Black/White wire going to the timer base. With the White/Black temp wire disconnected, the voltage should be 6 to 10 volts. When the White/Black temp wire is shorted to engine ground, the voltage should drop out. If the voltage on the Black/White wire stays in the 6-10 volt range, disconnect the Yellow/Red wire from the power pack. The voltage should drop out on the Black/White wire. If it does, the harness or starter solenoid is likely defective. If the voltage on the Black/White wire stays in the 6-10 volt range with the Yellow/Red wire disconnected and the White/Black wire shorted to engine ground, the power pack is defective.

Eight Cylinder Engines

(1988-1998 250-300 HP Quick-Start Models)

(Note) These engines usually have a 35 Amp battery charging capacity. Due to the size and weight of the flywheel magnets, it is highly recommended that you check to make sure both the triggering and charge magnets are still secure in the flywheel before you service the engine. A loose or broken magnet can be deadly to you or your pocketbook. It is a recommended you index the flywheel and check the timing on all cylinders when servicing these engines. Also check for static firing and intermittent spark.

NO SPARK ON ANY CYLINDER:

1. Disconnect BOTH of the Black/Yellow stop wires AT THE POWER PACK(S) and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below for BOTH banks:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow	900-1100 (35 amp)	150-400 V	150-400 V (*)
Orange	Orange/Black	93-103	11-22 V	45-120 V (*)
White	Purple	(c)	100-400 V (a)	0.6 V + (#)
White	Blue	(c)	100-400 V (a)	0.6 V + (#)
White	Green	(c)	100-400 V (a)	0.6 V + (#)
White	Pink	(c)	100-400 V (a)	0.6 V + (#)
White	Purple (2nd connector)	(c)	100-400 V (a)	0.6 V + (#)
White	Blue (2nd connector)	(c)	100-400 V (a)	0.6 V + (#)
White	Green (2nd connector)	(c)	100-400 V (a)	0.6 V + (#)
White	Pink (2nd connector)	(c)	100-400 V (a)	0.6 V + (#)
White	Black/White (2nd connector)	215-225	6-12 V (b)	6-12 V (from pack)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

(a) Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty. If below 0.6 V or 2.6 - 99 V, the timer base is faulty.

(b) DVA will drop below 1 V when the engine drops out of Quick-Start (engine is over 104 Degrees or 1200 RPM).

(c) Use a comparison reading as different brands of meters will give different readings. The typical range is 1M to 5M ohms. As long as you have approximately the same ohm reading on all six tests and the correct output with the DVA meter, the timer base should be good. Remember that temperature will affect the readings. The exception would be if one of the SCR's inside the timer base is breaking down while the engine is running. This can be found indexing the flywheel and checking the timing on all cylinders. If the readings are off, reverse the meter leads and retest to see if the readings are corrected.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE BANK or CYLINDERS 1-4 or 5-8:

1. Disconnect BOTH of the Black/Yellow stop wires AT THE POWER PACK(S) and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Swap the stator wire pairs from one side of the engine to the other side and see if the problem moves. If it does, the stator is bad.
3. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
4. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.
5. Check the stator and timer base resistance and DVA output on BOTH banks (see NO SPARK ON ANY CYLINDER above).
6. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one bank, disconnect the Orange wires from the ignition coil for that bank and reconnect them to a load resistor. Retest. If the reading is now good, one or all of the ignition coils are likely bad. A continued low reading indicates a bad power pack.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This is usually caused by a weak battery or dragging starter. Connect a battery charger on its highest setting to the battery and retest. If good spark, replace the starter and/or battery with an 850+ CCA cranking/dual purpose non-maintenance-free type.
2. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the Orange wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack or timer base.
4. Check the power pack resistance given below:

Wire Color	(CYL)	Check to Wire Color	Resistance
Orange/Blue	(#1)	Blue (in 5 pin connector with White wire)	110 (a)
Orange/Green	(#3)	Green (in 5 pin connector with White wire)	110 (a)
Orange/Blue/White	(#5)	Blue (in 5 pin connector with Black/White wire)	110 (a)
Orange/Green/White	(#7)	Green (in 5 pin connector with Black/White wire)	110 (a)
Orange/Purple	(#2)	Purple (in 5 pin connector with White wire)	110 (a)
Orange/Pink (or Red)	(#4)	Pink (in 5 pin connector with White wire)	110 (a)
Orange/Purple/White	(#6)	Purple (in 5 pin connector with Black/White wire)	110 (a)
Orange/Pink/White	(#8)	Pink (in 5 pin connector with Black/White wire)	110 (a)
White		Black (Engine Ground)	Shorted
Brown		Black (Engine Ground)	Open or M range
Brown/Yellow		Black (Engine Ground)	Open or M range
Brown/White		Black (Engine Ground)	Open or M range
Brown/Black		Black (Engine Ground)	Open or M range

(a) Use a comparison reading as different brands of meters will give different readings. The typical range is 90 to 150 ohms for the Orange wires. You should have approximately the same ohm reading on all six tests with the Orange wires. If one of the SCR's inside the power pack is shorted or open, the readings will be quite a bit different.

5. Check the spark plug wires for breaks and abrasions.
6. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
7. Swap the ignition coil with one that is sparking correctly.
8. Rare causes include a weak trigger magnet. If possible, try another flywheel.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the timer base wires for shorts to engine ground as a shorted timer base wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a timer base coil. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wires at the power pack. Connect a jumper wire to the stop wires from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack or timer base.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the power pack or ignition coil. Occasionally a timer base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

ENGINE WILL NOT ACCELERATE BEYOND 2500 RPM (Runs smooth below that RPM):

1. Use a temperature probe and verify that the engine is not overheating.
2. Disconnect the tan temperature wire from the pack and retest. If the engine now performs properly, test and replace the defective temperature switch, VRO, engine harness or boat harness.
3. Make sure the tan temperature switch wire is not located next to a spark plug wire.
4. Disconnect the VRO sensor from the engine harness and retest. If the engine performs correctly, replace the VRO or sensor.

ENGINE STAYS IN QUICK-START:

1. With the engine idling, check the Yellow/Red wire for DC voltage. If there is DC voltage on this wire while the engine is running, the Quick-Start will not disengage. A voltage of less than 7 volts will not engage the starter solenoid, yet will engage Quick-Start.
2. Short the White/Black temperature switch wire FROM the power pack to engine ground. Start the engine, if the Quick-Start drops out after approximately 5 seconds, replace the White/Black temperature switch.
3. Disconnect the Black/White wire from the power pack. If the Quick-Start feature is not now working, replace the power pack.

ENGINE DIES WHEN QUICK-START DROPS OUT:

Check ignition timing at idle with the White/Black temperature wire disconnected. Remember to allow for the drop in ignition timing when Quick-Start disengages. Verify ignition timing after engine has warmed up, according to the service manual.

ENGINE WILL NOT ENGAGE QUICK-START:

1. Disconnect the White/Black wire from the temperature sensor.
2. With the engine idling, check the Black/White timer base wire for DC voltage. There should be about 6 to 10 volts DC voltage on this wire while the engine is running for the Quick-Start to engage.
3. Short the White/Black temperature switch wire FROM the power pack to engine ground. If the voltage on the Black/White wire drops out after approximately 5 seconds but the engine timing does not change, replace the timer base. If the voltage remains present, disconnect the Yellow/Red wire to the pack and repeat the test. If the voltage still remains, replace the pack.

ENGINE TIMING TOO HIGH:

1. Check the flywheel center hub magnet to make sure it's tight. Look for signs of cracks and bulges in the Brown ferret magnet material.
2. Short the White/Black temp wire to engine ground and see if the timing drops back to normal.
3. Check the DC voltage on the Black/White wire going to the timer base. With the White/Black temp wire disconnected, the voltage should be 6 to 10 volts. When the White/Black temp wire is shorted to engine ground, the voltage should drop out. If

the voltage on the Black/White wire stays in the 6-10 volt range, disconnect the Yellow/Red wire from the power pack. The voltage should drop out on the Black/White wire. If it does, the harness or starter solenoid is likely defective. If the voltage on the Black/White wire stays in the 6-10 volt range with the Yellow/Red wire disconnected and the White/Black wire shorted to engine ground, the power pack is defective.

Johnson/Evinrude 60° 4 Cylinder Optical Ignition (OIS 2000) Carbureted 1995-2006 Model Years

Due to the differences in this ignition system, troubleshooting can be somewhat difficult if you are not familiar with the design. The other Johnson/Evinrude Quick-Start ignitions use stator charge coils and a power coil to provide high voltage and power for the Quick-Start and rev limiter circuits. They require a sensor for triggering and use separate magnets for the high voltage and triggering the sensor. The OIS 2000 Optical system uses the stator charge coil to provide high voltage for the firing of the ignition coils *and a power coil to provide power for the electronics, both inside the power pack and inside the sensor.* The other Quick-Start models will run the engine without the power coil being connected (of course this will burn out the control circuits inside the power pack). The OIS 2000 ignition has to have the power coil supplying power in order to operate the Quick-Start, S.L.O.W., rev limiter, and spark the coils beyond cranking speed. The optical sensor located on the top is fed power from the power pack and sends crankshaft position, cylinder location and direction of rotation back to the power pack. The pack is smart enough to know not to spark if the engine is not turning in the right direction. S.L.O.W. functions reduce the engine RPM to approximately 2500 when the engine over-heats or the no oil warning is activated. Quick-Start (a 10° timing advance) activates as long as the engine RPM is below 1100, the engine temperature is below 105° F and the Yellow/Red wire from the starter solenoid is not feeding 12V DC to the power pack all of the time. Quick-Start will also activate for 5-10 seconds each time the engine is started regardless of engine temperature. CDI Electronics (Blue case with Red sleeve) power packs have a built-in feature to compensate for a shorted cold sensor, allowing the engine to come out of Quick-Start after 5 minutes of running time regardless of the condition of the cold sensor. The CDI power pack will not spark if the wrong encoder wheel (6 cylinder) is installed by mistake.

At cranking speed the voltage from the stator may not be enough to operate the circuits inside the power pack, therefore there is battery voltage supplied from the starter solenoid via the Yellow/Red striped wire. The extra voltage is needed in order for the optical sensor to operate correctly as low voltage from the battery and/or stator can cause intermittent spark or no spark at all. There are a couple of critical items you should be aware of on these engines. First, the spark plug wires have to be the Gray *inductive* resistor wires – these are NOT automotive wires. Secondly, the spark plugs have to be the factory recommended QL78YC. Use of other spark plugs or wires can cause problems inside the power pack from RFI and MFI noise. CDI Electronics has the spark plug wires available as a set, P/N: 931-4921.

A breakthrough at CDI Electronics has allowed the use of microprocessor digital control circuits to handle the timing, Quick-Start, S.L.O.W. and rev limiter functions inside the power pack. This allows the timing to be set using a timing light, remote starter, spark gap tester, piston stop tool and a jumper wire. With these new digital power packs, you disconnect the port temperature switch/sensor leads and use a jumper wire to short the tan temperature sensor wire to engine ground. Once you have verified the timing pointer using a piston stop tool (Or a dial indicator), connect all spark plug wires to a spark gap tester, connect a remote starter to the engine and a timing light to # 1 spark plug wire. When you crank the engine over with the remote starter and check the timing, you should see the timing is set to approximately 4°-6° ATDC (After Top Dead Center). By advancing the throttle all the way and rechecking the timing for WOT (Wide Open Throttle), you should see approximately 19° - 21° BTDC (Before Top Dead Center) Without this timing feature built into the power pack, you would not be able to easily set the timing for idle or WOT without a optical diagnostic tool. Additional advantages offered by the digital circuitry include the ability to compensate for a bad temperature switch, a smoother rev limit, customized rev limiters and special timing curves.

Additional items to be aware of:

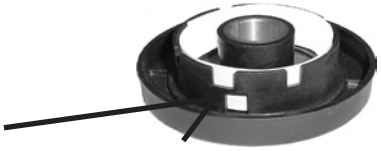
1. Originally the spark plugs were the QL82YC, but that recommendation was changed to the QL78YC for improved performance.
2. Some engines do not have the RFI/MFI noise shield between the ignition coils and the power pack. If it is missing, replace it.

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire AT THE POWER PACK and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Verify the engine is turning in a clockwise direction. If not, see TRIES TO RUN BACKWARDS below.
5. Check the power pack and ignition coil ground wires for corrosion and tightness.
6. Connect a spark gap tester to all cylinders.
7. Disconnect the boat side harness and connect a remote starter unit. Check for spark. If the engine has spark, check the boat side harness's Black/Yellow wire for shorts to ground.
8. Disconnect the Port 4 pin connector (with the Yellow/Red, Black/Yellow, Tan and White/Black wires) from the power pack and see if spark returns. If it does spark, check resistance to see if the Black/Yellow wire is shorted to engine ground.
9. If it loses spark after the key switch is disengaged, check the DVA voltage on the stator's power coil (Orange to Orange/Black) as given below in Step #13. Either the power coil or power pack is the fault.
10. Check the battery voltage on the Yellow/Red wire while cranking the engine. If below 11 VDC, charge the battery and check

all battery cables. A continued low battery reading could be from a dragging starter. If still below 11 VDC, disconnect the power pack's Yellow/Red wire from the starter solenoid and apply a verified 12 + VDC to the Yellow/Red wire. If the engine now runs good, check the DVA voltage on the stator's power coil (Orange to Orange/Black) as given below in Step #13. Either the power coil or power pack is the fault.

11. Remove the sensor wheel and check for damage, especially where the top slots are located. Sometimes the wheels will break out where the windows overlap.



The thin area between the crank position and the cylinder position is the most common breakout location.

12. Check the sensor eyes for dirt, grease, etc. If you have to clean it, use denatured alcohol and a Q-tip. Do not use any other cleaning agent because damage to the optical lens will occur.
13. Check the stator resistance and DVA voltage as given below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow (or Brown/White)	900-1200	150-400 V	150-400 V (*)
Orange	Orange/Black	50-60	11-22 V	45-120 V (*)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.
(NOTE) Low readings on all checks indicate a possible problem with the flywheel magnets that require checking.
(SERVICE NOTE) It is recommended that liquid neoprene be applied to the areas where piercing probes were used.

14. Check the DVA output from the power pack to the primary coil wires as follows:

WIRE	READ TO	DVA (Connected)
Orange/Blue	Engine Ground	150 V +
Orange/Green	Engine Ground	150 V +

(NOTE) If the DVA values are below these specifications, the power pack or sensor is likely bad.

15. Check the sensor DC voltage as follows:

WIRE	READ TO	DC voltage (Connected)
Orange/Red	Engine Ground	10.5-12 VDC
Black/Orange	Engine Ground	8-10 VDC

(WARNING!!) The Black/Orange wire should NEVER be shorted to engine ground as this will damage the sensor.

16. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
17. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

ONLY HAS SPARK AS LONG AS THE KEY SWITCH IS ENGAGED OR WILL NOT REV ABOVE IDLE SPEED:

Check the DVA voltage on the stator's power coil (Orange to Orange/Black) as given above in Step #13:

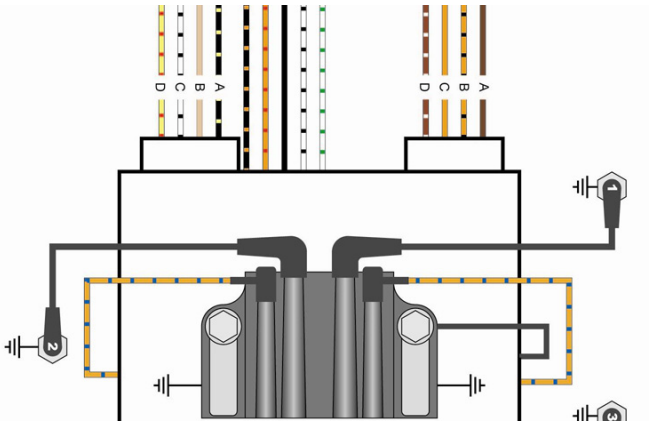
(NOTE) The readings should rapidly increase as the engine RPM increases and stabilize below 22 volts DVA (voltage exceeding 22 V DVA indicates a bad power pack). A sharp drop in voltage right before the miss becomes apparent usually indicates a bad stator winding. A sharp drop in voltage when you disengage the key switch indicates a bad power coil on the stator.

TRIES TO RUN BACKWARDS:

1. Check the encoder wheel. It must have 5 notches.
2. Check the timing. Before Quick-Start, it must be set to 4° BTDC. After Quick-Start, it must be set to 6° ATDC.
3. Try another sensor.
4. Replace the power pack.

NO SPARK OR INTERMITTENT SPARK ON ONE BANK:

1. Disconnect the Black/Yellow stop wire AT THE POWER PACK and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Check the stator resistance and DVA output (see Step #13 on NO SPARK ON ANY CYLINDER above). If the power pack has no spark on one bank and the readings are good, replace the power pack.
5. Disconnect the 4-pin connector on the port side of the power pack and see if the spark returns. If it does spark, check resistance to see if the Black/Yellow wire is shorted to engine ground. Check to see if the Shift Interrupter switch is located in the circuit where there is no spark.



Port 4 Pin Connector		Starboard 4 Pin Connector
a)	Black/Yellow	a) Brown
b)	Tan	b) Orange/Black
c)	White/Black	c) Orange
d)	Yellow/Red	d) Brown/Yellow

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the sensor wires for shorts to engine ground as a shorted sensor wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a sensor coil. Check the sensor DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

ONLY SPARKS #1 CYLINDER:

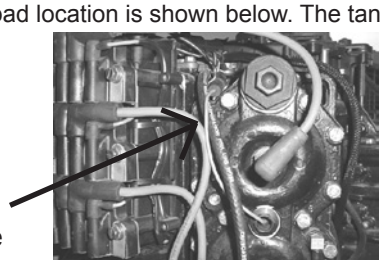
Check the optical sensor to encoder wheel mesh. You may need to shim the optical sensor upwards 25/1000" at a time to make it engage the encoder wheel.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack.
3. If the engine runs fine until you get above 4900 RPM and then starts missing, check the Orange to Orange/Black power coil wires with an oscilloscope (if available) or replace the pack. A breakdown inside the pack could cause RFI noise to activate the rev limiter for no apparent reason.
4. Connect an inductive tachometer to the spark plug wires one at a time and compare the readings. If most of the cylinders show the same reading and one or two show different readings, check the primary wires with the inductive pickup to see if the readings are the same from the power pack. A difference in readings between the primary and secondary coil wires usually indicates a bad coil or bad ignition wires. No difference indicates a bad power pack.
5. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
6. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
7. Rotate the stator one bolt hole in either direction and retest.

ENGINE WILL NOT REV ABOVE 2500 RPM *AND SHAKES HARD* (SLOW ACTIVATED):

1. Verify the engine is not actually over-heating by using a digital pyrometer.
2. Check the routing of the tan temperature wires, an example of a bad location is shown below. The tan wires have to be located as far away as possible from the spark plug wires.



Unacceptable routing for the temp wire

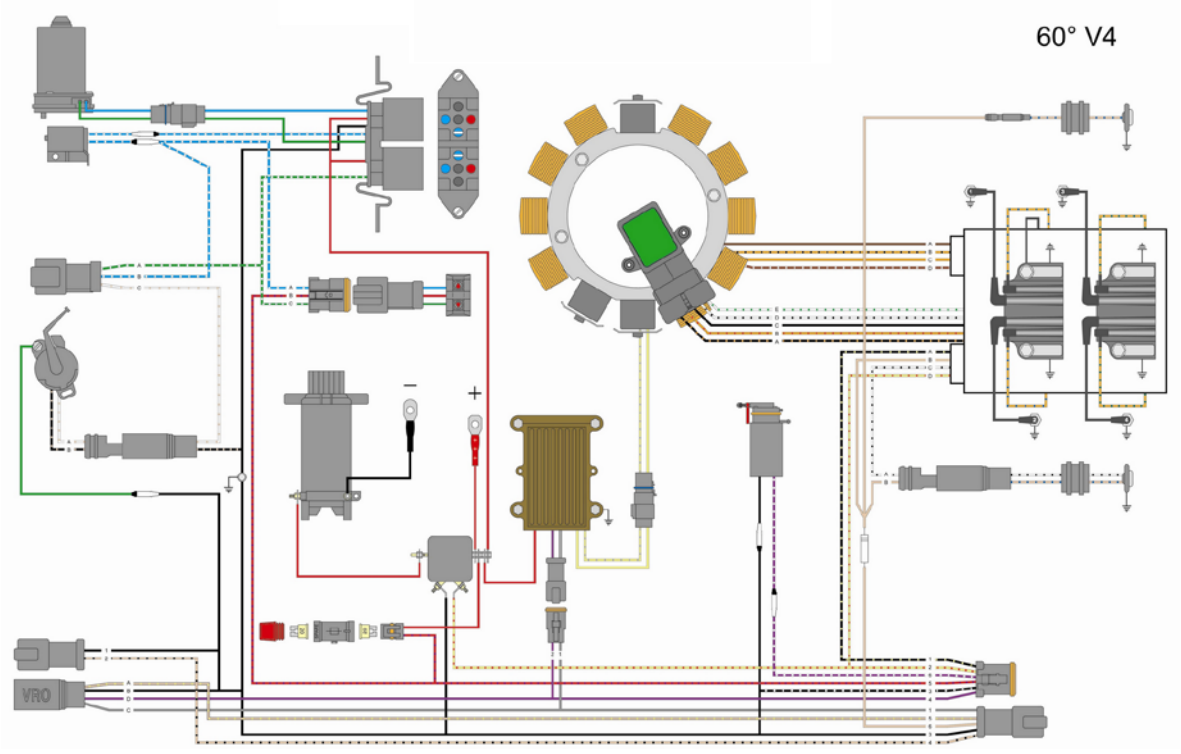
3. Verify the engine is not overheating and disconnect the Tan temperature sensor wire. If the engine performs normally, check both temperature sensors and replace the defective one.
4. If there is not any indication of a problem at this point, replace the power pack.

ENGINE STAYS IN QUICK-START:

1. Check the Yellow/Red wire for DC volts while the engine is running. You should only see voltage on this wire while the starter solenoid is engaged. A DC voltage of 5-7 volts will not engage the starter solenoid, but will engage Quick-Start.
2. Short the White/Black temperature switch wire FROM the power pack to engine ground. Start the engine, if the Quick-Start drops out after approximately 5 seconds, replace the White/Black temperature switch.
3. Disconnect the Black/White wire from the power pack. If the Quick-Start feature is not now working, replace the power pack.

ENGINE DIES WHEN QUICK-START DROPS OUT:

Check ignition timing at idle with the White/Black temperature wire disconnected. Remember to allow for the drop in ignition timing when Quick-Start disengages. Verify ignition timing after engine has warmed up, according to the service manual.



Johnson/Evinrude 60° 6 Cylinder Optical Ignition (OIS 2000)
Carbureted 1991-2006 Model Years

Due to the differences in this ignition system, troubleshooting can be somewhat difficult if you are not familiar with the design. The other Johnson/Evinrude Quick-Start ignitions use stator charge coils and a power coil to provide high voltage and power for the Quick-Start and rev limiter circuits. They require a sensor for triggering and use separate magnets for the high voltage and triggering the sensor. The OIS 2000 Optical system uses the stator charge coils to provide high voltage for the firing of the ignition coils *and a power coil to provide power for the electronics, both inside the power pack and inside the sensor.* The other Quick-Start models will run the engine without the power coil being connected (of course this will burn out the control circuits inside the power pack). The OIS 2000 ignition has to have the power coil supplying power in order to operate the Quick-Start, S.L.O.W., rev limiter, and spark the coils beyond cranking speed. The optical sensor located on the top is fed power from the power pack and sends crankshaft position, cylinder location and direction of rotation back to the power pack. The pack is smart enough to know not to spark if the engine is not turning in the right direction. S.L.O.W. functions reduce the engine RPM to approximately 2500 when the engine over-heats or the no oil warning is activated. Quick-Start (a 10° timing advance) activates as long as the engine RPM is below 1100, the engine temperature is below 105° F and the Yellow/Red wire from the starter solenoid is not feeding 12V DC to the power pack all of the time. Quick-Start will also activate for 5-10 seconds each time the engine is started regardless of engine temperature. CDI Electronics (Blue case with Red sleeve) power packs have a built-in feature to compensate for a shorted cold sensor, allowing the engine to exit Quick-Start after 5 minutes of running time regardless of the condition of the cold sensor. The CDI power pack also will not spark if the wrong encoder wheel (4 cylinder) is installed by mistake. At cranking speed the voltage from the stator may not be enough to operate the circuits inside the power pack. Therefore, battery voltage supplied via the Yellow/Red striped start wire. The extra voltage is needed in order for the optical sensor to operate correctly as low voltage from the battery and/or stator can cause intermittent spark or no spark at all. There are a couple of critical items you should be aware of on these engines. First, the spark plug wires have to be the Gray *inductive* resistor wires – these are NOT automotive wires. Secondly, the spark plugs should be the factory recommended QL78YC. Use of other spark plugs or wires can cause problems inside the power pack from RFI and MFI noise. CDI Electronics has the spark plug wires available as a set, P/N: 931-4921.

A breakthrough at CDI Electronics has allowed the use of microprocessor digital control circuits to handle the timing, Quick-Start, S.L.O.W. and rev limiter functions inside the power pack. This allows the timing to be set using a timing light, remote starter, spark gap tester, piston stop tool and a jumper wire. With these new digital power packs, you disconnect the port temperature switch/sensor leads and use a jumper wire to short the tan temperature sensor wire to engine ground. Once you have verified the timing pointer using a piston stop tool (Or a dial indicator), connect all spark plug wires to a spark gap tester, connect a remote starter to the engine and a timing light to # 1 spark plug wire. When you crank the engine over with the remote starter and check the timing, you should see the timing is set to approximately 4°-6° ATDC (After Top Dead Center). By advancing the throttle all the way and rechecking the timing for WOT (Wide Open Throttle), you should see approximately 19° - 20° BTDC (Before Top Dead Center) Without this timing feature built into the power pack, you will need the 511-4017 Timing Tool or the OEM version to set the timing for idle and WOT. Additional advantages offered by the digital circuitry include the ability to compensate for a bad temperature switch, a smoother rev limit, customized rev limiters and special timing curves.

Additional items to be aware of:

1. 1991 and 1992 engines came out with a Black sleeved power pack (P/N 584122) and stator (P/N 584109) and used a P/N 584265 sensor. In 1993 the power packs were changed to a Gray sleeve (Production) power pack (P/N 584910). The stator was changed to a Gray sleeve (P/N 584981) and the sensor was changed to P/N 584914. Engines with ignition problems had a service replacement power pack with a Blue sleeve and a replacement sensor installed as a set. The Blue sleeved power pack was only available as a service replacement. The Gray sleeved stator could be used with all of the power packs, but the Black sleeved stator was to be used only with a Black sleeved power pack. The sensor P/N changed to 586343 in the late 1990's.
2. The Gray inductive spark plug wires replaced the Black copper spark plug wires that were used on the early 1990's engines.
3. Originally the spark plugs were the QL82YC, but that recommendation was changed to the QL78YC for improved performance.
4. Early 150 and 175 HP engines did not have the tension washer on top of the sensor encoder wheel. This washer is required to keep the encoder locked in place. If it is missing, be sure to install the correct washer.
5. 1991 and 1992 engines did not have a shift interrupter switch. This resulted in hard shifting and required a conversion to resolve this problem.
6. The shift interrupter switch stopped the spark on the starboard bank of cylinders from 1993 thru mid 1990's. By 1998, a change was made for the shift interrupter switch to stop the spark on the Port bank.
7. 1991 through late 1990's engines occasionally developed a crack in the water jacket allowing water into the intake at high speed. This typically resulted in # 1 cylinder ingesting water. You can usually see signs of this because the head looks like it has been steam cleaned inside the combustion chamber.
8. Some engines do not have the RFI/MFI noise shield between the ignition coils and the power pack. If it is missing, replace it.

NO SPARK ON ANY CYLINDER:

1. Disconnect BOTH of the Black/Yellow stop wires AT THE POWER PACK and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.

2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Verify the engine is turning in a clockwise direction. If not, see TRIES TO RUN BACKWARDS below.
5. Check the power pack and ignition coil ground wires for corrosion and tightness.
6. Connect a spark gap tester to all cylinders.
7. Disconnect the boat side harness and connect a remote starter unit. Check for spark. If the engine has spark, check the boat side harness's Black/Yellow wire for shorts to ground.
8. Disconnect the 5-pin connector on the port side of the power pack and see if spark returns. If it does spark, check resistance to see if the Black/Yellow wires are shorted to engine ground.
9. If it loses spark after the key switch is disengaged, check the DVA voltage on the stator's power coil (Orange to Orange/Black) as given below in Step #13. Either the power coil or power pack is the fault.
10. Check the battery voltage on the Yellow/Red wire while cranking the engine. If below 11 VDC, charge the battery and check all battery cables. A continued low battery reading could be from a dragging starter. If still below 11 VDC, disconnect the power pack's Yellow/Red wire from the starter solenoid and apply a verified 12 + VDC to the Yellow/Red wire. If the engine now runs good, check the DVA voltage on the stator's power coil (Orange to Orange/Black) as given below in Step #13. Either the power coil or power pack is the fault.
11. Remove the sensor wheel and check for damage, especially where the top slots are located. Sometimes the wheels will break out where the windows overlap.

The thin area between the crank position and the cylinder position is the most common breakout location.

12. Check the sensor eyes for dirt, grease, etc. If you have to clean it, use denatured alcohol and a Q-tip. Do not use any other cleaning agent because damage to the optical lens will occur.
13. Check the stator resistance and DVA voltage as given below for BOTH banks:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow	450-600	150-400 V	150-400 V (*)
Brown/White	Brown/Black	450-600	150-400 V	150-400 V (*)
Orange	Orange/Black	50-60	11-22 V	45-120 V (*)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.
(NOTE) Low readings on all checks indicate a possible problem with the flywheel magnets that require checking.
(SERVICE NOTE) It is recommended that liquid neoprene be applied to the areas where piercing probes were used.

14. Check the DVA output from the power pack to the primary coil wires as follows:

WIRE	READ TO	DVA (Connected)
Orange/Blue	Engine Ground	150 V +
Orange	Engine Ground	150 V +
Orange/Green	Engine Ground	150 V +

(NOTE) If the DVA values are below these specifications, the power pack or sensor is likely bad.

15. Check the sensor DC voltage as follows:

WIRE	READ TO	DC voltage (Connected)
Orange/Red	Engine Ground	10.5-12 VDC
Black/Orange	Engine Ground	8-10 VDC

(WARNING!!) The Black/Orange wire should NEVER be shorted to engine ground as this will damage the sensor.

16. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
17. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

ONLY HAS SPARK AS LONG AS THE KEY SWITCH IS ENGAGED OR WILL NOT REV ABOVE IDLE SPEED:

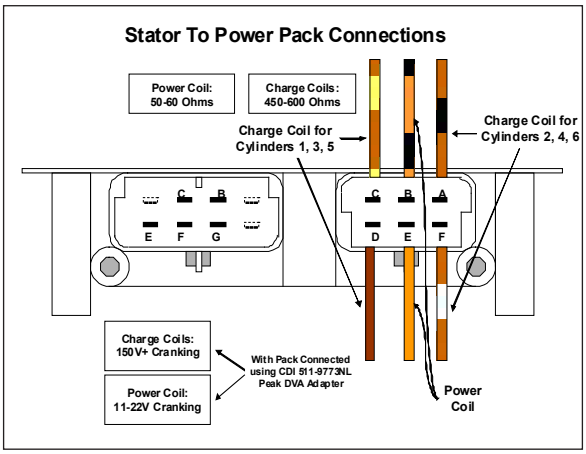
Check the DVA voltage on the stator's power coil (Orange to Orange/Black) as given above in Step #13:
(NOTE) The readings should rapidly increase as the engine RPM increases and stabilize below 22 volts DVA (voltage exceeding 22 V DVA indicates a bad power pack). A sharp drop in voltage right before the miss becomes apparent usually indicates a bad stator winding. A sharp drop in voltage when you disengage the key switch indicates a bad power coil on the stator.

TRIES TO RUN BACKWARDS:

1. Check the encoder wheel. It must have 7 notches.
2. Check the timing. Before Quick-Start, it must be set to 4° BTDC. After Quick-Start, it must be set to 6° ATDC.
3. Try another sensor.
4. Replace the power pack.

NO SPARK OR INTERMITTENT SPARK ON ONE BANK:

1. Disconnect BOTH of the Black/Yellow stop wires AT THE POWER PACK and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Swap the stator wire pairs to the other bank and see if the problem moves. If it does, the stator is bad.
3. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
4. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
5. Check the stator resistance and DVA output on BOTH banks (see Step #13 on NO SPARK ON ANY CYLINDER above).
6. Disconnect the 5-pin connector on the port side of the power pack and see if the spark returns. If it does spark, check resistance to see if the Black/Yellow or Black/Orange wire is shorted to engine ground. Check to see if the Shift Interrupter switch is located in the circuit where there is no spark.



6 Pin Connector

a) Brown/Black
b) Orange/Black
c) Brown/Yellow
d) Brown
e) Orange
f) Brown/White

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the sensor wires for shorts to engine ground as a shorted sensor wire can destroy a SCR inside the power pack.
2. In contrast, a shorted SCR inside the power pack can destroy a sensor coil. Check the sensor DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wires at the power pack. Connect a jumper wire to the stop wires from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack. Repeat test as necessary for additional packs.

ONLY SPARKS #1 CYLINDER:

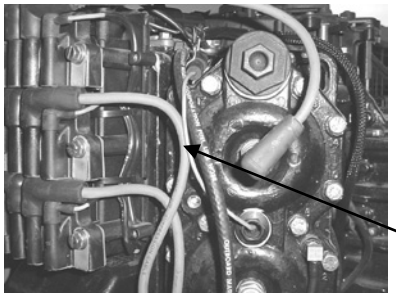
Check the optical sensor to encoder wheel mesh. You may need to shim the optical sensor upwards 25/1000" at a time to make it engage the encoder wheel.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the power pack.
3. If the engine runs fine until you get above 4900 RPM and then starts missing, check the Orange to Orange/Black power coil wires with an oscilloscope (if available) or replace the pack. A breakdown inside the pack could cause RFI noise to activate the rev limiter for no apparent reason.
4. Connect an inductive tachometer to the spark plug wires one at a time and compare the readings. If most of the cylinders show the same reading and one or two show different readings, check the primary wires with the inductive pickup to see if the readings are the same from the power pack. A difference in readings between the primary and secondary coil wires usually indicates a bad coil or bad ignition wires. No difference indicates a bad power pack.
5. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
6. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
7. Rotate the stator one bolt hole in either direction and retest.

ENGINE WILL NOT REV ABOVE 2500 RPM *AND SHAKES HARD* (SLOW ACTIVATED):

1. Verify the engine is not actually over-heating by using a digital pyrometer.
2. Check the routing of the tan temperature wires, an example of a bad location is shown below. The tan wires need to be located as far away as possible from the spark plug wires.



Unacceptable routing for the temp wire

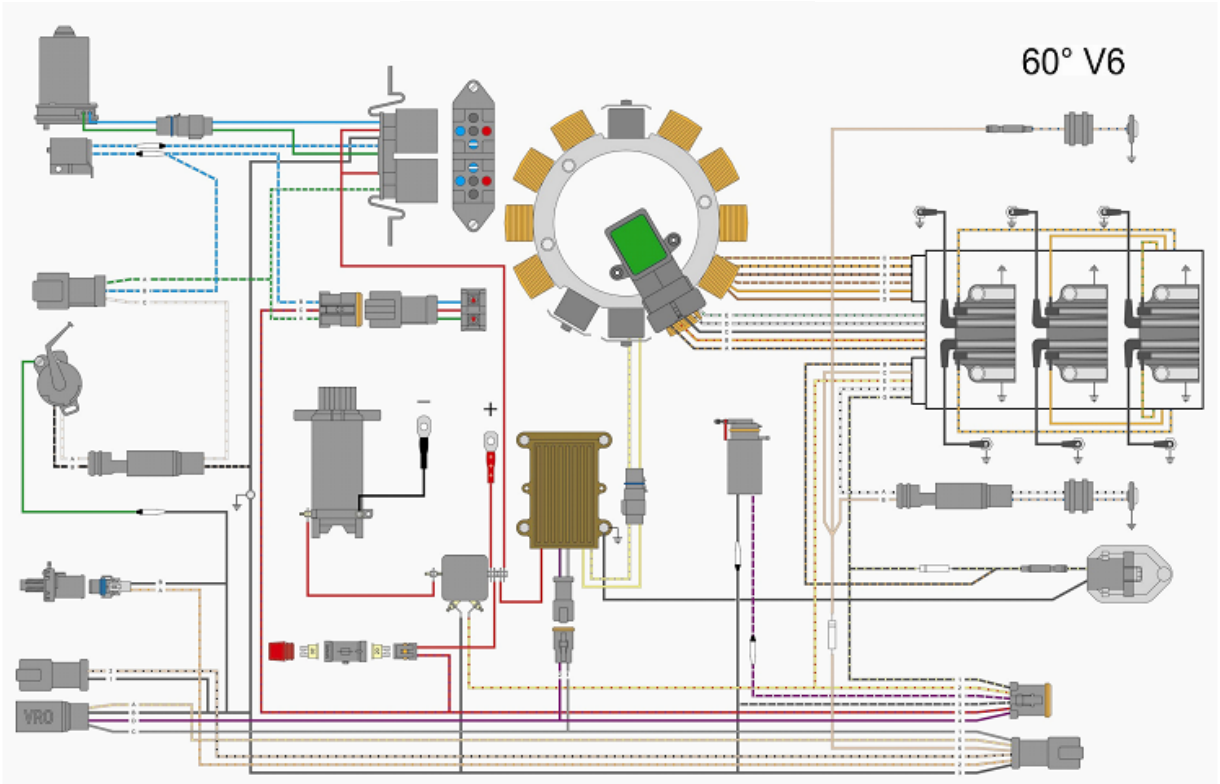
3. Disconnect the temperature sensors and see if the engine performs normally. If it does, check both temperature sensors and replace the defective one.
4. If there is not any indication of a problem at this point, replace the power pack.

ENGINE STAYS IN QUICK-START:

1. Check the Yellow/Red wire for DC volts while the engine is running. You should only see voltage on this wire while the starter solenoid is engaged. A DC voltage of 5-7 volts will not engage the starter solenoid, but will engage Quick-Start.
2. Short the White/Black temperature switch wire FROM the power pack to engine ground. Start the engine, if the Quick-Start drops out after approximately 5 seconds, replace the White/Black temperature switch.
3. Disconnect the Black/White wire from the power pack. If the Quick-Start feature is not now working, replace the power pack.

ENGINE DIES WHEN QUICK-START DROPS OUT:

Check ignition timing at idle with the White/Black temperature wire disconnected. Remember to allow for the drop in ignition timing when Quick-Start disengages. Verify ignition timing after engine has warmed up, according to the service manual.



Mercury

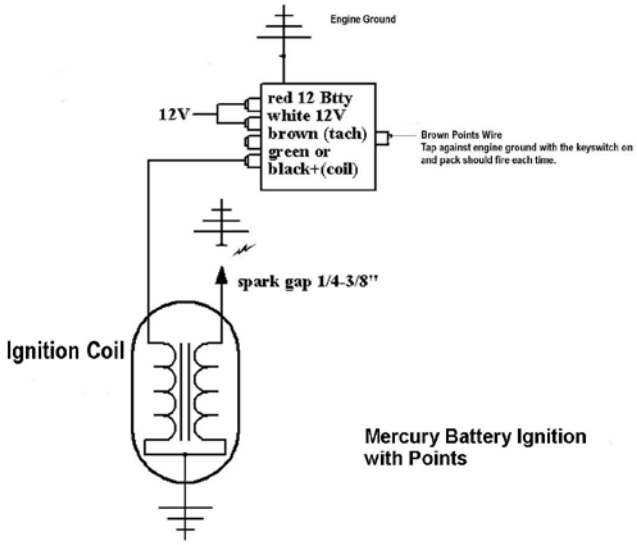
Battery CD Ignitions with Points

1966-1967 Models 950 and 1100 (With 114-2803/332-2803 Switch Box)

(SERVICE NOTE) Check the battery voltage at approximately 3500-RPM. The MAXIMUM reading allowable is 16 volts. Over 16 volts will damage the ignition. Check for loose connections or a bad battery.. **Maintenance free batteries are NOT recommended for this application.** A CD Tester (CDI Electronics P/N: 511-9701) can be used to test the CD module, distributor cap, rotor button and spark plug wires on the engine.

Technical Information: The points set at 0.005 on each set as a preliminary setting. Dwell must be set at 55 degrees with a dwell meter.

Engine Wiring Connection for Testing Ignition Module

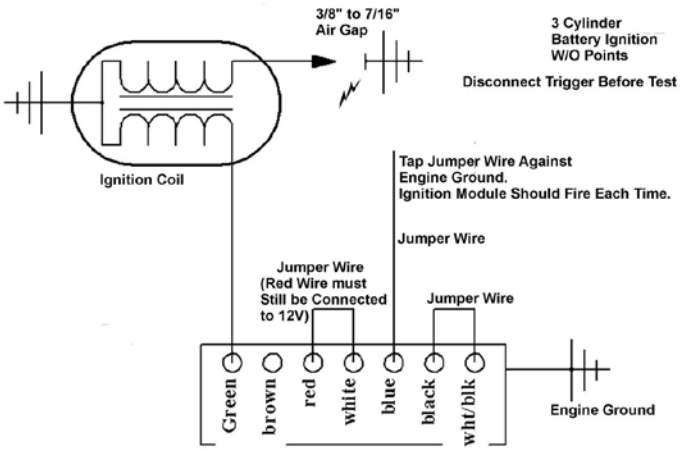


1. Clean all battery connections and engine grounds.
2. Disconnect the mercury tilt switch and retest. If the ignition works properly, replace the mercury switch.
3. Connect a spark gap tester to the spark plug wires and check for spark on *all cylinders*. If some cylinders spark and not others, the problem is likely in the distributor cap, rotor button or spark plug wires.
4. Connect a spark gap tester to the high-tension lead coming from the ignition coil and set it to approximately 7/16". When you crank the engine over, if it sparks while the spark gap tester is connected to the coil and does not spark through the spark plug wires – there is a problem in the distributor cap, rotor button or spark plug wires.
5. Check voltage present on the White and Red terminals (White wire on the 114-2803) while at cranking. It MUST be at least 9.5 volts. If not, there is a problem in the harness, key switch, starter battery cables or battery.
6. Check DVA voltage on the Green wire going to the coil, it should be over 100 volts at cranking.
7. Disconnect the Brown points wires. Turn the ignition switch on and strike one of the Brown points wire against engine ground. The unit should spark each time. If the coil does spark, this means the CD module is usually good and the points, points plate and grounding wire for the points plate should be checked.
8. Connect a spark gap tester to the high-tension leads coming from the distributor cap and set the gap to approximately 7/16". Align the rotor with #1 spark plug wire. Turn the ignition switch on and strike the Brown points wire against engine ground (Or use a CD Tester). Only the #1 spark plug wire should spark. If any other spark plug wire now has spark, there is a problem in the distributor cap. Repeat the test for the other cylinders.
9. Perform a voltage drop test after the engine is repaired to see if there is a problem with the voltage going to the CD module. At cranking and while the engine is running, use a DC voltmeter and put the Black meter lead on the battery POS (+) *post* and the Red meter lead on the positive battery cable at the starter solenoid. Keep the Black lead on the battery post and shift the Red meter lead to the positive post of the rectifier, then to the Red and White terminals on the switch box. If you find a reading above 0.6V, there is a problem at the point where the voltage jumped up. For example, if the meter reads 0.4V until you get to the White terminal and then jumps to 2.3V on the White terminal – this indicates a problem in the key switch, or harness. Repeat the test for the negative battery post by putting the Black meter lead on the battery NEG (-) *post* and the Red meter lead on the negative battery cable terminal, then shifting to the engine block, rectifier base and case ground of the CD module.

Mercury
Battery CD Ignitions without Points
Three Cylinder Engines (With 114-4796/332-4796/393-4797 Switch Box)

(Note) A CD Tester by CDI Electronics (511-9701) or Merc-o-Tronics can be used to test the CD module, distributor cap, rotor button and spark plug wires on the engine while the Trigger Tester by CDI can be used to test the distributor trigger.
(SERVICE NOTE) Check the battery voltage at approximately 3500 RPM, MAXIMUM reading allowable is 16 volts and minimum is 12V. Running below 12V or over 16 volts will damage the ignition. Check for loose connections or a bad battery.
Maintenance free batteries are NOT recommended for this application.

Engine Wiring Connection for Testing Ignition Module



GENERAL:

1. Clean all battery connections and engine grounds.
2. Disconnect the mercury tilt switch and retest. If the ignition works properly, replace or discard the mercury tilt switch.
3. Connect a spark gap tester to the spark plug wires and check for spark on *all cylinders*. If some cylinders spark and not others, the problem is likely in the distributor cap, rotor button or spark plug wires.
4. Perform a voltage drop test after the engine is repaired to see if there is a problem with the voltage going to the CD module. At cranking and while the engine is running, use a DC voltmeter and put the Black meter lead on the battery POS (+) *post* and the Red meter lead on the positive battery cable at the starter solenoid. Keep the Black lead on the battery post and shift the Red meter lead to the positive post of the rectifier, then to the Red and White terminals on the switch box. If you find a reading above 0.6V, there is a problem at the point where the voltage jumped up. For example, if the meter reads 0.4V until you get to the White terminal and then jumps to 2.3V on the White terminal – this indicates a problem in the key switch, or harness. Repeat the test for the negative battery post by putting the Black meter lead on the battery NEG (-) *post* and the Red meter lead on the negative battery cable terminal, then shifting to the engine block, rectifier base and case ground of the CD module.

NO SPARK ON ANY CYLINDER:

1. If a mercury tilt switch is connected to the switch box, disconnect it and retest. If you now have spark, replace or discard the mercury tilt switch.
2. Check DC voltage on the White and Red terminals (White wire on the 114-4796) (they must be connected to the switch box) to Engine Ground AT CRANKING. It MUST be at least 9.5 volts. If not, there is most likely a problem in the battery. Try a known-good non-maintenance-free cranking battery. If no change, check the key switch, starter and battery cables.
3. Perform the jumper wire test in the illustration above. Disconnect the trigger wires from the switch box and connect a jumper wire from the Black trigger terminal/wire of the switch box to the White/Black trigger terminal/wire of the switch box. Connect another jumper wire to the Blue trigger terminal/wire of the switch box. Turn the ignition switch to ON. Strike the jumper wire from the Blue trigger terminal/wire against Engine Ground – (DO NOT HOLD THE JUMPER AGAINST ENGINE GROUND). The ignition coil should spark each time the Blue wire is tapped to Engine Ground. If not, the switch box and/or ignition coil is faulty.
4. Connect a spark gap tester to the high-tension lead coming from the ignition coil and set it to approximately 7/16”. When you crank the engine over, if it sparks while the spark gap tester is connected to the coil and does not spark through the spark plug wires – there is a problem in the distributor cap, rotor button or spark plug wires.
5. Check DC voltage on the White/Black trigger terminal/wire (it must be connected to the switch box) to Engine Ground AT CRANKING. It must be at least at least 9V DC. A low reading indicates a bad switch box.
6. Check DVA voltage between the Blue and Black trigger terminals/wires (they must be connected to the switch box) AT CRANKING. It must be at least 3V DVA. A low reading indicates a bad trigger.
7. Check DVA voltage on the Green wire going to the coil to Engine Ground AT CRANKING. It must be at least 100V DVA. A low reading indicates a bad switch box.

ONLY HAS SPARK AS LONG AS THE STARTER IS ENGAGED:
This symptom usually indicates a bad trigger or low battery voltage.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:
1. Connect a spark gap tester to the high-tension leads coming from the distributor cap and set the gap to approximately 7/16". Use of a CD Tester is highly recommended.
2. Align the rotor with #1 spark plug wire. Disconnect the trigger wires from the switch box and connect a jumper wire from the Black trigger terminal/wire of the switch box to the White/Black trigger terminal/wire of the switch box.
3. Connect another jumper wire to the Blue trigger terminal/wire of the switch box. Turn the ignition switch to ON. Strike the jumper wire from the Blue trigger terminal/wire against Engine Ground – (DO NOT HOLD THE JUMPER AGAINST ENGINE GROUND). Only the #1 spark plug wire should spark. If any other spark plug wire has spark, there is a problem in the distributor cap.
4. Repeat the test for the other cylinders.

MISS AT ANY RPM:
1. Check the battery voltage on the Red and White terminals (White wire on the 114-4796) (they must be connected to the switch box) to Engine Ground throughout the RPM range. The voltage should be between 12V and 16V DC. A reading outside this range will damage the CD module. If the readings are abnormal, perform the voltage drop test described above.
2. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a high miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.

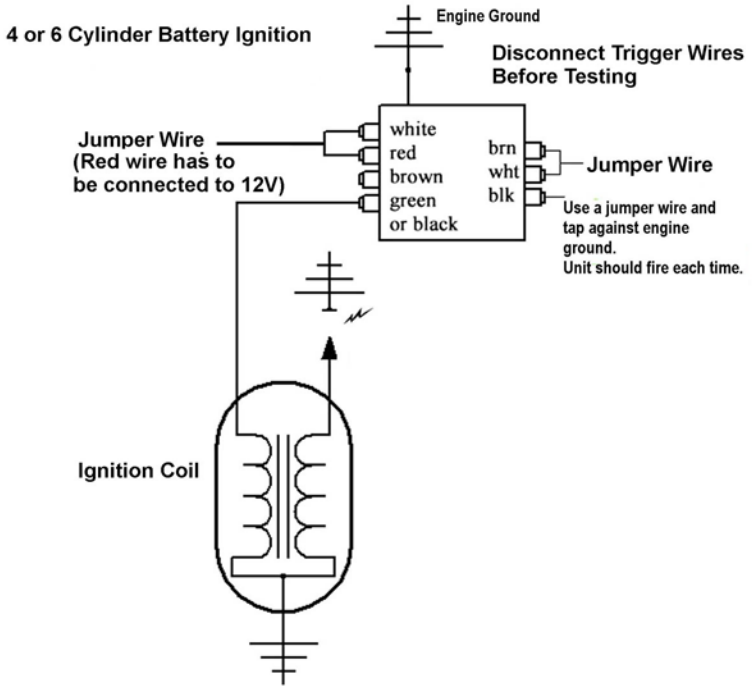
TRIES TO RUN BACKWARDS:
Check timing and timing belt.

Four and Six Cylinder Engines (With 114-2986/332-2986/393-3736 Switch Box)

(Note) A CD Tester like the one by CDI Electronics or Merc-o-Tronics can be used to test the CD module, distributor cap, rotor button and spark plug wires on the engine while the Trigger Tester by CDI can be used to test the distributor trigger.

(SERVICE NOTE) Check the battery voltage at approximately 3500 RPM, MAXIMUM reading allowable is 16 volts and minimum is 12V. Running below 12V or over 16 volts will damage the ignition. Check for loose connections or a bad battery.
Maintenance free batteries are NOT recommended for this application.

Engine Wiring Connection for Testing Ignition Module



GENERAL:
1. Clean all battery connections and engine grounds.
2. Disconnect the mercury tilt switch and retest. If the ignition works properly, replace or discard the mercury tilt switch.
3. Connect a spark gap tester to the spark plug wires and check for spark on *all cylinders*. If some cylinders spark and not others, the problem is likely in the distributor cap, rotor button or spark plug wires.
4. Perform a voltage drop test after the engine is repaired to see if there is a problem with the voltage going to the CD module. At cranking and while the engine is running, use a DC voltmeter and put the Black meter lead on the battery POS (+) *post*

and the Red meter lead on the positive battery cable at the starter solenoid. Keep the Black lead on the battery post and shift the Red meter lead to the positive post of the rectifier, then to the Red and White terminals on the switch box. If you find a reading above 0.6V, there is a problem at the point where the voltage jumped up. For example, if the meter reads 0.4V until you get to the White terminal and then jumps to 2.3V on the White terminal – this indicates a problem in the key switch, or harness. Repeat the test for the negative battery post by putting the Black meter lead on the battery NEG (-) *post* and the Red meter lead on the negative battery cable terminal, then shifting to the engine block, rectifier base and case ground of the CD module.

NO SPARK ON ANY CYLINDER:

1. If a mercury tilt switch is connected to the switch box, disconnect it and retest. If you now have spark, replace or discard the mercury tilt switch.
2. Check DC voltage on the White and Red terminals (White/Red wire on the 114-2986) (they must be connected to the switch box) to Engine Ground AT CRANKING. It MUST be at least 9.5 volts. If not, there is most likely a problem in the battery. Try a known-good non-maintenance-free cranking battery. If no change, check the key switch, starter and battery cables.
3. Perform the jumper wire test in the illustration above. Disconnect the trigger wires from the switch box and connect a jumper wire from the Brown trigger terminal/wire of the switch box to the White trigger terminal/wire of the switch box. Connect another jumper wire to the Black trigger terminal/wire of the switch box. Turn the ignition switch to ON. Strike the jumper wire from the Black trigger terminal/wire against Engine Ground – (DO NOT HOLD THE JUMPER AGAINST ENGINE GROUND). The ignition coil should spark each time the Black wire is tapped to Engine Ground. If not, the switch box and/or ignition coil is faulty.
4. Connect a spark gap tester to the high-tension lead coming from the ignition coil and set it to approximately 7/16”. When you crank the engine over, if it sparks while the spark gap tester is connected to the coil and does not spark through the spark plug wires – there is a problem in the distributor cap, rotor button or spark plug wires.
5. Check DC voltage on the Brown trigger terminal/wire (it must be connected to the switch box) to Engine Ground AT CRANKING. It must be at least at least 9V DC. A low reading indicates a bad switch box.
6. Check DVA voltage between the White and Black trigger terminals/wires (they must be connected to the switch box) AT CRANKING. It must be at least 3V DVA. A low reading indicates a bad trigger.
7. Check DVA voltage on the Green wire going to the coil to Engine Ground AT CRANKING. It must be at least 100V DVA. A low reading indicates a bad switch box.

ONLY HAS SPARK AS LONG AS THE STARTER IS ENGAGED:

This symptom usually indicates a bad trigger or low battery voltage.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Connect a spark gap tester to the high-tension leads coming from the distributor cap and set the gap to approximately 7/16”. (Use of a CD Tester is recommended).
2. Align the rotor with #1 spark plug wire. Disconnect the trigger wires from the switch box and connect a jumper wire from the Brown trigger terminal/wire of the switch box to the White trigger terminal/wire of the switch box.
3. Connect another jumper wire to the Black trigger terminal/wire of the switch box. Turn the ignition switch to ON. Strike the jumper wire from the Black trigger terminal/wire against Engine Ground – (DO NOT HOLD THE JUMPER AGAINST ENGINE GROUND). Only the #1 spark plug wire should spark. If any other spark plug wire has spark, there is a problem in the distributor cap.
4. Repeat the test for the other cylinders.

MISS AT ANY RPM:

1. Check the battery voltage on the Red and White terminals (White/Red wire on the 114-2986) (they must be connected to the switch box) to Engine Ground throughout the RPM range. The voltage should be between 12V and 16V DC. A reading outside this range will damage the CD module. If the readings are abnormal, perform the voltage drop test described above.
2. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a high miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.

TRIES TO RUN BACKWARDS:

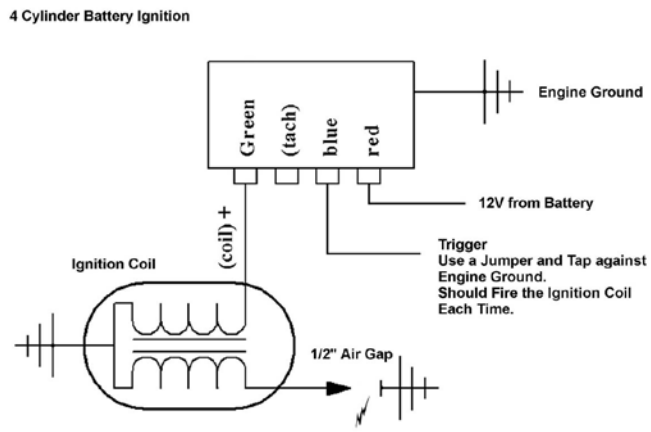
Check timing and timing belt.

Four Cylinder Engines
1970-1971 Engines (With 337-4406/337-4411 Switch Box)

WARNING: Check the battery voltage at approximately 3500 RPM, MAXIMUM allowable reading is 16 volts and minimum is 12V. Running below 12V or over 16 volts will damage the ignition. Check for loose connections or a bad battery. Maintenance free batteries are NOT recommended for this application.

(SERVICE NOTE) Due to problems associated with this system, it is recommended that the system be converted over to a 332-2986/393-3736 type system. (CDI Electronics offers a conversion kit, P/N – 114-2986K1)

Engine Wiring Connection for Testing Ignition 337-4411 Module



GENERAL:

1. Clean all battery connections and engine grounds.
2. Disconnect the mercury tilt switch and retest. If the ignition works properly, replace or discard the mercury tilt switch.
3. Connect a spark gap tester to the spark plug wires and check for spark on *all cylinders*. If some cylinders spark and not others, the problem is likely in the distributor cap, rotor button or spark plug wires.
4. Perform a voltage drop test after the engine is repaired to see if there is a problem with the voltage going to the CD module. At cranking and while the engine is running, use a DC voltmeter and put the Black meter lead on the battery POS (+) *post* and the Red meter lead on the positive battery cable at the starter solenoid. Keep the Black lead on the battery post and shift the Red meter lead to the positive post of the rectifier, then to the Red and White terminals on the switch box. If you find a reading above 0.6V, there is a problem at the point where the voltage jumped up. For instance, if the meter reads 0.4V until you get to the White terminal and then jumps to 2.3V on the White terminal – this indicates a problem in the key switch, or harness. Repeat the test for the negative battery post by putting the Black meter lead on the battery NEG (-) *post* and the Red meter lead on the negative battery cable terminal, then shifting to the engine block, rectifier base and case ground of the CD module.

NO SPARK ON ANY CYLINDER:

1. If a mercury tilt switch is connected to the switch box, disconnect it and retest. If you now have spark, replace or discard the mercury tilt switch.
2. Connect a spark gap tester to the high-tension lead coming from the ignition coil and set it to approximately 7/16”. When you crank the engine over, if it sparks while the spark gap tester is connected to the coil and does not spark through the spark plug wires – there is a problem in the distributor cap, rotor button or spark plug wires.
3. Check the DC voltage present on the White trigger wire and the Red terminal of the switch box while cranking. It MUST be at least 9.5 volts. If not, there is a problem in the harness, key switch, starter, battery cables or battery.
4. Check DVA voltage between the Blue terminal and engine ground while cranking (The trigger wire must be connected to the switch box). You should read at least 9V. A low reading indicates a bad switch box.
5. Disconnect the wire from the Blue terminal of the switch box and connect a jumper wire to the terminal. Strike the other end of the jumper wire against engine ground. The switch box should spark each time. Failure to spark usually indicates a bad CD module.
6. Check DVA voltage on the Green wire going to the coil, it should be over 100 volts at cranking.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Connect a spark gap tester to the spark plug wires coming from the distributor cap and set the air gap to approximately 7/16”.
2. Align the rotor with #1 spark plug wire. Disconnect the wire from the Blue terminal of the switch box and connect a jumper wire to the terminal. Strike the other end of the jumper wire against engine ground. Only the #1 spark plug wire should spark. If any other spark plug wire has spark, there is a problem in the distributor cap.
3. Repeat the test for the other cylinders.

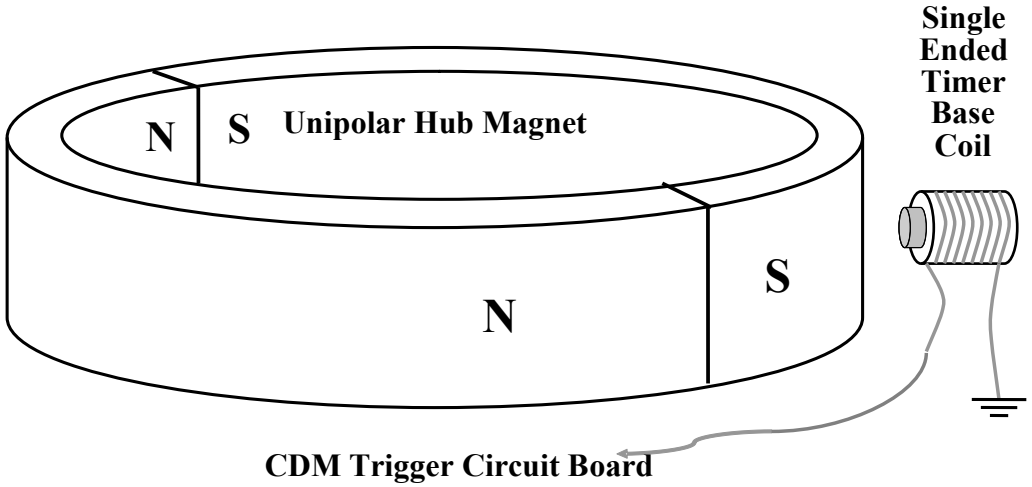
NOTICE: The 4 cylinder engines using the 332-3213 ignition module and belt driven ignition driver DO NOT USE BATTERY VOLTAGE. Connecting 12V to the Red terminal will destroy the module.

Mercury Trigger Magnets

THE FLYWHEELS WITH THESE MAGNET DESIGNS CANNOT BE INTERCHANGED!!!!

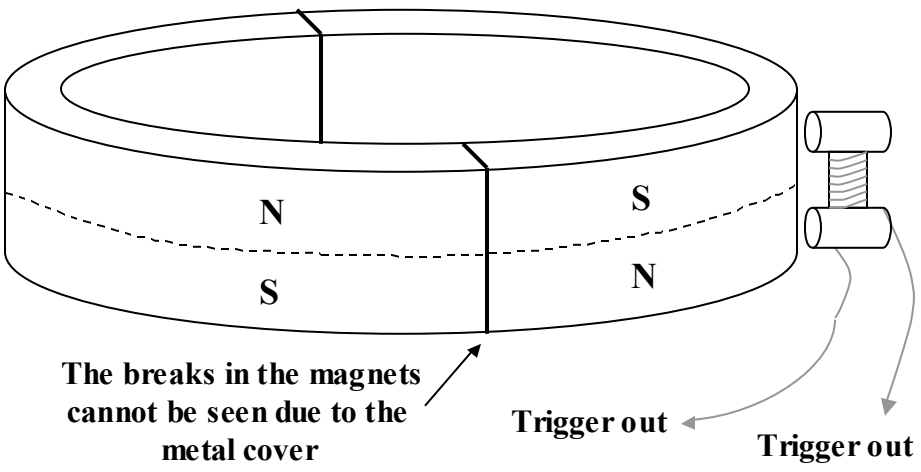
Mercury CDM Hub Magnet Design

1996 to 2006 2, 3 and 4 cylinder engines with CDM Modules



Mercury Hub Magnet Design

Push-Pull Trigger Coil Design (1978-1996 on 2, 3 and 4 Cyl engines All 1978-2005 L6, 2.0L, 2.4L and 2.5L engines)



Note that the design of the magnet for the push-pull is the same for the 3, 4 and 6 cylinder engines using standard ADI ignitions. The trigger magnet for the CDM modules is completely different.

Mercury
Alternator Driven Ignitions
One and Two Cylinder Engines 1971-1975 (With 336-4516 Phase-Maker Ignition)

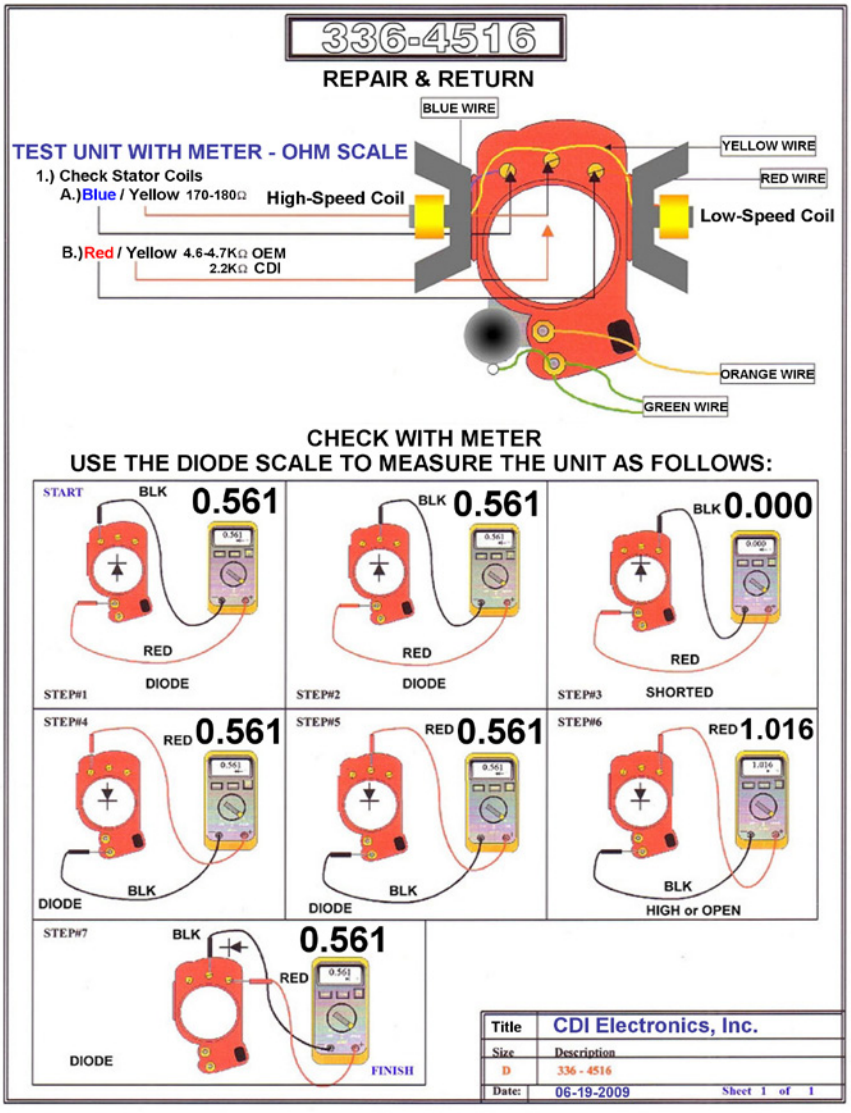
SERVICE NOTE: These engines require the Orange, Red or Green Ignition coils. The Black or Blue ignition coils use a common ground connection internally for the primary and the secondary side of the coils. This system requires that the primary and the secondary side of the coils be separate as the points drive the negative side of the coil to ground, causing the coil to generate spark on the secondary side.

NO SPARK ON ONE OR BOTH CYLINDERS:

1. Disconnect the Orange stop and connect it to engine ground. Retest. If the engine now has spark, the stop circuit has a fault.
2. Check the stator resistance and DVA output as given below:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)
Red	Yellow	4600-4700	2200	N/A
Blue	Yellow	170-180	180	N/A
Green	Engine Ground	--	--	180 V +

3. Disconnect the Brown and White points wires one at a time and retest. If the spark comes back on the one still connected when you disconnect one of them, the points or points wire is defective for the disconnected cylinder.
4. Disconnect the Green wires one at a time and retest. If the spark comes back on one cylinder, the ignition coil not connected is defective. Remember that the coils must not be the Black or Blue coils (these coils are not isolated ground).
5. Test the 336-4516 module as follows:



Mercury

One and Two Cylinder Engines 1966-1985 (With 174-3996/336-3996/336-3962 Stator/Switch Box)

WARNING!! DO NOT START AND RUN THIS ENGINE ON A FLUSHING ATTACHMENT OR EAR MUFFS AND ACTIVATE THE STOP CIRCUIT. This system operates with the Orange stop wire normally shorted to ground. When you activate the stop circuit, you open the Orange's connection to ground. The resulting backlash into the stator may damage the electronics. You must use the choke to stop the engine. In the water, the back pressure from the exhaust will slow the engine quickly enough to prevent damage to the stator.

(Note) The insulator blocks used with this stator are very important. You are strongly advised to closely inspect the Brown and White points wires and insulator blocks for cracking or arcing. This system operates at a much higher voltage than the normal systems and what would be acceptable on other systems will cause arcing problems.

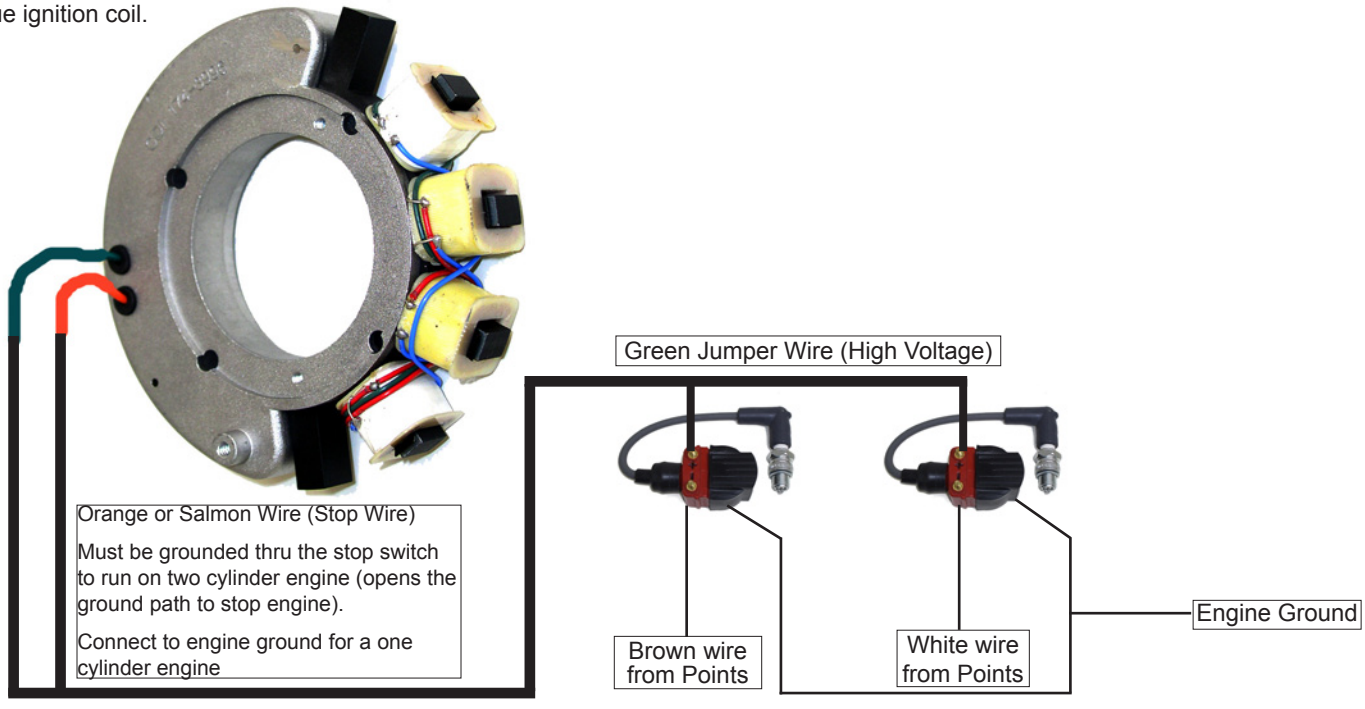
SERVICE NOTE: These engines require the Orange, Red or Green Ignition coils. The Black or Blue ignition coils use a common ground connection internally for the primary and the secondary side of the coils. This system requires that the primary and the secondary side of the coils be separate as the points drive the negative side of the coil to ground, causing the coil to generate spark on the secondary side.

NO SPARK ON ANY CYLINDER:

1. Disconnect the Orange stop wire and connect it to engine ground. Retest. If the ignition system now has spark, the stop circuit has a problem.
2. Disconnect the Brown and White points wires from the ignition coils and connect a jumper wire to the negative side of the coils. Crank the engine and carefully tap the jumper to engine ground, if the coil sparks – check the points and points wires. If it fails to spark, inspect the ignition coil. You should have either a Red, Orange or Green coil with a bare braided ground wire from the backside of the coil. This bare braided ground wire MUST be connected to a clean engine ground. You cannot use a Black or Blue ignition coil.

NO SPARK ON ONE CYLINDER:

1. Disconnect the Brown and White points wires from the ignition coils and swap them for a cranking test. Crank the engine over and see if the spark moves to a different coil. If it does, you have a problem in the points, points wire or insulator block for the cylinder not sparking.
2. If the spark remains on the same coil when you swap the points wires and it is the coil where the Green wire is coming from the stator, remove the Green jumper wire. Swap the Green wire coming from the stator from one coil to the other coil. If the spark moves to the other coil, replace the Green jumper wire connecting the two coils.
3. Check the ignition coil. You should have approximately 1,000 (1 K ohm) of resistance from the spark plug wire to engine ground using the Orange coil and 600 ohms for the Green coil.
4. Inspect the ignition coils. You should have either a Red, Orange or Green coil with a bare braided ground wire from the backside of the coil. This bare braided ground wire MUST be connected to a clean engine ground. You cannot use a Black or Blue ignition coil.



Mercury

1970-1975 Four Cylinder Engines (With 333-3213 Switch Box)

(With Ignition Driver Distributors)

WARNING!! DO NOT CONNECT 12VDC TO THE IGNITION MODULE AS DC VOLTAGE WILL SEVERELY DAMAGE THE SWITCH BOX AND IGNITION DRIVER.

NO SPARK ON ANY CYLINDER:

1. Disconnect the Orange (or Blue) stop wire AT THE SWITCH BOX and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
3. Check the Ignition Driver resistance and DVA output:

WIRE	READ TO	FUNCTION	RESISTANCE	DVA (Connected)
Red	White wire	Cranking Winding	400 ohms	180-400 V
Blue	White wire	High Speed Winding	10 Ohms	25-100 V
Green	Engine GND	Pack output	N/A	150 V +
White	Common for Ignition Driver (DOES NOT CONNECT TO ENGINE GND)			

4. Check the Ignition pack resistance:

RED METER LEAD	BLACK METER LEAD	READING
Red Terminal	Pack Case Ground	Diode
Pack Case Ground	Red Terminal	Open
Blue Terminal	Pack Case Ground	Diode
Pack Case Ground	Blue Terminal	Open
White Terminal	Pack Case Ground	Diode
Pack Case Ground	White Terminal	Open
Green	Engine Ground	Open
Pack Case Ground	Green Terminal	Diode

NO SPARK ON ONE OR MORE CYLINDERS:

If only one or two cylinders are not firing on this system, the problem will be either in the distributor cap or spark plug wires.

Two Cylinder Engines 1974-1985 (With 114-6222/339-6222/339-5287 Switch Box)

SERVICE NOTE: These engines require the Orange, Red or Green Ignition coils. The Black or Blue ignition coils use a common ground connection internally for the primary and the secondary side of the coils. This system requires that the primary and the secondary side of the coils be separate as the pack drives the negative side of the coil to ground, causing the coil to generate spark on the secondary side.

NO SPARK ON ANY CYLINDER:

1. Disconnect the Orange stop wire AT THE SWITCH BOX and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and trigger resistance and DVA output:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Orange	Engine GND	1600-1800 (800-900 per coil)	180-400 V	180-400 V (*)
Brown	White (or Brown)	140-160	0.5 V +	0.5 V + (#)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the pack is bad.

6. Inspect the ignition coils. You should have either a Red, Orange or Green coil with a bare braided ground wire from the backside of the coil. This bare braided ground wire MUST be connected to a clean engine ground. You cannot use a Black or Blue ignition coil.
7. Check the ignition coils as follows: Check resistance from + to – terminal reading should be 0.2-1.0 ohms and 800-1100 ohms from the high tension lead to engine ground. There should be no connection from the – terminal to engine ground.
8. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
9. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

ENGINE HAS SPARK BUT WILL NOT RUN:

1. Index the flywheel and check the timing. If it is out by 180 degrees, swap the trigger wires to the switch box.
2. If the timing is off by any other degree, check the flywheel key.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the DVA output between the Green and Green/White wires from the switch box, also between the Blue and Blue/White wires while they are connected to the ignition coils. You should have a reading of at least 150V or more. If the reading is low on one cylinder, disconnect the wires from the ignition coil for that cylinder and reconnect them to a load resistor. Retest. If the reading is now ok, the ignition coil is likely bad. A continued low reading indicates a bad switch box.
2. Connect an inductive tachometer to each cylinder and compare the RPM readings at the RPM where the problem is occurring. If only one cylinder is dropping out, swap the ignition coil locations and retest. If the problem follows a coil, replace the coil. If it stays on the same spark plug, replace the switch box.
3. Disconnect the negative side of the ignition coils. Connect a jumper wire to the negative side of the coil and while the engine is turning over, tap the jumper wire to engine ground. If this causes the coil to spark, the coil is good and you will need to replace the pack.
4. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the switch box.
2. In contrast, a shorted SCR inside the switch box can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repeat test as necessary for additional switch boxes.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Green wires from the switch box while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Two Cylinder Engines 1970-1971 Model 400 (With the 332-4172 Switch Box)

NO SPARK ON ANY CYLINDER:

1. Disconnect the Orange (or Salmon) stop wire AT THE SWITCH BOX and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Check the stator and trigger resistance and DVA output:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Blue	Engine GND	3200-3800	2200-2600	180-400 V	180-400 V (*)
Red (or White)	Engine GND	45-55	45-55	25-100 V	25-100 V (*)
Brown	Engine GND	N/A	N/A	1.0 V +	N/A

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

ENGINE HAS SPARK BUT WILL NOT RUN:

1. Index the flywheel and check the timing. If it is out, check the flywheel key.
2. If the timing is off and the flywheel key is ok, replace the trigger.

NO SPARK ON ONE CYLINDER:

If one cylinder is firing good and one is not, the problem is going to be either in the distributor cap or spark plug wire.

Two Cylinder Engines 1974-1985 (With 114-4911/332-4911/332-4733 Switch Box)

NO SPARK ON ANY CYLINDER:

1. Disconnect the Orange (or Black/Yellow) stop wire AT THE SWITCH BOX and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator and trigger resistance and DVA output:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Blue	White	6000-7400 (a)	2000-2500 (a)	180-400 V	180-400 V (*)
Blue	Engine GND	5200-7000 (b)	2000-2500 (b)	180-400 V	180-400 V (*)
Red	Blue	185-205 (a)	160-200 (a)	25-100 V	25-100 V (*)
Red	Engine GND	180-340 (b)	160-200 (b)	25-100 V	25-100 V (*)
Brown	White (or Brown)	800-1000 (a)	800-1000 (a)	0.5 V +	0.5 V + (#)
Brown	White (or Brown)	140-160 (b)	140-160 (b)	0.5 V +	0.5 V + (#)

   (*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.
   (#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the pack is bad.
   (a) 1973-1974
   (b) 1976-1978 (w/ full ring stator CDI part# 174-5255)
6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

ENGINE HAS SPARK BUT WILL NOT RUN:

1. Index the flywheel and check the timing. If it is out by 180 degrees, swap the trigger wires to the switch box.
2. If the timing is off by any other degree, check the flywheel key.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the DVA output from the switch box on the Green wire while it is connected to the ignition coil. You should have a reading of at least 150V or more. If the reading is low, you can have a problem firing both cylinders (the one that is firing will usually show a weak spark).
2. Connect an inductive tachometer to each cylinder and compare the RPM readings at the RPM where the problem is occurring. If only one cylinder is dropping out, swap the ignition coil locations and retest. If the problem follows a coil, replace the coil. If it stays on the same spark plug, replace the switch box.
3. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the switch box.
2. In contrast, a shorted SCR inside the switch box can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repeat test as necessary for additional switch boxes.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Green wires from the switch box while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK ON ANY CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Two Cylinder Engines 1979-1996 (With 114-7452A3 & K1/339-7452 Switch Box)

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire AT THE SWITCH BOX and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
3. Inspect and clean all engine and ignition ground connections.
4. Check the stator resistance and DVA output:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Black/Yellow	Engine GND	3250-3650	2200-2400	180-400 V	180-400 V (*)
Black/White	Engine GND	150-250	200-250	25-100 V	25-100 V (*)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

5. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
6. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the trigger resistance and DVA output:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown/Yellow	Brown/White	750-1400	925-1050	4 V +	4 V + (#)
Brown/Yellow	Engine GND	Open	Open	1 V +	N/A
Brown/White	Engine GND	Open	Open	1 V +	N/A

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the pack is bad.

2. Check the DVA output on the Green wires from the switch box while connected to the ignition coils. Check the reading on the switch box terminal AND on the ignition coil terminal. You should have a reading of at least 150V or more at both places. If the reading is low on one cylinder, disconnect the Green wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad switch box.
3. Connect an inductive tachometer to each cylinder and compare the RPM readings at the RPM where the problem is occurring. If only one cylinder is dropping out, swap the ignition coil locations and retest. If the problem follows a coil, replace the coil. If it stays on the same spark plug, replace the switch box.
4. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the switch box.
2. In contrast, a shorted SCR inside the switch box can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repeat test as necessary for additional switch boxes.

WILL NOT ACCELERATE BEYOND 3000-4000 RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has good spark, replace the rectifier.
2. Connect a DVA meter between the stator's Black/Yellow wire/terminal and engine ground. Run the engine up to the RPM where the problem is occurring. DVA voltage should increase with RPM. A sharp drop in DVA right before the problem occurs usually indicates a bad stator.
3. Connect a DVA meter between the stator's Black/White wire/terminal and engine ground. The DVA voltage should show a smooth climb in voltage and remain high through the RPM range. A reading lower than on the Black/Yellow wire/terminal reading indicates a bad stator.
4. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A single cylinder dropping spark will likely be a bad switch box or ignition coil. All cylinders not sparking properly usually indicates a bad stator.
5. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
6. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Green wires from the switch box while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Two Cylinder Engines 1994-1996 (With 114-4952A30/18495A9, A14, A16, A20, A21 or A30 Switch Box)

(NOTE) This engine has a locked trigger arm. Therefore, the timing is controlled by the switch box and is adjusted according to the engine RPM. RPM limiting is done by retarding the timing at high RPM.

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire AT THE SWITCH BOX and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
3. Inspect and clean all engine and ignition ground connections.
4. Check the stator resistance and DVA output as given below:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Blue	Black	2900-3500	2200-2600	180-400 V	180-400 V (*)
Red	Black	100-180	200-250	25-100 V	25-100 V (*)
Black	Engine GND	Open	Open	2 V +	N/A

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

5. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
6. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the trigger resistance and DVA output as shown below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	White	800-1400	4 V +	4 V + (#)
Brown	Engine GND	Open	1 V +	N/A
White	Engine GND	Open	1 V +	N/A

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the pack is bad.

2. Check the DVA output on the Green wires from the switch box while connected to the ignition coils. Check the reading on the switch box terminal AND on the ignition coil terminal. You should have a reading of at least 150V or more at both places. If the reading is low on one cylinder, disconnect the Green wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.
3. If the cylinders are only misfiring above an idle, connect an inductive tachometer to each cylinder in turn and try to isolate the problem cylinder.
4. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the switch box.
2. In contrast, a shorted SCR inside the switch box can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repet test as necessary for additional switch boxes.

WILL NOT ACCELERATE BEYOND 3000-4000 RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has good spark, replace the rectifier.
2. Connect a DVA meter between the stator's Blue and Black wires. Run the engine up to the RPM where the problem is occurring. DVA voltage should increase with RPM. A sharp drop in DVA right before the problem occurs usually indicates a bad stator.
3. Connect a DVA meter between the stator's Red and Black wires. The DVA voltage should show a smooth climb in voltage and remain high through the RPM range. A reading lower than on the Blue wire reading indicates a bad stator.
4. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A single cylinder dropping spark will likely be a bad switch box or ignition coil. All cylinders not sparking properly usually indicates a bad stator.
5. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
6. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Green wires from the switch box while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Two Cylinder Engines 1994-2006 (With 114-5713/855721A3 & A4 Switch Box)

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire AT THE SWITCH BOX and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator resistance and DVA output as given below:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
White/Green	Green/White	660-710	350-450	180-400 V	180-400 V (*)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Check the trigger resistance and DVA output as shown below:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown/Yellow	Brown/White	850-1100	850-1100	4 V +	4 V + (#)
Brown/Yellow	Engine GND	Open	Open	1 V +	N/A
Brown/White	Engine GND	Open	Open	1 V +	N/A

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the pack is bad.

2. Check the DVA output on the Green wires from the switch box while connected to the ignition coils. Check the reading on the switch box terminal AND on the ignition coil terminal. You should have a reading of at least 150V or more at both places. If the reading is low on one cylinder, disconnect the Green wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.
3. If the cylinders are only misfiring above an idle, connect an inductive tachometer to each cylinder in turn and try to isolate the problem cylinder.
4. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the switch box.
2. In contrast, a shorted SCR inside the switch box can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repeat test as necessary for additional switch boxes.

WILL NOT ACCELERATE BEYOND 3000-4000 RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has good spark, replace the rectifier.
2. Connect a DVA meter between the stator's Green/White and White/Green wires. Run the engine up to the RPM where the problem is occurring. DVA voltage should increase with RPM. A sharp drop in DVA right before the problem occurs usually indicates a bad stator.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A single cylinder dropping spark will likely be a bad switch box or ignition coil. All cylinders not sparking properly usually indicates a bad stator.
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Green wires from the switch box while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

Three Cylinder Engines
1976-1996
Three Cylinder Engines Using a Single Switch Box and Three Ignition Coils

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow (or Orange) stop wire AT THE SWITCH BOX and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the stator resistance and DVA output as given below:

Black Stator using Flywheel with Bolted-in Magnets

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Blue	Engine GND	5800-7000	2200-2400	180-400 V	180-400 V (*)
Red	Engine GND	135-165	45-55	25-100 V	25-100 V (*)

Black Stator using Flywheel with Glued-in Magnets

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Blue	Engine GND	3250-3650	500-600	180-400 V	180-400 V (*)
Red	Engine GND	75-90	28-32	25-100 V	25-100 V (*)

Red Stator Kit

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
White/Green	Green/White	500-700	500-600	180-400 V	180-400 V (*)
Blue	Engine GND	OPEN	OPEN	180-400 V	180-400 V (*)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

6. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the trigger resistance and DVA output as given below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	White/Black (or Black)	800-1400	4 V +	4 V + (#)
White	White/Black (or Black)	800-1400	4 V +	4 V + (#)
Purple	White/Black (or Black)	800-1400	4 V +	4 V + (#)
Brown	Engine GND	Open	1 V +	N/A
White	Engine GND	Open	1 V +	N/A
Purple	Engine GND	Open	1 V +	N/A

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the pack is bad.

2. Check the DVA output on the Green wires from the switch box while connected to the ignition coils. Check the reading on the switch box terminal AND on the ignition coil terminal. You should have a reading of at least 150V or more at both terminals. If the reading is low on one cylinder, disconnect the Green wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading symptom indicates a bad power pack.
3. If the cylinders are only misfiring above an idle, connect an inductive tachometer to all cylinders and try to isolate the problem cylinders.
4. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the switch box.
2. In contrast, a shorted SCR inside the switch box can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repeat test as necessary for additional switch boxes.

WILL NOT ACCELERATE BEYOND 3000-4000 RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has good spark, replace the rectifier.
2. Connect a DVA meter between the stator's Blue wire and engine ground. Run the engine up to the RPM where the problem is occurring. DVA voltage should increase with RPM. A sharp drop in DVA right before the problem occurs usually indicates a bad stator. (Read from Blue to engine ground if the engine has a Red stator kit installed).
3. Connect a DVA meter between the stator's Red wire and engine ground. The DVA voltage should show a smooth climb in voltage and remain high through the RPM range. A reading lower than on the Blue wire reading indicates a bad stator.
4. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A single cylinder dropping spark will likely be a bad switch box or ignition coil. All cylinders not sparking properly usually indicates a bad stator.
5. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
6. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Green wires from the switch box while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

WILL NOT IDLE BELOW 1500 RPM:

1. Check the Bias resistance from the Black/White terminal to engine ground. Reading should be 14-15,000 ohms.
2. Check for air leaks.

Four Cylinder Engines

1978-1996

Four Cylinder Engines Using a Single Switch Box and Four Ignition Coils

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow (or Orange) stop wire AT THE SWITCH BOX and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Verify the correct flywheel is installed.
6. Check the stator resistance and DVA output as shown below:

Black Stator using Flywheel with Bolted-in Magnets

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Blue	Blue/White	5000-7000	2200-2400	180-400 V	180-400 V (*)
Red	Red/White	125-155	45-55	25-100 V	25-100 V (*)

Black Stator using Flywheel with Glued-in Magnets

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Blue	Blue/White	3250-3650	500-600	180-400 V	180-400 V (*)
Red	Red/White	75-90	28-32	25-100 V	25-100 V (*)

Red Stator Kit

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
White/Green	Green/White	500-700	500-600	180-400 V	180-400 V (*)
Blue	Blue/White	OPEN	OPEN	180-400 V	180-400 V (*)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

7. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
8. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the trigger resistance and DVA output as given below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Purple	White	800-1400	4 V +	4 V + (#)
Brown	White/Black (or Black)	800-1400	4 V +	4 V + (#)
Purple	Engine GND	Open	1 V +	N/A
White	Engine GND	Open	1 V +	N/A
Brown	Engine GND	Open	1 V +	N/A
White/Black	Engine GND	Open	1 V +	N/A

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one or two cylinders and the trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the pack is bad.

(Note) If #1 and #2, or #3 and #4 are misfiring, check the trigger as described above. The trigger has two coils firing four cylinders. #1 & 2 share a trigger coil and #3 & 4 share a trigger coil. Also, the switch box is divided into two parts. The #1 and #2 cylinders spark on one side and #3 and #4 spark from the other side of the switch box. If the trigger tests are okay according to the chart above, but you have two cylinders not firing (either #1 and #2, or #3 and #4), the switch box or stator is bad.

2. If you have two cylinders not firing (either #1 and #2, or #3 and #4), switch the stator leads end to end on the switch box (swap Red with Red/White) and (swap Blue with Blue/White). If the problem moves to the other cylinders, the stator is bad. If the problem stays on the same cylinders, the switch box is likely bad.
3. Check the DVA output on the Green wires from the switch box while connected to the ignition coils. Check the reading on the switch box terminal AND on the ignition coil terminal. You should have a reading of at least 150V or more at both terminals. If the reading is low on one cylinder, disconnect the Green wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading symptom indicates a bad power pack.
4. If the cylinders are only misfiring above an idle, connect an inductive tachometer to all cylinders and try to isolate the problem cylinders.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the switch box.
2. In contrast, a shorted SCR inside the switch box can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repeat test as necessary for additional switch boxes.

WILL NOT ACCELERATE BEYOND 3000-4000 RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has good spark, replace the rectifier.
2. Connect a DVA meter between the stator's Blue and Blue/White wires. Run the engine up to the RPM where the problem is occurring. DVA voltage should increase with RPM. A sharp drop in DVA right before the problem occurs usually indicates a bad stator. (Read from Blue to engine ground if the engine has a Red stator kit installed).
3. Connect a DVA meter between the stator's Red and Red/White wires. The DVA voltage should show a smooth climb in voltage and remain high through the RPM range. A reading lower than on the Blue wire reading indicates a bad stator.
4. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A single cylinder dropping spark will likely be a bad switch box or ignition coil. All cylinders not sparking properly usually indicates a bad stator.
5. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
6. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. In the water or on a Dynameters, check the DVA output on the Green wires from the switch box while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
3. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
4. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

WILL NOT IDLE BELOW 1500 RPM:

1. Index the flywheel and check the timing on all cylinders. If the timing cannot be adjusted correctly or if the timing is off on one cylinder, replace the trigger.
2. Check for air leaks.
3. Check synchronization of the carburetors.

Six Cylinder Engines

1978-1999

Inline 6 and V6 Carbureted Engines Using Dual Switch Boxes and Six Ignition Coils

(SERVICE NOTE) Whenever replacing one switch box, always replace the other. Replacing just one switch box can result in damage to the engine if the remaining switch box on the engine has a problem in the bias circuit.

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow (or Orange) stop wires AT THE SWITCH BOXES and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the engine has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect and clean all engine and ignition ground connections.
5. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
6. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE BANK (3 OF 6 ON THE INLINE L-6):

1. Swap the stator leads from one switch box to the other (swap Red with Red/White) and (swap Blue with Blue/White). If the problem moves, the stator is bad. If the same bank still does not spark, the switch box is usually bad.
2. Check the stator resistance and DVA output as shown below:

9 to 16 Amp Flywheels

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Blue	Engine GND	5000-7000	2200-2400	180-400 V	180-400 V (*)
Blue/White	Engine GND	5000-7000	2200-2400	180-400 V	180-400 V (*)
Red	Engine GND	90-200	30-90	25-100 V	25-100 V (*)
Red/White	Engine GND	90-200	30-90	25-100 V	25-100 V (*)

40 Amp Flywheels

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Blue	Engine GND	3200-4200	2200-2400	180-400 V	180-400 V (*)
Blue/White	Engine GND	3200-4200	2200-2400	180-400 V	180-400 V (*)
Red	Engine GND	90-140	28-32	25-100 V	25-100 V (*)
Red/White	Engine GND	90-140	28-32	25-100 V	25-100 V (*)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.
(NOTE) If both Blue wires read low, check the cranking RPM. It must be more than 250 RPM.

3. Check the DVA output on the Green wires from the switch box while connected to the ignition coils. Check the reading on the switch box terminal AND on the ignition coil terminal. You should have a reading of at least 150V or more at both terminals on all cylinders. If the reading is low on one bank and the stator voltage is good, the switch box is usually bad.
4. Check the cranking RPM. A cranking speed less than 250-RPM will not allow the system to spark properly.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the trigger resistance and DVA output as shown below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown (Black Sleeve)	White (Yellow Sleeve)	800-1400	4 V +	4 V + (#)
White (Black Sleeve)	Purple (Yellow Sleeve)	800-1400	4 V +	4 V + (#)
Purple (Black Sleeve)	Brown (Yellow Sleeve)	800-1400	4 V +	4 V + (#)

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one or two cylinders and the trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the pack is bad.

(Service Note) You should get a high or open resistance reading to engine ground from each wire, but you will get a DVA reading of approximately 1-2 Volts. This reading can be used to determine if a pack has a problem in the triggering circuit. For example, if you have no spark on one cylinder and the DVA trigger reading for that cylinder is low – disconnect the trigger wire and recheck the DVA output to ground from the trigger wire. If the reading stays low – the trigger is bad.

2. Check the DVA output on the Green wires from the switch box while connected to the ignition coils. Check the reading on the switch box terminal AND on the ignition coil terminal. You should have a reading of at least 150V or more at both terminals. If the reading is low on one cylinder, disconnect the Green wire from the ignition coil for that cylinder and

reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading symptom indicates a bad switch box.
3. Connect a spark gap tester and verify which cylinders are misfiring. If the cylinders are only misfiring above an idle, connect an inductive tachometer to all cylinders and try to isolate the problem cylinders.
4. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the switch box.
2. In contrast, a shorted SCR inside the switch box can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
3. Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repeat test as necessary for additional switch boxes.

WILL NOT ACCELERATE BEYOND 3000-4000 RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has good spark, replace the rectifier.
2. Disconnect the idle stabilizer (advance module) and reset the timing between 23-25 degrees Wide Open Throttle. If the problem clears, discard the idle stabilizer as it is not needed.
3. Connect a DVA meter between the stator's Blue wire and engine ground. Run the engine up to the RPM where the problem is occurring. DVA voltage should increase with RPM. A sharp drop in DVA right before the problem occurs usually indicates a bad stator. (Repeat the test from Blue/White to engine ground and compare the readings).
4. Connect a DVA meter between the stator's Red wire and engine ground. The DVA voltage should show a smooth climb in voltage and remain high through the RPM range. A reading lower than on the Blue wire reading indicates a bad stator. (Repeat the test from Red/White to engine ground and compare the readings).
5. If all cylinders become intermittent, replace both switch boxes.
6. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. If two or more cylinders on the same bank are dropping out, the problem is likely going to be either the stator or the switch box. A single cylinder dropping spark will likely be a bad switch box or ignition coil. All cylinders not sparking properly usually indicates a bad stator.
7. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
8. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. Disconnect the idle stabilizer (advance module) and reset the timing between 23-25 degrees Wide Open Throttle. If the problem clears, discard the idle stabilizer as it is not needed.
3. In the water or on a Dynameters, check the DVA output on the Green wires from the switch box while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad stator. A sharp drop in DVA on less than all cylinders will normally be the switch box or trigger.
4. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
5. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
6. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
7. Rotate the stator one bolt hole in either direction and retest.

Mercury/Force
Two Cylinder Engines
1994-2006 Engines Using CDM Modules

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wires from the harness and retest. If the engine's ignition sparks, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect the spark plug wires, boots and spark plugs. Check for chafing on the wiring and harnesses.
5. Inspect and clean all engine and ignition ground connections.
6. Pull on each wire from each CDM harness plug. Make sure all wires are making proper contact inside plugs.
7. Disconnect one CDM module at a time and using a set of piercing probes and jumper wires - short the stator wire in the CDM connector to engine ground. Retest. If the other module starts sparking, the CDM you unplugged is bad.
8. Check the stator resistance and DVA output as follows:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
White/Green	Green/White	500-700	500-600	180-400 V	180-400 V (*)

(*) This reading can be used to determine if a stator or the CDM modules have a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – at least one of the CDM modules is bad.

9. Check the resistance of each of the CDM modules as follows:

	RED METER LEAD	BLACK METER LEAD	READING
CDM Pin #	A	C	OEM 2200-2400 Ohms – CDI 1200-1300 Ohms
CDM Pin #	D	A	DIODE*
CDM Pin #	A	D	DIODE*
CDM Pin #	D	B	DIODE*
CDM Pin #	B	D	DIODE*
CDM Pin #	A	B	DIODE*
	High Tension Lead	A	OEM 700-1300 Ohms – CDI 2200-2400 Ohms

* Diode readings are to be read one way, then reverse the leads and read again. You should get a low reading in one direction and a higher reading in the other.

10. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
11. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER:

1. Inspect the spark plug wires, boots and spark plugs. Check for chafing on the wiring and harnesses.
2. Clean and inspect CDM ground wire connections to engine ground.
3. Check the trigger DVA output as shown below:

WIRE	READ TO	RESISTANCE	DVA (Connected)
Purple	Engine GND	Open	1 V +
White	Engine GND	Open	1 V +

4. If one cylinder is not sparking, swap the White/Green and Green/White stator wires and retest. If the problem moves to the other cylinder, the stator is likely bad. If no change, replace both CDMs. A continued no spark condition on the same cylinder indicates a bad trigger.
5. If the cylinders are only misfiring up above an idle, connect an inductive tachometer to all cylinders and try to isolate the problem cylinders.
6. Check the resistance of each of the CDM modules (see NO SPARK ON ANY CYLINDER above).

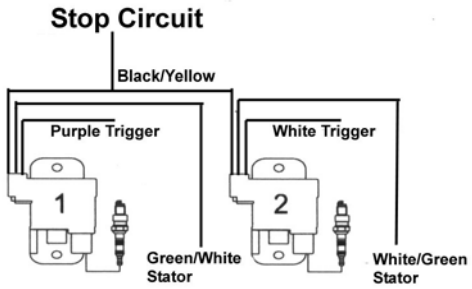
CDM OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the CDM.
2. In contrast, a shorted SCR inside the CDM can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Cut the Black/Yellow stop wire from the CDM not sparking. Measure DC voltage from Black/Yellow (from the harness) to engine ground. Turn the ignition switch on and off several times. DC voltage should never exceed 2V. If it does, the stop circuit has a fault. Check the key switch, harness and shift switch.
4. Replace the CDM on the cylinder dropping spark.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the trigger or CDM module. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE CYLINDER above).
3. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.

4. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
5. Rotate the stator one bolt hole in either direction and retest.



Mercury/Force
Three Cylinder Engines
1996-2006 Engines Using CDM Modules

NO SPARK ON ANY CYLINDER:

1. Cut each Black/Yellow stop wire from each CDM module and disconnect the RPM Limiter's stop wire one at a time and retest. If the engine's ignition sparks, the stop circuit you just cut has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect the spark plug wires, boots and spark plugs. Check for chafing on the wiring and harnesses.
5. Inspect and clean all engine and ignition ground connections.
6. Pull on each wire from each CDM harness plug. Make sure all wires are making proper contact inside plugs.
7. Disconnect one CDM module at a time and see if the other modules start sparking. If they do, the module you just unplugged is bad. Remember only one side of the stator is connected to one CDM and the other side is connected to two CDM modules. If you disconnect the CDM using the lone side of the stator, you will need to ground that side of the stator.
8. If the bottom two CDM modules are not sparking, swap the connection between the top and middle cylinder. If the middle cylinder starts sparking, replace the top CDM.
9. Check the stator resistance and DVA output as given below:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
White/Green	Green/White	500-700	500-600	180-400 V	180-400 V (*)

(*) This reading can be used to determine if a stator or the CDM modules have a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – at least one of the CDM modules is bad.

10. Check the resistance of each of the CDM modules as follows:

	RED METER LEAD	BLACK METER LEAD	READING
CDM Pin #	A	C	OEM 2200-2400 Ohms – CDI 1200-1300 Ohms
CDM Pin #	D	A	DIODE*
CDM Pin #	A	D	DIODE*
CDM Pin #	D	B	DIODE*
CDM Pin #	B	D	DIODE*
CDM Pin #	A	B	DIODE*
	High Tension Lead	A	OEM 700-1300 Ohms – CDI 2200-2400 Ohms

* Diode readings are to be read one way, then reverse the leads and read again. You should get a low reading in one direction and a higher reading in the other.

11. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
12. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Inspect the spark plug wires, boots and spark plugs. Check for chafing on the wiring and harnesses.
2. Clean and inspect CDM ground wire connections to engine ground.
3. Check the trigger DVA output as shown below:

WIRE	READ TO	RESISTANCE	DVA (Connected)
Purple	Engine GND	Open	1 V +
White	Engine GND	Open	1 V +
Brown	Engine GND	Open	1 V +

4. If (#1) or (#3) or (#1 and #2) or (#2 and #3) is not sparking, swap the White/Green and Green/White stator wires and retest. If the problem moves to the other cylinder(s), the stator is likely bad. If no change, replace all CDMs. A continued no spark condition on the same cylinder(s) indicates a bad trigger.

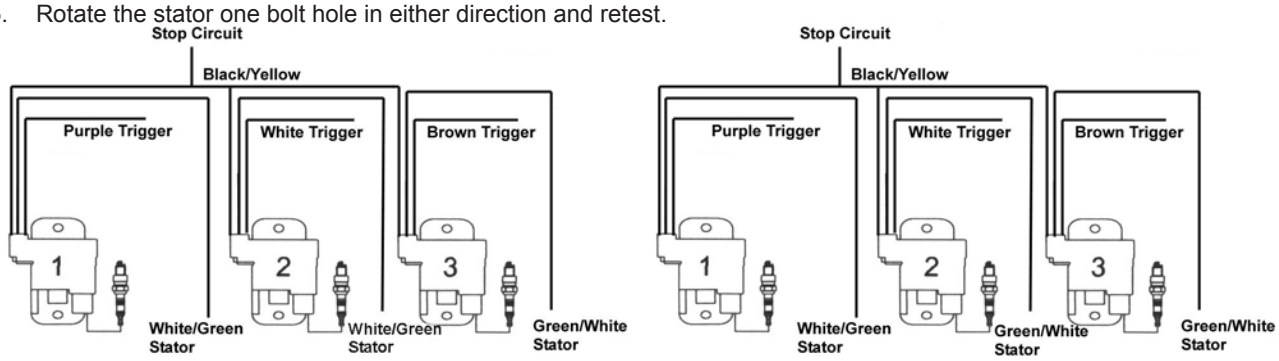
5. If #1 CDM module is not sparking, disconnect the #2 CDM module and see if the #1 CDM module starts sparking. If it does, the module you just unplugged is bad. If it does not, reconnect #2, then disconnect the #3 CDM module and see if the #1 module starts sparking. If it does, the module you just unplugged is bad.
6. If there is no spark on either # 2 or #3, swap locations with #1 and see if the problem moves. If it does, the module is bad. A continued no spark on the same cylinder indicates a bad trigger.
7. If the cylinders are only misfiring above an idle, connect an inductive tachometer to all cylinders and try to isolate the problem cylinders.
8. Check the resistance of each of the CDM modules (see NO SPARK ON ANY CYLINDER above).

CDM OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the CDM.
2. In contrast, a shorted SCR inside the CDM can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Cut the Black/Yellow stop wire from the CDM not sparking. Measure DC voltage from Black/Yellow (from the harness) to engine ground. Turn the ignition switch on and off several times. DC voltage should never exceed 2V. If it does, the stop circuit has a fault. Check the key switch, harness and shift switch.
4. Replace the CDM on the cylinder dropping spark.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the trigger or CDM module. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
3. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
4. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
5. Rotate the stator one bolt hole in either direction and retest.



Mercury/Force
Four Cylinder Engines
1996-2006 Engines Using CDM Modules

NO SPARK ON ANY CYLINDER:

1. Cut each Black/Yellow stop wire from each CDM module and disconnect the RPM Limiter's stop wire one at a time and retest. If the engine's ignition sparks, the stop circuit you just cut has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the engine has spark, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
4. Inspect the spark plug wires, boots and spark plugs. Check for chafing on the wiring and harnesses.
5. Inspect and clean all engine and ignition ground connections.
6. Pull on each wire from each CDM harness plug. Make sure all wires are making proper contact inside plugs.
7. Disconnect the CDM modules one at a time and see if you get spark back on the other cylinders. A shorted stop circuit in one CDM will prevent ALL cylinders from sparking.
8. Check the stator resistance and DVA output as given below:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
White/Green	Green/White	500-700	500-600	180-400 V	180-400 V (*)

(*) This reading can be used to determine if a stator or the CDM modules have a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – at least one of the CDM modules is bad.

9. Check the resistance of each of the CDM modules as follows:

	RED METER LEAD	BLACK METER LEAD	READING
CDM Pin #	A	C	OEM 2200-2400 Ohms – CDI 1200-1300 Ohms
CDM Pin #	D	A	DIODE*
CDM Pin #	A	D	DIODE*
CDM Pin #	D	B	DIODE*
CDM Pin #	B	D	DIODE*
CDM Pin #	A	B	DIODE*
	High Tension Lead	A	OEM 700-1300 Ohms – CDI 2200-2400 Ohms

* Diode readings are to be read one way, then reverse the leads and read again. You should get a low reading in one direction and a higher reading in the other.

10. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
11. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Inspect the spark plug wires, boots and spark plugs. Check for chafing on the wiring and harnesses.
2. Clean and inspect CDM ground wire connections to engine ground.
3. Check the trigger DVA output as shown below:

WIRE	READ TO	RESISTANCE	DVA (Connected)
Purple	Engine GND	Open	3 V +
White	Engine GND	Open	3 V +
Brown	Engine GND	Open	3 V +
Blue	Engine GND	Open	3 V +

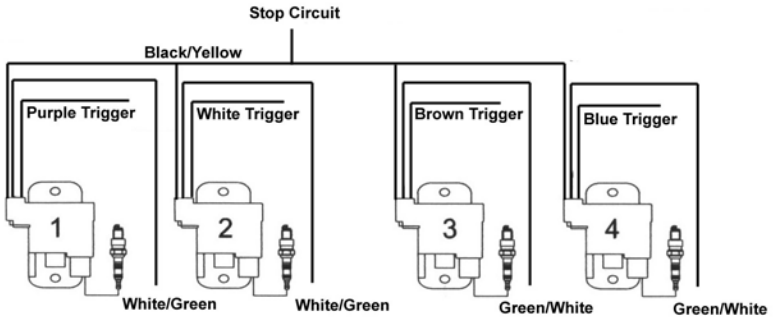
4. If (#1 and/or #2) or (#3 and/or #4) is not sparking, swap the White/Green and Green/White stator wires and retest. If the problem moves to the other cylinders, the stator is likely bad. If no change, replace all CDMs. A continued no spark condition on the same cylinders indicates a bad trigger.
5. Disconnect the CDM modules one at a time and see if you get spark back on the problem cylinders. If it does, replace all CDMs.
6. If the cylinders are only misfiring above an idle, connect an inductive RPM meter to all cylinders and try to isolate the problem cylinders.
7. Check the resistance of each of the CDM modules (see NO SPARK ON ANY CYLINDER above).

CDM OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the CDM.
2. In contrast, a shorted SCR inside the CDM can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Cut the Black/Yellow stop wire from the CDM not sparking. Measure DC voltage from Black/Yellow (from the harness) to engine ground. Turn the ignition switch on and off several times. DC voltage should never exceed 2V. If it does, the stop circuit has a fault. Check the key switch, harness and shift switch.
4. Replace the CDM on the cylinder dropping spark.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
2. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the trigger or CDM module. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
3. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
4. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
5. Rotate the stator one bolt hole in either direction and retest.
6. Use the wiring diagram below as an aid in locating areas where problems may occur. Remember a short in either #1 or #2 can cause either #3 or #4 not to have spark.



Mercury
Six Cylinder Engines
1996-2005 2.5 L Engines Using CDM Modules

NO SPARK ON ANY CYLINDER:

1. Cut each Black/Yellow stop wire from each CDM module and disconnect the RPM Limiter's stop wire one at a time and retest. If the engine's ignition sparks, the stop circuit you just cut has a fault. Check the key switch, harness and shift switch.
2. Disconnect the Yellow wires from the rectifier and retest. If the engine has spark, replace the rectifier.
3. Disconnect the ICM and reconnect the trigger to the CDM harness. If the engine has spark, verify 12V DC on the Purple wire to the ICM. If 12V DC is present, the ICM is faulty. If 12V DC is not present, check the key switch and harness.
4. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine.
5. Inspect the spark plug wires, boots and spark plugs. Check for chafing on the wiring and harnesses.
6. Inspect and clean all engine and ignition ground connections.
7. Pull on each wire from each CDM harness plug. Make sure all wires are making proper contact inside plugs.
8. Disconnect the CDM modules one at a time and see if you get spark back on the other cylinders. A shorted stop circuit in one CDM will prevent ALL cylinders from sparking.
9. Check the stator resistance and DVA output as given below:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
White/Green	Green/White	500-700	500-600	180-400 V	180-400 V (*)

(*) This reading can be used to determine if a stator or the CDM modules have a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – at least one of the CDM modules is bad.

10. Check the resistance of each of the CDM modules as follows:

	RED METER LEAD	BLACK METER LEAD	READING
CDM Pin #	A	C	OEM 2200-2400 Ohms – CDI 1200-1300 Ohms
CDM Pin #	D	A	DIODE*
CDM Pin #	A	D	DIODE*
CDM Pin #	D	B	DIODE*
CDM Pin #	B	D	DIODE*
CDM Pin #	A	B	DIODE*
	High Tension Lead	A	OEM 700-1300 Ohms – CDI 2200-2400 Ohms

* Diode readings are to be read one way, then reverse the leads and read again. You should get a low reading in one direction and a higher reading in the other.

11. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
12. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Inspect the spark plug wires, boots and spark plugs. Check for chafing on the wiring and harnesses.
2. Clean and inspect CDM ground wire connections to engine ground.
3. Check the trigger resistance and DVA output as given below:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Purple	Blue	1100-1400	850-1050	4 V +	4 V + (#)
White	Red	1100-1400	850-1050	4 V +	4 V + (#)
Brown	Yellow	1100-1400	850-1050	4 V +	4 V + (#)

(#) This reading can be used to determine if a CDM has a problem in the triggering circuit. For instance, if you have no spark on one or two cylinders and the trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the CDM is bad.

4. Disconnect the CDM modules one at a time and see if you get spark back on the problem cylinders. If it does, replace all CDMs.
5. If the cylinders are only misfiring above an idle, connect an inductive RPM meter to all cylinders and try to isolate the problem cylinders.
6. Check the resistance of each of the CDM modules (see NO SPARK ON ANY CYLINDER above).

CDM OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the CDM.
2. In contrast, a shorted SCR inside the CDM can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Cut the Black/Yellow stop wire from the CDM not sparking. Measure DC voltage from Black/Yellow (from the harness) to engine ground. Turn the ignition switch on and off several times. DC voltage should never exceed 2V. If it does, the stop circuit has a fault. Check the key switch, harness and shift switch.
4. Replace the CDM on the cylinder dropping spark.

MISS AT ANY RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.

2. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A high variance in RPM on one cylinder usually indicates a problem in the trigger or CDM module. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
3. Perform a high-speed shutdown and read the spark plugs. Check for water. A crack in the block can cause a miss at high speed when the water pressure gets high, but a normal shutdown will mask the problem.
4. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
5. Rotate the stator one bolt hole in either direction and retest.
6. Index the flywheel and check the timing on ALL cylinders. On carbureted models, the control module rev limit function starts to retard timing in sequence (2, 3, 4, 5, 6, 1) at 5800-6000 RPM. The control module will retard the timing each cylinder up to 30 degrees (starting with #2) and then stop firing that cylinder if the RPM is still above the limit. It will continue to retard, then shut down each cylinder until the engine drops below the limit.

NO SPARK OR INTERMITTENT SPARK ON #1, #2 and #3 OR #4, #5 and #6 CYLINDERS:

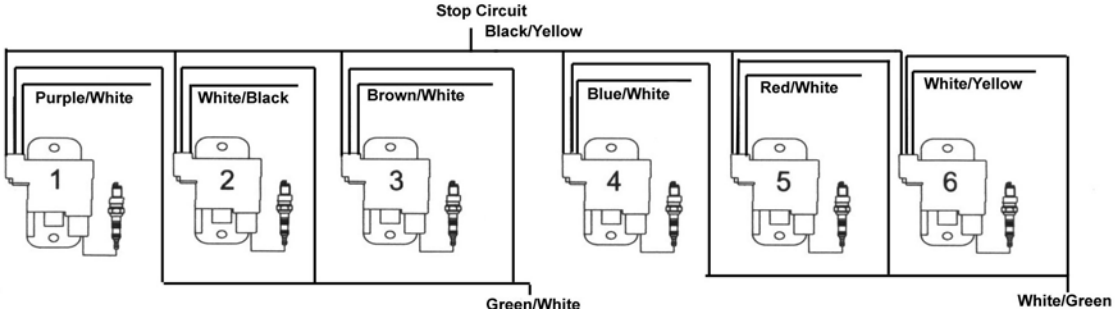
1. Check the cranking RPM. A cranking speed less than 250-RPM will not allow the system to spark properly.
2. Disconnect the CDM modules one at a time and see if you get spark back on the problem cylinders.
3. Check the stator resistance and DVA output as given below:

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
White/Green	Green/White	500-700	500-600	180-400 V	180-400 V (*)
White/Green	Engine GND	Open	Open	180-400 V	< 2 V
Green/White	Engine GND	Open	Open	180-400 V	< 2 V

4. Check the trigger resistance and DVA output (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
5. Check the trigger DVA output as given below:

WIRE	READ TO	RESISTANCE	DVA (Connected)
Purple	Engine GND	Open	1 V +
White	Engine GND	Open	1 V +
Brown	Engine GND	Open	1 V +
Blue	Engine GND	Open	1 V +
Red	Engine GND	Open	1 V +
Yellow	Engine GND	Open	1 V +

6. If (#1, #2 and #3) or (#4, #5 and #6) is not sparking, swap the White/Green and Green/White stator wires and retest. If the problem moves to the other cylinders, the stator is likely bad. If no change, replace all CDMs. A continued no spark condition on the same cylinders indicates a bad trigger.
7. The connection guide below will assist you in locating areas where problems can occur. Remember a short in either #1, #2 or #3 can cause either # 4, #5 or #6 not to have spark.



Mercury
Six Cylinder Engines
1994-2003 225/250 3.0L Engines Using CDM Modules

Service Notes: Please use the Factory recommended spark plug (currently Champion QL77CC) gapped at 0.035" for EFI engines and 0.040" for Carbureted engines.
The Crank Position Sensor should be gapped at 0.040" +/- 0.020".
The maximum spark timing is controlled by the ignition ECU and is non-adjustable. As long as the ECU, Crank Position Senor and Throttle Position Indicator are functioning properly, the maximum timing will be correct.

NO SPARK OR WEAK SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wires from the harness. Retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Inspect the spark plug wires, boots and spark plugs. Check for chafing on the wiring and harnesses.
3. Inspect and clean all engine and ignition ground connections.
4. Check the Stator Harness for loose connections.
5. Check the Alternator for dragging and shorted diodes.
6. Check the Crank Position Sensor resistance as given below:

WIRE	READ TO	RESISTANCE
Red	White	900-1300

NO SPARK OR WEAK SPARK ON ONE CYLINDER:

1. Inspect the spark plug wires, boots and spark plugs. Check for chafing on the wiring and harnesses.
2. Clean and inspect CDM ground wire connection to engine ground.
3. If the cylinders are only misfiring above an idle, connect an inductive RPM meter to all cylinders and try to isolate the problem cylinders.
4. Check the Stator resistance and DVA output as given below:

WIRE	READ TO	RESISTANCE	DVA (Connected)
Green	Engine GND	990-1210	100 V +
Green/Red	Engine GND	990-1210	100 V +
Green/Yellow	Engine GND	990-1210	100 V +
Green/Blue	Engine GND	990-1210	100 V +
Green/Orange	Engine GND	990-1210	100 V +
Green/Black	Engine GND	990-1210	100 V +

5. Check the resistance of each of the CDM modules as follows:

	RED METER LEAD	BLACK METER LEAD	READING
CDM Pin #	A	C	OEM 2200-2400 Ohms – CDI 1200-1300 Ohms
CDM Pin #	D	A	DIODE*
CDM Pin #	A	D	DIODE*
CDM Pin #	D	B	DIODE*
CDM Pin #	B	D	DIODE*
CDM Pin #	A	B	DIODE*
	High Tension Lead	A	OEM 700-1300 Ohms – CDI 2200-2400 Ohms

* Diode readings are to be read one way, then reverse the leads and read again. You should get a low reading in one direction and a higher reading in the other.

TIMING FLUCTUATES:

Service Notes: It is normal for timing to fluctuate 2° @ idle.
If engine overheats (above 200°F), Engine Temperature Sensor will retard timing to limit RPM to 3000.
If engine RPM exceeds 6000, over-rev circuit in ECU will retard timing to reduce RPM.
If engine RPM drops below 475, idle stabilizer in ECU will advance timing 3° to 6°.

1. Clean and inspect all ground connections.
2. Check the Crank Position Sensor gap (0.040" +/- 0.020") and resistance as given below:

WIRE	READ TO	RESISTANCE
Red	White	900-1300

3. Check the Throttle Position Sensor.
4. Check the Engine Temperature Sensor.
5. Check the ECU.

TIMING WILL NOT ADVANCE:

Service Note: If timing will not advance on only one cylinder, check wiring between Ignition Module and ECU. If wiring is OK, replace Ignition Module.

1. Check the Crank Position Sensor.
2. Check the Throttle Position Sensor.
3. Check the ECU.

ENGINE MISSES AT HIGH RPM:
1. Check the Ignition Modules.
2. Check the Crank Position Sensor.
3. Check the Alternator's Red output lead for tightness.
4. Check the ECU.
5. Check for correct spark plugs (use Champion QL77CC).

ENGINE HARD TO START WHEN COLD:
1. Check the Enrichment Solenoid (Carbureted engines).
2. Check the Engine Temperature Sensor.
3. Check the Crank Position Sensor.
4. Check the ECU.
5. Check the Harness for loose connections between ECU and Starter Solenoid.

ENGINE MISSES @ LOW RPM, BUT RUNS SMOOTH @ HIGH RPM:
1. Check the Harness for loose connections between ECU and Ignition Modules.
2. Check the Ignition Modules.

ENGINE STARTS HARD WHEN HOT:
1. Check the Enrichment Solenoid (Carbureted engines).
2. Check the Crank Position Sensor.
3. Check the Engine Temperature Sensor.

ENGINE WILL NOT RUN OVER 3000 RPM AND IS NOT OVERHEATING:
1. Check the Engine Temperature Sensor.
2. Check the Throttle Position Sensor.
3. Check the ECU, Map Sensor and Shift Interrupt Switch.

Tohatsu/Nissan
2 & 4 STROKE
2 STROKE Carbureted Engines

MISS AT ANY RPM:

1. If the boat is equipped with a Hummingbird I.D. depth finder, disconnect the power to it and retest. If the miss is gone, switch to a different depth finder. See Tohatsu Service Bulletin # 1200, dated 9/14/1990.
2. Check fuel lines/tank for restrictions, leaks or loose connections.
3. Check fuel pump diaphragms for holes, allowing extra fuel at high RPM.
4. Verify correct spark plugs are installed and are not fouled.
5. Disconnect the stop switch and retest. If the engine performs properly, the stop circuit has a fault.

2.5

NO SPARK:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) stator coil as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Red	Black	280-420	110 V Minimum
Black/Yellow	Eng Ground	-	198 V Minimum

If the above readings are OK and there is no spark, the ignition coil is likely defective.

3.5B

NO SPARK:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Red	Black	280-420	110 V Minimum
Blue	Black	30-46	4 V Minimum
Black/Yellow	Eng Ground	-	110 V Minimum

If the above readings are OK and there is no spark, the ignition coil is likely defective

5B

NO SPARK:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Red	Black	93-140	110 V Minimum
Blue	Black	80-117	4 V Minimum
Black/Yellow	Eng Ground	-	110 V Minimum

If the above readings are OK and there is no spark, the ignition coil is likely defective

8, 9.8

NO SPARK:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) stator coil as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Red	Black	224-336	110 V Minimum

If the above reading is OK and there is no spark, the ignition coil is likely defective.

9.9D, 9.9D2, 15D, 18E,

NO SPARK:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Red	Black	168-252	110 V Minimum
Blue	Black	30-46	4 V Minimum
Black/Yellow	Eng Ground	-	110 V Minimum

If the above readings are OK and there is no spark, the ignition coil is likely defective.

15D2, 18E2,
NO SPARK:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Red	Black	130-195	110 V Minimum
Blue	Black	30-46	4 V Minimum
Black/Yellow	Eng Ground	-	110 V Minimum CDI Output to coil

If the above readings are OK and there is no spark, the ignition coil is likely defective

25C2, 30A, 30A2, 30A3, 40C (2 Cyl), 50C, 50D, 60A, 70A
NO SPARK ON ANY CYLINDER:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Red	Black	200-300	110 V Minimum
Blue	Black	30-46	4 V Minimum

NO SPARK ON ONE CYLINDER:
If only one spark plug has spark, the internal ignition coil is defective. The power pack will need to be replaced.

40D (3 Cyl), 50D2
NO SPARK ON ANY CYLINDER:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Org	Wht/Grn		110 V Minimum
Wht/Red	Black		4 V Minimum
Wht/Blk	Black		4 V Minimum
Blue/Wht	Black		4 V Minimum
Blk/Wht	Black		110 V Minimum CDI Output to coil
Blk/Red	Black		110 V Minimum CDI Output to coil
Blk/Grn	Black		110 V Minimum CDI Output to coil

NO SPARK ON ONE CYLINDER:
If only one spark plug has spark, the internal ignition coil is defective. The power pack will need to be replaced.

60B, 70B
NO SPARK ON ANY CYLINDER:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Wht/Grn	Brn/Wht		8.1 V Minimum
Wht/Grn	Wht/Yel		34.2 V Minimum
Brn/Wht	Wht/Yel		35.1 V Minimum
Blue/Wht	Black		4.75 V Minimum
Blk/Wht	Black		110 V Minimum CDI Output to coil
Blk/Red	Black		110 V Minimum CDI Output to coil
Blk/Grn	Black		110 V Minimum CDI Output to coil

60C, 70C
NO SPARK ON ANY CYLINDER:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Wht/Red	Black		4.75 V Minimum
Wht/Blk	Black		4.75 V Minimum
Blue/Wht	Black		4.75 V Minimum
Blk/Wht	Black		110 V Minimum CDI Output to coil

80, 90

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Wht/Grn	Wht/Yel		135 V Minimum
Wht/Red	Black		4.75 V Minimum
Wht/Blk	Black		4.75 V Minimum
Wht/Blue	Black		4.75 V Minimum
Blk/Wht	Black		110 V Minimum CDI Output to coil
Blk/Red	Black		110 V Minimum CDI Output to coil
Blk/Grn	Black		110 V Minimum CDI Output to coil

115, 120

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Wht/Grn	Wht/Yel		135 V Minimum
Wht/Red	Black		4.75 V Minimum
Wht/Blk	Black		4.75 V Minimum
Wht/Blue	Black		4.75 V Minimum
Wht/Yel	Black		4.75 V Minimum
Blk/Wht	Black		110 V Minimum CDI Output to coil
Blk/Red	Black		110 V Minimum CDI Output to coil
Blk/Grn	Black		110 V Minimum CDI Output to coil
Blk/Blue	Black		110 V Minimum CDI Output to coil

4 STROKE Carbureted Engines

4, 5 and 6 HP

NO SPARK:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils while connected as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Eng Gnd	Black/Yellow		150 V Minimum
Black/Red	Eng Gnd		150 V Minimum
Red/White	Eng Gnd		3.5 V Minimum

If the above readings are OK and there is no spark, the ignition coil is likely defective.

8 and 9.8 HP

NO SPARK:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils while connected as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Eng Gnd	Orange		150 V Minimum
Blue	Black/Red		150 V Minimum
Red/White	Eng Gnd		3.5 V Minimum

If the above readings are OK and there is no spark, the ignition coil is likely defective.

9.9, 15 and 18 HP

NO SPARK:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils while connected as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Orange	Eng Gnd		90 V Minimum
Black/Red	Blue		175 V Minimum
Red/White	Eng Gnd		3.5 V Minimum

If the above readings are OK and there is no spark, the ignition coil is likely defective.

25 and 30 HP Carbureted
NO SPARK:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils while connected as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Black/Red	Blue		175 V Minimum
Black/White	Eng Gnd		190 V Minimum
Black/Red	Eng Gnd		190 V Minimum
Black/Green	Eng Gnd		190 V Minimum
White/Red	Eng Gnd		3.5 V Minimum
White/Black	Eng Gnd		3.5 V Minimum
White/Green	Eng Gnd		3.5 V Minimum

If the above readings are OK and there is no spark, the ignition coil is likely defective.

25 and 30 HP Carbureted
NO SPARK:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils while connected as follows:

Red Lead	Black Lead	Resistance	DVA Connected
Black/Red	Blue		175 V Minimum
Black/White	Eng Gnd		190 V Minimum
Black/Red	Eng Gnd		190 V Minimum
Black/Green	Eng Gnd		190 V Minimum
White/Red	Eng Gnd		3.5 V Minimum
White/Black	Eng Gnd		3.5 V Minimum
White/Green	Eng Gnd		3.5 V Minimum

If the above readings are OK and there is no spark, the ignition coil is likely defective.

25 and 30 HP EFI
NO SPARK:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils while connected as follows:

Red Lead	Black Lead	Resistance	DVA Connected
White/Red	White/Black		200 V Minimum
White/Blue	White/Black		25 V Minimum
Black/White	Eng Gnd		190 V Minimum
Black/Red	Eng Gnd		190 V Minimum
Black/Green	Eng Gnd		190 V Minimum
Red/Yellow	Eng Gnd		5 V Minimum
Red/White	Eng Gnd		5 V Minimum

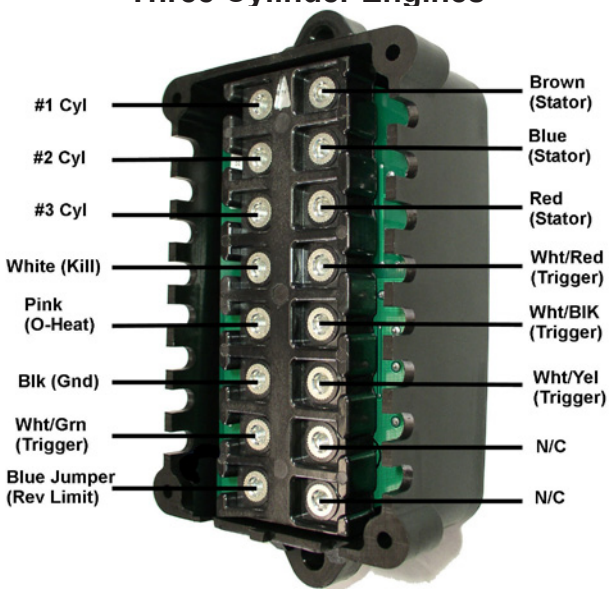
If the above readings are OK and there is no spark, the ignition coil is likely defective.

A special thanks to Tohatsu America for their help in creating this chart.

YAMAHA

2 Stroke Carbureted Engines - Screw Terminal Power Packs

Three Cylinder Engines



NO SPARK ON ANY CYLINDER:

1. Disconnect the White stop wire and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Check the resistance and DVA output of the Stator and Trigger:

Read from	Read to	OEM Reading	CDI Reading	DVA (connected)
White/Red Trigger wire	White/Yellow Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
White/Black Trigger wire	White/Green Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
Brown Stator wire	Blue Stator wire	840-1260 ohms	600-800 ohms	85 Volts Minimum
Blue Stator wire	Red Stator wire	110-130 ohms	10-20 ohms	25 Volts Minimum

3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine properly.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the resistance and DVA output of the Stator and Trigger:

Read from	Read to	OEM Reading	CDI Reading	DVA (connected)
White/Red Trigger wire	White/Yellow Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
White/Black Trigger wire	White/Green Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
White/Red Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
White/Black Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
White/Yellow Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
White/Green Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
Brown Stator wire	Blue Stator wire	840-1260 ohms	600-800 ohms	85 Volts Minimum
Brown Stator wire	Eng Ground	Open	Open	85 Volts Minimum
Blue Stator wire	Eng Ground	Open	Open	16 Volts Minimum
Blue Stator wire	Red Stator wire	65-130 ohms	10-20 ohms	16 Volts Minimum
Red Stator wire	Eng Ground	Open	Open	30 Volts Minimum

2. Check the DVA output on the Black/White wires from the power pack while connected to the ignition coils. You should have a reading of at least 125V or more. If the reading is low on one cylinder, disconnect the wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack or trigger (test per above).

ENGINE WILL NOT ACCELERATE ABOVE APPROXIMATELY 2000 RPM:

1. Verify the engine is not overheating and causing the power pack to limit the RPM.
2. Disconnect the Pink wire from the power pack and retest. If the engine now performs correctly, check the overheat sensor, oil level in the oil tank mounted on the engine and the wiring harness.
3. Check the position of the Pink wire and make sure it is not next to a spark plug wire.

ENGINE WILL NOT ACCELERATE ABOVE APPROXIMATELY 2500 RPM:

1. Using an inductive tachometer, check the RPM on all cylinders. A difference in readings between the individual cylinders can be caused by a bad coil, power pack or spark plug.
2. If all cylinders show the same RPM and the engine will only rev to approximately 2500 RPM, check the running stator DVA output from idle thru WOT. You should show a steady increase in voltage on the Blue to the Black/Red stator wires throughout the RPM range. A drop in voltage can be the result of a bad stator coil or a bad regulator/rectifier (disconnect the Green wires to the regulator/rectifier and retest – if the engine now performs OK, the regulator/rectifier is likely bad).

MISS AT ANY RPM:

1. Verify the engine is not overheating and causing the problem.
2. Using an inductive tachometer, check the RPM on all cylinders. A difference in readings between the individual cylinders can be caused by a bad coil, power pack or spark plug.
3. Disconnect the Green wires to the regulator/rectifier and retest – if the engine now performs OK, the regulator/rectifier is likely bad.

S.A.F.E. WILL NOT ENGAGE:

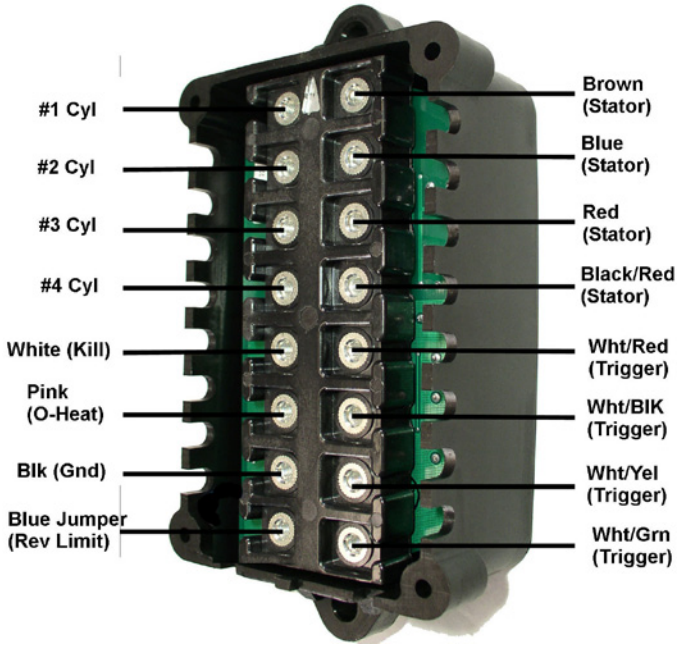
Disconnect the Pink warning wire from the power pack. Connect a jumper wire to engine ground and connect it to the terminal where the Pink wire goes. If the engine now limits at approximately 2000 RPM, check the wiring from the temperature sensor and oil tank to the power pack. If it still fails to engage, the power pack is likely bad.

ENGINE WILL NOT STOP:

Disconnect the White stop wire and connect a jumper wire to engine ground. If you still have spark, the power pack is likely bad. If the engine has no spark with the jumper connected, either the wiring harness, key switch or emergency stop switch is bad.

Four Cylinder Engines

NO SPARK ON ANY CYLINDER:



1. Disconnect the White stop wire and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Check the resistance and DVA output of the Stator and Trigger:

Read from	Read to	OEM Reading	CDI Reading	DVA (connected)
White/Red Trigger wire	White/Yellow Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
White/Black Trigger wire	White/Green Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
Brown Stator wire	Red Stator wire	840-1260 ohms	600-800 ohms	85 Volts Minimum
Blue Stator wire	Black/Red Stator wire	65-130 ohms	10-20 ohms	16 Volts Minimum

3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine properly.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the resistance and DVA output of the Stator and Trigger:

Read from	Read to	OEM Reading	CDI Reading	DVA (connected)
White/Red Trigger wire	White/Yellow Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
White/Black Trigger wire	White/Green Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
White/Red Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
White/Black Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
White/Yellow Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
White/Green Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
Brown Stator wire	Red Stator wire	840-1260 ohms	600-800 ohms	85 Volts Minimum
Brown Stator wire	Eng Ground	Open	Open	85 Volts Minimum
Red Stator wire	Eng Ground	Open	Open	85 Volts Minimum
Blue Stator wire	Black/Red Stator wire	65-130 ohms	10-20 ohms	16 Volts Minimum
Blue Stator wire	Eng Ground	Open	Open	16 Volts Minimum
Black/Red Stator wire	Eng Ground	Open	Open	16 Volts Minimum

2. Check the DVA output on the Black/White wires from the power pack while connected to the ignition coils. You should have a reading of at least 125V or more. If the reading is low on one cylinder, disconnect the wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack or trigger (test per above).

ENGINE WILL NOT ACCELERATE ABOVE APPROXIMATELY 2000 RPM:

1. Verify the engine is not overheating and causing the power pack to limit the RPM.
2. Disconnect the Pink wire from the power pack and retest. If the engine now performs correctly, check the overheat sensor, oil level in the oil tank mounted on the engine and the wiring harness.
3. Check the position of the Pink wire and make sure it is not next to a spark plug wire.

ENGINE WILL NOT ACCELERATE ABOVE APPROXIMATELY 2500 RPM:

1. Using an inductive tachometer, check the RPM on all cylinders. A difference in readings between the individual cylinders can be caused by a bad coil, power pack or spark plug.
2. If all cylinders show the same RPM and the engine will only rev to approximately 2500 RPM, check the running stator DVA output from idle thru WOT. You should show a steady increase in voltage on the Blue to the Black/Red stator wires throughout the RPM range. A drop in voltage can be the result of a bad stator coil or a bad regulator/rectifier (disconnect the Green wires to the regulator/rectifier and retest – if the engine now performs OK, the regulator/rectifier is likely bad).

MISS AT ANY RPM:

1. Verify the engine is not overheating and causing the problem.
2. Using an inductive tachometer, check the RPM on all cylinders. A difference in readings between the individual cylinders can be caused by a bad coil, power pack or spark plug.
3. Disconnect the Green wires to the regulator/rectifier and retest – if the engine now performs OK, the regulator/rectifier is likely bad.

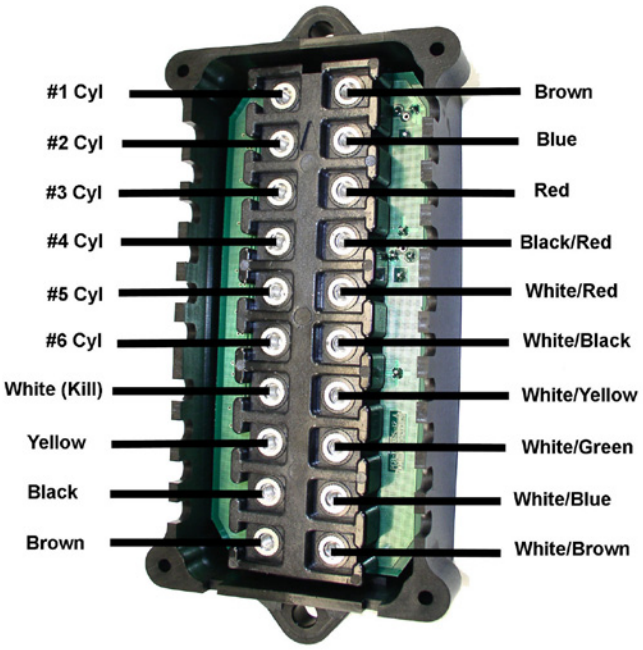
S.A.F.E. WILL NOT ENGAGE:

Disconnect the Pink warning wire from the power pack. Connect a jumper wire to engine ground and connect it to the terminal where the Pink wire goes. If the engine now limits at approximately 2000 RPM, check the wiring from the temperature sensor and oil tank to the power pack. If it still fails to engage, the power pack is likely bad.

ENGINE WILL NOT STOP:

Disconnect the White stop wire and connect a jumper wire to engine ground. If you still have spark, the power pack is likely bad. If the engine has no spark with the jumper connected, either the wiring harness, keyswitch or emergency stop switch is bad.

Six Cylinder Engines



NO SPARK ON ANY CYLINDER:

1. Disconnect the White stop wire and retest. If the engine's ignition now has spark, the stop circuit has a fault. Check the key switch, harness and shift switch.
2. Check the resistance and DVA output of the Stator and Trigger:

Read from	Read to	OEM Reading	CDI Reading	DVA (connected)
White/Red Trigger wire	White/ Green Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
White/Black Trigger wire	White/Blue Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
White/ Yellow Trigger wire	White/Brown Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
Brown Stator wire	Red Stator wire	840-1260 ohms	600-800 ohms	85 Volts Minimum
Blue Stator wire	Black/Red Stator wire	65-130 ohms	10-20 ohms	25 Volts Minimum

3. Check the cranking RPM. A cranking speed of less than 250-RPM will not allow the system to spark properly. This can be caused by a weak battery, dragging starter, bad battery cables or a mechanical problem inside the engine properly.

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Check the resistance and DVA output of the Stator and Trigger:

Read from	Read to	OEM Reading	CDI Reading	DVA (connected)
White/Red Trigger wire	White/ Green Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
White/Red Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
White/ Green Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
White/Black Trigger wire	White/Blue Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
White/ Black Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
White/ Blue Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
White/ Yellow Trigger wire	White/Brown Trigger wire	280-430 ohms	280-430 ohms	2.5 Volts Minimum
White/ Yellow Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
White/Brown Trigger wire	Eng Ground	Open	Open	2.5 Volts Minimum
Brown Stator wire	Red Stator wire	840-1260 ohms	600-800 ohms	85 Volts Minimum
Brown Stator wire	Eng Ground	Open	Open	85 Volts Minimum
Red Stator wire	Eng Ground	Open	Open	85 Volts Minimum
Blue Stator wire	Black/Red Stator wire	65-130 ohms	10-20 ohms	16 Volts Minimum
Blue Stator wire	Eng Ground	Open	Open	16 Volts Minimum
Black/Red Stator wire	Eng Ground	Open	Open	16 Volts Minimum

2. Check the DVA output on the Black/White wires from the power pack while connected to the ignition coils. You should have a reading of at least 125V or more. If the reading is low on one cylinder, disconnect the wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading indicates a bad power pack or trigger (test per above).

ENGINE WILL NOT ACCELERATE ABOVE APPROXIMATELY 2000 RPM:

1. Verify the engine is not overheating and causing the control module to limit the RPM.
2. Disconnect the White wire on the power pack coming from the control module and retest. If the engine now performs correctly, check the overheat sensor, oil level in the oil tank mounted on the engine and the wiring harness. If everything test correctly, the control module is likely defective.

ENGINE WILL NOT ACCELERATE ABOVE APPROXIMATELY 2500 RPM:

1. Using an inductive tachometer, check the RPM on all cylinders. A difference in readings between the individual cylinders can be caused by a bad coil, power pack or spark plug.
2. If all cylinders show the same RPM and the engine will only rev to approximately 2500 RPM, check the running stator DVA output from idle thru WOT. You should show a steady increase in voltage on the Blue to the Black/Red stator wires throughout the RPM range. A drop in voltage can be the result of a bad stator coil or a bad regulator/rectifier (disconnect the Green wires to the regulator/rectifier and retest – if the engine now performs OK, the regulator/rectifier is likely bad).

MISS AT ANY RPM:

1. Verify the engine is not overheating and causing the problem.
2. Using an inductive tachometer, check the RPM on all cylinders. A difference in readings between the individual cylinders can be caused by a bad coil, power pack or spark plug.
3. Disconnect the Green wires to the regulator/rectifier and retest – if the engine now performs OK, the regulator/rectifier is likely bad.

S.A.F.E. WILL NOT ENGAGE OR ENGINES REVS ABOVE 6500 RPM:

1. Disconnect the Pink warning wire from the control module. Connect a jumper wire to engine ground and connect it to the terminal where the Pink wire goes. If the engine now limits at approximately 2000 RPM, check the wiring from the temperature sensor and oil tank to the power pack. If it still fails to engage, the power pack is likely bad.
2. Check the voltage on the Brown wire going to the control module. You should see approximately 35 volts when running at idle. Low or high voltage is likely to be a shorted control module and a very low voltage is likely to be a defective power pack.

ENGINE WILL NOT STOP:

Disconnect the White stop wire and connect a jumper wire to engine ground. If you still have spark, the power pack is likely bad. If the engine has no spark with the jumper connected, either the wiring harness, key switch or emergency stop switch is bad.

CDI ELECTRONICS
(DVA) PEAK READING VOLTAGE AND RESISTANCE CHARTS

NOTICE: These charts were compiled using the CDI 511-9773NL Peak Adapter with a shielded Digital Multimeter.

(NOTE) The resistance readings are given for a room temperature of 68°F. Higher temperatures will cause a slightly higher resistance reading. DVA readings should always be taken with everything connected with the exception of the stop circuit.

The CDI peak reading voltage adapter is specifically designed to work with shielded Digital Multimeters. This adapter will simplify the testing of electronic ignition systems, stators, sensors and charging systems. The DVA readings will be approximately the same as any other DVA meter and the specifications listed in the service manuals can be followed without problems (Hopefully a little easier to you).

The CDI piercing probe set (511-9770) and the pack load resister (511-9775) are highly recommended for use with this adapter.

INSTRUCTIONS

1. Plug the adapter into the shielded Digital Multimeter with the (+) rib side pin in the (V, Ohms) jack and the other pin in the (COM) jack.
2. Set the digital voltmeter to DC Volts (the purpose of the adapter is to convert and *store* the voltage so that it can be read by a meter).
3. Connect the probes to the component to be measured.

*(NOTE) The adapter will **automatically compensate for polarity** and all readings will be peak voltage.*

See the following pages for readings of Chrysler, Force, Mercury, OMC (Johnson/Evinrude), OMC Sea Drive and Yamaha engines. Other ignitions can be tested using test results given by the manufacturer of the equipment or by comparing a known good system to a suspect one. Please forward any additional readings you would like to have included in future printings.

Chrysler/Force

DVA (Peak Reading) Voltage and Resistance Chart

HP	Year	Model or Serial#	Ignition Part Number	Stator						Trigger			Ignition Coil Ohms	
				Read		Ohms		DVA						
				Low Spd	High Spd	Low Spd	High Spd	Low Spd	High Spd	Read	Ohms	DVA	Pri	Sec
7.5	1972	B0C/B1D/ H0C/H1D	525475 116-5475*	Blue to Blue		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	N/A	125-140 225-325*
7.5	1977	B0C/B1C/ H0C/H1C	525475 116-5475*	Blue to Blue		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	N/A	125-140 225-325*
7.5	1979-1984	All Models	525475 116-5475*	Blue to Blue		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	N/A	125-140 225-325*
8	1982	82H8J-87H8A	525475 116-5475*	Blue to Blue		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	N/A	125-140 225-325*
9.9	1979-1984	A, B	510301 116-0301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
10	1976-1978	W/CD & Alternator	510301 116-0301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
12	1979	W/CD & Alternator	510301 116-0301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
15	1976-1984	W/CD & Alternator	510301 116-0301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
20	1979-1981	W/CD & Alternator	529301 116-9301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
25	1983-1984	W/CD & Alternator	529301 116-9301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
30	1979-1982	W/CD & Alternator	529301 116-9301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
35	1978-1984	W/CD & Alternator	529301 116-9301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
35	1987-1991	All Models	529301 116-9301*	Blue to Yellow (b)		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn (a)	48-52	0.5V+	N/A	125-140 225-325*
40	1992-1995	OE000001-OE138599	18495 114-4952*	Blue to Blue/Wht	Red to Red/Wht	3250-3650 2200-2400*	75-90 28-32*	180-400V	25-100V	Wht/Blk to Brown, White & Purple	800-1400	4V+	0.2-1.0	800-1100
40	1996-1999	OE138600-OE369299	827509 114-7509*	Green/White to White/Green		500-700 400-600*		180-400V		Eng Gnd to Wht/Blk at CDM	Open	1V+	N/A	800-1100
50	1988	A, B, C	658475 116-8475*	Blue to Blue		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn (a)	48-52	0.5V+	N/A	125-140 225-325*
50	1988	D	658301 116-8301*	Blue to Yellow (b)		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn (a)	48-52	0.5V+	N/A	125-140 225-325*
50	1989-1992	All Models	658301 116-8301*	Blue to Yellow (b)		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn (a)	48-52	0.5V+	N/A	125-140 225-325*
50	1992-1995	OE000001-OE138599	18495 114-4952*	Blue to Blue/Wht	Red to Red/Wht	3250-3650 2200-2400*	75-90 28-32*	180-400V	25-100V	Wht/Blk to Brown, White & Purple	800-1400	4V+	0.2-1.0	800-1100
50	1996-1999	OE138600-OE369299	827509 114-7509*	Green/White to White/Green		500-700 400-600*		180-400V		Eng Gnd to Wht/Blk at CDM	Open	1V+	N/A	800-1100
55	1977-1980	W/Magna-power II	474301-1	T1 & T4 to Eng Gnd		Not Applicable		180-400V		Between Terminals	Open	0.5V+	0.2-1.0	200-2000
55	1981-1983	All Models	475301 116-5301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
60	1984	All Models	475301 116-5301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
60	1985	All Models	475301 116-5301*	Blue to Yellow (b)		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn (a)	48-52	0.5V+	0.2-1.0	800-1100
65	1977-1978	W/Magna-power II	474301-1	T1 & T4 to Eng Gnd		Not Applicable		180-400V		Between Terminals	Open	0.5V+	0.2-1.0	200-2000
70	1991-1992	OE000001-OE009499	332-7778 114-7778*	Blue to Eng Gnd	Red to Eng Gnd	3250-3650 2200-2400*	75-90 28-32*	180-400V	25-100V	Wht/Blk to Brown, White & Purple	800-1400	4V+	0.2-1.0	800-1100
70	1993-1995	OE009500-OE138599	18495 114-4953*	Blue to Eng Gnd	Red to Eng Gnd	3250-3650 2200-2400*	75-90 28-32*	180-400V	25-100V	Wht/Blk to Brown, White & Purple	800-1400	4V+	0.2-1.0	800-1100
75	1996-1999	OE138600-OE369299	827509 114-7509*	Green/White to White/Green		500-700 400-600*		180-400V		Eng Gnd to Wht/ Blk, Wht/Yel, Blue/ Wht	Open	1V+	N/A	900-1100 2100-2400*
80	1983-1984	W/CD & Alternator	475301 116-5301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
85	1983	856XL	475301 116-5301*	Blue to Yellow (b)		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn (a)	48-52	0.5V+	0.2-1.0	800-1100
85	1984-1989	All Models	475301 658301 116-5301* 116-8301*	Blue to Yellow (b)		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn (a)	48-52	0.5V+	0.2-1.0	200-2000
90	1983-1984	W/CD & Alternator	475301 116-5301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
90	1990	All Models	658301 116-8301*	Blue to Yellow (b)		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn (a)	48-52	0.5V+	0.2-1.0	800-1100
90	1991	B & D	332-7778 114-7778*	Blue to Eng Gnd	Red to Eng Gnd	3250-3650 2200-2400*	75-90 28-32*	180-400V	25-100V	Wht/Blk to Brown, White & Purple	800-1400	4V+	0.2-1.0	800-1100
90	1991	A, C & E	658301 116-8301*	Blue to Yellow (b)		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn (a)	48-52	0.5V+	0.2-1.0	200-2000

Blk = Black Grn = Green Pur = Purple Yel = Yellow Eng Gnd = Engine Ground N/A = Not Applicable Pri = Primary
Brn = Brown Org = Orange Wht = White Gnd = Engine Ground COMM = Commercial Sec = Secondary

* Indicates a part manufactured by CDI Electronics

Chrysler/Force

DVA (Peak Reading) Voltage and Resistance Chart

HP	Year	Model or Serial#	Ignition Part Number	Stator						Trigger			Ignition Coil Ohms	
				Read		Ohms		DVA						
				Low Spd	High Spd	Low Spd	High Spd	Low Spd	High Spd	Read	Ohms	DVA	Pri	Sec
90	1991-1995	OE000001-OE138599	332-7778 18495 114-7778* 114-4953*	Blue to Eng Gnd	Red to Eng Gnd	3250-3650 2200-2400*	75-90 28-32*	180-400V	25-100V	Wht/Blk to Brown, White & Purple	800-1400	4V+	0.2-1.0	800-1100
90	1996-1999	OE138600-OE369299	827509 114-7509*	Green/White to White/Green		500-700 400-600*		180-400V		Eng Gnd to Wht/Blk, Wht/Yel, Blue/Wht	Open	1V+	N/A	900-1100 2100-2400*
105	1976	BD/BE/HA/HD/HE	474301-1	T1 & T4 to Eng Gnd		Not Applicable		180-400V		Between Terminals	Open	0.5V+	0.2-1.0	200-2000
115	1983-1984	W/CD & Alternator	475301 116-5301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
120	1976	BD/BE/HD/HE	474301-1	T1 & T4 to Eng Gnd		Not Applicable		180-400V		Between Terminals	Open	0.5V+	0.2-1.0	200-2000
120	1990-1994	90A, 91C	658301 116-8301*	Blue to Yellow (b)		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn (a)	48-52	0.5V+	0.2-1.0	200-2000
120	1996-1999	OE138600-OE369299	827509 114-7509*	Green/White to White/Green		500-700 400-600*		180-400V		Eng Gnd to Wht/Blk, Wht/Yel, Blue/Wht, Brn/Wht	Open	1V+	N/A	900-1100 2100-2400*
120 L Drive	1990	A, B, C	658301 116-8301*	Blue to Yellow (b)		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn (a)	48-52	0.5V+	0.2-1.0	200-2000
120	1991-1995	OE006551-OE138599	332-5772 114-5772*	Blue to Blue/Wht (LS) Red to Red/Wht (HS)		3250-3650 2200-2400*	75-90 28-32*	180-400V	25-100V	Brown to Wht/Blk Purple to White	800-1400	4V+	0.2-1.0	800-1100
125	1981-1982	W/CD & Alternator	475301 116-5301*	Blue to Yellow		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn	48-52	0.5V+	0.2-1.0	800-1100
125	1983-1989	All Models	475301 658301 116-5301* 116-8301*	Blue to Yellow (b)		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn (a)	48-52	0.5V+	0.2-1.0	800-1100
135	1976	BD/BE/HD/HE	474301-1	T1 & T4 to Eng Gnd		Not Applicable		180-400V		Between Terminals	Open	0.5V+	0.2-1.0	200-2000
150	1989-1991	89A, 90C, 90D, 91A	658301 116-8301*	Blue to Yellow (b)		680-850 300-400*		180-400V		Org to Grn Red to Wht/Grn (a)	48-52	0.5V+	0.2-1.0	800-1100
150	1991-1992	OE000001-OE093699	332-817323 116-7323*	Blue to Eng Gnd		Not Appicable 12V Inverter		225-300V		Wht/Blk to Brn, Blk, Wht, Pur & Yel	800-1400	5V+	0.2-1.0	800-1100

Blk = Black **Grn = Green** **Pur = Purple** **Yel = Yellow** **Eng Gnd = Engine Ground** **N/A = Not Applicable** **Pri = Primary**
Brn = Brown **Org = Orange** **Wht = White** **Gnd = Engine Ground** **COMM = Commercial** **Sec = Secondary**

*** Indicates a part manufactured by CDI Electronics**

a) Some units use a White/Orange trigger lead instead of a Green wire.
b) Some Stator leads are Brown/Blue stripe instead of Blue and Brown/Yellow stripe instead of Yellow.

Color Code Cross Reference

FUNCTION	OLD	NEW
Trigger	Orange	White/Orange Stripe
Trigger	Green	White/Yellow Stripe
Trigger	Red	White/Red Stripe
Trigger	White/Green Stripe	White/Green Stripe
Stator	Blue	Brown/Blue Stripe
Stator	Yellow	Brown/Yellow Stripe
Pack Output to Coil	Orange	Orange/Blue
Pack Output to Coil	Red	Blue/Red
Ignition Coil	White	Orange/Blue
Stop Circuit	White	Black/Yellow

Johnson/Evinrude

DVA (Peak Reading) Voltage and Resistance Chart

HP	Year	Model	Ignition Part Number	Stator						Trigger		
				Charge Coil			Power Coil					
				Read	Ohms	DVA	Read	Ohms	DVA	Read	Ohms	DVA
4-60	1978-1988	CD2	582285 582453 582474 583241 113-2285* 113-2453* 113-2474* 113-3241*	Brown to Brown/ Yellow	450-550	150-400V	N/A	N/A	N/A	White/Black to Black/White	15-50	0.6V+
4-55	1989-1993	CD2 - USL	584488 584489	Brown to Brown/ Yellow	450-550	150-400V	N/A	N/A	N/A	N/A	N/A	N/A
4-55	1989-1993	CDI USL Replacement	113-4488* 113-4489*	Brown to Brown/ Yellow	450-550	150-400V	N/A	N/A	N/A	White/Black to Black/White	15-50	0.6V+
5-50	1992-2006	CD2 W/SLOW	584767 584783 113-4767* 113-4783*	Brown to Brown/ Yellow	450-550	150-400V	N/A	N/A	N/A	White/Black to Black/White	15-50	0.6V+
25-50	1992-2005	CD2 W/SLOW	585316 113-5316*	Brown to Brown/ Yellow	450-550	150-400V	Orange to Orange/Black	450-550 45-55*	11-22V	White to Blue and Green	15-50	100-400V
50-55	1971-1977	Power Pack 2	581397 113-1397*	Brown to Engine Ground	400-600	150-400V	N/A	N/A	N/A	White/Black to Black/White	10-20 30-40*	0.6V+
25-35 Electric Start	1995-1997	CD3 OPTICAL	584823 586472 586504	Brown to Brown/ Yellow	720-880	150-400V	Orange to Orange/Black	52-62	11-22V	N/A	N/A	N/A
25-35 Manual Start	1995-1997	CD3 OPTICAL	584823 586472 586504	Brown to Brown/ Yellow	1010-1230	150-400V	Orange to Orange/Black	76-92	11-22V	N/A	N/A	N/A
40-70	1993-2001	CD3 Looper	584808 113-4808*	Brown to Brown/ Yellow	450-550	150-400V	Orange to Orange/Black	450-550 45-55*	11-22V	White to Blue/ Purple/Green White to Black/White	Open 400-500	100-400V 6-12V
60-75	1972-1978	Power Pack 3	581726 113-1726*	Brown to Brown/ Yellow	400-600	150-400V	N/A	N/A	N/A	Black/White to White/Blacks	10-20 30-40*	0.6V+
60-75	1979-1990	CD3	582115 582138 113-2115* 113-2138*	Brown to Brown/ Yellow	450-550	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green	38-42	0.6V+
60-70	1989-1995	CD3 W/SLOW	583748 113-3748*	Brown to Brown/ Yellow	450-550	150-400V	Orange to Orange/Black	450-550 45-55*	11-22V	White to Blue/ Purple/Green	38-42	100-400V
65-75	1984-1988	CD3	582537 582556 582705 583122 113-2537* 113-2556* 113-2705* 113-3122*	Brown to Brown/ Yellow	450-550	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green	38-42	0.6V+
65	1996-2001	CD3 W/SLOW	585274 113-5274*	Brown to Brown/ Yellow	450-550	150-400V	Orange to Orange/Black	450-550 45-55*	11-22V	White to Blue/ Purple/Green	38-42	100-400V
65-115	1989-1998	CD4	584028 584030 113-4028* 113-4030*	Brown to Brown/ Yellow	450-550	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green/Pink	11-45	100-400V
85-140	1973-1977	Power Pack 4	581731 113-1731*	Brown to Brown/ Yellow	400-600	150-400V	N/A	N/A	N/A	#1 to #3 and #2 to #4	10-20 30-40*	0.6V+
85-140	1978-1987	CD2/4 Dual Packs	582125 582684 582704 582811 583110 583116 113-2125* 113-2684* 113-2704* 113-2811* 113-3110* 113-3116*	Brown to Brown/ Yellow Brown to Brown/ Yellow	9 AMP 450-550 35 AMP 950-1100	9 AMP 150-400V 35 AMP 150-400V	N/A	N/A	N/A	White to Blue and Green White/Black to Blue/ White and Green/ White	11-45	0.6V+
88-140	1985-1988	CD4	583072 583101 113-3072* 113-3101*	Brown to Brown/ Yellow	450-550	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green/Pink	11-45	0.6V+
90-115	1995-2006	CD4 OPTICAL	586292 113-6292*	Brown to Brown/ Yellow (or Brown/White)	900-1200	150-400V	Orange to Orange/Black	50-60	11-22V	Orange/Red to Eng Gnd Black/Orange to Eng Gnd	N/A	10.5-12 VDC 8-10 VDC
120-140	1988-2001	CD4 w/Quick-Start	584041 113-4041*	Brown to Brown/ Yellow Brown to Brown/ Yellow	9 AMP 450-550 35 AMP 950-1100	9 AMP 150-400V 35 AMP 150-400V	Orange to Orange/Black	93-100 45-55*	11-22V	White to Blue/ Purple/Green/Pink White to Blue/ White, Purple/White, Green/White and Pink/White	35-55 120-130	0.6V+ 1.5V+
125 COMM Manual St.	1996-1998	CD4	584032 113-4032*	Brown to Brown/ Yellow	450-550	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green/Pink	11-45	100-400V

Blk = Black Grn = Green Pur = Purple Yel = Yellow Eng Gnd = Engine Ground N/A = Not Applicable Pri = Primary
Brn = Brown Org = Orange Wht = White Gnd = Engine Ground COMM = Commercial Sec = Secondary

* Indicates a part manufactured by CDI Electronics NOTE: Ignition Coils will read 0.2 to 1.0 ohms on the Primary and 200-400 ohms on the Secondary windings

Johnson/Evinrude

DVA (Peak Reading) Voltage and Resistance Chart

HP	Year	Model	Ignition Part Number	Stator						Trigger		
				Charge Coil			Power Coil					
				Read	Ohms	DVA	Read	Ohms	DVA	Read	Ohms	DVA
150-235	1976-1978	Power Pack 3/6	581726 113-1726*	Brown to Brown/Yellow	400-600	150-400V	N/A	N/A	N/A	White to Blue/Purple/Green	10-20 30-40*	0.6V+
150-235	1979-1988	CD3/6 Dual Packs	582138 582651 582817 583112 583114 583401 583605 113-2138* 113-2651* 113-2817* 113-3112* 113-3114* 113-3401* 113-3605*	Brown to Brown/Yellow Brown to Brown/Yellow	9 AMP 450-550 35 AMP 950-1100	9 AMP 150-400V 35 AMP 150-400V	N/A	N/A	N/A	White to Blue/Purple/Green	15-50	0.6V+
150	1989-1991	CD6	583816 584044	Brown to Brown/Yellow Brown/White to Brown/Black	450-550	150-400V	N/A	N/A	N/A	Black to Blue/Purple/Green Black to Blue/White, Purple/White and Green/White	15-50 15-50	100-400V 100-400V
150-175	1989-1992	CD6 Cross-Flow	583865 113-3865*	Brown to Brown/Yellow Brown/White to Brown/Black	900-1100	150-400V	Orange to Orange/Black	93-103	11-22V	White to Blue/Purple/Green White to Black/White	Open 215-225	100-400V 6-12V
150-175	1992-2005	CD6 OPTICAL	584985 584986 113-4985* 113-4986*	Brown to Brown/Yellow Brown/White to Brown/Black	450-600	150-400V	Orange to Orange/Black	50-60	11-22V	Orange/Red to Eng Gnd Black/Orange to Eng Gnd	N/A	10.5-12 VDC 8-10 VDC
185-250	1988-2000	CD6	584037 586212 113-4037* 113-6212*	Brown to Brown/Yellow	900-1100	150-400V	Orange to Orange/Black	93-103	11-22V	White to Blue/Purple/Green White to Black/White	Open 215-225	100-400V 6-12V
250-300	1988-1998	CD8	584035 584642 113-4035* 113-4642*	Brown to Brown/Yellow	900-1100	150-400V	Orange to Orange/Black	93-103	11-22V	White to Blue/Purple/Green/Pink White to Black/White	Open 215-225	100-400V 6-12V
275-300	1985-1987	CD8 Quad Packs	568076 113-8076*	Brown to Brown/Yellow	950-1100	150-400V	N/A	N/A	N/A	White to Blue and Green	35-55	0.6V+
275-300	1985-1987	CD4/8 Dual Packs	583072 583101 113-3072* 113-3101*	Brown to Brown/Yellow	950-1100	150-400V	N/A	N/A	N/A	White to Blue/Purple/Green/Pink	35-55	0.6V+

Blk = Black **Grn = Green** **Pur = Purple** **Yel = Yellow** **Eng Gnd = Engine Ground** **N/A = Not Applicable** **Pri = Primary**
Brn = Brown **Org = Orange** **Wht = White** **Gnd = Engine Ground** **COMM = Commercial** **Sec = Secondary**

*** Indicates a part manufactured by CDI Electronics**

NOTE: Ignition Coils will read 0.2 to 1.0 ohms on the Primary and 200-400 ohms on the Secondary windings

OMC Sea Drive

DVA (Peak Reading) Voltage and Resistance Chart

Engine	Year	Model	Ignition Part Number	Stator						Trigger			Ignition Coil Ohms	
				Charge Coil			Power Coil							
				Read	Ohms	DVA	Read	Ohms	DVA	Read	Ohms	DVA	Pri	Sec
2.5/2.6L	1982	"S"	582138 113-2138*	Brown to Brown/Yellow	450-600	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green	35-45	0.6V+	0.2-1.0	200-400
1.6L	1983	"S"	582125 113-2125*	Brown to Brown/Yellow	450-600	150-400V	N/A	N/A	N/A	White to Blue &Green	35-45	0.6V+	0.2-1.0	200-400
2.6L 10 AMP	1983	1AA/ 2BA/2BB	582556 113-2556*	Brown to Brown/Yellow	450-600	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green	35-45	0.6V+	0.2-1.0	200-400
2.5L 35 AMP	1983	1AA/ 2BA/2BB	582138 113-2138*	Brown to Brown/Yellow	950-1100	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green	35-45	0.6V+	0.2-1.0	200-400
1.6L V4	1984	"S"	582125 113-2125*	Brown to Brown/Yellow	450-600	150-400V	N/A	N/A	N/A	White to Blue &Green	35-45	0.6V+	0.2-1.0	200-400
2.5L/2.6L V6	1984		582556 113-2556*	Brown to Brown/Yellow	950-1100	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green	35-45	0.6V+	0.2-1.0	200-400
1.6L V4	1985	"S"	582811 113-2811*	Brown to Brown/Yellow	450-600	150-400V	N/A	N/A	N/A	White to Blue &Green	35-45	0.6V+	0.2-1.0	200-400
2.5L/2.6L V6	1985		582651 113-2651*	Brown to Brown/Yellow	950-1100	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green	35-45	0.6V+	0.2-1.0	200-400
1.6L V4	1986	"S"	583110 113-3110*	Brown to Brown/Yellow	450-600	150-400V	N/A	N/A	N/A	White to Blue &Green	35-45	0.6V+	0.2-1.0	200-400
2.6L V6	1986		583114 113-3114*	Brown to Brown/Yellow	950-1100	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green	35-45	0.6V+	0.2-1.0	200-400
1.6L V4	1987	"S"	583110 113-3110*	Brown to Brown/Yellow	450-600	150-400V	N/A	N/A	N/A	White to Blue &Green	35-45	0.6V+	0.2-1.0	200-400
1.8L V4	1987	"S"	583101 113-3101*	Brown to Brown/Yellow	950-1100	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green/Pink	35-45	0.6V+	0.2-1.0	200-400
2.7L V6	1987		583605 113-3605*	Brown to Brown/Yellow	950-1100	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green	35-45	0.6V+	0.2-1.0	200-400
3.6L V8	1987		583101 113-3101*	Brown to Brown/Yellow	950-1100	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green/Pink	35-45	0.6V+	0.2-1.0	200-400
1.6L V4	1988	"S"	583110 113-3110*	Brown to Brown/Yellow	450-600	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green/Pink	35-45	0.6V+	0.2-1.0	200-400
2.0L V4	1988	"S"	584041 113-4041*	Brown to Brown/Yellow	950-1100	150-400V	Orange to Org/Black	93-103	11-22V	White to Blue/ Purple/Green/Pink	35-45	0.6V+	0.2-1.0	200-400
3.0L V6	1988	"S"	584037 113-4037*	Brown to Brown/Yellow	950-1100	150-400V	Orange to Org/Black	93-103	11-22V	White to Blue/ Purple/Green	Open	0.6V+	0.2-1.0	200-400
1.6L V4	1989	"S"	583030 113-3030*	Brown to Brown/Yellow	450-600	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green/Pink	35-45	0.6V+	0.2-1.0	200-400
2.0L V4	1989	"S"	584041 113-4041*	Brown to Brown/Yellow	950-1100	150-400V	Orange to Org/Black	93-103	11-22V	White to Blue/ Purple/Green/Pink	35-45	0.6V+	0.2-1.0	200-400
3.0L V6	1989	"S"	584037 113-4037*	Brown to Brown/Yellow	950-1100	150-400V	Orange to Org/Black	93-103	11-22V	White to Blue/ Purple/Green	Open	0.6V+	0.2-1.0	200-400
4.0L V8	1989	"S"	584035 113-4035*	Brown to Brown/Yellow	950-1100	150-400V	Orange to Org/Black	93-103	11-22V	White to Blue/ Purple/Green/Pink	Open	0.6V+	0.2-1.0	200-400
1.6L V4	1990	"S"	583030 113-3030*	Brown to Brown/Yellow	450-600	150-400V	N/A	N/A	N/A	White to Blue/ Purple/Green/Pink	35-45	0.6V+	0.2-1.0	200-400
2.0L V4	1990	"S"	584041 113-4041*	Brown to Brown/Yellow	950-1100	150-400V	Orange to Org/Black	93-103	11-22V	White to Blue/ Purple/Green/Pink	35-45	0.6V+	0.2-1.0	200-400
3.0L V6	1990	"S"	584037 113-4037*	Brown to Brown/Yellow	950-1100	150-400V	Orange to Org/Black	93-103	11-22V	White to Blue/ Purple/Green	Open	0.6V+	0.2-1.0	200-400
4.0L V8	1990	"S"	584035 113-4035*	Brown to Brown/Yellow	950-1100	150-400V	Orange to Org/Black	93-103	11-22V	White to Blue/ Purple/Green/Pink	Open	0.6V+	0.2-1.0	200-400

Blk = Black **Grn = Green** **Pur = Purple** **Yel = Yellow** **Eng Gnd = Engine Ground** **N/A = Not Applicable** **Pri = Primary**
Brn = Brown **Org = Orange** **Wht = White** **Gnd = Engine Ground** **COMM = Commercial** **Sec = Secondary**

*** Indicates a part manufactured by CDI Electronics**

Mercury

DVA (Peak Reading) Voltage and Resistance Chart

HP	Year	Serial#	Ignition Part Number	Stator						Trigger		
				Read		Ohms		DVA				
				Low Spd	High Spd	Low Spd	High Spd	Low Spd	High Spd	Read	Ohms	DVA
4 1 CYL	1972- 1975	3296137- A855096	336-4516	Green to Engine Ground (DVA only)		2100-2300 (a)	170-190 (b)	180- 400V		Points Brown & White	N/A	N/A
4-20 2 CYL	1972- 1989	3069294- A855096	336-4516	Green to Engine Ground (DVA only)		2100-2300 (a)	170-190 (b)	180- 400V		Points Brown & White	N/A	N/A
4-20 2 CYL	1974- 1986	3795659- A197111	339-6222 114-6222*	Orange to Engine Ground		1600-1800 (800-900 per coil)		180- 400V		Brown to Brown or Brown to White	800- 1400	0.5V+
6-35 2 CYL	1979- 1997	5705532- OG760299	339-7452 114-7452K1*	Blk/Yel to Eng Gnd	Blk/Wh to Eng Gnd	3250-3650 2200-2400*	150-250 200-250*	180- 400V	25- 100V	Brown/Yellow to Brown/White	800- 1400	0.5V+
6-25 2 CYL	1997- 2006	OG760300- 1B999999	855721 114-5713*	Green/White to White/Green		660-710 350-450*		180- 400V		Brown/Yellow to Brown/White	850- 1100	4V+
15-25 2 CYL	1994- 1998	OG044027- OG760299	18495A30 114-4952A30*	Blue to Black	Red to Black	2900-3500 2200-2600*	100-180 200-250*	180- 400V	25- 100V	Brown to White	800- 1400	4V+
18-40 2 CYL	1979- 1989	5837437- OB393190	339-7452A3 114-7452A3*	Blk/Yel to Eng Gnd	Blk/Wh to Eng Gnd	3250-3650 2200-2400*	150-250 200-250*	180- 400V	25- 100V	Brown/Yellow to Brown/White	800- 1400	0.5V+
20-40 2 CYL	1972- 1981	3336258- 5823917	332-4733 332-4911 338-4733 114-4911*	Blue to Eng Gnd	Red to Eng Gnd	5200-7400	180-340	180- 400V	25- 100V	Brown to White	140- 160	0.5V+
30-40 CDM 2 CYL	1994- 2005	OG053314- OT999999	822779 827509 114-7509* 114-7509K1*	Green/White to White/Green		500-700 500-600*		180- 400V		Engine Gnd to White and Purple	Open	1V+
40 2 CYL	1970- 1971	2874704- 3336237	332-4172	Blue to Eng Gnd	White to Eng Gnd	3200-3800 2200-2600*	45-55 45-55*	180- 400V	25- 100V	Brown to Engine Ground	N/A	1V+
30-90 CDM 3 CYL	1996- 2007	OG438000- 1B999999	827509 114-7509*	Green/White to White/Green		500-700 500-600*		180- 400V		Engine Gnd to Brown, White and Purple	Open	1V+
45-60 3 CYL	1991- 1997	OD000750- OG589999	19052 114-9052*	Blue to Eng Gnd	Red to Eng Gnd	3250-3650 500-600*	75-90 28-32*	180- 400V	25- 100V	White/Black to Brown, White and Purple	800- 1400	4V+
45-60 Red Stator Kit 3 CYL	1991- 1997	OD000750- OG589999	19052 114-9052*	Green/White to White/Green		500-700 500-600*		180- 400V		White/Black to Brown, White and Purple	800- 1400	4V+
50-70 Bolted-in Magnets 3 CYL	1976- 1990	4382057- OD000749	332-7778 114-7778*	Blue to Eng Gnd	Red to Eng Gnd	5800-7000 2200-2400*	135-165 45-55*	180- 400V	25- 100V	White/Black to Brown, White and Purple	800- 1400	4V+
50-90 Red Stator Kit 3 CYL	1976- 1994	4382057- OE033710	332-7778 114-7778*	Green/White to White/Green		500-700 500-600*		180- 400V		White/Black to Brown, White and Purple	800- 1400	4V+
65-95 3 CYL	1994- 1996	OD283222- OG760299	18495 114-4953*	Blue to Eng Gnd	Red to Eng Gnd	3250-3650 500-600*	75-90 28-32*	180- 400V	25- 100V	White/Black to Brown, White and Purple	800- 1400	4V+
65-95 Red Stator Kit 3 CYL	1994- 1996	OD283222- OG760299	18495 114-4953*	Green/White to White/Green		500-700 500-600*		180- 400V		White/Black to Brown, White and Purple	800- 1400	4V+
70-90 Glued-in Magnets 3 CYL	1977- 1994	4571652- OE033710	332-7778 114-7778*	Blue to Eng Gnd	Red to Eng Gnd	3250-3650 500-600*	135-165 30-90*	180- 400V	25- 100V	White/Black to Brown, White and Purple	800- 1400	4V+
30-85 Bolted-in Magnets 4 CYL	1976- 1996	4357640- OG291031	332-5772 114-5772*	Blue to Blue/Wht	Red to Red/Wht	5000-7000 2200-2400*	125-155 45-55*	180- 400V	25- 100V	Brown to White/Black Purple to White	800- 1400	4V+
30-125 Red Stator Kit 4 CYL	1976- 1996	4357640- OG437999	332-5772 114-5772*	Green/White to White/Green		500-700 500-600*		180- 400V		Brown to White/Black Purple to White	800- 1400	4V+
40-125 Glued-in Magnets 4 CYL	1988- 1996	OB209468- OG437999	332-5772 114-5772*	Blue to Blue/Wht	Red to Red/Wht	3250-3650 500-600*	75-90 28-32*	180- 400V	25- 100V	Brown to White/Black Purple to White	800- 1400	4V+
50-65 4 CYL	1968- 1975	2309311- 4357639	333-3213	Red to White	Blue to White	380-420	9-11	180- 400V	25- 100V	Ignition Driver	N/A	N/A
80-125 CDM 4 CYL	1995- 2006	OG141089- 1B999999	827509 114-7509*	Green/White to White/Green		500-700 500-600*		180- 400V		Engine Gnd to Brown, White, Purple and White/Black	Open	3V+
120 4 CYL	1995	OE080400- OE141088	332-826866 114-6866*	Blue to Blue/Wht	Red to Red/Wht	3250-3650 500-600*	75-90 28-32*	180- 400V	25- 100V	Brown to White/Black Purple to White	800- 1400	4V+

Blk = Black **Grn = Green** **Pur = Purple** **Yel = Yellow** **Eng Gnd = Engine Ground** **N/A = Not Applicable** **Pri = Primary**
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NOTE: Ignition Coils will read 0.2 to 1.0 ohms on the Primary and 800-1100 ohms on the Secondary windings

Mercury

DVA (Peak Reading) Voltage and Resistance Chart

HP	Year	Model or Serial#	Ignition Part Number	Stator						Trigger		
				Read		Ohms		DVA				
				Low Spd	High Spd	Low Spd	High Spd	Low Spd	High Spd	Read	Ohms	DVA
90-350 9-16 Amp 6 CYL	1976-1994	4301235-OG201874	332-7778 114-7778*	Blue to Gnd Blue/Wht to Gnd	Red to Gnd Red/Wht to Gnd	5000-7000 2200-2400*	90-200 30-90*	180-400V	25-100V	See NOTE 1	800-1400	4V+
105-275 40 Amp 6 CYL	1989-2000	OC100861-OG960499	332-7778 114-7778*	Blue to Gnd Blue/Wht to Gnd	Red to Gnd Red/Wht to Gnd	3200-4200 2200-2400*	90-140 28-32*	180-400V	25-100V	See NOTE 1	800-1400	4V+
135-240 2.5L CDM 6 CYL	1996-2005	OE373939-1B999999	827509 114-7509*	Green/White to White/Green		500-700 500-600*		180-400V		Purple to Blue White to Red Brown to Yellow	1100-1400 850-1050*	4V+
175-210 6 CYL	1997-1999	OE151580-OE433133	18495 114-4953-32*	Blue to Gnd Blue/Wht to Gnd	Red to Gnd Red/Wht to Gnd	3250-3650 500-600*	75-90 28-32*	180-400V	25-100V	See NOTE 1	800-1400	4V+
225-250 3.0L CDM 6 CYL	1994-2003	OD280813-OT408999	827509 114-7509K1* 114-7509*	Engine Gnd to Grn, Grn/Red, Grn/Yel, Grn/Blue, Grn/Org and Grn/Blk		990-1210		100-400V		N/A	N/A	N/A

Blk = Black **Grn = Green** **Pur = Purple** **Yel = Yellow** **Eng Gnd = Engine Ground** **N/A = Not Applicable** **Pri = Primary**
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NOTE 1: Read from (Yellow sleeve) to (Black sleeve)

Brown	**to**	**Purple**
White	**to**	**Brown**
Purple	**to**	**White**

NOTE: Ignition Coils will read 0.2 to 1.0 ohms on the Primary and 800-1100 ohms on the Secondary windings

Yamaha

DVA (Peak Reading) Voltage and Resistance Chart

HP	YEAR	# Cyl	STK	Model	Stator						Trigger			CDI Out	Ignition Coil		SPK PLG CAP
					Read		Ohms		DVA						OHMS +/- 10%		
					Low Spd	High Spd	Low Spd	High Spd	Low Spd	High Spd	Read	Ohms	DVA		Primary	Sec	
2	1984-2004	1	2		Brown to Gnd		320-390				N/A	N/A	N/A		0.21	3.2 K	
2.5	2003-2004	1	4	F											.56-.84	11.6K-17.4K	4-6 K
3	1984-2002	1	2		Blk to Brown		250-300		100		Blk to Wht/Red Blk to Wht/Grn	30-36 LS 280-340 HS			0.1	2.6 K	
4	1984-1999	1	2		Blk to Brown		250-300		100		Blk to Wht/Red Blk to Wht/Grn	30-36 LS 280-340 HS			0.1	3.1 K	None
4	1999-2004	1	2		TCI to Gnd				126						.56-.84	11.6K-17.4K	4.9-5.1 K
5	1984-2002	1	2		Blk to Brown		250-300		100		Blk to Wht/Red Blk to Wht/Grn	30-36 LS 280-340 HS			0.3	3.1 K	None
6	1984-2000	2	2		Blk to Brown		81-99		100		Blk to Wht/Red	92-111			0.1	3.5 K	None
6/8	2001-2004	2	4	F	Blk to Brown		81-99		100		Blk to Wht/Red	92-111			0.1	7.8 K	None
8	1986-2004	2	2		Blk to Brown		81-99		100		Blk to Wht/Red	92-111			0.3	3.5 K	None
9.9	1984-1992	2	2		Blk to Brown		81-99		100		Blk to Wht/Red	92-111			0.3	3.5 K	None
9.9	1993-1995	2	2		Blk to Brown		81-99		100		Blk to Wht/Red	92-111			0.3	5.4 K	None
9.9/15	1996-2004	2	2		Blk to Brown		280-340		105		Blk to Wht/Red	396-484			0.6	2.1 K	None
9.9	1984-1990	2	4	F/FT/T	Brown to Blue		300-400		90		Blk to Wht/Red	280-340	2.5		0.5	3.4 K	None
9.9	1991-2004	2	4	F/FT/T	Brown to Blue		300-400		90		Blk to Wht/Red	280-340	2.5		0.5	4.1 K	None
15	1984-1995	2	2		Blk to Brown		81-99				Blk to Wht/Red	92-111			0.3	5.4 K	None
15	1998-2004	2	4	F	Brown to Blue		272-408		135		Blk to Wht/Red	234-348	4	115	0.5	4.91K	None
20	1996-1997	2	2		Brown to Blue		340-420		125		Blk to Wht/Red Blk to Wht/Blk	310-390	5.5	105	0.5	3.2 K	None
25	1984-1987	2	2		Brown to Blue		120-150		190		Blk to Wht/Red Blk to Wht/Blk	12-16	5	210	0.5	3.5 K	None
25	1988-1993	2	2		Blk to Brown		200-275		190		Blk to Wht/Red Blk to Wht/Blk	90-120	5	210	0.5	3.5 K	None
25	1994-2004	2	2		Brown to Blue		340-420		125		Blk to Wht/Red Blk to Wht/Blk	310-390	5.5	105	0.5	3.2 K	None
25	1996-2002	3	2		Brown to Blue		340-420		175		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk	310-390	4	135	0.5	6.3 K	None
25	1990-1992	2	2	C	Blk to Brown		200-275		190		Blk to Wht/Red	90-120	5	210	0.5	3.5 K	None
25	1993-1995	2	2	C	Blk to Brown		200-275		190		Blk to Wht/Red	90-120	5	210	0.5	5.4 K	None
25	1996-1997	2	2	C	Blk to Brown		200-275		190		Blk to Wht/Red	90-120	5	210	0.5	8.5 K	None
25	1998-2004	2	4	F	Grn/Wht to Wht/Grn		660-710		190		Red to White	300-350	6	100	0.5	4.1 K	None
30	1984-1986	2	2		Brown to Blue		120-150		190		Blk to Wht/Red	12-16	5	210	0.5	3.5 K	None
30	1987-2002	3	2		Brown to Blue		280-330		175		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk	310-390	4	135	0.5	6.3 K	None
30	1989-1992	2	2	C	Blk to Brown		120-150		190		Blk to Wht/Red	12-16	5	210	0.5	3.5 K	None
30	1993-1996	2	2	C	Brown to Blue		400-490		125		Blk to Wht/Red Blk to Wht/Blk	310-390	4	105	0.5	3.2 K	None
30	1997	2	2	C	Brown to Blue		340-420		125		Blk to Wht/Red Blk to Wht/Blk	310-390	4	105	0.5	3.2 K	None
30	2001-2004	2	4	F	Grn/Wht to Wht/Grn		600-720		193		Blk to Wht/Red	270-330	6	151	0.5	4.1 K	None
40/50	1984-1988	3	2		Brown to Blue		180-250		175		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk	310-390	4	135	0.5	6.3 K	

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Yamaha

DVA (Peak Reading) Voltage and Resistance Chart

HP	YEAR	# Cyl	STK	Model	Stator						Trigger			CDI Out	Ignition Coil OHMS +/- 10%		SPK PLG CAP
					Read		Ohms		DVA		Read	Ohms	DVA		Primary	Sec	
					Low Spd	High Spd	Low Spd	High Spd	Low Spd	High Spd							
40/50	1989-1994	3	2		Brown to Blue		280-330		200		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk	180-220	4	175	0.5	3.2 K	None
40/50	1995-2004	3	2		Brown to Blue		400-510		145		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk	180-240	3	125	0.5	3.2 K	None
40	1989-1997	2	2	C	Brown to Blue		120-140		125		Blk to Wht/Red	12-16	5.5	115	0.5	3.5 K	None
40	1998-2002	3	2	C	Brown to Blue		400-510		145		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk	180-220	4	125	0.5	3.2 K	None
40	1999	4	4	F	Brown to Blue		300-380		140		Red//Wht to White/Blk	375-475	7	105	0.5	4.1 K	4-6 K
40	2000-2004	3	4	F	Grn/Wht to Wht/Grn		600-710		193		Blk to Wht/Red	270-330	6	151	0.5	2.7K-3.7K	4-6 K
48	1995-2000	2	4	E	Blk to Brown		81-99				Blk to Wht/Red	92-111			0.3	5.4 K	None
50	1999-2002	3	2	C	Brown to Blue		420-510		145		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk	180-240	3	125	0.5	3.2 K	None
50	1995-2000	4	4	F	Brown to Blue		300-380		137		Red//Wht to White/Blk	375-475	3.5	150	0.5	4.1 K	3.8-5.7 K
50	1996-2000	4	4	F	Brown to Blue		300-380		137		Red//Wht to White/Blk	375-475	3.5	150	0.5	4.1 K	3.8-5.7 K
50	2001-2004	4	4	F	Brown to Blue		272-408		144		Red//Wht to White/Blk	396-594	6.3	126	0.078-0.106	3.5K-4.7K	3.8-5.7 K
55	1989-1994	2	2	C	Brown to Blue		200-260		135		Blk to Wht/Red Blk to Wht/Blk Blk to Yellow	70-88 23-29	2	150	0.5	3.1 K	None
55	1995	2	2	C	Brown to Blue		200-260		135		Blk to Wht/Red Blk to Wht/Blk	280-360	2	150	0.5	3.1 K	None
60	1991-2000	3	2		Brown to Blue		145-190		140		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk	110-150	2.5	100	0.5	3.2 K	None
60	1992-1999	2	2	P	Brown to Blue		150-190		120		White/Red to White/Blk	270-330	2.5	105	0.5	4.1 K	None
60	1996-2002	2	2	C	Brown to Blue		150-190		120		White/Red to White/Blk	270-330	2.5	105	0.5	4.1 K	None
60	2001-2004	3	2		Brown to Blue		150-190		150		White/Red to White/Blk	270-330	2.5	105 on #1 & #3 at idle (0 on #2), 145 on all at 1500 RPM	0.5	4.1 K	None
60	2002-2004	4	4	F/T	Brown to Blue		272-408		144		Red//Wht to White/Blk	396-594	6.3	126	0.078-0.106	3.5K-4.7K	3.8-5.7 K
70	1984-1991	3	2		Brown to Blue		145-190		140		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk	110-150	2.5	100	0.5	3.2 K	
70	1992-2004	3	2		Brown to Blue		150-190		150		White/Red to White/Blk	270-330	2.5	105 on #1 & #3 at idle (0 on #2), 145 on all at 1500 RPM	0.5	4.1 K	None
75	1994-1996	3	2	C	Brn to Blue	Red to Blue	900-1100	105-140	85	45	Wht/Red to Wht/Yel Wht/Grn to Wht/Blk	290-370	2.5	95	0.5	4.5 K	

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Yamaha

DVA (Peak Reading) Voltage and Resistance Chart

HP	YEAR	# Cyl	STK	Model	Stator						Trigger			CDI Out	Ignition Coil		SPK PLG CAP
					Read		Ohms		DVA		Read	Ohms	DVA		OHMS +/- 10%		
					Low Spd	High Spd	Low Spd	High Spd	Low Spd	High Spd					Primary	Sec	
75	1998-1999	3	2	C	Brn to Red	Blue to Red	191-288	64-96	55	90	White/Red to White/Blk	241-362	7	105 on #1 & #3 at idle (0 on #2), 145 on all at 1500 RPM	0.5	4.0 K	None
75	1995-1996	3	2	E	Brn to Blue	Red to Blue	900-1100	105-140	85	45	Wht/Red to White/Grn Wht/Blk to Wht/Grn	290-370	2.5	95	0.5	4.8 K	None
75	1996-1999	3	2	P	Brn to Blue	Red to Blue	900-1100	105-140	85	45	Wht/Red to White/Yel Wht/Grn to Wht/Blk	290-370	2.5	95	0.5	4.8 K	None
75	1997-2000	3	2	E	Brn to Blue	Red to Blue	480-600	50-70	105	45	Wht/Red to White/Grn Wht/Blk to Wht/Grn	290-370	2.5	105	0.5	4.1 K	None
75/90	2003-2004	4	4	F	?	?	?	?	?	?	Blk to Wht/Red Blk to Wht/Blk	396-594	2.7	107	0.5	4.1 K	#1 - 7.6K #2 - 5.6 K #3 - 6.3 K #4 - 7.2 K
80	1997	3	2	C	Brn to Red	Blue to Red	220-270	70-90	100	60	White/Red to Wht/Blk	241-362	5	130	0.5	4.1 K	None
80/100	1999-2002	4	4	F	?	?	?	?	?	?	Blk to Wht/Red Blk to Wht/Blk	396-594	2.7	107	0.5	4.1 K	#1 - 7.6K #2 - 5.6 K #3 - 6.3 K #4 - 7.2 K
85	1989-1996	4	2	C	Brn to Blue	Red to Blue	900-1100	105-140	85	45	Wht/Red to White/Yel Wht/Grn to Wht/Blk	290-370	2.5	95	0.5	4.8 K	None
90	1984-1989	4	2		Brn to Blue	Red to Blue	765-935	105-135	85	45	Wht/Red to White/Yel Wht/Grn to Wht/Blk	290-370	2.5	95	0.5	2.5 K	None
90	1990-1991	4	2		Brn to Blue	Red to Blue	900-1100	105-140	85	45	Wht/Red to White/Yel Wht/Grn to Wht/Blk	290-370	2.5	95	0.5	4.8 K	None
90	1992-2004	3	2		Brn to Red	Blue to Red	220-270	70-90	100	60	White/Red to White/Blk	241-362	5	130	0.5	4.1 K	None
115	1984-1988	4	2	B/P/S	Brn to Red	Blue to Blk/Red	625-820	62-79	160	45	Wht/Red to White/Yel Wht/Grn to Wht/Blk	280-460	2.5	95	0.5	3.8 K	None
115	1994-2000	4	2	C	Brn to Red	Blue to Blk/Red	900-1100	105-140	85	45	Wht/Red to White/Yel Wht/Grn to Wht/Blk	320-400	2.5	95	0.5	2.5 K	4-6 K
115	2000-2004	4	4	F	?	?	?	?	?	?	Blk to Wht/Red Blk to Wht/Blk	?	3	5			None
130	1984-1989	4	2		Brn to Red	Blue to Blk/Red	900-1100 625-820*	105-140 12-17*	85	45 20*	Wht/Red to White/Yel Wht/Grn to Wht/Blk	290-370	2.5	95	0.5	4.8 K	None
130	1990-2003	4	2		Brn to Red	Blue to Blk/Red	625-820	62-79	160	45	Wht/Red to White/Yel Wht/Grn to Wht/Blk	280-460	2.5	125	0.5	3.8 K	4-6 K
150/175	1984-1989	6	2		Brn to Red	Blue to Blk/Red	900-1100	21-27	75	14	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue Wht/Yel to Wht/Brn	280-460	1.6	105	0.5	2.5 K	4-6 K

Blk = Black **Grn = Green** **Pur = Purple** **Yel = Yellow** **Eng Gnd = Engine Ground** **N/A = Not Applicable** **Pri = Primary**
Brn = Brown **Org = Orange** **Wht = White** **Gnd = Engine Ground** **COMM = Commercial** **Sec = Secondary**

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Yamaha

DVA (Peak Reading) Voltage and Resistance Chart

HP	YEAR	# Cyl	STK	Model	Stator						Trigger			CDI Out	Ignition Coil		SPK PLG CAP
					Read		Ohms		DVA		Read	Ohms	DVA		OHMS +/- 10%		
					Low Spd	High Spd	Low Spd	High Spd	Low Spd	High Spd					Primary	Sec	
150/175	1990-1995	6	2		Brn to Red	Blue to Blk/Red	660-820	62-79	145	40	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue Wht/Yel to Wht/Brn	280-460	2	105	0.5	3.8 K	4-6 K
150	1996-2004	6	2	D/L/P/S	Brn to Red	Blue to Blk/Red	660-820	62-79	145	40	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue \Wht/Yel to Wht/Brn	280-460	3	130	0.5	4.1 K	5 K
150	1996-1999	6	2	C	Brn to Red	Blue to Blk/Red	460-620	70-90	90	30	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue \Wht/Yel to Wht/Brn	280-460	2.5	65	0.5	4.1 K	None
150	1999-2003	6	2	DX/SX VX	Brn to Red	Blue to Blk/Red	224-336		110		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	294-398	3	100	0.5	2.72K-3.68K	None
150	1999-2002	6	2	LX/PX	Brn to Red	Blue to Blk/Red	224-336		110		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	294-398	3	100	0.5	2.72K-3.68K	None
150	1994-1995	6	2	P	Brn to Red	Blue to Blk/Red	660-820	62-79	145	40	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue \Wht/Yel to Wht/Brn	280-460	2.5	65	0.5	3.8 K	None
150	2000-2004	6	2	Z/LZ VZ	Red/Yellow to Black/Orange, Black/Yellow, Black/Blue, Black/Green and Black/White		CDI OUTPUT		140		Wht/Red to Wht/Grn Wht/Blk to Wht/Blue Wht/Yel to Wht/Brn	?	5	140			4-6 k
150	2004	6	4	F/LF	Blk to Blk/Org Blk to Blk/Wht		ECM OUTPUT		260		Blk to Wht/Red Blk to Wht/Blk	459-561	3.5	260	1.53-2.07	12.5K-16.91K	None
175	1996-1999	6	2	P/S	Brn to Red	Blue to Blk/Red	660-820	62-79	140	40	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue Wht/Yel to Wht/Brn	280-460	2.5	130	0.5	4.1 K	5 K
175	1996-2000	6	2		Brn to Red	Blue to Blk/Red	660-820	62-79	140	40	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue Wht/Yel to Wht/Brn	280-460	2.5	130	0.5	4.1 K	5 K
175	2001-2004	6	2	Z/VZ	Blk/Org to Red/Yel Blk/Yel to Red/Yel Blk/Blue to Red/Yel Blk/Grn to Red/Yel Blk/Wht to Red/Yel		CDI OUTPUT		140		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	?	5	140			4-6 K
200	1984-1989	6	2		Brn to Red	Blue to Blk/Red	900-1100	21-27	75	14	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue Wht/Yel to Wht/Brn	280-460	1.6	105	0.5	2.5K	
200	1990-1995	6	2		Brn to Red	Blue to Blk/Red	660-820	62-79	145	40	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue Wht/Yel to Wht/Brn	280-460	2.5	105	0.5	3.8K	None

Blk = Black **Grn = Green** **Pur = Purple** **Yel = Yellow** **Eng Gnd = Engine Ground** **N/A = Not Applicable** **Pri = Primary**
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Yamaha

DVA (Peak Reading) Voltage and Resistance Chart

HP	YEAR	# Cyl	STK	Model	Stator						Trigger			CDI Out	Ignition Coil		SPK PLG CAP
					Read		Ohms		DVA		Read	Ohms	DVA		OHMS +/- 10%		
					Low Spd	High Spd	Low Spd	High Spd	Low Spd	High Spd					Primary	Sec	
200	1991-1995	6	2	P	Brn to Red	Blue to Blk/Red	660-820	62-79	145	40	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue Wht/Yel to Wht/Brn	280-460	2	105	0.5	3.8K	None
200	1996-1999	6	2	L/P/S	Brn to Red	Blue to Blk/Red	660-820	62-79	140	40	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue Wht/Yel to Wht/Brn	280-460	2.5	130	0.5	4.1K	5 K
200	1998	6	2	V	Brn to Red	Blue to Blk/Red	224-336		115		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	294-398	3	100	0.5	2.7K-3.6K	5 K
200	2002-2004	6	4	F	Blk/Org to Red/Yel Blk/Yel to Red/Yel Blk/Wht to Red/Yel		CDI OUTPUT		252		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk	459-561	5.3	252	1.5-1.9	19.6 - 35.4K	None
200	1999-2002	6	2	LX	Blk/Org to Red/Yel Blk/Yel to Red/Yel Blk/Blue to Red/Yel Blk/Grn to Red/Yel Blk/Wht to Red/Yel		CDI OUTPUT		140		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	?	3	140			4-6 K
200	1999-2004	6	2	SX	Blk/Org to Red/Yel Blk/Yel to Red/Yel Blk/Blue to Red/Yel Blk/Grn to Red/Yel Blk/Wht to Red/Yel		CDI OUTPUT		100		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	?	3	100			4-6 K
200	1999-2004	6	2	V/VX	Brn to Red	Blue to Blk/Red	224-336		115		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	294-398	3	100	0.5	2.7K-3.6K	5 K
200	2000-2004	6	2	LZ/Z HPDI	Blk/Org to Red/Yel Blk/Yel to Red/Yel Blk/Blue to Red/Yel Blk/Grn to Red/Yel Blk/Wht to Red/Yel		CDI OUTPUT		140		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	?	5	140	0.5		4-6 K
220	1984-1986	6	2		Brn to Red	Blue to Blk/Red	900-1100	21-27	75	14	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue Wht/Yel to Wht/Brn	280-460	1.6	58	0.5	2.5K	5 K
225	1984-1989	6	2		Brn to Red	Blue to Blk/Red	900-1100	21-27	75	14	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue Wht/Yel to Wht/Brn	280-460	1.6	58	0.5	2.5K	5 K
225	1990-1995	6	2	L/HP	Brn to Red	Blue to Blk/Red	660-820	62-79	145	40	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue Wht/Yel to Wht/Brn	280-460	2	105	0.5	3.8K	5 K
225	1996-1997	6	2	L/HP	Brn to Red	Blue to Blk/Red	660-820	62-79	145	40	Wht/Red to Wht/Grn Wht/Blk to Wht/Blue Wht/Yel to Wht/Brn	280-460	2	130	0.5	4.1K	5 K
225	1994-1995	6	2	X/HP U/HP	Brn to Red	Blue to Blk/Red	224-336	224-336	90	90	Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	294-398	3	100	0.5	2.7K	5 K

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Yamaha

DVA (Peak Reading) Voltage and Resistance Chart

HP	YEAR	# Cyl	STK	Model	Stator						Trigger			CDI Out	Ignition Coil		SPK PLG CAP
					Read		Ohms		DVA						OHMS +/- 10%		
					Low Spd	High Spd	Low Spd	High Spd	Low Spd	High Spd	Read	Ohms	DVA		Primary	Sec	
225	2002-2004	6	4	F	Blk/Org to Red/Yel Blk/Yel to Red/Yel Blk/Wht to Red/Yel		CDI OUTPUT		252		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk	459-561	5.3	252	1.5- 1.9	19.6-35.4K	None
225	1996-2002	6	2	S/X/UL/LX SX	Brn to Red	Blue to Blk/Red	224-336		115		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	294-398	3	100	0.5	2.7 K	5 K
225	1998-2004	6	2	VX	Brn to Red	Blue to Blk/Red	224-336		115		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	294-398	3	100	0.5	2.7 K	5 K
225	2003-2004	6	2	VZ HPDI	Red to Blk/Wht		224-336		160		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	294-398	3.5	160	1.87-2.53	8.93-12.08 K	None
250	1990-1996	6	2		Brn to Red	Blue to Blk/Red	224-336		90		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	294-398	3	100	0.5	2.7 K	5 K
250	1997-2002	6	2		Brn to Red	Blue to Blk/Red	224-336		115		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	294-398	3	100	0.5	2.7 K	5 K
250	2003-2004	6	2	HPDI	Red to Blk/Wht		CDI OUTPUT		160		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	294-398	3.5	140	1.87-2.53	8.93-12.08 K	None
300	2004	6	2	LZ/VZ Z HPDI	Red to Blk/Wht		CDI OUTPUT		265		Blk to Wht/Red Blk to Wht/Grn Blk to Wht/Blk Blk to Wht/Blue Blk to Wht/Yel Blk to Wht/Brn	294-398	3.5	265	1.36-1.84	7.31 - 9.89K	None

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Glossary of Terms

ADI – **Alternator Driven Ignition**, consists of a flywheel, stator, trigger and ignition module.

ADTC - **After Top Dead Center** Reference on ignition timing.

BTDC - **Before Top Dead Center** Reference on ignition timing.

CD Ignition – **Capacitive Discharge Ignition**. The capacitor stores the power developed by a stator or inverter and uses a SCR to deliver the power to the ignition coil.

CDM – **Capacitive Discharge Module**. The CDM is a combination of the switch box and ignition coil.

Crank - Refers to the engine being turned over with the starter, not running. Spark plug wires are usually connected to a spark gap tester.

DVA – **Direct Voltage Adapter**. Also known as Peak voltage. The term refers to the peak voltage as read by a specialized meter or a multimeter using an adapter to convert the peak voltage in the ignition system to a DC value. Regular meters cannot read the voltages due to the frequency and duration of the pulses in the system.

Power Pack – Term used by Johnson/Evinrude for the ignition module.

RPM – **Revolutions per minute**. The number of times the engine rotates in one minute.

S.L.O.W. – **Speed Limiting Oil Warning** system. Limits the RPM of the engine to approximately 2500 RPM in order to reduce the damage to the engine caused by a no oil or overheat condition.

Spark Tester - Device used to check for spark from the ignition coil to the spark plug. Testers are normally available in 1, 4, 6 and 8 cylinder configurations.

Switch Box – Term used for Force, Mariner and Mercury ignition modules.

W.O.T. – **Wide Open Throttle**.

CDI ELECTRONICS
OUTBOARD SERVICE BULLETIN

12/06/2003 **CDI Bulletin # 2276 Rev.1**

Models affected: Johnson/Evinrude 60 HP 1986 (CE) through 1994 (ER)
Johnson/Evinrude 65 HP 1987 (CU) through 1994 (ER)
Johnson/Evinrude 70 HP 1989 (CD) through 1994 (ER)

Problem:

The engine and electrical system can become damaged by overheating when air is trapped in the upper half of the cooling system. Trapped air can cause the upper cylinder or regulator/rectifier to overheat, resulting in damage to the piston or regulator (also damaging the stator). Air can become trapped when:

1. The engine is idling with a blocked or restricted thermostat bypass hole.
2. The engine is operated in aerated water, such as a pontoon or deck boat wakes.

SOLUTION:

Relocate the water pump indicator outlet tee (for the pee tube) from the side of the engine block to the top of the engine cylinder block. This allows air to be vented from the top of the cooling system and helps ensure an adequate water level when idling.

If the engine does not have a threaded hole located in the top of the cylinder block, please follow the steps below:

1. Remove the indicator hose from the outlet tee and discard.
2. Remove the outlet tee.
3. Install a 1/8th inch NPT brass or aluminum pipe plug into the hole where the tee was located (use gel-seal on the threads). (See fig. 1)
4. Measure 2 inches forward from the rear corner of the exhaust manifold cover (ref "A") and 1-3/8th inches from the exhaust cover gasket (Ref to "B"). Mark the intersection with a center punch. (See fig. 2).
5. Mark an 11/32nd (Letter "R") drill bit ½ inch from the tip (to prevent damage to the water jacket) as a depth gauge. Grease the tip and drill a hole through the casting. The grease will help prevent shavings from entering the cooling system.
6. Grease the tip of an 1/8th NPT tap and thread the hole.
7. Apply gel-seal to the threads of the original tee and install it in the hole you just tapped. Position the tee so that the indicator nipple is facing the back of the engine.
8. Install a new piece of 3/16th hose (19 inches long) from the tee to the indicator.

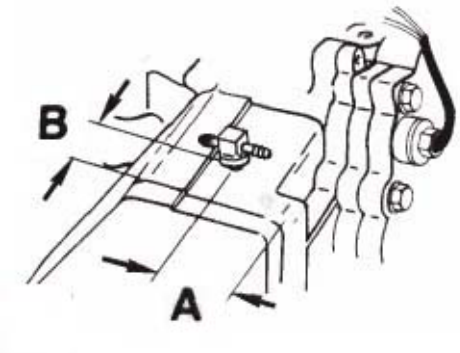


Fig. 1

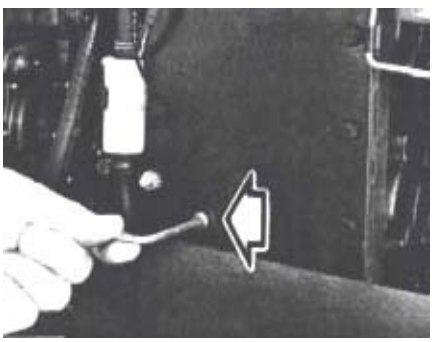
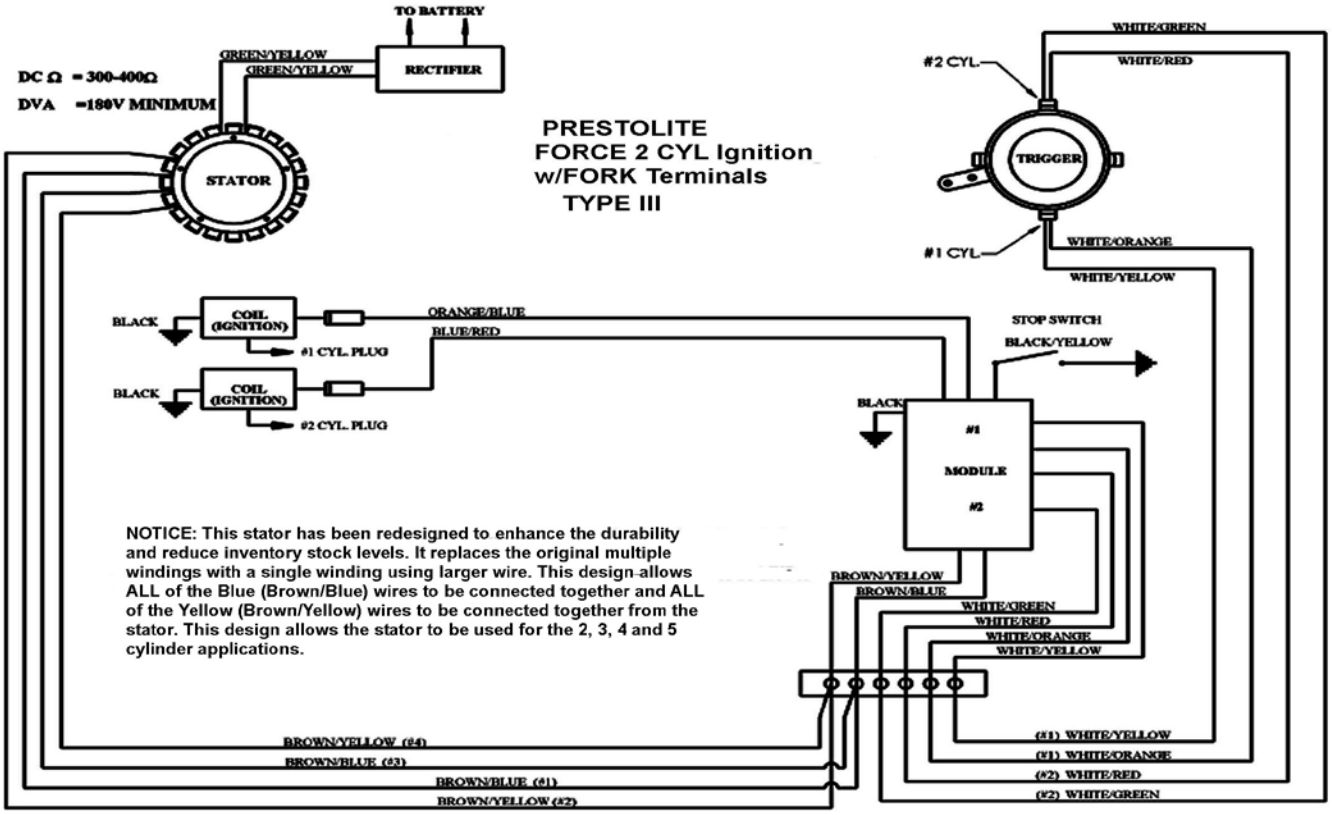
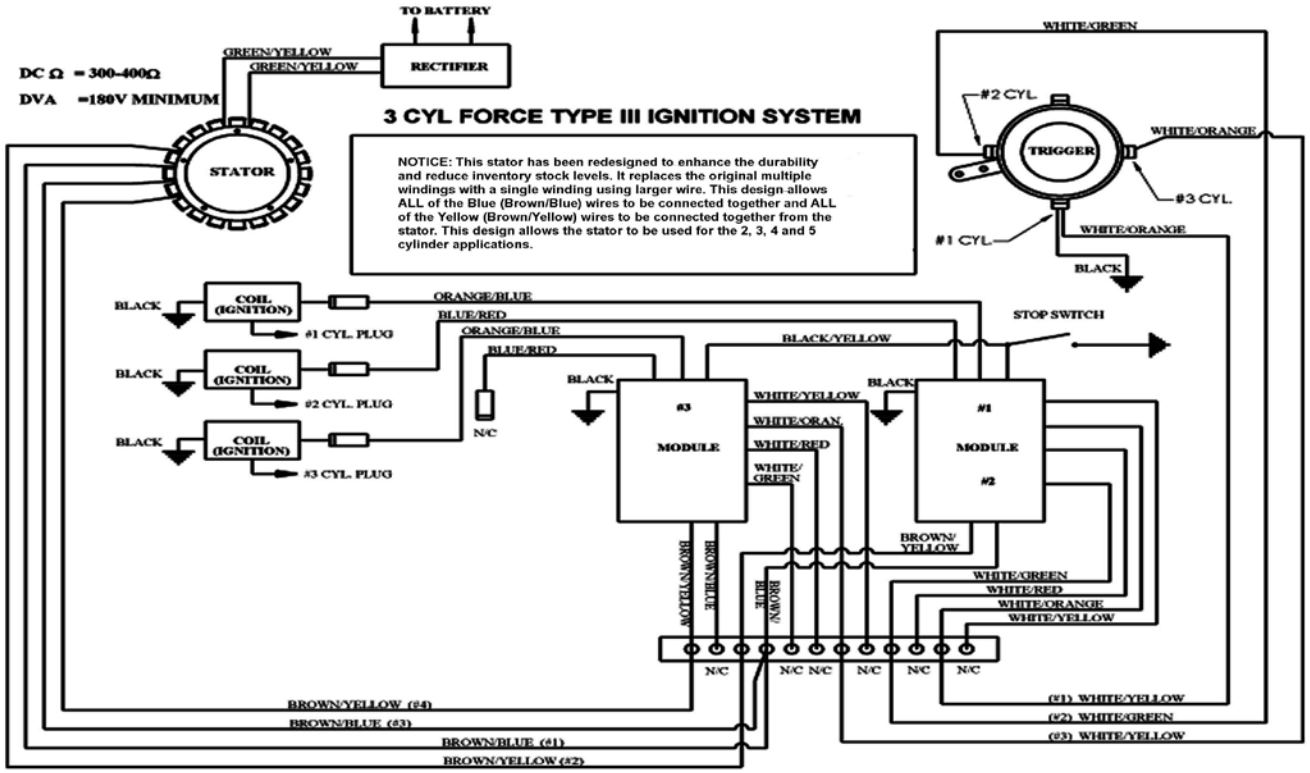


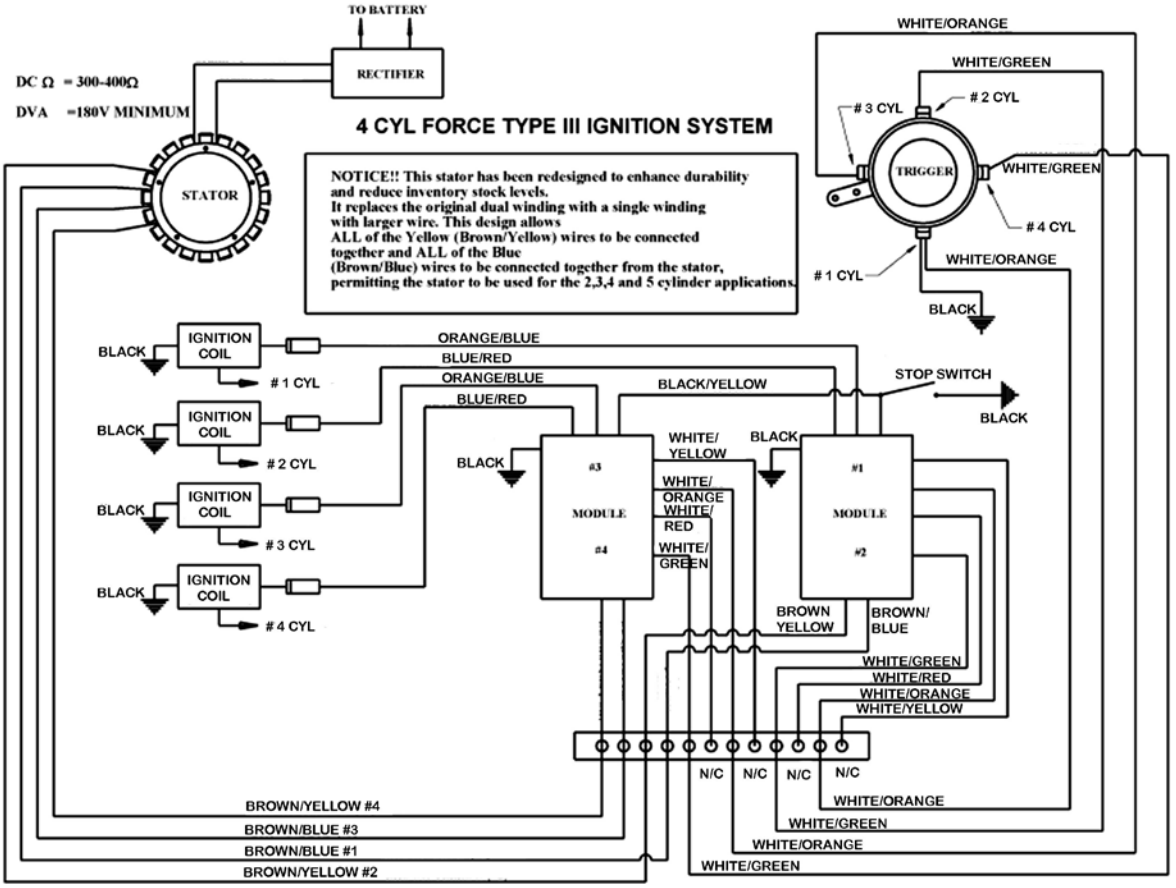
Fig. 2

Modified Force Engine Wiring Diagrams for CDI Electronics Components

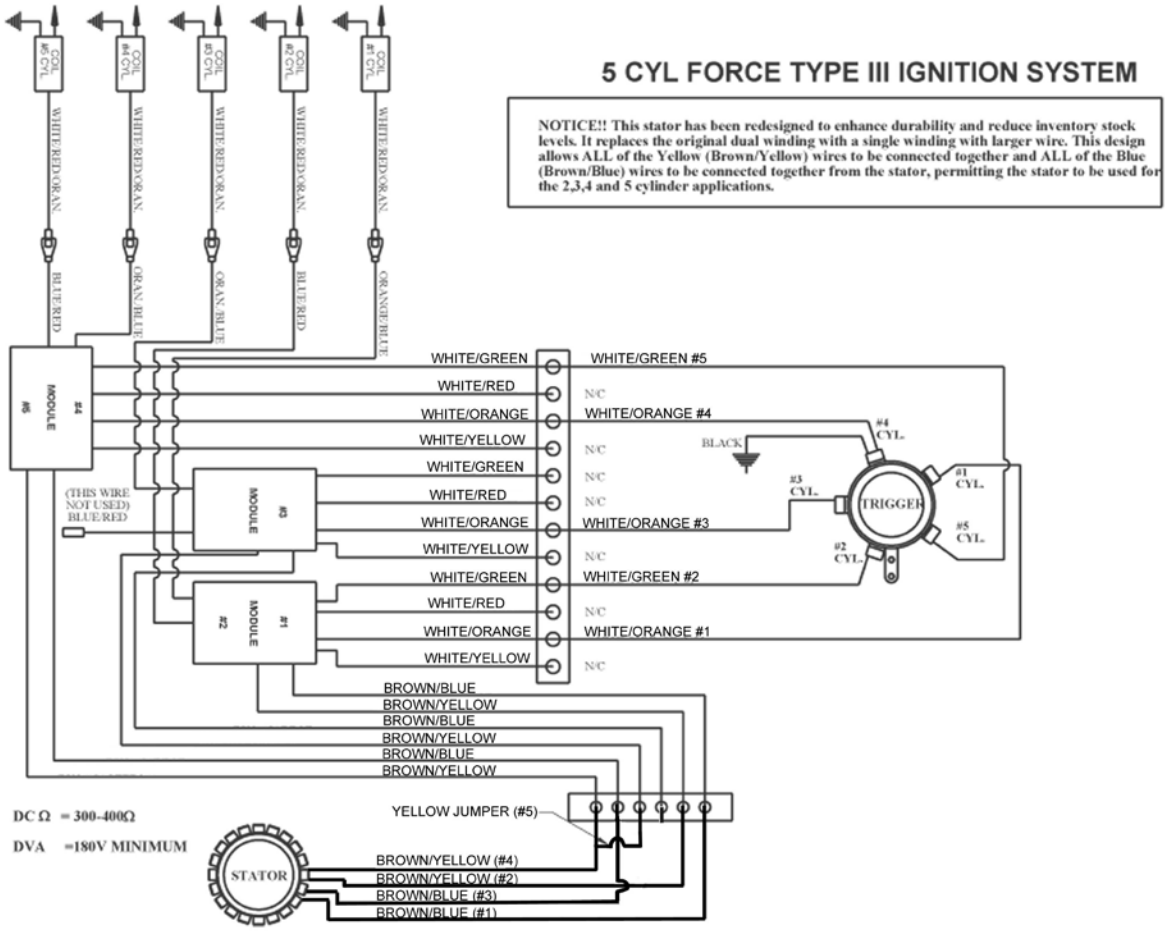




Modified Force Engine Wiring Diagrams for CDI Electronics Components



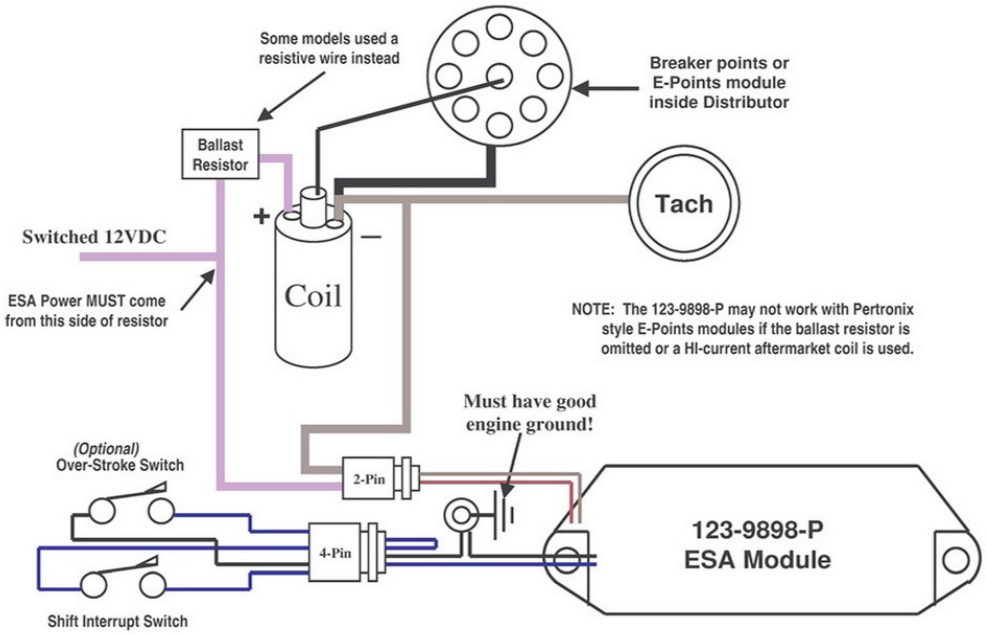
Modified Force Engine Wiring Diagrams for CDI Electronics Components



OMC Cobra Drive ESA Cross Reference

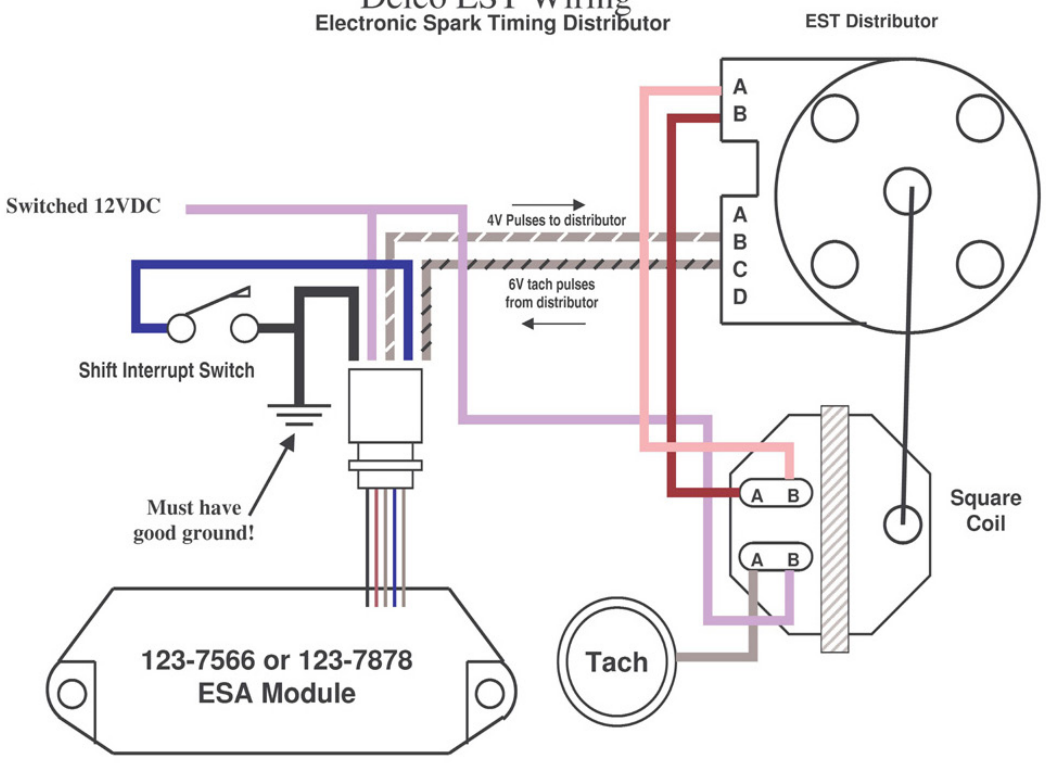
Application	Years	Type	OEM P/N	Supersession	CDI P/N	Coil
2.3L, 2.5L, 3.0L	86 - 88	Points	984281	987740	123-9898-P	383444
2.3L, 2.5L, 3.0L, 4.3L	86 - 90	Points	987740		123-9898-P	383444
2.3L, 2.6L, 3.0L, 4.3L	89 - 90	Points	985902	987740	123-9898-P	383444
2.5L, 3.0L	82 - 85	Points	982755		123-9898-P	383444
3.0L, 3.0L HO	90	Delco EST	986610	987396	123-7878	986644
3.0L, 3.0L HO	90	Delco EST	987396	987878	123-7878	986644
3.0L, 3.0L HO	92 - 93	Delco EST	987566		123-7566	986644
3.0L, 3.0L HO		Delco EST	987874		123-7566	986644
3.0L, 3.0L HO		Delco EST	987878		123-7878	986644
3.0L, 4.3L, 5.0L, 5.7L, 5.8L	91	Switch Assy.	986900		N/A	N/A
3.0L, 4.3L, 5.0L, 5.7L, 5.8L	92 - 93	Switch Assy.	987602		N/A	N/A
3.2L, 5.7L, 7.4L, 7.5L	90 - 93	Switch Assy.	986368	988039	N/A	N/A
3.8L, 4.3L	82 - 85	Points	982774		123-9898-P	383444
4.3L	86 - 88	Points	984036	986342	123-9898-P	383444
4.3L	86 - 88	Points	986342	987740	123-9898-P	383444
4.3L 2V only (HO 4V = EEM)	91	Prestolite BID	986999	987403	123-7567	383444
4.3L 2V only (HO 4V = EEM)	91	Prestolite BID	987403	987875	123-7567	383444
4.3L 2V only (HO 4V = EEM)	91	Prestolite BID	987875		123-7567	383444
4.3L 2V only (HO 4V = EEM)	92 - 93	Prestolite BID	987567		123-7567	987673
5.0L - 5.8L Ford	?? - 90	Points	987739		123-9898-P	383444
5.0L, 5.7L	82 - 85	Points	982749		123-9898-P	383444
5.0L, 5.7L	86 - 88	Points	984276	984730	123-9898-P	383444
5.0L, 5.7L, 5.8L	89 - 90	Points	974730	987739	123-9898-P	383444
5.0L, 5.7L, 7.5L Ford	?? - 90	Points	987738		123-9898-P	383444
5.0L, 5.8L Ford	91	Prestolite BID	987876		123-7571	383444
5.0L, 5.8L Ford	92 - 93	Prestolite BID	987564		123-7571	383444
5.0L, 5.8L Ford	93	Switch Assy.	987757		N/A	N/A
5.7L	90 - 91	EEM	986297	987495	N/A	914636
5.7L	91	Prestolite BID	987877		123-7571	383444
5.7L	91 - 92	Prestolite BID	987571		123-7571	383444
5.8L	93	Switch Assy.	988038		N/A	N/A
5.8L	93	Switch Assy.	988039	3854432	N/A	N/A
5.8L	94	Switch Assy.	3854410		N/A	N/A
5.8L	94	Switch Assy.	3854431		N/A	N/A
5.8L	94	Switch Assy.	3854432		N/A	N/A
7.4L	90 - 91	EEM	986293	987497	N/A	914636
7.4L	94 - 95	Switch Assy.	986361	3854133	N/A	N/A
7.4L	94 - 95	Switch Assy.	3854133	3854432	N/A	N/A
7.4L	95	Delco EST	3854714		123-7566	3854002
7.5L Ford	87 - 88	Points	974730	987738	123-9898-P	383444
Shift Switch for most	86 - 90	Switch Assy.	984051		933-4051	N/A
			987000	987400	N/A	
			987400		N/A	

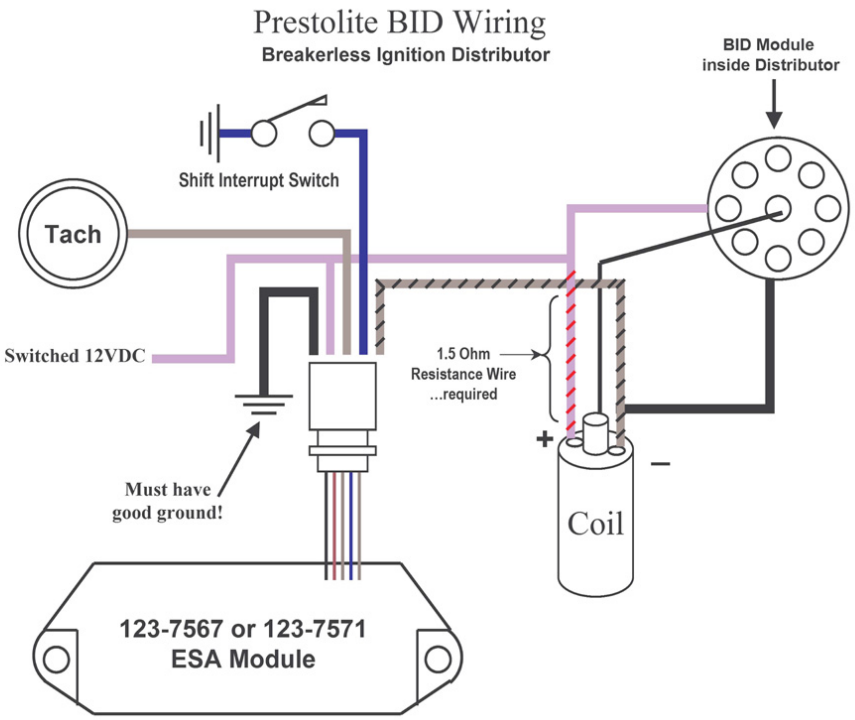
Breaker Points Wiring



Delco EST Wiring

Electronic Spark Timing Distributor





Ignition Checklist

NAME: _____ **DATE:**_____

PHONE #: _____ **ALT PHONE#:** _____

MFG: _____ **HP:** _____ **YEAR:** _____ **# OF CYLS:** _____ **MDL/SN:** _____

PROBLEM: _____

_____

_____

_____

SPARK: #1 _____ #2 _____#3 _____#4 _____ #5 _____#6 _____

STATOR DVA: Charge Coil: _____/_____Charge Coil: _____/_____Power Coil: _____/_____
Conn Dis Conn Dis Conn Dis

MERC STATOR DVA: LS: _____/_____LS: _____/_____ HS: _____/_____HS: _____/____
Conn Dis Conn Dis Conn Dis Conn Dis

STATOR RESISTANCE: Charge Coil: _____Charge Coil: _____Power Coil: _____

MERC STATOR RESISTANCE: LS: _____LS: _____HS: _____HS: _____

TRIGGER DVA: #1 _____/_____#2 _____/_____#3 _____/_____#4 _____/_____#5 _____/_____#6 ___/____
Conn Dis Conn Dis Conn Dis Conn Dis Conn Dis Conn Dis

TRIGGER RESISTANCE: #1 _____ #2 _____ #3 _____ #4 _____#5 _____ #6 _____

PP DVA TO COIL: #1 _____#2 _____#3 _____#4 _____#5 _____#6 _____

BATTERY VOLTAGE: @ CRANKING_____ @ IDLE_____ @ WOT_____

STARTER AMPERAGE DRAW: _____ **ENGINE TIMING:** _____

RECOMMENDED CORRECTIONS: _____

_____

_____

_____

_____