Installation and Troubleshooting Guide

NOTE: This installation is to be completed by an Authorized Dealer or Professional Service Technician. For questions regarding installation or warranty, call CDI Tech Support at 866-423-4832. **Do not return to the Dealer or Distributor where the part was purchased. Contact CDI Electronics Directly for Return Materiel Authorization**.

CDI PN: 414-0007 Harness, Ignition 6 Cylinder CDM 2.5L Engine

Replaces: 84-857163A 1 and 84-857163T 1.
Fits: 2000-2001 (135-200) HP EFI 2.5 L Engines and
2000-2005 (135-200) HP 2.5 L Carbureted Engines

WARNING This product is designed for installation by a professional marine mechanic. CDI cannot be held liable for injury or damage resulting from improper installation, abuse, neglect, or misuse of this product.

INSTALLATION

1. Disconnect the negative battery cable.
2. Disconnect and remove the old Harness from the CDM Modules, Overheat Sensor, Trigger, Stator, Kill circuit, TPM (Engine Controller), and engine ground.

   NOTE: Put a small amount of Dielectric Grease in the Female Bullet terminals and on the Blue seals to help seal out moisture (also make assembly easier).

3. Connect the 2 pin connector with the Green/White and White/Green wires to the Stator.
4. Connect the 6 pin connector to the TPM (Engine Controller).
5. Connect the Single male bullet on the Black/Yellow wire to the Black/Yellow Kill wire from the engine harness.
6. Connect the 4 pin connector (Labeled #1) with the Purple/White Striped Trigger wire in it to the #1 (Top) CDM Module, Starboard Side.
7. Connect the 4 pin connector (Labeled #2) with the White/Black Striped Trigger wire in it to the #2 (Top) CDM Module, Port Side.
8. Connect the 4 pin connector (Labeled #3) with the Brown/White Striped Trigger wire in it to the #3 (Middle) CDM Module, Starboard Side.
9. Connect the 4 pin connector (Labeled #4) with the Blue/White Striped Trigger wire in it to the #4 (Middle) CDM Module, Port Side.
10. Connect the 4 pin connector (Labeled #5) with the Red/White Striped Trigger wire in it to the #5 (Bottom) CDM Module, Starboard Side.
11. Connect the 4 pin connector (Labeled #6) with the White/Yellow Striped Trigger wire in it to the #6 (Bottom) CDM Module, Port Side.
12. Connect one of the Black Ground wires with a ¼" ring terminal to the top grounding point on the mounting plate for the CDM modules and the remaining Black Ground wire with a ¼" ring terminal to the bottom ground point on the mounting plate**.**
13. Reconnect the negative battery cable.

TROUBLESHOOTING

NO SPARK ON ANY CYLINDER:

1. Disconnect the TPM's (Engine Controller) 6 pin connectors from the Trigger and CDM Harness.
2. Connect the Trigger directly to the CDM Harness, bypassing the TPM. Remember, the TPM for the Carburetor models have a built in RPM Limiter (The one for the Fuel Injected engines do not).
3. Check for Spark. If Spark is present, check the Purple wire to the TPM. With the key switch on, you should have battery voltage present (above 10 V while cranking). If the voltage is not present , trace the Purple wire back to the key switch and locate the break in the wire.
4. If the spark does not return, check the Stator DVA and Resistance as given below.

Read from	Read to	Ohms	DVA Connected	DVA Disconnected
White/Green (Stator)	Green/White (Stator)	380-430 Ω	160-400 V	200-400 V

5. If no change, 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 can prevent ALL cylinders from firing.
6. If still no spark, disconnect the boat side harness and check for spark. If spark returns, check the key switch, emergency kill switch and boat side harness.

7. Disconnect the Yellow wires from the Regulator/Rectifiers and retest. If the engine now has spark, replace the Regulator/Rectifiers and visually inspect the stator for discoloration of the copper windings (replace the stator if the copper windings have turned dark).
8. Check the cranking RPM. A low cranking speed may 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.
9. Inspect the spark plug wires, boots, and spark plugs. Check for chafing on the wiring and harnesses.
10. Inspect and clean all engine and ignition ground connections. Tug on the ground wires for the CDM Modules against the ring terminal. If the insulation stretches, the wire is broken internally. Replace the original 3 wire ring terminal with individual ring terminals (Solder them on if possible) and add a secondary ground wire,10 or 12 Gauge, from the ground point of the CDM Modules, routing it to connect it with the engine's negative black ground battery cable.
11. Pull on the wires from each CDM harness plug. Make sure all wires are making proper contact inside plugs.
12. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
13. Check the triggering and charge coil flywheel magnets for cracked, broken, or loose magnets.
14. Using a **934-0006** CDM Test Harness and a multimeter, check the resistance of each of the CDM modules as follows:

	Red Meter Lead	Black Meter Lead	OEM Ohms	CDI Ohms
CDM Pin #	(A) Gnd	(C) Trigger	1.2-1.4 K Ω	1.2-1.4 K Ω
CDM Pin #	(D) Stator	(A) Gnd	Open*	Open*
CDM Pin #	(A) Gnd	(D) Stator	Reading*	Reading*
CDM Pin #	(D) Stator	(B) Kill Circuit	Reading*	Reading*
CDM Pin #	(B) Kill Circuit	(D) Stator	Open*	Open*
CDM Pin #	(A) Gnd	(B) Kill Circuit	Reading*	Reading*
CDM Pin #	(B) Kill Circuit	(A) Gnd	High M Ω or Open*	High M Ω or Open*
	High Tension Lead	(A) Gnd	0.7-1.3K Ω	2.2-2.4K Ω

* ***This Measurement is with the meter set to the diode scale. Where you see the term "Reading", it represents a value on the meter. Where you see the term "Open", it represents no value showing on the meter.***

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 as given below:

Read from	Read to	OEM Ohms	CDI Ohms	DVA (Connected)	DVA (Disconnected)
Purple (#1 Trigger)	Blue (#4 Trigger)	1.1-1.4K Ω	0.85-1.05K Ω	0.4 V Minimum	4 V Minimum
White (#2 Trigger)	Red (#5 Trigger)	1.1-1.4K Ω	0.85-1.05K Ω	0.4 V Minimum	4 V Minimum
Brown (#3 Trigger)	Yellow (#6 Trigger)	1.1-1.4K Ω	0.85-1.05K Ω	0.4 V Minimum	4 V Minimum
Purple (#1 Trigger)	Engine Gnd	Open	Open	0.2-5.0 V	1 V Minimum
White (#2 Trigger)	Engine Gnd	Open	Open	0.2-5.0 V	1 V Minimum
Brown (#3 Trigger)	Engine Gnd	Open	Open	0.2-5.0 V	1 V Minimum
Blue (#4 Trigger)	Engine Gnd	Open	Open	0.2-5.0 V	1 V Minimum
Red (#5 Trigger)	Engine Gnd	Open	Open	0.2-5.0 V	1 V Minimum
Yellow (#6 Trigger)	Engine Gnd	Open	Open	0.2-5.0 V	1 V Minimum

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**).

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 (see **NO SPARK ON ANY CYLINDER)**.
3. Disconnect the plug 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 2 V. 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 (see **NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS)**.
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, or loose magnets.
5. 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 can retard the timing on 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 may 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 as given below:

Read from	Read to	Ohms	DVA (Connected)	DVA (Disconnected)
White/Green (Stator)	Green/White (Stator)	380-430 Ω	160-400 V	200-400 V
White/Green (Stator)	Engine Ground	Open	160-400 V	0.2 V Minimum
Green/White (Stator)	Engine Ground	Open	160-400 V	0.2 V Minimum

4. Check the Trigger resistance and DVA (see **NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS**).
5. 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.
6. The connection guide below will assist you in locating areas where problems can occur. Remember, a short in #1, #2 or #3 can cause either #4, #5 or #6 not to have spark.

ENGINE HAS ERRATIC TIMING OR ADVANCED TIMING:

1. Check the Trigger magnet in the flywheel to see if it is loose or cracked.
2. Check the DC voltage on the Purple wire at cranking. You should see at least 10 VDC. Low voltage can cause a no spark or no injector operation.
3. Verify/Clean ground wires and connections.
4. Disconnect the 4 wire Detonation Controller and check the DVA on the Black/White wire, reference to engine ground. You should read 25 - 40 DVA. If the voltage is low, replace the TPM.
5. Replace the TPM Controller (if Carbureted engine, order a **144-7185**. If EFI Engine, order a **144-7169**).

ENGINE HARD TO SHIFT INTO OR OUT OF GEAR:

1. Check the Bias DVA on the Black/White wire, reference to engine ground. You should read 25 - 40 DVA. If the voltage is low, replace the TPM Control Module.

ENGINE MISFIRES OVER 2000 RPM:

1. Connect a **511-5207A 1** CDM Test Harness to the CDM modules and check the DVA from the Stator and Trigger at the RPM where the misfire occurs.
   a. You should have over 200 V DVA on the Stator lead. If the voltage is low, check the Stator resistance. If it is high, check the CDM and ground connections. Replace the stator if the CDM and ground connections are good.
   b. The Trigger should read 2 V DVA minimum. If the voltage is low, check the Trigger resistance. If it is high, check the CDM and ground connections. If the Trigger resistance is good, replace the TPM – Engine Controller.

NOTE: If the Stator reads low on three cylinders and they share the same stator color code, swap the Stator wires and retest. If the problem moves, replace the Stator. If the problem stays on the same CDMs, one of them is likely defective.

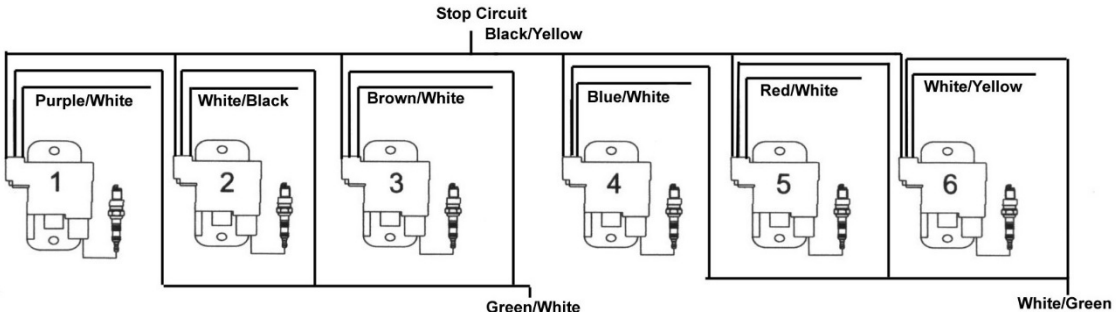
2. Check the DVA on the Black/White wire, reference to engine ground. You should read 25 - 40 DVA. If the voltage is low, replace the TPM (if Carbureted engine, order a **144-7185**. If EFI Engine, order a **144-7169**).

ENGINE DOUBLE FIRING:

1. Check the Bias DVA on the Black/White wire, reference to engine ground. You should read 25-40 DVA. If the voltage is low, replace the TPM.
2. Inspect and clean all engine and ignition ground connections. Tug on the ground wires for the CDM Modules against the ring terminal. If the insulation stretches, the wire is broken internally. Replace the original 3 wire ring terminal with individual ring terminals (Solder them on if possible) and add a secondary ground wire,10 or 12 Gauge, from the ground point of the CDM Modules and route it around and connect it with the negative black ground battery cable on the engine.
3. Swap the CDM that is double firing with another CDM firing cleanly. If the problem moves, replace the defective CDM.

FUEL INJECTORS NOT ACTIVATING:

1. Check the DVA voltage on the Green, Green/White and Green/Red wires, reference to engine ground at cranking speed. You should read about 5 V. If the voltage is low, check the voltage on the Purple wire going to the TPM, you should read above 10 V while cranking the engine. If you have spark on all cylinders, good voltage on the Purple wire and no signal on the Green wires, replace the TPM (Order PN: **144-7169**)
2. Check the voltage going to the fuel injectors, you should read above 10 V on the Red wire while cranking the engine.
3. Check the DVA across the fuel injectors, if you see approximately 25-60 DVA, the injectors are pulsing. You may have stopped up injectors. Have the injectors cleaned and fuel flow tested.



REPLACEMENT PARTS AVAILABLE FOR THIS ENGINE FROM CDI ELECTRONICS

Coils - 114-7509

Trigger - 134-6456-18

Stator - 174-0002

Regulator/Rectifier - 194-2115K 1 (2 Required)

TPM (Engine Controller) - Carbureted Engine 144-7185

TPM (Engine Controller) - Fuel Injected Engine 144-7169