

INSTALLATION/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 P/N: 213-6292 High Performance Power Pack 4 Cyl.

This unit replaces the following P/N's: 113-6292, 586015, 586098, 586292 for Racing Applications

WARNING! This product is designed to be installed 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. The RPM limit has been reset to 8000 RPM's.

SERVICE NOTE: This kit contains a power pack, special spark plug wires and a replacement sensor. Please use only the Factory Recommended Champion QL78YC (0.30 Gap) Spark Plugs. DO NOT OPERATE ENGINE WITH PLASTIC ENCODER COVER OFF OF THE ENGINE.

INSTALLATION

1. Disconnect the battery cables.
2. Remove timing wheel cover, power pack cover and regulator/rectifier cover (Between the timing cover and the power pack).
3. Disconnect the stator wire connector from the power pack.
4. Disconnect the harness wire connector from the power pack.
5. Disconnect the timing wire connector from the sensor.
6. Disconnect the spark plug wires from the spark plugs.
7. Unbolt and remove the ignition coils and old power pack.
8. Check for DC voltage on the kill (stop) wires (usually Black/Yellow) with the key-switch in the on and off position. At no time should you see over 2 volts DC on this wire as severe damage to the power pack can occur.
9. Disconnect the ignition coils from the old power pack and reconnect them to the new power pack.
10. Install the new power pack and ignition coils. (Take care not to over-torque the mounting bolts, OEM specification calls for 50-95 in lbs of torque). Make sure the RF Noise Shield is between the ignition coils and the power pack.
11. Connect the stator and harness connectors to the power pack. Use a small amount of dielectric silicone grease on the connector seal – Do not put any inside the sockets.
12. Connect the harness wire connector to the power pack.
13. Connect the timing wire connector to the sensor.
14. Connect all spark plug wires to a spark gap tester.
15. Disconnect the Port temperature switch's Tan and White/Black wires.
16. Connect a jumper wire to the Tan wire and short it to engine ground.
17. Connect a timing light to the # 1 spark plug wire.
18. Connect the battery cables.
19. Disconnect the engine harness from the boat harness.
20. Using a piston stop tool or dial indicator, verify the TDC timing pointer's accuracy. Reset as needed to correct.
21. Use a remote starter (511-6996 is recommended) and verify the ignition timing as follows:

ENGINE	IDLE Timing	WOT Timing
90/115	4-6 Deg ATDC	20 Deg BTDC

NOTE: Adjust the idle timing to adjust the idle speed.

22. Reconnect the engine harness.
23. Replace the timing wheel cover, power pack cover and regulator/rectifier covers.
24. Connect the spark plug wires to the spark plugs.
25. Disconnect the jumper wire from the Tan temp sensor wire.
26. Connect the Tan and White/Black temp switch wires to the temperature switch on the Port side of the engine.
27. Using a motor flushing device or in the water, start and run the engine until it reaches operating temperature.
28. Verify that the engine's QuickStart function is working by watching for the drop in engine RPM as the engine temperature goes above 105 Deg F and drops the timing back to running mode.
29. Stop the engine and restart it. You should have approximately a 5-10 second period of QuickStart timing advance before the engine settles down to a normal idle.

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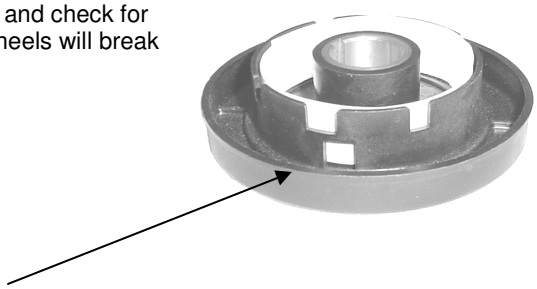


30. Disconnect the Port temperature switch's Tan and White/Black wires.
31. Connect a jumper wire to the Tan wire and short it to engine ground.
32. Using a motor flushing device or in the water, start and run the engine . Make sure the over-temp alarm is working and try to rev the engine up. You should not be able to exceed 2600 RPM as the engine should go into S.L.O.W. function at 2500 RPM. **Turn the engine off and wait 10 seconds for the processor inside the power pack to reset** before continuing.
33. Disconnect the jumper wire from the Tan temperature sensor wire.
34. Connect Tan and White/Black temperature switch wire to the temperature switch on the Port side of the engine.

TROUBLESHOOTING

NO FIRE ON ANY CYLINDER:

1. Disconnect the Black/Yellow stop wire AT 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.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine sparks, replace the rectifier.
3. Check the cranking RPM. A cranking speed of less than 250-RPM will 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. Verify the engine is turning in a clockwise direction. If not, see TRIES TO RUN BACKWARDS below.
5. Check the power pack and ignition coil ground wires for corrosion and tightness.
6. Connect a spark gap tester to all cylinders.
7. Disconnect the boat side harness and connect a remote starter unit. Check for spark. If the engine has spark, check the boat side harness's Black/Yellow wire for shorts to ground.
8. Disconnect the Port 4 pin connector (with the Yellow/Red, Black/Yellow, Tan and White/Black wires) from the power pack and see if spark returns. If it does spark, check resistance to see if the Black/Yellow wire is shorted to engine ground.
9. If it loses spark after the key switch is disengaged, check the DVA voltage on the stator's power coil (Orange to Orange/Black) as given below in Step #13. Either the power coil or power pack is the fault.
10. Check the battery voltage on the Yellow/Red wire while cranking the engine. If below 11 VDC, charge the battery and check all battery cables. A continued low battery reading could be from a dragging starter. If still below 11 VDC, disconnect the power pack's Yellow/Red wire from the starter solenoid and apply a verified 12 + VDC to the Yellow/Red wire. If the engine now runs good, check the DVA voltage on the stator's power coil (Orange to Orange/Black) as given below in Step #13. Either the power coil or power pack is the fault.
11. Remove the sensor wheel and check for damage, especially where the top slots are located. Sometimes the wheels will break out where the windows overlap.



The thin area between the crank position and the cylinder position is the most common breakout location.

12. Check the sensor eyes for dirt, grease, etc. If you have to clean it, use denatured alcohol and a Q-tip. Do not use any other cleaning agent because damage to the optical lens will occur.
13. Check the stator resistance and DVA voltage as given below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/ White (Brown/Yellow)	900-1200	150-400 V	150-400 V (*)
Orange	Orange/Black	50-60	11-22 V	45-120 V (*)

(*) This reading can be used to determine if a stator or pack has a problem. For instance, if you have no spark on any cylinder and the stator's DVA reading is out of spec – disconnect the stator wires and recheck the DVA output. If the reading is still out of spec – the stator is bad. If the reading is now within spec – the pack is bad.

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(NOTE) Low readings on all checks indicate a possible problem with the flywheel magnets that require checking.
(SERVICE NOTE) It is recommended that liquid neoprene be applied to the areas where piercing probes were used.

14. Check the DVA output from the power pack to the primary coil wires as follows:

WIRE	READ TO	DVA (Connected)
Orange/Blue	Engine Ground	150 V +
Orange/Green	Engine Ground	150 V +

(NOTE) If the DVA values are below these specifications, the power pack or sensor is likely bad.

15. Check the sensor DC voltage as follows:

WIRE	READ TO	DC voltage (Connected)
Orange/Red	Engine Ground	10.5-12 VDC
Black/Orange	Engine Ground	8-10 VDC

(WARNING!!) The Black/Orange wire should NEVER be shorted to engine ground as this will damage the sensor.

16. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
17. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

ONLY HAS FIRE AS LONG AS THE KEY SWITCH IS ENGAGED OR WILL NOT REV ABOVE IDLE SPEED:

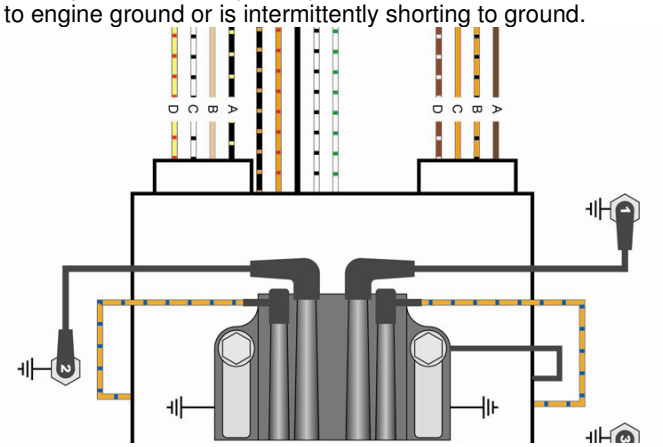
Check the DVA voltage on the stator's power coil (Orange to Orange/Black) as given above in Step #13:
(NOTE) The readings should rapidly increase as the engine RPM increases and stabilize below 22 volts DVA (voltage exceeding 22 V DVA indicates a bad power pack). A sharp drop in voltage right before the miss becomes apparent usually indicates a bad stator winding. A sharp drop in voltage when you disengage the key switch indicates a bad power coil on the stator.

ENGINE TRIES TO RUN BACKWARDS:

1. Check the encoder wheel. It must have 5 notches.
2. Check the timing. Before Quick-Start, it should be set to 4° BTDC. After Quick-Start, it should be set to 6° ATDC.
3. Try another sensor.
4. Replace the power pack.

NO FIRE OR INTERMITTENT FIRE ON ONE BANK:

1. Check the stator resistance and DVA output (see Step #13 on NO FIRE ON ANY CYLINDER above). If the power pack has no fire on one bank and the readings are good, replace the power pack.
2. Disconnect the 4-pin connector on the port side of the power pack and see if the fire returns. If it does, check resistance to see if the Black/Yellow wire is shorted to engine ground or is intermittently shorting to ground.



Port 4 Pin Connector **Starboard 4 Pin Connector**
a) Black/Yellow a) Brown

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b)	Tan	b) Orange/Black
c)	White/Black	c) Orange
d)	Yellow/Red	d) Brown/Yellow

POWER PACK REPEATEDLY BLOWS ON SAME CYLINDER:

Replace the ignition coil on the cylinder dropping spark.

ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the power pack. Connect a jumper wire to the stop wire from the pack and short it to engine ground. If this stops the pack from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the pack from sparking, replace the power pack.

ONLY FIRES #1 CYLINDER:

1. Verify the engine is spinning in a clockwise direction.
2. Check the optical sensor to encoder wheel mesh. You may need to shim the optical sensor upwards 0.020” to 0.0285” to make it engage the encoder wheel.

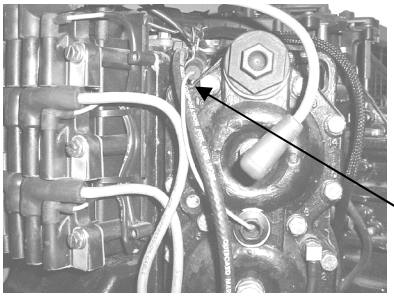
HIGH SPEED MIS-FIRE OR WEAK HOLE SHOT:

1. Connect DVA meter to between the brown wires and do a running test. AT NO TIME SHOULD THE VOLTAGE EXCEED 400v. If it does, the regulator circuit in the power pack is bad. The voltage should show a smooth climb and stabilize, gradually falling off at high RPM (above 5000). If you see a sudden drop in voltage right before the miss becomes apparent, the problem is likely in the stator.
2. Disconnect the Yellow wires from the stator to the rectifier and retest. If the miss clears, replace the rectifier.
3. In the water or on a Dynameters, check the DVA output on the Orange wires from the power pack while connected to the ignition coils. You should have a reading of at least 150V DVA or more, increasing with engine RPM until it reaches 300-400V 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.
4. If the engine runs fine until you get above 4900 RPM and then starts missing, check the Orange to Orange/Black power coil wires with an oscilloscope (if available) or replace the pack. A breakdown inside the pack could cause RFI noise to activate the rev limiter for no apparent reason.
5. Connect an inductive tachometer to the spark plug wires one at a time and compare the readings. If most of the cylinders show the same reading and one or two show different readings, check the primary wires with the inductive pickup to see if the readings are the same from the power pack. A difference in readings between the primary and secondary coil wires usually indicates a bad coil or bad ignition wires. No difference indicates a bad power pack.
6. 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.
7. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
8. Rotate the stator one bolt hole in either direction and retest.

ENGINE WILL NOT REV ABOVE 2500 RPM *AND SHAKES HARD* (SLOW ACTIVATED):

1. Verify the engine is not actually over-heating by using a digital pyrometer.
2. Check the routing of the tan temperature wires, an example of a bad location is shown below. The tan wires have to be located as far away as possible from the spark plug wires.

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Unacceptable routing for the temp wire (V6 engine shown)

3. Verify the engine is not overheating and disconnect the Tan temperature sensor wire. If the engine performs normally, check both temperature sensors and replace the defective one.
4. If there is not any indication of a problem at this point, replace the power pack.

ENGINE STAYS IN QUICK-START:

1. Check the Yellow/Red wire for DC volts while the engine is running. You should only see voltage on this wire while the starter solenoid is engaged. A DC voltage of 5-7 volts will not engage the starter solenoid, but will engage Quick-Start. Check the starter solenoid, harness and ignition switch.
2. Short the White/Black temperature switch wire FROM the power pack to engine ground. Start the engine, if the Quick-Start drops out after approximately 5 seconds, replace the White/Black temperature switch.
3. Disconnect the Black/White wire from the power pack. If the Quick-Start feature is not now working, replace the power pack.

ENGINE DIES WHEN QUICK-START DROPS OUT:

Check ignition timing at idle with the White/Black temperature wire disconnected. Remember to allow for the drop in ignition timing when Quick-Start disengages. Verify ignition timing after engine has warmed up, according to the service manual.

QUICKSTART DOES NOT WORK:

1. Check the stator resistance and DVA voltage as given below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/ White (Brown/Yellow)	900-1200	150-400 V	150-400 V
Orange	Orange/Black	50-60	11-22 V	45-120 V

2. Check DVA voltage from the Orange to the Orange/Black wires while connected to the power pack. The reading should be between 8 and 24V. A reading above 24V indicates a problem in the power pack while a reading below 8 volts usually indicates a problem in the stator.

WILL NOT RUN WHEN HOT:

1. Check the stator resistance and DVA voltage as given below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	Brown/ White (Brown/Yellow)	900-1200	150-400 V	150-400 V
Orange	Orange/Black	50-60	11-22 V	45-120 V

2. Test the Trigger sensor while hot using the 511-4017 Sensor Tester or substitute another sensor for testing.

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