



# Installation and Troubleshooting Guide

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## CDI P/N: 173-1235

This stator replaces P/N's: 580950, 581114, 581235, 581301 and 763771 used on 1973 through 1978 3 Cylinder engines with terminal block style power packs.

**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.

SERVICE NOTE: Discoloration of all the battery windings is an indication of a problem in the rectifier/regulator. Discoloration of only one post of the battery windings indicates a problem in the stator.

## INSTALLATION

1. Remove the negative battery cable.
2. Remove the flywheel.
3. Disconnect the original stator wires.
4. Remove the original stator, saving the original bolts.
5. Install the new stator using the original bolts with a good thread-locker applied (CDI 989-3977 is recommended) to the bolts and tightened to the factory torque specifications.
6. Connect the new stator to the power pack.
7. Connect the new stator to the regulator/rectifier (ignore any stripes on the rectifier as the new stator does not require its wires to be connected to a particular rectifier wire).
8. Replace the flywheel according to the service manual.
9. Clean all battery cable connections, both on the battery and the engine.
10. Replace the battery cable.

## TROUBLESHOOTING

**NOTICE:** 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 rectifier/regulator be closely checked or replaced.

### NO SPARK ON ANY CYLINDER:

(Note) If the ignition only sparks with the spark plugs out, the timer base is likely weak or the engine is not spinning fast enough. See steps #3 and #7 below.

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 rectifier and retest. If the engine now 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. Inspect and clean all engine and ignition ground connections.
5. Check the stator and timer base resistance and DVA output as given below:

WIRE	READ TO	OEM Ohms	CDI Ohms	DVA (Connected)	DVA (Disconnected)
Brown	Brown/Yellow	400-600	600-800	150-400 V	150-400 V (*)
Black/White	White/Black (all)	10-20	30-40	0.6 V +	0.6 V + (#)
Black/White	Engine GND	Open	Open	150-400 V (a)	N/A
White/Black	Engine GND	Open	Open	150-400 V (a)	N/A

(\*) 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 low – disconnect the stator wires and recheck the DVA output. If the reading stays low – the stator is bad. If the reading is now within spec – the pack is bad.

(#) This reading can be used to determine if a pack has a problem in the triggering circuit. For instance, if you have no spark on one cylinder and the timer base's DVA reading for that cylinder is low – disconnect the timer base wires and recheck the DVA output. If the reading stays low – the timer base is bad. If the reading is now within spec – the pack is bad.

(a) The trigger signal rides on top of the high voltage on these timer bases. Check stator DVA first. Then if timer base DVA is 0.6 - 2.5 V, the pack is faulty.

6. If the timer base output is low, you may try to reset the air gap between the timer base sensor and the triggering magnet using a Sensor Gap Gauge (553-9702) or use the following procedure outlined below.
  - a) Loosen the two mounting screws on the sensors and the nuts located in the epoxy on the outside of the heat shield of the timer base and slide the sensors in toward the crankshaft until the sensor touches the stop boss located at the base of the sensor mounting area. Tighten the mounting screws.
  - b) Coat the face of the sensor with machinists bluing or equivalent and install the flywheel without the key and rotate the flywheel at least one full turn.
  - c) Remove the flywheel and check to see if the triggering magnet struck the sensor face. If it did, back the sensor out approximately 0.005".
  - d) If the ignition has spark, finger tight the nut on the outside of the heat shield and coat it with RTV.
  - e) If still no spark, replace the timer base.



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7. Check the DVA voltage on the Black/White wire to engine ground. You should have a reading of at least 150V or more (while connected to the pack). If the reading is low, disconnect the timer base wires from the pack and recheck the Black/White terminal ON THE PACK. If the voltage jumps up to an acceptable reading, the timer base may have a problem in the internal wiring (A thin spot in the insulation on one wire).
8. Check the center hub triggering magnet in the flywheel. A loose magnet can cause this problem.
9. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

## **NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:**

1. Disconnect the Yellow wires from the rectifier and retest. If the engine has good spark, replace the rectifier.
2. Check the timer base resistance and DVA output (see NO SPARK ON ANY CYLINDER above).
3. Swap the timer base wires and see if the no spark problem follows a timer base wire.
4. Disconnect the timer base from the pack and check the resistance in the pack as follows:

Red meter lead	Black meter lead	Reading
Black/White terminal	Sensor 1	100-200 ohms
Black/White terminal	Sensor 2	100-200 ohms
Black/White terminal	Sensor 3	100-200 ohms

All readings should be fairly even. If the sensor reading in the pack for the cylinder not firing shows over a 10% different reading compared to the other sensors, the pack needs replacing.
5. 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 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 load resistor. Retest. If the reading is good, the ignition coil is likely bad. A continued low reading indicates a bad power pack.
6. Visually inspect the ignition coils for burned or discolored areas and cracks in the casing (indicating arcing inside the coil).
7. Swap the ignition coil with one that is sparking correctly.
8. Rare causes include a weak trigger magnet. If possible, try another flywheel.

## **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 output (see NO SPARK ON ANY CYLINDER above).
3. 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. Repeat test as necessary for additional packs.

## **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 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 or timer base.
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 base will cause this same problem. Check the timer base DVA voltage (see NO SPARK ON ANY CYLINDER above).
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 triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
6. Rotate the stator one bolt hole in either direction and retest.

## **HIGH SPEED MISS OR WEAK HOLE SHOT:**

1. Connect DVA meter between the Brown/Yellow and the Brown wire 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 rectifier and retest. If the problem disappears, replace the rectifier and retest.