

# CORE ECU



# DIAGNOSTIC MANUAL



## REVISION HISTORY

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Date	Revisions
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## TABLE OF CONTENTS

INTRODUCTION	12
SAFETY INFORMATION	12
LIMITED WARRANTY	13
LIMITATION OF LIABILITY	14
CORE DIAGNOSTIC TROUBLE CODE (DTC) LIST	15
CORE INPUTS & OUPUTS	21
BACKFIRE DIAGNOSTICS	22
CUTS-OUT & MISSES DIAGNOSTICS	23
FUEL SYSTEM DIAGNOSTICS	24
HARD START DIAGNOSTICS	25
HESITATION DIAGNOSTICS	26
INTERMITTENT DIAGNOSTICS	27
NO START DIAGNOSTICS	28
DTC P06B1 - POWER SUPPLY 5V SENSOR 1 STATUS NOT OK	29
DTC P06B4 - POWER SUPPLY 5V SENSOR 2 STATUS NOT OK	30
DTC P0102 - MASS AIRFLOW SENSOR CIRCUIT LOW	31
DTC P0103 - MASS AIRFLOW SENSOR CIRCUIT HIGH	33

DTC P0107 - MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT LOW	36
DTC P0108 - MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT HIGH	38
DTC P0112 - INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW	41
DTC P0113 - INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH	43
DTC P0117 - ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW	46
DTC P0118 - ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH	48
DTC P0130 - LAMBDA BANK 1 SENSOR 1 CIRCUIT FAILURE	52
DTC P0131 - LAMBDA BANK 1 SENSOR 1 CIRCUIT LOW	54
DTC P0132 - LAMBDA BANK 1 SENSOR 1 CIRCUIT HIGH	56
DTC P0135 - LAMBDA 1 SENSOR HEATER TIMED OUT	58
DTC P0150 - LAMBDA BANK 2 SENSOR 1 CIRCUIT FAILURE	59
DTC P0151 - LAMBDA BANK 2 SENSOR 1 CIRCUIT LOW	61
DTC P0152 - LAMBDA BANK 2 SENSOR 1 CIRCUIT HIGH	63
DTC P0155 - LAMBDA 2 SENSOR HEATER TIMED OUT	65
DTC P0178 - FLEX FUEL COMPOSITION SENSOR CIRCUIT LOW	66
DTC P0179 - FLEX FUEL SENSOR DTC MAXIMUM FREQUENCY	67

DTC P0227 - THROTTLE POSITION 1 SENSOR CIRCUIT LOW	68
DTC P0228 - THROTTLE POSITION 1 SENSOR CIRCUIT HIGH	70
DTC P0327 - KNOCK BANK 1 SENSOR CIRCUIT LOW	73
DTC P0328 - KNOCK BANK 1 SENSOR CIRCUIT HIGH	75
DTC P0332 - KNOCK BANK 2 SENSOR CIRCUIT LOW	78
DTC P0333 - KNOCK BANK 2 SENSOR CIRCUIT HIGH	80
DTC P0511 - IDLE AIR CONTROL CIRCUIT FAILURE	82
DTC P0522 - OIL PRESSURE SENSOR CIRCUIT LOW	85
DTC P0523 - OIL PRESSURE SENSOR CIRCUIT HIGH	87
DTC P0532 - AIR CONDITIONER REFRIGERANT PRESSURE SENSOR CIRCUIT LOW	90
DTC P0533 - AIR CONDITIONER REFRIGERANT PRESSURE SENSOR CIRCUIT HIGH	91
DTC P0537 - AIR CONDITIONER REFRIGERANT TEMPERATURE SENSOR CIRCUIT LOW	92
DTC P0538 - AIR CONDITIONER REFRIGERANT TEMPERATURE SENSOR CIRCUIT HIGH	93
DTC P0562 - BATTERY VOLTAGE LOW	94
DTC P0563 - BATTERY VOLTAGE HIGH	96

DTC P0570 - FRONT BRAKE PRESSURE BELOW MINIMUM THRESHOLD	97
DTC P0571 - FRONT BRAKE PRESSURE ABOVE MAXIMUM THRESHOLD	98
DTC P0572 - FRONT BRAKE PRESSURE SENSOR CIRCUIT LOW	99
DTC P0573 - FRONT BRAKE PRESSURE SENSOR CIRCUIT HIGH	100
DTC P0668 - INTERNAL THERMISTOR (ECU) TEMPERATURE BELOW MINIMUM THRESHOLD	101
DTC P0669 - INTERNAL THERMISTOR (ECU) TEMPERATURE ABOVE MAXIMUM THRESHOLD	102
DTC P0712 - TRANSMISSION OIL TEMPERATURE SENSOR CIRCUIT LOW	103
DTC P0713 - TRANSMISSION OIL TEMPERATURE SENSOR CIRCUIT HIGH	104
DTC P0719 - REAR BRAKE PRESSURE BELOW MINIMUM THRESHOLD	105
DTC P0720 - REAR BRAKE PRESSURE ABOVE MAXIMUM THRESHOLD	106
DTC P0721 - REAR BRAKE PRESSURE SENSOR CIRCUIT LOW	107
DTC P0722 - REAR BRAKE PRESSURE SENSOR CIRCUIT HIGH	108
DTC P0842 - TRANSMISSION LINE PRESSURE SENSOR CIRCUIT LOW	109

DTC P0843 - TRANSMISSION LINE PRESSURE SENSOR CIRCUIT HIGH	110
DTC P1102 - MASS AIRFLOW BELOW MINIMUM THRESHOLD	111
DTC P1103 - MASS AIRFLOW ABOVE MAXIMUM THRESHOLD	113
DTC P1107 - MANIFOLD ABSOLUTE PRESSURE BELOW MINIMUM THRESHOLD	115
DTC P1108 - MANIFOLD ABSOLUTE PRESSURE ABOVE MAXIMUM THRESHOLD	117
DTC P1112 - INTAKE AIR TEMPERATURE BELOW MINIMUM THRESHOLD	119
DTC P1113 - INTAKE AIR TEMPERATURE ABOVE MAXIMUM THRESHOLD	120
DTC P1117 - ENGINE COOLANT TEMPERATURE BELOW MINIMUM THRESHOLD	121
DTC P1118 - ENGINE COOLANT TEMPERATURE ABOVE MAXIMUM THRESHOLD	122
DTC P1122 - THROTTLE POSITION 2 BELOW MINIMUM THRESHOLD	123
DTC P1123 - THROTTLE POSITION 2 ABOVE MAXIMUM THRESHOLD	124
DTC P1127 - ACCELERATION PEDAL 1 SENSOR CIRCUIT LOW	125
DTC P1128 - ACCELERATION PEDAL 1 SENSOR CIRCUIT HIGH	127

DTC P1129 - ACCELERATION PEDAL 2 BELOW MINIMUM THRESHOLD	130
DTC P1130 - ACCELERATION PEDAL 2 ABOVE MAXIMUM THRESHOLD	131
DTC P1131 - LAMBDA BANK 1 SENSOR 1 BELOW MINIMUM THRESHOLD	132
DTC P1132 - LAMBDA BANK 1 SENSOR 1 ABOVE MAXIMUM THRESHOLD	133
DTC P1151 - LAMBDA BANK 2 SENSOR 1 BELOW MINIMUM THRESHOLD	134
DTC P1152 - LAMBDA BANK 2 SENSOR 1 ABOVE MAXIMUM THRESHOLD	135
DTC P1178 - FLEX FUEL COMPOSITION BELOW MINIMUM THRESHOLD	136
DTC P1179 - FLEX FUEL COMPOSITION ABOVE MAXIMUM THRESHOLD	137
DTC P1226 - THROTTLE POSITION 1 ABOVE MAXIMUM THRESHOLD	138
DTC P1227 - THROTTLE POSITION 1 BELOW MINIMUM THRESHOLD	139
DTC P1228 - BAROMETRIC PRESSURE BELOW MINIMUM THRESHOLD	140



DTC P1229 - BAROMETRIC PRESSURE ABOVE MAXIMUM THRESHOLD	142
DTC P1347 - NITROUS PRESSURE SENSOR CIRCUIT LOW	144
DTC P1348 - NITROUS PRESSURE SENSOR CIRCUIT HIGH	145
DTC P1350 - DOME (CO <sub>2</sub> ) PRESSURE BELOW MINIMUM THRESHOLD	146
DTC P1351 - DOME (CO <sub>2</sub> ) PRESSURE ABOVE MAXIMUM THRESHOLD	147
DTC P1360 - DOME (CO <sub>2</sub> ) PRESSURE SENSOR CIRCUIT LOW	148
DTC P1361 - DOME (CO <sub>2</sub> ) PRESSURE SENSOR CIRCUIT HIGH	149
DTC P1362 - FUEL PRESSURE BELOW MINIMUM THRESHOLD	150
DTC P1363 - FUEL PRESSURE ABOVE MAXIMUM THRESHOLD	151
DTC P1364 - FUEL PRESSURE SENSOR CIRCUIT LOW	152
DTC P1365 - FUEL PRESSURE SENSOR CIRCUIT HIGH	153
DTC P1366 - NITROUS PRESSURE BELOW MINIMUM THRESHOLD	154
DTC P1367 - NITROUS PRESSURE ABOVE MAXIMUM THRESHOLD	155
DTC P1522 - OIL PRESSURE BELOW MINIMUM THRESHOLD	156
DTC P1523 - OIL PRESSURE ABOVE MAXIMUM THRESHOLD	158
DTC P1532 - AIR CONDITIONER REFRIGERANT PRESSURE BELOW MINIMUM THRESHOLD	160

DTC P1533 - AIR CONDITIONER REFRIGERANT PRESSURE ABOVE MAXIMUM THRESHOLD	161
DTC P1537 - AIR CONDITIONER REFRIGERANT TEMPERATURE BELOW MINIMUM THRESHOLD	162
DTC P1538 - AIR CONDITIONER REFRIGERANT TEMPERATURE ABOVE MAXIMUM THRESHOLD	163
DTC P1712 - TRANSMISSION OIL TEMPERATURE BELOW MINIMUM THRESHOLD	164
DTC P1713 - TRANSMISSION OIL TEMPERATURE ABOVE MAXIMUM THRESHOLD	166
DTC P1842 - TRANSMISSION LINE PRESSURE BELOW MINIMUM THRESHOLD	168
DTC P1843 - TRANSMISSION LINE PRESSURE ABOVE MAXIMUM THRESHOLD	170
DTC P2109 - ELECTRONIC THROTTLE OVERRIDE	172
DTC P2122 - THROTTLE POSITION 2 SENSOR CIRCUIT LOW	173
DTC P2123 - THROTTLE POSITION 2 SENSOR CIRCUIT HIGH	175
DTC P2129 - ACCELERATION PEDAL 1 BELOW MINIMUM THRESHOLD	177
DTC P2130 - ACCELERATION PEDAL 1 ABOVE MAXIMUM THRESHOLD	178
DTC P2132 - ACCELERATION PEDAL POSITION 2 SENSOR CIRCUIT	179

LOW

DTC P2133 - ACCELERATION PEDAL POSITION 2 SENSOR CIRCUIT

HIGH 181

DTC P2228 - BAROMETRIC PRESSURE SENSOR CIRCUIT LOW 183

DTC P2229 - BAROMETRIC PRESSURE SENSOR CIRCUIT HIGH 185

## INTRODUCTION

Thank you for purchasing HP Tuners CORE ECU.

All of our hardware, firmware, and software designs undergo rigorous testing. All products are individually tested before they ship to ensure you receive a working product. Please read all the associated documentation to get the most out of your Electronic Control Unit (ECU).

Your purchase and use of the HP Tuners CORE ECU is subject to the End User Agreement and HP Tuners General Terms and Conditions, which can be found at <https://www.hptuners.com/terms-of-use/>.

The use of the **Harness Test Lead Kit** is required, when performing any diagnostic work on any Drive-By-Cable or Drive-By-Wire harness. Failure to use the test lead kit will void any and all warranty associated with any harness manufactured by **BP Automotive, LLC** or **EFI Connection, LLC**.

## SAFETY INFORMATION

At HP Tuners, safety is our top priority. We are dedicated to ensuring that each Electronic Control Unit (ECU) has been tested for safety and reliability. Our team works diligently to design and manufacture ECUs that adhere to stringent safety protocols. We employ rigorous quality control measures at every stage of production, from firmware, software, design, and testing, to support that our ECUs perform flawlessly and safely.

Additionally, we stay up-to-date with the latest industry safety regulations and standards to ensure that our products consistently meet or exceed all relevant requirements.

**CAUTION:**

- Do not overcharge the battery or reverse the polarity of the battery or any charging unit.
- Always disconnect the CORE ECU from the electrical system whenever doing any welding on the vehicle by unplugging the wiring harness connector from the ECU.
- Always disconnect the battery when doing electrical work on your vehicle. Avoid sparks, open flames or use of electrical devices near flammable substances. Do not run the engine with a battery charger connected as this could damage the ECU and other electrical equipment.
- Ensure there is no wiring left un-insulated. Un-insulated wiring can cause sparks, short circuits and in some cases fire. Before attempting to run the engine ensure there are no leaks in the fuel system.
- Ensure all fuel system components and wiring should be mounted away from heat sources, shielded if necessary and well ventilated.
- Always be vigilant and adhere to all workshop safety precautions when working on any vehicle to ensure a safe working environment.

**LIMITED WARRANTY**

HP Tuners warrants to the original purchaser of an HP Tuners CORE ECU that the product will be free from defects in materials or workmanship in the manufacturing process for a period of twelve months from the date of registration. The twelve month limited warranty will apply to any CORE ECU purchased and registered through HP Tuners. During the applicable warranty period, we will, repair or replace (in our sole discretion) any ECU found by HP Tuners (in our sole discretion) to contain defective materials or workmanship, at no cost to you. HP tuners will also warrant any CORE harness to the original purchaser of an HP Tuners CORE harness for twelve months from the date of purchase. During the twelve month warranty period, we will, repair or replace (in our sole discretion) any CORE harness found by HP Tuners (in our sole discretion) to contain defective materials or workmanship, at no cost to you.

To file a warranty claim you must submit a ticket to our support team through the **HP Tuners website** or by emailing **Support@hptuners.com**. When submitting a warranty claim we will need the ECUs serial number, which can be found on the bottom of the ECU. When submitting a warranty claim for any of the CORE harnesses, we will need a Proof of Purchase (original invoice and/or order number) and serial number.

This limited warranty will not apply to any problems with a CORE ECU and CORE harness that, in HP Tuners' determination, is a result of conditions, malfunctions or damage unrelated to defects in material or workmanship in the manufacturing process, including failure to comply with HP Tuners' Compliance Statement. This limited warranty is not transferable and does not apply to any ECU and harness not properly installed or properly used by the purchaser. The above warranty is the full extent of the warranty available for the CORE ECU and CORE harnesses. HP Tuners specifically disclaims all other warranties, express or implied, including all warranties of fitness for a particular purpose or warranties of merchantability.

### **LIMITATION OF LIABILITY**

IN NO EVENT WILL HP TUNERS, ITS AFFILIATES, SUPPLIERS, LICENSORS, EMPLOYEES, OR AGENTS BE LIABLE FOR ANY INCIDENTAL, DIRECT, INDIRECT, PUNITIVE, ACTUAL, CONSEQUENTIAL, GENERAL, SPECIAL, EXEMPLARY, OR OTHER DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, THOSE RESULTING FROM LOST PROFITS, LOST DATA OR BUSINESS INTERRUPTION) ARISING OUT OF THE USE OF A CORE ECU PRODUCT, WHETHER BASED ON WARRANTY, CONTRACT, TORT OR ANY OTHER LEGAL THEORY AND WHETHER OR NOT HP TUNERS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

## CORE DIAGNOSTIC TROUBLE CODE (DTC) LIST

DTC Code	Description	VCM Live Parameter (below are both characteristic and measurement parameters)
P0102	Mass Airflow Sensor Circuit Low	Mass Airflow (MAF) Sensor DTC Minimum Frequency
P0103	Mass Airflow Sensor Circuit High	Mass Airflow (MAF) Sensor DTC Maximum Frequency
P0107	Manifold Absolute Pressure Sensor Circuit Low	Manifold Absolute Pressure (MAP) Sensor DTC Minimum Voltage
P0108	Manifold Absolute Pressure Sensor Circuit High	Manifold Absolute Pressure (MAP) Sensor DTC Maximum Voltage
P0112	Intake Air Temperature Sensor Circuit Low	Intake Air Temperature (IAT) Sensor DTC Minimum Voltage
P0113	Intake Air Temperature Sensor Circuit High	Intake Air Temperature (IAT) Sensor DTC Maximum Voltage
P0117	Engine Coolant Temperature Sensor Circuit Low	Engine Coolant Temperature (ECT) Sensor DTC Minimum Voltage
P0118	Engine Coolant Temperature Sensor Circuit High	Engine Coolant Temperature (ECT) Sensor DTC Maximum Voltage
P0130	Lambda Bank 1 Sensor 1 Circuit Failure	Lambda Sensor 1 DTC Status
P0131	Lambda Bank 1 Sensor 1 Circuit Low	Lambda Sensor DTC Minimum Voltage
P0132	Lambda Bank 1 Sensor 1 Circuit High	Lambda Sensor DTC Maximum Voltage
P0134	Lambda 1 Sensor Heater Status Not Ok	Lambda Sensor 1 Heater Status Ok
P0135	Lambda 1 Sensor Heater Timed Out	Lambda Sensor 1 DTC Status
P0150	Lambda Bank 2 Sensor 1 Circuit Failure	Lambda Sensor DTC Minimum Voltage
P0151	Lambda Bank 2 Sensor 1 Circuit Low	Lambda Sensor DTC Minimum Voltage
P0152	Lambda Bank 2 Sensor 1 Circuit High	Lambda Sensor DTC Maximum Voltage
P0154	Lambda 2 Sensor Heater Status Not Ok	Lambda Sensor 2 Heater Status Ok
P0155	Lambda 2 Sensor Heater Timed Out	Lambda Sensor 2 DTC Status
P0178	Flex Fuel Composition Sensor Circuit Low	Flex Fuel Sensor DTC Minimum Frequency

P0179	Flex Fuel Composition Sensor Circuit High	Flex Fuel Sensor DTC Maximum Frequency
P0227	Throttle Position 1 Sensor Circuit Low	Throttle Position 1 Sensor (TPS 1) DTC Minimum Voltage
P0228	Throttle Position 1 Sensor Circuit High	Throttle Position 1 Sensor (TPS 1) DTC Maximum Voltage
P0327	Knock Bank 1 Sensor Circuit Low	Knock Bank 1 Sensor DTC Minimum Voltage
P0328	Knock Bank 1 Sensor Circuit High	Knock Bank 1 Sensor DTC Maximum Voltage
P0332	Knock Bank 2 Sensor Circuit Low	Knock Bank 2 Sensor DTC Minimum Voltage
P0333	Knock Bank 2 Sensor Circuit High	Knock Bank 2 Sensor DTC Maximum Voltage
P0511	Idle Air Control Circuit Failure	Idle Air Control Valve Fault
P0522	Oil Pressure Sensor Circuit Low	Oil Pressure Sensor DTC Minimum Voltage
P0523	Oil Pressure Sensor Circuit High	Oil Pressure Sensor DTC Maximum Voltage
P0532	Air Conditioner Refrigerant Pressure Sensor Circuit Low	Air Conditioner (AC) Refrigerant Pressure Sensor DTC Minimum Voltage
P0533	Air Conditioner Refrigerant Pressure Sensor Circuit High	Air Conditioner (AC) Refrigerant Pressure Sensor DTC Maximum Voltage
P0537	Air Conditioner Refrigerant Temperature Sensor Circuit Low	Air Conditioner (AC) Refrigerant Temperature Sensor DTC Minimum Voltage
P0538	Air Conditioner Refrigerant Temperature Sensor Circuit High	Air Conditioner (AC) Refrigerant Temperature Sensor DTC Maximum Voltage
P0562	Battery Voltage Low	Battery Voltage Sensor DTC Minimum
P0563	Battery Voltage High	Battery Voltage Sensor DTC Maximum
P0570	Front Brake Pressure Below Minimum Threshold	Front Brake Pressure Sensor DTC Minimum
P0571	Front Brake Pressure Above Maximum Threshold	Front Brake Pressure Sensor DTC Maximum
P0572	Front Brake Pressure Sensor Circuit Low	Front Brake Pressure Sensor DTC Minimum Voltage
P0573	Front Brake Pressure Sensor Circuit High	Front Brake Pressure Sensor DTC Maximum Voltage
P0668	Internal Thermistor (ECU) Temperature Below Minimum Threshold	Internal Thermistor Temperature Sensor DTC Minimum
P0669	Internal Thermistor (ECU) Temperature Above Maximum Threshold	Internal Thermistor Temperature Sensor DTC Maximum



P06B1	Power Supply 5V Sensor 1 Status Not Ok	Power Supply 5v Sensor 1 Status Ok
P06B4	Power Supply 5V Sensor 2 Status Not Ok	Power Supply 5v Sensor 2 Status Ok
P0712	Transmission Oil Temperature Sensor Circuit Low	Transmission Oil Temperature (Trans Temp) Sensor DTC Minimum Voltage
P0713	Transmission Oil Temperature Sensor Circuit High	Transmission Oil Temperature (Trans Temp) Sensor DTC Maximum Voltage
P0719	Rear Brake Pressure Below Minimum Threshold	Rear Brake Pressure Sensor DTC Minimum
P0720	Rear Brake Pressure Above Maximum Threshold	Rear Brake Pressure Sensor DTC Maximum
P0721	Rear Brake Pressure Sensor Circuit Low	Rear Brake Pressure Sensor DTC Minimum Voltage
P0722	Rear Brake Pressure Sensor Circuit High	Rear Brake Pressure Sensor DTC Maximum Voltage
P0842	Transmission Line Pressure Sensor Circuit Low	Transmission Line Pressure Sensor DTC Minimum Voltage
P0843	Transmission Line Pressure Sensor Circuit High	Transmission Line Pressure Sensor DTC Maximum Voltage
P1102	Mass Airflow Below Minimum Threshold	Mass Airflow (MAF) Sensor DTC Minimum
P1103	Mass Airflow Above Maximum Threshold	Mass Airflow (MAF) Sensor DTC Maximum
P1107	Manifold Absolute Pressure Below Minimum Threshold	Manifold Absolute Pressure (MAP) Sensor DTC Minimum
P1108	Manifold Absolute Pressure Above Maximum Threshold	Manifold Absolute Pressure (MAP) Sensor DTC Maximum
P1112	Intake Air Temperature Below Minimum Threshold	Intake Air Temperature (IAT) Sensor DTC Minimum
P1113	Intake Air Temperature Above Maximum Threshold	Intake Air Temperature (IAT) Sensor DTC Maximum
P1117	Engine Coolant Temperature Below Minimum Threshold	Engine Coolant Temperature (ECT) Sensor DTC Minimum
P1118	Engine Coolant Temperature Above Maximum Threshold	Engine Coolant Temperature (ECT) Sensor DTC Maximum
P1122	Throttle Position 2 Below Minimum Threshold	Throttle Position 2 Sensor (TPS 2) DTC Minimum
P1123	Throttle Position 2 Above Maximum Threshold	Throttle Position 2 Sensor (TPS 2) DTC Maximum

P1127	Acceleration Pedal 1 Sensor Circuit Low	Acceleration Pedal Position 1 Sensor DTC Minimum Voltage
P1128	Acceleration Pedal 1 Sensor Circuit High	Acceleration Pedal Position 1 Sensor DTC Maximum Voltage
P1129	Acceleration Pedal 2 Below Minimum Threshold	Acceleration Pedal Position 2 Sensor DTC Minimum
P1130	Acceleration Pedal 2 Above Maximum Threshold	Acceleration Pedal Position 2 Sensor DTC Maximum
P1131	Lambda Bank 1 Sensor 1 Below Minimum Threshold	Lambda Sensor DTC Minimum
P1132	Lambda Bank 1 Sensor 1 Above Maximum Threshold	Lambda Sensor DTC Maximum
P1151	Lambda Bank 2 Sensor 1 Below Minimum Threshold	Lambda Sensor DTC Minimum
P1152	Lambda Bank 2 Sensor 1 Above Maximum Threshold	Lambda Sensor DTC Maximum
P1178	Flex Fuel Composition Below Minimum Threshold	Flex Fuel Composition Sensor DTC Minimum
P1179	Flex Fuel Composition Above Maximum Threshold	Flex Fuel Composition Sensor DTC Maximum
P1226	Throttle Position 1 Above Maximum Threshold	Throttle Position 1 Sensor (TPS 1) DTC Maximum
P1227	Throttle Position 1 Below Minimum Threshold	Throttle Position 1 Sensor (TPS 1) DTC Minimum
P1228	Barometric Pressure Below Minimum Threshold	Barometric Pressure (Baro) Sensor DTC Minimum
P1229	Barometric Pressure Above Maximum Threshold	Barometric Pressure (Baro) Sensor DTC Maximum
P1347	Nitrous Pressure Sensor Circuit Low	Nitrous Pressure (NOS) Sensor DTC Minimum Voltage
P1348	Nitrous Pressure Sensor Circuit High	Nitrous Pressure (NOS) Sensor DTC Maximum Voltage
P1350	Dome (Co <sup>2</sup> ) Pressure Below Minimum Threshold	Dome Pressure Sensor DTC Minimum
P1351	Dome (Co <sup>2</sup> ) Pressure Above Maximum Threshold	Dome Pressure Sensor DTC Maximum

P1360	Dome (Co <sup>2</sup> ) Pressure Sensor Circuit Low	Dome Pressure Sensor DTC Minimum Voltage
P1361	Dome (Co <sup>2</sup> ) Pressure Sensor Circuit High	Dome Pressure Sensor DTC Maximum Voltage
P1362	Fuel Pressure Below Minimum Threshold	Fuel Pressure Sensor DTC Minimum
P1363	Fuel Pressure Above Maximum Threshold	Fuel Pressure Sensor DTC Maximum
P1364	Fuel Pressure Sensor Circuit Low	Fuel Pressure Sensor DTC Minimum Voltage
P1365	Fuel Pressure Sensor Circuit High	Fuel Pressure Sensor DTC Maximum Voltage
P1366	Nitrous Pressure Below Minimum Threshold	Nitrous Pressure (NOS) Sensor DTC Minimum
P1367	Nitrous Pressure Above Maximum Threshold	Nitrous Pressure (NOS) Sensor DTC Maximum
P1522	Oil Pressure Below Minimum Threshold	Oil Pressure Sensor DTC Minimum
P1523	Oil Pressure Above Maximum Threshold	Oil Pressure Sensor DTC Maximum
P1532	Air Conditioner Refrigerant Pressure Below Minimum Threshold	Air Conditioner (AC) Refrigerant Pressure Sensor DTC Minimum
P1533	Air Conditioner Refrigerant Pressure Above Maximum Threshold	Air Conditioner (AC) Refrigerant Pressure Sensor DTC Maximum
P1537	Air Conditioner Refrigerant Temperature Below Minimum Threshold	Air Conditioner (AC) Refrigerant Temperature Sensor DTC Minimum
P1538	Air Conditioner Refrigerant Temperature Above Maximum Threshold	Air Conditioner (AC) Refrigerant Temperature Sensor DTC Maximum
P1712	Transmission Oil Temperature Below Minimum Threshold	Transmission Oil Temperature (Trans Temp) Sensor DTC Minimum
P1713	Transmission Oil Temperature Above Maximum Threshold	Transmission Oil Temperature (Trans Temp) Sensor DTC Maximum
P1842	Transmission Line Pressure Below Minimum Threshold	Transmission Line Pressure (Trans Pr) Sensor DTC Minimum
P1843	Transmission Line Pressure Above Maximum Threshold	Transmission Line Pressure (Trans Pr) Sensor DTC Maximum
P2109	Electronic Throttle Override	Electronic Throttle Override Enabled
P2122	Throttle Position 2 Sensor Circuit Low	Throttle Position 2 Sensor (TPS 2) DTC Minimum Voltage
P2123	Throttle Position 2 Sensor Circuit High	Throttle Position 2 Sensor (TPS 2) DTC Maximum Voltage
P2129	Acceleration Pedal 1 Below Minimum	Acceleration Pedal Position 1 (Accel Pedal 1) Sensor

	Threshold	DTC Minimum
P2130	Acceleration Pedal 1 Above Maximumm Threshold	Acceleration Pedal Position 1 (Accel Pedal 1) Sensor DTC Maximum
P2132	Acceleration Pedal Position 2 Sensor Circuit Low	Acceleration Pedal Position 2 (Accel Pedal 2) Sensor DTC Minimum Voltage
P2133	Acceleration Pedal Position 2 Sensor Circuit High	Acceleration Pedal Position 2 (Accel Pedal 2) Sensor DTC Maximum Voltage
P2228	Barometric Pressure Sensor Circuit Low	Barometric Pressure (Baro) Sensor DTC Minimum Voltage
P2229	Barometric Pressure Sensor Circuit High	Barometric Pressure (Baro) Sensor DTC Maximum Voltage

**Table 1. CORE Diagnostic Trouble Code (DTC) List**

## CORE INPUTS & OUPUTS

The Core ECU is a 150 channel ECU which receives input data from various sensors mounted to the LS engine and then outputs various signals to control engine operation.

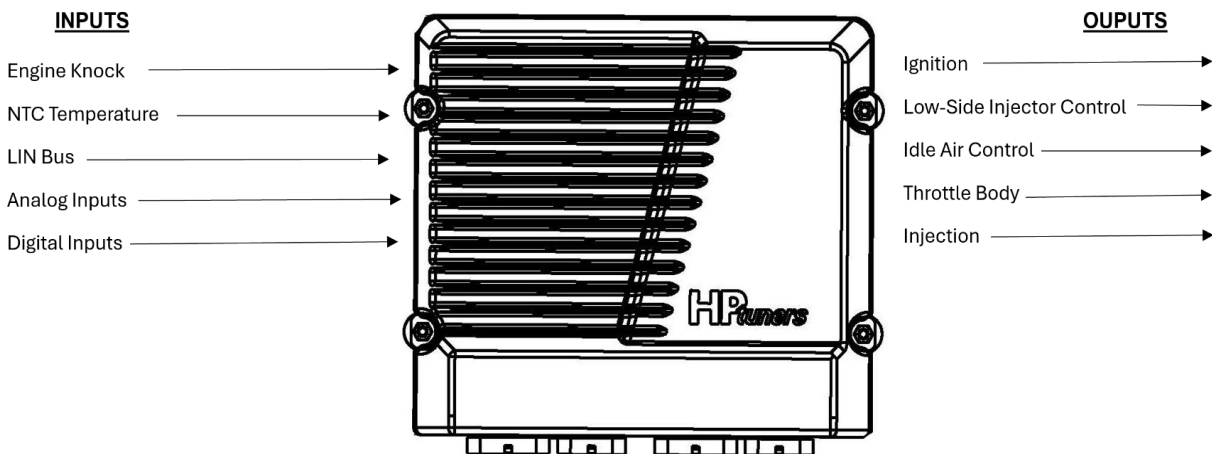


Figure 1. CORE Inputs & Outputs



**NOTE:** For the entire list of inputs and ouputs, refer to the **CORE Installation Guide**.

The CORE ECU also performs diagnostic functions, which notifies the user of the engine malfunctions by turning on a Malfunction Indicator Light (MIL) 🚗, which can be found within VCM Live. Malfunctions within the ECU are identified by Diagnostic Trouble Codes (DTC) numbers. In addition to notifying the user of the malfunction in the ECU, CORE also stores the information about the malfunction in its memory.

## BACKFIRE DIAGNOSTICS

**NOTE:** Backfire is when the fuel is igniting in the intake manifold, or in the exhaust system, making a loud popping noise.

Checks	Action
Preliminary Checks	N/A
Ignition System Checks	<ul style="list-style-type: none"> <li>- Check for proper ignition timing</li> <li>- Check the connection at the ignition coils</li> <li>- Check the resistance (ohms) of the spark plug wires, if any wires have a reading of over 29,000 ohms, replace those wires</li> </ul> Remove the plugs and inspect them for any of the below conditions: <ul style="list-style-type: none"> <li>- improper gap</li> <li>- any and all deposits</li> <li>- wet plugs</li> <li>- cracks</li> <li>- burned electrodes</li> </ul>
Engine Mechanical Checks	Check the engine for any of the below conditions: <ul style="list-style-type: none"> <li>- sticking or leaking valves</li> <li>- exhaust system leaks</li> <li>- improper valve timing</li> <li>- engine compression</li> <li>- sticking or leaking valves</li> <li>- manifold vacuum leaks</li> </ul>
Fuel System Checks	- Perform a fuel system diagnostics check (Refer to the <i>Fuel System Diagnostics</i> (Page 24) of the manual.

**Table 2. Backfire Diagnostic Table**

## CUTS-OUT & MISSES DIAGNOSTICS



**NOTE:** Cut-out and misses issues occur when the engine begins jerking that follows engine speed, usually pronounced as the engine load increases but normally felt below 2,000 RPM. The exhaust has a steady spitting sound at idle, low speed, or hard acceleration for the fuel starvation that can cause the engine to cut-out.

Checks	Action
Preliminary Checks	N/A
Ignition System Checks	<ol style="list-style-type: none"> <li>1. Start the engine.</li> <li>2. Check ignition for proper voltage output with a spark tester.</li> <li>3. Check for any cylinder misfires.</li> <li>4. Verify all spark plugged are gapped correctly.</li> </ol> Remove all spark plugs and check for the below conditions: <ul style="list-style-type: none"> <li>- burned electrodes</li> <li>- any and all deposits</li> <li>- improper spark plug gaps</li> <li>- any and all wear and tear</li> </ul> Check the secondary ignition for the below conditions: <ul style="list-style-type: none"> <li>- ignition wires for arcing and proper routing</li> <li>- ignition coils for any cracks and carbon tracking</li> <li>- cross-firing</li> </ul>
Engine Mechanical Checks	Perform a cylinder compression check for all cylinders. Check all cylinders for the following conditions: <ul style="list-style-type: none"> <li>- worn rocker arms</li> <li>- worn camshaft lobes</li> <li>- broken valve springs</li> <li>- improper valve timing</li> <li>- improper valve clearance</li> </ul>
Fuel System Checks	Check the fuel system for the below conditions: <ul style="list-style-type: none"> <li>- low pressure</li> <li>- plugged filters</li> </ul>
Additional Checks	Check the routing for the secondary wires and their ground circuits.

**Table 3. Cuts-Out & Misses Diagnostics Table**

## FUEL SYSTEM DIAGNOSTICS

Checks	Action
Before Using This Section	Before using this section, you should complete the following: <ul style="list-style-type: none"> <li>- The ECU is operating correctly</li> <li>- There are no DTCs stored or exists in the memory</li> </ul> Several of the following symptoms procedures call for a careful visual and physical check. These checks are very important as they can lead to prompt diagnosis and correction of a problem
Fuel System Checks	<ol style="list-style-type: none"> <li>1. Verify the user's complaint</li> <li>2. Locate the correct DTC table</li> <li>3. Check the items indicated under the symptom</li> <li>4. Operate the vehicle under the conditions the symptom occurs</li> <li>5. Take a datalog screen shot under the condition that the symptom occurs to review at a later time</li> </ol>
Visual & Physical Checks	<ul style="list-style-type: none"> <li>- Check all CORE system fuses and relays</li> <li>- Check all CORE grounds for being clean, tight and in its proper locations</li> <li>- Check the vacuum hoses for splits, kinks, and proper connections</li> <li>- Check thoroughly for any type of leak or restriction</li> <li>- Check for air leaks at all the mounting areas of the intake manifold sealing surfaces</li> <li>- Check for proper installation of the mixer assembly</li> <li>- Check for air leaks at the mixer assembly</li> </ul> Check the ignition wires for the following conditions: <ul style="list-style-type: none"> <li>- Cracking</li> <li>- Hardening</li> <li>- Proper routing</li> <li>- Carbon tracking</li> <li>- Check all wires for any pinches or cuts</li> </ul>

**Table 4. Fuel System Diagnostics Table**




## HARD START DIAGNOSTICS

**NOTE:** Hard start issues occur when the engine cranks but does not start for a long time. Engine may also eventually run or may start but immediately die.

Checks	Action
Preliminary Checks	Ensure the user is using the correct starting procedure (if applicable).
Sensor Checks	<ul style="list-style-type: none"> <li>- Compare the ECT with the ambient air temperature on a cold start. If the coolant temperature reading is more than 10 degrees greater or less than the ambient air temperature, check for high resistance in the ECT sensor circuit.</li> <li>- Check the TPS and foot pedal position sensor connections.</li> </ul>
Fuel System Checks	<ul style="list-style-type: none"> <li>- Check for intake system leakage.</li> </ul>
Ignition System Checks	<ul style="list-style-type: none"> <li>- Check for proper ignition voltage.</li> <li>- Check the spark plugs are properly gapped.</li> <li>- Check the spark plugs for any irregular, wear, cracks, heavy deposits, and burned electrodes.</li> </ul>
Engine Mechanical Checks	<p>Check for all of the below items:</p> <ul style="list-style-type: none"> <li>- Vacuum leaks</li> <li>- Improper valve timing</li> <li>- Low compression</li> <li>- Improper valve clearance</li> <li>- Worn or weak valve springs</li> <li>- Worn camshaft lobes</li> </ul>
Exhaust System Checks	<ul style="list-style-type: none"> <li>- Check the exhaust system for any restrictions and damaged pipes</li> </ul>

**Table 5. Hard Start Diagnostics Table**

## HESITATION DIAGNOSTICS

 **NOTE:** Hesitation is when the engine has a lack of response when putting it under load, this condition may cause the engine to stall if severe enough.

Checks	Action
Preliminary Checks	N/A
Fuel System Checks	<ul style="list-style-type: none"> <li>- Check the TMAP sensor response and accuracy</li> <li>- Check fuel pump</li> </ul>
Ignition System Checks	<ul style="list-style-type: none"> <li>- Check for proper ignition voltage output</li> <li>- Check to see if the proper OEM spec spark plugs are being used and are gapped correctly</li> <li>- Check for faulty spark plugs wires</li> <li>- Check for fouled spark plugs</li> </ul>
Additional Checks	<ul style="list-style-type: none"> <li>- Check for proper alternator voltage output</li> <li>- Check for proper manifold vacuum</li> </ul>

**Table 6. Hesitation Diagnostics Table**

## INTERMITTENT DIAGNOSTICS

**NOTE:** Intermittent issues may or may not turn ON the check engine light or store Diagnostic Trouble Codes (DTC).

Checks	Action
Preliminary Checks	Do not use the DTC table. If a fault is an intermittent, the use of the DTC tables with this condition may result in the replacement of good part
Faulty Electrical Connection & Wiring	<p>Faulty electrical connections or wiring can cause most intermittent problems. Check the suspected circuit for the following conditions:</p> <ul style="list-style-type: none"> <li>- Faulty fuse or circuit breaker, connectors poorly mated, terminals not fully seated in the connector (backed out). Terminals not properly formed or damaged</li> <li>- Terminal tension is insufficient</li> <li>- Wire terminals poorly connected</li> <li>- Examine any and all potential terminals for proper contact tension</li> </ul>
Operational Test	Once all visual and physical examination does not locate the problem, operate the vehicle with VCM live on any watch any abnormal spikes in voltage with the corresponding parameter
Loss of DTC Memory	<p>To Check for the loss of DTC memory check the following:</p> <ol style="list-style-type: none"> <li>1. Disconnect any sensor</li> <li>2. Idle the engine until the check engine light illuminates</li> <li>3. VCM Live should store a DTC for whichever sensor was disconnected and remain in the memory when the ignition is turned OFF. If no DTC is stored, the ECU might be faulty.</li> </ol>

**Table 7. Intermittent Diagnostics Table**

## NO START DIAGNOSTICS

**NOTE:** No start issues occur when the engine cranks but does not start.

Checks	Action
Preliminary Checks	N/A
ECU Checks	<ul style="list-style-type: none"> <li>- Check for proper communication with the ECU</li> <li>- Check all fuses and relays for any damage</li> <li>- Check battery power, ignition power and ground circuits to the ECU</li> </ul>
Sensor Checks	<ul style="list-style-type: none"> <li>- Check the MAP sensor</li> <li>- Check the cam sensor for proper RPM output</li> </ul>
Fuel System Checks	<ul style="list-style-type: none"> <li>- Check the air intake components for any leakage</li> <li>- Check for proper fuel pressure</li> </ul>
Ignition System Checks	<ul style="list-style-type: none"> <li>- Check for proper ignition voltage output</li> <li>- Check the spark plugs for proper gap, cracks, heavy deposits, wet plugs, wear, and ensure to also check the ignition wires</li> </ul>
Engine Mechanical Checks	<p>Check for all of the below items:</p> <ul style="list-style-type: none"> <li>- Vacuum leaks</li> <li>- Improper valve timing</li> <li>- Low compression</li> <li>- Worn rocker arms</li> <li>- Improper valve clearance</li> <li>- Broken or weak valve springs</li> <li>- Worn camshaft lobes</li> </ul>
Exhaust System Checks	<p>Check for all of the below conditions:</p> <ul style="list-style-type: none"> <li>- Inspect the exhaust system for damaged or collapsed pipes</li> <li>- Check for plugged catalytic converter</li> </ul>

**Table 8. No Start Diagnostics Table**

## **DTC P06B1 - POWER SUPPLY 5V SENSOR 1 STATUS NOT OK**

### **CONDITIONS FOR SETTING DTC P06B1**

- Ignition On
- 5V Sensor 1 power supply  $\leq$  4.25 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P06B1

## **DTC P06B4 - POWER SUPPLY 5V SENSOR 2 STATUS NOT OK**

### **CONDITIONS FOR SETTING DTC P06B4**

- Ignition On
- 5V Sensor 2 power supply  $\leq$  4.25 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P06B4

## DTC P0102 - MASS AIRFLOW SENSOR CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P0102

- Engine Running
- Mass Airflow Sensor Frequency  $\leq$  100 Hz
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0102



**NOTE:** Both the Terminated Gen III Drive-By-Cable & Gen IV Drive-By-Wire harnesses will have a 5 wire MAF that integrates with the IAT. Customers will have to purchase an adapter harness from EFI to split the 3 wire MAF sensor.

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the MAF sensor DTC parameter, does the MAF sensor parameter display less than 100 Hz?	$\leq$ 100 Hz	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key Off - Disconnect the MAF sensor connector from the wiring harness - Jump the MAF signal cavity "A" - Key On - Does VCM Live display MAF voltage of 4.5 volts or greater?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Inspect MAF connector and pins for corrosion, contamination or any physical damage. - Any issues found?		Repair any issues found and retest.	Go to Step 4
4	- Key off - Disconnect the CORE connector "C" - Check continuity between the MAF sensor connector signal cavity "A" and ECU MAP signal pin C2-15 - Do you have continuity between them?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced

5	<ul style="list-style-type: none"> <li>- Check for continuity between the MAF sensor connector signal cavity "A" and pin C2-15?</li> <li>- Do you have continuity between them?</li> </ul>		<p>Go to Step 6</p>	<p>Repair the circuit as necessary, locate any wires that need to be repaired or replaced</p>
6	<ul style="list-style-type: none"> <li>- Check for continuity between the MAF sensor connector ground cavity "B" (WHT/BLK) wire and ECU ground pin C23-B.</li> <li>- Do you have continuity between them?</li> </ul>		<p>Go to Step 7</p>	<p>Repair the circuit as necessary, locate any wires that need to be repaired or replaced</p>
7	<ul style="list-style-type: none"> <li>- Replace MAF Sensor</li> <li>- Is the replacement of the MAF sensor complete?</li> </ul>		<p>Go to Step 8</p>	
8	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		<p>System is now operational and ready to be tuned</p>	<p>Contact <b>HP Tuners Support</b></p>

**Table 9. Mass Airflow Sensor Circuit Low Diagnostics Table**



## DTC P0103 - MASS AIRFLOW SENSOR CIRCUIT HIGH

### CONDITIONS FOR SETTING DTC P0103

- Engine Running
- Mass Airflow Sensor Frequency  $\geq 12,000$  Hz
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0103



**NOTE:** Both the Terminated Gen III Drive-By-Cable & Gen IV Drive-By-Wire harnesses will have a 5 wire MAF that integrates with the IAT. Customers will have to purchase an adapter harness from EFI to split the 3 wire MAF sensor.

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the MAF sensor DTC parameter, does the MAF sensor parameter display more than 12,000 Hz?	$\geq 12,000$ Hz	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key Off - Disconnect the MAF sensor connector from the wiring harness - Jump the MAF signal cavity "A" - Key On - Does VCM Live display MAF voltage of 0.1 volts or less?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.
3	- Inspect MAF connector and pins for corrosion, contamination or any physical damage. - any issues found?		Repair any issues found and retest.	Go to Step 4
4	- Key off - Disconnect the CORE connector "C" - Check continuity between the MAF sensor connector signal cavity "A" and ECU MAP signal pin C2-15 - Do you have continuity between them?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.
5	- Check for continuity between the MAF		Go to Step	Repair the circuit as

	<p>sensor connector signal cavity "A" and pin C2-15?</p> <p>- Do you have continuity between them?</p>		6	necessary, locate any wires that need to be repaired or replaced.
6	<p>- Check for continuity between the MAF sensor connector ground cavity "B" (WHT/BLK) wire and ECU ground pin C23-B.</p> <p>- Do you have continuity between them?</p>		Go to Step 7	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.
7	<p>- Replace MAF Sensor</p> <p>- Is the replacement of the MAF sensor complete?</p>		Go to Step 8	
8	<p>- Clear any DTC from the ECU</p> <p>- Turn the ignition off and wait 30 seconds</p> <p>- Start the engine and operate the engine to full operating temperature</p> <p>- Observe the Check Engine Light on the Menu bar in VCM Live</p> <p>- After operating the engine within the test parameters, check for any store codes</p> <p>- Does the engine operate without any stored DTC's?</p>		System is now operational and ready to be tuned.	Contact <b>HP Tuners Support</b>

**Table 10. Mass Airflow Sensor Circuit High Diagnostics Table**

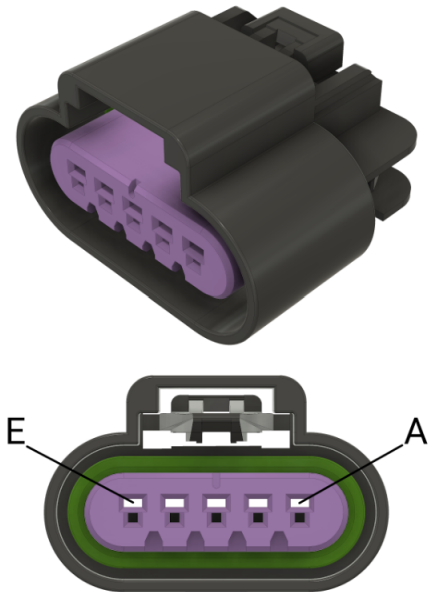


Figure 2. MAF Sensor Cavity Connector Location

## DTC P0107 - MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P0107

- Engine Running
- Manifold Absolute Pressure Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0107

Step	Action	Values (s)	YES	NO
1	- Key on, engine running - Within VCM Live, open the MAP sensor DTC parameter, does the MAP sensor parameter display a voltage less than 0.1 volts with the engine running below 3,000 rpm?	$\leq 0.1$ volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key off - Disconnect the MAP sensor connector - Jump the 5 volt reference (Drive-By-Cable cavity 'C' & Drive-By-Wire cavity '1') and reference pin (Drive-By-Cable cavity 'B' & Drive-By-Wire cavity '3') together - Key on - Does the VCM Live MAP parameter display a voltage of 4.5 volts or greater?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.
3	- Inspect the MAP sensor and pins for corrosion, contamination or any physical damage. - any issues found?		Repair the circuit as necessary, locate any wires that need to be repaired or replaced.	Go to Step 4
4	- Key off - Disconnect the ECU connector 'C' - Check for continuity between the MAP sensor connector signal (cavity 'B' for DBC & cavity '3' for DBW) and the ECU signal pin C3-28 - Do you have continuity?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.

5	<ul style="list-style-type: none"> <li>- Check for continuity between the MAP sensor connector 5v reference (cavity 'C' for DBC &amp; cavity '1' for DBW) and the ECU ground pin C25-C (for DBC harness) &amp; pin C42-1 (for DBW harness)</li> <li>- Do you have continuity between them?</li> </ul>		Go to Step 6	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.
6	<ul style="list-style-type: none"> <li>- Check for continuity between the MAP sensor connector ground signal (cavity 'A' for DBC &amp; cavity '2' for DBW) and the ECU ground pin C25-C (for DBC harness) &amp; pin C42-1 (for DBW harness)</li> <li>- Do you have continuity between them?</li> </ul>		Go to step 7	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.
7	<ul style="list-style-type: none"> <li>- Replace the MAP sensor</li> <li>- Is the replacement of the MAP sensor complete?</li> </ul>		Go to Step 8	
8	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned.	Contact <b>HP Tuners Support</b>

**Table 11. Manifold Absolute Pressure Sensor Circuit Low Diagnostics Table**

## DTC P0108 - MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT HIGH

### CONDITIONS FOR SETTING DTC P0108

- Engine Running
- Manifold Absolute Pressure Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0108

Step	Action	Values (s)	YES	NO
1	- Key on, engine running - Within VCM Live, open the MAP sensor DTC parameter, does the MAP sensor parameter display a voltage more than 4.9 volts with the engine running below 3,000 rpm?	$\geq$ 4.9 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key off - Disconnect the MAP sensor connector - Jump the 5 volt reference (Drive-By-Cable cavity 'C' & Drive-By-Wire cavity '1') and reference pin (Drive-By-Cable cavity 'B' & Drive-By-Wire cavity '3') together - Key on - Does the VCM Live MAP parameter display a voltage of 0.1 volts or less?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.
3	- Inspect the MAP sensor and pins for corrosion, contamination or any physical damage. - any issues found?		Repair the circuit as necessary, locate any wires that need to be repaired or replaced.	Go to Step 4
4	- Key off - Disconnect the ECU connector 'C' - Check for continuity between the MAP sensor connector signal (cavity 'B' for DBC & cavity '3' for DBW) and the ECU signal pin C3-28 - Do you have continuity?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.

5	<ul style="list-style-type: none"> <li>- Check for continuity between the MAP sensor connector 5v reference (cavity 'C' for DBC &amp; cavity '1' for DBW) and the ECU ground pin C25-C (for DBC harness) &amp; pin C42-1 (for DBW harness)</li> <li>- Do you have continuity between them?</li> </ul>		Go to Step 6	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.
6	<ul style="list-style-type: none"> <li>- Check for continuity between the MAP sensor connector ground signal (cavity 'A' for DBC &amp; cavity '2' for DBW) and the ECU ground pin C25-C (for DBC harness) &amp; pin C42-1 (for DBW harness)</li> <li>- Do you have continuity between them?</li> </ul>		Go to step 7	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.
7	<ul style="list-style-type: none"> <li>- Replace the MAP sensor</li> <li>- Is the replacement of the MAP sensor complete?</li> </ul>		Go to Step 8	
8	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned.	Contact <b>HP Tuners Support</b>

**Table 12. Manifold Absolute Pressure Sensor Circuit High Diagnostics Table**

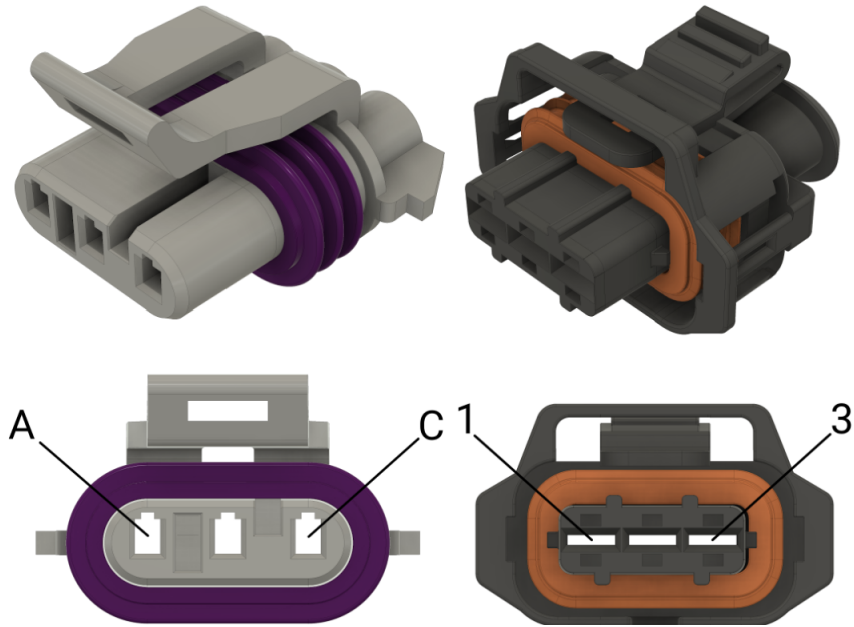


Figure 3. MAP Connector Sensor Cavity Location (Drive-By-Cable & Drive-By-Wire)



## DTC P0112 - INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P0112

- Engine Running
- Intake Air Temperature Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0112

**NOTE:** Both the Terminated Gen III Drive-By-Cable & Gen IV Drive-By-Wire harnesses will have a 5 wire MAF that integrates with the IAT. Customers will have to purchase an adapter harness from EFI to split the 3 wire MAF sensor.

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running -Within VCM Live, open the IAT sensor DTC parameter, does the IAT sensor parameter display less than 0.1 volts?	$\leq 0.1$ volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key Off - Disconnect the IAT sensor connector from the wiring harness - Jump the IAT signal cavity "A" - Key On - Does VCM Live display IAT voltage of 4.5 volts or greater?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.
3	- Inspect IAT connector and pins for corrosion, contamination or any physical damage. - any issues found?		Repair any issues found and retest.	Go to Step 4
4	- Key off - Disconnect the CORE connector "C" - Check continuity between the IAT sensor connector signal cavity "E" and ECU IAT signal pin C4-9		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.

	- Do you have continuity between them?			
5	- Check for continuity between the IAT sensor connector 5 volt reference cavity 'C' and ECU C23-C - Do you have continuity between them?		Go to Step 6	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.
6	- Check for continuity between the IAT sensor connector ground cavity 'D' and ECU ground pin C23-B - Do you have continuity between them?		Go to Step 7	Repair the circuit as necessary, locate any wires that need to be repaired or replaced.
7	- Replace IAT Sensor - Is the replacement of the IAT sensor complete?		Go to Step 8	
8	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		System is now operational and ready to be tuned.	Contact <b>HP Tuners Support</b>

**Table 13. Intake Air Temperature Sensor Circuit Low Diagnostics Table**

## DTC P0113 - INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH

### CONDITIONS FOR SETTING DTC P0113

- Engine Running
- Intake Air Temperature Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0113

**NOTE:** Both the Terminated Gen III Drive-By-Cable & Gen IV Drive-By-Wire harnesses will have a 5 wire MAF that integrates with the IAT. Customers will have to purchase an adapter harness from EFI to split the 3 wire MAF sensor.

Step	Action	Values (s)	YES	NO
1	- Key ON - Within VCM Live, open the IAT sensor DTC parameter, does the IAT sensor parameter display a voltage of 4.9 volts or greater?	$\geq$ 4.9 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the MAF/IAT sensor connector jump cavities 'D' & 'E' - Key ON - Does VCM Live IAT parameter display a voltage of 0.1 volts or less?			Go to Step 4
3	- Key OFF - Jump the IAT signal cavity 'E' to the engine ground - Key ON - Does VCM Live IAT parameter display a voltage of 0.1 volts or less?		Go to step 6	Go to Step 5
4	- Replace the IAT sensor			

	- Is the replacement complete?			
5	<ul style="list-style-type: none"> <li>- Key OFF</li> <li>- Disconnect the ECU wire harness connector "D"</li> <li>- Check for continuity between the IAT sensor connector signal cavity "E" &amp; ECU Connector "D" pin 9</li> <li>- Is there continuity between them?</li> </ul>		Go to Step 9	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
6	<ul style="list-style-type: none"> <li>- Check for continuity between the IAT sensor ground connector cavity "D" &amp; ECU ground C23-D</li> <li>- Do you have continuity between them?</li> </ul>		Go to Step 9	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
7	<ul style="list-style-type: none"> <li>- Replace the ECU</li> <li>- Is the replacement complete?</li> </ul>		Go to Step 10	N/A
8	<ul style="list-style-type: none"> <li>- Re-check wire harness and IAT sensor connector for any and all damages, corrosion, or contamination.</li> <li>- Any issues found?</li> </ul>		Repair the circuit as necessary, locate any wires that need to be repaired or replaced	Go to Step 4
9	<ul style="list-style-type: none"> <li>- Re-check wire harness and IAT sensor connector for damages</li> <li>- Any issues found?</li> </ul>		Repair the circuit as necessary, locate any wires that need to be repaired or replaced	Go to Step 7
10	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned.	Contact <b>HP Tuners Support</b>

**Table 14. Intake Air Temperature Sensor Circuit High Diagnostics Table**

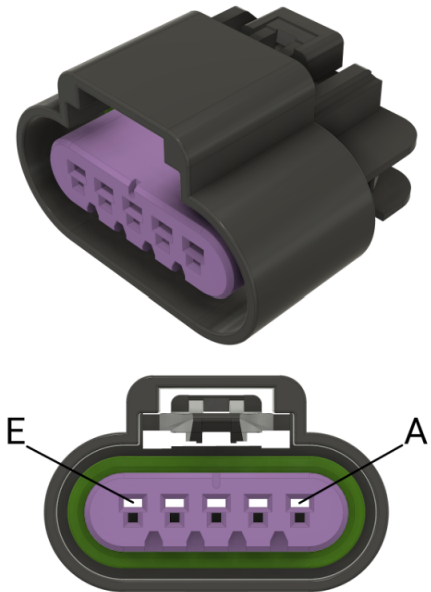


Figure 4. IAT Sensor Cavity Connector Location

## DTC P0117 - ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P0117

- Engine Running
- Engine Coolant Temperature Sensor  $\leq$  0.1 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0117

Step	Action	Values (s)	YES	NO
1	- Key ON - Within VCM Live, open the ECT sensor DTC parameter, does the ECT sensor parameter display a voltage of 0.1 volts or less?	$\leq$ 0.1 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the ECT sensor connector - Key ON - Does VCM Live ECT parameter display 4.9 volts or greater?		Go to Step 3	Go to Step 4
3	- Replace the ECT sensor - Is the replacement complete?		Go to Step 7	N/A
4	- Key OFF - Disconnect the ECU wire harness connector 'D' - Check for continuity between ECT sensor connector signal cavity 'B' and ECU signal connector 'D' pin 11 - Do you have continuity between them?		Repair the circuit as necessary, locate any wires that need to be repaired or replaced	Go to Step 5
5	- Check for continuity between ECT sensor connector cavity 'A' & ECU ground C28-A - Do you have continuity between them?		Repair the circuit as necessary, locate any wires that need to be repaired or replaced	Go to Step 6
6	- Replace ECU - Is the replacement complete?		Go to Step 7	N/A

7	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>
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**Table 15. Engine Coolant Temperature Sensor Circuit Low Diagnostics Table**

## DTC P0118 - ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH

### CONDITIONS FOR SETTING DTC P0118

- Engine Running
- Engine Coolant Temperature Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0118

Temperature (*F)	Ohms (+/- 10%)
242	101
231	121
211	175
201	209
181	302
163	434
144	625
127	901
102	1,556
78	2,689
49	5,576

**Table 16. ECT Resistance & Temperature Reference Table**

Step	Action	Value (s)	YES	NO
1	- Key ON	$\geq$ 4.9 volts	Go to Step 2	Intermittent Issue



	- Within VCM Live, open the ECT sensor DTC parameter, does the ECT sensor parameter display a voltage of 4.9 volts or greater?			(Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the ECT sensor connector and jump cavities 'A' & 'B' together - Key ON - Does the ECT parameter display a voltage of 0.05 volts or less?		Go to Step 3	Go to Step 7
3	- Using a DVOM (Digital Volt-Ohm Meter) check the resistance between the two terminals of the ECT sensor and compare the resistance reading to the above table - Is the resistance value correct according to the above resistance table?	See the 'ECT Resistance & Temperature Reference Table'	Go to Step 5	Go to Step 4
4	- Replace the ECT sensor - Is the replacement complete?		Go to Step 13	N/A
5	- Inspect the ECT wire harness connector terminals 'A' & 'B' for damages, corrosion or contamination - Any issues found?		Repair the circuit as necessary, locate any wires that need to be repaired or replaced	Go to Step 6
6	- Key OFF - Disconnect ECU wire harness connector 'D' - Inspect the ECU connector Pin 11 for corrosion or contamination - Any issues found?		Repair the circuit as necessary and fix any pins with corrosion or contamination	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
7	- Jump the ECT signal cavity 'B' connector to the engine ground - Does The VCM Live ECT parameter display a voltage of 0.5 volts or less?		Go to Step 8	Go to Step 11
8	- Key OFF - Disconnect the ECU 'D' connector - Using a DVOM check for continuity between ECT sensor low reference		Go to Step 9	Repair the circuit as necessary, locate any wires that need to be

	cavity 'A' and ECU ground C28-A - Do you have continuity between them?			repaired or replaced
9	Inspect all of the connector 'D' pins for corrosion or contamination - Any issues found?		Repair the circuit as necessary, locate any wires that need to be repaired or replaced	Go to Step 10
10	- Replace the ECU - Is the replacement complete?		Go to Step 13	N/A
11	- Key OFF - Disconnect the ECU wire harness connector 'D' - Using a DVOM check for continuity between the ECT connector signal cavity 'B' & ECU connector 'D' pin 11 - Do you have continuity between them?		Go to Step 12	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
12	- Inspect the ECU connector 'D' pin 11 and all ground C28-A pins for any corrosion or contamination - Any issues found?		Repair the circuit as necessary, locate any wires that need to be repaired or replaced	Go to Step 10
13	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 17. Engine Coolant Temperature Sensor Circuit High Diagnostics Table**

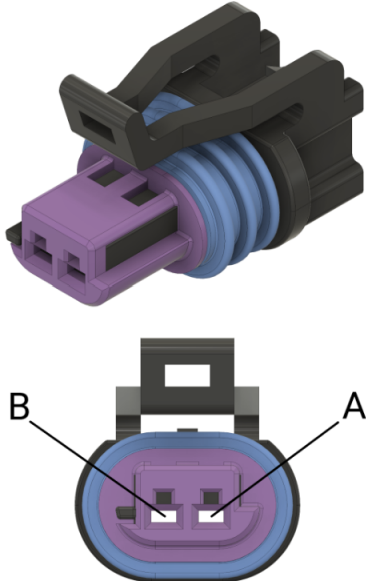


Figure 5. ECT Sensor Connector Cavity Location

## DTC P0130 - LAMBDA BANK 1 SENSOR 1 CIRCUIT FAILURE

### CONDITIONS FOR SETTING DTC P0130

- Engine Running
- Lambda Bank 1 Sensor 1 open circuit detected for heater
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0130

Step	Action	Values (s)	YES	NO
1	<ul style="list-style-type: none"> <li>- Key OFF</li> <li>- Disconnect the lambda 1 sensor and ECU connector 'C'</li> <li>- Check for continuity lambda 1 sensor connector cavity 3 and ECU connector 'C' pin 18</li> <li>- Do you have continuity?</li> </ul>		Go to Step 2	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
2	<ul style="list-style-type: none"> <li>- Key OFF</li> <li>- Disconnect the ECU connector 'C' and inspect pin 18 for any corrosion and contamination</li> <li>- Any issues found</li> </ul>		Repair the circuit as necessary and fix any pins with corrosion or contamination	Go to Step 3
3	<ul style="list-style-type: none"> <li>- Replace lambda bank 1</li> </ul>		Go to Step 4	N/A
4	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

Table 18. Lambda Bank 1 Sensor 1 Circuit Failure Diagnostics Table

## DTC P0131 - LAMBDA BANK 1 SENSOR 1 CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P0131

- Engine Running
- Lambda Bank 1 Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0131

Step	Action	Value (s)	YES	NO
1	- Key on, engine running - Within VCM Live, open the Lambda sensor DTC parameter, does the lambda sensor parameter display a voltage of 0.1 volts or less?	$\leq 0.1$ volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the Lambda 1 sensor connector and check for continuity between cavity 1 & the ECU connector "C" pin 13 - Do you have continuity?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Key OFF - Disconnect the Lambda 1 sensor connector and check for continuity between cavity 2 & the ECU connector "C" pin 14 - Do you have continuity?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Key OFF - Disconnect the Lambda 1 sensor connector and check for continuity between cavity 4 & the ECU 12v C14-4 - Do you have continuity?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
5	- Key OFF - Disconnect the Lambda 1 sensor connector and check for continuity between cavity 5 & the ECU connector "C" pin 24 - Do you have continuity?		Go to Step 6	Repair the circuit as necessary, locate any wires that need to be repaired or replaced

6	<ul style="list-style-type: none"> <li>- Key OFF</li> <li>- Disconnect the Lambda 1 sensor connector and check for continuity between cavity 6 &amp; the ECU connector 'C' pin 23</li> <li>- Do you have continuity?</li> </ul>		Go to Step 7	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
7	<ul style="list-style-type: none"> <li>- Replace Lambda 1 sensor</li> <li>- Is the replacement complete?</li> </ul>		Go to Step 8	N/A
8	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

Table 19. Lambda Bank 1 Sensor 1 Circuit Low Diagnostics Table

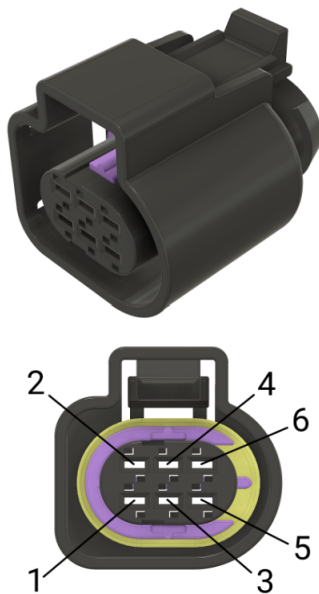


Figure 6. Lambda 1 Sensor Connector Cavity Location

## DTC P0132 - LAMBDA BANK 1 SENSOR 1 CIRCUIT HIGH

### CONDITIONS FOR SETTING DTC P0132

- Engine Running
- Lambda Bank 1 Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0132

Step	Action	Value (s)	YES	NO
1	- Key on, engine running - Within VCM Live, open the Lambda sensor DTC parameter, does the lambda sensor parameter display a voltage of 4.9 volts or greater?	$\geq$ 4.9 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the Lambda 1 sensor connector and check for continuity between cavity 1 & the ECU connector "C" pin 13 - Do you have continuity?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Key OFF - Disconnect the Lambda 1 sensor connector and check for continuity between cavity 2 & the ECU connector "C" pin 14 - Do you have continuity?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Key OFF - Disconnect the Lambda 1 sensor connector and check for continuity between cavity 4 & the ECU 12v C14-4 - Do you have continuity?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
5	- Key OFF - Disconnect the Lambda 1 sensor connector and check for continuity between cavity 5 & the ECU connector "C" pin 24 - Do you have continuity?		Go to Step 6	Repair the circuit as necessary, locate any wires that need to be repaired or replaced



6	<ul style="list-style-type: none"> <li>- Key OFF</li> <li>- Disconnect the Lambda 1 sensor connector and check for continuity between cavity 6 &amp; the ECU connector 'C' pin 23</li> <li>- Do you have continuity?</li> </ul>		Go to Step 7	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
7	<ul style="list-style-type: none"> <li>- Replace Lambda 1 sensor</li> <li>- Is the replacement complete?</li> </ul>		Go to Step 8	N/A
8	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 20. Lambda Bank 1 Sensor 1 Circuit High Diagnostics Table**

## **DTC P0135 - LAMBDA 1 SENSOR HEATER TIMED OUT**

### **CONDITIONS FOR SETTING DTC P0135**

- Engine Running
- Lambda 1 Sensor needs to heat to idle temperature

## DTC P0150 - LAMBDA BANK 2 SENSOR 1 CIRCUIT FAILURE

### CONDITIONS FOR SETTING DTC P0150

- Engine Running
- Lambda Bank 2 Sensor 1 open circuit detected for heater
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0150

Step	Action	Values (s)	YES	NO
1	<ul style="list-style-type: none"> <li>- Key OFF</li> <li>- Disconnect the lambda 2 sensor and ECU connector 'C'</li> <li>- Check for continuity lambda 1 sensor connector cavity 3 and ECU connector 'C' pin 26</li> <li>- Do you have continuity?</li> </ul>		Go to Step 2	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
2	<ul style="list-style-type: none"> <li>- Key OFF</li> <li>- Disconnect the ECU connector 'C' and inspect pin 26 for any corrosion and contamination</li> <li>- Any issues found</li> </ul>		Repair the circuit as necessary and fix any pins with corrosion or contamination	Go to Step 3
3	<ul style="list-style-type: none"> <li>- Replace lambda bank 2</li> </ul>		Go to Step 4	N/A
4	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

Table 21. Lambda Bank 2 Sensor 1 Circuit Failure Diagnostics Table

## DTC P0151 - LAMBDA BANK 2 SENSOR 1 CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P0151

- Engine Running
- Lambda Bank 2 Sensor 1  $\leq$  0.1 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0151

Step	Action	Value (s)	YES	NO
1	- Key on, engine running - Within VCM Live, open the Lambda sensor DTC parameter, does the lambda sensor parameter display a voltage of 0.1 volts or less?	$\leq$ 0.1 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the Lambda 2 sensor connector and check for continuity between cavity 1 & the ECU connector "C" pin 15 - Do you have continuity?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Key OFF - Disconnect the Lambda 2 sensor connector and check for continuity between cavity 2 & the ECU connector "C" pin 16 - Do you have continuity?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Key OFF - Disconnect the Lambda 2 sensor connector and check for continuity between cavity 4 & the ECU 12v C15-4 - Do you have continuity?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
5	- Key OFF - Disconnect the Lambda 2 sensor connector and check for continuity between cavity 5 & the ECU connector "C" pin 22 - Do you have continuity?		Go to Step 6	Repair the circuit as necessary, locate any wires that need to be repaired or replaced

6	<ul style="list-style-type: none"> <li>- Key OFF</li> <li>- Disconnect the Lambda 2 sensor connector and check for continuity between cavity 6 &amp; the ECU connector 'C' pin 21</li> <li>- Do you have continuity?</li> </ul>		Go to Step 7	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
7	<ul style="list-style-type: none"> <li>- Replace Lambda 2 sensor</li> <li>- Is the replacement complete?</li> </ul>		Go to Step 8	N/A
8	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 22. Lambda Bank 2 Sensor 1 Circuit Low Diagnostics Table**

## DTC P0152 - LAMBDA BANK 2 SENSOR 1 CIRCUIT HIGH

### CONDITIONS FOR SETTING DTC P0152

- Engine Running
- Lambda Bank 2 Sensor 1 Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0152

Step	Action	Value (s)	YES	NO
1	- Key on, engine running - Within VCM Live, open the Lambda sensor DTC parameter, does the lambda sensor parameter display a voltage of 4.9 volts or higher?	$\geq$ 4.9 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the Lambda 2 sensor connector and check for continuity between cavity 1 & the ECU connector "C" pin 15 - Do you have continuity?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Key OFF - Disconnect the Lambda 2 sensor connector and check for continuity between cavity 2 & the ECU connector "C" pin 16 - Do you have continuity?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Key OFF - Disconnect the Lambda 2 sensor connector and check for continuity between cavity 4 & the ECU 12v C15-4 - Do you have continuity?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
5	- Key OFF - Disconnect the Lambda 2 sensor connector and check for continuity between cavity 5 & the ECU connector "C" pin 22 - Do you have continuity?		Go to Step 6	Repair the circuit as necessary, locate any wires that need to be repaired or replaced

6	<ul style="list-style-type: none"> <li>- Key OFF</li> <li>- Disconnect the Lambda 2 sensor connector and check for continuity between cavity 6 &amp; the ECU connector 'C' pin 21</li> <li>- Do you have continuity?</li> </ul>		Go to Step 7	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
7	<ul style="list-style-type: none"> <li>- Replace Lambda 2 sensor</li> <li>- Is the replacement complete?</li> </ul>		Go to Step 8	N/A
8	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 23. Lambda Bank 2 Sensor 1 Circuit High Diagnostics Table**



## DTC P0155 - LAMBDA 2 SENSOR HEATER TIMED OUT

### CONDITIONS FOR SETTING DTC P0155

- Engine Running
- Lambda 2 Sensor needs to heat to idle temperature

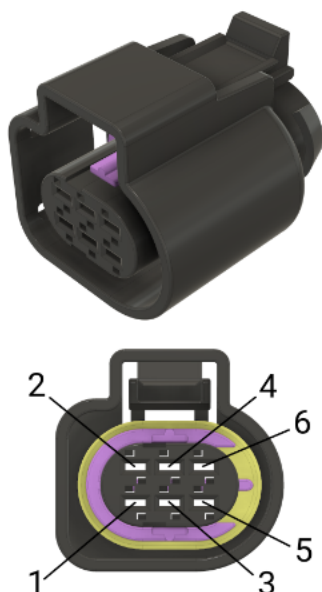


Figure 7. Lambda 2 Sensor Cavity Connector Location

## **DTC P0178 - FLEX FUEL COMPOSITION SENSOR CIRCUIT LOW**

### **CONDITIONS FOR SETTING DTC P0178**

- Engine Running
- Flex Fuel Frequency  $\leq$  50 Hz
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0178

## **DTC P0179 - FLEX FUEL SENSOR DTC MAXIMUM FREQUENCY**

### **CONDITIONS FOR SETTING DTC P0179**

- Engine Running
- Flex Fuel Frequency  $\geq$  150 Hz
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0179

## DTC P0227 - THROTTLE POSITION 1 SENSOR CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P0227

- Engine Running
- Throttle Position Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0227

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine OFF - Within VCM Live, open the TPS 1 DTC Minimum parameter, does the TPS sensor parameter display 0.1 volts or less?	$\leq 0.1$ volts	Go to Step 3	Go to Step 2
2	- Slowly depress the foot pedal while observing the TPS voltage parameter within VCM Live - Does the TPS voltage ever fall below 0.2 volts?		Go to Step 3	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
3	- Key OFF - Disconnect the TPS connector and jump the 5 volt reference cavity 1 & the TPS signal cavity 3 together at the TPS connector - Key ON - Does the TPS parameter within VCM live display a voltage of 4.0 volts or greater?		Go to Step 6	Go to Step 4
4	- Key OFF - Disconnect the ECU harness connector 'C' - Using a DVOM check continuity between the TPS connector signal cavity 3 & the ECU connector 'C' pin 25 - Do you have continuity between them?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced

5	<ul style="list-style-type: none"> <li>- Replace the ECU</li> <li>- Is the replacement complete?</li> </ul>		Go to Step 8	N/A
6	<ul style="list-style-type: none"> <li>- Inspect the TPS wire harness connector terminals for corrosion or contamination</li> <li>- Any issues found?</li> </ul>		Repair the circuit as necessary and fix any pins with corrosion or contamination	Go to Step 7
7	<ul style="list-style-type: none"> <li>- Replace the TPS</li> <li>- Is the replacement complete?</li> </ul>		Go to Step 8	N/A
8	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 24. Throttle Position 1 Sensor Circuit Low Diagnostics Table**

## DTC P0228 - THROTTLE POSITION 1 SENSOR CIRCUIT HIGH

### CONDITIONS FOR SETTING DTC P0228

- Engine Running
- Manifold Absolute Pressure Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0228

Step	Action	Values (s)	YES	NO
1	- Key ON, Engine OFF - Within VCM Live, open the TPS 1 sensor DTC Maximum parameter, does the TPS sensor parameter display 4.9 volts or greater?	$\geq$ 4.9 volts	Go to Step 3	Go to Step 2
2	- Slowly depress the foot pedal while observing the TPS voltage parameter within VCM Live - Does the TPS voltage ever exceed 4.8 volts?		Go to Step 3	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
3	- Key OFF - Disconnect the TPS connector - Key ON - Does the TPS voltage parameter within VCM Live display a voltage of 0.2 volts or less?		Go to Step 6	Go to Step 4
4	- Key OFF - Disconnect the ECU wire harness connector "C" - Key ON - Using a DVOM check for voltage between the ECU TPS ECU connector "C" pin 25 and engine ground - Do you have voltage?		Repair the circuit as necessary, locate any wires that need to be repaired or replaced	Go to Step 5
5	- Replace ECU - Is the replacement complete?		Go to Step 10	N/A
6	- Back probe the sensor ground circuit at the ECU side of the wire harness ground C29-2 with a test light		Go to Step 7	Go to Step 9

	<p>connected to battery voltage</p> <ul style="list-style-type: none"> <li>- Does the light come on?</li> </ul>			
7	<ul style="list-style-type: none"> <li>- Inspect the TPS connector terminals for corrosion, physical damage, and contamination</li> <li>- Any issues found?</li> </ul>		<p>Repair the circuit as necessary and fix any pins with corrosion or contamination</p>	<p>Go to Step 8</p>
8	<ul style="list-style-type: none"> <li>- Replace the TPS</li> <li>- Is the replacement complete?</li> </ul>		<p>Go to Step 10</p>	<p>N/A</p>
9	<ul style="list-style-type: none"> <li>- Key OFF</li> <li>- Disconnect the ECU connector 'C'</li> <li>- Using a DVOM check for continuity between the TPS connector ground cavity 2 &amp; the ECU connector 'C' pin SP3</li> <li>- Do you have continuity between them?</li> </ul>		<p>Go to Step 5</p>	<p>Repair the circuit as necessary, locate any wires that need to be repaired or replaced</p>
10	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		<p>System is now operational and ready to be tuned</p>	<p>Contact <b>HP Tuners Support</b></p>

**Table 25. Throttle Position 1 Sensor Circuit High Diagnostics Table**

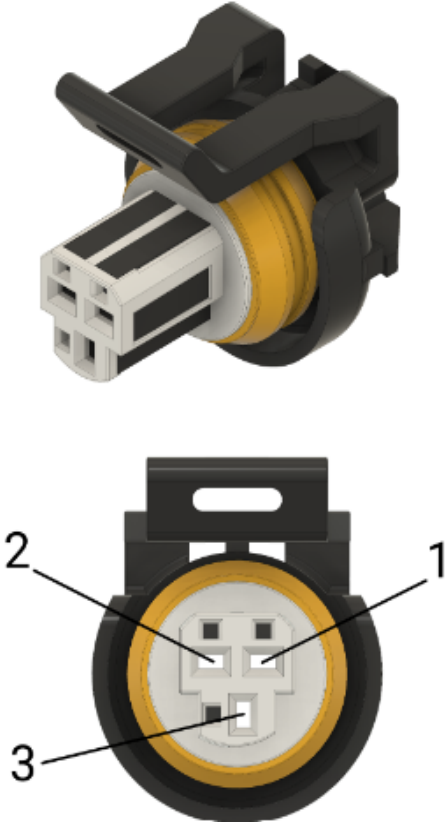


Figure 8. TPS Cavity Connector Location



## DTC P0327 - KNOCK BANK 1 SENSOR CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P0327

- Engine Running
- Knock Bank 1 Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0327

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the knock sensor DTC parameter, does the knock sensor parameter display 0.1 volts or less?	$\leq 0.1$ volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the Knock 1 sensor connector and the ECU harness connector "D" - Using a DVOM check for continuity between the Knock 1 sensor signal 1 cavity "A" (for both Drive-By-Cable & Drive-By-Wire harnesses) & the ECU connector "D" pin 1 (for both Drive-By-Cable & Drive-By-Wire harnesses) - Do you have continuity between them?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Key OFF - Disconnect the Knock 1 sensor connector and the ECU harness connector "D" - Using a DVOM check for continuity between the Knock 1 sensor signal 2 cavity "B" (for Drive-By-Cable harness) cavity "B" is the low reference signal (for drive-By-Wire) & the ECU connector "D" pin 8 (for both Drive-By-Cable harness) & C19-B (for Drive-By-Wire harness) - Do you have continuity between them?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Replace Knock 1 sensor - Is the replacement complete?		Go to Step 5	N/A
5	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full		System is now operational and ready to	Contact <b>HP Tuners Support</b>

	operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		be tuned	
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**Table 26. Knock Bank 1 Sensor Circuit Low Diagnostics Table**

## DTC P0328 - KNOCK BANK 1 SENSOR CIRCUIT HIGH

### CONDITIONS FOR SETTING DTC P0328

- Engine Running
- Knock Bank 1 Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0328

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the knock sensor DTC parameter, does the knock sensor parameter display 4.9 volts or higher?	$\geq$ 4.9 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the Knock 1 sensor connector and the ECU harness connector "D" - Using a DVOM check for continuity between the Knock 1 sensor signal 1 cavity "A" (for both Drive-By-Cable & Drive-By-Wire harnesses) & the ECU connector "D" pin 1 (for both Drive-By-Cable & Drive-By-Wire harnesses) - Do you have continuity between them?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Key OFF - Disconnect the Knock 1 sensor connector and the ECU harness connector "D" - Using a DVOM check for continuity between the Knock 1 sensor signal 2 cavity "B" (for Drive-By-Cable harness) cavity "B" is the low reference signal (for drive-By-Wire) & the ECU connector "D" pin 8 (for both Drive-By-Cable harness) & C19-B(for Drive-By-Wire harness) - Do you have continuity between them?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Replace Knock 1 sensor - Is the replacement complete?		Go to Step 5	N/A
5	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full		System is now operational and ready to	Contact <b>HP Tuners Support</b>

	operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		be tuned	
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Table 27. Knock Bank 1 Sensor Circuit High Diagnostics Table

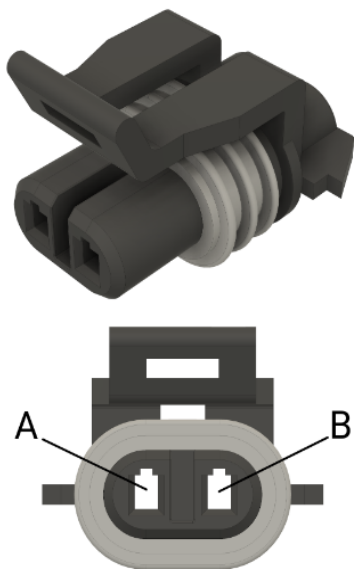


Figure 9. Drive-By-Cable Knock 1 Sensor Cavity Connector Location

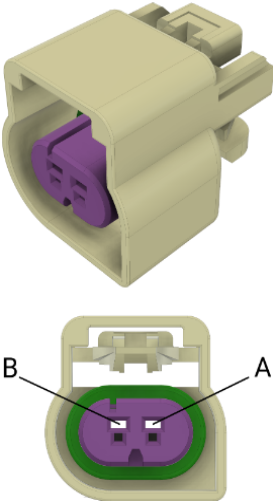


Figure 10. Drive-By-Wire Knock 1 Sensor Cavity Connector Location

## DTC P0332 - KNOCK BANK 2 SENSOR CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P0332

- Engine Running
- Knock Bank 2 Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0332

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the knock sensor DTC parameter, does the knock sensor parameter display 0.1 volts or less?	$\leq 0.1$ volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the Knock 2 sensor connector and the ECU harness connector 'D' - Using a DVOM check for continuity between the Knock 2 sensor signal cavity 'A' (for Drive-By-Wire Harness) & the ECU connector 'D' pin 8 (for Drive-By-Wire harnesses) - Do you have continuity between them?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Key OFF - Disconnect the Knock 2 sensor connector and the ECU harness connector 'D' - Using a DVOM check for continuity between the Knock 2 sensor low reference 2 cavity 'B' (for Drive-By-Wire harness) & the ECU ground C20-B (Drive-By-Wire harness) - Do you have continuity between them?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Replace Knock 2 sensor - Is the replacement complete?		Go to Step 5	N/A
5	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

	<ul style="list-style-type: none"><li>- After operating the engine within the test parameters, check for any store codes</li><li>- Does the engine operate without any stored DTC's?</li></ul>			
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**Table 28. Knock Bank 2 Sensor Circuit Low Diagnostics Table**

## DTC P0333 - KNOCK BANK 2 SENSOR CIRCUIT HIGH

### CONDITIONS FOR SETTING DTC P0333

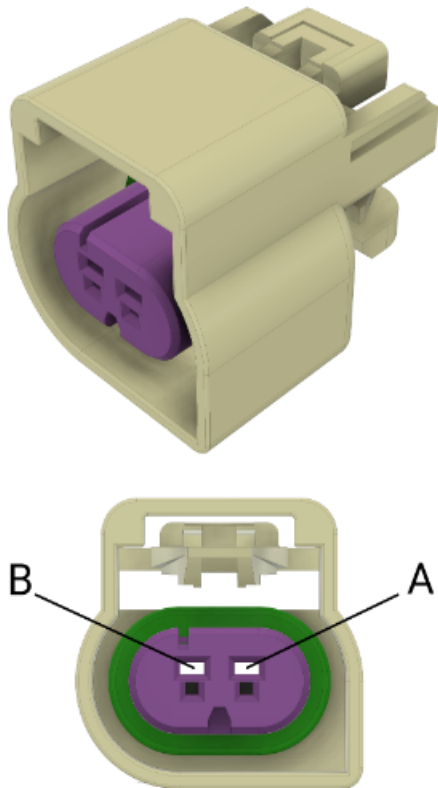
- Engine Running
- Knock Bank 2 Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0333

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the knock sensor DTC parameter, does the knock sensor parameter display 4.9 volts or higher?	$\geq$ 4.9 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the Knock 2 sensor connector and the ECU harness connector 'D' - Using a DVOM check for continuity between the Knock 2 sensor signal cavity 'A' (for Drive-By-Wire Harness) & the ECU connector 'D' pin 8 (for Drive-By-Wire harnesses) - Do you have continuity between them?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Key OFF - Disconnect the Knock 2 sensor connector and the ECU harness connector 'D' - Using a DVOM check for continuity between the Knock 2 sensor low reference 2 cavity 'B' (for Drive-By-Wire harness) & the ECU ground C20-B (for Drive-By-Wire harness) - Do you have continuity between them?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Replace Knock 2 sensor - Is the replacement complete?		Go to Step 5	N/A
5	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>



	<ul style="list-style-type: none"> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>			
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**Table 29. Knock Bank 2 Sensor Circuit High Diagnostics Table**



**Figure 11. Drive-By-Wire Knock 2 Sensor Cavity Connector Location**

## DTC P0511 - IDLE AIR CONTROL CIRCUIT FAILURE

### CONDITIONS FOR SETTING DTC P0511

- Engine Running
- Idle Air Control  $\leq 0.1$  volts or detects an open circuit
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0511

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the IAC sensor DTC parameter, does the IAC sensor parameter display 0.1 volts or less?	$\leq 0.1$ volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the IAC sensor connector & the IAC ECU connector 'A' - Using a DVOM check for continuity between the IAC sensor connector cavity 'A' & the ECU connector 'A' pin 16 - Do you have continuity between them?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Key OFF - Disconnect the IAC sensor connector & the IAC ECU connector 'A' - Using a DVOM check for continuity between the IAC sensor connector cavity 'B' & the ECU connector 'A' pin 33 - Do you have continuity between them?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Key OFF - Disconnect the IAC sensor connector & the IAC ECU connector 'A'		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced

	<ul style="list-style-type: none"> <li>- Using a DVOM check for continuity between the IAC sensor connector cavity 'C' &amp; the ECU connector 'A' pin 11</li> <li>- Do you have continuity between them?</li> </ul>			
5	<ul style="list-style-type: none"> <li>- Key OFF</li> <li>- Disconnect the IAC sensor connector &amp; the IAC ECU connector 'A'</li> <li>- Using a DVOM check for continuity between the IAC sensor connector cavity 'D' &amp; the ECU connector 'A' pin 27</li> <li>- Do you have continuity between them?</li> </ul>		Go to Step 6	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
6	<ul style="list-style-type: none"> <li>- Key OFF</li> <li>- Inspect IAC connector and pins for corrosion, contamination or any physical damage.</li> <li>- Any issues found?</li> </ul>		Repair the circuit as necessary and repair any pins with any corrosion, contamination or physical damage	Go to Step 7
7	<ul style="list-style-type: none"> <li>- Replace the IAC sensor</li> <li>- Is the replacement complete?</li> </ul>		Go to Step 8	N/A
8	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 30. Idle Air Control Circuit Failure Diagnostics Table**

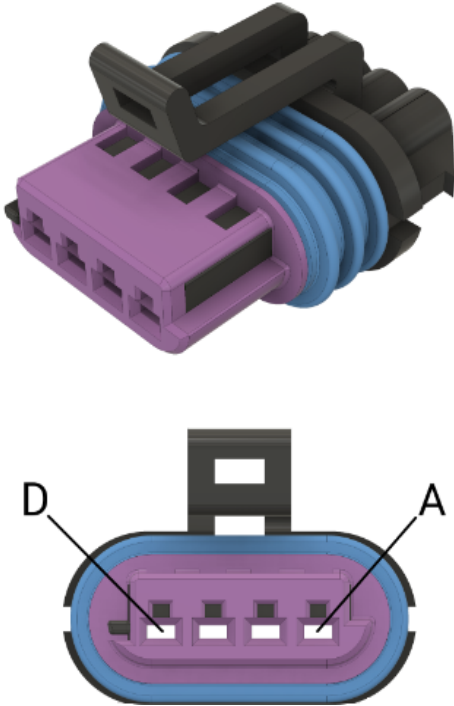


Figure 12. IAC Sensor Cavity Connector Location

## DTC P0522 - OIL PRESSURE SENSOR CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P0522

- Engine Running
- Oil Pressure Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0522

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the Oil Pressure sensor DTC parameter, does the Oil Pressure sensor parameter display 0.1 volts or less?	$\leq 0.1$ volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the Oil Pressure sensor connector & the Oil Pressure sensor ECU connector "C" - Using a DVOM check for continuity between the oil pressure sensor signal connector cavity 3 (for Drive-By-Cable harness) cavity 1 (for Drive-By-Wire Harness) & the ECU connector "C" pin 19 (for Drive-By-Cable harness & Drive-By-Wire harnesses) - Do you have continuity between them?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Key OFF - Disconnect the Oil Pressure sensor connector & the Oil Pressure sensor ECU connector "C" - Using a DVOM check for continuity between the oil pressure sensor 5 volt reference connector cavity 2 (for Drive-By-Cable harness & Drive-By-Wire harnesses) & the ECU 5v C18-2 (for Drive-By-Cable harness) & C41-2 (Drive-By-Wire harnesses) - Do you have continuity between them?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Key OFF - Disconnect the Oil Pressure sensor connector & the Oil Pressure sensor ECU connector "C" - Using a DVOM check for continuity between the oil pressure sensor low reference connector cavity 1 (for		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired

	Drive-By-Cable harness) cavity 3 (for Drive-By-Wire Harness) & the ECU connector 'C' pin SP3 (for Drive-By-Cable harness & Drive-By-Wire harnesses) - Do you have continuity between them?			or replaced
5	- Replace Oil Pressure Sensor - Is the replacement complete?		Go to Step 6	N/A
6	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 31. Oil Pressure Sensor Circuit Low Diagnostics Table**

## DTC P0523 - OIL PRESSURE SENSOR CIRCUIT HIGH

### CONDITIONS FOR SETTING DTC P0523

- Engine Running
- Oil Pressure Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0523

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the Oil Pressure sensor DTC parameter, does the Oil Pressure sensor parameter display 4.9 volts or greater?	$\geq$ 4.9 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the Oil Pressure sensor connector & the Oil Pressure sensor ECU connector 'C' - Using a DVOM check for continuity between the oil pressure sensor signal connector cavity 3 (for Drive-By-Cable harness) cavity 1 (for Drive-By-Wire Harness) & the ECU connector 'C' pin 19 (for Drive-By-Cable harness & Drive-By-Wire harnesses) - Do you have continuity between them?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Key OFF - Disconnect the Oil Pressure sensor connector & the Oil Pressure sensor ECU connector 'C' - Using a DVOM check for continuity between the oil pressure sensor 5 volt reference connector cavity 2 (for Drive-By-Cable harness & Drive-By-Wire harnesses) & the ECU 5v C18-2 (for Drive-By-Cable harness) & C41-2 (Drive-By-Wire harnesses) - Do you have continuity between them?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Key OFF - Disconnect the Oil Pressure sensor connector & the Oil Pressure sensor ECU connector 'C' - Using a DVOM check for continuity between the oil pressure sensor low reference connector cavity 1 (for		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired

	Drive-By-Cable harness) cavity 3 (for Drive-By-Wire Harness) & the ECU connector 'C' pin SP3 (for Drive-By-Cable harness & Drive-By-Wire harnesses) - Do you have continuity between them?			or replaced
5	- Replace Oil Pressure Sensor - Is the replacement complete?		Go to Step 6	N/A
6	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

Table 32. Oil Pressure Sensor Circuit High Diagnostics Table

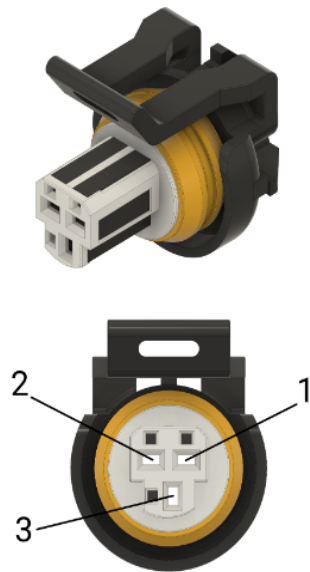


Figure 13. Drive-By-Cable Oil Pressure Sensor Cavity Connector Location



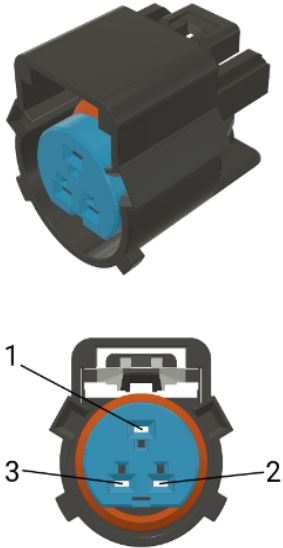


Figure 14. Drive-By-Wire Oil Pressure Sensor Cavity Connector Location

## **DTC P0532 - AIR CONDITIONER REFRIGERANT PRESSURE SENSOR CIRCUIT LOW**

### **CONDITIONS FOR SETTING DTC P0532**

- Engine Running
- A/C Refrigerant Pressure Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0532

## **DTC P0533 - AIR CONDITIONER REFRIGERANT PRESSURE SENSOR CIRCUIT HIGH**

### **CONDITIONS FOR SETTING DTC P0533**

- Engine Running
- A/C Refrigerant Pressure Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0533

## **DTC P0537 - AIR CONDITIONER REFRIGERANT TEMPERATURE SENSOR CIRCUIT LOW**

### **CONDITIONS FOR SETTING DTC P0537**

- Engine Running
- A/C Refrigerant Temperature Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0537

## **DTC P0538 - AIR CONDITIONER REFRIGERANT TEMPERATURE SENSOR CIRCUIT HIGH**

### **CONDITIONS FOR SETTING DTC P0538**

- Engine Running
- A/C Refrigerant Temperature Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0538

## DTC P0562 - BATTERY VOLTAGE LOW

### CONDITIONS FOR SETTING DTC P0562

- Ignition On
- Battery Voltage Sensor  $\leq$  9.0 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0562

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the Battery Voltage Sensor DTC minimum parameter characteristic, does the parameter display 9.0 volts or less?	$\leq$ 9.0 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Check the condition of the battery and battery terminals for any corrosion, physical damage, or contamination - Any issues found?		Replace battery or battery terminals	Go to Step 3
3	- Check the charging system for any corrosion, physical damage, or contamination - Any issues found?		Replace the charging system	Go to Step 4
4	- Check all of the below ECU ground by using a DVOM and measuring voltage between each of the below pins and battery positive 1. ECU Connector 'A' pin 26 2. ECU Connector 'A' pin 34 3. ECU Connector 'B' pin 20 4. ECU Connector 'B' pin 26 5. ECU Connector 'C' pin 10 6. ECU Connector 'D' pin 26 - Any issues found?		Repair the circuit as necessary, locate any wires that need to be repaired or replaced	Go to Step 5
5	- Replace ECU - Is the replacement complete?		Go to Step 6	N/A
6	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds		System is now operational and ready to be tuned	Contact <b>HP Tuners</b>

	<ul style="list-style-type: none"> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>			<p><b>Support</b></p>
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**Table 33. Battery Voltage Low Diagnostics Table**

## DTC P0563 - BATTERY VOLTAGE HIGH

### CONDITIONS FOR SETTING DTC P0563

- Ignition On
- Battery Voltage Sensor  $\geq$  16.0 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0563

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the Battery Voltage Sensor DTC Maximum parameter characteristic, does the parameter display 16.0 volts or greater?	$\geq$ 16.0 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Check the condition of the battery and battery terminals for any corrosion, physical damage, or contamination - Any issues found?		Replace battery or battery terminals	Go to Step 3
3	- Check the charging system for any corrosion, physical damage, or contamination - Any issues found?		Replace the charging system	Go to Step 4
4	- Replace the ECU - Is the replacement complete?		Go to Step 5	N/A
5	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

Table 34. Battery Voltage High Diagnostics Table



## **DTC P0570 - FRONT BRAKE PRESSURE BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P0570**

- Engine Running
- Front Brake Pressure Sensor  $\leq 0.01$  Mpa
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0570

## **DTC P0571 - FRONT BRAKE PRESSURE ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P0571**

- Engine Running
- Front Brake Pressure Sensor  $\geq$  100.00 MPa
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0571

## **DTC P0572 - FRONT BRAKE PRESSURE SENSOR CIRCUIT LOW**

### **CONDITIONS FOR SETTING DTC P0572**

- Engine Running
- Front Brake Pressure Sensor  $\leq 0.01$  Volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0572

## **DTC P0573 - FRONT BRAKE PRESSURE SENSOR CIRCUIT HIGH**

### **CONDITIONS FOR SETTING DTC P0573**

- Engine Running
- Front Brake Pressure Sensor  $\geq$  5.0 Volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0573

## **DTC P0668 - INTERNAL THERMISTOR (ECU) TEMPERATURE BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P0668**

- Engine Running
- Internal Thermistor Temperature Sensor  $\leq -40$  °F
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0668

## **DTC P0669 - INTERNAL THERMISTOR (ECU) TEMPERATURE ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P0669**

- Engine Running
- Internal Thermistor Temperature Sensor  $\geq 284$  °F
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0669

## **DTC P0712 - TRANSMISSION OIL TEMPERATURE SENSOR CIRCUIT LOW**

### **CONDITIONS FOR SETTING DTC P0712**

- Engine Running
- Transmission Oil Temperature Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0712

## **DTC P0713 - TRANSMISSION OIL TEMPERATURE SENSOR CIRCUIT HIGH**

### **CONDITIONS FOR SETTING DTC P0713**

- Engine Running
- Transmission Oil Temperature Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0713



## **DTC P0719 - REAR BRAKE PRESSURE BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P0719**

- Engine Running
- Rear Brake Pressure Sensor  $\leq$  0.00 MPa
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0719

## **DTC P0720 - REAR BRAKE PRESSURE ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P0720**

- Engine Running
- Rear Brake Pressure Sensor  $\geq$  100.00 MPa
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0720

## **DTC P0721 - REAR BRAKE PRESSURE SENSOR CIRCUIT LOW**

### **CONDITIONS FOR SETTING DTC P0721**

- Engine Running
- Rear Brake Pressure Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0721

## **DTC P0722 - REAR BRAKE PRESSURE SENSOR CIRCUIT HIGH**

### **CONDITIONS FOR SETTING DTC P0722**

- Engine Running
- Rear Brake Pressure Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0722

## **DTC P0842 - TRANSMISSION LINE PRESSURE SENSOR CIRCUIT LOW**

### **CONDITIONS FOR SETTING DTC P0842**

- Engine Running
- Transmission Line Pressure Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0842

## **DTC P0843 - TRANSMISSION LINE PRESSURE SENSOR CIRCUIT HIGH**

### **CONDITIONS FOR SETTING DTC P0843**

- Engine Running
- Transmission Line Pressure Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P0843

## DTC P1102 - MASS AIRFLOW BELOW MINIMUM THRESHOLD


### CONDITIONS FOR SETTING DTC P1102

- Engine Running
- Mass Airflow Sensor  $\leq 0.00$  lb/min
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1102

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine running at full operating temperature - Within VCM Live, open the MAF sensor DTC Minimum parameter, does the MAF sensor parameter display less than 0.00 lb/min?	$\leq 0.00$ lb/min	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the MAF sensor - Key ON - Does the MAF sensor parameter within VCM live display pressure less than 0.05 lb/min?	$\leq 0.05$ lb/min	Go to Step 3	Go to Step 5
3	- Probe the MAF connector ground cavity 'B' with a test light connected to battery voltage - Does the test light come on?		Go to Step 4	Go to Step 7
4	- Check the location of the MAF, ensure the location is free from physical damage or any and all debris that can cause restriction of airflow - Is the MAF sensor location area OK?		Go to Step 5	Repair the location that has physical damage and clean any debris that was found.
5	- Key OFF - Disconnect the ECU connector 'B' and inspect the pins for any physical damage or corrosion - Are the pins OK?		Go to Step 6	Repair the circuit and pins as necessary, locate any wires that need to be repaired or replaced
6	- Replace the MAF sensor - Is the replacement complete?		Go to Step 8	N/A

7	<ul style="list-style-type: none"> <li>- Disconnect the ECU connector 'B' and check for continuity between the MAF sensor connector ground cavity 'B' &amp; ECU ground C23-B</li> <li>- Do you have continuity between them?</li> </ul>		Go to Step 8	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
8	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 35. Mass Airflow Below Minimum Threshold Diagnostics Table**

 **NOTE:** Reference *DTC P0103 - Mass Airflow Sensor Circuit High (Page 33)* for sensor cavity location.



## DTC P1103 - MASS AIRFLOW ABOVE MAXIMUM THRESHOLD


### CONDITIONS FOR SETTING DTC P1103

- Engine Running
- Mass Airflow Sensor  $\geq 66.14$  lb/min
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1103

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine running at full operating temperature - Within VCM Live, open the MAF sensor DTC Maximum parameter, does the MAF sensor parameter display more than 66.14 lb/min?	$\geq 66.14$ lb/min	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the MAF sensor - Key ON - Does the MAF sensor parameter within VCM live display pressure less than 0.05 lb/min?	$\leq 0.05$ lb/min	Go to Step 3	Go to Step 5
3	- Probe the MAF connector ground cavity 'B' with a test light connected to battery voltage - Does the test light come on?		Go to Step 4	Go to Step 7
4	- Check the location of the MAF, ensure the location is free from physical damage or any and all debris that can cause restriction of airflow - Is the MAF sensor location area OK?		Go to Step 5	Repair the location that has physical damage and clean any debris that was found.
5	- Key OFF - Disconnect the ECU connector 'B' and inspect the pins for any physical damage or corrosion - Are the pins OK?		Go to Step 6	Repair the circuit and pins as necessary, locate any wires that need to be repaired or replaced
6	- Replace the MAF sensor - Is the replacement complete?		Go to Step 8	N/A

7	<ul style="list-style-type: none"> <li>- Disconnect the ECU connector 'B' and check for continuity between the MAF sensor connector ground cavity 'B' &amp; ECU ground C23-B</li> <li>- Do you have continuity between them?</li> </ul>		Go to Step 8	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
8	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 36. Mass Airflow Above Maximum Threshold Diagnostics Table**

 **NOTE:** Reference *DTC P0103 - Mass Airflow Sensor Circuit High (Page 33)* for sensor cavity location.

## DTC P1107 - MANIFOLD ABSOLUTE PRESSURE BELOW MINIMUM THRESHOLD


### CONDITIONS FOR SETTING DTC P1107

- Engine Running
- Manifold Absolute Pressure Sensor  $\leq 0.73$  psi
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1107

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine Running at full operating temperature - Within VCM Live, open the MAP sensor DTC Minimum parameter, does the MAP sensor parameter display 0.73 psi or less?	$\leq 0.73$ psi	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the MAP sensor connector - Key ON - Does the MAP sensor parameter within VCM Live display less than 0.5 psi?	$\leq 0.5$ psi	Go to Step 3	Go to Step 5
3	- Probe the MAP ground connector cavity "A" (for Drive-By-Cable harness) cavity 2 (for Drive-By-Wire harness) with a test light connected to battery voltage - Does the test light come on?		Go to Step 4	Go to Step 6
4	- Check the MAP mechanical vacuum connection for correct mounting or any possible physical damage that may cause leakage - Any issues found?		Go to Step 5	Repair any issues found
5	- Key OFF - Disconnect the ECU connector "C" and inspect the terminals for any physical damage or corrosion and contamination - Any issues found?		Go to Step 6	Repair the pins as necessary and circuit.
6	- Replace the MAP sensor - Is the repair complete?		Go to Step 7	N/A

7	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>
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**Table 37. Manifold Absolute Pressure Below Minimum Threshold Diagnostics Table**

 **NOTE:** Reference *DTC P0108 - Manifold Absolute Pressure Sensor Circuit High (Page 38)* for sensor cavity location.

## DTC P1108 - MANIFOLD ABSOLUTE PRESSURE ABOVE MAXIMUM THRESHOLD


### CONDITIONS FOR SETTING DTC P1108

- Engine Running
- Manifold Absolute Pressure Sensor  $\geq 14.94$
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1108

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine Running at full operating temperature - Within VCM Live, open the MAP sensor DTC Maximum parameter, does the MAP sensor parameter display 14.94 psi or greater?	$\geq 14.94$	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key OFF - Disconnect the MAP sensor connector - Key ON - Does the MAP sensor parameter within VCM Live display less than 0.5 psi?	$\leq 0.5$	Go to Step 3	Go to Step 5
3	- Probe the MAP ground connector cavity "A" (for Drive-By-Cable harness) cavity 2 (for Drive-By-Wire harness) with a test light connected to battery voltage - Does the test light come on?		Go to Step 4	Go to Step 6
4	- Check the MAP mechanical vacuum connection for correct mounting or any possible physical damage that may cause leakage - Any issues found?		Go to Step 5	Repair any issues found
5	- Key OFF - Disconnect the ECU connector "C" and inspect the terminals for any physical damage or corrosion and contamination - Any issues found?		Go to Step 6	Repair the pins as necessary and circuit.
6	- Replace the MAP sensor - Is the repair complete?		Go to Step 7	N/A

7	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>
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**Table 38. Manifold Absolute Pressure Above Maximum Threshold Diagnostics Table**

 **NOTE:** Reference *DTC P0108 - Manifold Absolute Pressure Sensor Circuit High (Page 38)* for sensor cavity location.

## DTC P1112 - INTAKE AIR TEMPERATURE BELOW MINIMUM THRESHOLD

### CONDITIONS FOR SETTING DTC P1112

- Engine Running
- Intake Air Temperature Sensor  $\leq -31$  °F
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1112



**NOTE:** This DTC will be triggered when the air intake is much hotter than normal. The most common cause of low air intake temperature is when a problem with the air intake system is present. Ensure the air intake system is free from any and all obstructions, contamination, and physical damage.



**NOTE:** If none of the above are present, follow the Diagnostic steps for **DTC P0112**.

## DTC P1113 - INTAKE AIR TEMPERATURE ABOVE MAXIMUM THRESHOLD

### CONDITIONS FOR SETTING DTC P1113

- Engine Running
- Intake Air Temperature Sensor  $\geq$  -293 °F
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1113



**NOTE:** This DTC will be triggered when the air intake is much hotter than normal. The most common cause of high air intake temperature is when a problem with the air intake system is present. Ensure the air intake system is free from any and all obstructions, contamination, and physical damage.



**NOTE:** If none of the above are present, follow the Diagnostic steps for **DTC P0113**.



## DTC P1117 - ENGINE COOLANT TEMPERATURE BELOW MINIMUM THRESHOLD

### CONDITIONS FOR SETTING DTC P1117

- Engine Running
- Engine Coolant Temperature Sensor  $\leq -40$  °F
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1117

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine Running - Ensure engine is running at normal operating temperature and then run the engine above 1200 RPM for at least 30 seconds - Within VCM Live, open the ECT sensor DTC Minimum parameter, does the ECT sensor parameter display -40 °F or less?	$\leq -40$ °F	Go to Step 2	
2	- Verify with a temperature gauge that the engine coolant is below 205 °F $\pm$ 10 - Does the temperature gauge indicate 205 °F or less?	$\leq -205$ °F	Repair cooling system	Go to Step 3
3	- If the above steps did not correct the issue, see diagnostic steps for <b>DTC P0117</b>		N/A	N/A

**Table 39. Engine Coolant Temperature Below Minimum Threshold Diagnostics Table**

## DTC P1118 - ENGINE COOLANT TEMPERATURE ABOVE MAXIMUM THRESHOLD

### CONDITIONS FOR SETTING DTC P1118

- Engine Running
- Engine Coolant Temperature Sensor  $\geq 302$  °F
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1118

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine Running - Ensure engine is running at normal operating temperature and then run the engine above 1200 RPM for at least 30 seconds - Within VCM Live, open the ECT sensor DTC Maximum parameter, does the ECT sensor parameter display 302 °F or greater?	$\geq 302$ °F	Go to Step 2	
2	- Verify with a temperature gauge that the engine coolant is above 215 °F $\pm 10$ - Does the temperature gauge indicate 215 °F or greater?	$\geq 215$ °F	Repair cooling system	Go to Step 3
3	- If the above steps did not correct the issue, see diagnostic steps for <b>DTC P0118</b>		N/A	N/A

**Table 40. Engine Coolant Temperature Above Maximum Threshold Diagnostics Table**

## **DTC P1122 - THROTTLE POSITION 2 BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1122**

- Engine Running
- Throttle Position 2 Sensor  $\leq 0.00\%$
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1122

## **DTC P1123 - THROTTLE POSITION 2 ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1123**

- Engine Running
- Throttle Position 2 Sensor  $\geq$  100%
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1123

## DTC P1127 - ACCELERATION PEDAL 1 SENSOR CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P1127

- Engine Running
- Acceleration Pedal 1 Sensor  $\leq$  0.1 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1127

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine OFF - Within VCM Live, open the Accel Pedal 1 sensor DTC Minimum parameter, does the Accel Pedal 1 sensor parameter display 0.1 volts or less?	$\leq$ 0.1 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Slowly increase the acceleration pedal while observing the Accel Pedal 1 sensor voltage - Does the parameter ever display 0.1 volts or less?	$\leq$ 0.1 volts	Go to Step 3	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
3	- Disconnect the APP sensor connector and the ECU connector 'D' - Check for continuity between the APP sensor connector cavity 'B' and ECU connector 'D' pin 20 - Do you have continuity between them?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Disconnect the APP sensor connector and the ECU connector 'C' - Check for continuity between the APP sensor signal connector cavity 'E' and ECU connector 'C' pin 11 - Do you have continuity between them?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
5	- Disconnect the APP sensor connector and the ECU connector 'C' & 'D' - Check for continuity between both APP sensor 5 volt reference connector cavity 'C' & 'D' and ECU connector 'C' pin 11 & Connector 'D' pin 11		Go to Step 6	Repair the circuit as necessary, locate any wires that need to be repaired or replaced

	- Do you have continuity between them?			
6	- Inspect all pins and terminals for any corrosion, physical damage, and contamination - Any issues found?		Repair any pins or terminals that have been damaged.	Go to Step 7
7	- Replace the ACC Pedal 1 Sensor - Is the replacement complete?		Go to Step 8	N/A
8	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 41. Acceleration Pedal 1 Sensor Circuit Low Diagnostics Table**

## DTC P1128 - ACCELERATION PEDAL 1 SENSOR CIRCUIT HIGH

### CONDITIONS FOR SETTING DTC P1128

- Engine Running
- Acceleration Pedal 1 Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1128

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine OFF - Within VCM Live, open the Accel Pedal 1 sensor DTC Maximum parameter, does the Accel Pedal 1 sensor parameter display 4.9 volts or greater?	$\geq$ 4.9 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Slowly increase the acceleration pedal while observing the Accel Pedal 1 sensor voltage - Does the parameter ever display 4.9 volts or greater?	$\geq$ 4.9 volts	Go to Step 3	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
3	- Disconnect the APP sensor connector and the ECU connector 'D' - Check for continuity between the APP sensor connector cavity 'B' and ECU connector 'D' pin 20 - Do you have continuity between them?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Disconnect the APP sensor connector and the ECU connector 'C' - Check for continuity between the APP sensor signal connector cavity 'E' and ECU connector 'C' pin 11 - Do you have continuity between them?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
5	- Disconnect the APP sensor connector and the ECU connector 'C' & 'D' - Check for continuity between both APP sensor 5 volt reference connector cavity 'C' & 'D' and ECU connector 'C' pin 11 & Connector 'D' pin 11		Go to Step 6	Repair the circuit as necessary, locate any wires that need to be repaired or replaced

	- Do you have continuity between them?			
6	- Inspect all pins and terminals for any corrosion, physical damage, and contamination - Any issues found?		Repair any pins or terminals that have been damaged.	Go to Step 7
7	- Replace the ACC Pedal 1 Sensor - Is the replacement complete?		Go to Step 8	N/A
8	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 42. Acceleration Pedal 1 Sensor Circuit High Diagnostics Table**



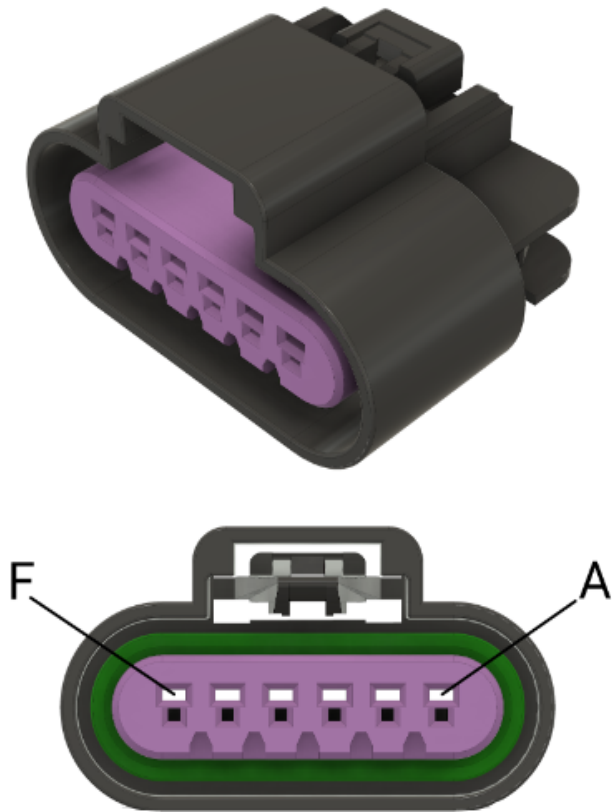


Figure 15. Drive-By-Wire Acceleration Pedal Sensor Cavity Connector Location

## **DTC P1129 - ACCELERATION PEDAL 2 BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1129**

- Engine Running
- Acceleration Pedal 2 Sensor  $\leq 0.00\%$
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1129

## **DTC P1130 - ACCELERATION PEDAL 2 ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1130**

- Engine Running
- Acceleration Pedal 2 Sensor  $\geq$  100%
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1130

## **DTC P1131 - LAMBDA BANK 1 SENSOR 1 BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1131**

- Engine Running
- Lambda Bank 1 Sensor 1  $\leq 0.700$
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1131

## **DTC P1132 - LAMBDA BANK 1 SENSOR 1 ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1132**

- Engine Running
- Lambda Bank 1 Sensor 1  $\geq$  12.0
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1132

## **DTC P1151 - LAMBDA BANK 2 SENSOR 1 BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1151**

- Engine Running
- Lambda Bank 2 Sensor 1  $\leq 0.700$
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1151

## **DTC P1152 - LAMBDA BANK 2 SENSOR 1 ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1152**

- Engine Running
- Lambda Bank 2 Sensor 1  $\geq$  12.0
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1152

## **DTC P1178 - FLEX FUEL COMPOSITION BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1178**

- Engine Running
- Flex Fuel Composition Sensor  $\leq 0.0\%$
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1178



## **DTC P1179 - FLEX FUEL COMPOSITION ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1179**

- Engine Running
- Flex Fuel Composition Sensor  $\geq$  100%
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1179

## **DTC P1226 - THROTTLE POSITION 1 ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1226**

- Engine Running
- Throttle Position 1 Sensor  $\geq$  100%
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1226

## **DTC P1227 - THROTTLE POSITION 1 BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1227**

- Engine Running
- Throttle Position 1 Sensor  $\leq 0.0\%$
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1227

## DTC P1228 - BAROMETRIC PRESSURE BELOW MINIMUM THRESHOLD

### CONDITIONS FOR SETTING DTC P1228

- Engine Running
- Barometric Pressure Sensor  $\leq$  1.51 psi
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1228

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the Baro sensor DTC Minimum parameter, does the Baro sensor parameter display 1.51 psi or less?	$\leq$ 1.51 psi	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Disconnect the Baro pressure sensor connector and ECU connector 'C' - Check for continuity between Baro pressure sensor low reference cavity 1 and ECU ground C12-1 - Do you have continuity?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Disconnect the Baro pressure sensor connector and ECU connector 'C' - Check for continuity between Baro pressure sensor 5 volt reference cavity 2 and ECU 5v C12-2 - Do you have continuity?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Disconnect the Baro pressure sensor connector and ECU connector 'C' - Check for continuity between Baro pressure sensor signal cavity 3 and ECU connector 'C' pin 29 - Do you have continuity?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
5	- Disconnect the Baro pressure sensor connector and ECU connector 'C' - Check for any physical damage, corrosion, or contamination of any of the pins		Repair any pins and circuit as necessary.	Go to Step 6

	- Any issues found?			
6	- Replace the Baro Pressure Sensor - Is the replacement complete?		Go to Step 7	N/A
7	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 43. Barometric Pressure Below Minimum Threshold Diagnostics Table**

## DTC P1229 - BAROMETRIC PRESSURE ABOVE MAXIMUM THRESHOLD

### CONDITIONS FOR SETTING DTC P1229

- Engine Running
- Barometric Pressure Sensor  $\geq$  14.94 psi
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1229

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the Baro sensor DTC Maximum parameter, does the Baro sensor parameter display 14.94 psi or greater?	$\geq$ 14.94 psi	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Disconnect the Baro pressure sensor connector and ECU connector 'C' - Check for continuity between Baro pressure sensor low reference cavity 1 and ECU ground C12-1 - Do you have continuity?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Disconnect the Baro pressure sensor connector and ECU connector 'C' - Check for continuity between Baro pressure sensor 5 volt reference cavity 2 and ECU 5v C12-2 - Do you have continuity?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Disconnect the Baro pressure sensor connector and ECU connector 'C' - Check for continuity between Baro pressure sensor signal cavity 3 and ECU connector 'C' pin 29 - Do you have continuity?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
5	- Disconnect the Baro pressure sensor connector and ECU connector 'C' - Check for any physical damage, corrosion, or contamination of any of the pins		Repair any pins and circuit as necessary.	Go to Step 6

	- Any issues found?			
6	- Replace the Baro Pressure Sensor - Is the replacement complete?		Go to Step 7	N/A
7	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

Table 44. Barometric Pressure Above Maximum Threshold Diagnostics Table

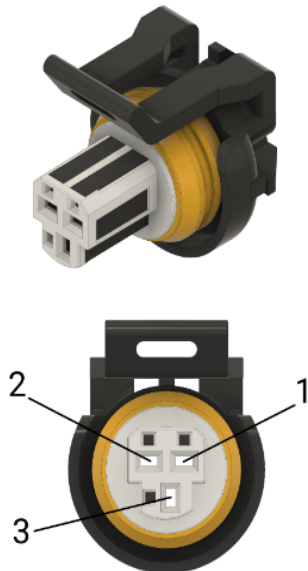


Figure 16. Barometric Pressure Sensor Cavity Connector Location

## **DTC P1347 - NITROUS PRESSURE SENSOR CIRCUIT LOW**

### **CONDITIONS FOR SETTING DTC P1347**

- Engine Running
- Nitrous Pressure Sensor  $\leq$  0.1 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1347



## **DTC P1348 - NITROUS PRESSURE SENSOR CIRCUIT HIGH**

### **CONDITIONS FOR SETTING DTC P1348**

- Engine Running
- Nitrous Pressure Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1348

## **DTC P1350 - DOME (CO<sub>2</sub>) PRESSURE BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1350**

- Engine Running
- Dome Pressure Sensor  $\leq 0.0$  kPa
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1350

## **DTC P1351 - DOME (CO<sub>2</sub>) PRESSURE ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1351**

- Engine Running
- Dome Pressure Sensor  $\geq$  600 kPa
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1351

## **DTC P1360 - DOME (CO<sub>2</sub>) PRESSURE SENSOR CIRCUIT LOW**

### **CONDITIONS FOR SETTING DTC P1360**

- Engine Running
- Dome Pressure Sensor  $\leq$  0.1 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1360

## **DTC P1361 - DOME (CO<sub>2</sub>) PRESSURE SENSOR CIRCUIT HIGH**

### **CONDITIONS FOR SETTING DTC P1361**

- Engine Running
- Dome Pressure Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1361

## DTC P1362 - FUEL PRESSURE BELOW MINIMUM THRESHOLD

### CONDITIONS FOR SETTING DTC P1362

- Engine Running
- Fuel Pressure Sensor  $\leq$  0.0 psi
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1362

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine Running - Within VCM Live, open the Fuel Pressure sensor DTC Minimum parameter, does the Fuel Pressure sensor parameter display 0.0 psi or less?	$\leq$ 0.0 psi	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Check the fuel pressure using a manual fuel pressure gauge - Does the manual fuel pressure gauge read 0.0 psi or less?	$\leq$ 0.0 psi	Go to Step 3	Go to Step 4
3	- Check the fuel pressure hoses for proper installation, routing, and blockages - Any issues found?		Repair the hoses as necessary	Go to Step 4
4	- Replace the fuel pressure sensor - Is the replacement complete?		Go to Step 5	N/A
5	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

Table 45. Fuel Pressure Below Minimum Threshold Diagnostics Table

## DTC P1363 - FUEL PRESSURE ABOVE MAXIMUM THRESHOLD

### CONDITIONS FOR SETTING DTC P1363

- Engine Running
- Fuel Pressure Sensor  $\geq 2,900.75$  psi
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1363

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine Running - Within VCM Live, open the Fuel Pressure sensor DTC Maximum parameter, does the Fuel Pressure sensor parameter display 2,900.75 psi or greater?	$\geq 2,900.75$ psi	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Check the fuel pressure using a manual fuel pressure gauge - Does the manual fuel pressure gauge read 2,900.75 psi or greater?	$\geq 2,900.75$ psi	Go to Step 3	Go to Step 4
3	- Check the fuel pressure hoses for proper installation, routing, and blockages - Any issues found?		Repair the hoses as necessary	Go to Step 4
4	- Replace the fuel pressure sensor - Is the replacement complete?		Go to Step 5	N/A
5	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

Table 46. Fuel Pressure Above Maximum Threshold Diagnostics Table

## **DTC P1364 - FUEL PRESSURE SENSOR CIRCUIT LOW**

### **CONDITIONS FOR SETTING DTC P1364**

- Engine Running
- Fuel Pressure Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1364



## **DTC P1365 - FUEL PRESSURE SENSOR CIRCUIT HIGH**

### **CONDITIONS FOR SETTING DTC P1365**

- Engine Running
- Fuel Pressure Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1365

## **DTC P1366 - NITROUS PRESSURE BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1366**

- Engine Running
- Nitrous Pressure Sensor  $\leq$  0.1 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1366

## **DTC P1367 - NITROUS PRESSURE ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1367**

- Engine Running
- Nitrous Pressure Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1367

## DTC P1522 - OIL PRESSURE BELOW MINIMUM THRESHOLD

### CONDITIONS FOR SETTING DTC P1522

- Engine Running
- Oil Pressure Sensor  $\leq$  0.0 psi
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1522

Step	Action	Value (s)	YES	NO
1	- Use a mechanical oil pressure gauge to verify the oil pressure - Does the mechanical gauge read 0.0 psi or less?	$\leq$ 0.0 psi	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key ON - Disconnect the Oil Pressure sensor connector - With a DVOM check cavity 2 the 5 volt reference from the ECU - Do you have 4.5 volts from cavity 2?	4.5 volts	Go to Step 4	Go to Step 3
3	- Disconnect the ECU connector 'C' - With a DVOM check the 5 volt reference connector 'C' pin 18 (for Drive-By-Cable harness) & Pin 41 (for Drive-By-Wire harness) - Do you have 5 volts coming from the ECU side?		Repair faulty wiring between the ECU and Oil Pressure Sensor	Go to Step 4
4	- Replace the oil pressure sensor - Is the replacement complete?		Go to Step 5	N/a
5	- Clear any DTC from the ECU		System is now operational and ready	Contact <b>HP</b>

	<ul style="list-style-type: none"> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		<p>to be tuned</p>	<p><b>Tuners Support</b></p>
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**Table 47. Oil Pressure Below Minimum Threshold Diagnostics Table**

## DTC P1523 - OIL PRESSURE ABOVE MAXIMUM THRESHOLD

### CONDITIONS FOR SETTING DTC P1523

- Engine Running
- Oil Pressure Sensor  $\geq$  145.04 psi
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1523

Step	Action	Value (s)	YES	NO
1	<ul style="list-style-type: none"> <li>- Use a mechanical oil pressure gauge to verify the oil pressure</li> <li>- Does the mechanical gauge read 145.04 psi or greater?</li> </ul>	$\geq$ 145.04 psi	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	<ul style="list-style-type: none"> <li>- Key ON</li> <li>- Disconnect the Oil Pressure sensor connector</li> <li>- With a DVOM check cavity 2 the 5 volt reference from the ECU</li> <li>- Do you have 4.5 volts from cavity 2?</li> </ul>	4.5 volts	Go to Step 4	Go to Step 3
3	<ul style="list-style-type: none"> <li>- Disconnect the ECU connector "C"</li> <li>- With a DVOM check the 5 volt reference connector "C" pin 18 (for Drive-By-Cable harness) &amp; Pin 41 (for Drive-By-Wire harness)</li> <li>- Do you have 5 volts coming from the ECU side?</li> </ul>		Repair faulty wiring between the ECU and Oil Pressure Sensor	Go to Step 4
4	<ul style="list-style-type: none"> <li>- Replace the oil pressure sensor</li> <li>- Is the replacement complete?</li> </ul>		Go to Step 5	N/a
5	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners</b>

	<p>30 seconds</p> <ul style="list-style-type: none"> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>			<p><b>Support</b></p>
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**Table 48. Oil Pressure Above Maximum Threshold Diagnostics Table**

 **NOTE:** Reference *DTC P0523 - Oil Pressure Sensor Circuit High (Page 87)* for sensor cavity location.

## **DTC P1532 - AIR CONDITIONER REFRIGERANT PRESSURE BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1532**

- Engine Running
- Air Conditioner Refrigerant Pressure Sensor  $\leq$  1.51 psi
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1532



## **DTC P1533 - AIR CONDITIONER REFRIGERANT PRESSURE ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1533**

- Engine Running
- Air Conditioner Refrigerant Pressure Sensor  $\geq$  14.69 psi
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1533

## **DTC P1537 - AIR CONDITIONER REFRIGERANT TEMPERATURE BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1537**

- Engine Running
- Air Conditioner Refrigerant Temperature Sensor  $\leq -40^{\circ}\text{F}$
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1537

## **DTC P1538 - AIR CONDITIONER REFRIGERANT TEMPERATURE ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P1538**

- Engine Running
- Air Conditioner Refrigerant Temperature Sensor  $\geq 302^{\circ}\text{F}$
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1538

## DTC P1712 - TRANSMISSION OIL TEMPERATURE BELOW MINIMUM THRESHOLD


### CONDITIONS FOR SETTING DTC P1712

- Engine Running
- Transmission Oil Temperature Sensor  $\leq -40$  °F
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1712

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the Trans Temp sensor DTC Minimum parameter, does the Trans Temp sensor parameter display -40 °F or less?	$\leq -40$ °F	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Disconnect the trans Oil Temp sensor connector and the sub harness connector - With a DVOM check for continuity between the trans fluid temp signal pin 1 & cavity "L"		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Disconnect the trans Oil Temp sensor connector and the sub harness connector - With a DVOM check for continuity between the trans fluid temp low reference pin 12 & cavity "M"		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Inspect the Trans Temp Sensor connector and pins for corrosion, contamination or any physical damage. - Any issues found?		Repair any issues found and retest.	Go to Step 5
5	- Replace the Trans Temp Sensor - Is the replacement complete?		Go to Step 6	N/A
6	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

	<ul style="list-style-type: none"> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>			
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**Table 49. Transmission Oil Temperature Minimum Threshold Diagnostics Table**

 **NOTE:** Reference *DTC P1843 - Transmission Line Pressure Above Maximum Threshold (Page 170)* for sensor cavity location.

## DTC P1713 - TRANSMISSION OIL TEMPERATURE ABOVE MAXIMUM THRESHOLD


### CONDITIONS FOR SETTING DTC P1713

- Engine Running
- Transmission Oil Temperature Sensor  $\geq 302$  °F
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1713

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the Trans Temp sensor DTC Maximum parameter, does the Trans Temp sensor parameter display 302 °F or greater?	$\geq 302$ °F	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Disconnect the trans Oil Temp sensor connector and the sub harness connector - With a DVOM check for continuity between the trans fluid temp signal pin 1 & cavity "L"		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Disconnect the trans Oil Temp sensor connector and the sub harness connector - With a DVOM check for continuity between the trans fluid temp low reference pin 12 & cavity "M"		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Inspect the Trans Temp Sensor connector and pins for corrosion, contamination or any physical damage. - Any issues found?		Repair any issues found and retest.	Go to Step 5
5	- Replace the Trans Temp Sensor - Is the replacement complete?		Go to Step 6	N/A
6	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

	<ul style="list-style-type: none"> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>			
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**Table 50. Transmission Oil Temperature Above Maximum Threshold Diagnostics Table**

 **NOTE:** Reference *DTC P1843 - Transmission Line Pressure Above Maximum Threshold (Page 170)* for sensor cavity location.

## DTC P1842 - TRANSMISSION LINE PRESSURE BELOW MINIMUM THRESHOLD

### CONDITIONS FOR SETTING DTC P1842

- Engine Running
- Transmission Line Pressure Sensor  $\leq$  1.51 psi
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1842

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the Trans Pressure Sensor DTC Minimum parameter, does the Trans pressure sensor parameter display 1.51 psi or less?	$\leq$ 1.51 psi	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Disconnect the trans line pressure sensor connector and the sub harness connector - With a DVOM check for continuity between the trans pressure control solenoid valve pin 3 & cavity "C"		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Disconnect the trans line pressure sensor connector and the sub harness connector - With a DVOM check for continuity between the trans line pressure low reference pin 12 & cavity "D"		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Inspect the Trans Line pressure Sensor connector and pins for corrosion, contamination or any physical damage. - Any issues found?		Repair any issues found and retest.	Go to Step 5
5	- Replace the Trans Pressure Sensor - Is the replacement complete?		Go to Step 6	N/A
6	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>



	bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?			
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**Table 51. Transmission Line Pressure Below Minimum Threshold Diagnostics Table**

 **NOTE:** Reference *DTC P1843 - Transmission Line Pressure Above Maximum Threshold (Page 170)* for sensor cavity location.

## DTC P1843 - TRANSMISSION LINE PRESSURE ABOVE MAXIMUM THRESHOLD

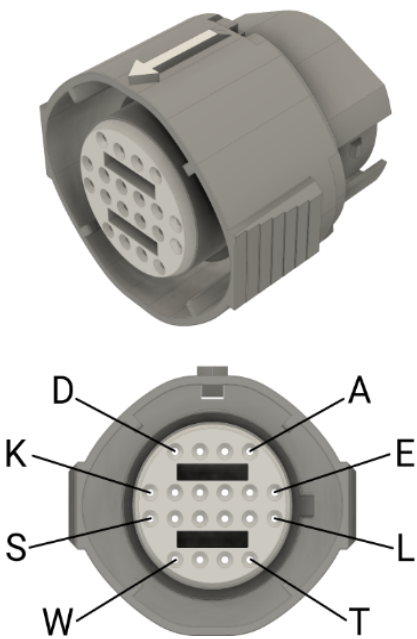
### CONDITIONS FOR SETTING DTC P1843

- Engine Running
- Transmission Line Pressure Sensor  $\geq$  14.69 psi
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P1843

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the Trans Pressure Sensor DTC Maximum parameter, does the Trans pressure sensor parameter display 14.69 psi or greater?	$\geq$ 14.69 psi	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Disconnect the trans line pressure sensor connector and the sub harness connector - With a DVOM check for continuity between the trans pressure control solenoid valve pin 3 & cavity "C"		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- Disconnect the trans line pressure sensor connector and the sub harness connector - With a DVOM check for continuity between the trans line pressure low reference pin 12 & cavity "D"		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Inspect the Trans Line pressure Sensor connector and pins for corrosion, contamination or any physical damage. - Any issues found?		Repair any issues found and retest.	Go to Step 5
5	- Replace the Trans Pressure Sensor - Is the replacement complete?		Go to Step 6	N/A
6	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

	bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?			
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**Table 52. Transmission Line Pressure Above Maximum Threshold Diagnostics Table**



**Figure 17. 4l60e & 4L80E Sensor Cavity Connector Location**

## DTC P2109 - ELECTRONIC THROTTLE OVERRIDE

### CONDITIONS FOR SETTING DTC P2109

- Engine Running
- Parameter "Electronic Throttle Override Enabled" set to "Yes"
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P2109



When parameter "Electronic Throttle Override Enabled" is set to "Yes", the vehicles fuel & spark will be shut down.

## DTC P2122 - THROTTLE POSITION 2 SENSOR CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P2122

- Engine Running
- Throttle Position 2 Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P2122

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine OFF - Within VCM Live, open the TPS 2 DTC Minimum parameter, does the TPS sensor parameter display 0.1 volts or less?	$\leq 0.1$ volts	Go to Step 3	Go to Step 2
2	- Slowly depress the foot pedal while observing the TPS voltage parameter within VCM Live - Does the TPS voltage ever fall below 0.2 volts?	$\leq 0.2$ volts	Go to Step 3	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
3	- Key OFF - Disconnect the TPS connector and jump the 5 volt reference cavity 1 & the TPS signal cavity 3 together at the TPS connector - Key ON - Does the TPS parameter within VCM live display a voltage of 4.0 volts or greater?		Go to Step 6	Go to Step 4
4	- Key OFF - Disconnect the ECU harness connector "C" - Using a DVOM check continuity between the TPS connector signal cavity 3 & the ECU connector "C" pin 25 - Do you have continuity between them?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced

5	<ul style="list-style-type: none"> <li>- Replace the ECU</li> <li>- Is the replacement complete?</li> </ul>		Go to Step 8	N/A
6	<ul style="list-style-type: none"> <li>- Inspect the TPS wire harness connector terminals for corrosion or contamination</li> <li>- Any issues found?</li> </ul>		Repair the circuit as necessary and fix any pins with corrosion or contamination	Go to Step 7
7	<ul style="list-style-type: none"> <li>- Replace the TPS</li> <li>- Is the replacement complete?</li> </ul>		Go to Step 8	N/A
8	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 53. Throttle Position 2 Sensor Circuit Low Diagnostics Table**

## DTC P2123 - THROTTLE POSITION 2 SENSOR CIRCUIT HIGH

### CONDITIONS FOR SETTING DTC P2123

- Engine Running
- Throttle Position 2 Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P2123

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine OFF - Within VCM Live, open the TPS 2 DTC Maximum parameter, does the TPS sensor parameter display 4.9 volts or greater?	$\geq$ 4.9 volts	Go to Step 3	Go to Step 2
2	- Slowly depress the foot pedal while observing the TPS voltage parameter within VCM Live - Does the TPS voltage ever fall below 0.2 volts?	$\leq$ 0.2 volts	Go to Step 3	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
3	- Key OFF - Disconnect the TPS connector and jump the 5 volt reference cavity 1 & the TPS signal cavity 3 together at the TPS connector - Key ON - Does the TPS parameter within VCM live display a voltage of 4.0 volts or greater?		Go to Step 6	Go to Step 4
4	- Key OFF - Disconnect the ECU harness connector 'C' - Using a DVOM check continuity between the TPS connector signal cavity 3 & the ECU connector 'C' pin 25 - Do you have continuity between them?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced

5	<ul style="list-style-type: none"> <li>- Replace the ECU</li> <li>- Is the replacement complete?</li> </ul>		Go to Step 8	N/A
6	<ul style="list-style-type: none"> <li>- Inspect the TPS wire harness connector terminals for corrosion or contamination</li> <li>- Any issues found?</li> </ul>		Repair the circuit as necessary and fix any pins with corrosion or contamination	Go to Step 7
7	<ul style="list-style-type: none"> <li>- Replace the TPS</li> <li>- Is the replacement complete?</li> </ul>		Go to Step 8	N/A
8	<ul style="list-style-type: none"> <li>- Clear any DTC from the ECU</li> <li>- Turn the ignition off and wait 30 seconds</li> <li>- Start the engine and operate the engine to full operating temperature</li> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 54. Throttle Position 2 Sensor Circuit High Diagnostics Table**

**NOTE:** Reference *DTC P0228 - Throttle Position 1 Sensor Circuit High (Page 70)*



## **DTC P2129 - ACCELERATION PEDAL 1 BELOW MINIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P2129**

- Engine Running
- Acceleration Pedal 1 Sensor  $\leq 0\%$
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P2129

## **DTC P2130 - ACCELERATION PEDAL 1 ABOVE MAXIMUM THRESHOLD**

### **CONDITIONS FOR SETTING DTC P2130**

- Engine Running
- Acceleration Pedal 1 Sensor  $\geq$  100 %
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P2130

## DTC P2132 - ACCELERATION PEDAL POSITION 2 SENSOR CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P2132

- Engine Running
- Acceleration Pedal Position 2 Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P2132

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine OFF - Within VCM Live, open the Accel Pedal 2 Sensor DTC Minimum parameter, does the Accel Pedal 1 sensor parameter display 0.1 volts or less?	$\leq 0.1$ volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Slowly increase the acceleration pedal while observing the Accel Pedal 2 sensor voltage - Does the parameter ever display 0.1 volts or less?	$\leq 0.1$ volts	Go to Step 3	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
3	- Disconnect the APP sensor connector and the ECU connector 'D' - Check for continuity between the APP sensor connector cavity 'B' and ECU connector 'D' pin 20 - Do you have continuity between them?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Disconnect the APP sensor connector and the ECU connector 'C' - Check for continuity between the APP sensor signal connector cavity 'E' and ECU connector 'C' pin 11 - Do you have continuity between them?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
5	- Disconnect the APP sensor connector and the ECU connector 'C' & 'D' - Check for continuity between both APP sensor 5 volt reference connector cavity 'C' & 'D' and ECU connector 'C' pin 11 & Connector 'D' pin 11		Go to Step 6	Repair the circuit as necessary, locate any wires that need to be repaired or replaced

	- Do you have continuity between them?			
6	- Inspect all pins and terminals for any corrosion, physical damage, and contamination - Any issues found?		Repair any pins or terminals that have been damaged.	Go to Step 7
7	- Replace the ACC Pedal 1 Sensor - Is the replacement complete?		Go to Step 8	N/A
8	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 55. Acceleration Pedal Position 2 Sensor Circuit Low Diagnostics Table**

## DTC P2133 - ACCELERATION PEDAL POSITION 2 SENSOR CIRCUIT HIGH

### CONDITIONS FOR SETTING DTC P2133

- Engine Running
- Acceleration Pedal Position 2 Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P2133

Step	Action	Value (s)	YES	NO
1	- Key ON, Engine OFF - Within VCM Live, open the Accel Pedal 2 sensor DTC Maximum parameter, does the Accel Pedal 1 sensor parameter display 4.9 volts or greater?	$\geq$ 4.9 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Slowly increase the acceleration pedal while observing the Accel Pedal 2 sensor voltage - Does the parameter ever display 4.9 volts or greater?	$\geq$ 4.9 volts	Go to Step 3	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
3	- Disconnect the APP sensor connector and the ECU connector 'D' - Check for continuity between the APP sensor connector cavity 'B' and ECU connector 'D' pin 20 - Do you have continuity between them?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Disconnect the APP sensor connector and the ECU connector 'C' - Check for continuity between the APP sensor signal connector cavity 'E' and ECU connector 'C' pin 11 - Do you have continuity between them?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
5	- Disconnect the APP sensor connector and the ECU connector 'C' & 'D' - Check for continuity between both APP sensor 5 volt reference connector cavity 'C' & 'D' and ECU connector 'C' pin 11 & Connector 'D' pin 11		Go to Step 6	Repair the circuit as necessary, locate any wires that need to be repaired or replaced

	- Do you have continuity between them?			
6	- Inspect all pins and terminals for any corrosion, physical damage, and contamination - Any issues found?		Repair any pins or terminals that have been damaged.	Go to Step 7
7	- Replace the ACC Pedal 1 Sensor - Is the replacement complete?		Go to Step 8	N/A
8	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the Menu bar in VCM Live - After operating the engine within the test parameters, check for any store codes - Does the engine operate without any stored DTC's?		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

**Table 56. Acceleration Pedal Position 2 Sensor Circuit High Diagnostics Table**

**NOTE:** Reference *DTC P1128 - Acceleration Pedal 1 Sensor Circuit High (Page 127)*

## DTC P2228 - BAROMETRIC PRESSURE SENSOR CIRCUIT LOW

### CONDITIONS FOR SETTING DTC P2228

- Engine Running
- Barometric Pressure Sensor  $\leq 0.1$  volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P2228

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the Baro sensor DTC Minimum voltage parameter, does the Baro sensor parameter display 0.1 volts or less?	$\leq 0.1$ volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key off - Disconnect the CORE connector 'C' - Check continuity between the Baro sensor connector signal cavity 3 and ECU baro signal connector 'C' pin 29 - Do you have continuity between them?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- check for continuity between the baro sensor connector 5 volt reference cavity 2 and ECU 5v C12-2 - Do you have continuity?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Check for continuity between the baro sensor connector low reference cavity 1 and ECU ground C12-1 - Do you have continuity?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
5	- Replace the baro sensor - Is the replacement complete?		Go to Step 6	N/A
6	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature - Observe the Check Engine Light on the		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

	<p>Menu bar in VCM Live</p> <ul style="list-style-type: none"><li>- After operating the engine within the test parameters, check for any store codes</li><li>- Does the engine operate without any stored DTC's?</li></ul>			
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**Table 57. Barometric Pressure Sensor Circuit Low Diagnostics Table**



## DTC P2229 - BAROMETRIC PRESSURE SENSOR CIRCUIT HIGH


### CONDITIONS FOR SETTING DTC P2229

- Engine Running
- Barometric Pressure Sensor  $\geq$  4.9 volts
- The above must be present for a period of 128 instances/cycles or greater to trigger DTC P2229

Step	Action	Value (s)	YES	NO
1	- Key on, Engine running - Within VCM Live, open the Baro sensor DTC Maximum voltage parameter, does the Baro sensor parameter display 4.9 volts or greater?	$\geq$ 4.9 volts	Go to Step 2	Intermittent Issue (Refer to <i>Intermittent Diagnostics</i> (Page 27))
2	- Key off - Disconnect the CORE connector 'C' - Check continuity between the Baro sensor connector signal cavity 3 and ECU baro signal connector 'C' pin 29 - Do you have continuity between them?		Go to Step 3	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
3	- check for continuity between the baro sensor connector 5 volt reference cavity 2 and ECU 5v C12-2 - Do you have continuity?		Go to Step 4	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
4	- Check for continuity between the baro sensor connector low reference cavity 1 and ECU ground C12-1 - Do you have continuity?		Go to Step 5	Repair the circuit as necessary, locate any wires that need to be repaired or replaced
5	- Replace the baro sensor - Is the replacement complete?		Go to Step 6	N/A
6	- Clear any DTC from the ECU - Turn the ignition off and wait 30 seconds - Start the engine and operate the engine to full operating temperature		System is now operational and ready to be tuned	Contact <b>HP Tuners Support</b>

	<ul style="list-style-type: none"> <li>- Observe the Check Engine Light on the Menu bar in VCM Live</li> <li>- After operating the engine within the test parameters, check for any store codes</li> <li>- Does the engine operate without any stored DTC's?</li> </ul>			
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**Table 58. Barometric Pressure Sensor Circuit High Diagnostics Table**

 **NOTE:** Reference *DTC P1229 - Barometric Pressure Above Maximum Threshold* (Page 142) for sensor cavity location.