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: 174-2075K 2

This unit will replace the following P/N's ONLY: 398-832075A3, A4, 398-9873A15, A19, A22, and A28.

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 Stator is to be used as a replacement for the "RED" Mercury 16 Amp Stators. It is NOT a kit designed to replace the 398-5454, 398-8778, or 398-9710 series Stators.

Note: 174-2075K 2 requires a Voltage Regulator, DO NOT USE WITH A RECTIFIER ONLY.

Warning! Do not use this Stator with the 332-7778, 332-5772, 18495, or 19052 series Switch Boxes without the Adapter Module because the voltage generated by the Ignition Charge coils of this Stator will destroy the Switch Boxes!

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

Any sign of leakage out of the Ignition charge 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 Voltage Regulator be closely checked. To replace Stators with ring terminals, please use the bullet to ring adapters enclosed with this Stator.

INSTALLATION

1. Disconnect the Negative battery cable.
2. Disconnect the Stator wires from the CDM harness (or the Adapter Module for Switchbox applications), engine ground, and the Voltage Regulator.
3. Remove the flywheel according to the service manual for your engine.
4. Mark the position of the mounting screws in relation to where the Stator wires come out of the old Stator.
5. Remove the old Stator.
6. 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.
7. Connect the new Stator Yellow wires to the Voltage Regulator ignoring any stripes on the Yellow wires of the Voltage Regulator as the new Stator does not require the Yellow wires to be connected to a particular Voltage Regulator wire.
8. Connect the Green/White and White/Green Stator wires to the CDM harness (or the Adapter Module for Switchbox applications).
9. If installing this Stator on a 2 cylinder (30-40 HP) engine with CDM Ignition, you will need to use the provided barrel connector depending on which connector you need. Remove the existing connector from the wire that will not connect to the TPM Module on your engine. Solder or crimp the appropriate connector on the wire and connect the wire to the TPM Module.
10. Reinstall the flywheel according to the service manual for your engine.
11. Reconnect the Negative battery cable.

GENERAL TROUBLESHOOTING FOR CDM IGNITION SYSTEMS

HOW TO TEST THE ENGINE STOP CIRCUIT (KILL) FOR DC VOLTAGE:

1. DC voltage present on the kill circuit of the CDM Modules due to a faulty key switch, boat harness, or engine harness will severely damage the CDM Module's internal kill circuit**.** Disconnect the CDM wiring harness at the CDM's on ALL OF THE CDM Modules at the same time**.** Connect a Digital Multi Meter to the Black/Yellow Ignition Stop wires at the CDM's by way of the plug connectors of the CDM Harness. Use the Black/Yellow wires in reference to a known good engine ground (Black wire in CDM plug connector). 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 ANY CDM Module at any point until the problem is corrected **OR DAMAGE TO THE CDM MODULE'S WILL OCCUR**!

NO SPARK ON ANY CYLINDER:

1. Disconnect each Black/Yellow stop wire from each CDM module and disconnect the RPM Limiter's stop wire and retest. If the engine's Ignition now has spark, the stop circuit you just disconnected has a fault. Check the key switch, harness, RPM Limiter, and shift switch (if present).
2. Disconnect the Yellow wires from the Voltage Regulator and retest. If the engine has spark, replace the Voltage Regulator.
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 the spark plug wires, boots, and spark plugs. Check for chafing on the wiring and harnesses.
5. Inspect and clean all engine and ignition ground connections.

6. Pull on each wire from each CDM harness plug. Make sure all wires are making proper contact inside plugs.
7. Disconnect the CDM modules one at a time and see if you get spark back on the other cylinders. A shorted stop circuit in one CDM will prevent ALL cylinders from sparking.
8. Check the Trigger and Charge coil flywheel magnets for cracked, broken, or loose magnets.
9. Check the resistance and diodes of each of the CDM modules as follows:

	Red Meter Lead	Black Meter Lead	OEM Reading	CDI Reading
CDM Pin #	(A) Ground	(C) Trigger	1.2-1.4K Ω	1.2-1.4K 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" represents a reading on the meter. Where you see the term "Open" represents no value showing on the meter.***

INTERMITTENT SPARK OR NO SPARK ON ONE OR MORE CYLINDERS:

1. Check the resistance of the Black wire in the 4 pin connector to the CDM in reference to a good clean engine ground. It should show a short, less than 0.5 Ω. A high reading or an open reading indicates a break in the Black wire. Check the wire at the ground terminal.
2. If the cylinders are only showing a problem above an idle, connect an inductive Tachometer to all cylinders and try to isolate the problem cylinders.

HIGH SPEED MISFIRE OR WEAK HOLE SHOT:

1. Connect a DVA meter from the White/Green to the Green/White wires and do a running test. The voltage should show a smooth climb throughout the RPM range. A sudden drop or decline in voltage indicates a problem usually found in the Stator.
2. Disconnect the Voltage Regulator and retest. If the problem disappears, replace the Voltage Regulator.
3. Rotate the Stator one bolt hole in either direction and re-test. If the miss is gone, leave the Stator as is. If the miss is worse, rotate the Stator back to where it was.

2 CYLINDER CDM IGNITION TROUBLESHOOTING

INTERMITTENT SPARK OR NO SPARK ON ONE OR MORE CYLINDERS:

1. Check the Stator resistance and DVA as given below:

Read from	Read to	OEM Ohms	CDI Ohms	DVA (Connected)	DVA (Disconnected)
White/Green (Stator)	Green/White (Stator)	500-700 Ω	400-550 Ω	180-400 V	200-400 V

2. Check the Trigger DVA as shown below:

Read from	Read to	Ohms	DVA Connected	DVA Disconnected
Purple (#1 Trigger)	Engine Gnd	Open	0.5-1.5 V**	5 V or more
White (#2 Trigger)	Engine Gnd	Open	0.5-1.5 V**	5 V or more

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

NOTE: As these Triggers have the Bias circuit built into them, you cannot perform a Resistance test on the Trigger.

3. If one cylinder is not sparking, swap the White/Green and Green/White Stator wires and retest. If the problem moves to the other cylinder, the Stator is likely bad. A continued no spark condition on the same cylinder potentially indicates a bad Trigger.
4. If # 1 is not firing, disconnect #2 CDM module. Check to see which Stator wire feeds #2 CDM and by using a jumper wire, short that side of the Stator to engine ground. If # 1 starts firing, replace the #2 CDM.
5. For #2 CDM not firing, short the Stator wire that feeds the #1 CDM. Again, if the #2 CDM starts firing, replace the #1 CDM.

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3 CYLINDER CDM IGNITION TROUBLESHOOTING

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Inspect the spark plug wires, boots, and spark plugs. Check for chafing on the wiring and harnesses.
2. Clean and inspect all CDM ground wire connections to engine ground.
3. Check the Stator resistance and DVA as given below:

Read from	Read to	OEM Ohms	CDI Ohms	DVA (Connected)	DVA (Disconnected)
White/Green	Green/White	500-700 Ω	400-550 Ω	180-400 V	200-400 V

4. Check the Trigger DVA as shown below:

Read from	Read to	Ohms	DVA (Connected)
Purple (#1 Trigger)	Engine Gnd	Open	1 V Minimum
White (#2 Trigger)	Engine Gnd	Open	1 V Minimum
Brown (#3 Trigger)	Engine Gnd	Open	1 V Minimum

5. If (#1 and #3) or (#1 and #2) or (#2 and #3) is not sparking, swap the White/Green and Green/White Stator wires and retest. If the problem moves to the other cylinder(s), the Stator is likely bad. If no change, replace all CDMs. A continued no spark condition on the same cylinder(s) indicates a bad Trigger.
6. If #1 CDM module is not sparking, disconnect the #2 CDM module and see if the #1 CDM module starts sparking. If it does, the CDM module you just unplugged is bad. If it does not, reconnect #2, then disconnect the #3 CDM module and see if the #1 module starts sparking. If it does, the module you just unplugged is bad.
7. If there is no spark on either # 2 or #3, swap locations with #1 and see if the problem moves. If it does, the CDM module is bad. A continued no spark on the same cylinder indicates a bad Trigger.
8. If the cylinders are only misfiring above an idle, connect an inductive tachometer to all cylinders and try to isolate the problem cylinders.
9. Check the resistance of each of the CDM modules.

4 CYLINDER CDM IGNITION TROUBLESHOOTING

NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Inspect the spark plug wires, boots and spark plugs. Check for chafing on the wiring and harnesses.
2. Clean and inspect all CDM ground wire connections to engine ground.
3. Check the Stator resistance and DVA as given below:

Read from	Read to	OEM Ohms	CDI Ohms	DVA (Connected)	DVA (Disconnected)
White/Green (Stator)	Green/White (Stator)	500-700 Ω	400-550 Ω	180-400 V	200-400 V
Purple (#1 Trigger)	Engine Gnd	Open	Open	1 V Minimum	-
White (#2 Trigger)	Engine Gnd	Open	Open	1 V Minimum	-
Brown (#3 Trigger)	Engine Gnd	Open	Open	1 V Minimum	-
Blue (#4 Trigger)	Engine Gnd	Open	Open	1 V Minimum	-

Note: When moving CDM modules around on the engine, pay attention to the Stator wire colors going to the CDMs. You must have a Green/White and White/Green wire connected or you will lose fire on all CDMs.

4. If (#1 and #2) or (#3 and #4) is not sparking, swap the White/Green and Green/White Stator wires and retest. If the problem moves to the other cylinders, the Stator is likely bad. If no change, replace all CDMs. A continued no spark condition on the same cylinders indicates a bad Trigger.
5. Disconnect the CDM modules one at a time and see if you get spark back on the problem cylinders. If spark returns, replace the CDM module you disconnected.
6. If the cylinders are only misfiring above an idle, connect an inductive RPM meter to all cylinders and try to isolate the problem cylinders.
7. Check the resistance of each of the CDM modules.

TROUBLESHOOTING FOR SWITCHBOX IGNITION SYSTEMS

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

1. DC voltage present on the kill circuit of the Switchbox due to a faulty key switch, boat harness, or engine harness will severely damage the Switchbox's internal kill circuit**.** Connect a Digital Multi Meter to the Ignition Stop wire(s) AT THE SWITCHBOX while disconnected from the Switchbox 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 Switchbox at any point until the problem is corrected **OR DAMAGE TO THE SWITCHBOX WILL OCCUR**!

NO SPARK ON ANY CYLINDER:

1. Perform a visual inspection of the Stator and Trigger wiring to the Switchbox. Check to make sure that the wiring is correct, clean, and free of corrosion, and that all connections are tight.
2. Disconnect the Black/Yellow kill wire AT THE SWITCHBOX 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 Voltage Regulator and retest. If the engine now has spark, replace the Voltage Regulator.
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 Stator and Trigger resistance and DVA for your engine in the lists below:

Check the 2 cylinder engine as follows:

Read from	Read to	Ohms	DVA (Connected)	DVA (Disconnected)
White/Green (Stator)	Green/White (Stator)	400-550 Ω	180-400 V	200-400 V
Blue (Adapter Module)	Blue/White (Adapter Module)	Open	180 V Minimum	180-400 V
Purple (#1 Trigger)	White (#2 Trigger)	0.8-1.4K Ω	4 V Minimum	4 V Minimum
Purple (#1 Trigger)	Engine Gnd	Open	1 V Minimum	-
White (#2 Trigger)	Engine Gnd	Open	1 V Minimum	-

Check the 3 cylinder engine as follows:

Read from	Read to	Ohms	DVA (Connected)	DVA (Disconnected)
White/Green (Stator)	Green/White (Stator)	400-550 Ω	180-400 V	200-400 V
Blue (Adapter Module)	Engine Gnd	Open	180 V Minimum	180-400 V
Brown (Trigger)	White/Black (or Black) (Trigger)	0.8-1.4K Ω	4 V Minimum	4 V Minimum
White (Trigger)	White/Black (or Black) (Trigger)	0.8-1.4K Ω	4 V Minimum	4 V Minimum
Purple (Trigger)	White/Black (or Black) (Trigger)	0.8-1.4K Ω	4 V Minimum	4 V Minimum
Brown (Trigger)	Engine Gnd	Open	1 V Minimum	-
White (Trigger)	Engine Gnd	Open	1 V Minimum	-
Purple (Trigger)	Engine Gnd	Open	1 V Minimum	-

NOTE: The 3 cylinder engines have several configurations to the firing order. Please refer to the Factory Service Manual to make that determination. The pairing should always be as follows:

- ***Green Coil Wire goes with the Brown Trigger Wire***
- ***Green/Red Coil Wire goes with the Purple Trigger Wire***
- ***Green/White Coil Wire goes with the White Trigger Wire***

Check the 4 cylinder engine as follows:

Read from	Read to	Ohms	DVA (Connected)	DVA (Disconnected)
White/Green (Stator)	Green/White (Stator)	400-550 Ω	180-400 V	200-400 V
Blue (Adapter Module)	Blue/White (Adapter Module)	Open	180 V Minimum	180-400 V
Purple (#1 Trigger)	White (#2 Trigger)	0.8-1.4K Ω	4 V Minimum	4 V Minimum
Brown (#3 Trigger)	White/Black or Black (#4 Trigger)	0.8-1.4K Ω	4 V Minimum	4 V Minimum
Purple (#1 Trigger)	Engine Gnd	Open	1 V Minimum	-
White (#2 Trigger)	Engine Gnd	Open	1 V Minimum	-
Brown (#3 Trigger)	Engine Gnd	Open	1 V Minimum	-
White/Black (#4 Trigger)	Engine Gnd	Open	1 V Minimum	-

HIGH SPEED MISFIRE OR WEAK HOLE SHOT:

1. Connect a DVA meter to the Green/White and White/Green Stator wires and perform a running test. The voltage should show a smooth climb throughout the RPM range. A sudden drop or decline in voltage indicates a problem usually found in the Stator, although a Voltage Regulator can cause the same symptom.
2. Connect a DVA meter to the Adapter Module Blue and Blue/White wires on 2 and 4 cylinder engines (or the Blue wire in reference to engine ground on a 3 cylinder engine) and perform a running test. The voltage should show a smooth climb throughout the RPM range. A sudden drop or decline in voltage indicates a problem with the Adapter Module.
3. Disconnect the Voltage Regulator and retest. If the problem disappears, replace the Voltage Regulator and retest.
4. Rotate the Stator one bolt hole in either direction and re-test. If the miss is gone, leave the Stator as is. If the miss is worse, rotate the Stator back where it was.

ENGINE WILL NOT STOP (KILL):

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

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 Voltage Regulator. #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 Voltage Regulator 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 Regulator failure(s).
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 Voltage Regulator. At idle the DVA will normally between 8-25 DVA. If not, disconnect the Yellow wires from the Voltage Regulator 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.

TACHOMETER TESTS

1. Measure the DVA across the Stator's Yellow battery charge wires, while connected to the Voltage Regulator. At idle the DVA will normally be between 8-25 DVA. If not, disconnect the Yellow wires from the Voltage Regulator and retest. DVA will normally be 17-50 DVA at idle. If the voltage is now within specification, the Voltage Regulator is likely defective.
2. Disconnect the Voltage Regulator's Gray wire. At 800-1,000 RPM, check the DVA on the Gray wire FROM THE VOLTAGE REGULATOR in reference to engine ground. The reading should be 8 DVA or more. If not, replace the Voltage Regulator.
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 BATTERY:

1. Using a multi meter, check the voltage on the battery and compare it to the voltage on the Red wire connected to the starter solenoid to engine ground.
2. If the voltage is high on the engine compared to the voltage on the battery, do a voltage drop test and try to isolate the area where the problem is.
3. If the voltage is the same on the battery and the engine, but is over 15.5 volts at 4500 RPM, replace the battery with a known good flooded wet lead acid marine cranking battery.