

AB: Injector Driver Circuit Operation

← [AB: Introduction](#)

AB1 DIAGNOSTIC TROUBLE CODES (DTCs) P0261, P0264, P0267, P0270, P0273, P0276, P0279, P0282: CHECK FOR GROUND SHORT IN LOW SIDE CIRCUIT

- DTCs below indicate a low side ground short in the circuit between the IDM and the injector. The following table lists the circuit to inspect while performing these pinpoint tests, based on the DTC retrieved during the KOEO On-Demand or Injector Electrical Self Tests.

Cyl.	DTC	Circuit	Cyl.	DTC	Circuit
1	P0261	555 (T)	5	P0273	559 (T/BK)
2	P0264	556 (W)	6	P0276	560 (LG/O)
3	P0267	557 (BR/Y)	7	P0279	561 (T/R)
4	P0270	558 (BR/LB)	8	P0282	562 (LB)

- Key off.
- Disconnect injector valve cover connector at the suspect injector.
- Measure resistance between suspect circuit of the engine harness connector and battery negative post.

Is resistance greater than 10,000 ohms?

Yes	No
GO to AB2 .	GO to AB4 .

AB2 CHECK SHORT IN CIRCUIT TO GROUND

- Install Rotunda Glow Plug Injector Adapter 014-00935 or equivalent to the valve cover gasket.
- Measure resistance between suspect circuit and battery ground.

Is the resistance greater than 10,000 ohms?

Yes	No
Fault may be intermittent, GO to AB5 .	GO to AB3 .

AB3 UNDER VALVE COVER SHORT

- Remove valve cover and disconnect injector connector.
- Inspect under valve cover (UVC) harness for shorting to ground.

Is fault indicated?

Yes	No
REPLACE UVC harness.	REPLACE injector.

AB4 CHECK FOR SHORT BETWEEN INJECTOR VALVE COVER CONNECTOR AND IDM

- Key off.
- Disconnect IDM.
- At IDM harness connector, measure resistance between respective injector circuit and all other circuits in the IDM harness connector and to chassis ground.

Is the resistance greater than 10,000 ohms?

Yes	No
REPLACE IDM. RERUN Scan Tool Diagnostic Test.	SERVICE short to ground between injector valve cover connector and IDM connector. RERUN Scan Tool Diagnostic Test.

AB5 CHECK FOR INTERMITTENT SHORT TO GROUND

- Key off.
- Disconnect IDM. Inspect for damaged or pushed-out pins.
- All other connectors plugged in.
- Using a digital multimeter and the flex tips supplied with the NGS Tester, measure resistance between the suspect injector low side circuit on the IDM connector and battery ground post. Refer to injector illustration at beginning of this pinpoint test for pin location.
- Grasp the harness close to the suspect injector connector. Wiggle and shake harness while working toward the IDM.

Does resistance ever drop below 10,000 ohms?

Yes	No
ISOLATE short to ground and REPAIR. CLEAR DTC and RETEST.	IDM internal failure, REPLACE IDM.

AB6 DIAGNOSTIC TROUBLE CODES (DTCs) P0262, P0265, P0268, P0271, P0274, P0277, P0280, P0283 and P1261-P1268: CHECK FOR SHORT TO B+ OR TO HIGH SIDE IN THE LOW SIDE CIRCUIT

- DTCs P1261-P1268 indicate that the low side circuit is shorted to B+ or the high side circuit between the IDM and the injector. The following table lists the circuits to inspect while performing these pinpoint tests, based on the DTC retrieved during the KOEO On-Demand or Injector Electrical Self Tests.

Cyl.	DTC	Low Side	High Side
1	P1261-P0262	555 (T)	1087 (O)
2	P1262-P0265	556 (W)	878 (PK/Y)
3	P1263-P0268	557 (BR/Y)	1087 (O)
4	P1264-P0271	558 (BR/LB)	878 (PK/Y)
5	P1265-P0274	559 (T/BK)	1087 (O)
6	P1266-P0277	560 (LG/O)	878 (PK/Y)

7	P1267-P0280	561 (T/R)	1087 (O)
8	P1268-P0283	562 (LB)	878 (PK/Y)

- Key on/engine off.
- Disconnect IDM.
- Disconnect both connectors on the bank with the code.
- Measure resistance between the low side and battery positive post, then to high side at the injector valve cover connector. Refer to injector illustration at beginning of this pinpoint test for pin location.

Are both resistance readings less than 10,000 ohms?

Yes	No
GO to AB7 .	REPAIR short in circuits between IDM and injector valve cover connector. RERUN Scan Tool Diagnostic Test.

AB7 CHECK FOR SHORT INTERNAL TO VALVE COVER

- Key off.
- Install Rotunda Glow Plug Injector Adapter 014-00935 or equivalent to valve cover gasket.
- Measure resistance between high side and low side circuits.

Is resistance less than 2.0 ohms on a cold engine?

Yes	No
GO to AB8 .	Fault may be intermittent. GO to AB10 .

AB8 CHECK FOR SHORT UNDER VALVE COVER

- Key off.
- Remove valve cover.
- Disconnect injector connector.
- Measure resistance between Rotunda Glow Plug Injector Adapter 014-00935 or equivalent and injector connector on both high and low side circuits.

Is resistance greater than 10,000 ohms?

Yes	No
REPLACE injector. RERUN Scan Tool Diagnostic Test.	GO to AB9 .

AB9 GASKET HARNESS OR UVC SHORT LOW SIDE TO HIGH SIDE

- Remove UVC harness.
- Measure resistance between gasket harness low side and high side circuitry.

Is resistance less than 5 ohms?

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Yes	No
REPLACE gasket harness. RERUN Scan Tool Diagnostic Test.	REPLACE UVC harness. RERUN Scan Tool Diagnostic Test.

AB10 CHECK FOR INTERMITTENT LOW SIDE SHORT TO B+ OR HIGH SIDE

- Key on/engine off.
- IDM disconnected.
- All four valve cover connectors disconnected.
- Using a digital multimeter and the flex tips supplied with the NGS Tester, measure resistance between the suspect injector low side circuit and battery positive post, then to high side circuit on the IDM connector. Refer to injector illustration at the beginning of this pinpoint test for pin location.
- Grasp the harness close to the suspect injector connector. Wiggle and shake harness while working toward the IDM.

Do either resistance readings ever drop below 10,000 ohms?

Yes	No
ISOLATE shorted circuit and REPAIR. CLEAR DTCs and RETEST.	IDM internal failure. REPLACE IDM.

AB11 DIAGNOSTIC TROUBLE CODES (DTCs) P1271-P1278: CHECK FOR OPEN BETWEEN INJECTOR HIGH SIDE TO LOW SIDE AT VALVE COVER CONNECTOR

- DTCs P1271-P1278 indicate a low side-to-high side open in the circuit between the IDM and the injector. The following table lists the circuits to inspect while performing these pinpoint tests, based on the DTC retrieved during the KOEO On-Demand or Injector Electrical Self Tests.

Note: If all of the DTCs associated with an entire bank are retrieved, the high side circuit is most likely open.

Cyl.	DTC	Low Side	High Side	Bank
1	P1271	555 (T)	1087 (O)	Right
2	P1272	556 (W)	878 (PK/Y)	Left
3	P1273	557 (BR/Y)	1087 (O)	Right
4	P1274	558 (BR/LB)	878 (PK/Y)	Left
5	P1275	559 (T/BK)	1087 (O)	Right
6	P1276	560 (LG/O)	878 (PK/Y)	Left
7	P1277	561 (T/R)	1087 (O)	Right
8	P1278	562 (LB)	878 (PK/Y)	Left

- Key off.
- Disconnect injector valve cover connector.
- Install Rotunda Glow Plug Injector Adapter 014-00935 or equivalent to valve cover gasket.
- Measure resistance between the high side and low side on the injector. Refer to injector illustration at beginning of this pinpoint test for proper pin location.

Is the resistance less than 5 ohms?

Yes	No
GO to AB13 .	GO to AB12 .

AB12 CHECK INJECTOR FOR OPEN CIRCUIT

- Key off.
- Remove valve cover.
- Disconnect injector connector.
- Measure resistance between high side circuit from adapter tool and injector connector.
- Measure resistance between low side circuit from adapter tool and injector connector.

Is each resistance less than 5 ohms?

Yes	No
REPLACE injector. RERUN Scan Tool Diagnostic Test.	GO to AB23 .

AB13 CHECK FOR OPEN IN LOW SIDE CIRCUIT

- Key off.
- Disconnect IDM.
- Measure resistance on injector low side circuit between valve cover connector and IDM.

Is resistance less than 5 ohms?

Yes	No
GO to AB14 .	REPAIR open in low side circuit.

AB14 CHECK FOR OPEN IN HIGH SIDE CIRCUIT

- Key off.
- IDM disconnected.
- Measure resistance between suspect injector high side circuit on injector harness connector and IDM connector.

Is resistance less than 5 ohms?

Yes	No
Fault may be intermittent. GO to AB15 .	REPAIR open in high side circuit.

AB15 CHECK FOR OPEN INJECTOR CIRCUIT

- Key off.
- IDM disconnected.

- All other connectors plugged in.
- Using a digital multimeter and flex tips supplied with the NGS Tester, measure resistance between suspect low side and high side circuit at the IDM connector. Refer to injector illustration at beginning of this pinpoint test for pin location.
- Grasp the harness close to the suspect injector harness connector. Wiggle and shake harness while working your way back to the IDM.

Do resistance readings ever go above 5 ohms?

Yes	No
ISOLATE open in circuit and REPAIR.	IDM internal failure. REPLACE IDM.

AB16 DIAGNOSTIC TROUBLE CODES (DTCs) P1291 AND P1292: CHECK FOR SHORT IN HIGH SIDE CIRCUIT

- DTCs P1291 and P1292 indicate a ground short or short to battery positive exists on the high side circuit between the IDM and the injectors. The following table list the circuits to inspect while performing these pinpoint tests, based on the DTC retrieved during the KOEO test.

DTC	High Side	Bank
P1291	1087 (O)	Right
P1292	878 (PK/Y)	Left

- Key off.
- Disconnect IDM.
- Using a digital multimeter and the flex tips supplied with the NGS Tester, measure resistance between the suspect high side circuit at the IDM harness connector and battery negative post. Refer to injector illustration at beginning of this pinpoint test for proper pin location.

Is resistance greater than 10,000 ohms?

Yes	No
GO to AB18 .	GO to AB17 .

AB17 CHECK SHORT TO GROUND IN HIGH SIDE CIRCUIT

- Key off.
- IDM disconnected.
- Disconnect both valve cover connectors on the bank with the code.
- Measure resistance between suspect high side circuit at IDM connector and battery negative post.

Is resistance greater than 10,000 ohms?

Yes	No
GO to AB2 .	REPAIR short to ground between IDM and injector valve cover connector.

AB18 CHECK SHORT TO POWER IN HIGH SIDE CIRCUIT

- IDM disconnected.
- Key on.
- Measure resistance between the suspect high side circuit at IDM connector and battery positive post, then to other high side circuit.

Are both resistance readings greater than 10,000 ohms?

Yes	No
Fault may be intermittent. GO to AB19 .	REPAIR short to power on high side circuit.

AB19 CHECK FOR INTERMITTENT SHORT TO POWER IN HIGH SIDE CIRCUIT

- IDM disconnected.
- Key on.
- Using a digital multimeter and the flex tips supplied with the NGS Tester, measure resistance between suspect high side circuit on the IDM connector and battery positive post, then to other high side circuit.
- Grasp the harness close to the suspect injector harness connector. Wiggle, shake harness while working towards the IDM.

Do both resistance readings ever drop below 10,000 ohms?

Yes	No
ISOLATE short circuit and REPAIR. CLEAR DTC and RETEST.	IDM internal failure. REPLACE IDM.

AB20 DIAGNOSTIC TROUBLE CODES (DTCs) P1294 AND P1293: CHECK FOR VOLTAGE ON HIGH SIDE CIRCUIT

- DTCs P1294 and P1293 indicate an open circuit exists on the high side circuit between the IDM and the injectors. The following table lists the circuits to inspect while performing these pinpoint tests, based on the DTC retrieved during the KOEO On-Demand and Injector Electrical Self Tests.

DTC	High Side	Injector Bank
P1294	878 (PK/Y)	Left
P1293	1087 (O)	Right

- Key off.
- Disconnect both connectors on the bank with the code.
- Key on, engine off.
- Measure voltage on the suspect high side circuit Pin C on the injector vehicle harness connectors and battery ground.

Is battery voltage present?

Yes	No
GO to AB21 .	GO to AB24 .

AB21 CHECK INJECTOR RESISTANCE

- Key off.
- Suspect injector valve cover connectors disconnected.
- Install Rotunda Glow Plug Injector Adapter 014-00935 or equivalent.
- Measure resistance between high side and low side injector terminals on the adapter tool.

Is resistance less than 5 ohms?

Yes	No
Fault may be intermittent. GO to AB15 .	GO to AB22 .

AB22 CHECK HARNESS FOR OPEN

- Remove valve cover.
- Disconnect injector harness connector.
- Measure resistance between injector connector and exterior gasket connector.

Is resistance less than 5 ohms?

Yes	No
REPLACE injector. RERUN Scan Tool Diagnostic Test.	GO to AB23 .

AB23 DETERMINE WHETHER GASKET OR UVC HARNESS HAS FAILED

- Disconnect UVC harness from gasket.
- Measure resistance across each contact in the gasket.

Is each resistance reading less than 5 ohms?

Yes	No
REPLACE UVC harness.	REPLACE valve cover gasket.

AB24 CHECK FOR OPEN IN HIGH SIDE CIRCUIT

- Key off.
- Disconnect IDM.
- Both connectors on the bank with the code disconnected.
- Using a digital multimeter and the flex tips supplied with the NGS Tester, measure resistance between suspect high side circuit at the IDM connector and Pin C and both suspect injector connectors.

Are both resistance readings less than 5 ohms?

Yes	No
Fault may be intermittent. GO to AB15 .	REPAIR open in high side circuit.

AB25 DIAGNOSTIC TROUBLE CODES (DTCs) P0263, P0266, P0269, P0272, P0275, P0278,

P0281 AND P0284: CYLINDER NON-CONTRIBUTING

Note: Engine may smoke during KOEO Injector Electrical Test. The cylinders are tested in this order: 1, 2, 3, 4, 5, 6, 7, 8. The 8-cylinder test is run first. If no dead cylinder is detected, it automatically runs the 4-cylinder test to detect a low contributing cylinder.

- A CCT code retrieved indicates that a cylinder was not contributing equally during the KOER Cylinder Contribution Self Test.

DTC	Cylinder	DTC	Cylinder
P0263	1	P0275	5
P0266	2	P0278	6
P0269	3	P0281	7
P0272	4	P0284	8

- Possible causes:
 - broken compression rings
 - inoperative injector assembly
 - leaking or bent valves
 - bent push rod
 - broken rocker arm bolts
 - bent connecting rod
- Perform KOEO On-Demand Self Test, KOEO Injector Electrical Self Test, Retrieve/Clear Continuous DTCs.

Were any DTCs retrieved?

Yes	No
REPAIR any concerns found. CLEAR DTCs and RETEST.	GO to AB26 .

AB26 CYLINDER NON-CONTRIBUTING

Note: A/C must be off when running KOER Cylinder Contribution Self Test.

- Go to [Section 4C](#), Diagnostic Routines, Performance Diagnostic Procedures. Perform Steps 7a, 7b, 8, 10a, 10b, and 11.

Were any problems found after running all of the above steps?

Yes	No
REPAIR any concerns found. CLEAR DTCs and RETEST.	If base engine diagnostic checks pass, REPLACE injector assembly. If base engine does not pass, REPAIR concern. CLEAR DTCs and RETEST.

AB27 DIAGNOSTIC TROUBLE CODE (DTC) P1297: BOTH INJECTOR HIGH SIDE CIRCUITS SHORTED TOGETHER

- Key off.
- Disconnect IDM.

- Measure resistance between both high side circuits at the IDM connector.

Is resistance greater than 10,000 ohms?

Yes	No
GO to AB28 .	REPAIR short between both high side circuits.

AB28 CHECK FOR INTERMITTENT SHORT BETWEEN BOTH HIGH SIDE CIRCUITS

- Key off.
- Using a digital multimeter and the flex tips supplied with the NGS Tester, measure resistance between both high side circuits at the IDM connector, Pins 22 and 23.
- Grasp the harness close to the IDM connector. Wiggle, shake harness while working towards the injectors.

Does resistance ever drop below 10,000 ohms?

Yes	No
ISOLATE short circuit and REPAIR.	IDM internal failure. REPLACE IDM.

AB29 DIAGNOSTIC TROUBLE CODES (DTCs) P1295 AND P1296: MULTIPLE CONCERNS

- DTCs P1295 and P1296 indicate that more than one fault exists on the right or left bank. A short and open on both the low side and high side can exist on the bank with the DTC.

DTC	BANK
P1295	Right Bank
P1296	Left Bank

- Check for short to ground:
 - Key off.
 - Disconnect IDM.
 - Measure resistance between each injector circuit one by one and battery ground from the IDM harness connector.

Are all circuits greater than 10,000 ohms?

Yes	No
GO to AB30 .	If low side short was found, GO to AB1 to find short, then RETURN to this step. If high side short was found, GO to AB16 , then RETURN to this step.

AB30 CHECK FOR SHORT TO B+

- Key off.
- IDM disconnected.
- Key on/engine off.
- Measure resistance between each injector circuit one by one and battery positive from the IDM harness

connector.

Are all circuits greater than 10,000 ohms?

Yes	No
GO to AB31 .	If low side short was found, GO to AB6 , then RETURN to this step. If high side short was found, GO to AB16 , then RETURN to this step.

AB31 CHECK FOR HIGH SIDE CIRCUIT SHORTED TOGETHER

- Key off.
- IDM disconnected.
- Measure resistance between high side circuits from the IDM harness connector Pins 23 and 24.

Is resistance greater than 10,000 ohms?

Yes	No
GO to AB32 .	REPAIR short between both high side circuits.

AB32 CHECK FOR OPEN CIRCUIT

- Key off.
- IDM disconnected.
- Disconnect all four valve cover connectors on both banks.
- Measure resistance between valve cover connector and IDM connector on all injector high side and low side circuits.

Are any circuits greater than 10,000 ohms?

Yes	No
REPAIR open in suspect circuit.	GO to AB33 .

AB33 CHECK FOR OPEN UNDER VALVE COVER

- Key off.
- All four valve cover connectors disconnected.
- Using Rotunda Glow Plug Injector Adapter 014-00935 or equivalent, measure resistance between high side and low side of every injector circuit through the valve cover.

Are any injector circuits greater than 5 ohms?

Yes	No
GO to AB12 .	RECONNECT everything, CLEAR continuous DTCs and RERUN KOEO Injector Electrical Self Test and KOEO On-Demand Self Test. If DTC P1295 or P1296 reappears, REPLACE IDM.

