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: 173-4766

This Stator replaces the following P/N: 583779, 584236, 584766, and 763762

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.

It is recommended that dielectric grease (i.e. CDI 991-9705) be used in the bullet nose connectors to help prevent corrosion.

Any sign of leakage out of the high voltage coils or bubbling around the battery charge windings indicate a bad Stator. Check for burned marks on each pole. If a problem is found on the battery windings, we recommend the Regulator/Rectifier be closely checked.

Please use the Factory recommended spark plug (currently Champion QL77JC4) gapped at 0.030".

INSTALLATION

1. Remove the negative battery cable.
2. Disconnect the Stator wires from the Power Pack, engine ground, and the Rectifier.
3. Remove the Flywheel.
4. Disconnect the original Stator wires.
5. Remove the Black/Yellow kill wire from the old Stator's 5 pin connector.
6. Remove the original Stator, saving the original bolts.
7. Orient and install the new Stator (using a good thread-locker applied to the bolts) in the same position as the old Stator on the engine and install the flywheel, following the service manual instructions.
8. Install the Black/Yellow kill wire in the new Stator's 5 pin connector empty hole.
9. Connect the new Stator to the Power Pack.
10. Connect the new Stator to the Rectifier (ignore any stripes on the Rectifier as the new Stator does not require the Yellow wires to be connected to a particular Rectifier wire).
11. Replace the Flywheel according to the service manual.

TROUBLESHOOTING

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(s) 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(s), 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**!

NO SPARK ON ANY CYLINDER:

1. Perform a visual inspection of the Stator and Trigger wiring to the Power Pack. Check to make sure that the wiring is correct, clean, free of corrosion, and that all connections are tight.
2. Disconnect the Black/Yellow kill wire AT THE POWER PACK and retest. If the engine's Ignition now has spark, the stop circuit has a fault. Check the key switch, harness, and shift switch (if present).
3. Disconnect the Yellow wires from the Stator to the Rectifier and retest. If the engine now has spark, replace the Rectifier.
4. Check the cranking RPM. A cranking speed less than 250 RPM will not allow the system to fire properly. This can be caused by a weak battery, dragging starter, bad battery cables, or a mechanical problem inside the engine.
5. Check the Trigger and Charge coil magnet in the Flywheel. A loose or damaged magnet can cause this problem.
6. Check the resistance and DVA of the Stator and Timer Base:

Read from	Read to	Ohms	DVA Connected	DVA Disconnected
Brown (Stator)	Brown/Yellow (Stator)	500-650 Ω	150-400 V	150-400 V
Orange (Power Coil)	Orange/Black (Power Coil)	45-55 Ω	11-22 V	45-120 V
White (Common)	Blue (#1 Timer Base)	1-5M Ω	100-400 V	0.6 V Minimum
White (Common)	Purple (#2 Timer Base)	1-5M Ω	100-400 V	0.6 V Minimum
White (Common)	Green (#3 Timer Base)	1-5M Ω	100-400 V	0.6 V Minimum

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 Base.
3. Connect a DVA meter to each set of Brown Stator wires and do a running test. The voltage should show a smooth climb and stabilize, gradually falling off at high RPM (above 5000). If you see a sudden drop in DVA right before the miss becomes apparent, swap stator leads to see if the problem is in the Stator or Power Pack.
4. 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 Base will cause this same problem. Check the Timer Base DVA (see **NO SPARK ON ANY CYLINDER**).
5. 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.
6. Check the Trigger and Charge coil flywheel magnets for cracked, broken, or loose magnets.

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.

NO SPARK OR INTERMITTENT ON ONE OR MORE CYLINDERS:

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

Read from	Read to	Ohms	DVA Disconnected	DVA Connected
White (Common)	Blue (#1 Timer Base)	1-5M Ω	100-400 V	0.6 V Minimum
White (Common)	Purple (#2 Timer Base)	1-5M Ω	100-400 V	0.6 V Minimum
White (Common)	Green (#3 Timer Base)	1-5M Ω	100-400 V	0.6 V Minimum

2. 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 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.
3. Visually inspect the Ignition coils for burned, discolored areas, or cracks in the casing (indicating arcing inside the coil).
4. Check the cranking RPM. A cranking speed of less than 250 RPM may not allow the system to fire properly. This can be caused by a weak battery, dragging starter, bad battery cables, or a mechanical problem inside the engine.
5. Check the kickback diodes connected internally to the Power Pack's SCR's, 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	Reading
Black Ground wire	Orange/Blue (#1 Primary)	Reading*
Black Ground wire	Orange/Purple (#2 Primary)	Reading*
Black Ground wire	Orange/Green (#3 Primary)	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.***

6. Check the Power Pack resistance as given below:

Read from	Read to	Ohms
Blue (#1 Timer Base Input)	Orange/Blue (#1 Primary)	110 Ω (a)
Purple (#2 Timer Base Input)	Orange/Purple (#2 Primary)	110 Ω (a)
Green (#3 Timer Base Input)	Orange/Green (#3 Primary)	110 Ω (a)
White (Common)	Black (Engine Ground)	Shorted
Brown (Stator)	Black (Engine Ground)	Open or M range
Brown/Yellow (Stator)	Black (Engine Ground)	Open or M range

(a) Use a comparison reading as different brands of meters may give different readings. The typical range is 90-150 Ω for the Orange wires. You should have approximately the same Ohm reading on all three tests with the Orange wires. If one of the SCR's inside the Power Pack is shorted or open, the readings will be quite a bit different.

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.

POWER PACK OR TIMER BASE REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the Timer Base wires for shorts to engine ground as a shorted Timer Base wire can destroy a SCR inside the Power Pack.
2. In contrast, a shorted SCR inside the Power Pack can destroy a Timer Base coil. Check the Timer Base resistance and DVA (see **NO SPARK ON ANY CYLINDER**).
3. Replace the Ignition coil on the cylinder dropping spark.

BATTERY CHARGING ISSUES:

1. Regardless of whether the charging issue is overcharging or not charging at all, the #1 cause of all charging issues is the battery often due to improper style and/or charging neglect. #2 is the battery's connections. #3 is the Rectifier. #4 is the Stator.
2. The recommended type of battery for outboards is a single (NOT more than one) 850+ CCA dual purpose or cranking/starting **non-maintenance-free battery**.
3. Non-maintenance-free batteries (lead-acid flooded cell; has vent caps on its top) have heavy, thick plates. They're ideal for outboards, where batteries are commonly drained by accessories while fishing, etc. when there is no charge applied to a battery while the battery is in use. Its heavy plates can withstand constant discharging and charging. These batteries have much more reserve time and are much more suited for this behavior.

   NOTE: Some Maintenance free batteries will have vented caps on top. When in doubt, change the battery to a non-maintenance free type.

4. Maintenance-free batteries should ***NEVER*** be used in an Outboard application. A new, fully charged maintenance-free battery may work fine at first but their life span is dramatically shortened due to the constant charging and discharging. This activity will cause the cells to become weak, and/or the cells will become dead. When this happens, the battery is unable to accept a full charge, thus putting the Rectifier at extreme risk of failure. Therefore, maintenance-free style batteries commonly cause charging issues shortly after installation.
5. Check all battery connections, particularly at engine ground. Make sure that all connections are tight and free of corrosion. Do ***NOT*** use wing nuts as they tend to loosen over a period of time from vibration. A loose connection ***WILL*** cause a premature battery and/or Rectifier failure.
6. If there is no change, try a single (***NOT*** more than one) known good fully charged battery that is 850+ CAA Dual Purpose, or a cranking/starting battery that is non-maintenance free. Make sure the battery is a lead acid flooded cell battery (has vent caps on its top).
7. Measure the DVA across the Stator's Yellow battery charge wires, while connected to the Rectifier. At idle the DVA will normally be between 8-25 DVA. If not, disconnect the Yellow wires from the Rectifier and retest. DVA will normally be 17-50 DVA at idle. If the voltage is low, the Stator is possibly faulty. Perform a visual of the Stator for browning and varnish dripping. These are signs that the Stator has overheated. If the visual inspection shows any of these signs, replace the Stator.

MAXIMUM OUTPUT TEST:

1. Install an ammeter capable of reading at least 12 Amps between the Red wire and the starter solenoid battery post.
2. Connect a load bank to the battery.
3. In the water or on a Dynamometer, start the engine and bring the RPM up to approximately 4500 RPM in gear.
4. Turn on the load bank switches to increase the battery load to equal 12 Amps.
5. Check the ammeter.
6. If the amperage is low,
   A) Check the load bank connections and meter for battery draw.
   B) If the output is still low, check and clean all connections between the battery and the Rectifier. Inspect the Stator windings for burned or discolored windings.
7. If the amperage is correct, but the battery voltage remains low, replace the battery.

TACHOMETER TESTS

1. Measure the DVA across the Stator's Yellow battery charge wires, while connected to the Rectifier. At idle the DVA will normally be between 8-25 DVA. If not, disconnect the Yellow wires from the Rectifier and retest. DVA will normally be 17-50 DVA at idle. If the voltage is now within specification, the Rectifier is likely defective.
2. Disconnect the Rectifier's Gray wire. At 800-1,000 RPM, check the DVA on the Gray wire FROM THE RECTIFIER measured to engine ground. The reading should be 8 DVA or more. If not, replace the Rectifier.
3. If at least 8 DVA, run a jumper wire from the Gray wire out of the harness to one of the Stator's Yellow wires.
4. If still no tachometer signal, try a known good tachometer.
5. If still no tachometer signal, replace the Stator.

OVERCHARGING:

1. Clean all battery terminals, cables, and mounting bosses.
2. Check the voltage on the battery with a multi-meter and compare it to the dash meter.
3. Compare the voltage at the Regulator/Rectifier with the voltage at the battery. If the voltage is ok at the Regulator/Rectifier and not good at the battery, you have a bad connection somewhere. Clean the battery posts and terminals.
4. Replace the battery with a known good Maintenance type flooded wet lead acid marine battery. If the battery voltage remains ok, install a new Maintenance type flooded wet lead acid battery.