

NOTE: 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 121-BR50-3.0 Shift Assist Ballast

**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.**

### INSTALLATION

1. Verify correct Ignition circuit resistance. (See Page 2)
  - A) Measure resistance of the coil (Step 1). Normal coil resistance should be 1.5Ω, if less resistance is found a higher resistance ballast resistor may be needed.
  - B) Reassemble all wiring, then, disconnect the 2 pin connector containing Violet and Gray (Gray/Black) wires. Measure the resistance between Violet and Gray (Gray/Black) wire on the engine side (Step 2). Measurement should be 3Ω.
  - C) If either reading in step A or B is not correct, Perform Engine stalls during shift troubleshooting and then select proper ballast resistor, or contact CDI Tech support for further help.
2. Install new ballast resistor. Disconnect the negative battery cable.
3. Disconnect all wires from the positive post of the ignition coil.
4. Find a good place to mount the ballast resistor close to the Ignition coil to that is a flat metal surface that can be used for heat sinking. **CAUTION:** Ballast resistor may get hot in high current conditions (low coil resistance), do not mount to anything can melt!
5. Once a good mounting location is found. Cut the Violet wire to length to go to one side of the ballast resistor. Once wire is correct length, connect wire to resistor.
6. With the portion of the Violet wire that has the ring terminal that was cut off, mount to other side of ballast wire. Then install Violet wire back on ignition coil positive terminal. If the piece of wire is not long enough, use a new wire and install a ring terminal and then install to positive coil post.
7. The following is a color code/function explanation:
  - A) **Violet** - Switched 12V to power the ESA module and feeding power to the ballast resistor.
  - B) **Gray (Gray/Black)** - Negative side of ignition coil to the points. Also for the ESA to monitor the engine RPM and cause the engine to stumble when shifting and provide a Tachometer signal pulse to the dash mounted RPM gauge.
  - C) **Black** - Engine ground reference for the ESA module.
  - D) **Blue** - Ground signal from the shift switch indicating a shift is occurring.
8. Reconnect the negative battery cable.

### TROUBLESHOOTING

#### Engine stalls during shift:

This usually only occurs with performance coils and modified ballast resistance. The higher the current in the ESA the more likely failure will occur. Typical ESA circuit current should not exceed 4-5 amps. With an aftermarket coil, ESA circuit current can exceed 10 amps. A typical stock set up uses a 1.5Ω coil and a 1.5Ω ballast resistor (3Ω total).

Perform measurements per installation guide step 3. If the total circuit resistance between the gray and violet wires is less than 3Ω, then calculate ballast resistance to be added. **Example:** If measurement is 0.8Ω, then  $3.0\ \Omega - 0.8\ \Omega = 2.2\ \Omega$  of ballast resistance needed. Rebalance the circuit by adding a ballast resistor per diagram on page 2.

#### Hard Shift: ESA doesn't appear to affect Rpm:

Verify all connections are correct. Inspect the connectors and make sure the wire colors and pin locations are the same on both sides of the connector. Check for pins that may have pushed out of the connector shell.

Back probe the Blue wire (*you may remove the wire from the connector if needed*) and with the engine idling in neutral, short the Blue wire (*the end going to the ESA module*) to engine ground. You should notice a slight drop in engine Rpm. If the engine works correctly with this test, but does not work when the Blue wire is connected to the shift switch, check the shift switch and wires to ensure it is providing the ESA with a ground when the switch is activated.

**Note:** If the engine is idling too fast, or too slow, the ESA will not engage. If the ESA does not work with the Blue wire shorted to engine ground, recheck the engine RPM, ground wire connection and 12V power to the ESA.

#### Engine misses, erratic spark:

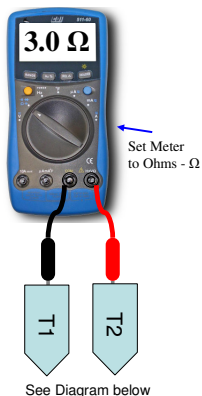
With the engine OFF, disconnect everything from the negative side of the coil except the distributor. If the condition persists, the distributor or coil requires servicing. If the problem clears up, reconnect wires to the negative side of the coil one at a time to isolate the problem. A defective tachometer gauge can affect ignition performance.

# Installation and Troubleshooting Guide

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Step 1-  
Disconnect all wires  
from the coil and  
measure its resistance.

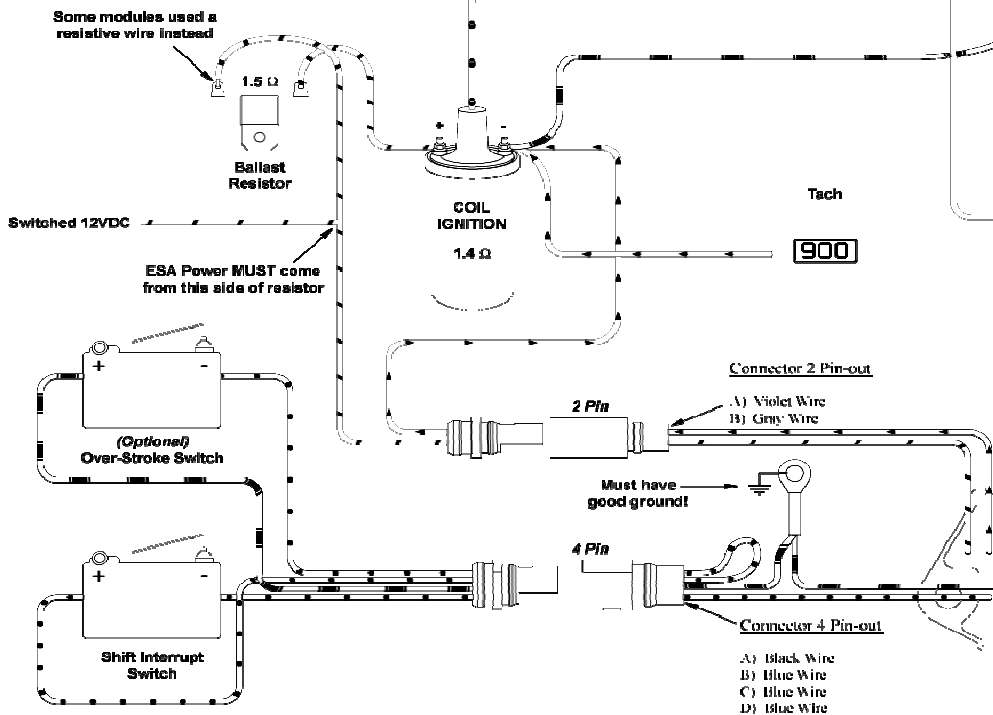


Step 2-  
Measure circuit  
resistance between  
Gray and Violet wire

Ballast Resistor Required  
3 Ohms – Step 2 reading =  
(See Table for Selection)

Coil Ohms	Ballast Resistor Required	Ballast Resistor Selection	CDI Part #
0.4	2.6	2.5	121-BR50-2.5
0.5	2.5	2.5	121-BR50-2.5
0.6	2.4	2.5	121-BR50-2.5
0.7	2.3	2.5	121-BR50-2.5
0.8	2.2	2.5	121-BR50-2.5
0.9	2.1	2	121-BR50-2
1	2.0	2	121-BR50-2
1.1	1.9	2	121-BR50-2
1.2	1.8	2	121-BR50-2
1.3	1.7	2	121-BR50-2
1.4	1.6	1.5	121-BR50-1.5
1.5	1.5	1.5	121-BR50-1.5
1.6	1.4	1.5	121-BR50-1.5
1.7	1.3	1.5	121-BR50-1.5
1.8	1.2	1.5	121-BR50-1.5
1.9	1.1	1.5	121-BR50-1.5
2	1.0	1.5	121-BR50-1.5

Spark Plug  
Black  
Gray  
Blue  
Violet  
E-point Module



NOTE: The 123-9898-P may not work with Pertronix style E-Points modules if the ballast resistor is omitted or a Hi-current aftermarket coil is used.

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