Installation and Troubleshooting Guide

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 P/N: 113-4489

The conversion kit replaces P/N's: 583656, 583664, 583665, 583896, 583984, 584329, 584331, 584347, 584486, 584487, 584489, 4-5794, 18-5794, 18-5794-1, and 300-26085.

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

This Power Pack has a 6100 RPM limit built in.

How to test the Engine Stop Circuit (Kill) for DC Voltage:

1. DC voltage present on the kill circuit of the Power Pack due to a faulty key switch, boat harness, or engine harness will severely damage the Power Pack's internal kill circuit**.** Connect a Digital Multi Meter to the Ignition Stop wire AT THE POWER PACK while disconnected from the Power Pack in reference to a known good engine ground. Turn the Ignition switch on and off several times. If, at any time, you see over 2 VDC on the kill wire, there is a problem with one or both harnesses and/or the Ignition switch. The Ignition Stop wire should not be connected back to the new Power Pack at any point until the problem is corrected **OR DAMAGE TO THE POWER PACK WILL OCCUR**!

INSTALLATION

1. Disconnect the Negative battery cable.
2. Remove the flywheel according to the service manual for your engine.
3. Disconnect the Orange and Orange/Blue Ignition coil Primary wires.
4. Remove the Stator base assembly with the old Power Pack mounted on it.
5. Remove the old Power Pack from the Timer Sensor plate and save the mounting bolts.
6. Cut the Black/Yellow kill wire close to the old Power Pack and save the wire.
7. Disconnect the Stator charge coil wires from the old Power Pack.
8. Replace the old Stator charge coil with the new one. Bend the top lamination up and the bottom lamination down to wedge the coil in place against the frame.

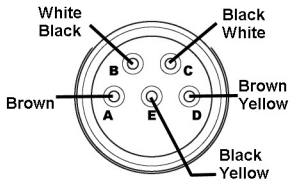
   Note: ***Remember to install the shunt plate on the outside of the charge coil ONLY IF THE OLD CHARGE COIL HAD A SHUNT PLATE INSTALLED.***

9. Route the Stator charge coil wires and the new Timer sensor wires through the top of the Timer Base plate.
10. Slide the Stator charge coil and Timer sensor wires through the new sleeving.
11. Install the new sensor plate assembly (Plate side up). Set the air gap according to the service manual, using PN: 553-4994 Locator Ring.

    Note: On some engines, you may have to remove some of the excess aluminum on the original stator plate assembly in order for the new sensor plate assembly to mount correctly with the sensor plate being straight.

12. Place the 553-4994 Locator Ring over the outside of the Timer Sensor and Stator assemblies, seating it over the mounting bosses in the armature plate.
13. Loosen the mounting screws holding the Timer Sensor and Stator assemblies in place ***ONLY*** if the air gap needs to be adjusted.
14. If the sensor air gap requires adjustment:
    a) Remove and apply the Red Locktite 271 to the screws holding the Timer Sensor to the mounting plate.
    b) Slide the Timer Sensor outward until the pickup is even with the outside of the mounting plate.
    c) Lightly tighten the screws holding the mounting plate in place and align the Timer Sensor against the 553-4994 Locator Ring, sliding the Timer Sensor inward or outward to get the correct air gap.
    d) Tighten the screws holding the Timer Sensor on the plate to 15-22 in. lbs. of torque.
    e) Remove the screws holding the mounting plate in place, one at a time and apply the Red Locktite 271 to the screws holding the Timer Sensor to the plate and tighten them to 40-50 in. lbs. of torque.
    f) Slide the Timer Sensor and Stator assemblies out against the Locator Ring and hold them in place.
    g) Tighten the Sensor screws to 15-22 in. lbs. of torque.
    h) Tighten the sensor plate and stator screws to 30-40 in. lbs. of torque.
15. Install the clamp on top of the armature plate to position and secure the Stator charge coil and Timer Sensor coil leads. Make sure the wires are flat and do not cross over another wire.
16. Slide the sleeving up to the armature plate to protect the wiring and install the cover on the bottom of the plate (align the notch in the cover with the notch in the plate). Make sure the wires are flat and do not cross over another wire.

17. Apply Blue thread locker to the screws securing the ignition plate to the retainer plate and tighten them to 25-35 in. lbs. of torque.
18. Install the Timer Sensor assembly and tighten the screws to 25-35 in. lbs. of torque.
19. Connect the linkage.
20. Reinstall the flywheel according to the service manual.
21. Mount the new Power Pack to the engine (or to the adapter plate if there are no mounting bosses for the Power Pack, keeping the wires to the inside edge of the plate). If needed, mount the adapter plate on the port side of the engine at the top of the water jacket.
22. Route the Timer Sensor and Stator charge coil wires around and over to the new Power Pack.
23. Insert the Stator charge wires and Timer Sensor wires into the 5 pin connector, matching the wire color pin locations to the Power Pack connector.



BACK SIDE VIEW

24. Cut and strip approximately 3/16” of insulation from the Black/Yellow wire and crimp the terminal furnished with the kit.
25. Insert the Black/Yellow wire into the empty slot of the 5 pin connector.
26. Connect the Tan temperature wire to the temperature sensor.
27. Connect the Orange/Blue Primary wire to the top #1 cylinder Ignition coil and the Orange Primary wire to the bottom #2 cylinder Ignition coil.
28. Reconnect the Negative battery cable.
29. Reset the ignition timing according to the service manual.

TROUBLESHOOTING

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire from the Power Pack and retest. If the engine's ignition has spark, the stop circuit has a fault. Check the key switch, harness, and shift switch (if present).
2. Disconnect the Yellow wires from the Regulator/Rectifier and retest. If the engine now has spark, replace the Regulator/Rectifier.
3. Check the cranking RPM. A cranking speed of less than 250 RPM 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.
4. Check the resistance and DVA of the Stator and Timer Base as given below:

Read from	Read to	OEM Ohms	CDI Ohms	DVA (Connected)	DVA (Disconnected)
Brown (Stator)	Brown/Yellow (Stator)	500-650 Ω (85-88)	500-650 Ω	150-400 V	150-400 V
Brown (Stator)	Brown/Yellow (Stator)	550-600 Ω (89-92)	500-650 Ω	150-400 V	150-400 V
Brown (Stator)	Brown/Yellow (Stator)	500-650 Ω (93-97)	500-650 Ω	150-400 V	150-400 V
Brown (Stator)	Engine Gnd	Open	Open	150-400 V	-
Brown/Yellow (Stator)	Engine Gnd	Open	Open	150-400 V	-
Black/White (#1 Sensor)	White/Black (#2 Sensor)	30-50 Ω	45-55 Ω	0.6 V Minimum	0.6 V Minimum
Black/White (#1 Sensor)	Engine Gnd	Open	Open	0.6 V Minimum	-
White/Black (#2 Sensor)	Engine Gnd	Open	Open	0.6 V Minimum	-

5. Check the DVA on the Black/Yellow kill wire coming out of the Power Pack. You should have a reading of at least 150 DVA or more. The Stator and Timer Sensor should be connected to the Power Pack for this test. If you do not, check the DVA on the Stator and Timer Sensor. If the DVA on the Stator and Timer Sensor is good but the DVA on the Black/Yellow Kill wire coming out of the Power Pack is low, the Power Pack is likely faulty.
6. Check the DVA on the Orange Primary wires from the Power Pack while connected to the Ignition coils. You should have a reading of at least 150 V or more. If the reading is low on one cylinder, disconnect the Orange Primary wire from the Ignition coil for that cylinder and reconnect it to a Pack Load resistor. Retest. If the reading is now good, the Ignition coil is likely bad. A continued low reading usually indicates a bad Power Pack.

7. Check the Stator input diodes connected inside the Power Pack using a meter set to diode scale. If the readings show a short or open, replace the Power Pack.

Red meter lead	Black meter lead	Diode Reading
Brown (Stator)	Black (Ground)	Reading*
Brown/Yellow (Stator)	Black (Ground)	Reading*
Black/Yellow (Kill)	Brown (Stator)	Reading*
Black/Yellow (Kill)	Brown/Yellow (Stator)	Reading*

**** This Measurement is with the meter set to the diode scale. Where you see the term "Reading" represents a reading on the meter. Actual Meter readings will vary depending on type of meter.***

NO SPARK ON ONE CYLINDER:

1. Check the Timer Sensor resistance and DVA (see **NO SPARK ON ANY CYLINDER**).
2. Swap the Timer Sensor wires and see if the problem follows the Timer Sensor wire.
3. Check the DVA on the Orange Primary wires from the Power Pack while connected to the Ignition coils. You should have a reading of at least 150 V or more while connected.
4. Visually inspect the Ignition coils for burned, discolored areas, or cracks in the casing (indicating arcing inside the coil).
5. Swap the Ignition coil with one that is sparking correctly.
6. Rare causes include a weak Trigger magnet. If possible, try another flywheel.

NOTE: If the Orange Primary DVA reading is low on one cylinder, disconnect the wire from the Ignition coil for that cylinder and reconnect it to a Pack Load resistor (CDI P/N 511-9775). Retest. If the reading is now within specifications, the Ignition coil is likely defective. If it still measures low, it indicates a bad Power Pack if Timer Sensor test good.

INTERMITTENT ON ONE OR BOTH CYLINDERS:

1. Check the resistance and DVA of the stator and Timer Base:

Read from	Read to	OEM Ohms	CDI Ohms	DVA (Connected)	DVA (Disconnected)
Brown (Stator)	Brown/Yellow (Stator)	500-650 Ω (85-88)	500-650 Ω	150-400 V	150-400 V
Brown (Stator)	Brown/Yellow (Stator)	550-600 Ω (89-92)	500-650 Ω	150-400 V	150-400 V
Brown (Stator)	Brown/Yellow (Stator)	500-650 Ω (93-97)	500-650 Ω	150-400 V	150-400 V
Brown (Stator)	Engine Gnd	Open	Open	150-400 V	-
Brown/Yellow (Stator)	Engine Gnd	Open	Open	150-400 V	-
Black/White (#1 Sensor)	White/Black (#2 Sensor)	30-50 Ω	45-55 Ω	0.6 V Minimum	0.6 V Minimum
Black/White (#1 Sensor)	Engine Gnd	Open	Open	0.6 V Minimum	-
White/Black (#2 Sensor)	Engine Gnd	Open	Open	0.6 V Minimum	-

2. Check the DVA on the Orange Primary wires from the Power Pack while connected to the Ignition coils. You should have a reading of at least 150 V or more. If the reading is low on one cylinder, disconnect the Orange wire from the Ignition coil for that cylinder and reconnect it to a Pack Load resistor. Retest. If the reading is now good, the Ignition coil is likely bad. A continued low reading usually indicates a bad Power Pack.

ENGINE WILL NOT STOP (KILL):

1. Disconnect the Black/Yellow wire at the Power Pack. Connect a jumper wire to the stop wire from the Power Pack and short it to engine ground. If this stops the Power Pack from sparking, the stop circuit has a fault. Check the key switch, harness, and shift switch (if present). If this does not stop the Power Pack from sparking, replace the Power Pack.

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. In the water or on a Dynamometer, check the DVA on the Orange wires from the Power Pack while connected to the ignition coils. You should have a reading of at least 150 DVA or more, increasing with engine RPM until it reaches 300-400 DVA maximum. A sharp drop in DVA right before the miss becomes apparent on all cylinders will normally be caused by a bad Stator. A sharp drop in DVA on less than all cylinders will normally be the Power Pack or Timer Sensor.
3. 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 Power Pack or Ignition coil. Occasionally a Timer Sensor will cause this same problem. Check the Timer Sensor DVA (see **NO SPARK ON ANY CYLINDER**).
4. 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.
5. Check the Trigger and Charge coil flywheel magnets for cracked, broken, or loose magnets.

ENGINE WILL NOT ACCELERATE BEYOND 2500 RPM (Runs smooth below that RPM):

1. Use a temperature probe and verify that the engine is not overheating.
2. Disconnect the Tan temperature wire from the Power Pack and retest. Make sure to cut the key switch off killing the engine, and then crank the engine back again. This resets the circuit board inside the Power Pack. If the engine now performs properly, check the temperature switch, harness, and System Check Gauge.
3. Make sure the Tan temperature switch wire is not located next to a spark plug wire (RF interference can activate the S.L.O.W function without sounding the warning horn).
4. If the engine will not rev above 2500 RPM and the Tan wire is disconnected from the Power Pack (and not near a spark plug wire), the Power Pack is likely defective. Make sure to cut the key switch off killing the engine, and then crank the engine back again. This resets the circuit board inside the Power Pack.

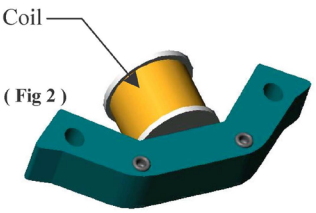
SLOW CIRCUIT WILL NOT ACTIVATE:

1. Disconnect the Tan temperature wire from the Power Pack and short it to engine ground. *If the SLOW circuit now operates*, replace the temperature sensor. *If the SLOW circuit still does not work*, replace the Power Pack.

CD2 DIAGRAM

113-4488 and 113-4489
CD2 USL Conversion Kit Assembly

(FIG:2)
1. *Remove the single charge coil from the timer base plate.*
2. *Remove original coil from the lamination.*
3. *Place the new high voltage coil P/N: 173-1670 onto the lamination post.*
4. *Bend the outer lamination to secure the coil to the lamination.*
5. *Install the new assembly back on to the plate. Use loctite to secure the bolts.*
6. *Route the lead wires for the electrical connections.*



(Fig:1)
1. *Remove flywheel.*
2. *Remove original CD2 USL from the timer base plate.*
3. *Mount the CDI sensor on the plate where the original CD2 USL was removed. See diagram for proper mounting.*
4. *Set the air-gap according to the factory service manual using the CDI gauge P/N: 533-4994.*
5. *Secure the mounting screws using Loctite adhesive.*
6. *Route the lead wires for the electrical connections.*