

# Tempest 3 (T3) Installation Instructions Sea-Doo 2-coil Ignition

For use with models:

**GSX-L GTX-L XP-L**

The Tempest 3 Model 2186 Ignition is designed for use with 1999 through 2005 Sea-Doo dual coil 951 Rave engines. Your Tempest 3 Ignition is the first of a new breed of fully integrated engine controllers.

## Tools Required

- 8" Slip joint pliers
- Diagonal cutters
- Black electrical tape

## First Things First, For Safety...

 **Disconnect the battery positive cable (red) before proceeding.**

## Installation Overview

This Ignition is designed to give you trouble-free service if installed according to these instructions. Read the entire installation instructions before beginning the installation. If you do not understand any portion of these instructions, refer installation to a qualified technician.

1. With the help of the "MPEM Wiring Guide" in Figure 1, locate the model of your boat.
2. Having located your model on the guide, you now know how the connectors (P1, P2, & P3) are arranged on the MPEM.
3. The picture of your model MPEM points to a chart of numbers in the center of Figure 1. The chart indicates where each wire from the Tempest Ignition attaches to your MPEM. Example: For an XP-L, the Black wire attaches to Connector P3, pin # 17.

## Mount the T3 Ignition

Locate a suitable position near the MPEM and mount the ignition. The T3 Ignition is waterproof, but try to find a place where it is somewhat protected from excess water. Some MPEMs have an open area between the connectors that is suitable to mount the ignition.

## Dress in the T3 Wire Harness

1. With the Ignition mounted in place, plug-in the T3 cable harness into the T3 Ignition. Untangle the wires as necessary and wrap the first several inches of the wires with the spiral wrap provided in the T3 Installation kit.
2. Dress the wrapped cable toward the first Sea-Doo MPEM connector that will have T3 wires connected to it. Provide enough extra wire length on the T3 cable to provide a service loop.
3. Continue the spiral wrap up to the point just short of the first MPEM connector.

# Tempest 3 MPEM Wiring Guide '99 - '05 Models

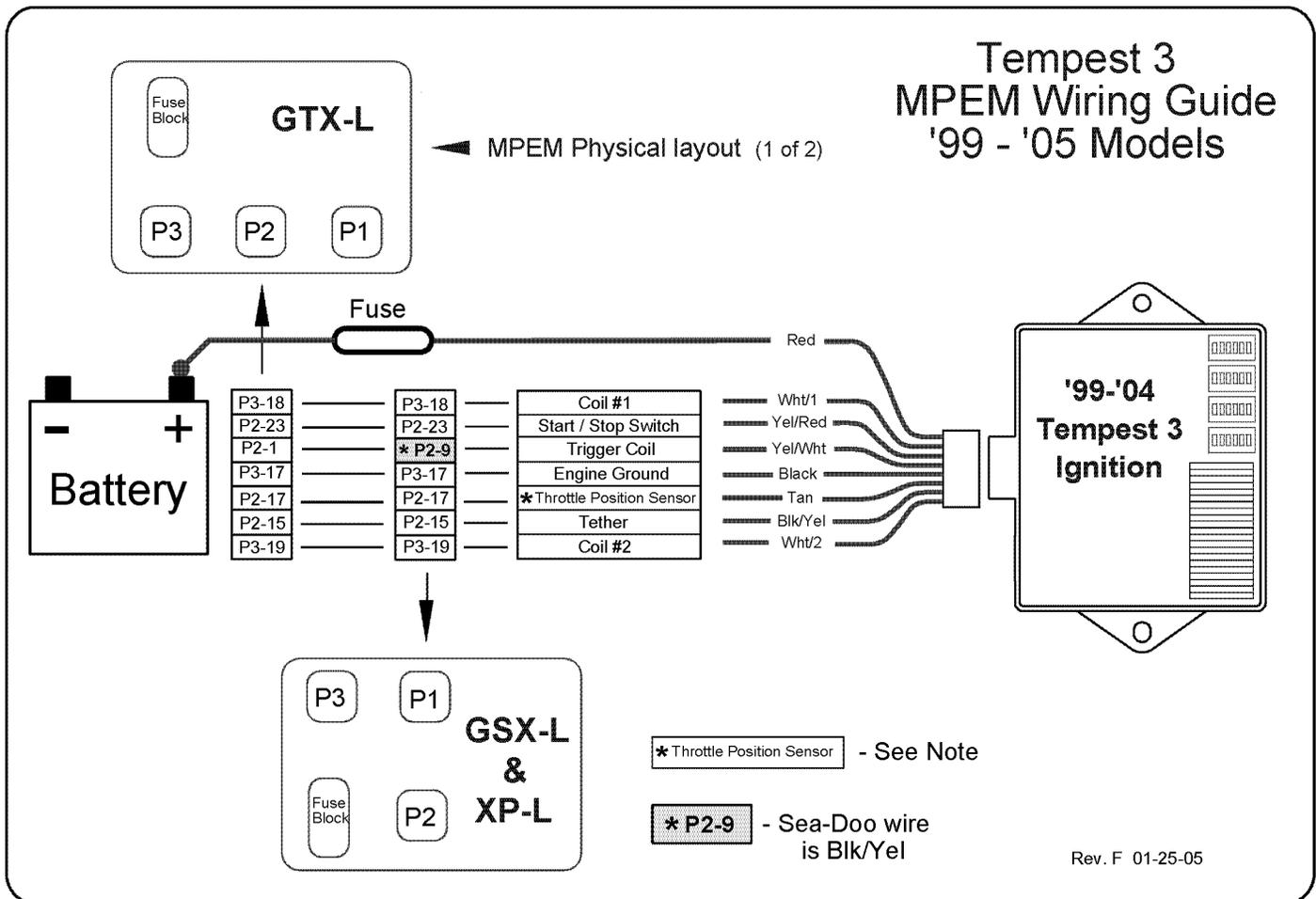


Figure 1

## Battery Wire

Route the Red wire from the T3 wire harness over the gas tank, through the engine compartment to the battery. Keep the wire away from any hot surfaces or objects that may chafe the wire. Do not connect the free end of the Red wire at this time.

## Wiring MPEM connector (P2)

- Note the designation of connector (P2) on your model MPEM (see Figure 1). Locate the two latches (top & bottom) on the connector and squeeze them at the same time to release the latches, then pull to disconnect it from the MPEM.
- Expose 3" or 4" of wire at the Sea-Doo connector by folding back and cutting off the vinyl tubing around the cable. This makes room for connecting the T3 wires.
- Referring to the Wiring Chart in Figure 1, note that 4 wires from the T3 Ignition attach to 4 wires on this MPEM P2 connector.
- First, read the following section **Wire Connections Using the Blue T-Splice**. Then, using Figures 1 & 3 as guides, locate and attach the wires in the following order.

- T3 Yellow/Red wire to MPEM P2-23.
- T3 Black/Yellow wire to MPEM P2-15.
- T3 Yellow/White wire to MPEM P2-9 or (P2-1 on GSX-L)

**\*NOTE:** The T3 wire connecting to P2-9 is **WHT/YEL**, while the XP-L and GSX-L wire at P2-9 is **BLK/YEL**. This is the only wire from the T3 Ignition that does not match to Sea-Doo wire colors. The P2-1 wire on the GSX-L is Yellow/White, the same as the T3 Ignition wire.

Be very careful to locate the **BLK/YEL** wire at the correct pin location on the MPEM connector. There is a second **BLK/YEL** in the same connector, as well as a **YEL/WHT** wire. Neither of these wires is correct and do not make connections to them.

Continued...

5. Tan wire to MPEM P2-17 (Throttle Position Sensor)

**NOTE:** The T3 Ignition supports the Throttle Position Sensor (TPS) on the XP-L and GTX-L. Other models do not have TPS.

Sea-Doo models without the TPS function require the TAN wire to be attached to an electrical ground. A suitable grounding point is the BLACK wire from the Advent T3 Ignition connector. Use a blue T-splice to make the connection.

### Wire Connections Using the Blue T-Splice

The T-splice is used to connect the end of one wire to a point along the length of another wire.

The T-splice has an open flap exposing a metal plate and silicon gel. You will note that at one end of the splice there is a single hole while at the opposite end there are two holes. By pulling on the flap you will expose the entire side of one of the holes. Place this area over the wire you wish to splice to a T3 wire as shown in Figure 3. When the wire is in place, close the flap over the wire and ‘click’ it in place.

Insert the end of the second wire into the hole on the end of the T-splice. Now, using a pair of pliers press the metal plate firmly down until its top edge is flush with the plastic housing. This locks the wires in place and provides an electrical connection between the wires. Snap the remaining flap over and ‘click’ it in place.

After all wires have been attached to the MPEM P2 connector, re-install the connector into the MPEM.

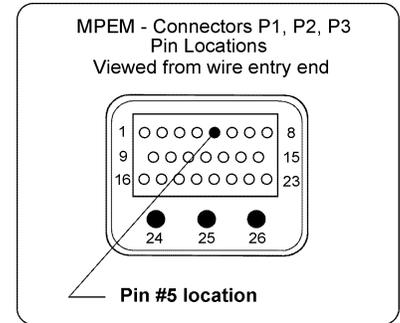


Figure 2

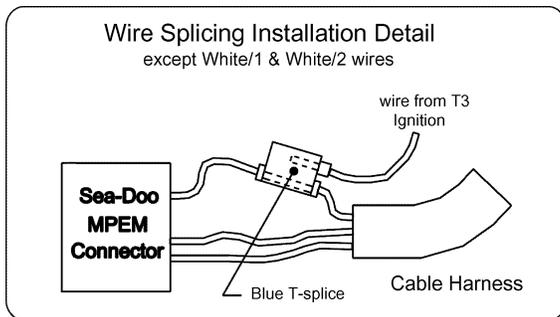


Figure 3

### Wiring MPEM connector (P3)

6. Note the designation of the lower right connector (P3) on your model MPEM (see Figure 1). Locate the two latches (top & bottom) on the connector and squeeze them at the same time to release the latches, then pull to disconnect it from the MPEM.
7. Expose 3” or 4” of wire at the Sea-Doo connector by folding back and cutting off the vinyl tubing around the cable. This makes room for connecting the T3 wires.

Referring to the Wiring Chart in Figure 1, note that 3 wires from the T3 Ignition attach to 3 wires on this MPEM P3 connector.

2. First, read the following section **Wire Connections Using the Blue T-Splice**. Then, using Figure 1 & 3 as guides, locate and attach the wires in the following order.
  - A. T3 Black wire to MPEM P3-17.
  - B. T3 White/1 wire to MPEM P3-18 (see following section - **Connect the (White/1) and (White/2) wires**)
  - C. T3 White/2 wire to MPEM P3-19 (see following section - **Connect the (White/1) and (White/2) wires**)

### Connect the (White/1) and (White/2) wires

Connect only one white wire at a time to be sure that White/1 and White/2 wires don’t become reversed.

1. Attach White/1 and White/2 wires as instructed above.
2. Using a pair of wire cutters, cut the Sea-Doo (White/1) wire mid-way between the T-splice and the Sea-Doo connector P3, see Figure 4. This will leave a pigtail on the Sea-Doo connector and the T-splice to reconnect the stock ignition if it becomes necessary.

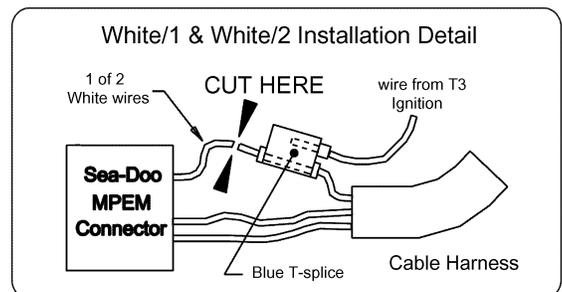


Figure 4

3. Wrap black electrical tape over the cut end of the exposed wire ends to protect them from shorting to any conductive surface.
4. Refer to Figure 1 to determine the location of the Sea-Doo (White/2) wire. Follow steps 1, 2 & 3 above to complete (White/2) wire installation.

### **Last Things Last**

1. Remove the bolt from the the positive (+) battery terminal, then locate the Red wire previously routed to the battery. Slip the ring lug over the bolt's shaft and reinstall the bolt with ring lug in the battery terminal.
2. Reconnect the battery cable removed at the beginning of this installation procedure.
3. Perform the Crank Position Sensor procedure that follows in the next section.

**Attention!** Severe engine damage may occur.

**Do not attempt to start the engine until you have properly set the Timing Correction Switches and selected the correct Advance Curve.**

**If you have any questions or comments, please contact us by phone, FAX or E-Mail.  
Be sure to reference the year and model of your Sea-Doo.**

# Crank Position Sensor Calibration Procedure

**Caution:** Severe engine damage is possible if this procedure is not properly completed.

**Engine Timing Overview:** The Sea-Doo RAVE engine is built with excessive tolerance in the positioning of its ignition pulser coil. The pulser coil must be correctly positioned relative to the piston to achieve accurate ignition timing. Otherwise, poor engine performance or engine damage may result.

The ignition trigger sensor in the RAVE engine can be as much as 4° retarded to 3° advanced from the correct setting.

## Setting the Timing Correction Switches

### Using a Timing Light to Determine Timing Correction Value

Calibrating the engine timing must be performed when the T3 ignition is installed on any model Sea Doo. If this procedure is not performed severe damage can result.

**Note:** If you do not have the required tools or are not confident in performing the procedure as outlined, please consult your local dealer or other qualified person for assistance.

### Tools Required:

#### Tools you supply

- 12mm wrench
- 13mm wrench
- Spark plug wrench
- Tachometer (if boat is not equipped with one)
- TDC dial gauge
- Timing Light

#### Tools supplied with Ignition

- Pointer tool
- Alcohol wipes
- Timing calibration tape

### Set Ignition timing correction

1. Set the timing correction switches to the most retarded timing calibration. Set switches Sw B 3,4,5 as shown in Figure 1x.
2. Set the Curve Selector to curve 1 (stock, pump gas), Sw 1 & 2 both OFF.

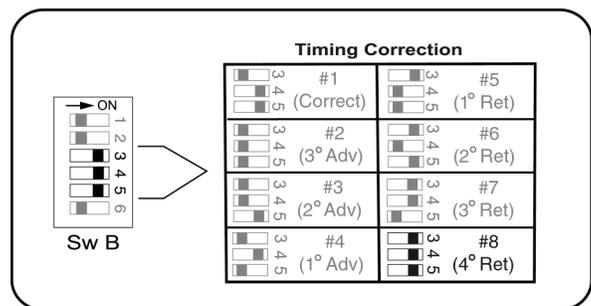


Figure 1x

### Setup the Engine for Timing Measurement

1. Remove the two breather hoses just forward of the gas tank along with the accompanying grommets used to hold them in place in the hull.
2. Remove the black or gray plastic drive shaft safety cover from the rear of the engine. There is a drive shaft 'hanger' bolted to the bottom of the safety cover. This hanger bracket must be removed first. Locate the two 12mm bolts, one on each side. Remove these bolts and lift out the hanger.

3. Remove the two 13mm bolts and flat washers, one on each side of the safety cover. Remove the cover and set it aside.
  4. Remove both spark plugs. Ground the spark plugs case so they will spark when the engine turns over. Failure to do this will cause damage to the ignition coils.
  5. Using a dial gauge, insert it into either spark plug hole and locate Top Dead Center (TDC). **DO NOT** use the starter motor to turn the engine. Manually turn the power take off (PTO) that is exposed in step 1. Leave the dial gauge in place.
  6. Using the alcohol wipe provided, clean the top area of the PTO's outer edge between the 10 and 2 o'clock positions.
  7. Remove the backing paper from the Timing Calibration Tape and fasten it to the area just cleaned. The arrow on the chart must point in the counter clockwise direction when viewed from the rear of the engine toward the front. Be sure the 0.0° mark (TDC) on the tape is positioned near the top center, 12 o'clock position of the PTO. Note: the timing tape can be lifted and repositioned if required.
  8. Insert the nylon 'jam washer' into the ¼" hole in the rear engine mount. This hole is located directly above the 12 O'clock position of the PTO.
  9. Insert the short end of the pointer tool bracket into the jam washer. Apply firm pressure to the bracket until it is inserted completely into the nylon jam washer. The bracket is properly inserted when it comes to rest on the head of a cap bolt directly beneath the jam washer.
  10. Slide the pointer along the bracket until it is precisely aligned with the 0.0° (TDC) mark on the timing tape. Next, rotate the pointer downward so it is close but not touching the timing tape. This reduces the parallax error.
  11. Repeat step 5 and confirm that the pointer is at TDC on the tape. Readjust the pointer as required.
  12. Remove the dial gauge and reinstall the spark plugs and plug wires.
  13. Attach a timing light per its operating instructions.
- Note:** Make sure the timing light is attached to the spark plug of the cylinder you're using to find TDC.

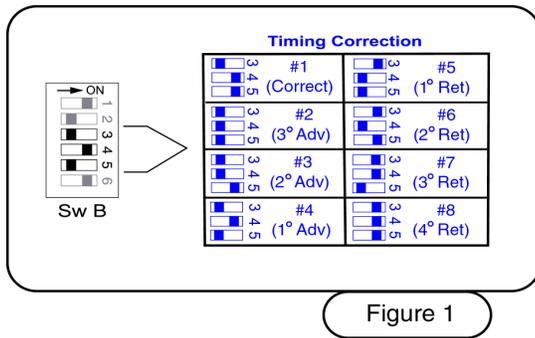
### Measure and Calibrate Engine Timing

The timing tape displays crankshaft angles from TDC 20° in through 35° in 1.0° increments.

1. Set the ignition to Curve #1 by turning switches 1 and 2 OFF on Switch block B.
2. Refer to the Timing table sheets that were supplied with your ignition. Determine the timing at 3000rpm from curve #1.
3. Using a highlighter pen highlight the value from step 2 on the timing tape so it can be easily distinguished during the tests.
4. Start the engine (**Do not rev it up past 5000rpm since it could cause damage to your engine**).
5. Adjust the idle screw to set the engine RPM close to 3000 RPM.
6. Using a timing light, determine how many degrees advanced or retarded your engine is compared to the highlighted value on the timing tape. Stop the engine. Example: 24° highlighted, 26° measured. The result is 2° advanced.

**NOTE:** On all models except the GTX-L sight through one of the holes used by the vent tubes to get a clear view of the timing tape and pointer.

## Set the Timing Correction Switches



- Referring to Figure 1, locate the degrees of advance (Adv) or retard (Ret) you measured in step 5 above. Set Sw B, switches 3, 4 & 5 as indicated in Fig 1.

**Example: With engine running at 3000 RPM. The timing pointer indicates 27°. The curve on pg5 says it should be 25°, so retard the ignition 2°. Set sw3=ON, sw4=OFF, sw5=ON.**

Enter your Timing Correction Number here

## Put the Boat Back Together

- Remove the timing pointer and jam washer from the rear engine-mounting bracket. The timing tape can be removed or remain in place. Save these parts for later use.
- Reinstall the safety shield using the 2 flat washers, 13mm bolts, and wing nuts.
- Reattach the hanger bar using the 12mm bolts.
- Insert the grommets and breather tubes in their mounting holes.
- Proceed to the next section: “**Selecting an Advance Curve.**”

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