MSD IGNITION INSTALLATION INSTRUCTIONS

MSD Watercraft Ignition System
PN 4242, 4243, 4244

IMPORTANT: Read these Instructions before attempting the installation!

WARNING:
During installation, disconnect the battery cables. When disconnecting the battery, always remove the Negative cable first and install it last.

Parts Included In This Kit

1 - MSD Watercraft Ignition PN 4272
1 - Ignition Coil, PN 4292
1 - Ignition Wire Set, MSD Super Conductor, PN 31009
1 - Trigger Pickup, PN 4316
1 - Trigger Plate, Kaw 650/750 PN 4312, Yam: 650/701/760 PN 4311, Sea Doo 720: PN 4328
1 - Flywheel, Kaw. 650/750 PN 4302, Yam. 650/701/760 PN 4303, Sea Doo 720: PN 4304
1 - Shim Kit, 2 - .020 Shims, 1 - .060 Shim, PN 4318
1 - Grommet, Kaw. 650/750 PN 4321, Yam. 650/701/760 PN 4322
1 - 18 ga. Violet Wire
6 - Perma Seal Ring Lug Terminals, 3-No. 6, 2-No. 10, 3 - 5/16"
8 - Perma Seal Butt Connectors, 18-22 Ga.
2 - 4/40 3/8" Phillips Screws
2 - 4/40 1/2" Phillips Screws
1 - 3mm x 5mm Woodruff Key (Kaw. 650/750 Models Only)
1 - 3mm x 3.6mm Woodruff Key (Sea Doo Only)
1 - 5mm x 6.5mm Woodruff Key (Yam. 650/701/760 Models Only)
2 - 6mm x 20mm Button Head Stainless Bolts (Kaw. 650/750 & Yam. 650/701/760 Models Only)
2 - 14 x 6.4mm Compression Washer (Kaw. 650/750 & Yam. 650/701/760 Models Only)

Parts Not Included But May Be Required

1 - Starter Relay, MSD PN 4390
1 - Waterproof On/Off Switch, MSD PN 4370
1 - MSD Ignition Kill Lanyard, PN 43731
1 - Momentary On/Off Switch, MSD PN 4372

Ignition Mounting Plates:
Kawasaki 750 SX, SXi, PN 4395
Yamaha Super Jet, Blaster, VXR,
Wave Raider, WaveRunner, PN 4396
All Sea Doo, PN 4397

Tools Required

1 - 4mm Allen Wrench
1 - Phillips Screw Driver
1 - 1/2" Drive Rachet
1 - 1/2 x 30mm Socket (Sea Doo Only)
1 - 1/2 x 14mm Socket (650/750 Kaw. Eng. Only)
1 - 1/2 x 17mm Socket (650/701 Yam. Eng. Only)
1 - Torque Wrench
1 - Wire Terminal Crimper
1 - Heat Gun
1 - Caliper or Measuring Device
1 - Clay or Soft Wax
1 - Flywheel Puller
1 - Flywheel Holder
1 - Single Edge Razor Blade

For ease of installation, these instructions are divided into sections.

Section I: Mounting the Ignition, Coil and Starter Relay
Section II: Installing the Spark Plug Wires
Section III: Installing the Flywheel and Trigger Pickup Assembly
Section IV: Wiring the Ignition System, Cable Identification, Connecting the Power Leads
Section V: Timing the Ignition, Programming the Ignition
Section VI: Troubleshooting
Section VII: Customer Service & Warranty

SECTION I

MOUNTING THE IGNITION, COIL, STARTER RELAY

The MSD Watercraft Ignition may be mounted in any location except on the engine or near the exhaust manifold. Excessive heat at these locations could damage the ignition.

It is recommended that a mounting plate be fabricated out of aluminum or stainless steel and the ignition, coil and starter relay be mounted to it. Use the template supplied to assist you in making a mounting plate for your craft. When selecting a mounting location make sure that the ignition's cable assembly will reach the battery and flywheel areas.

To simplify installation, MSD offers mounting plates for most applications (Figure 1). These strong aluminum plates are pre-drilled and attach to the factory mounting locations. Part numbers are listed on page 1.

Ignition

Using the Ignition as a template, mark the location of the mounting holes on the mounting plate. Remove the ignition and drill a 1/4" hole at each marked location. Mount the ignition using 10-32 x 3/4" or 5mm x 16mm stainless steel bolts (not supplied).

Ignition Coil

Using the coil as a template, mark the location of the mounting holes. Remove the coil and drill a 1/4" hole at each marked location. Mount the coil using 1/4" x 3/4" or 6mm x 20mm stainless steel bolts (not supplied).

Starter Relay

When installing the MSD Watercraft Ignition System it may be necessary to remove the stock starter relay and replace it with an MSD External Relay, PN 4390. Using the relay as a template mark the location of the mounting holes. Remove the relay and drill a 1/4" hole at each marked location. Mount the coil using 1/4" x 1/2" or 6mm x 12mm stainless steel bolts (not supplied).

Figure 1 An MSD Mounting Plate.

The following are suggested areas to install the mounting plate to your craft.

Kawasaki 650 SX	Remove the stock electrical box and mount the plate to existing mounting bosses.
Kawasaki X2	Attach ignition mounting plate under the hood latch mounting bolts. Mount coil above engine next to the steering arm.
Kawasaki 750 SX, SXi SS, Xi, Xir, Zxi	Remove the stock electrical box and mount the plate to existing mounting bosses.
Yamaha Blaster, SuperJet VXR/WaveRunner, Raider 701/760	Remove the stock electrical box and mount the plate to existing mounting bosses.

SECTION II

INSTALLING THE SPARK PLUG WIRES

Each wire set includes two 90° dual crimp terminals, two MSD Heli-Core Spark Plug Wires and a Mini-Stripper-Crimper. The MSD Mini-Stripper-Crimper is supplied for assembling the MSD Spark Plug Wires. Before using the tool it must be separated into two parts. Separate it by bending the tool back and forth until the center breaks (Figure 2).

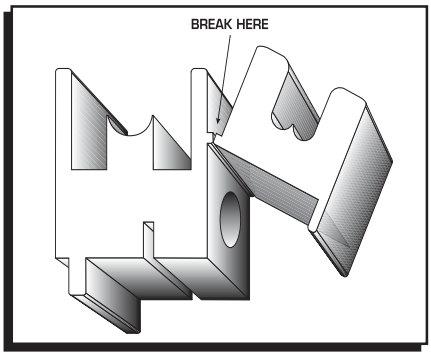


Figure 2 Separating the Mini-Stripper.

1. Locate the correct cutting groove of the Mini-Stripper-Crimper for your wire. One groove is larger to accept the 8.5mm Super Conductor Wire. Insert the wire from the long side of the crimper tool and push it through until it is flush with the other side (Figure 3).

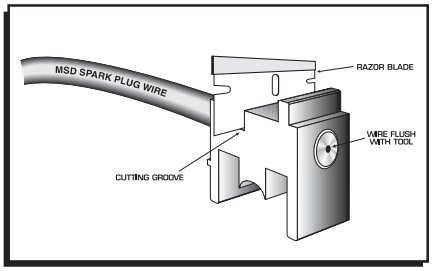


Figure 3 Stripping the Wire.

2. Press a single edge razor blade in the cutting groove and push all the way down. Slowly rotate the wire 360° then remove the razor blade. Remove the wire from the Crimper and slowly twist the cut end of wire off in a counterclockwise direction.

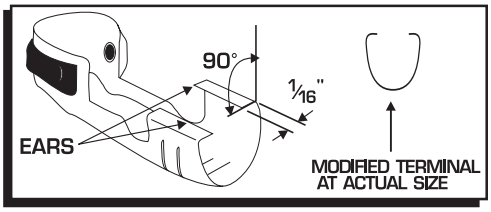


Figure 4 Preparing the Terminals.

3. Before crimping the terminals to the wires the terminals must be modified as shown in Figure 4. Bend the terminal ears over 90° by using a pair of regular needle nose or long nose pliers.

4. Position the wire in the terminal until the insulation sleeve is about 1/8" beyond its crimping tabs. Position the conductor between the conductor crimps and use a pair of needle nose pliers to crimp the tabs tightly against the conductor (Figure 5). Make sure the conductor does not slide out and **do not overtighten.**

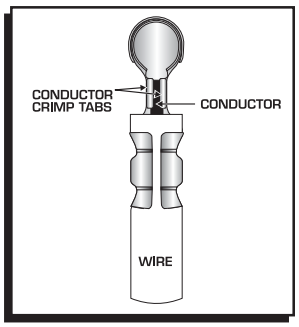


Figure 5 Installing the Terminal.

5. After positioning the conductor, position the terminal/wire assembly into the "W" groove side of the Mini-Crimper. Align the tabs so they are exactly centered on the point (Figure 6).

6. Slide the stripper block over the crimping block. Push the wire and terminal in the rest of the way by lightly squeezing the Mini-Stripper-Crimper together. Make sure the "Vise Flags" are on the same side and that they are pushed against the vise jaws to ensure correct alignment (Figure 6).

7. Slowly close the jaws of the vise. Make sure that the crimp is properly forming and that the tool remains aligned. Stop when the ends of the terminal have curled tightly into the wire sleeve but do not tear into the sleeve (Figure 6). DO NOT overcrimp the wire!

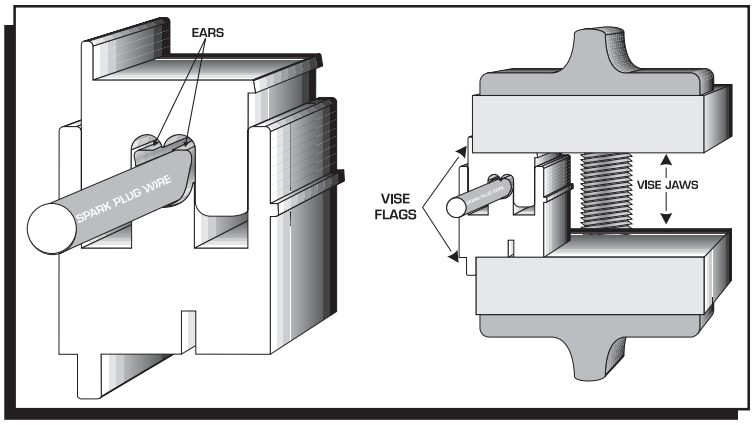


Figure 6 Installing the Wire and Crimping.

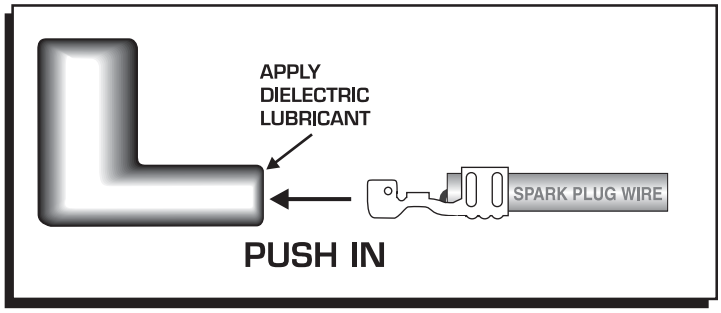


Figure 7 Postioning the Terminal in the Boot.

8. Apply dielectric (non conductive) lubricant to the inside of the boot. Grasp the boot and push the wire with the terminal into the boot until the terminal stops at the boot's 90° bend. Make sure the terminal is positioned in the boot so the open side of the terminal faces the open side of the boot (Figure 7).

9. Apply a light coat of dielectric grease to the spark plug and the coil spark plug wire tower and install the wire onto the engine.

SECTION III FLYWHEEL AND TRIGGER PLATE

REMOVAL

Before installing the MSD Flywheel and Trigger Pickup assembly, the stock magneto flywheel and stator plate must be removed. Refer to your craft's service manual for the proper removal procedure.

TRIGGER PLATE ASSEMBLY

1. Assemble the trigger plate and pick-up assembly as shown in Figure 8. Place the trigger plate assembly on the bosses with the trigger on the side of the engine where the wires normally exit the case (Figure 9). Screw the supplied bolts and compression washers into the case and lightly tighten to hold the trigger plate in the center of the case's mounting pads.

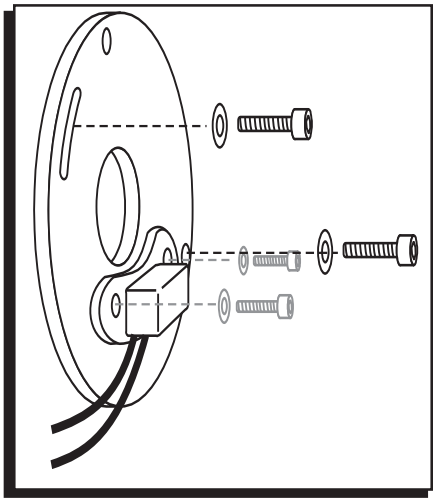


Figure 8 Assembling the Trigger Plate.

Kawasaki 750 installation: The engine case mounting pads of the Kawasaki 750 must be drilled and tapped (Figure 10).

A. Drill and tap a hole on each pad 2.165" from the center of the case. Drill and tap each hole for a 6mm x 1mm allen head bolt using a No. 9 or 5mm drill bit and a 6mm x 1mm tap. Each hole needs to be drilled 21mm deep.

B. Rotate the plate through the slotted positions to ensure that the plate slides smoothly and does not rock. If resistance is felt remove the trigger plate and inspect the mounting bosses for burrs and file flat if necessary. Note: The PN 4312 Kawasaki 650/750 Trigger Plate outside diameter is machined to fit the mounting pads on the Kawasaki 750 engine. When this plate is used on a Kawasaki 650 engine the trigger plate will have approximately 1/16" play on each side.

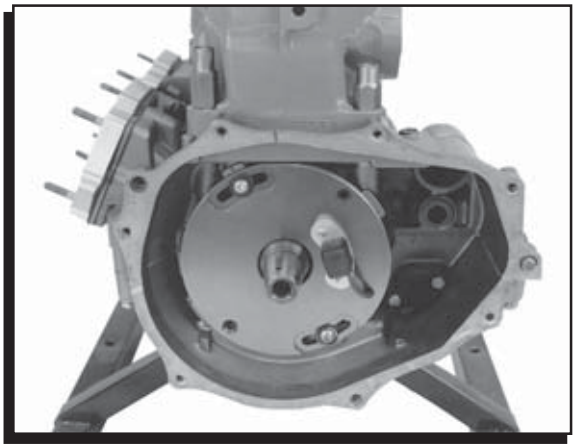


Figure 9 Mounting the Trigger Plate Assembly.

2. Slide the Green trigger pickup wires through the grommet. Install the grommet with wires attached in the case and secure in place using the stock mounting hardware. Place a small amount of silicone sealer around the wires where they enter the grommet.

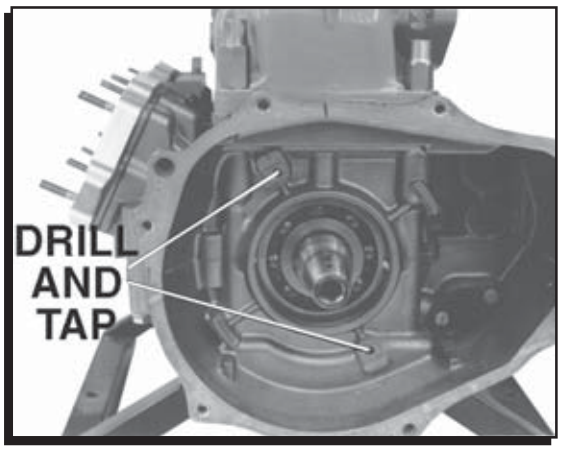


Figure 10 Modifying the Kawasaki 750 Case.

CHECKING THE AIR GAP

It is important to have the correct air gap between the pickup and the flywheel. Too much may not trigger the ignition while too little may cause contact to the pickup.

1. Position a small amount of clay on the top of the trigger pickup (Figure 11).
2. Place the flywheel on the crankshaft and lightly tap with a rubber or wooden object to hold it in place.
3. Remove the flywheel and measure the thickness of the clay. Refer to the chart (Figure 12) for the number of shims that will need to be placed under the trigger pickup to obtain the correct air gap between the trigger pickup and the magnet in the flywheel. The correct air gap is .050" to .094".
4. Insert the necessary shims under the trigger pickup. Make sure the trigger retaining bolts are the correct length for the number of shims being used and are tightened firmly.

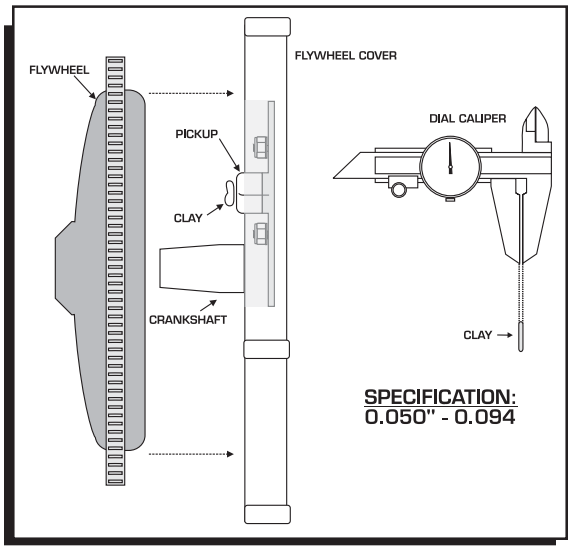


Figure 11 Checking the Air Gap.

INSTALLING THE FLYWHEEL

Heating the flywheel in boiling water to evenly expand the flywheel material before it is installed is necessary in the following procedure. Be sure to wear adequate skin and eye protection to prevent possible burning.

Note: On Kawasaki 750 engines the stock front engine cover will require modification. The stock stator mounting bosses will have to be machined out of the front cover so that the MSD flywheel will fit. If you do not have access to a machine shop, you can also use a stock Kawasaki 650 SX front cover. To modify the Kawasaki 750 flywheel cover, machine the areas that are shaded in gray flush with the flywheel cover (Figure 13).

Note: If the starter gear was removed (Kawasaki 650/750, Yamaha 650/701/760 and Sea Doo engines only) during the installation of the trigger plate, install the gear now.

1. Place the flywheel in boiling water for five minutes to evenly heat the flywheel.
2. Position the Woodruff Key on the crankshaft.
3. After the flywheel is thoroughly heated, quickly remove the flywheel from the water and install it onto the crankshaft. With a flashlight, look into the Woodruff Key slot and make sure the key is still in position. Install the flywheel retaining nut/bolt.
4. Attach a flywheel holding tool (not supplied) and torque the flywheel retaining bolt/nut to: Kaw. 650/750 - 65 ft-lbs; Yam. 650/701/760 - 65 ft-lbs; Sea Doo - 100 ft-lbs.

SHIM CHART

If the thickness of the clay is between:	ADD THESE SHIMS	
	.020"	.060"
.050" - .094"	0	0
.095" - .115"	1	0
.116" - .135"	2	0
.136" - .155"	0	1
.156" - .176"	1	1
.176" - .195"	2	1

Figure 12 Air Gap Shim Chart.

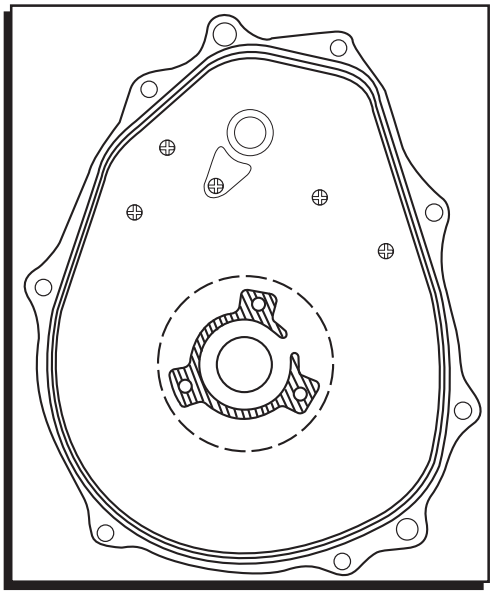


Figure 13 Modifying the Kawasaki 750 Front Cover.

SECTION IV WIRING

All wires must be routed to the locations described, then cut to length and have Perma-Seal solderless connectors installed as shown in Figure 14. Applying a small amount of heat to the connector seals the wire to terminal connection.

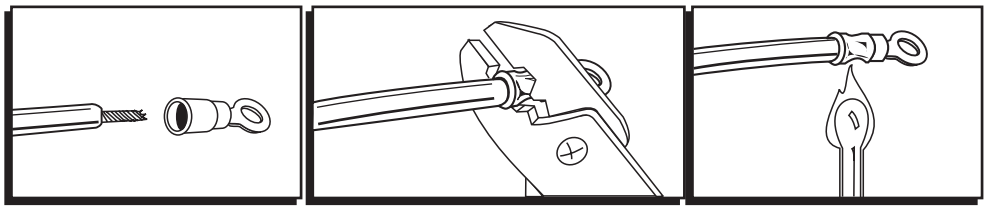


Figure 14 Installing Perma-Seal Connectors.

MSD CABLE IDENTIFICATION

Figure 15 shows a complete installation of the MSD Watercraft Ignition System.

Connecting The Power Leads

Before connecting the power leads, clean all surfaces of dirt, paint and other foreign substances where the power leads will be connected . If the power leads need to be lengthened, use 14 gauge. wire and solder all splices. Power leads may be shortened if necessary.

1. Connect the Red wire directly to the battery positive (+) post or to the starter solenoid where the cable from the battery (+) is connected.
2. Connect the Black wire to ground, preferably on the engine where the ground strap from battery (-) is connected to the engine case.

Connecting the Ignition

1. Connect the ORANGE wire from the ignition to the ORANGE wire from the coil.
2. Connect the BLUE wire from the ignition to the BLACK wire from the coil.
3. Connect the two GREEN wires from the ignition to the two GREEN wires from the trigger pickup.

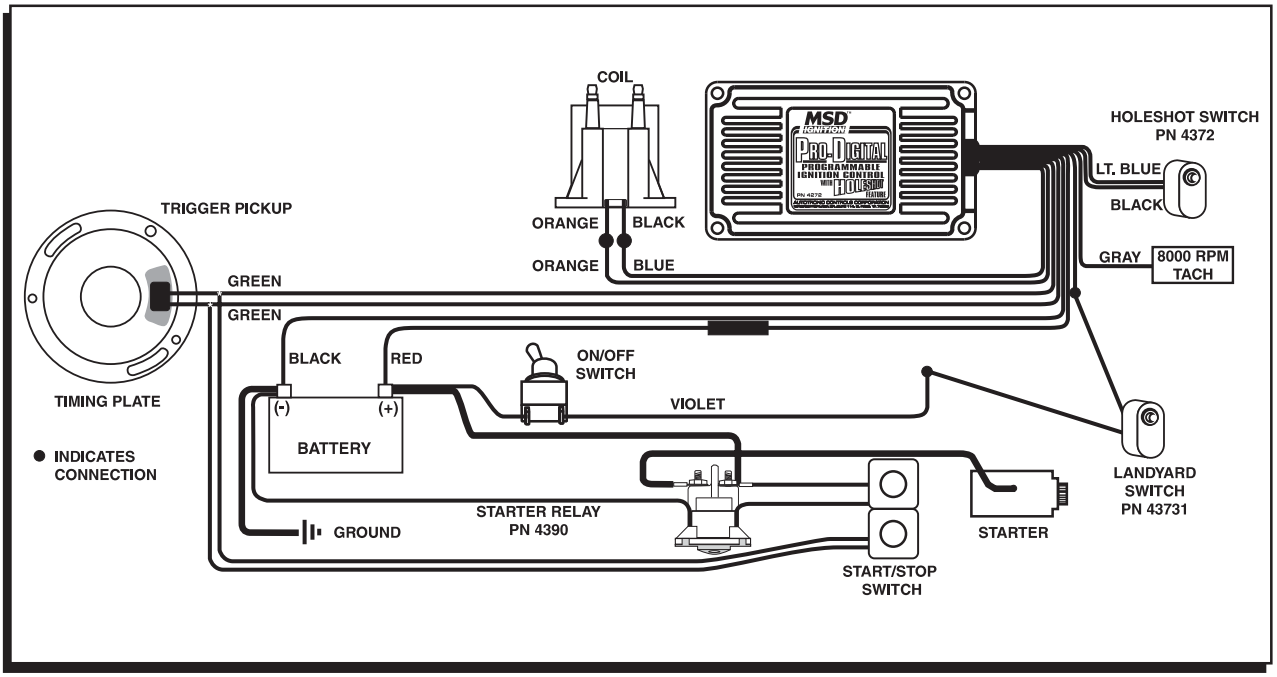


Figure 15 Wiring the MSD Watercraft Ignition System.

Note: It does not matter which Green wire on the ignition is hooked to which Green wire on the trigger pickup.

CONNECTING THE FACTORY STOP SWITCH

PN 4272:
To retain use of the factory stop switch located on the handle bar, attach the two wires coming from the stop switch to the two GREEN wires from the MSD Ignition (Figure 15).

Note: Sea Doo uses factory Landyard Switch to kill the engine. See Lanyard Switch hookup below.

CONNECTING THE IGNITION KILL LANYARD FEATURE

Landyard Switches are listed as Normally Open or Closed when the switch is not connected to anything and the Landyard is removed from the switch.

Normally Open Lanyard Switch

Connect the Violet wire of the MSD Ignition to one side of the N.O. Lanyard Switch and the other side to positive battery (12 volts) (Figure 16).

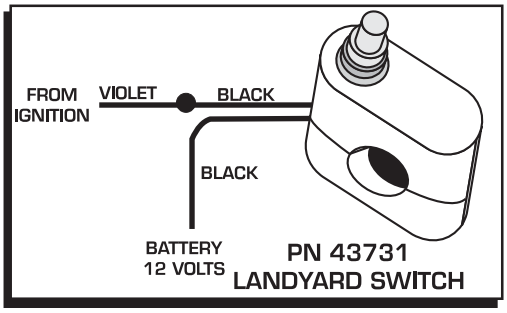


Figure 16 Normally Open Lanyard Switch.

CONNECTING THE HOLESHOT FEATURE

Connect the WHITE wire to one side of a normally open momentary switch and the other side of the switch to the BLACK wire (Figure 17).

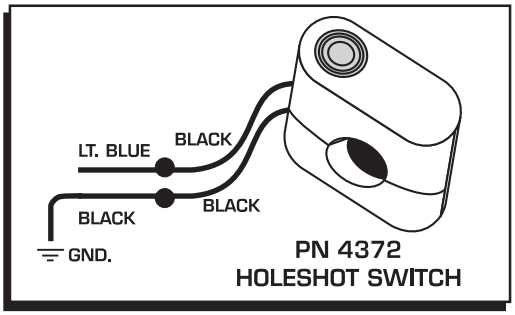


Figure 17 Connecting the Holeshot Feature with a Normaly Open Switch.

CONNECTING A TACHOMETER

The tach signal from the MSD is a 12 volt square wave signal so many types of tachometers can be used with the ignition. Some of the more commonly used tachometers are the Jetmeter, Water Strike Marine, Optak, J.R. Electronics, VDO, Faria, and Autometer. Connect the tachometer trigger wire to the MSD ignitions Gray wire as shown in Figure 15.

SECTION V TIMING AND PROGRAMMING

The MSD Watercraft Ignitions innovative design allows you to static time the engine before the engine is started. Study the special features shown in Figure 18 before proceeding.

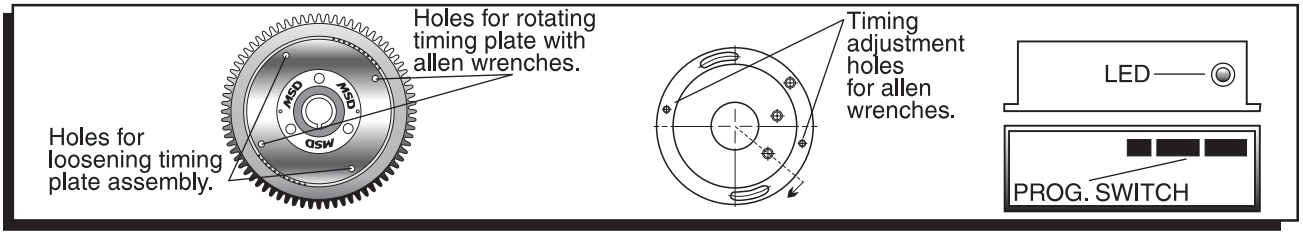


Figure 19 How to Check Static Timing

At this point in the installation, the ignition, coil and starter relay should be mounted and installed in the craft along with the trigger plate assembly and flywheel. Now you are ready to time the engine before starting the engine.

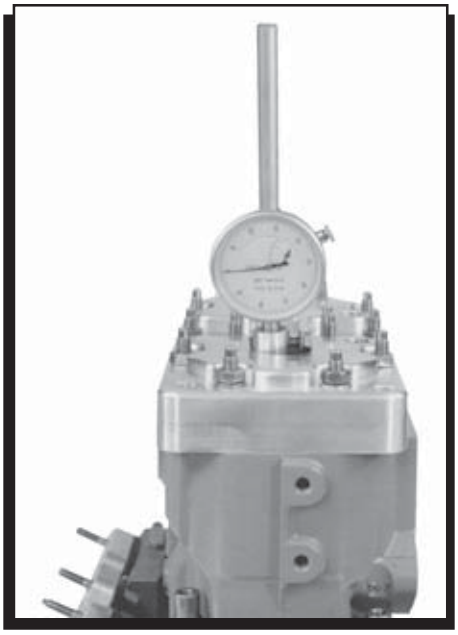


Figure 19 Finding Top Dead Center.

1. Locate Top-Dead-Center (TDC) by placing a dial indicator in the front cylinder and rotating the crankshaft until the piston reaches the highest point in the cylinder (Figure 19). When TDC is found, place a mark on the engine case so that it lines up with the TDC mark of the far left timing mark on the flywheel as shown in figure (Figure 20).
2. Remove the ignitions backing plate. Position switch 1 to ON/ON/ON. Position selector S4 of switch 2 to "ON" in order to disable the ignition's spark and activate the built-in LED indicator. Turn the ignition on/off switch to the ON position and place the spark plugs with spark plug wires attached against ground. **WARNING:** Do not trigger the ignition without the spark plugs grounded and the plug wires attached. Damage to the ignition coil may result.
3. Slowly rotate the flywheel clockwise until the small LED on the side of the ignition turns on. When the LED is on, this indicates that the magnet on the flywheel is entering over the trigger pickup and that the ignition will fire at this point. Note: As the flywheel is rotated the timing marks will decrease from a high number to a low number. Each dimple on the flywheel represents 5° of timing adjustment with the first dimple being TDC.
4. Follow the timing mark on the engine down to the flywheel and determine where the timing is set at by reading the timing mark on the flywheel. Write this number down. **(Because of the advanced circuitry in the MSD Ignition the true timing is 5° less than what the timing mark will show)**. To achieve your true timing, subtract 5° from the number you wrote down. Example - shown 30° less 5° equals 25° of true timing. Note: the MSD Digital Ignition can be programmed to electronically

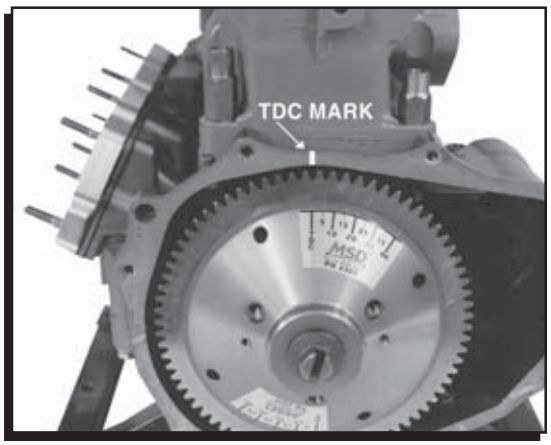


Figure 20 Marking TDC.

retard the timing up to 7° less than what the maximum true timing is set at. Always set the trigger plate for the maximum amount of timing the engine will ever run at.

5. To adjust the ignition's max timing the trigger plate must be rotated counter-clockwise to advance the timing or clockwise to retard the timing. To adjust the plate without removing the flywheel, locate the four trigger plate access holes in the flywheel (Figure 21). Rotate the flywheel back to TDC and then insert two 4mm allen wrenches into the holes that line up with the trigger plate hold down bolts. Loosen the bolts to allow the trigger plate to be rotated.

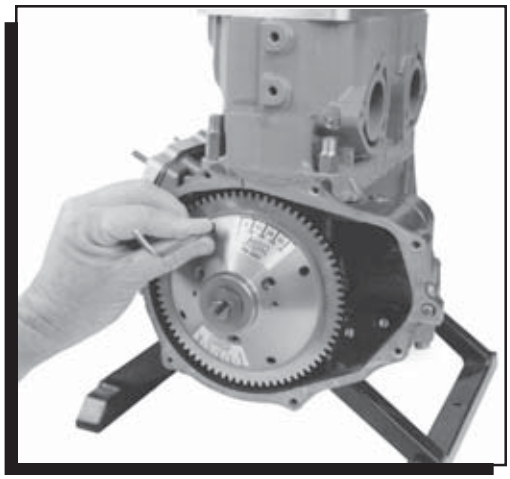


Figure 21 Loosening the Trigger Plate.

6. Remove the two wrenches and rotate the flywheel to the timing mark that was previously recorded. Insert the two allen wrenches into the other two holes (located 90° to the first two holes) so the trigger plate rotates with the flywheel. Rotate the flywheel clockwise or counter clockwise until the desired timing mark on the flywheel lines up with the timing mark on the engine (Figure 22).

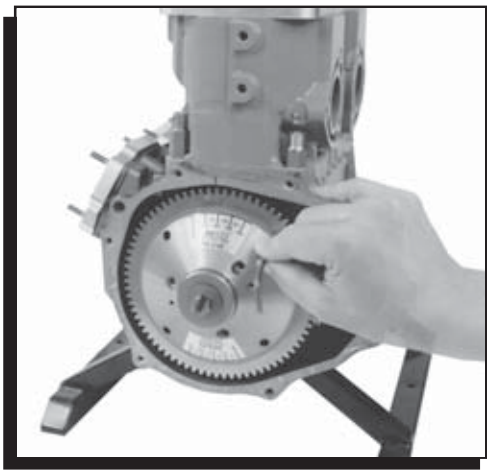


Figure 22 Moving the Trigger Plate to Adjust the Timing.

7. Remove the two wrenches and rotate the flywheel to TDC. Insert the allen wrenches into the first two holes that line up with the trigger plate retaining bolts and tighten the bolts.

8. Rotate the flywheel clockwise until the LED turns on. Check to make sure the desired timing has been set correctly. Install the flywheel cover.

9. To program the engines final maximum timing setting, position selectors S1-S3 of switch as required to match the desired timing. Example - indicated timing is 25° less -3° (selectors S1-S3 set for 3°) = 22° maximum timing.

10. Turn the ignition switch to the OFF position and position selector S4 of switch 2 to off position. Install the spark plugs and spark plug wires. The engine is now ready to start.

Note: If the application you are installing the system on permits, verify the ignition timing using a timing light.

PROGRAMMING

The function of the timing curve is to match the ignition to the burning rate of the fuel and the speed (RPM) of the engine. By adjusting the timing of the ignition maximum combustion pressure can be achieved at the same time the piston is beginning the power stroke. Any factor that changes the burning rate of the fuel or the engine speed (RPM) can cause a need for an ignition timing change.

To the right is a chart of some of the factors that will affect ignition timing.

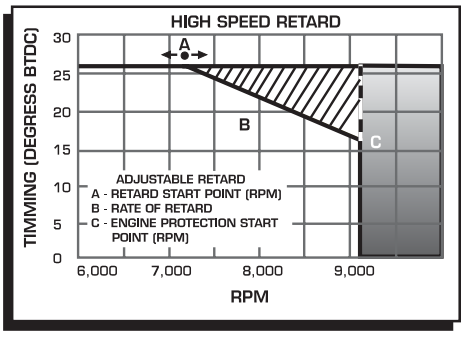


Figure 23 Programming Points.

As you can see from the chart, most factors will change throughout the range of engine operation.

Timing adjustments must be made to compensate for these changes.

FACTOR	ADVANCE FOR	RETARD FOR
Cylinder Pressure	Low	High
RPM Engine	Low	High
Energy of Ignition	Low	High
Fuel Octane	High	Low
Mixture (Fuel/Air)	Rich	Lean
Temperature	Cool	Hot
Combustion Turbulence	Low	High
Load	Light	Heavy

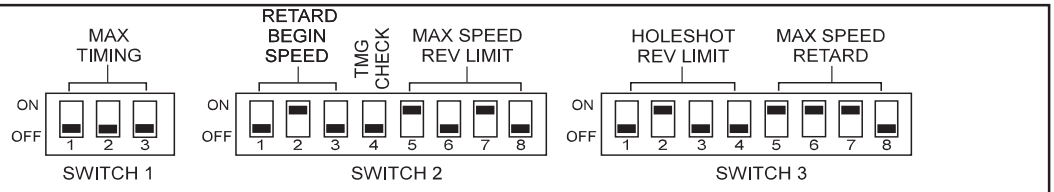
Obviously, a full technical explaination of the correct ignition timing would be very complicated. The best way to arrive at a suitable timing curve for your engine is to use the above chart as a guide and compare your engine combination against the chart.

TIPS FOR SETTING YOUR IGNITION TIMING

1. Use as much initial advance as possible without encountering excessive starter load or engine kickback on starting. Beware of detonation when setting the initial advance.
2. Set the timing retard start point as early as possible without sacrificing low RPM performance.
3. Use the highest retard as possible without hurting top end performance.

PROGRAMMING THE IGNITION

The MSD Ignition produces a computer-generated timing curve. Several programming options are available to tune the basic timing curve to meet specific engine requirements. The factory program settings are suitable for most watercraft, but changes can be made for special applications. Three switches located under the aluminum plate of the MSD ignition module select the programming options (Figure 24). **IMPORTANT NOTE: If the selector switch settings are changed, the ignition switch must be turned "off" and back "on" before the new program functions become active.** Always install aluminum backing plate to seal switches.



The factory settings are:			
Switch 1	Selectors	S1-on, S2-on, S3-on	(Max Timing = 0°)
Switch 2	Selectors	S1-off, S2-on, S3-off	(Begin Retard = 5000 rpm)
		S4-off	(Timing Setup = Ignition Operate)
		S5-on, S6-off, S7-on, S8-off	(Rev Limit = 7750 rpm)
Switch 3	Selectors	S1-off, S2-on, S3-off, S4-off	(Holeshot Rev Limit = 3500 rpm)
		S5-on, S6-on, S7-on, S8-off	(Max Speed Retard = 7°.)

Figure 24 Programming Switches

TIMING RETARD FUNCTION

The max speed retard function is an rpm-dependent timing retard. It is configured by three seperate elements:

1. The "Retard Begin Speed" (C) Fig. 25 is the point in the rpm range when the timing retard begins.
2. The "Total Retard" (F) Fig. 25 is the total amount of timing retard (in crankshaft degrees) introduced between the retard begin point and the Rev Limit point.
3. The "Rev Limit" (D) Fig. 25 is the point in the rpm range where maximum safe engine rpm limit is set and where the timing retard ends at.

SETTING THE PROGRAM SWITCHES

INITIAL TIMING:

(A) The LED indicated timing is 5° advanced from the actual run timing, if switch 1 is set to on/on/on. Refer to Section V "Timing the Watercraft Ignition" for proper setting.

SETTING MAX TIMING:

(B) The max timing is 5° less than the LED indicated timing. Max timing can be retarded up to 7° from the max timing setting by Selectors S1-S3 of switch. Refer to Section V "Timing the Watercraft Ignition" for setting the max timing.

SETTING THE RETARD BEGIN SPEED:

(C) Selectors S1-S3 of switch 2 determines the rpm point at which the timing will begin to retard at. The rpm point is adjustable in 500 rpm increments between 4000 rpm and 7500 rpm. Position selectors S1-S3 of switch 2 to the desired retard begin speed for your particular combination.

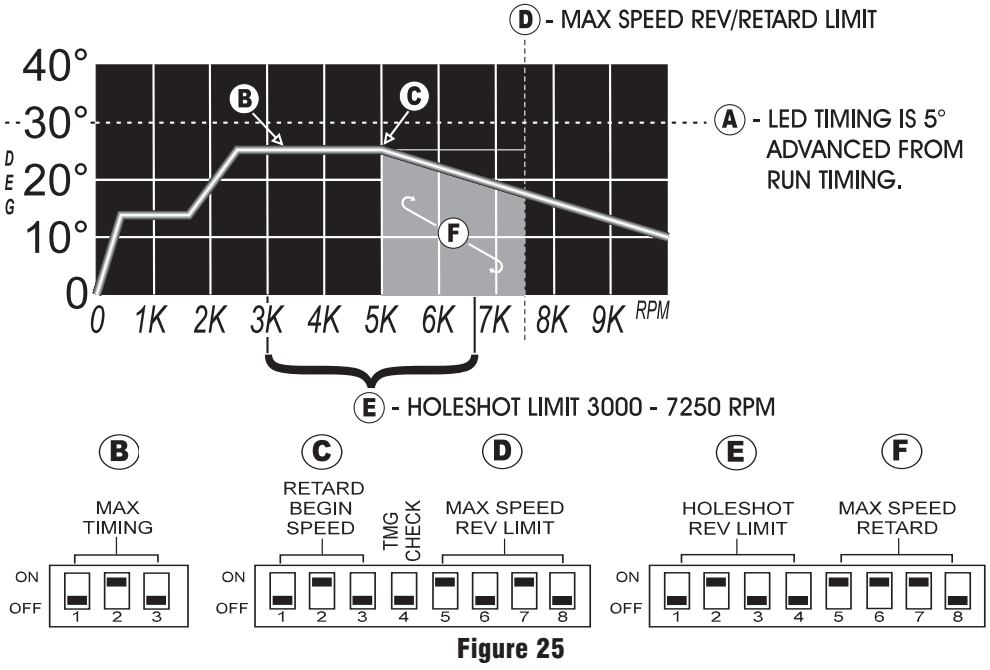


Figure 25

MAX SPEED REV/RETARD LIMIT:

(D) The rev/retard limiter function is variable in 250 rpm increments between 6500 rpm and 10250 rpm. The system is supplied with the rev/retard limit pre-set at 7750 rpm. Position selectors S5-S8 of switch 2 to the desired rpm/retard limit point for your particular engine combination.

(E) SETTING THE HOLESHOT LIMIT:

The Holeshot rev limit function is variable in 250 rpm increments between 3000 rpm and 6750 rpm. Position selectors S1-S4 of switch 3 to the desired rpm limit point for your application.

SETTING THE MAX RETARD:

(F) Selectors S5-S8 of switch 3 determines how much timing retard will occur between the Retard Begin rpm point and the Rev Limit rpm point. The Max Retard is adjustable in 1 degree increments from 0 to 15 degrees. The retard is operational only when the Max Retard function is set to a value other than zero. If the max retard is not desired, the "Max Retard" function should be set to zero (all selectors "off"). Position selectors S5-S8 of switch 3 to the desired retard amount for your particular engine combination.

MAXIMUM TIMING			
DEG	S1	S2	S3
-7	OFF	OFF	OFF
-6	ON	OFF	OFF
-5	OFF	ON	OFF
-4	ON	ON	OFF
-3	OFF	OFF	ON
-2	ON	OFF	ON
-1	OFF	ON	ON
MAX	ON	ON	ON

SET MAX TIMING SWITCHES ALL ON AND SET TIMING WITH LED FOR 5 DEG GREATER THAN TIMING DESIRED

RETARD BEGIN SPEED			
RPM	S1	S2	S3
4000	OFF	OFF	OFF
4500	ON	OFF	OFF
5000	OFF	ON	OFF
5500	ON	ON	OFF
6000	OFF	OFF	ON
6500	ON	OFF	ON
7000	OFF	ON	ON
7500	ON	ON	ON

TIMING SETUP	S4
LED OPERATE	ON
IGN. OPERATE	OFF

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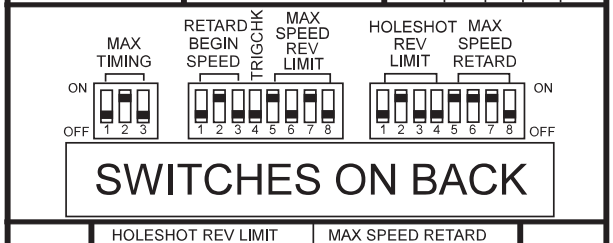
MAX SPEED REV LIMIT				
RPM	S5	S6	S7	S8
6500	OFF	OFF	OFF	OFF
6750	ON	OFF	OFF	OFF
7000	OFF	ON	OFF	OFF
7250	ON	ON	OFF	OFF
7500	OFF	OFF	ON	OFF
7750	ON	OFF	ON	OFF
8000	OFF	ON	ON	OFF
8250	ON	ON	ON	OFF
8500	OFF	OFF	OFF	ON
8750	ON	OFF	OFF	ON
9000	OFF	ON	OFF	ON
9250	ON	ON	OFF	ON
9500	OFF	OFF	ON	ON
9750	ON	OFF	ON	ON
10000	OFF	ON	ON	ON
10250	ON	ON	ON	ON



HOLESHOT REV LIMIT				
RPM	S1	S2	S3	S4
3000	OFF	OFF	OFF	OFF
3250	ON	OFF	OFF	OFF
3500	OFF	ON	OFF	OFF
3750	ON	ON	OFF	OFF
4000	OFF	OFF	ON	OFF
4250	ON	OFF	ON	OFF
4500	OFF	ON	ON	OFF
4750	ON	ON	ON	OFF
5000	OFF	OFF	OFF	ON
5250	ON	OFF	OFF	ON
5500	OFF	ON	OFF	ON
5750	ON	ON	OFF	ON
6000	OFF	OFF	ON	ON
6250	ON	OFF	ON	ON
6500	OFF	ON	ON	ON
6750	ON	ON	ON	ON

MAX SPEED RETARD				
DEG	S5	S6	S7	S8
0	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

SUGGESTED PROGRAMMING POINTS

ENGINE	RPM	RETARD BEGIN	RETARD	REV/RETARD LIMIT
650/750 Kaw.	5000-6000	3800-4200 RPM	8°	7000 RPM
650/750 Kaw.	6000-7000	4600-5000 RPM	7°	8000 RPM
650/750 Kaw.	6600-7600	5000-5600 RPM	7°	9000 RPM
650/701/760 Yam.	5000-6000	3800-4200 RPM	8°	7000 RPM
650/701/760 Yam.	6000-7000	4600-5000 RPM	7°	8000 RPM
650/701/760 Yam.	6600-7600	5000-5600 RPM	7°	9000 RPM
650/720 Sea Doo	5000-6000	3800-4200 RPM	8°	7000 RPM
650/720 Sea Doo	6000-7000	4600-5000 RPM	7°	8000 RPM
650/720 Sea Doo	6600-7600	5000-5600 RPM	7°	9000 RPM

SECTION VI

TROUBLESHOOTING

After installing the MSD Ignition System, if the craft fails to start, check the installation procedure for any missed steps. If everything checks correctly, inspect the following:

1. Check the battery to make sure it is fully charged and properly connected. Also make sure the terminal connections are clean and tight.
2. Make sure there are no loose wire connections. All connections should be free of rust, paint or other debris.
3. Visually check the connections on the coil. Only two wires should be making contact to the coil wires. Orange should be connected to the Orange wire on the coil and the blue wire should be connected to the Black wire on the coil. **Do Not** connect any test equipment, test lights, etc. to the coil wires.
4. Check the Ignition's heavy Red wire for 12 volts. If 12 volts is not there, check the connections or battery condition.
5. Check for 12 volts on the Violet wire of the MSD Ignition when the ignition on/off switch is in the ON position.
6. Check the craft's safety lanyard for proper operation.
7. Check the programming switch S4 of switch 2. Timing check - ignition operate position.

If there is still a problem present after checking all of the above steps, continue with the following diagnostic procedures.

TESTING THE IGNITION FOR SPARK

After checking the wiring through the Troubleshooting Check List and the schematic on page 7 of the instructions, test the MSD Ignition to make sure that it is sparking. If the ignition produces a spark in this test, then it can be assumed that the ignition is functioning properly. To check for spark, follow this procedure:

1. Make sure the ignition switch is in the Off position.
2. Remove the spark plugs, then connect the spark plug wires to the plugs and position them so you can observe the spark jump the plug gap. The plugs must be grounded.
3. Cut the two green trigger wires from the trigger pickup. When finished with this test you must connect the wires together following the wiring tips discussed earlier in this manual.
4. Turn the ignition switch On. Do Not attempt to crank the engine.
5. Take a short length of wire and jump the two Green wires from the ignition together, then release them quickly several times. When you do this, a spark should jump the spark plug gap.
6. If there is no spark, substitute another ignition coil and repeat the test.

TESTING THE TRIGGER PICKUP

After checking the Ignition Module, you can test the operation of the trigger pickup.

Note: The two Green trigger pickup wires must be connected at this time.

1. The MSD Ignition's Red wire should be disconnected from the battery or starter solenoid while turning the engine by hand. Turn the ignition switch to the On position. NOTE: This can be left connected if - the timing check switch is moved to the LED operate position. (The switch must be in the LED position to check pickups or timing.)
2. While observing the LED on the side of the ignition, rotate the crankshaft by hand. When the pickup and the magnet on the flywheel line up, the LED should illuminate.
3. If the LED lights, the trigger pickup is operating properly. If the LED does not light when switch 2, S4 is on, check the air gap between the pickup and the flywheel magnet. It should be .050" - .094". If the air gap is correct, the trigger pickup is at fault.

NOTE: Timing setup switch S4 must be in LED operate position.

If you perform all the above suggestions and still have problems or have any questions concerning the installation or operation of your MSD Watercraft Ignition Kit, call the MSD Watercraft Customer Service Department for more information.

TECH NOTES

MSD IGNITION INSTALLATION INSTRUCTIONS

TECH NOTES

Service

In case of malfunction, this MSD component will be repaired free of charge according to the terms of the warranty. When returning MSD components for service, Proof of Purchase must be supplied for warranty verification. After the warranty period has expired, repair service is charged based on a minimum and maximum charge.

Send the unit prepaid with proof of purchase to the attention of: **Customer Service Department, Autotronic Controls Corporation, 12120 Esther Lama, Suite 114, El Paso Texas 79936**.

When returning the unit for repair, leave all wires at the length in which you have them installed. Be sure to include a detailed account of any problems experienced, and what components and accessories are installed on the vehicle.

The repaired unit will be returned as soon as possible after receipt, COD for any charges. For more information, call the MSD Customer Service Line **(915) 857-5200**. MSD technicians are available from 8:00 a.m. to 5:00 p.m. Monday - Friday (mountain time).

Limited Warranty

Autotronic Controls Corporation warrants MSD Ignition products to be free from defects in material and workmanship under normal use and if properly installed for a period of one year from date of purchase. If found to be defective as mentioned above, it will be replaced or repaired if returned prepaid along with proof of date of purchase. This shall constitute the sole remedy of the purchaser and the sole liability of Autotronic Controls Corporation. To the extent permitted by law, the foregoing is exclusive and in lieu of all other warranties or representations whether expressed or implied, including any implied warranty of merchantability or fitness. In no event shall Autotronic Controls Corporation be liable for special or consequential damages.