



# Installation and Troubleshooting Guide



NOTE: This installation is to be completed by an Authorized Dealer or Professional Service Technician.

## CDI P/N: 114-7778

This switch Box replaces these P/N's: 332-5524, 332-7778A1, 332-7778A3, 332-7778A5, 332-7778A6, 332-7778A9 and 332-7778A12.

**Warning!** This product is designed for installation by a professional marine mechanic. CDI cannot be held liable for injury or damage resulting from improper installation, abuse, neglect or misuse of this product.

**SERVICE NOTE: DISCONNECT THE BLACK/YELLOW KILL WIRE FROM THE SWITCHBOX:** Connect a DC volt meter between the kill wires and engine ground. Turn the ignition switch on and off several times. If, at any time, you see over 2V DC on the kill wires, there is a problem with the harness or ignition switch. Battery voltage over 2V on the kill circuit may severely damage most ADI type switch boxes.

## INSTALLATION

1. Disconnect the Negative battery cable.
2. Check and clean all battery terminals and engine grounds.
3. Unbolt and remove the old switch box, saving the original bolts and nuts.
4. Install the new switch box using the original bolts and nuts.
5. Connect the Black ground wire from the switchbox to engine ground.
6. Connect the ignition coil ground wire to the extra stud in the new switch box if the engine originally had the coil ground wires connected to the side of the switch box.
7. Reconnect battery cable.

## TROUBLESHOOTING

### Three Cylinder Engines 1976-1996

#### Three Cylinder Engines Using a Single Switch Box and Three Ignition Coils

#### NO SPARK ON ANY CYLINDER:

1. Disconnect the Black/Yellow (or Orange) stop wire AT THE SWITCH BOX and retest. If the engine's ignition now 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 has spark, replace the rectifier.
3. Check the cranking RPM. A low cranking speed may 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 resistance and DVA output as given below:

#### Black Stator using Flywheel with Bolted-in Magnets

WIRE	READ TO	OEM OHMS	CDI OHMS	DVA (Connected)	DVA (Disconnected)
Blue	Engine GND	5000-7000	2000-2400	180-400 V	180-400 V (*)
Red	Engine GND	135-165	45-55	25-100 V	25-100 V (*)

#### Black Stator using Flywheel with Glued-in Magnets

WIRE	READ TO	OEM OHMS	CDI OHMS	DVA (Connected)	DVA (Disconnected)
Blue	Engine GND	3250-3650	488-662	180-400 V	180-400 V (*)
Red	Engine GND	75-90	28-32	25-100 V	25-100 V (*)

#### Red Stator Kit

WIRE	READ TO	OEM OHMS	CDI OHMS	DVA (Connected)	DVA (Disconnected)
White/Green	Green/White	500-700	400-550	180-400 V	180-400 V (*)
Blue	Engine GND	OPEN	OPEN	180-400 V	180-400 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 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.

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

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

1. Check the trigger resistance and DVA output as given below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown	White/Black (or Black)	800-1400	4 V +	4 V + (#)
White	White/Black (or Black)	800-1400	4 V +	4 V + (#)
Purple	White/Black (or Black)	800-1400	4 V +	4 V + (#)
Brown	Engine GND	Open	1 V +	N/A
White	Engine GND	Open	1 V +	N/A
Purple	Engine GND	Open	1 V +	N/A

(#) 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 trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the pack is bad.

2. Check the DVA output on the Green wires from the switch box while connected to the ignition coils. Check the reading on the switch box terminal AND on the ignition coil terminal. You should have a reading of at least 150V or more at both terminals. If the reading is low on one cylinder, disconnect the Green wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading symptom indicates a bad power pack.
3. If the cylinders are only misfiring above an idle, connect an inductive tachometer to all cylinders and try to isolate the problem cylinders.
4. Swap the wires on the switchbox as shown below. If the miss or no fire problem moves to another cylinder, replace the switchbox. If it stays on the same cylinder(s), re-test the trigger and check the ignition coils ferrite core for cracks or broken cores (dismount the coils and carefully slide the coils out of the holder to expose the rubber boot covering the side opposite end of the coil from the sparkplug wire. If the dark grey ferrite core is damaged, replace the coil.
  - Green Coil Wire with the Green/Red Coil Wire
  - Green/White Coil Wire with the Green/Black Coil Wire
  - Swap the Purple Trigger Wire with the Brown Trigger Wire
  - Swap the White Trigger Wire with the White/Black (or solid Black) Trigger Wire
5. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

## SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the switch box.
2. In contrast, a shorted SCR inside the switch box can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
3. Replace the ignition coil on the cylinder dropping spark.

## ENGINE WILL NOT SHUT OFF:

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repeat test as necessary for additional switch boxes.

## WILL NOT ACCELERATE BEYOND 3000-4000 RPM:

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has good spark, replace the rectifier.
2. Connect a DVA meter between the stator's Blue wire and engine ground. Run the engine up to the RPM where the problem is occurring. DVA voltage should increase with RPM. A sharp drop in DVA right before the problem occurs usually indicates a bad stator. (Read from Blue to engine ground if the engine has a Red stator kit installed).
3. Connect a DVA meter between the stator's Red wire and engine ground. The DVA voltage should show a smooth climb in voltage and remain high through the RPM range. A reading lower than on the Blue wire reading indicates a bad stator.
4. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. A single cylinder dropping spark will likely be a bad switch box or ignition coil. All cylinders not sparking properly usually indicates a bad stator.
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 triggering and charge coil flywheel magnets for cracked, broken and loose magnets.



# Installation and Troubleshooting Guide



NOTE: This installation is to be completed by an Authorized Dealer or Professional Service Technician.

## 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 Green wires from the switch box 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 switch box or trigger.
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 switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS 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.

## WILL NOT IDLE BELOW 1500 RPM:

1. Check the Bias resistance from the Black/White **terminal** (wire disconnected) on the switchbox to engine ground. Reading should be 14-15,000 ohms.
2. Check the Stator and Trigger as described under "No Fire on Any Cylinder".
3. Check for air leaks.

## Six Cylinder Engines 1978-1999

### Inline 6 and V6 Carbureted Engines Using Dual Switch Boxes and Six Ignition Coils

**(SERVICE NOTE)** Whenever replacing one switch box, consider replacing the other switchbox as well. Replacing just one switch box can result in damage to the engine if the remaining switch box on the engine has a problem in the bias circuit. A rule of thumb is if one cylinder does not fire due to the switchbox, replace one pack. Two or more cylinders, replace both switchboxes.

## 9 and 16 Amp Battery Charging Systems

### NO FIRE ON ANY CYLINDER:

1. Disconnect the Black/Yellow kill wire FROM BOTH PACKS.
2. Check for broken or bare wires on the unit, stator and trigger.
3. Check the resistance and DVA voltage of the stator as follows:

READ FROM	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA
Blue	Eng Gnd	5000-7000	2000-2400*	180V or more
Blue/White	Eng Gnd	5000-7000	2000-2400*	180V or more
Red	Eng Gnd	90-200	27-55*	20V or more
Red/White	Eng Gnd	90-200	27-55*	20V or more

4. Check the trigger as follows:

BLACK SLEEVE	TO	YELLOW SLEEVE	TO	Resistance	DVA Reading
Brown wire		White wire		800-1400	4V or more Connected
White wire		Purple wire		800-1400	4V or more Connected
Purple wire		Brown wire		800-1400	4V or more Connected
Brown wire	-	Engine Ground		Open	1V or more Connected
White wire	-	Engine Ground		Open	1V or more Connected
Purple wire	-	Engine Ground		Open	1V or more Connected
-	Brown wire	Engine Ground		Open	1V or more Connected
-	White wire	Engine Ground		Open	1V or more Connected
-	Purple wire	Engine Ground	Open		1V or more Connected

\*\* Verify the resistance readings are in the same ballpark. i.e, If one coil reads 1200 ohms and the other reads 1500, the trigger is likely defective.

5. Disconnect the rectifier. If the engine has fire, replace the rectifier.

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# Installation and Troubleshooting Guide



NOTE: This installation is to be completed by an Authorized Dealer or Professional Service Technician.

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

1. Check the resistance and DVA voltage of the stator as follows:

READ FROM	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA
Blue	Eng Gnd	5000-7000	2000-2400*	180V or more
Blue/White	Eng Gnd	5000-7000	2000-2400*	180V or more
Red	Eng Gnd	90-200	27-55*	20V or more
Red/White	Eng Gnd	90-200	27-55*	20V or more

\* Verify the resistance readings are in the same ballpark. i.e, If one coil reads 30 ohms and the other reads 50, the stator is likely defective.

2. Swap both sets of the stator wires between the packs. 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 packs. If the problem stays with one pack, replace the pack. NOTE: If the pack is bad, it is recommended that BOTH packs be replaced AS A SET.

## INTERMITTANT SPARK ON ONE OR MORE CYLINDERS:

1. Disconnect the white/black wire between the packs on a 6 cylinder and retest. If all cylinders now fire, replace both packs as there is a problem in the bias circuitry.
2. On all others, check for low voltage from the stator and trigger. Disconnect the rectifier and retest. If the problem disappears, replace the rectifier.
3. Check the trigger as follows:

BLACK SLEEVE TO	YELLOW SLEEVE TO	Resistance	DVA Reading
Brown wire	White wire	800-1400	4V or more Connected
White wire	Purple wire	800-1400	4V or more Connected
Purple wire	Brown wire	800-1400	4V or more Connected
Brown wire	- Engine Ground	Open	1 V or more Connected
White wire	- Engine Ground	Open	1 V or more Connected
Purple wire	- Engine Ground	Open	1 V or more Connected
-	Brown wire Engine Ground	Open	1 V or more Connected
-	White wire Engine Ground	Open	1 V or more Connected
-	Purple wire Engine Ground	Open	1 V or more Connected

## ENGINE WILL NOT STOP RUNNING:

Connect a jumper wire to the Black/Yellow terminal or wire coming out of the pack and short it to ground. If this kills the engine, the kill circuit in the harness or on the boat is bad, possibly the ignition switch.

## HIGH SPEED MISS OR WEAK HOLE SHOT:

1. Disconnect the rectifier and retest. If miss is gone, the rectifier is usually at fault. Remember a problem rectifier can damage a stator.
2. DVA check the Blue and Blue/White wires to engine ground and do a running test. The voltage should show a smooth climb and stabilize, gradually falling off at higher RPM's (above 3000). If you see a sudden drop in voltage right before the miss becomes apparent, the stator is likely at fault.
3. Check DVA voltage on the Red wires reference to engine ground of the stator at high speed. **NOTICE:** Use caution when doing this and do not exceed the rated voltage range of your meter. 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.
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 dyno, 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).

## NO SPARK WITH THE SPARKPLUGS INSTALLED:

1. Check for dragging starter or low battery causing slow cranking speed. DVA test stator and trigger.
2. Disconnect rectifier, regulator and retest. If the problem goes away, replace the rectifier and/or regulator.

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## SPARK ON ALL CYLINDERS BUT ENGINE WILL NOT RUN:

Disconnect the White/Black wire and check the bias circuit (White/Black terminals) resistance to engine ground. Readings should be approximately 15,000Ω for standard packs. If the readings are correct on the packs, index the flywheel and check timing on all individual cylinders. If the timing varies, replace BOTH packs.

## 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 13,000-15,000 ohms. Readings above 15,000 ohms or less than 13,000 ohms 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 DC Voltmeter to check the voltage on the White/Black (Bias) terminal. With everything connected, run the engine at various Rpm's and watch the voltage reading. 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** switch boxes. If the problem went away, reconnect the items taken off of the White/Black terminal one at a time, retest after every reconnection until you locate the source of the problem.

## 40 Amp Battery Charging Systems

1989-1999

WIRE	READ TO	OEM RESISTANCE	CDI RESISTANCE	DVA (Connected)	DVA (Disconnected)
Blue	Engine GND	3200-4200	2100-2400	180-400 V	180-400 V (*)
Blue/White	Engine GND	3200-4200	2100-2400	180-400 V	180-400 V (*)
Red	Engine GND	90-140	28-32	25-100 V	25-100 V (*)
Red/White	Engine GND	90-140	28-32	25-100 V	25-100 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 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.

(NOTE) If both Blue wires read low, check the cranking RPM. It must be more than 250 RPM.

4. Check the DVA output on the Green wires from the switch box while connected to the ignition coils. Check the reading on the switch box terminal AND on the ignition coil terminal. You should have a reading of at least 150V or more at both terminals on all cylinders. If the reading is low on one bank and the stator voltage is good, the switch box is usually bad.
5. Check the cranking RPM. A cranking speed less than 250-RPM will not allow the system to spark properly.

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

1. Check the trigger resistance and DVA output as shown below:

WIRE	READ TO	RESISTANCE	DVA (Connected)	DVA (Disconnected)
Brown (Black Sleeve)	White (Yellow Sleeve)	800-1400	4 V +	4 V + (#)
White (Black Sleeve)	Purple (Yellow Sleeve)	800-1400	4 V +	4 V + (#)
Purple (Black Sleeve)	Brown (Yellow Sleeve)	800-1400	4 V +	4 V + (#)

(#) 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 or two cylinders and the trigger's DVA reading for that cylinder is low – disconnect the trigger wires and recheck the DVA output. If the reading stays low – the trigger is bad. If the reading is now within spec – the pack is bad.

(Service Note) You should get a high or open resistance reading to engine ground from each wire, but you will get a DVA reading of approximately 1-2 Volts. This reading can be used to determine if a pack has a problem in the triggering circuit. For example, if you have no spark on one cylinder and the DVA trigger reading for that cylinder is low – disconnect the trigger wire and recheck the DVA output to ground from the trigger wire. If the reading stays low – the trigger is bad.

2. Check the DVA output on the Green wires from the switch box while connected to the ignition coils. Check the reading on the switch box terminal AND on the ignition coil terminal. You should have a reading of at least 150V or more at both terminals. If the reading is low on one cylinder, disconnect the Green wire from the ignition coil for that cylinder and reconnect it to a load resistor. Retest. If the reading is now good, the ignition coil is likely bad. A continued low reading symptom indicates a bad switch box.

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3. Connect a spark gap tester and verify which cylinders are misfiring. If the cylinders are only misfiring above an idle, connect an inductive tachometer to all cylinders and try to isolate the problem cylinders.
4. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

### **SWITCH BOX OR TRIGGER REPEATEDLY BLOWS ON SAME CYLINDER:**

1. Check the trigger wires for shorts to engine ground as a shorted trigger wire can destroy a SCR inside the switch box.
2. In contrast, a shorted SCR inside the switch box can destroy a trigger coil. Check the trigger resistance and DVA output (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
3. Replace the ignition coil on the cylinder dropping spark.

### **ENGINE WILL NOT SHUT OFF:**

Disconnect the stop wire at the switch box. Connect a jumper wire to the stop wire from the switch box and short it to engine ground. If this stops the switch box from sparking, the stop circuit has a fault. Check the key switch, harness and shift switch. If this does not stop the switch box from sparking, replace the switch box. Repeat test as necessary for additional switch boxes.

### **WILL NOT ACCELERATE BEYOND 3000-4000 RPM:**

1. Disconnect the Yellow wires from the stator to the rectifier and retest. If the engine now has good spark, replace the rectifier.
2. Disconnect the idle stabilizer (advance module) and reset the timing between 23-25 degrees Wide Open Throttle. If the problem clears, discard the idle stabilizer as it is not needed.
3. Connect a DVA meter between the stator's Blue wire and engine ground. Run the engine up to the RPM where the problem is occurring. DVA voltage should increase with RPM. A sharp drop in DVA right before the problem occurs usually indicates a bad stator. (Repeat the test from Blue/White to engine ground and compare the readings).
4. Connect a DVA meter between the stator's Red wire and engine ground. The DVA voltage should show a smooth climb in voltage and remain high through the RPM range. A reading lower than on the Blue wire reading indicates a bad stator. (Repeat the test from Red/White to engine ground and compare the readings).
5. If all cylinders become intermittent, replace both switch boxes.
6. Connect an inductive tachometer to each cylinder in turn and try to isolate the problem. If two or more cylinders on the same bank are dropping out, the problem is likely going to be either the stator or the switch box. A single cylinder dropping spark will likely be a bad switch box or ignition coil. All cylinders not sparking properly usually indicates a bad stator.
7. 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.
8. Check the triggering and charge coil flywheel magnets for cracked, broken and loose magnets.

### **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. Disconnect the idle stabilizer (advance module) and reset the timing between 23-25 degrees Wide Open Throttle. If the problem clears, discard the idle stabilizer as it is not needed.
3. In the water or on a Dynameters, check the DVA output on the Green wires from the switch box 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 switch box or trigger.
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 switch box or ignition coil. Occasionally a trigger will cause this same problem. Check the trigger DVA voltage (see NO SPARK OR INTERMITTENT SPARK ON ONE OR MORE CYLINDERS above).
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 triggering and charge coil flywheel magnets for cracked, broken and loose magnets.
7. Rotate the stator one bolt hole in either direction and retest.