

**SEA-DOO® 800 Enhancer Ignition,  
PN 30-08-2630**

**Fits SEA-DOO® XP, GSX, GTX Watercraft w/Rave Engine**

**IMPORTANT:** Read these instructions completely before attempting this installation!

**Note:** It is recommended to use resistor Spark Plugs with this Ignition.

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

**Parts Included**

- 1 - SEA-DOO® Enhancer, PN 30-08-2630
- 1 - Hold Down Bracket, Enhancer
- 1 - Holeshoot Activation Wire, Blue
- 1 - Timing Tape

**Tools Required**

- 1 - Exacto-Knife
- 1 - 10 mm Wrench
- 1 - Terminal Crimper
- 1 - Phillips Screwdriver

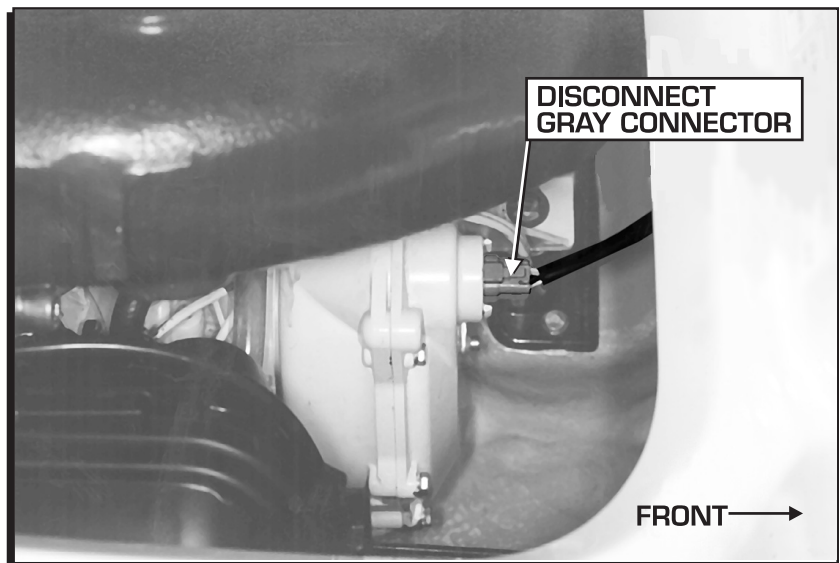
**Parts Not Included But May Be Required**

- 1 - Holeshoot Switch, FDP PN 00-00-0520

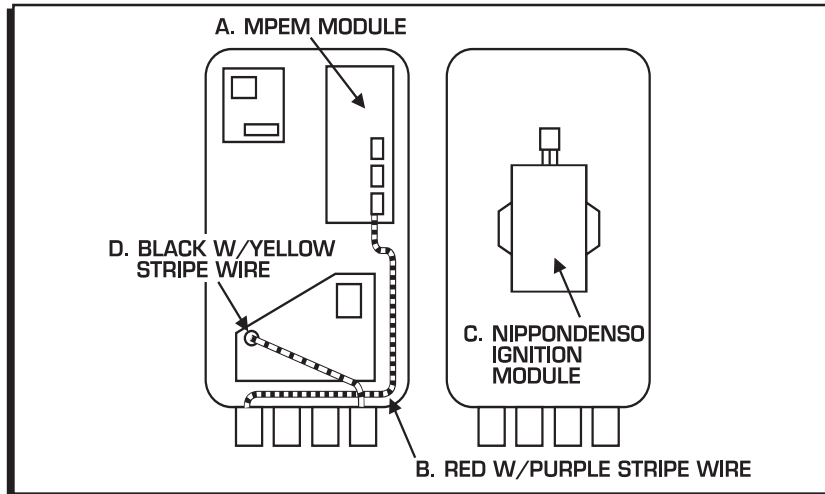
**Note:** The SEA-DOO® Enhancer is designed to replace the stock ignition on SEA-DOO® 800 watercrafts.

**MOUNTING**

1. Disconnect the Gray electrical connector located above the magneto cover (Figure 1).
2. Open the front deck lid and remove the storage tray. Locate the gray electrical box next to the gas tank and disconnect all connectors going to the box.
3. Release the retaining clip holding the box and carefully remove the electrical box out of the craft through the front storage compartment.
4. Open the stock electrical box by spreading the latches located at each side of the box while at the same time lifting off the cover.

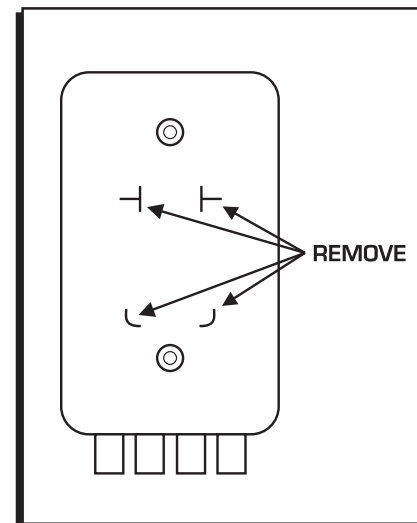


**Figure 1 Disconnecting the Gray Electrical Connector.**



**Figure 2 Identifying the Components.**

5. Identify these components (Figure 2):
  - a. MPEM Module
  - b. Red w/Purple stripe wire from MPEM Module.
  - c. Nippondenso Ignition Module.
  - d. Black w/Yellow stripe wire from ground lug.
6. Remove the two screws of the hold-down bracket and remove the ignition.
7. Using diagonals or a sharp knife, remove the four plastic mounting risers that held the stock ignition in place (Figure 3).
8. Position the Enhancer between the two screw standoffs so that the program switches are visible. Install the supplied hold down bracket to secure the ignition.



**Figure 3 Removing the Mounting Risers.**

**Note:** The hold down bracket will cover part of the switch assembly after installation is complete.

## **WIRING**

The Enhancer uses factory connectors for quick, easy connection. Figure 4 shows how to wire the Ignition.

**Gray/Blk/Wht:** Disconnect the White 3-pin connector between the MPEM module and Ignition Module. Plug the female 3-pin connector from Enhancer into Male connector on MPEM Module.

**Org/Yel/Pur/Blk:** Disconnect the White 6-pin connector connected to the with Nippondenso Module and discard the ignition module. Plug the female 6-pin connector from Enhancer into Male connector on the open harness.

**Red Wire:** Disconnect Red w/Purple stripe wire from MPEM module and connect the MSD Enhancer's T-Spliced Red wire into matching connectors. Note: there will be several Red w/ Purple stripe wires inside the electrical box. Make sure you locate the one wire coming from the MPEM module only.

**Green Wire:** Remove the ring lug attached to the Black w/Yellow wire in the electrical box and install the supplied female bullet connector to the wire. Connect the Green wire from the Enhancer into the Black w/Yellow stripe wire.

**Tan Wire:** This is an optional wire. Connect the Tan wire to the negative (-) side of the coil when using an aftermarket coil **only**.

**Light Blue Wire:** Holeshot feature activation wire. Connect the Light Blue Wire to one side of a momentary on/off switch such as the FDP Holeshot Switch, PN 00-00-0520. Connect the other side of the switch to ground.

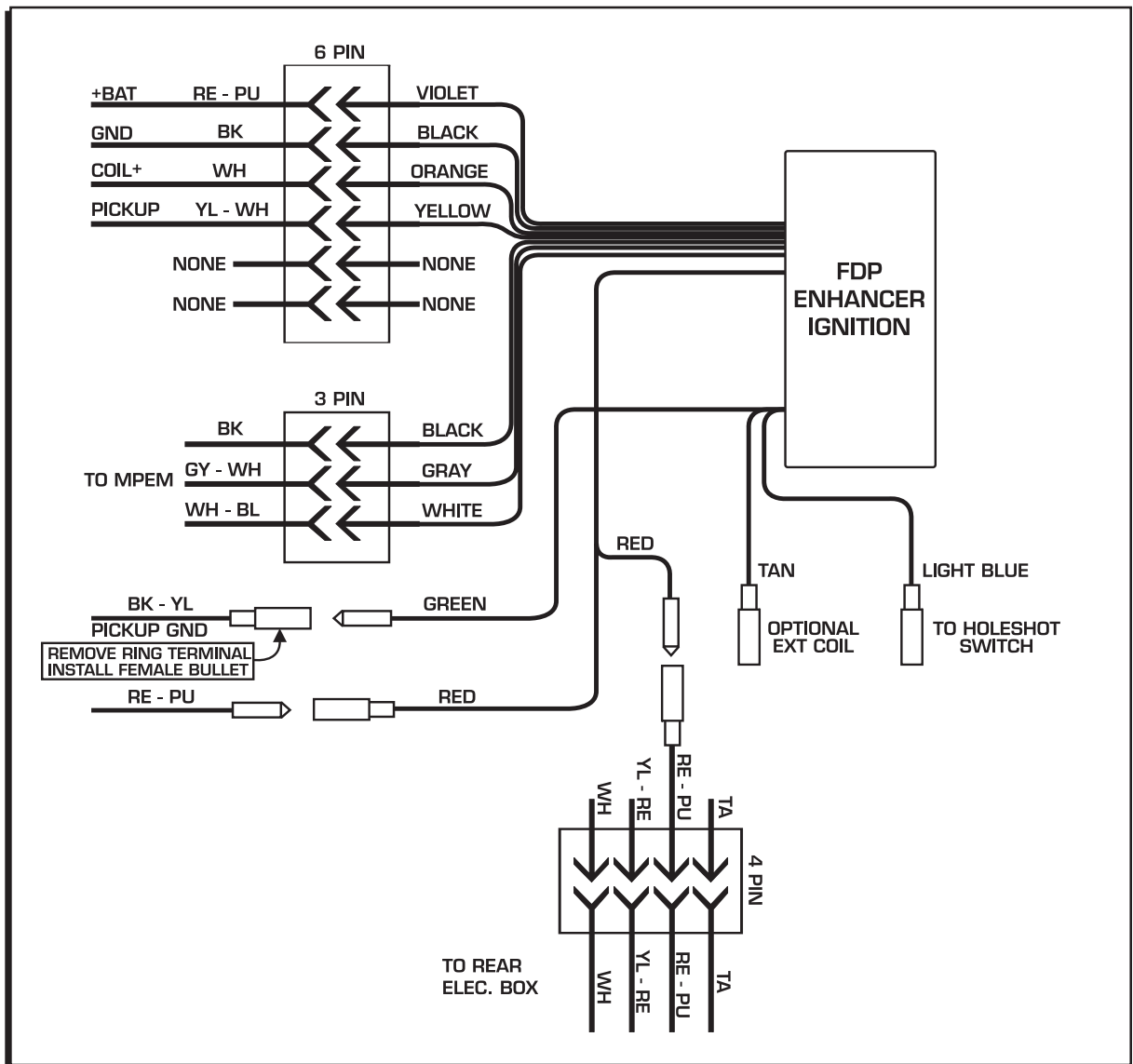


Figure 4 Wiring the FDP Enhancer.

## PROGRAMMING FEATURES

The Enhancer produces a computer-generated timing curve as well as two rev limits which can all be adjusted (Figure 5). The following rpm and timing points are adjustable by programming the ignition with the switches shown in Figure 6.

The Enhancer is programmed at the factory so it is suitable for most stock engines. It is recommended to start the engine in this program, then begin adjusting the program settings for special requirements. The FDP allows you to adjust:

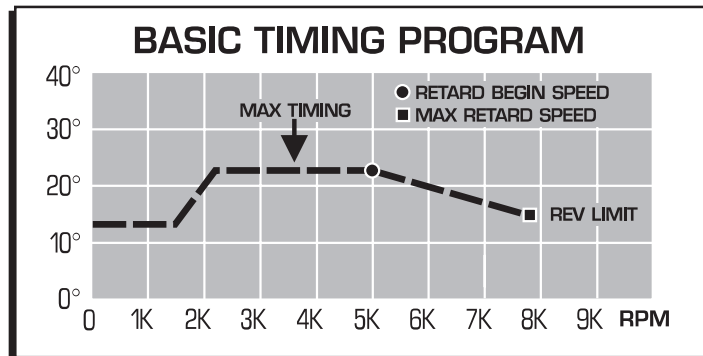


Figure 5 An Example of Ignition Timing Program.

**Max Timing:** The maximum amount of timing that will occur.

**Retard Begin Speed:** This is the rpm point that the retard begins. The amount of retard is set at the Max Speed Retard.

**Max Speed Retard:** This is the amount of retard that occurs between the Retard Begin setting and the Max Speed Rev Limit.

**Max Speed Rev Limit:** This setting limits the rpm to protect the engine from over-revving and is also the point at which all of the max speed retard is complete.

**Holeshot Rev Limit:** When the Holeshot wiring is connected, this setting will provide you with another rpm limit. This limit can be used during starting to provide consistent, quick launches.

**Trigger Check (LED Monitor):** This function provides an easy way to verify that the ignition is receiving a trigger signal. When the switch is On, the ignition does not deliver spark to the coils. Instead, the LED substitutes a visual trigger signal. This can be used to verify that the ignition is receiving a trigger signal.

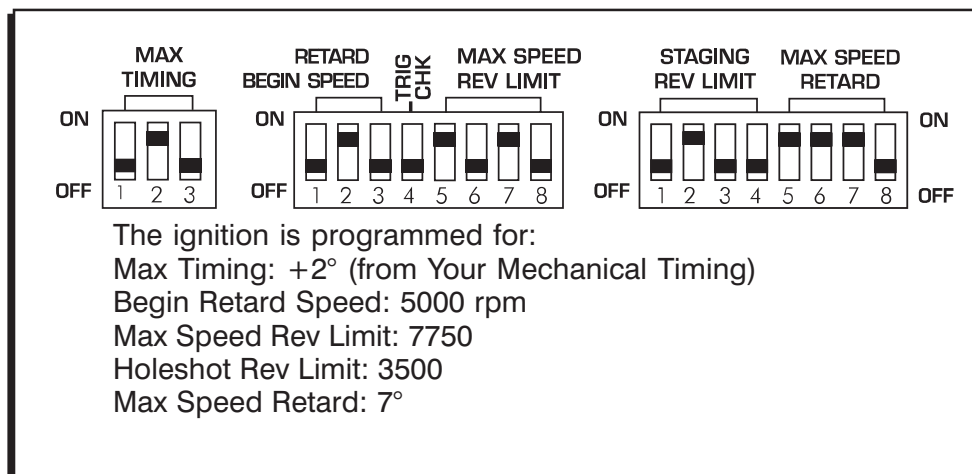


Figure 6 Programming Switches and Factory Settings.

## CONFIRMING AND SETTING THE MAX TIMING

The SEA-DOO® 800's ignition timing is controlled by the ignition module and cannot be mechanically adjusted. The Enhancer allows you to adjust the timing, however you need to know what the mechanical timing is set at before you can adjust the timing through the FDP Ignition.

1. Set S1 - S3 of switch 1 to the Off position (Figure 7). This allows the engine to run at the Mechanical Timing (YMT).
2. Find TDC of the front cylinder. It is recommended to remove the spark plug and use a dial indicator or consult the Service Manual.
3. Locate and remove the PTO cover.
4. Scribe a mark on the PTO to indicate where TCD is located.
5. Install the supplied Timing Tape to the PTO. Line up the "0" with the mark you scribed the TDC mark. Note: Make sure the PTO is free of grease and is dry before installing the tape.
6. Start the engine and check the timing with the engine at about 2500 rpm. Determine what the timing is set at by lining up the TDC mark on the engine support bracket with the number on the timing tape. Write this number down.

Maximum Timing			
Deg	S1	S2	S3
YMT	Off	Off	Off
+1Deg	On	Off	Off
+2Deg	Off	On	Off
+3Deg	On	On	Off
+4Deg	Off	Off	On
+5Deg	On	Off	On
+6Deg	Off	On	On
+7Deg	On	On	On

Figure 7 Maximum Timing.

7. If the timing requires adjustment, refer to the Max Timing section on the Programming decal (Figure 8). To adjust the timing move selectors S1 - S3 of switch 1.

Example: If you check the timing and it is at 20° and you want to have 22°, you need to add 2°. To add 2°, select the +2 DEG on the chart and move the selectors (S1-off, S2-on, S3-off) to the positions shown in the chart.

**Note:** Turn engine off before changing switch settings.

8. Repeat step 6 to confirm the timing setting.
9. Reinstall the PTO cover.

## PROGRAMMING

**Note:** If the selector switch settings are changed during the testing procedures, the ignition switch must be turned Off and back On to activate the new program.

MAXIMUM TIMING				RETARD BEGIN SPEED				MAX SPEED REV LIMIT				HOLESHOT REV LIMIT				MAX SPEED RETARD							
DEG	S1	S2	S3	RPM	S1	S2	S3	RPM	S5	S6	S7	S8	RPM	S1	S2	S3	S4	DEG	S5	S6	S7	S8	
YMT	OFF	OFF	OFF	4000	OFF	OFF	OFF	6500	OFF	OFF	OFF	OFF	3000	OFF	OFF	OFF	OFF	0	OFF	OFF	OFF	OFF	
+1	ON	OFF	OFF	4500	ON	OFF	OFF	6750	ON	OFF	OFF	OFF	3250	ON	OFF	OFF	OFF	1	ON	OFF	OFF	OFF	
+2	OFF	ON	OFF	5000	OFF	ON	OFF	7000	OFF	ON	OFF	OFF	3500	OFF	ON	OFF	OFF	2	OFF	ON	OFF	OFF	
+3	ON	ON	OFF	5500	ON	ON	OFF	7250	ON	ON	OFF	OFF	3750	ON	ON	OFF	OFF	3	ON	ON	OFF	OFF	
+4	OFF	OFF	ON	6000	OFF	OFF	ON	7500	OFF	OFF	ON	OFF	4000	OFF	OFF	ON	OFF	4	OFF	OFF	ON	OFF	
+5	ON	OFF	ON	6500	ON	OFF	ON	7750	ON	OFF	ON	OFF	4250	ON	OFF	ON	OFF	5	ON	OFF	ON	OFF	
+6	OFF	ON	ON	7000	OFF	ON	ON	8000	OFF	ON	ON	OFF	4500	OFF	ON	ON	OFF	6	OFF	ON	ON	OFF	
+7	ON	ON	ON	7500	ON	ON	ON	8250	ON	ON	ON	OFF	4750	ON	ON	ON	OFF	7	ON	ON	ON	OFF	
CHECK TIMING WITH SWITCHES S1, S2, S3, = OFF THIS IS YOUR MINIMUM TIMING				XXXXXXXXXXXX				8500	OFF	OFF	OFF	ON	5000	OFF	OFF	OFF	ON	8	OFF	OFF	OFF	ON	
				TRIGGER CHECK				S4	8750	ON	OFF	OFF	ON	5250	ON	OFF	OFF	ON	9	ON	OFF	OFF	ON
				LED OPERATE				ON	9000	OFF	ON	OFF	ON	5500	OFF	ON	OFF	ON	10	OFF	ON	OFF	ON
				IGN. OPERATE				OFF	9250	ON	ON	OFF	ON	5750	ON	ON	OFF	ON	11	ON	ON	OFF	ON
				PN 30-08-2630				9500	OFF	OFF	ON	ON	6000	OFF	OFF	ON	ON	12	OFF	OFF	ON	ON	
								9750	ON	OFF	ON	ON	6250	ON	OFF	ON	ON	13	ON	OFF	ON	ON	
								10000	OFF	ON	ON	ON	6500	OFF	ON	ON	ON	14	OFF	ON	ON	ON	
10250	ON	ON	ON					ON	6750	ON	ON	ON	ON	15	ON	ON	ON	ON					

MAX TIMING

RETARD BEGIN SPEED

MAX SPEED REV LIMIT

**Note:** Staging Rev Limit and Holeshot Rev limit are the same feature.

Figure 8 Programming Switches.

## RECOMMENDED SWITCH SETTINGS

Figure 9 shows suggested programs for Max Timing, Retard Begin Speed, Max Speed Retard and Rev Limit setting for several engine combinations.

ENGINE	MAX TIMING	RETARD BEGIN SPEED	MAX SPEED RETARD	REV LIMIT
Stock	22 DEGREES	5000 RPM	8 DEGREES	7750 RPM
Limited	22 DEGREES	5000 RPM	6 DEGREES	8000 RPM
Modified	24 DEGREES	5000 RPM	6 DEGREES	8000 RPM

Figure 9 Suggested switch settings.

### MAX TIMING:

Selectors S1-S3 of Switch 1 are responsible for the Max Timing amount. This setting is the maximum amount of timing that will occur in the engine (Figure 7). The timing can be advanced or retarded by one degree increments.

**Note:** It is not recommended to advance the timing more than 22° in stock applications.

### RETARD BEGIN SPEED - MAX SPEED RETARD:

The MSD Enhancer will provide a timing curve or a retard as rpm increases. This timing curve function is an rpm-dependent timing retard. It is configured by three separate elements (Figure 8):

1. The **Retard Begin Speed** is the point in the rpm range when the timing retard begins.
2. The **Max Speed Retard** is the total amount of timing retard (in crankshaft degrees) introduced between the retard begin point and the **Max Speed Rev Limit**.

The **Retard Begin Speed** point (selectors S1-S3 of switch 2) is variable in 500 rpm increments between 4000 rpm and 7500 rpm. The rpm-dependent retard does not function until engine rpm reaches the specified rpm point.

The **Max Speed Retard** (selectors S5-S8 of switch 3) is variable in one degree increments between zero and 15°.

**Note:** The retard is operational only when the Max Speed Retard function is set to a value other than zero. If the max speed retard is not desired, the Max Speed Retard function should be set to zero (all selectors Off). A max speed retard is useful for all types of engine combinations, particularly when increasing the engine's compression or when low octane fuel or varying altitudes are encountered.

**Note:** In some cases the engine may respond to more timing at lower engine speeds and less timing in the upper ranges. In this instance the Max Timing can be increased for better low-end response and the Max Speed Retard setting can be set higher to reduce the timing in the upper rpm ranges during wide open throttle.

### MAX SPEED REV LIMIT:

The Enhancer's Rev Limiter function (selectors S5-S8 of Switch 2) is variable in 250 rpm increments between 6500 rpm and 10250 rpm. The MSD is programmed with the rev limit at 7750 rpm. It is **not** recommended that the limit be raised above this rpm point unless a qualified mechanic suggests to increase the safe rpm limit of the engine.

## TESTING PROCEDURES AND CONSIDERATIONS:

On-the-water testing is the most realistic method to verify the timing program.



**CAUTION: Proceed with caution. If engine timing is advanced excessively, engine damage may result.** Before testing, the engine should be warmed to normal operating temperature. From idle snap the throttle to the wide open. Listen carefully for any “pinging” or “knocking” sounds. These are characteristic indications of detonation. The most reliable method to verify timing for a competition engine is repetitive course testing.

If there are no indications of detonation during testing, the Max Speed Retard can be defined to a lower setting. This should increase engine response. Reduce the setting in 1° increments. Testing must be performed after each change to verify that there are no signs of detonation. If the Max Speed Retard is reduced to the lowest point (0°) and signs of detonation are not present, the Max Timing can be increased above 22°. When timing exceeds 22° it is highly recommended that the setting be incremented in 1° or 2° steps, followed by thorough testing.

Secure the cover back on the electrical box and return the box to its original position in the craft. Reconnect all connections going to the electrical box and to the magneto cover. Reattach the battery cables and start the engine. Test ride the craft to ensure all functions are operating normally.

## **TROUBLESHOOTING**

### **GENERAL SYSTEM CHECKS:**

1. Check the timing setup function. Observe the LED Monitor while attempting to start the engine. If the LED blinks, the timing setup function has not been returned to the ignition operate (off) setting. Change the setting, turn the ignition switch Off and On and start the engine. Note: the MPEM module may require a 30-40 sec. Off period before cranking the engine.
2. Review the wiring diagram and confirm that all of the wires are routed to the correct connections.
3. Check wire connectors by pulling each connector apart; verify all pins are firmly crimped to the wires.
4. Check the battery cables to verify that the positive (+) and negative (-) are firmly connected to the battery terminals.
5. Check the battery condition with a volt-ohm meter. If the meter indicates less than 10 volts static (non-cranking, ignition switch On) or less than 7 volts while cranking the engine with the starter, the Enhancer will not operate properly. Replace or charge the battery.
6. Check all fuses on MPEM module and voltage regulator.
7. Inspect the condition of the lanyard switch, wiring and connections throughout the switch circuit. If necessary, replace.
8. Check the 12-volt input to the FDP by plugging in the lanyard and using a volt-ohm meter to verify that at least 10 volts is supplied to the red wire. Repeat the test on the Violet wire with the start button depressed. If less than 10 volts is supplied to either the Red or Violet wire, the Enhancer will not operate properly. If no voltage is present while cranking, the MPEM may be at fault.

If the system checks out ok, but will not start, the problem may be in one of the four areas: the MPEM, the pickup assembly, the coil or the Enhancer module. The following procedures may be used to identify a possible problem:

**MPEM/Pickup Operation Test:** If the LED Monitor blinks when the timing setup function is active (on) and the engine is cranking, the MPEM is operating properly, the pickup section is operating properly and the malfunction is in the Enhancer/coil section.

If the LED does not blink during this test, four problems may exist: The pickup harness is not properly connected; the MPEM is not functioning properly; the pickup is not functioning properly or the Enhancer is malfunctioning.

# **FACTORY DIRECT PERFORMANCE** INSTALLATION INSTRUCTIONS

[www.factorydirectperf.com](http://www.factorydirectperf.com)

Made exclusively for FDP by **MSD** IGNITION

**Pickup Test:** Refer to the SEA-DOO® Service Manual for proper procedure for checking the factory pickup coil.

**Coil Check:** If the engine fires intermittently, but will not run consistently and the “Factory Pickup Test” indicates that the pickup is operating properly, the coil may be defective.

**Secondary Resistance:** Turn the ignition switch off and remove both spark plugs and spark plug caps. Check the secondary resistance value of the coil by inserting the test probes into both spark plug wire ends. The value should be 9K - 15K ohms.

**Primary Resistance:** Remove both primary wires to the coil terminals. Check the primary resistance of the coil by touching the test probes to both the primary wires on the coil. The primary resistance should be less than one ohm.

If either of the coil's resistance values are out of specifications, replace the coil.

**Enhancer:** Total Spark Failure: If the general function checks fail to locate the problem and the LED Monitor indicates the pickup is working properly, the Enhancer is probably at fault.

If a solution is not found after completing all of the above tests the best option is to return the Enhancer module to FDP Ignition for evaluation.

## **Service**

In case of malfunction, this component will be repaired free of charge according to the terms of the warranty. When returning 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, Factory Direct Performance, 1355 Pullman Dr., 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/Cashiers Check for any charges. For more information, call the FDP Customer Service Line **(915) 858-3365**. FDP technicians are available from 8:00 a.m. to 5:00 p.m. Monday - Friday (Mountain Time).

## **Limited Warranty**

Factory Direct Performance warrants this product to be free from defects in material and workmanship under its intended normal use\* and if properly installed, for a period of one year from the date of original purchase. If found to be defective as mentioned above, it will be repaired or replaced at the option of Factory Direct Performance. Any item that is covered under this warranty will be returned free of charge through standard shipping methods. If faster service is required the customer has the option of paying for this service.

This shall constitute the sole remedy of the purchaser and the sole liability of Factory Direct Performance. 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 Factory Direct Performance or its suppliers be liable for special or consequential damages.

\*Intended normal use means that this item is being used as was originally intended and for the original application as sold by Factory Direct Performance. Any modifications to this item or if it is used on an application other than what Factory Direct Performance markets the product, the warranty will be void. It is the sole responsibility of the customer to determine that this item will work for the application they are intending. Factory Direct Performance will accept no liability for custom applications.