

If you experience any problems with installation, operations or need applications information not covered in this brochure, call our "Mopar Technical Service" hot line toll free at:

**1-800-86MOPAR** (1-800-866-6727)  
8am to 8pm M-F (ET)

*"Please have Product Part Number and Application available for reference"*

## MOPAR Remanufactured Single Board Engine Controller (SBEC) 12 Month / 12,000 Mile Limited Warranty

This MOPAR Single Board Engine Controller is warranted by Chrysler Corporation against defects in workmanship or materials for 12 months or 12,000 miles, whichever comes first, from the date of its installation into a Chrysler, Plymouth, Dodge, Jeep or Eagle vehicle. If it fails, it will be repaired or replaced, at the option of Chrysler Corporation. To obtain service under this Limited Warranty, return the module to an authorized Chrysler Corporation Dealer.

This is the only warranty to this computer. If this computer is not sold for installation into a vehicle which is operated for personal, family or household purposes, Chrysler disclaims any implied warranties which may pass with the sale of this computer, to the extent allowed by law. If this computer is sold for installation into a vehicle which is operated for personal, family or household purposes, Chrysler limits the duration of any implied warranties to the duration of the express warranty made above. Under no circumstances will Chrysler be liable for any incidental or consequential damages which may result from the breach of any expressed or implied warranty, including any liability for loss of use or diminished value.

Some states do not allow limitations on how long an implied warranty will last or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.



## MOPAR REMANUFACTURED SINGLE BOARD ENGINE CONTROLLER (SBEC)

### Removal and Installation Instructions



### Important

Before attempting any repairs you should refer to appropriate Chrysler Corporation service manuals for complete troubleshooting and repair procedures, along with required diagnostic tools. These manuals are available through your local Chrysler Corporation Dealer.

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### Safety Precautions

Before replacing any damaged component you should always first determine what caused the component to fail and repair that before continuing.

Static electricity can damage electronic components. By following a few safety procedures you can reduce the risk of damage from static electricity.

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1. Avoid contact with the electrical connectors.
2. By frequently touching a known good ground during installation you can discharge any static electricity that you may have developed.

**Caution:** Do not remove grease from 60 way connector or connector cavity in computer. The grease is used in order to prevent moisture from corroding the terminals. If there isn't at least 1/8 inch of grease on bottom of computer connector cavity, apply a liberal amount of Mopar Multipurpose Part No. 2932524 or equivalent over the entire end of connector plug before reinstalling.

## Removal Procedure

### Passenger Cars, Minivans & Full Size Pickups (Mounted to left front fender wall)

When replacement of Single Board Engine Controller (SBEC) is necessary proceed as follows:

1. Remove air cleaner duct from SBEC.
2. Remove battery (if needed).
3. Remove the 60 way connector for the wiring harness using an 8mm socket (Fig. 1a, b c)
4. Using the same socket, remove the (2) module mounting screws {(3) screws on full size pickup} (Fig. 1a, b, c)
5. **REVERSE** the above procedure for **INSTALLATION**.

**CAUTION:** Check inside of 60 way wiring harness connector for bent pins or corrosion. Repair as necessary. Install 60 way connector to the Engine Controller. Tighten mounting screw to 35 inch pounds torque. Excessive torque may cause physical damage to the Engine Controller.

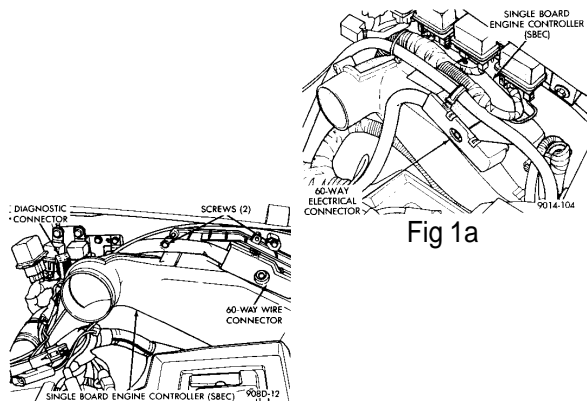


Fig 1a

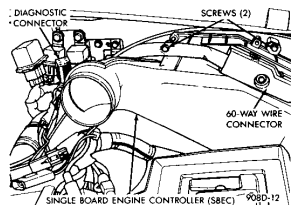


Fig 1b

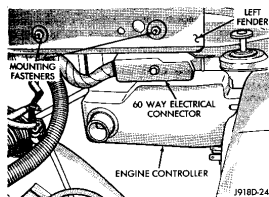


Fig 1c

## Removal Procedure

### Mid Size Pickups

(Mounted to right front fender wall)

1. Remove air cleaner duct from SBEC.
2. Remove the 60 way connector for the wiring harness using an 8mm socket (Fig. 2)
3. Using the same socket, remove the (3) module mounting screws (Fig. 2)
4. **REVERSE** the above procedure for **INSTALLATION**.

**CAUTION:** Check inside of 60 way wiring harness connector for bent pins or corrosion. Repair as necessary. Install 60 way connector to the Engine Controller. Tighten mounting screw to 35 inch pounds torque. Excessive torque may cause physical damage to the Engine Controller.

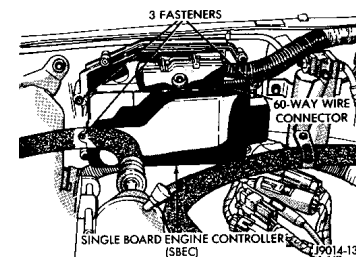


Fig 2

## Removal Procedure

### Full Size Van / Wagon

(Mounted to dash panel)

1. Remove air cleaner duct from SBEC.
2. Remove the 60 way connector for the wiring harness using an 8mm socket (Fig. 3)
3. Using the same socket, remove the (3) module mounting screws (Fig. 3)
4. **REVERSE** the above procedure for **INSTALLATION**.

**CAUTION:** Check inside of 60 way wiring harness connector for bent pins or corrosion. Repair as necessary. Install 60 way connector to the Engine Controller. Tighten mounting screw to 35 inch pounds torque. Excessive torque may cause physical damage to the Engine Controller.

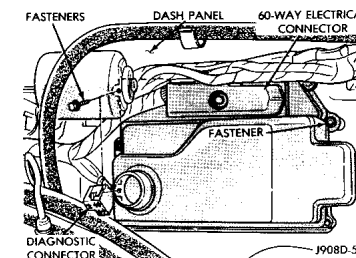


Fig 3

# Troubleshooting Tips for SBEC Controllers

## **Common failures that cause mis-diagnosis of SBEC Controllers:**

- Intermittent grounds; Loose or corroded grounds may cause false sensor readings. Verify all sensor grounds terminate at SBEC 60 way connector, pin 4 (bk/lb\* wire).
- Manifold absolute pressure (MAP) sensor and Throttle position sensor (TPS) voltages; check voltage over the entire range, not just the extremes. Whenever possible use oscilloscope to check MAP sensor and TPS sensor output voltages for noise spikes.
- Verify minimum T.P.S. voltage. Minimum TPS voltage should be approximately .8 to 1.2 vdc.
- Automatic idle speed (AIS) motor; Shorted windings or intermittent connections. If AIS codes are present, check to ensure motor windings or related connectors are not shorted to ground.
- Heater voltage for oxygen sensor. Verify battery volts  $\pm$  1 volt at oxygen sensor connector (dg/bk wire) with engine running.
- Charging system malfunction; Alternator defective or battery not fully charged. Check alternator output to ensure there is not excessive ripple voltage.
- Sensor voltage supply. Check for approximately 5 volt output from 60 way SBEC connector pin 6 (vt/wht\* wire) to MAP and TPS sensor, with ignition switch on.
- Distributor voltage supply. Check for approximately 8 to 9 1/2 vdc output from 60 way SBEC connector pin 7 (org wire) to distributor connector(s) with ignition switch on and while cranking.

### **Other things to consider:**

- Auto-shutdown (ASD) relay; Corroded wires or faulty relay.
- Minimum air flow; check for air leaks or airflow obstruction.
- Vacuum system; Contaminants or leaks in vacuum lines, notably in line connected to M.A.P. sensor.
- Fuel pressure and leak down.
- Vehicle speed sensor operation.
- Crankshaft and Camshaft sensors; Some aftermarket pick-ups have not worked properly with Mopar engine controllers.
- Splices and Fusible Links; check for open and/or shorted wires.
- Closed throttle switch operation on AB, AD, AN bodies.

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- Damaged connector terminals; Remove gasket from SBEC 60 way connector, reseal connector, and check for symptom/problem. If symptom / problem has been corrected, check 60 way harness and/or connector for terminal damage or loose connection.
- Excessive current on certain connector pins may damage the SBEC. Use of a test lamp or a short in the wiring harness of the vehicle can cause this condition. Always use a DVM when checking the unit/system.
- Check Technical Service Bulletins according to model year and system malfunction.

## On Board Diagnostics

The Single Board Engine Controller (SBEC) has been programmed to monitor several different circuits of the fuel injection system. This monitoring is called On Board Diagnosis. If a problem is sensed with a monitored circuit, often enough to indicate an actual problem, its Fault Code is stored in the SBEC for eventual display to the service technician. If the problem is repaired or ceases to exist, the SBEC cancels the Fault Code after 50 to 100 vehicle key on/off cycles.

## Fault Code Description

When a fault code appears, either by flashes of the check engine lamp or by watching the Diagnostic Tool, it indicates that the SBEC has recognized an abnormal signal in the system. Fault codes indicate the results of a failure but never identify the failed component directly.

## Obtaining Fault Codes

1. Connect Diagnostic Tool to the connector located in the engine compartment near the SBEC.
2. Start the engine if possible, cycle the transmission selector and the A/C switch if applicable. Shut off the engine.
3. Turn the ignition switch on, off, on, off, on within 5 seconds. Record all the diagnostic codes shown on the Diagnostic Tool, observe the check engine lamp on the instrument panel; the lamp should light for 3 seconds then go out (bulb check).

***If you do not have a Diagnostic Readout Tool use the procedure which follows.***

1. Start the engine (if possible).
2. With brakes applied, cycle the transmission selector and the A/C Switch (if applicable). Shut off the engine.
3. Turn ignition switch on, off, on, off, on within 5 seconds. This activates the display of the fault codes through flashes of the check engine lamp on the instrument panel.

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4. The Check Engine Lamp should light for two seconds to verify the bulb is good, then go out.
5. To display fault codes the lamp will flash briefly, (first digit of the fault code) pause, then flash briefly again ( second digit of the fault code), followed by a longer pause before displaying the next fault code.
6. After all fault codes have been displayed Code 55 will be displayed indicating the end of fault code messages.

## Fault Codes

<u>Code</u>	<u>DRB II Display*</u>	<u>Description of Fault Code</u>
11	No Reference Signal During Cranking	No distributor reference signal detected during engine cranking.
12	Number of Key-ons Since Last Fault or Since Faults Were Erased	Direct battery input to the PCM disconnected within the last 50 ignition key-ons.
13 + **	Slow Change in Idle MAP Signal (MAP Pneumatic Signal) or No Change in MAP from Start to Run (MAP Pneumatic Change)	No variation in MAP sensor signal is detected. No difference recognized between engine MAP reading and stored barometric pressure reading at start up.
14 + **	MAP Voltage Too Low or MAP Voltage Too High	MAP sensor input below minimum acceptable voltage. MAP sensor input above maximum acceptable voltage.
15**	No Vehicle Speed Signal	No distance sensor signal detected during road load conditions.
16	Battery Input Sense	<b>{MY 89 3.0L MPI - Only}</b> Battery voltage sense input not detected during engine running.
17	Engine is Cold Too Long (Low Engine Temp)	Engine coolant temperature remains below normal operating temperatures during vehicle travel. (Thermostat)
21**	O2 Signal Stays at Center or O2 Signal Shorted to Voltage	Neither rich or lean condition is detected from the oxygen sensor input. Oxygen sensor input voltage maintained above normal operating range.
22 + **	Coolant Sensor Voltage Too High or Coolant Sensor Voltage Too Low	Coolant temperature sensor input above the maximum acceptable voltage. Coolant temperature sensor input below the minimum acceptable voltage.

\* DRB II display message may vary depending on model year of vehicle.

+ Check Engine Lamp On

\*\* Check Engine Lamp On (California only).

(Continued on page 7)

<u>Code</u>	<u>DRB II Display*</u>	<u>Description of Fault Code</u>
23 + **	Charge Temperature Sensor Voltage High or Charge Temperature Sensor Voltage Low	<b>{Jeep, Turbo III, IV and 3.3 &amp; 3.8L MPI - Only}</b> Charge temp. sensor input above the maximum acceptable voltage. Charge temperature sensor input below the minimum acceptable voltage.
23	Throttle Body Temp Voltage High or Throttle Body Temp Voltage Low	<b>{TBI and RWD truck/van - Only}</b> Throttle body temp. input above the maximum acceptable voltage. Throttle body temp. input below the minimum acceptable voltage.
24 + **	Throttle Position Sensor Voltage High or Throttle Position Sensor Voltage Low	Throttle position sensor input above the minimum acceptable voltage. Throttle position sensor input below the maximum acceptable voltage.
25**	Automatic Idle Speed Motor Circuits	A shorted condition detected in one or more of the AIS control circuits.
26 + **	Injector #1 Peak Current Not Reached or Injector #2 Peak Current Not Reached or Injector #3 Peak Current Not Reached	<b>{MPI - Only}</b> High resistance condition detected in the INJ 1 injector bank circuits. High resistance condition detected in the INJ 2 injector bank circuits. High resistance condition detected in the INJ 3 injector bank circuits.
27 + **	Injector #1 Control Ckt	<b>{TBI &amp; RWD truck/van - Only}</b> Injector output driver does not respond properly to control signal. (Injector output driver #1 or #2 in 3.9, 5.2, & 5.9L engines)
27 + **	Injectors 1 - 6 Control Circuits	<b>{Jeep, Turbo &amp; MPI - Only}</b> Injector 1 - 6 output driver does not respond properly to the control signal.
31**	Purge Solenoid Circuit	An open or shorted condition detected in the purge solenoid circuit.
32**	EGR Solenoid Circuit or EGR System Failure	<b>(California emissions packages only)</b> An open or shorted condition detected in EGR solenoid circuit. Required change in Fuel/Air ratio not detected during diagnostic test.
33	A/C Clutch Relay Circuit	An open or short detected in A/C clutch relay circuit.
34	Speed Control Solenoid Circuits	An open or short detected in the speed control vacuum or vent solenoid circuits.

\* DRB II display message may vary depending on model year of vehicle.

+ Check Engine Lamp On

\*\* Check Engine Lamp On (California only).

(Continued on page 8)

<b>Code</b>	<b>DRB II Display*</b>	<b>Description of Fault Code</b>
35	Idle Switch Shorted Low or Idle Switch Open Circuit	<b>{3.9, 5.2, &amp; 5.9L RWD truck/van - Only}</b> Idle contact switch input circuit shorted to ground. Idle contact switch input circuit opened.
36 **	Air Switching Solenoid Circuit	<b>{3.9, 5.2, &amp; 5.9L RWD truck/van - Only}</b> An open or shorted condition detected in the air switching solenoid circuit.
36 + **	Wastegate Solenoid Circuit	<b>{Turbo I &amp; III - Only}</b> An open or shorted condition in the turbocharger wastegate control solenoid circuit.
36	VNT solenoid # 3 circuit	<b>{Turbo IV - Only}</b> An open or shorted condition detected in the VNT #3 solenoid circuit.
37	Torque Converter Lockup Solenoid Circuit (PTU Solenoid Circuit)	<b>{TBI, Turbo &amp; RWD truck/van - Only}</b> An open or short detected in the torque converter (part throttle) lockup circuit.
41 + **	Alternator Field Not Switching Properly	An open or short detected in the alternator field control circuit.
42	Auto Shutdown Relay Control Circuit or No ASD Relay (Z1) Voltage Sense at Controller	An open or short detected in the autosutdown relay circuit. No ASD relay (Z1) voltage sensed when the ASD relay is energized.
43	Ignition Control Circuit	<b>{89 3.0L MPI - Only}</b> Output driver stage for ignition coil does not respond properly to dwell control signal.
43	Ignition Coil #1 Primary Circuit or Ignition Coil #2 Primary Circuit	<b>{Turbo III - Only}</b> Peak primary circuit current not achieved with maximum dwell time. Peak primary circuit current not achieved with maximum dwell time.
43	Ignition Coil #1 Primary Circuit or Ignition Coil #2 Primary Circuit or Ignition Coil #3 Primary Circuit	<b>{3.3 &amp; 3.8L MPI - Only}</b> Peak primary circuit current not achieved with maximum dwell time. Peak primary circuit current not achieved with maximum dwell time. Peak primary circuit current not achieved with maximum dwell time.
44	Battery Temp. Sensor Voltage Out of Limit	<b>{Jeep Only}</b> Battery Temp. Sensor Voltage Out of Limit
45	Overdrive Solenoid Circuit	<b>{RWD truck/van - Only}</b> An open or short condition detected in the overdrive solenoid circuit.

\* DRB II display message may vary depending on model year of vehicle.

+ Check Engine Lamp On

\*\* Check Engine Lamp On (California only).

(Continued on page 9)

<b>Code</b>	<b>DRB II Display*</b>	<b>Description of Fault Code</b>
45	Turbo Boost Limit Exceeded	<b>{Turbo I &amp; III - Only}</b> MAP reading above overboost limit detected during engine operation.
46 + **	Charging System Voltage Too High	Battery voltage sense input above target charging voltage during engine operation.
47 + **	Charging System Voltage Too Low	Battery voltage sense input below target charging voltage during engine operation and no significant change in voltage detected during active test of alternator output.
51 **	O2 Signal Stays Below Center (Lean F/A)	Oxygen sensor signal input indicates lean fuel/air ratio condition during engine operation.
51 **	O2 Signal Stays Below Center (Lean F/A) or Additive Adaptive Memory at Rich Limit	<b>{RWD truck/van - Only}</b> O2 sensor signal stays lean. Additive adaptive memory at rich limit.
52 **	O2 Signal Stays Above Center (Rich F/A)	Oxygen sensor signal input indicates rich fuel/air ratio condition during engine operation.
52 **	O2 Signal Stays Above Center (Rich F/A) or Additive Adaptive Memory at Lean Limit	<b>{RWD truck/van - Only}</b> O2 sensor signal stays rich. Additive adaptive memory at lean limit.
53	Internal Controller Failure (SelfTest)	Internal engine controller fault condition detected.
54	No Sync Pick-Up Signal	<b>{Jeep, Turbo, 3.3 &amp; 3.8L MPI - Only}</b> No fuel sync signal detected during engine rotation.
54	No Sync Pick-Up Signal	<b>{3.0L MPI - Only}</b> No high data rate signal detected during engine rotation.
55	N/A	Completion of fault code display on CHECK ENGINE lamp.
61**	Baro Read Solenoid Circuit	<b>{Turbo I &amp; III - Only}</b> An open or shorted condition detected in the baro read solenoid circuit.
62	Controller Failure EMR Mileage Not Stored	<b>{Jeep and RWD truck/van - Only}</b> Unsuccessful attempt to update EMR mileage in the controller EEPROM.
63	Controller Failure EEPROM Write Denied	Unsuccessful attempt to write to an EEPROM location by the controller.

\* DRB II display message may vary depending on model year of vehicle.

+ Check Engine Lamp On

\*\* Check Engine Lamp On (California only).

(Continued on page 10)

<u>Code</u>	<u>DRB II Display*</u>	<u>Description of Fault Code</u>	<u>Reman. Part No.</u>	<u>Vehicle Application -</u>	
				<u>Year, Body Type</u>	<u>Engine Specifications</u>
64	VNT Solenoid # 1 Ckt	<b>{Turbo IV - Only}</b> An open or shorted condition detected in the VNT#1 solenoid circuit.	R4686558	1990 A,G,J,P BODY	2.5L TBI A/T (3ATX) FED
65	VNT Solenoid # 2 Ckt	<b>{Turbo IV - Only}</b> An open or shorted condition detected in the VNT#1 solenoid circuit.	R4686562	1990 A,G,J,P BODY	2.5L TBI M/T FED
67	VNT A-Side Control	<b>{Turbo IV - Only}</b> Map reading above boost goal for an extended time period.	R4686588	1990 A,G,J,P BODY	2.5L TURBO A/T (4EATX) FED
76	Fuel Pump Resistor Bypass Relay Circuit	<b>{Jeep - Only}</b> An open or shorted condition detected in the ballast resistor bypass circuit.	R4686592	1990 A,G,J,P BODY	2.5L TURBO SEQ M/T FED
77	Speed Control Power Relay Circuit	<b>{Monaco - Only}</b> An open or shorted condition detected in the speed control power relay circuit.	R4686596	1990 G,J,P BODY	2.2L TURBO IV M/T FED
			R4686640	1990 S BODY	2.5L TBI M/T FED
			R4686648	1990 C BODY	2.5L TBI A/T (4EATX) FED
			R4686652	1990 S BODY	2.5L TBI A/T (4EATX) FED
			R4686656	1990 C,Y BODY	3.3L MPI W/DIS A/T (4EATX) FED
			R4686658	1990 C,Y BODY	3.3L MPI W/DIS A/T (4EATX) CAL

## Part Number Applications

<u>Reman. Part No.</u>	<u>Vehicle Application -</u>	
	<u>Year, Body Type</u>	<u>Engine Specifications</u>
R3008937	1991 D BODY	5.9L M/T LD FED
R4557481	1990 N BODY	3.9L EFI A/T FED
R4557511	1990 B,D BODY	5.2L EFI A/T (A500-518) FED
R4557561	1990 B,D BODY	5.2L EFI A/T (A998-999) FED
R4557571	1990 B,D BODY	5.9L EFI A/T LD FED
R4639372	1991 S BODY	3.3L MPI A/T (4EATX) FED
R4639393	1991 A BODY	2.2L TURBO III/16 VALVE M/T FED
R4672435	1990 S BODY	3.3L MPI W/DIS A/T (4EATX) FED
R4672438	1990 S BODY	3.3L MPI W/DIS A/T (4EATX) CAL
R4672510	1991 P BODY	2.2L TBI A/T FED
R4672522	1991 A,G,J,P BODY	2.5L TBI A/T (A413) FED
R4672524	1991 A,G,J,P BODY	2.5L TBI A/T (3ATX) CAL
R4672526	1991 C BODY	2.5L TBI A/T (3ATX) FED
R4686430	1991 C,Y BODY	3.3L MPI A/T (4EATX) FED
R4686442	1991 C,Y BODY	3.3L MPI A/T (4EATX) FED
R4686544	1990 L,P BODY	2.2L TBI A/T (3ATX) FED

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