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 Material Authorization**.

CDI PN: 414-0005 Harness, 2 Cylinder CDM

Replaces: 84-854322A 2

Fits: 1996-2006 (30 HP) 1996-2005 (40 HP)

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 Engine Harness from the CDM Modules, RPM Limiter (if present), Trigger, Stator, Kill circuit, 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 Blue/White and the Green/White wires near the 8 pin connector to the Tilt/Trim boat side harness.
4. Connect the Yellow/Black wire near the 8 pin connector to the Fuel Enrichment (Primer).
5. Connect the Tan/Blue wire to the overheat sensor.
6. Connect the White wire with the Female bullet connector close to the 20 Amp fuse holder to the Brown sensor lead of the RPM Limiter if present.
7. Connect the Purple and Black/Yellow wires close to the 20 Amp fuse holder to the RPM Limiter (if present).
8. Connect the 4 pin connector with the Purple Trigger wire in it to the #1 (Top) CDM Module.
9. Connect the Grey wire to the Regulator/Rectifier.
10. Connect the Green/White and White/Green wires in the new Harness to the Stator.
11. Connect the 4 pin connector with the White Trigger wire in it to the #2 (Bottom) CDM Module.
12. Connect the Two Red wires, male and female bullet terminals to the Regulator/Rectifier.
13. Connect the Black wire with the 5/16’ ring terminal to engine ground.
14. Connect the Black wire with the ¼’ ring terminal to the CDM Modules mounting plate.
15. Connect the Black wire in the tubing with the two Black/Yellow wires to the CDM Modules mounting plate.
16. If not already connected together, connect the two Black/Yellow wires together.
17. Connect the Purple (Violet), White, and Black Trigger wire’s in the new Harness to the Trigger leads, matching wire colors.
18. Connect the Yellow/Red and Black wires, with the small (#10 ring) terminals, that are located near the end of the harness to the starter solenoid.
19. Connect the Red wire with the ¼’ ring terminal on the starter relays battery post.
20. Connect the Red, Green/White and Blue/White to the Tilt/Trim relay’s harness.
21. Connect the Black wire with the 5/16” ring terminal to engine ground.
22. Connect the Green/White, Blue/White and Red (Tilt/Trim) wires, located near the main ground Black wire, to the Tilt/Trim Switch on the lower cowling.
23. Connect the Black/White and Blue wires to the oil tank’s low oil sensor.
24. Reconnect the negative battery cable.

TROUBLESHOOTING

STARTER WILL NOT ENGAGE:

1. Listen for the starter relay to click. If you hear the click, check the voltage on both sides of the relay. If the readings are both equal and above 10 V, the starter is likely defective. If you only see the voltage on the battery cable side, replace the solenoid. If the battery voltage drops below 10 V, charge/replace the battery.
2. If it does not click, verify the battery connections are clean and tight. Use two jumper wires and short the post with the Yellow/Red wire to the battery side of the starter relay. If the relay does not click, check the resistance between the two small posts of the starter relay. You should read a low resistance reading between them. If you get a high reading, replace the relay.
3. Verify the starter relay has a ground connection when in neutral. If not, disconnect the two Black wires from the neutral safety switch and jumper the two Black wires together (located close to the Oil Warning Blue/White sensor wires). If the starter relay now clicks, adjust/replace the neutral safety switch.
4. Verify the battery is fully charged.

5. Check the battery voltage at the battery and compare that reading with the voltage at the starter relay. The readings should be within 1 V of each other. If not, replace the battery cables if the connections are clean and tight.

NO SPARK ON ANY CYLINDER:

NOTE: CDI P/N 511-5207A 1 (CDM Test Harness) is highly recommended for testing these parts.

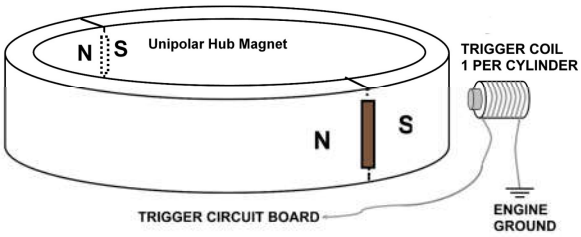
1. Disconnect the Black/Yellow kill wires from the harness and retest. If the engine now has spark, the kill circuit has a fault. It is most likely the key switch, harness, or emergency kill switch.
2. Check for DC voltage on the kill (stop) wires, usually Black/Yellow, with the key switch in the on and off position (do not engage the starter). At no time should you see over 2 volts DC on this wire, as severe damage to the CDMs can occur.
3. Some of these engines have a RPM Limiter on them. Locate and disconnect the Black/Yellow Stripe and the White (connected to a Brown) wire from it. If spark returns, replace the RPM Limiter. The **144-1889-51** (5200 RPM) or the **144-1889-52** (5800 RPM) Limiters are available from CDI Electronics.
4. Check/Clean all engine ground connections from both the terminals and the grounding location.
5. Install a secondary 10 or 12 Gauge ground wire from the grounding point of the **414-0005**, routed around the engine, connecting it with the negative battery cable on the engine.
6. Check Connector pinout as follows:

   Pin A = Black - Ground
   Pin B = Black/Yellow Stripe - Kill
   Pin C = (Purple or White) - Trigger
   Pin D = (Green/White or White/Green) - Stator

7. Verify you have the correct flywheel. The base number of the casting is the same for both the older ignitions and the CDM ignition. The only visible difference is the trigger magnet. If you do not see the 2 slots in the steel band around the magnetic material, you have the wrong flywheel.

Mercury CDM Hub Magnet Design

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



8. Install a **511-5207A 1** test harness inline to one of the CDM Modules and unplug the Black/Yellow wires in the test harness (if connected together). This will isolate that CDM from all other connections. If spark returns on that CDM with the Black/Yellow wires unplugged, test the remaining CDM. If you disconnect one CDM and the other CDM starts firing, the one that the test harness is connected to is defective.
9. Test the Stator and Trigger resistance and DVA as given below:

Read from	Read to	OEM Ohms	CDI Ohms	DVA Connected	DVA Disconnected
Green/White (Stator)	White/Green (Stator)	500-700 Ω	400-550 Ω	180 V Minimum	200 V Minimum
Green/White (Stator)	Engine Gnd	Open	Open	180 V Minimum	Less than 5 V
White/Green (Stator)	Engine Gnd	Open	Open	180 V Minimum	Less than 5 V
Purple (#1 Cyl Trigger)	Black (Trigger)	-	-	1 V Minimum	4 V Minimum
White (#2 Cyl Trigger)	Black (Trigger)	-	-	1 V Minimum	4 V Minimum

NOTE: This trigger has the Bias circuit built into it, therefore you cannot meter them as you do on the older engines.

10. Check for broken or bare wires on the unit, Stator and Trigger.
11. Disconnect the Yellow wires from the stator to the Regulator/Rectifier and retest. If the engine fires, replace the Regulator/Rectifier.
12. Check the resistance of the Black wire in the 4 pin connector to the CDM, referenced to engine ground. It should show a short, less than 0.5 Ω. Remember to touch your meter leads together and subtract that reading from the reading

obtained when testing the Black wire to engine ground. If a high reading or an open reading exist, check the Black wire at the ground terminal as it indicates a break in the Black wire.

Check the resistance of the CDM Modules as follows (**934-0006** Test Harness is recommended):

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

ENGINE WILL NOT STOP (KILL):

1. Check kill circuit in the CDM Module by using the **511-5207A 1** Test Harness connected inline to the CDM Module and shorting the Black/Yellow wire with the female bullet connector to engine ground. If this kills the spark on that CDM, the kill circuit could possibly have a fault in the Key Switch or Harness.
2. Disconnect the Black/Yellow kill wire from the harness and short the harness's Black/Yellow wire to ground. If there is now no spark, the problem is in the harness or kill switch.
3. Install a **511-5207A 1** test harness inline to one of the CDM Modules and short the two Black/Yellow kill wires to engine ground. If there is now no spark on either CDM Module, the problem is in the Harness or kill switch. If the engine still has spark, replace both CDM Modules.

HIGH SPEED MISS:

1. Disconnect the Regular/Rectifier and retest. If the miss is gone, the Regular/Rectifier is usually at fault.
2. Check the DVA voltage between the White/Green and Green/White wires at high speed. The reading should show a smooth climb in voltage, peaking below 300 V DVA. If there is a sudden or fast drop in voltage right before the miss becomes apparent, the Stator is usually at fault. If there is no indication of the problem, it could be mechanical problem. If the DVA voltage exceeds 330V, replace both CDM Modules as a set.

   NOTICE: Use caution when doing this and do not exceed the rated voltage range of your meter.

3. Replace both CDM modules at the same time. If the miss is gone, put one CDM back on at a time and retest until you determine which original CDM caused the problem. If the miss is still present and the Stator is ok, replace the TPM.

BOTH CYLINDERS HAVE SPARK BUT THE ENGINE WILL NOT RUN:

1. Check the shear key in the flywheel.
2. Index the flywheel and check timing on both cylinders. If the timing varies, replace the Trigger.

ONE CYLINDER HAS WEAK OR NO FIRE ON 1 CYLINDER:

1. Check Trigger and Stator voltage to the CDM.
2. Replace CDM module.

ENGINE HARD TO START WHEN COLD OR WHEN HOT:

1. Check fuel enrichment valve.
2. Verify the carburetors are getting fuel to them (not vapor locked).
3. Test the stator both hot (Approximately 200 Degrees F) and cold (Approximately 40 Degrees F) as follows:

Read from	Read to	OEM Ohms	CDI Ohms	DVA Connected	DVA Disconnected
Green/White (Stator)	White/Green (Stator)	500-700 Ω	400-550	180 V Minimum	200 V Minimum
Green/White (Stator)	Engine Gnd	open	open	180 V Minimum	Less than 5 V
White/Green (Stator)	Engine Gnd	open	open	180 V Minimum	Less than 5 V
Purple (#1 Cyl Trigger)	Black (Trigger)	-	-	1 V Minimum	4 V Minimum
White (#2 Cyl Trigger)	Black (Trigger)	-	-	1 V Minimum	4 V Minimum

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ENGINE TIMING FLUCTUATES:

(NOTE- Timing can vary by 2-3 degrees at idle).

1. Inspect the Trigger magnet on the flywheel to insure it is not loose nor damaged.
2. Replace the Trigger.
3. Replace both CDM Modules as a set.

ENGINE MISFIRES OCCASIONALLY:

1. Check spark plugs – must be inductive type (i.e. Champion QL series, NGK BPZ series, etc). Also, check for damage to the sparkplugs (cracks, incorrect gap, broken porcelain).
2. Are the Sparkplug wires fully seated?
3. Check CDM connectors for damaged pins.
4. Check sparkplug wires for damage.
5. Check ground connections.
6. Check bullet connections for corrosion, loose connections or burned connections.
7. Check battery connections for loose or corroded connections.
8. Check the resistance of the CDM Modules as follows. CDI P/N **934-0006** (Test Harness) is recommended:

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

INTERMITTENT SPARK OR NO SPARK ON ONE OR MORE CYLINDERS:

1. Verify the correct sparkplugs are installed and gapped properly. Refer to the EPA Data plate for specifications.
2. Check the resistance of the Black wire in the 4 pin connector to the CDM, referenced to engine ground. It should show a short, less than 0.5 Ω. Remember to touch your meter leads together and subtract that reading from the reading obtained when testing the Black wire to engine ground. If a high reading or an open reading exist, check the Black wire at the ground terminal as it indicates a break in the Black wire. If the cylinders are only acting up above an idle, connect an inductive Tachometer to all cylinders and try to isolate the problem cylinder.

   NOTE: This Trigger has the Bias circuit built into it, therefore you cannot meter it as you do on the older engines.

3. Using the **511-5207A 1** CDM Test Harness, check the Trigger DVA as given below:

Read from	Read to	Ohms	DVA Connected	DVA Disconnected
Purple wire (#1 Cyl Trigger)	Engine Gnd	Open	0.5-1.5 V**	1 V Minimum
White wire (#2 Cyl Trigger)	Engine Gnd	Open	0.5-1.5 V**	1 V Minimum

*****A DVA voltage reading that is close to the same reading connected and disconnected may indicate a broken ground wire.***

REPLACEMENT PARTS AVAILABLE FOR THIS ENGINE FROM CDI ELECTRONICS

Coils - 114-7509

Trigger - 134-3960-2

Stator - 174-2075K 2 (16 Amp Battery Charge Capacity)

Regulator/Rectifier - 194-5279

RPM Limiter - 144-1889-51 (5200 RPM Limit) 144-1889-52 (5800 RPM Limit)