



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: 174-5456-16

This unit replaces the following P/N's: 398-5454A11, A15, A16, A30, A31, A32, A34, A35, A36, A61, A64, and A66.

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.

Note: 174-5456-16 requires a Voltage Regulator, DO NOT USE WITH A RECTIFIER ONLY.

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 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 Switchbox, 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 in the same position as the old Stator on the engine and install the flywheel, following the service manual instructions for your engine.
7. Connect the Yellow Stator leads to the Voltage Regulator. It does not matter on the polarity of each wire.
8. Connect the Stator Black wire to a clean engine ground.
9. Connect the Red and Blue wire to one Switchbox and connect the Red/White and Blue/White wires to the other Switchbox. It is important that the solid Red and Blue wire stay together on the same Switchbox, and the Red/White and Blue/White wires stay on the same Switchbox.
10. Replace the flywheel according to the service manual for your engine.
11. Reconnect the Negative battery cable.

TROUBLESHOOTING

NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow (or Orange) kill wire FROM BOTH SWITCHBOXES. If the engine's Ignition now has spark, the stop circuit has a fault. Check the key switch, harness, and shift switch (if present).
2. Check for broken or bare wires on the Switchbox, Stator, and Trigger.
3. Disconnect the Yellow wires from the Stator to the Voltage Regulator and retest. If the engine now has good spark, replace the Voltage Regulator.
4. Check the resistance and DVA of the Stator and Trigger as follows:

Read from	Read to	OEM Ohms	CDI Ohms	DVA (Connected)
Blue (Low speed Coil)	Engine Gnd	5-7K Ω	2-2.4K Ω	180 V Minimum
Blue/White (Low speed Coil)	Engine Gnd	5-7K Ω	2-2.4K Ω	180 V Minimum
Red (High speed Coil)	Engine Gnd	90-200 Ω	27-55 Ω	20 V Minimum
Red/White (High speed Coil)	Engine Gnd	90-200 Ω	27-55 Ω	20 V Minimum
Brown (#1 Trigger) (a)	White (#4 Trigger) (b)	0.8-1.4K Ω	0.8-1.4K Ω	4 V Minimum
White (#3 Trigger) (a)	Purple (#6 Trigger) (b)	0.8-1.4K Ω	0.8-1.4K Ω	4 V Minimum
Purple (#5 Trigger) (a)	Brown (#2 Trigger) (b)	0.8-1.4K Ω	0.8-1.4K Ω	4 V Minimum
Brown (#1 Trigger) (a)	Engine Gnd	Open	Open	1 V Minimum
White (#3 Trigger) (a)	Engine Gnd	Open	Open	1 V Minimum
Purple (#5 Trigger) (a)	Engine Gnd	Open	Open	1 V Minimum
Brown (#2 Trigger) (b)	Engine Gnd	Open	Open	1 V Minimum
White (#4 Trigger) (b)	Engine Gnd	Open	Open	1 V Minimum
Purple (#6 Trigger) (b)	Engine Gnd	Open	Open	1 V Minimum

(a) Black band – Inside Switchbox (Engines using Studded Switchboxes)

(b) Yellow band – Outside Switchbox (Engines using Studded Switchboxes)

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NO SPARK ON ONE BANK (ODD OR EVEN CYLINDERS ON INLINE 6 CYLINDER):

1. Check the resistance and DVA of the Stator as follows:

Read from	Read to	OEM Ohms	CDI Ohms	DVA (Connected)
Blue (Low speed Coil)	Engine Gnd	5-7K Ω	2-2.4K Ω	180 V Minimum
Blue/White (Low speed Coil)	Engine Gnd	5-7K Ω	2-2.4K Ω	180 V Minimum
Red (High speed Coil)	Engine Gnd	90-200 Ω	27-55 Ω	20 V Minimum
Red/White (High speed Coil)	Engine Gnd	90-200 Ω	27-55 Ω	20 V Minimum

2. Swap both sets of the Stator wires between the Switchboxes. If the problem moves, replace the Stator.
3. If the problem stays on the same bank, swap physical location and all connections of the two Switchboxes. If the problem stays with one Switchbox, replace the Switchbox. If the Switchbox is bad, it is recommended that BOTH Switchboxes be replaced AS A SET.

INTERMITTENT SPARK ON ONE OR MORE CYLINDERS:

1. Disconnect the White/Black wire between the Switchboxes on a 6 cylinder and retest. If all cylinders now spark, replace both Switchboxes as there is a problem in the Bias circuitry.
2. On all others, check for low DVA from the Stator and Trigger. Disconnect the Voltage Regulator and retest. If the problem disappears, replace the Voltage Regulator.
3. Check the Trigger resistance and DVA as follows:

Read from	Read to	OEM Ohms	CDI Ohms	DVA (Connected)
Brown (#1 Trigger) (a)	White (#4 Trigger) (b)	0.8-1.4K Ω	0.8-1.4K Ω	4 V Minimum
White (#3 Trigger) (a)	Purple (#6 Trigger) (b)	0.8-1.4K Ω	0.8-1.4K Ω	4 V Minimum
Purple (#5 Trigger) (a)	Brown (#2 Trigger) (b)	0.8-1.4K Ω	0.8-1.4K Ω	4 V Minimum
Brown (#1 Trigger) (a)	Engine Gnd	Open	-	1 V Minimum
White (#3 Trigger) (a)	Engine Gnd	Open	-	1 V Minimum
Purple (#5 Trigger) (a)	Engine Gnd	Open	-	1 V Minimum
Brown (#2 Trigger) (b)	Engine Gnd	Open	-	1 V Minimum
White (#4 Trigger) (b)	Engine Gnd	Open	-	1 V Minimum
Purple (#6 Trigger) (b)	Engine Gnd	Open	-	1 V Minimum

(a) Black band – Inside Switchbox (Engines using Studded Switchboxes)

(b) Yellow band – Outside Switchbox (Engines using Studded Switchboxes)

ENGINE WILL NOT STOP (KILL):

1. Disconnect the Black/Yellow (or Orange) 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. Repeat the test as necessary for any additional Switchboxes.

HIGH SPEED MISS OR WEAK HOLE SHOT:

1. Disconnect the Voltage Regulator and retest. If the miss is gone, the Voltage Regulator is usually at fault. Remember, a problem Voltage Regulator can damage a Stator.
2. Perform a DVA test on the Blue and Blue/White wires in reference to engine ground and do a running test. The DVA should show a smooth climb and stabilize, gradually falling off at higher RPM's (above 3,000). If you see a sudden drop in DVA right before the miss becomes apparent, the Stator is likely at fault.
3. Check DVA on the Red wires reference to engine ground of the Stator at high speed. The readings should show a smooth climb in voltage. If there is a sudden or fast drop in voltage right before the miss becomes apparent, the Stator is usually at fault. If there is no indication of the problem, it could be mechanical problem.

NOTE: Use caution when doing this and do not exceed the rated voltage range of your meter.

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.
5. Using extreme caution, on the water or connected to a dynamometer, take the engine to the RPM where the problem is occurring and hold it for a few seconds, then perform a high speed shutdown at that RPM. Check the sparkplugs for differences in color or the presence of water droplets on the sparkplug (an indicator of a possible crack in the engine block or a blown head gasket).



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NO SPARK WITH THE SPARKPLUGS INSTALLED:

1. Check for dragging starter or low battery causing slow cranking speed. DVA test Stator and Trigger (see **NO SPARK ON ANY CYLINDER**).
2. Disconnect Voltage Regulator and retest. If the problem goes away, replace the Voltage Regulator.

SPARK ON ALL CYLINDERS BUT ENGINE WILL NOT RUN:

1. Disconnect the White/Black wire and check the Bias circuit (White/Black terminals) resistance to engine ground. Readings should be between 13-15K Ω for standard Switchboxes. If the readings are correct on the Switchboxes, index the Flywheel and check timing on all individual cylinders. If the timing varies, replace BOTH Switchboxes.

DESTROYED ONE OR TWO CYLINDERS/PISTONS:

1. Check the Bias resistance from the Black/White **terminal** (wire disconnected) on the Switchbox to engine ground, you should read 13-15K Ω . Readings above 15K Ω or less than 13K Ω indicate a defective Switchbox. Due to the design of the Switchboxes, a Switchbox with a defective bias circuit can damage a mating Switchbox (domino effect). **REPLACE BOTH SWITCHBOXES AS A SET!!!!**
2. Use an ANALOG DVA meter to check the voltage on the White/Black (Bias) terminal. With everything connected, run the engine at various Rpm's and monitor the DVA. It should remain steady for a set RPM. Fluctuation in voltage indicates a problem in the Bias circuit. If there is a problem, disconnect everything on the White/Black terminal except the jumper from the inside Switchbox to the outside Switchbox. Retest, if the problem persists, replace **BOTH** Switchboxes. If the problem went away, reconnect the items taken off of the White/Black terminal one at a time. Re-test after every reconnection until you locate the source of the problem.

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 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 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 Grey wire FROM THE VOLTAGE REGULATOR measured 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 Grey 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.

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