<table>
<thead>
<tr>
<th>DTC</th>
<th>Component Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0112, P0113</td>
<td>IAT SENSOR</td>
<td>111</td>
</tr>
<tr>
<td>P0102, P0103</td>
<td>MAF SENSOR</td>
<td>103</td>
</tr>
<tr>
<td>P0093</td>
<td>FUEL SYSTEM</td>
<td>91</td>
</tr>
<tr>
<td>P0089</td>
<td>FUEL PUMP</td>
<td>89</td>
</tr>
<tr>
<td>P0088</td>
<td>FUEL SYSTEM</td>
<td>87</td>
</tr>
<tr>
<td>P0093</td>
<td>FUEL SYSTEM</td>
<td>91</td>
</tr>
<tr>
<td>P0101</td>
<td>MAF SENSOR</td>
<td>94</td>
</tr>
<tr>
<td>P0102, P0103</td>
<td>MAF SENSOR</td>
<td>103</td>
</tr>
<tr>
<td>P0117, P0118</td>
<td>ECT SENSOR</td>
<td>115</td>
</tr>
<tr>
<td>P0192, P0193</td>
<td>FRP SENSOR</td>
<td>128</td>
</tr>
<tr>
<td>P0201 - P0204</td>
<td>FUEL INJECTOR</td>
<td>133</td>
</tr>
<tr>
<td>P0116</td>
<td>CKP - CMP CORRELATION</td>
<td>85</td>
</tr>
<tr>
<td>P0088</td>
<td>FUEL PUMP</td>
<td>89</td>
</tr>
<tr>
<td>P0093</td>
<td>FUEL SYSTEM</td>
<td>91</td>
</tr>
<tr>
<td>P0101</td>
<td>MAF SENSOR</td>
<td>94</td>
</tr>
<tr>
<td>P0102, P0103</td>
<td>MAF SENSOR</td>
<td>103</td>
</tr>
<tr>
<td>P0200</td>
<td>FUEL INJECTOR</td>
<td>132</td>
</tr>
<tr>
<td>P0201 - P0204</td>
<td>FUEL INJECTOR</td>
<td>133</td>
</tr>
</tbody>
</table>
# DTC P0217 ENGINE OVER TEMPERATURE .......................... 138
Description ............................................................. 138
CONSULT-III Reference Value in Data Monitor ..... 138
Mode .................................................................. 138
On Board Diagnosis Logic .................................. 138
Overall Function Check ...................................... 139
Wiring Diagram ..................................................... 141
Diagnosis Procedure .......................................... 141
Main 12 Causes of Overheating ......................... 145
Component Inspection .......................................... 145
Removal and Installation ....................................... 172

# DTC P0341 CMP SENSOR .............................. 168
Description ............................................................. 168
CONSULT-III Reference Value in Data Monitor ..... 168
Mode .................................................................. 168
On Board Diagnosis Logic .................................. 168
DTC Confirmation Procedure ......................... 168
Wiring Diagram ..................................................... 169
Diagnosis Procedure .......................................... 170
Component Inspection .......................................... 172

# DTC P0341 CMP SENSOR .............................. 168
Description ............................................................. 168
CONSULT-III Reference Value in Data Monitor ..... 168
Mode .................................................................. 168
On Board Diagnosis Logic .................................. 168
DTC Confirmation Procedure ......................... 168
Wiring Diagram ..................................................... 169
Diagnosis Procedure .......................................... 170
Component Inspection .......................................... 172

# DTC P0335 CKP SENSOR .............................. 152
Description ............................................................. 152
CONSULT-III Reference Value in Data Monitor ..... 152
Mode .................................................................. 152
On Board Diagnosis Logic .................................. 152
DTC Confirmation Procedure ......................... 152
Wiring Diagram ..................................................... 153
Diagnosis Procedure .......................................... 154
Component Inspection .......................................... 156
Removal and Installation ....................................... 156

# DTC P0336 CKP SENSOR .............................. 157
Description ............................................................. 157
CONSULT-III Reference Value in Data Monitor ..... 157
Mode .................................................................. 157
On Board Diagnosis Logic .................................. 157
DTC Confirmation Procedure ......................... 157
Wiring Diagram ..................................................... 158
Diagnosis Procedure .......................................... 159
Component Inspection .......................................... 161
Removal and Installation ....................................... 162

# DTC P0340 CMP SENSOR .............................. 163
Description ............................................................. 163
CONSULT-III Reference Value in Data Monitor ..... 163
Mode .................................................................. 163
On Board Diagnosis Logic .................................. 163
DTC Confirmation Procedure ......................... 163
Wiring Diagram ..................................................... 164
Diagnosis Procedure .......................................... 165
Component Inspection .......................................... 166
Removal and Installation ....................................... 167

# DTC P0222, P0223 APP SENSOR ............... 147
Description ............................................................. 147
CONSULT-III Reference Value in Data Monitor ..... 147
Mode .................................................................. 147
On Board Diagnosis Logic .................................. 147
DTC Confirmation Procedure ......................... 147
Wiring Diagram ..................................................... 148
Diagnosis Procedure .......................................... 149
Component Inspection .......................................... 150
Removal and Installation ....................................... 151

# DTC P0222, P0223 APP SENSOR ............... 147
Description ............................................................. 147
CONSULT-III Reference Value in Data Monitor ..... 147
Mode .................................................................. 147
On Board Diagnosis Logic .................................. 147
DTC Confirmation Procedure ......................... 147
Wiring Diagram ..................................................... 148
Diagnosis Procedure .......................................... 149
Component Inspection .......................................... 150
Removal and Installation ....................................... 151

# DTC P0335 CKP SENSOR .............................. 152
Description ............................................................. 152
CONSULT-III Reference Value in Data Monitor ..... 152
Mode .................................................................. 152
On Board Diagnosis Logic .................................. 152
DTC Confirmation Procedure ......................... 152
Wiring Diagram ..................................................... 153
Diagnosis Procedure .......................................... 154
Component Inspection .......................................... 156
Removal and Installation ....................................... 156

# DTC P0335 CKP SENSOR .............................. 152
Description ............................................................. 152
CONSULT-III Reference Value in Data Monitor ..... 152
Mode .................................................................. 152
On Board Diagnosis Logic .................................. 152
DTC Confirmation Procedure ......................... 152
Wiring Diagram ..................................................... 153
Diagnosis Procedure .......................................... 154
Component Inspection .......................................... 156
Removal and Installation ....................................... 156

# DTC P0336 CKP SENSOR .............................. 157
Description ............................................................. 157
CONSULT-III Reference Value in Data Monitor ..... 157
Mode .................................................................. 157
On Board Diagnosis Logic .................................. 157
DTC Confirmation Procedure ......................... 157
Wiring Diagram ..................................................... 158
Diagnosis Procedure .......................................... 159
Component Inspection .......................................... 161
Removal and Installation ....................................... 162

# DTC P0340 CMP SENSOR .............................. 163
Description ............................................................. 163
CONSULT-III Reference Value in Data Monitor ..... 163
Mode .................................................................. 163
On Board Diagnosis Logic .................................. 163
DTC Confirmation Procedure ......................... 163
Wiring Diagram ..................................................... 164
Diagnosis Procedure .......................................... 165
Component Inspection .......................................... 166
Removal and Installation ....................................... 167

# DTC P0341 CMP SENSOR .............................. 168
Description ............................................................. 168
CONSULT-III Reference Value in Data Monitor ..... 168
Mode .................................................................. 168
On Board Diagnosis Logic .................................. 168
DTC Confirmation Procedure ......................... 168
Wiring Diagram ..................................................... 169
Diagnosis Procedure .......................................... 170
Component Inspection .......................................... 172

# DTC P0341 CMP SENSOR .............................. 168
Description ............................................................. 168
CONSULT-III Reference Value in Data Monitor ..... 168
Mode .................................................................. 168
On Board Diagnosis Logic .................................. 168
DTC Confirmation Procedure ......................... 168
Wiring Diagram ..................................................... 169
Diagnosis Procedure .......................................... 170
Component Inspection .......................................... 172

# DTC P0380 GLOW RELAY .......................... 173
Description ............................................................. 173
CONSULT-III Reference Value in Data Monitor ..... 173
Mode .................................................................. 173
On Board Diagnosis Logic .................................. 173
DTC Confirmation Procedure ......................... 173
Wiring Diagram ..................................................... 174
Diagnosis Procedure .......................................... 174
Component Inspection .......................................... 176

# DTC P0403 EGR SYSTEM ............................. 177
Description ............................................................. 177
CONSULT-III Reference Value in Data Monitor ..... 177
Mode .................................................................. 177
On Board Diagnosis Logic .................................. 177
DTC Confirmation Procedure ......................... 177
Wiring Diagram ..................................................... 179
Diagnosis Procedure .......................................... 180
Removal and Installation ....................................... 183

# DTC P0405, P0406 EGR SENSOR .................. 184
Description ............................................................. 184
CONSULT-III Reference Value in Data Monitor ..... 184
Mode .................................................................. 185
On Board Diagnosis Logic .................................. 185
DTC Confirmation Procedure ......................... 185
Wiring Diagram ..................................................... 186
Diagnosis Procedure .......................................... 187
Removal and Installation ....................................... 189

# DTC P0409 EGR SYSTEM ............................. 190
Description ............................................................. 190
CONSULT-III Reference Value in Data Monitor ..... 190
Mode .................................................................. 191
On Board Diagnosis Logic .................................. 191
DTC Confirmation Procedure ......................... 191
Wiring Diagram ..................................................... 192
Diagnosis Procedure .......................................... 193
Removal and Installation ....................................... 195

# DTC P0488 EGR SYSTEM ............................. 196
Description ............................................................. 196
CONSULT-III Reference Value in Data Monitor ..... 196
Mode .................................................................. 197
On Board Diagnosis Logic .................................. 197
DTC Confirmation Procedure ......................... 197
Wiring Diagram ..................................................... 198
Diagnosis Procedure .......................................... 199
Removal and Installation ....................................... 200

# DTC P0563 BATTERY VOLTAGE ..................... 201
Description ............................................................. 201
CONSULT-III Reference Value in Data Monitor ..... 201
Mode .................................................................. 201
On Board Diagnosis Logic .................................. 201
DTC Confirmation Procedure ......................... 201
Diagnosis Procedure .......................................... 201

# DTC P0606 ECM ............................................. 203
Description ............................................................. 203
CONSULT-III Reference Value in Data Monitor ..... 203
Mode .................................................................. 203
On Board Diagnosis Logic .................................. 203
DTC Confirmation Procedure ......................... 203
Diagnosis Procedure .......................................... 203

# DTC P0628, P0629 FUEL PUMP ......................
Description ............................................................. 218
CONSULT-III Reference Value in Data Monitor
Mode ................................................................. 218
On Board Diagnosis Logic ..................................... 218
DTC Confirmation Procedure ........................... 218
Wiring Diagram .................................................... 218
Diagnosis Procedure ........................................... 218

DTC P2135 APP SENSOR .................................. 257
CONSULT-III Reference Value in Data Monitor
Mode ................................................................. 257
On Board Diagnosis Logic .................................. 257
DTC Confirmation Procedure ........................... 257
Wiring Diagram .................................................... 257
Diagnosis Procedure ........................................... 257
Component Inspection ......................................... 257
Removal and Installation .................................... 257

DTC P2146, P2149 FUEL INJECTOR POWER
SUPPLY .......................................................... 262
CONSULT-III Reference Value in Data Monitor
Mode ................................................................. 262
On Board Diagnosis Logic .................................. 262
DTC Confirmation Procedure ........................... 262
Wiring Diagram .................................................... 262
Diagnosis Procedure ........................................... 262
Component Inspection ......................................... 262
Removal and Installation .................................... 262
CONSULT-III Reference Value in Data Monitor Mode ................................................................. 262
On Board Diagnosis Logic ........................................................................................................ 262
DTC Confirmation Procedure ...................................................................................................... 262
Wiring Diagram .......................................................................................................................... 263
Diagnosis Procedure ................................................................................................................. 265

DTC P2147, P2148 FUEL INJECTOR CIRCUIT ................................................................. 266
Component Description ............................................................................................................. 266
CONSULT-III Reference Value in Data Monitor Mode .............................................................. 266
On Board Diagnosis Logic ......................................................................................................... 266
DTC Confirmation Procedure .................................................................................................... 266
Wiring Diagram .......................................................................................................................... 267
Diagnosis Procedure ................................................................................................................. 269
Component Inspection ................................................................................................................ 270
Removal and Installation ............................................................................................................ 270

DTC P2228, P2229 BARO SENSOR ...................................................................................... 271
Description ................................................................................................................................. 271
On Board Diagnosis Logic ........................................................................................................ 271
DTC Confirmation Procedure .................................................................................................... 271
Diagnosis Procedure ................................................................................................................. 271

GLOW CONTROL SYSTEM ................................................................................................. 273
Description ................................................................................................................................. 273
Wiring Diagram .......................................................................................................................... 274
Diagnosis Procedure .................................................................................................................. 274
Component Inspection .............................................................................................................. 278
Removal and Inspection .............................................................................................................. 279

HEAT UP SWITCH .................................................................................................................. 280
Description ................................................................................................................................. 280
CONSULT-III Reference Value in Data Monitor Mode .............................................................. 280
Wiring Diagram .......................................................................................................................... 281
Diagnosis Procedure ................................................................................................................. 282
Component Inspection ................................................................................................................ 284

BRAKE SWITCH ...................................................................................................................... 285
Description ................................................................................................................................. 285
CONSULT-III Reference Value in Data Monitor Mode .............................................................. 285
Wiring Diagram .......................................................................................................................... 286
Diagnosis Procedure ................................................................................................................. 287
Component Inspection ................................................................................................................ 288

PNP SWITCH ............................................................................................................................. 289
Description ................................................................................................................................. 289
CONSULT-III Reference Value in Data Monitor Mode .............................................................. 289
Wiring Diagram .......................................................................................................................... 290
Diagnosis Procedure ................................................................................................................. 291

START SIGNAL ....................................................................................................................... 293
Wiring Diagram .......................................................................................................................... 293
Diagnosis Procedure ................................................................................................................. 294

MI & DATA LINK CONNECTORS .............................................................................................. 296
Wiring Diagram .......................................................................................................................... 296

SERVICE DATA AND SPECIFICATIONS (SDS) ................................................................. 298
General Specification ................................................................................................................. 298
Mass Air Flow Sensor ................................................................................................................ 298
Intake Air Temperature Sensor ................................................................................................. 298
Engine Coolant Temperature Sensor ......................................................................................... 298
Fuel Rail Pressure Sensor .......................................................................................................... 298
Fuel Injector ............................................................................................................................... 298
Crankshaft Position Sensor ....................................................................................................... 298
Camshaft Position Sensor ......................................................................................................... 299
Glow Plug .................................................................................................................................... 299
Fuel Pump .................................................................................................................................... 299
Major Modification Item

- YD25DDTi (with common rail) engine has newly been added.
# INDEX FOR DTC

## U1000

<table>
<thead>
<tr>
<th>DTC*1</th>
<th>Items (CONSULT-III screen item)</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSULT-III GST*2</td>
<td>ECM*3</td>
<td>CAN COMM CIRCUIT</td>
</tr>
<tr>
<td>U1000</td>
<td>1000*4</td>
<td></td>
</tr>
</tbody>
</table>

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.
*2: This number is prescribed by ISO 15031-6.
*3: In Diagnostic Test Mode II (Self-diagnostic results).
*4: The troubleshooting for this DTC needs CONSULT-III.

## P0016 - P0123

<table>
<thead>
<tr>
<th>DTC*1</th>
<th>Items (CONSULT-III screen item)</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSULT-III GST*2</td>
<td>ECM*3</td>
<td></td>
</tr>
<tr>
<td>P0016</td>
<td>0016</td>
<td>CMP/CKP RELATION</td>
</tr>
<tr>
<td>P0088</td>
<td>0088</td>
<td>HIGH FUEL PRESS</td>
</tr>
<tr>
<td>P0089</td>
<td>0089</td>
<td>FUEL PUMP</td>
</tr>
<tr>
<td>P0093</td>
<td>0093</td>
<td>FUEL LEAK</td>
</tr>
<tr>
<td>P0101</td>
<td>0101</td>
<td>MAF SENSOR</td>
</tr>
<tr>
<td>P0102</td>
<td>0102</td>
<td>MAF SEN/CIRCUIT</td>
</tr>
<tr>
<td>P0103</td>
<td>0103</td>
<td>MAF SEN/CIRCUIT</td>
</tr>
<tr>
<td>P0112</td>
<td>0112</td>
<td>IAT SEN/CIRCUIT</td>
</tr>
<tr>
<td>P0113</td>
<td>0113</td>
<td>IAT SEN/CIRCUIT</td>
</tr>
<tr>
<td>P0117</td>
<td>0117</td>
<td>ECT SEN/CIRCUIT</td>
</tr>
<tr>
<td>P0118</td>
<td>0118</td>
<td>ECT SEN/CIRCUIT</td>
</tr>
<tr>
<td>P0122</td>
<td>0122</td>
<td>APP SEN 1/CIRCUIT</td>
</tr>
<tr>
<td>P0123</td>
<td>0123</td>
<td>APP SEN 1/CIRCUIT</td>
</tr>
</tbody>
</table>

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.
*2: This number is prescribed by ISO 15031-6.
*3: In Diagnostic Test Mode II (Self-diagnostic results).

## P0182 - P0217

<table>
<thead>
<tr>
<th>DTC*1</th>
<th>Items (CONSULT-III screen item)</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSULT-III GST*2</td>
<td>ECM*3</td>
<td></td>
</tr>
<tr>
<td>P0182</td>
<td>0182</td>
<td>FUEL TEMP SEN/CIRC</td>
</tr>
<tr>
<td>P0183</td>
<td>0183</td>
<td>FUEL TEMP SEN/CIRC</td>
</tr>
<tr>
<td>P0192</td>
<td>0192</td>
<td>FRP SEN/CIRC</td>
</tr>
<tr>
<td>P0193</td>
<td>0193</td>
<td>FRP SEN/CIRC</td>
</tr>
<tr>
<td>P0200</td>
<td>0200</td>
<td>INJECTOR</td>
</tr>
<tr>
<td>P0201</td>
<td>0201</td>
<td>CYL1 INJECTOR</td>
</tr>
<tr>
<td>P0202</td>
<td>0202</td>
<td>CYL2 INJECTOR</td>
</tr>
</tbody>
</table>
# INDEX FOR DTC

## CONSULT-III GST*2 ECM*3 (CONSULT-III screen item) Reference page

<table>
<thead>
<tr>
<th>DTC*1</th>
<th>Items</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0203</td>
<td>0203 CYL3 INJECTOR</td>
<td>EC-133</td>
</tr>
<tr>
<td>P0204</td>
<td>0204 CYL4 INJECTOR</td>
<td>EC-133</td>
</tr>
<tr>
<td>P0217</td>
<td>0217 ENG OVER TEMP</td>
<td>EC-138</td>
</tr>
</tbody>
</table>

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.
*2: This number is prescribed by ISO 15031-6.
*3: In Diagnostic Test Mode II (Self-diagnostic results).

## P0222 - P0488

<table>
<thead>
<tr>
<th>DTC*1</th>
<th>Items</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0222</td>
<td>0222 APP SEN 2/CIRCUIT</td>
<td>EC-147</td>
</tr>
<tr>
<td>P0223</td>
<td>0223 APP SEN 2/CIRCUIT</td>
<td>EC-147</td>
</tr>
<tr>
<td>P0335</td>
<td>0335 CKP SEN/CIRCUIT</td>
<td>EC-152</td>
</tr>
<tr>
<td>P0336</td>
<td>0336 CKP SENSOR</td>
<td>EC-157</td>
</tr>
<tr>
<td>P0340</td>
<td>0340 CMP SEN/CIRCUIT</td>
<td>EC-163</td>
</tr>
<tr>
<td>P0341</td>
<td>0341 CMP SENSOR</td>
<td>EC-168</td>
</tr>
<tr>
<td>P0380</td>
<td>0380 GLOW RELAY</td>
<td>EC-173</td>
</tr>
<tr>
<td>P0403</td>
<td>0403 EGR SYSTEM</td>
<td>EC-177</td>
</tr>
<tr>
<td>P0405</td>
<td>0405 EGR SENSOR</td>
<td>EC-184</td>
</tr>
<tr>
<td>P0406</td>
<td>0406 EGR SENSOR</td>
<td>EC-184</td>
</tr>
<tr>
<td>P0409</td>
<td>0409 EGR SYSTEM</td>
<td>EC-190</td>
</tr>
<tr>
<td>P0488</td>
<td>0488 EGR SYSTEM</td>
<td>EC-196</td>
</tr>
</tbody>
</table>

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.
*2: This number is prescribed by ISO 15031-6.
*3: In Diagnostic Test Mode II (Self-diagnostic results).

## P0563 - P0686

<table>
<thead>
<tr>
<th>DTC*1</th>
<th>Items</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0563</td>
<td>0563 BATTERY VOLTAGE</td>
<td>EC-201</td>
</tr>
<tr>
<td>P0606</td>
<td>0606 ECM</td>
<td>EC-203</td>
</tr>
<tr>
<td>P0628</td>
<td>0628 FUEL PUMP/CIRC</td>
<td>EC-205</td>
</tr>
<tr>
<td>P0629</td>
<td>0629 FUEL PUMP/CIRC</td>
<td>EC-205</td>
</tr>
<tr>
<td>P0642</td>
<td>0642 SENSOR PWR/CIRC1</td>
<td>EC-210</td>
</tr>
<tr>
<td>P0643</td>
<td>0643 SENSOR PWR/CIRC1</td>
<td>EC-210</td>
</tr>
<tr>
<td>P0652</td>
<td>0652 SENSOR PWR/CIRC2</td>
<td>EC-214</td>
</tr>
<tr>
<td>P0653</td>
<td>0653 SENSOR PWR/CIRC2</td>
<td>EC-214</td>
</tr>
<tr>
<td>P0668</td>
<td>0668 ECM</td>
<td>EC-218</td>
</tr>
<tr>
<td>P0669</td>
<td>0669 ECM</td>
<td>EC-218</td>
</tr>
<tr>
<td>P0686</td>
<td>0686 ECM RELAY</td>
<td>EC-220</td>
</tr>
</tbody>
</table>

INFOID:0000000003759281
INFOID:0000000003759284
INFOID:0000000003759287
## INDEX FOR DTC

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.  
*2: This number is prescribed by ISO 15031-6.  
*3: In Diagnostic Test Mode II (Self-diagnostic results).

### P1268 - P1275

<table>
<thead>
<tr>
<th>DTC*1</th>
<th>Items (CONSULT-III screen item)</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1268</td>
<td>1268 INJECTOR 1</td>
<td>EC-227</td>
</tr>
<tr>
<td>P1269</td>
<td>1269 INJECTOR 2</td>
<td>EC-227</td>
</tr>
<tr>
<td>P1270</td>
<td>1270 INJECTOR 3</td>
<td>EC-227</td>
</tr>
<tr>
<td>P1271</td>
<td>1271 INJECTOR 4</td>
<td>EC-227</td>
</tr>
<tr>
<td>P1272</td>
<td>1272 FRP RELIEF VALVE</td>
<td>EC-234</td>
</tr>
<tr>
<td>P1273</td>
<td>1273 FUEL PUMP</td>
<td>EC-239</td>
</tr>
<tr>
<td>P1274</td>
<td>1274 FUEL PUMP</td>
<td>EC-244</td>
</tr>
<tr>
<td>P1275</td>
<td>1275 FUEL PUMP</td>
<td>EC-249</td>
</tr>
</tbody>
</table>

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.  
*2: This number is prescribed by ISO 15031-6.  
*3: In Diagnostic Test Mode II (Self-diagnostic results).

### P1610 - P1616

<table>
<thead>
<tr>
<th>DTC*1</th>
<th>Items (CONSULT-III screen item)</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1610</td>
<td>1610 LOCK MODE</td>
<td>EL-102</td>
</tr>
<tr>
<td>P1611</td>
<td>1611 ID DISCORD, IMM-ECM</td>
<td>EL-103</td>
</tr>
<tr>
<td>P1612</td>
<td>1612 CHAIN OF ECM-IMMU</td>
<td>EL-103</td>
</tr>
<tr>
<td>P1614</td>
<td>1614 CHAIN OF IMMU-KEY</td>
<td>EL-105</td>
</tr>
<tr>
<td>P1615</td>
<td>1615 DIFFERENCE OF KEY</td>
<td>EL-106</td>
</tr>
<tr>
<td>P1616</td>
<td>1616 ECM</td>
<td>EL-106</td>
</tr>
</tbody>
</table>

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.  
*2: This number is prescribed by ISO 15031-6.  
*3: In Diagnostic Test Mode II (Self-diagnostic results).

### P1622 - P2229

<table>
<thead>
<tr>
<th>DTC*1</th>
<th>Items (CONSULT-III screen item)</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1622</td>
<td>1622 INJ ADJ VAL UNRGST</td>
<td>EC-254</td>
</tr>
<tr>
<td>P1623</td>
<td>1623 INJ ADJ VAL ERROR</td>
<td>EC-255</td>
</tr>
<tr>
<td>P2135</td>
<td>2135 APP SENSOR</td>
<td>EC-257</td>
</tr>
<tr>
<td>P2146</td>
<td>2146 INJ PWR/CIRC</td>
<td>EC-262</td>
</tr>
<tr>
<td>P2147</td>
<td>2147 INJECTOR/CIRC</td>
<td>EC-266</td>
</tr>
<tr>
<td>P2148</td>
<td>2148 INJECTOR/CIRC</td>
<td>EC-266</td>
</tr>
<tr>
<td>P2149</td>
<td>2149 INJ PWR/CIRC</td>
<td>EC-262</td>
</tr>
</tbody>
</table>
## INDEX FOR DTC

<table>
<thead>
<tr>
<th>DTC*1</th>
<th>CONSULT-III GST*2</th>
<th>ECM*3</th>
<th>Items (CONSULT-III screen item)</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2228</td>
<td>2228</td>
<td></td>
<td>BARO SEN/CIRC</td>
<td>EC-271</td>
</tr>
<tr>
<td>P2229</td>
<td>2229</td>
<td></td>
<td>BARO SEN/CIRC</td>
<td>EC-271</td>
</tr>
</tbody>
</table>

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.
*2: This number is prescribed by ISO 15031-6.
*3: In Diagnostic Test Mode II (Self-diagnostic results).
PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the “SUPPLEMENTAL RESTRAINT SYSTEM” and “SEAT BELTS” of this Service Manual.

WARNING:
- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SUPPLEMENTAL RESTRAINT SYSTEM”.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

Precaution for Procedure without Cowl Top Cover

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.

On Board Diagnosis (OBD) System of Engine

The ECM has an on board diagnostic system. It will light up the malfunction indicator (MI) to warn the driver of a malfunction causing emission deterioration.

CAUTION:
- Be sure to turn the ignition switch OFF and disconnect the battery negative cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to “HARNESS CONNECTOR” in [EL section].
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MI to light up due to the malfunction of the fuel system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.
PRECAUTIONS

Precaution

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery negative cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect battery negative cable.

- Do not disassemble ECM.

- When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.

- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors. A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to IC's.
- Keep engine control system harness at least 10cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of IC's, etc.
- Keep engine control system parts and harness dry.
Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-57, "ECM Terminal and Reference Value".

Handle mass air flow sensor carefully to avoid damage.

Do not disassemble mass air flow sensor.

Do not clean mass air flow sensor with any type of detergent.

Even a slight leak in the air intake system can cause serious incidents.

Do not shock or jar the camshaft position sensor, crankshaft position sensor.

After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.

When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

Do not disassemble fuel pump. If NG, take proper action.

Do not disassemble fuel injector. If NG, replace fuel injector.
PRECAUTIONS

- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
  - Keep the antenna as far as possible from the electronic control units.
  - Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls. Do not let them run parallel for a long distance.
  - Adjust the antenna and feeder line so that the standing-wave radio can be kept smaller.
  - Be sure to ground the radio to vehicle body.
### Special Service Tool

<table>
<thead>
<tr>
<th>Tool number</th>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EG17650301</td>
<td>Radiator cap tester adapter</td>
<td>Adapting radiator cap tester to radiator cap and radiator filler neck</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a: 28 (1.10) dia.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b: 31.4 (1.236) dia.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c: 41.3 (1.626) dia.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit: mm (in)</td>
</tr>
<tr>
<td>KV11106030</td>
<td>Positioning stopper pin</td>
<td>Fixing fuel pump sprocket</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a: 6 mm (0.24 in) dia.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b: 80 mm (3.15 in) dia.</td>
</tr>
<tr>
<td>KV11106040</td>
<td>TORX wrench</td>
<td>Removing and installing fuel pump sprocket</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a: T70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b: 26 mm (1.02 in)</td>
</tr>
<tr>
<td>KV11106050</td>
<td>Hexagonal wrench</td>
<td>Removing and installing fuel pump sprocket</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a: 6 mm (0.24 in) (Face to face)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b: 42 mm (1.65 in)</td>
</tr>
<tr>
<td>KV11106060</td>
<td>Sprocket holder</td>
<td>Holding fuel pump sprocket</td>
</tr>
<tr>
<td>Tool name</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Socket wrench</td>
<td>Removing and installing engine coolant tempera-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ture sensor</td>
<td></td>
</tr>
</tbody>
</table>

<Diagram of Socket wrench>
**ENGINE CONTROL SYSTEM**

**System Chart**

<table>
<thead>
<tr>
<th>Input (Sensor)</th>
<th>ECM Function</th>
<th>Output (Actuator)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Accelerator pedal position sensor</td>
<td>Fuel injection control</td>
<td>• Fuel injector</td>
</tr>
<tr>
<td>• Fuel rail pressure sensor</td>
<td>Fuel injection timing control</td>
<td>• Fuel injector</td>
</tr>
<tr>
<td>• Fuel pump temperature sensor</td>
<td>Fuel cut control</td>
<td>• Fuel injector</td>
</tr>
<tr>
<td>• Engine coolant temperature sensor</td>
<td>Glow control system</td>
<td>• Glow relay</td>
</tr>
<tr>
<td>• Mass air flow sensor</td>
<td>On board diagnostic system</td>
<td>• Glow indicator lamp^2</td>
</tr>
<tr>
<td>• Intake air temperature sensor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Crankshaft position sensor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Camshaft position sensor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Vehicle speed sensor^1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ABS actuator and electric unit (control unit)^1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Ignition switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Stop lamp switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Air conditioner switch^1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Park/neutral position switch</td>
<td>Fuel injection control</td>
<td>Fuel injector</td>
</tr>
<tr>
<td>• Battery voltage</td>
<td>Fuel cut control</td>
<td>Fuel pump</td>
</tr>
<tr>
<td>• EGR volume control valve control position sensor</td>
<td>Glow control system</td>
<td></td>
</tr>
</tbody>
</table>

^1: The input signal is sent to the ECM through CAN communication line.
^2: The output signal is sent from the ECM through CAN communication line.

**Fuel Injection Control System**

**SYSTEM DESCRIPTION**

Three types of fuel injection control are provided to accommodate engine operating conditions; normal control, idle control and start control. The ECM determines the appropriate fuel injection control. Under each control, the amount of fuel injected is adjusted to improve engine performance. Pulse signals are sent to fuel injectors according to the input signals to adjust the amount of fuel injected to preset value.

**START CONTROL**

Input/Output Signal Chart

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input Signal to ECM</th>
<th>ECM Function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Engine coolant temperature</td>
<td>Fuel injection control (start control)</td>
<td>Fuel injector</td>
</tr>
<tr>
<td>Crankshaft position sensor</td>
<td>Engine speed</td>
<td></td>
<td>Fuel pump</td>
</tr>
<tr>
<td>Camshaft position sensor</td>
<td>Piston position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ignition switch</td>
<td>Start signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel rail pressure sensor</td>
<td>Fuel rail pressure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When the ECM receives a start signal from the ignition switch, the ECM adapts the fuel injection system for the start control. The amount of fuel injected at engine starting is a preset program value in the ECM. The program is determined by the engine speed, engine coolant temperature and fuel rail pressure.

For better start ability under cool engine conditions, the lower the coolant temperature becomes, the greater the amount of fuel injected. The ECM ends the start control when the engine speed reaches the specific value, and shifts the control to the normal or idle control.

**IDLE CONTROL**

Input/Output Signal Chart
ENGINE CONTROL SYSTEM

< SERVICE INFORMATION >

[YD25DDTi]

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input Signal to ECM</th>
<th>ECM Function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Engine coolant temperature</td>
<td>Fuel injection control (Idle control)</td>
<td>Fuel injector</td>
</tr>
<tr>
<td>Crankshaft position sensor</td>
<td>Engine speed</td>
<td></td>
<td>Fuel pump</td>
</tr>
<tr>
<td>Battery</td>
<td>Battery voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerator pedal position sensor</td>
<td>Accelerator pedal position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel rail pressure sensor</td>
<td>Fuel rail pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle speed sensor</td>
<td>Vehicle speed*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air conditioner switch</td>
<td>Air conditioner signal*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: The input signal is sent to the ECM through CAN communication line.

When the ECM determines that the engine speed is at idle, the fuel injection system is adapted for the idle control. The ECM regulates the amount of fuel injected corresponding to changes in load applied to the engine to keep engine speed constant. The ECM also provides the system with a fast idle control in response to the engine coolant temperature signal.

NORMAL CONTROL

Input/Output Signal Chart

The amount of fuel injected under normal driving conditions is determined according to sensor signals. The crankshaft position sensor detects engine speed, the accelerator pedal position sensor detects accelerator pedal position and fuel rail pressure sensor detects fuel rail pressure. These sensors send signals to the ECM. The fuel injection data, predetermined by correlation between various engine speeds, accelerator pedal positions and fuel rail pressure are stored in the ECM memory, forming a map. The ECM determines the optimal amount of fuel to be injected using the sensor signals in comparison with the map.

MAXIMUM AMOUNT CONTROL

Input/Output Signal Chart

The maximum injection amount is controlled to an optimum by the engine speed, intake air amount, engine coolant temperature, and accelerator opening in accordance with the driving conditions. This prevents the oversupply of the injection amount caused by decreased air density at a high altitude or during a system failure.

DECELERATION CONTROL

Input/Output Signal Chart
The ECM sends a fuel cut signal to the fuel injectors and fuel pump during deceleration for better fuel efficiency. The ECM determines the time of deceleration according to signals from the accelerator pedal position sensor and crankshaft position sensor.

Fuel Injection Timing Control System

**DESCRIPTION**

The target fuel injection timing in accordance with the engine speed and the fuel injection amount are recorded as a map in the ECM beforehand. The ECM determines the optimum injection timing using sensor signals according with the map.

Air Conditioning Cut Control

**INPUT / OUTPUT SIGNAL CHART**

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input Signal to ECM</th>
<th>ECM Function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air conditioner switch</td>
<td>Air conditioner ON signal*</td>
<td>Air conditioner cut control</td>
<td>Air conditioner relay</td>
</tr>
<tr>
<td>Accelerator pedal position sensor</td>
<td>Accelerator pedal opening angle</td>
<td>Fuel injection control (Deceleration control)</td>
<td>Fuel injector, Fuel pump</td>
</tr>
<tr>
<td>Vehicle speed sensor</td>
<td>Vehicle speed*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Engine coolant temperature</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: The input signal is sent to the ECM through CAN communication line.

**SYSTEM DESCRIPTION**

This system improves acceleration when the air conditioner is used. When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds. When engine coolant temperature becomes excessively high, the air conditioner is turned off. This continues until the engine coolant temperature returns to normal.

Fuel Cut Control (At No Load & High Engine Speed)

**INPUT/OUTPUT SIGNAL CHART**

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input Signal to ECM</th>
<th>ECM Function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle speed sensor</td>
<td>Vehicle speed*</td>
<td>Fuel cut control</td>
<td>Fuel injector</td>
</tr>
<tr>
<td>Accelerator pedal position sensor</td>
<td>Accelerator pedal position</td>
<td>Fuel injection</td>
<td></td>
</tr>
<tr>
<td>Crankshaft position sensor</td>
<td>Engine speed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: The input signal is sent to the ECM through CAN communication line.

If the engine speed is above 2,800 rpm under no load (for example, the shift position is neutral and engine speed is over 2,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

**NOTE:**

This function is different from deceleration control listed under [EC-18, "Fuel Injection Control System"].

Crankcase Ventilation System

**DESCRIPTION**
In this system, blow-by gas is sucked into the air duct after oil separation by oil separator in the rocker cover.

**INSPECTION**

Ventilation Hose

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.

**CAN Communication**

**SYSTEM DESCRIPTION**

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only. Refer to EL-110, "CAN System Specification Chart", about CAN communication for detail.
BASIC SERVICE PROCEDURE

Fuel Filter

DESCRIPTION
A water draining cock is on the lower side and a priming pump for bleeding air is on the upper side.

AIR BLEEDING
Pump the priming pump (1) to bleed air.
• When air is bled completely, the pumping of the priming pump suddenly becomes heavy. Stop the operation at that time.
• If it is difficult to bleed air by the pumping of the priming pump (the pumping of the priming pump does not become heavy), disconnect the fuel supply hose between the fuel filter and the fuel gallery. Then, perform the operation described above, and make sure that fuel comes out. (Use a pan, etc. so as not to spill fuel. Do not let fuel get on engine and other parts.) After that, connect the hose, then bleed air again.
• Start engine and let it idle for at least 1 minute after performing air bleeding.

WATER DRAINING
1. Remove the fuel filter, filter bracket, protector assembly from the dash panel as follows.
   a. Remove the air cleaner case (upper), air duct assembly, and vacuum hose for brake booster (between the vacuum pump and vacuum pipe).
      CAUTION:
      After the duct is removed, cover the opening with gum tape, etc. to prevent foreign object from getting into the engine during the operation.
   b. Remove the mounting nuts on the dash panel, then remove the fuel filter, filter bracket, and protector assembly from the dash panel.
      • It is not necessary to disconnect the fuel hose.
2. Using a tool such as a pliers, loosen the water draining cock at the bottom of the fuel filter.
   Loosening drain cock four to five turns causes water to start draining.
   Do not remove drain cock by loosening it excessively.
   If water dose not drain properly, move the priming up and down.
   CAUTION:
   When the water is drained, the fuel is also drained. Use a pan, etc. to avoid fuel adherence to the rubber parts such as the engine mount insulator.
   Do not over-tighten the water draining cock. This will damage the cock thread, resulting in water or fuel leak.
3. Bleed air of the fuel filter. Refer to “AIR BLEEDING”.
4. Start the engine.

Procedure After Replacing ECM

When replacing ECM, the following procedure must be performed.
1. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EL-96, "ECM Re-communicating Function".
2. Perform EC-22, "Injector Adjustment Value Registration".
3. Perform EC-23, "Fuel Pump Learning Value Clearing".
4. Perform EC-24, "EGR Volume Control Valve Closed Position Learning Value Clear".
5. Perform EC-24, "EGR Volume Control Valve Closed Position Learning".

Injector Adjustment Value Registration

DESCRIPTION
Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector. The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control. A performance of emission control and a drivability may effect when there is a mismatch between the following two values.
- The injector adjustment value stored in ECM
- The injector adjustment value of the injector which is installed on the vehicle

Injector Adjustment Value Registration must be performed after the following cases.
- Injector(s) are replaced.
- ECM is replaced.

For the first case, Injector Adjustment Value Registration for the replaced fuel injector must be performed. And for the second case, Injector Adjustment Value Registration for all the fuel injectors must be performed.

Example: Injector adjustment value = D121ABCD1A061234000000000000E6

**Operation Procedure**

**NOTE:**
- Before performing this procedure, record injector adjustment value printed on a fuel injector.
- When all fuel injectors are replaced or ECM is replaced, it is recommended to perform “INJ ADJ VAL CLR” in “WORK SUPPORT” mode before performing this procedure. By performing “INJ ADJ VAL CLR” in “WORK SUPPORT” mode, injector adjustment value stored in ECM is initialized.

1. Turn ignition switch ON (engine stopped).
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-III.
3. Touch “START”.
   **NOTE:** When touching “START”, CONSULT-III reads injector adjustment values stored in ECM.
4. Select the number of the cylinder which needs Injector Adjustment Value Registration.
5. Input injector adjustment value, and touch “ENTER”.
   **NOTE:** Input injector adjustment value is stored in CONSULT-III.
6. Repeat step 4 - 5 till there is no cylinder which needs Injector Adjustment Value Registration, and touch “START”.
   **NOTE:** When touching “START”, injector adjustment values stored in CONSULT-III are written onto ECM memory.
7. After “CMND FINISHED” is displayed, make sure that the following values are same for each cylinder.
   - Injector adjustment value which is printed on a fuel injector.
   - Injector adjustment value which is displayed on CONSULT-III screen.
   **NOTE:**
   - In this step, CONSULT-III reads injector adjustment values stored in ECM and displays the values on the CONSULT-III screen. This is for checking if injector adjustment values are written onto ECM memory correctly.
   - If DTC is detected, perform DTC Confirmation Procedure for the DTC, and check if the same DTC is detected again.

**Fuel Pump Learning Value Clearing**

**DESCRIPTION**
In order to always keep optimum fuel pressure in fuel rail, the ECM controls fuel pump in high precision with monitoring the signal of fuel rail pressure sensor. Accordingly, the ECM always learns characteristic value of fuel pump. Fuel Pump Learning Value Clearing is an operation to clear the value of the fuel pump learning. Fuel Pump Learning Value Clearing should be performed under the following conditions.

- Fuel pump is changed.
- ECM is replaced with used one which stores the fuel pump learning value of other fuel pump.

**OPERATION PROCEDURE**

**NOTE:**
When removing fuel pump, perform Fuel Pump Learning Value Clearing before starting engine.

**With CONSULT-III**
1. Turn ignition switch ON.
2. Select “PUMP LEARNT CLEAR” in “ACTIVE TEST” mode with CONSULT-III.
3. Touch “CLEAR” and wait a few seconds.
4. Make sure that “CMPLT” is displayed on CONSULT-III screen.

**Without CONSULT-III**
Fuel pump learning value can be erased from the back up memory in the ECM by the same operation as erasing DTC. In detail, refer to EC-32, "Emission-Related Diagnostic Information".

**EGR Volume Control Valve Closed Position Learning Value Clear**

EGR volume control valve closed position learning value should be cleared under the following cases.

- EGR volume control valve is removed.
- EGR volume control valve is replaced.

**OPERATION PROCEDURE**

**NOTE:**
Always perform the following procedure with engine coolant temperature 0 to 30°C (32 to 86°F).

1. Turn ignition switch ON.
2. Select “EGR/V LEARN CLR” in “WORK SUPPORT” mode with CONSULT-III.
3. Touch “CLEAR” and wait a few seconds.
4. Make sure the “CMPLT” is displayed on CONSULT-III screen.

**EGR Volume Control Valve Closed Position Learning**

EGR Volume Control Valve Closed Position Learning is an operation to learn the fully closed position of the EGR volume control valve by monitoring the EGR volume control valve control position sensor output signal. It must be performed under any of the following conditions:

- EGR volume control valve is replaced.
- ECM is replaced.

**OPERATION PROCEDURE**

1. Turn ignition switch ON and wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
   Make sure that EGR volume control valve moves during above 10 seconds by confirming the operating sound.

**FUEL PUMP**

Components
Removal and Installation

CAUTION:
- Before removing and installing fuel pump, be sure to remove sprocket. Never loosen or remove installation nut in the center of fuel pump. If loosened or removed, replace fuel pump.
- After removing timing chain, never turn crankshaft and camshaft separately, or valves will strike piston heads.
- When installing camshafts, chain tensioners, oil seals, or other sliding parts, lubricate contacting surfaces with new engine oil.
- When fuel pump is replaced with new one or another one, perform fuel pump leaning value cleaning before starting engine. Refer to EC-23, "Fuel Pump Learning Value Clearing".

REMOVAL
1. Remove engine cover, vacuum gallery and heater feed pipe. Refer to EM-6.
2. Remove fuel hose and spill hose from fuel pump. Refer to EM-8.
   CAUTION:
   Be careful not to spill fuel in the engine component.
3. Disconnect harness connectors from fuel pump.
   CAUTION:
   Be careful not to spill fuel in the engine component.
BASIC SERVICE PROCEDURE

5. Remove secondary timing chain. Refer to "TIMING CHAIN" in EM section.
6. Hold fuel pump sprocket and remove bolt.
   a. Insert the positioning stopper pin [SST (KV11106030)] into the hole 6 mm (0.24 in) in the diameter on the fuel pump sprocket.
   b. Using the TORX wrench [SST (KV11106040)], turn pump shaft little by little to adjust the position of fuel pump sprocket so that the holes align.
   c. Push the positioning stopper pin [SST (KV11106030)] through fuel pump sprocket to fuel pump body to hold fuel pump sprocket.

• Insert the positioning stopper pin until its flange contacts the fuel pump sprocket.

7. Using the hexagonal wrench [SST (KV11106050)] remove tightening bolts of fuel pump sprocket.
8. Using the sprocket holder [SST (KV11106060)], hold fuel pump sprocket to prevent falling.
   • Rework sprocket holder [SST (KV11106060)] to use, as shown in the figure.

   • When the sprocket holder is installed, if the positioning stopper pin [SST (KV11106030)] interferes, pull out the positioning stopper pin approximately 10 mm (0.39 in), then install it.
   • After the sprocket holder is installed temporarily, tighten the sprocket holder after making extension bar and TORX socket (size: E10) (commercial service tool) insert into the machined bore.
   • The length of the sprocket holder mounting bolts should be approximately 15 mm (0.59 in) (M6 thread length).
   • Check that the a- and b-faces of the sprocket holder contact the bottom side of the sprocket (small diameter side).

   **CAUTION:**
   Never remove the sprocket holder [SST (KV11106060)] until fuel pump is installed.

   • After the sprocket holder is installed, pull out the positioning stopper pin from fuel pump sprocket.

9. Using the extension bar and the TORX socket (size: E10) (commercial service tool), remove the tightening bolts.

   **CAUTION:**
   Never disassemble or adjust fuel pump.

10. Remove the fuel pump toward the rear of engine.

   **CAUTION:**
   For removal, be careful not to drop the seal washer into the engine.

   **NOTE:**
   The seal washer of the tightening bolts cannot be reused.

11. Remove adjusting shim.

12. Attach a suitable tool in the M8 bolt hole on coupling.
13. Loosen sprocket nut with the TORX wrench [SST (KV11106040)].

14. Remove coupling with a suitable puller.

15. Remove spacer from fuel pump.
16. Remove oil seal from spacer.

INSPECTION AFTER REMOVAL

Timing Chain
Check for cracks and excessive wear at roller links. Replace timing chain if necessary.

INSTALLATION
1. Install new oil seal to spacer.

2. Install spacer to fuel pump.
3. Install coupling to fuel pump of spacer.
   - Using the TORX wrench [SST (KV11106040)], tighten the sprocket nut to fix the coupling.

4. Install adjusting shim.
   - For shim adjustment, measure dimension L [Distance between front surface of coupling and the fuel pump flange (spacer)] at two opposing points near the coupling bolt center. Use the average of these two measurements to select the shim grade that marked on adjusting shim.

   - The shim adjustment is required only when the fuel pump is replaced.

<table>
<thead>
<tr>
<th>Part No. of adjusting shim</th>
<th>Grade number</th>
<th>Measuring dimension L mm (in)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>16614 8H800</td>
<td>0.5 t</td>
<td>39.23 - 39.77 (1.5445 - 1.5657)</td>
<td>A</td>
</tr>
<tr>
<td>16614 8H810</td>
<td>1.0 t</td>
<td>38.76 - 39.23 (1.5260 - 1.5445)</td>
<td>B</td>
</tr>
<tr>
<td>16614 8H860</td>
<td>1.2 t</td>
<td>38.57 - 38.76 (1.5185 - 1.5260)</td>
<td>C</td>
</tr>
<tr>
<td>16614 8H820</td>
<td>1.6 t</td>
<td>38.18 - 38.57 (1.5031 - 1.5185)</td>
<td>D</td>
</tr>
<tr>
<td>16614 8H800 + 16614 8H860</td>
<td>0.5 t + 1.2 t</td>
<td>38.09 - 38.18 (1.4996 - 1.5031)</td>
<td>A + C</td>
</tr>
<tr>
<td>16614 8H810 + 16614 8H810</td>
<td>1.0 t + 1.0 t</td>
<td>37.80 - 38.09 (1.4882 - 1.4996)</td>
<td>B + B</td>
</tr>
<tr>
<td>16614 8H860 + 16614 8H810</td>
<td>1.2 t + 1.0 t</td>
<td>37.60 - 37.80 (1.4803 - 1.4882)</td>
<td>C + B</td>
</tr>
<tr>
<td>16614 8H820 + 16614 8H810</td>
<td>1.6 t + 1.0 t</td>
<td>37.21 - 37.60 (1.4650 - 1.4803)</td>
<td>D + B</td>
</tr>
</tbody>
</table>
5. Before fuel pump is installed, check that spacer and the 6 mm (0.24 in) dia. hole on coupling are aligned.

6. Insert fuel pump to the mounting position from the rear side of the engine, and install the tightening bolts with seal washer. **CAUTION:** Be careful not to drop the seal washer into engine.

7. Using the extension bar and the TORX socket (size: E10) (commercial service tool), tighten the tightening bolts of fuel pump.

8. Remove the sprocket holder [SST (KV11106060)].

9. Using the TORX wrench [SST (KV11106040)], turn the pump shaft gradually to adjust the position of fuel pump sprocket. Then, insert the positioning stopper pin [SST (KV11106030)] to the 6 mm (0.24 in) dia. hole of the fuel pump sprocket through the pump body.

10. Remove the TORX wrench [SST (KV11106040)].

11. Using the hexagonal wrench [SST (KV11106050)], tighten the sprocket tightening bolt. • When the washer of the fuel pump sprocket is removed, install it with the marking “F” (front) facing the front of the engine.

12. Pull out the positioning stopper pin [SST (KV11106030)].
13. Install secondary timing chain. Refer to "TIMING CHAIN" in EM section.
14. Following steps below, install injection tube center. Refer to EM-8.
   a. Pre-set clip and insert rubber to injection tube center.
   b. Pre-tight nut of injection tube center to fuel pump and fuel rail by hand. (until seal surface touched)
   c. Adjust clip dimension and tight bolt for clip to intake manifold by tool.
   d. Tight nut of injection tube center to fuel pump by tool.
   e. Tight nut of injection tube center to fuel rail by tool.
15. Connect the harness connector to fuel pump.
17. Hereafter, install in the reverse order of removal.
   **CAUTION:**
   When fuel pump is replaced with new one or another one, perform fuel pump leaning value cleaning before starting engine. Refer to EC-23, "Fuel Pump Learning Value Clearing".
ON BOARD DIAGNOSTIC (OBD) SYSTEM

Introduction

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

<table>
<thead>
<tr>
<th>Emission-related diagnostic information</th>
<th>ISO Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic Trouble Code (DTC)</td>
<td>Service $03$ of ISO 15031-5</td>
</tr>
<tr>
<td>Freeze Frame data</td>
<td>Service $02$ of ISO 15031-5</td>
</tr>
<tr>
<td>1st/2nd Trip Diagnostic Trouble Code (1st/2nd Trip DTC)</td>
<td>Service $07$ of ISO 15031-5</td>
</tr>
<tr>
<td>Calibration ID</td>
<td>Service $09$ of ISO 15031-5</td>
</tr>
</tbody>
</table>

The above information can be checked using procedures listed in the table below.

<table>
<thead>
<tr>
<th>CONSULT-III</th>
<th>DTC</th>
<th>1st trip DTC</th>
<th>2nd trip DTC</th>
<th>Freeze Frame data</th>
</tr>
</thead>
<tbody>
<tr>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GST</th>
<th>DTC</th>
<th>1st trip DTC</th>
<th>2nd trip DTC</th>
<th>Freeze Frame data</th>
</tr>
</thead>
<tbody>
<tr>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECM</th>
<th>DTC</th>
<th>1st trip DTC</th>
<th>2nd trip DTC</th>
<th>Freeze Frame data</th>
</tr>
</thead>
<tbody>
<tr>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>—</td>
</tr>
</tbody>
</table>

*: When DTC and 1st/2nd trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator (MI) on the instrument panel lights up when the same malfunction is detected in three consecutive trips (Three trip detection logic).

Three Trip Detection Logic and One Trip Detection Logic

On board diagnosis (OBD) system of this vehicle has “Three Trip Detection Logic” and “One Trip Detection Logic”. For which logic each self-diagnosis corresponds with, refer to EC-32, “Emission-Related Diagnostic Information”.

“Trip” of “Three Trip Detection Logic” means a driving mode in which the self-diagnosis is performed while driving.

THREE TRIP DETECTION LOGIC

When a malfunction is detected for the first time, 1st trip DTC is stored in the ECM memory. MI does not illuminate at this stage. <1st trip>

When the same malfunction is detected again during the next driving, 2nd trip DTC is stored in the ECM memory and 1st trip DTC is cleared from the ECM memory. MI does not illuminate at this stage. <2nd trip>

When the same malfunction is detected again at the third driving, DTC and Freeze Frame Data are stored in the ECM memory and 2nd trip DTC is cleared from the same time when DTC is stored. <3rd trip>

In other words, DTC and Freeze Frame Data are stored and MI illuminates when the same malfunction occurs in 3 consecutive trips.

This is called “Three Trip Detection Logic”.

ONE TRIP DETECTION LOGIC

When a malfunction is detected for the first time, DTC and Freeze Frame Data are stored in the ECM memory and MI lights up. This is called “One Trip Detection Logic”. Some self-diagnoses will not illuminate MI when DTC is stored. (Refer to EC-32, "Emission-Related Diagnostic Information"). 1st/2nd trip DTC is not stored for one trip detection logic.

Emission-Related Diagnostic Information

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS
### ON BOARD DIAGNOSTIC (OBD) SYSTEM

**[YD25DDTi]**

<table>
<thead>
<tr>
<th>DTC*¹</th>
<th>CONSULT-III GST*²</th>
<th>ECM*³</th>
<th>Items (CONSULT-III screen item)</th>
<th>Trip</th>
<th>Ml lighting up</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1000</td>
<td>1000*⁴</td>
<td></td>
<td>CAN COMM CIRCUIT</td>
<td>1</td>
<td>—</td>
<td>EC-83</td>
</tr>
<tr>
<td>P0000</td>
<td>0000</td>
<td></td>
<td>NO DTC IS DETECTED, FURTHER TESTING MAY BE REQUIRED.</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>P0016</td>
<td>0016</td>
<td></td>
<td>CMP/CKP RELATION</td>
<td>3</td>
<td>×</td>
<td>EC-85</td>
</tr>
<tr>
<td>P0088</td>
<td>0088</td>
<td></td>
<td>HIGH FUEL PRESS</td>
<td>3</td>
<td>×</td>
<td>EC-87</td>
</tr>
<tr>
<td>P0089</td>
<td>0089</td>
<td></td>
<td>FUEL PUMP</td>
<td>3</td>
<td>×</td>
<td>EC-89</td>
</tr>
<tr>
<td>P0093</td>
<td>0093</td>
<td></td>
<td>FUEL LEAK</td>
<td>3</td>
<td>×</td>
<td>EC-91</td>
</tr>
<tr>
<td>P0101</td>
<td>0101</td>
<td></td>
<td>MAF SENSOR</td>
<td>3</td>
<td>×</td>
<td>EC-94</td>
</tr>
<tr>
<td>P0102</td>
<td>0102</td>
<td></td>
<td>MAF SEN/CIRCUIT</td>
<td>3</td>
<td>×</td>
<td>EC-103</td>
</tr>
<tr>
<td>P0103</td>
<td>0103</td>
<td></td>
<td>MAF SEN/CIRCUIT</td>
<td>3</td>
<td>×</td>
<td>EC-103</td>
</tr>
<tr>
<td>P0112</td>
<td>0112</td>
<td></td>
<td>IAT SEN/CIRCUIT</td>
<td>3</td>
<td>×</td>
<td>EC-111</td>
</tr>
<tr>
<td>P0113</td>
<td>0113</td>
<td></td>
<td>IAT SEN/CIRCUIT</td>
<td>3</td>
<td>×</td>
<td>EC-111</td>
</tr>
<tr>
<td>P0117</td>
<td>0117</td>
<td></td>
<td>ECT SEN/CIRCUIT</td>
<td>3</td>
<td>×</td>
<td>EC-115</td>
</tr>
<tr>
<td>P0118</td>
<td>0118</td>
<td></td>
<td>ECT SEN/CIRCUIT</td>
<td>3</td>
<td>×</td>
<td>EC-115</td>
</tr>
<tr>
<td>P0122</td>
<td>0122</td>
<td></td>
<td>APP SEN 1/CIRCUIT</td>
<td>1</td>
<td>—</td>
<td>EC-119</td>
</tr>
<tr>
<td>P0123</td>
<td>0123</td>
<td></td>
<td>APP SEN 1/CIRCUIT</td>
<td>1</td>
<td>—</td>
<td>EC-119</td>
</tr>
<tr>
<td>P0182</td>
<td>0182</td>
<td></td>
<td>FUEL TEMP SEN/CIRC</td>
<td>3</td>
<td>×</td>
<td>EC-124</td>
</tr>
<tr>
<td>P0183</td>
<td>0183</td>
<td></td>
<td>FUEL TEMP SEN/CIRC</td>
<td>3</td>
<td>×</td>
<td>EC-124</td>
</tr>
<tr>
<td>P0192</td>
<td>0192</td>
<td></td>
<td>FRP SEN/CIRC</td>
<td>3</td>
<td>×</td>
<td>EC-128</td>
</tr>
<tr>
<td>P0193</td>
<td>0193</td>
<td></td>
<td>FRP SEN/CIRC</td>
<td>3</td>
<td>×</td>
<td>EC-128</td>
</tr>
<tr>
<td>P0200</td>
<td>0200</td>
<td></td>
<td>INJECTOR</td>
<td>3</td>
<td>×</td>
<td>EC-132</td>
</tr>
<tr>
<td>P0201</td>
<td>0201</td>
<td></td>
<td>CYL1 INJECTOR</td>
<td>3</td>
<td>×</td>
<td>EC-133</td>
</tr>
<tr>
<td>P0202</td>
<td>0202</td>
<td></td>
<td>CYL2 INJECTOR</td>
<td>3</td>
<td>×</td>
<td>EC-133</td>
</tr>
<tr>
<td>P0203</td>
<td>0203</td>
<td></td>
<td>CYL3 INJECTOR</td>
<td>3</td>
<td>×</td>
<td>EC-133</td>
</tr>
<tr>
<td>P0204</td>
<td>0204</td>
<td></td>
<td>CYL4 INJECTOR</td>
<td>3</td>
<td>×</td>
<td>EC-133</td>
</tr>
<tr>
<td>P0217</td>
<td>0217</td>
<td></td>
<td>ENG OVER TEMP</td>
<td>1</td>
<td>—</td>
<td>EC-138</td>
</tr>
<tr>
<td>P0222</td>
<td>0222</td>
<td></td>
<td>APP SEN 2/CIRCUIT</td>
<td>1</td>
<td>—</td>
<td>EC-147</td>
</tr>
<tr>
<td>P0223</td>
<td>0223</td>
<td></td>
<td>APP SEN 2/CIRCUIT</td>
<td>1</td>
<td>—</td>
<td>EC-147</td>
</tr>
<tr>
<td>P0335</td>
<td>0335</td>
<td></td>
<td>CKP SEN/CIRCUIT</td>
<td>3</td>
<td>×</td>
<td>EC-152</td>
</tr>
<tr>
<td>P0336</td>
<td>0336</td>
<td></td>
<td>CKP SENSOR</td>
<td>3</td>
<td>×</td>
<td>EC-157</td>
</tr>
<tr>
<td>P0340</td>
<td>0340</td>
<td></td>
<td>CMP SEN/CIRCUIT</td>
<td>3</td>
<td>×</td>
<td>EC-163</td>
</tr>
<tr>
<td>P0341</td>
<td>0341</td>
<td></td>
<td>CMP SENSOR</td>
<td>3</td>
<td>×</td>
<td>EC-168</td>
</tr>
<tr>
<td>P0380</td>
<td>0380</td>
<td></td>
<td>GLOW RELAY</td>
<td>3</td>
<td>×</td>
<td>EC-173</td>
</tr>
<tr>
<td>P0403</td>
<td>0403</td>
<td></td>
<td>EGR SYSTEM</td>
<td>3</td>
<td>×</td>
<td>EC-177</td>
</tr>
<tr>
<td>P0405</td>
<td>0405</td>
<td></td>
<td>EGR SENSOR</td>
<td>3</td>
<td>×</td>
<td>EC-184</td>
</tr>
<tr>
<td>P0406</td>
<td>0406</td>
<td></td>
<td>EGR SENSOR</td>
<td>3</td>
<td>×</td>
<td>EC-184</td>
</tr>
<tr>
<td>P0409</td>
<td>0409</td>
<td></td>
<td>EGR SYSTEM</td>
<td>3</td>
<td>×</td>
<td>EC-190</td>
</tr>
<tr>
<td>P0488</td>
<td>0488</td>
<td></td>
<td>EGR SYSTEM</td>
<td>3</td>
<td>×</td>
<td>EC-196</td>
</tr>
<tr>
<td>P0563</td>
<td>0563</td>
<td></td>
<td>BATTERY VOLTAGE</td>
<td>1</td>
<td>—</td>
<td>EC-201</td>
</tr>
<tr>
<td>P0606</td>
<td>0606</td>
<td></td>
<td>ECM</td>
<td>3</td>
<td>×</td>
<td>EC-203</td>
</tr>
<tr>
<td>P0628</td>
<td>0628</td>
<td></td>
<td>FUEL PUMP/CIRC</td>
<td>3</td>
<td>×</td>
<td>EC-205</td>
</tr>
</tbody>
</table>

**NOTES:**

- X: Applicable
- —: Not applicable

[^1]: DTC: Diagnostic Trouble Code
[^2]: GST: General Service Trouble
[^3]: ECM: Engine Control Module
[^4]: * for CONSULT-III screen item,

---

**Reference Pages:**

- EC-83
- EC-85
- EC-87
- EC-89
- EC-91
- EC-94
- EC-103
- EC-103
- EC-111
- EC-111
- EC-115
- EC-115
- EC-119
- EC-119
- EC-124
- EC-124
- EC-128
- EC-128
- EC-132
- EC-133
- EC-133
- EC-133
- EC-133
- EC-138
- EC-147
- EC-147
- EC-152
- EC-157
- EC-163
- EC-168
- EC-173
- EC-177
- EC-184
- EC-184
- EC-190
- EC-196
- EC-201
- EC-203
- EC-205
## ON BOARD DIAGNOSTIC (OBD) SYSTEM

### DTC AND 1ST/2ND TRIP DTC

The number of 1st/2nd trip DTC is the same as the number of DTC. When a malfunction is detected during 1st trip, 1st trip DTC is stored in the ECM memory. MI does not illuminate at this time. When the same malfunction is detected in the next trip (2nd trip), 2nd trip DTC is stored in the ECM memory and 1st trip DTC is cleared from the ECM memory. MI does not illuminate at this time. In addition, DTC is stored in the ECM memory and MI lights up when the same malfunction is detected during the following consecutive trip (3rd trip).

The procedure for erasing DTC, 1st trip DTC, and 2nd trip DTC from the ECM memory is described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

<table>
<thead>
<tr>
<th>DTC*1</th>
<th>CONSULT-III GST*2</th>
<th>ECM*3</th>
<th>Items (CONSULT-III screen item)</th>
<th>Trip</th>
<th>MI lighting up</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0629</td>
<td>0629</td>
<td>FUEL PUMP/CIRC</td>
<td>3</td>
<td>×</td>
<td>EC-205</td>
<td></td>
</tr>
<tr>
<td>P0642</td>
<td>0642</td>
<td>SENSOR PWR/CIRC1</td>
<td>3</td>
<td>×</td>
<td>EC-210</td>
<td></td>
</tr>
<tr>
<td>P0643</td>
<td>0643</td>
<td>SENSOR PWR/CIRC1</td>
<td>3</td>
<td>×</td>
<td>EC-210</td>
<td></td>
</tr>
<tr>
<td>P0652</td>
<td>0652</td>
<td>SENSOR PWR/CIRC1</td>
<td>3</td>
<td>×</td>
<td>EC-214</td>
<td></td>
</tr>
<tr>
<td>P0653</td>
<td>0653</td>
<td>SENSOR PWR/CIRC2</td>
<td>3</td>
<td>×</td>
<td>EC-214</td>
<td></td>
</tr>
<tr>
<td>P0668</td>
<td>0668</td>
<td>ECM</td>
<td>3</td>
<td>×</td>
<td>EC-218</td>
<td></td>
</tr>
<tr>
<td>P0669</td>
<td>0669</td>
<td>ECM</td>
<td>3</td>
<td>×</td>
<td>EC-218</td>
<td></td>
</tr>
<tr>
<td>P0686</td>
<td>0686</td>
<td>ECM RELAY</td>
<td>1</td>
<td>—</td>
<td>EC-220</td>
<td></td>
</tr>
<tr>
<td>P1268</td>
<td>1268</td>
<td>INJECTOR 1</td>
<td>1</td>
<td>—</td>
<td>EC-227</td>
<td></td>
</tr>
<tr>
<td>P1269</td>
<td>1269</td>
<td>INJECTOR 2</td>
<td>1</td>
<td>—</td>
<td>EC-227</td>
<td></td>
</tr>
<tr>
<td>P1270</td>
<td>1270</td>
<td>INJECTOR 3</td>
<td>1</td>
<td>—</td>
<td>EC-227</td>
<td></td>
</tr>
<tr>
<td>P1271</td>
<td>1271</td>
<td>INJECTOR 4</td>
<td>1</td>
<td>—</td>
<td>EC-227</td>
<td></td>
</tr>
<tr>
<td>P1272</td>
<td>1272</td>
<td>FRP RELIEF VALVE</td>
<td>3</td>
<td>×</td>
<td>EC-234</td>
<td></td>
</tr>
<tr>
<td>P1273</td>
<td>1273</td>
<td>FUEL PUMP</td>
<td>3</td>
<td>×</td>
<td>EC-234</td>
<td></td>
</tr>
<tr>
<td>P1274</td>
<td>1274</td>
<td>FUEL PUMP</td>
<td>1</td>
<td>×</td>
<td>EC-234</td>
<td></td>
</tr>
<tr>
<td>P1275</td>
<td>1275</td>
<td>FUEL PUMP</td>
<td>1</td>
<td>×</td>
<td>EC-234</td>
<td></td>
</tr>
<tr>
<td>P1610</td>
<td>1610</td>
<td>LOCK MODE</td>
<td>1</td>
<td>—</td>
<td>EL-102</td>
<td></td>
</tr>
<tr>
<td>P1611</td>
<td>1611</td>
<td>ID DISCORD, IMM-ECM</td>
<td>1</td>
<td>—</td>
<td>EL-103</td>
<td></td>
</tr>
<tr>
<td>P1612</td>
<td>1612</td>
<td>CHAIN OF ECM-IMMU</td>
<td>1</td>
<td>—</td>
<td>EL-103</td>
<td></td>
</tr>
<tr>
<td>P1614</td>
<td>1614</td>
<td>CHAIN OF IMMU-KEY</td>
<td>1</td>
<td>—</td>
<td>EL-105</td>
<td></td>
</tr>
<tr>
<td>P1615</td>
<td>1615</td>
<td>DIFFERENCE OF KEY</td>
<td>1</td>
<td>—</td>
<td>EL-106</td>
<td></td>
</tr>
<tr>
<td>P1616</td>
<td>1616</td>
<td>ECM</td>
<td>1</td>
<td>—</td>
<td>EL-106</td>
<td></td>
</tr>
<tr>
<td>P1622</td>
<td>1622</td>
<td>INJ ADJ VAL UNRGST</td>
<td>1</td>
<td>—</td>
<td>EC-254</td>
<td></td>
</tr>
<tr>
<td>P1623</td>
<td>1623</td>
<td>INJ ADJ VAL ERROR</td>
<td>1</td>
<td>—</td>
<td>EC-255</td>
<td></td>
</tr>
<tr>
<td>P2135</td>
<td>2135</td>
<td>APP SENSOR</td>
<td>1</td>
<td>—</td>
<td>EC-257</td>
<td></td>
</tr>
<tr>
<td>P2146</td>
<td>2146</td>
<td>INJ PWR/CIRC</td>
<td>3</td>
<td>×</td>
<td>EC-262</td>
<td></td>
</tr>
<tr>
<td>P2147</td>
<td>2147</td>
<td>INJECTOR/CIRC</td>
<td>3</td>
<td>×</td>
<td>EC-266</td>
<td></td>
</tr>
<tr>
<td>P2148</td>
<td>2148</td>
<td>INJECTOR/CIRC</td>
<td>3</td>
<td>×</td>
<td>EC-266</td>
<td></td>
</tr>
<tr>
<td>P2149</td>
<td>2149</td>
<td>INJ PWR/CIRC</td>
<td>3</td>
<td>×</td>
<td>EC-262</td>
<td></td>
</tr>
<tr>
<td>P2228</td>
<td>2228</td>
<td>BARO SEN/CIRC</td>
<td>3</td>
<td>×</td>
<td>EC-271</td>
<td></td>
</tr>
<tr>
<td>P2229</td>
<td>2229</td>
<td>BARO SEN/CIRC</td>
<td>3</td>
<td>×</td>
<td>EC-271</td>
<td></td>
</tr>
</tbody>
</table>

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.
*2: This number is prescribed by ISO 15031-6.
*3: In Diagnostic Test Mode II (Self-diagnostic results).
*4: The troubleshooting for this DTC needs CONSULT-III.
ON BOARD DIAGNOSTIC (OBD) SYSTEM

For malfunctions in which 1st/2nd trip DTC are displayed, Refer to “EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS”.

1st/2nd trip DTC is specified in Service $07 of ISO15031-5. 1st/2nd trip DTC detection occurs without lighting up MI and therefore does not warn the driver of a malfunction.

When 1st/2nd trip DTC is detected, check, print out or write down, and erase 1st/2nd trip DTC as specified with step II of Work Flow, refer to EC-41, "Trouble Diagnosis Introduction". Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, it is necessary to investigate the cause again.

How to Read DTC and 1st/2nd Trip DTC
DTC and 1st/2nd trip DTC can be read by the following procedures.

With CONSULT-III
CONSULT-III or GST (Generic Scan Tool): Examples: P0117, P0335, P1268, etc.
These numbers are prescribed by ISO 15031-6.
(CONSULT-III also displays the malfunctioning parts and systems.)
A sample of CONSULT-III display for DTC and 1st/2nd trip DTC is shown in the figure. DTC and 1st/2nd trip DTC are displayed in the “SELF-DIAG RESULTS” mode of CONSULT-III.
‘TIME’ data shows how many times the vehicle was driven after the last detection of DTC or 1st/2nd trip DTC.
When DTC or 1st/2nd trip DTC has been detected currently, “TIME” becomes “0”.
• CONSULT-III displays for DTC and 1st/2nd trip DTC become the same.
• The output of a DTC indicates a malfunction. However, GST does not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify the malfunction status. Therefore the use of CONSULT-III (If available) is recommended.

FREEZE FRAME DATA
ECM records driving conditions such as calculated load value, engine coolant temperature, engine speed, vehicle speed, and intake manifold pressure at the moment a malfunction is detected.
The data stored together with DTC is called Freeze Frame Data, and is displayed on CONSULT-III or GST.
When 1st/2nd trip DTC is detected, Freeze Frame Data is not recorded.
Only a set of Freeze Frame Data can be stored in the ECM memory. When ECM records Freeze Frame Data, and another Freeze Frame Data is generated after that, the first (original) Freeze Frame Data is not updated in ECM and it remains.
When the DTC is erased from ECM memory, Freeze Frame Data is erased with DTC. The procedure for erasing DTC is described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC and 1st Trip DTC

WITH CONSULT-III
NOTE:
• If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
1. Select “ENGINE” with CONSULT-III.
2. Select “SELF-DIAG RESULTS”.
3. Touch “ERASE”. (DTC in ECM will be erased.)

WITH GST
NOTE:
• If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

NO TOOLS
NOTE:
• If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
• If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.
• The following data are cleared when the ECM memory is erased.
  - Diagnostic trouble codes
  - 1st trip diagnostic trouble codes
  - 2nd trip diagnostic trouble codes
  - Freeze frame data
ON BOARD DIAGNOSTIC (OBD) SYSTEM

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

NATS (Nissan Anti-Theft System)

- If the security indicator lights up with the ignition switch in the ON position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform self-diagnostic results mode with CONSULT-III using NATS program card. Refer to EL-95.
- Confirm no self-diagnostic results of NATS is displayed before touching “ERASE” in “SELF-DIAG RESULTS” mode with CONSULT-III.
- When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-III using NATS program card. Therefore, be sure to receive all keys from vehicle owner. Regarding the procedure of NATS initialization and all NATS ignition key ID registration, refer to CONSULT-III operation manual, NATS.

Malfunction Indicator (MI)

DESCRIPTION
The MI is located on the instrument panel.
1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MI does not light up, refer to EC-296.
2. When the engine is started, the MI should go off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction.

ON BOARD DIAGNOSTIC SYSTEM FUNCTION
The on board diagnostic system has the following three functions.

<table>
<thead>
<tr>
<th>Diagnostic Test Mode</th>
<th>KEY and ENG. Status</th>
<th>Function</th>
<th>Explanation of Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode I</td>
<td>Ignition switch in ON position Engine stopped</td>
<td>BULB CHECK</td>
<td>This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit. (See EC-296.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine running</td>
<td>MALFUNCTION WARNING</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ignition switch in ON position Engine stopped</td>
<td>SELF-DIAGNOSTIC RESULTS</td>
</tr>
</tbody>
</table>

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:
It is better to count the time accurately with a clock.
It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.

How to Set Diagnostic Test Mode II (Self-diagnostic Results)
1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.
   a. Fully depress the accelerator pedal.
   b. Fully release the accelerator pedal.
3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)
1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to “How to Set Diagnostic Test Mode II (Self-diagnostic Results)”. 
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK
In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EC-296.

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

<table>
<thead>
<tr>
<th>MI</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>When the malfunction is detected.</td>
</tr>
<tr>
<td>OFF</td>
<td>No malfunction.</td>
</tr>
</tbody>
</table>

These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)
In this mode, the DTC is indicated by the number of blinks of the MI as shown below. A DTC will be used as an example for how to read a code.

A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle. A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-32, "Emission-Related Diagnostic Information".)

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)
The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to “How to Erase Diagnostic Test Mode II (Self-diagnostic Results)".

- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

**OBD System Operation Chart**

**RELATIONSHIP BETWEEN MI, 1ST/2ND TRIP DTC, DTC, AND DETECTABLE ITEMS**
- When the malfunction is detected for the first time, 1st trip DTC is stored in the ECM memory.
- When the same malfunction is detected during 2nd consecutive trip, 2nd trip DTC is stored and 1st trip DTC is cleared.
- When the same malfunction is detected during 3rd consecutive trip, DTC and Freeze Frame Data are stored and MI illuminates. Refer to EC-32, "Three Trip Detection Logic and One Trip Detection Logic" for details. 1st/2nd trip DTC are cleared from the ECM memory.
- MI will go off after the vehicle is driven 3 consecutive times with no malfunction (driving pattern A).
- 1st/2nd trip DTC, DTC, and Freeze Frame Data will be stored until the vehicle is driven 41 times (driving pattern B) without the same malfunction recurring. “TIME” data displayed in the “SELF-DIAG RESULTS” mode of CONSULT-III shows the number of times the vehicle is driven without the same malfunction recurring.

**SUMMARY CHART**

<table>
<thead>
<tr>
<th>Items</th>
<th>Trip</th>
<th>Counter</th>
<th>Driving Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI (goes off)</td>
<td>3</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>DTC, Freeze Frame Data (clear)</td>
<td>41</td>
<td>40</td>
<td>B</td>
</tr>
<tr>
<td>1st/2nd Trip DTC (clear)</td>
<td>41</td>
<td>40</td>
<td>B</td>
</tr>
</tbody>
</table>

Refer to “RELATIONSHIP BETWEEN MI, DTC, 1ST/2NDTRIP DTC AND DRIVING PATTERNS” for details of pattern A and B.

**RELATIONSHIP BETWEEN MI, DTC, 1ST/2NDTRIP DTC AND DRIVING PATTERNS**
ON BOARD DIAGNOSTIC (OBD) SYSTEM

< DRIVING PATTERN A >

Driving pattern A means the vehicle operation as follows:
Engine speed should go over 500 rpm at least 5 seconds and the DTC Confirmation Procedure is performed.

- The A counter will be cleared when the same malfunction is detected.
- The A counter will be counted up when the same malfunction is not detected.
- The MI will go off when the A counter reaches 3.

< DRIVING PATTERN B >

*1: CONSULT-III displays for DTC and 1st/2nd trip DTC become the same.

*2: 1st/2nd trip DTC becomes the same display in mode 7 of GST.

*3: When the same malfunction is detected in three consecutive trips, MI will light up.

*4: MI will go off after vehicle is driven 3 times (pattern A) without any malfunctions.

*5: When the malfunction is detected for the first time, 1st trip DTC is stored in the ECM memory.

*6: When the same malfunction is detected during 2nd consecutive trip, 2nd trip DTC is stored and 1st trip DTC is cleared.

*7: When the same malfunction is detected during 3rd consecutive trip, DTC and Freeze Frame Data are stored.

*8: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 41 times (pattern B) without the same malfunction.
Driving pattern B means the vehicle operation as follows:
Driving pattern A and (1)-(3) are satisfied.

- The B counter will be cleared when the same malfunction is detected.
- The B counter will be counted up when the same malfunction is not detected.
- The DTC will not be displayed after the B counter reaches 40.
TROUBLE DIAGNOSIS

TROUBLE DIAGNOSIS

Trouble Diagnosis Introduction

INTRODUCTION
The engine has an ECM to control major systems such as fuel injection control, fuel injection timing control, glow control system, etc. The ECM accepts input signals from sensors and instantly actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, or other malfunctions with the engine.

It is much more difficult to diagnose a malfunction that occurs intermittently rather than continuously. Most intermittent malfunctions are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the incidents. A road test with CONSULT-III (or GST) or a circuit tester connected should be performed. Follow the “WORK FLOW”. Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on “WORK FLOW” should be used.

Start your diagnosis by looking for conventional incidents first. This will help troubleshoot driveability incidents on an electronically controlled engine vehicle.

WORK FLOW
Description for Work Flow

*1 If time data of “SELF-DIAG RESULTS” is other than “0”, perform EC-70.

*2 If the incident cannot be verified, perform EC-70.

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-71.

*4 If malfunctioning part cannot be detected, perform EC-70.
There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about an incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one shown below in order to organize all the information for troubleshooting.
### DTC Inspection Priority Chart

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Startability</th>
<th>Impossible to start</th>
<th>No combustion</th>
<th>Partial combustion</th>
<th>Partial combustion affected by throttle position</th>
<th>Partial combustion when engine is cool</th>
<th>Possible but hard to start</th>
<th>Others [ ]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Idling</td>
<td>No fast idle</td>
<td>Unstable</td>
<td>High idle</td>
<td>Low idle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Others [ ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Driveability</td>
<td>Stumble</td>
<td>Surge</td>
<td>Knock</td>
<td>Lack of power</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Engine stall</td>
<td>At the time of start</td>
<td>While idling</td>
<td>While accelerating</td>
<td>While decelerating</td>
<td>Just after stopping</td>
<td>While loading</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Incident occurrence</th>
<th>Just after delivery</th>
<th>Recently</th>
<th>In the morning</th>
<th>At night</th>
<th>In the daytime</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Frequency</th>
<th>All the time</th>
<th>Under certain conditions</th>
<th>Sometimes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Weather conditions</th>
<th>Not affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather</td>
<td>Fine</td>
</tr>
<tr>
<td>Temperature</td>
<td>Hot</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Engine conditions</th>
<th>Cold</th>
<th>During warm-up</th>
<th>After warm-up</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Engine speed</th>
<th>0</th>
<th>2,000</th>
<th>4,000</th>
<th>6,000</th>
<th>8,000</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Road conditions</th>
<th>In town</th>
<th>In suburbs</th>
<th>Highway</th>
<th>Off road (up/down)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Driving conditions</th>
<th>Not affected</th>
<th>At starting</th>
<th>While idling</th>
<th>At racing</th>
<th>While accelerating</th>
<th>While cruising</th>
<th>While decelerating</th>
<th>While turning (RH/LH)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Vehicle speed</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>MPH</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Malfunction indicator</th>
<th>Turned on</th>
<th>Not turned on</th>
</tr>
</thead>
</table>

### Worksheet Sample

<table>
<thead>
<tr>
<th>Customer name MR/MS</th>
<th>Model &amp; Year</th>
<th>VIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine #</td>
<td>Trans.</td>
<td>Mileage</td>
</tr>
<tr>
<td>Incident Date</td>
<td>Manuf. Date</td>
<td>In Service Date</td>
</tr>
</tbody>
</table>

MTBLS063
Basic Inspection

Precaution:
Perform Basic Inspection without electrical or mechanical loads applied.
- Headlamp switch is OFF.
  - For vehicles equipped with daytime light systems, perform one of the following procedures before starting engine not to illuminate headlamps.
  - Apply parking brake
  - Set lighting switch to the 1st position
  - Air conditioner switch is OFF.
  - Rear defogger switch is OFF.
  - Steering wheel is in the straight-ahead position, etc.

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction.
2. Check the current need for scheduled maintenance, especially for fuel filter and air cleaner filter. Refer to MA-3 (For Europe), MA-8 (For Australia).
3. Open engine hood and check the following:
   - Harness connectors for improper connections
   - Vacuum hoses for splits, kinks, or improper connections
   - Wiring for improper connections, pinches, or cuts
4. Start engine and warm it up to the normal operating temperature.

>> GO TO 2.

2. PREPARATION FOR CHECKING IDLE SPEED
< SERVICE INFORMATION >

With CONSULT-III
Connect CONSULT-III to the data link connector.

Without CONSULT-III
Install diesel tacho tester to the vehicle.

>> GO TO 3.

3. CHECK IDLE SPEED

With CONSULT-III
1. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-III.
2. Read idle speed.

M/T: 750±25 rpm (in Neutral position)

Without CONSULT-III
Read idle speed.

M/T: 750±25 rpm (in Neutral position)

OK or NG
OK >> INSPECTION END
NG >> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG
OK >> GO TO 5.
NG >> Repair or replace.

5. BLEED AIR FROM FUEL SYSTEM

1. Stop engine.
2. Use priming pump to bleed air from fuel system. Refer to EC-22, "Fuel Filter".

>> GO TO 6.

6. CHECK IDLE SPEED AGAIN

With CONSULT-III
1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-III.
3. Read idle speed.

M/T: 750±25 rpm (in Neutral position)

Without CONSULT-III
Read idle speed.

M/T: 750±25 rpm (in Neutral position)

OK or NG
OK >> INSPECTION END
NG >> GO TO 7.

7. DRAIN WATER FROM FUEL FILTER

Drain water from fuel filter. Refer to EC-22, "Fuel Filter".

>> GO TO 8.

8. CHECK IDLE SPEED AGAIN
With CONSULT-III
1. Start engine and let it idle.
2. Select “CKPS-RPM (TDC)” in “DATA MONITOR” mode with CONSULT-III.
3. Read idle speed.

M/T: 750±25 rpm (in Neutral position)

Without CONSULT-III
Read idle speed.

M/T: 750±25 rpm (in Neutral position)

9. CHECK AIR CLEANER FILTER
Check air cleaner filter for clogging or breaks.

OK or NG
OK  >> INSPECTION END
NG  >> GO TO 9.

10. CHECK BATTERY VOLTAGE
Check battery voltage.

Voltage: More than 12.13 V

OK or NG
OK  >> GO TO 12.
NG  >> GO TO 11.

11. CHECK BATTERY
Refer to EL-12.

OK or NG
OK  >> Check charging system. Refer to “BATTERY” in EL section.
NG  >> Repair or replace.

12. CHECK COMPRESSION PRESSURE
Check compression pressure. Refer to “MEASUREMENT OF COMPRESSION PRESSURE” in EM section.

OK or NG
OK  >> GO TO 13.
NG  >> Follow the instruction of “CHECKING COMPRESSION PRESSURE”.

13. CHECK IDLE SPEED AGAIN

With CONSULT-III
1. Start engine and let it idle.
2. Select “CKPS-RPM (TDC)” in “DATA MONITOR” mode with CONSULT-III.
3. Read idle speed.

M/T: 750±25 rpm (in Neutral position)

Without CONSULT-III
Read idle speed.

M/T: 750±25 rpm (in Neutral position)

OK or NG
OK  >> INSPECTION END
NG  >> 1. Replace fuel injector.
     2. GO TO 3.
### TROUBLE DIAGNOSIS

#### Symptom Matrix Chart

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HARD/NO START/RESTART (EXCP. HA)</td>
<td></td>
</tr>
<tr>
<td>HARD TO START WHEN ENGINE IS COLD</td>
<td></td>
</tr>
<tr>
<td>HARD TO START WHEN ENGINE IS HOT</td>
<td></td>
</tr>
<tr>
<td>AT IDLE</td>
<td></td>
</tr>
<tr>
<td>DURING DRIVING</td>
<td></td>
</tr>
<tr>
<td>WHEN DECELERATING/FLAT SPOT</td>
<td></td>
</tr>
<tr>
<td>KNOCK/DETONATION</td>
<td></td>
</tr>
<tr>
<td>LACK OF POWER</td>
<td></td>
</tr>
<tr>
<td>POOR ACCELERATION</td>
<td></td>
</tr>
<tr>
<td>HI IDLE</td>
<td></td>
</tr>
<tr>
<td>LOW IDLE</td>
<td></td>
</tr>
</tbody>
</table>

#### WARRANTY SYMPTOM CODE

<table>
<thead>
<tr>
<th>Component</th>
<th>Code</th>
<th>AA</th>
<th>AB</th>
<th>AC</th>
<th>AD</th>
<th>AE</th>
<th>AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel pump</td>
<td></td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Fuel filter</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel injector</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Glow control system</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine body</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>EGR system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air cleaner and duct</td>
<td></td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel rail pressure relief valve</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

*SYSTEM — Basic engine control system*
## TROUBLE DIAGNOSIS

### < SERVICE INFORMATION >

#### [YD25DDTi]

<table>
<thead>
<tr>
<th>SYSTEM — Basic engine control system</th>
<th>SYMPTOM</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO START (with first firing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO START (without first firing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HARD TO START WHEN ENGINE IS COLD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HARD TO START WHEN ENGINE IS HOT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT IDLE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DURING DRIVING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHEN DECELERATING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KNOCK/DETONATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LACK OF POWER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POOR ACCELERATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HI/DE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOW/IDLE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Warranty symptom code</th>
<th>AA</th>
<th>AB</th>
<th>AC</th>
<th>AD</th>
<th>AE</th>
<th>AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel pump circuit</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Fuel injector circuit</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Fuel injector adjustment value</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass air flow sensor circuit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine coolant temperature circuit</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Vehicle speed signal circuit</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerator pedal position sensor circuit</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel rail pressure sensor circuit</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Crankshaft position sensor circuit</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camshaft position sensor circuit</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start signal circuit</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Ignition switch circuit</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Heat up switch circuit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Power supply for ECM circuit</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling fan relay circuit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glow relay circuit</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECM relay (Self-shutoff) circuit</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECM</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NATS (Nissan Anti-theft System)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 - 5: The numbers refer to the order of inspection.
## TROUBLE DIAGNOSIS

(continued on next table)

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>ROUGH IDLE/HUNTING</th>
<th>IDLING VIBRATION</th>
<th>SLOW/NO RETURN TO IDLE</th>
<th>OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE</th>
<th>EXCESSIVE FUEL CONSUMPTION</th>
<th>EXCESSIVE OIL CONSUMPTION</th>
<th>BLACK SMOKE</th>
<th>WHITE SMOKE</th>
<th>DEAD BATTERY (UNDER CHARGE)</th>
<th>Malfunction indicator illuminates.</th>
<th>Can be detected by CONSULT-III?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warranty symptom code</td>
<td>AG</td>
<td>AH</td>
<td>AJ</td>
<td>AK</td>
<td>AL</td>
<td>AM</td>
<td>AP</td>
<td>HA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel pump</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>EC-22</td>
</tr>
<tr>
<td>Fuel filter</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel injector</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>EC-133</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glow control system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>EC-273</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine body</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td>EC-18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR system</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EC-177, EC-190, EC-196</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air cleaner and duct</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Refer to Service Manual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel rail pressure relief valve</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>EC-91</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Trouble Diagnosis

**< Service Information >**

## SYMPTOM

<table>
<thead>
<tr>
<th>Warranty symptom code</th>
<th>AG</th>
<th>AH</th>
<th>AJ</th>
<th>AK</th>
<th>AL</th>
<th>AM</th>
<th>AP</th>
<th>HA</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel pump circuit</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>EC-239</td>
</tr>
<tr>
<td>Fuel injector circuit</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>EC-133</td>
</tr>
<tr>
<td>Fuel injector adjustment value</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>EC-22</td>
</tr>
<tr>
<td>Mass air flow sensor circuit</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EC-94, EC-103</td>
</tr>
<tr>
<td>Engine coolant temperature circuit</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>EC-115</td>
</tr>
<tr>
<td>Vehicle speed signal circuit</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EC-119, EC-147, EC-257</td>
</tr>
<tr>
<td>Accelerator pedal position sensor circuit</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>EC-119, EC-147, EC-257</td>
</tr>
<tr>
<td>Fuel rail pressure sensor circuit</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>EC-128</td>
</tr>
<tr>
<td>Crankshaft position sensor circuit</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>EC-152, EC-157</td>
</tr>
<tr>
<td>Camshaft position sensor circuit</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EC-163, EC-168</td>
</tr>
<tr>
<td>Start signal circuit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EC-293</td>
</tr>
<tr>
<td>Ignition switch circuit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EC-71</td>
</tr>
<tr>
<td>Heat up switch circuit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EC-280</td>
</tr>
<tr>
<td>Power supply for ECM circuit</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EC-71</td>
</tr>
<tr>
<td>Cooling fan relay circuit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>EC-138</td>
</tr>
<tr>
<td>Glow relay circuit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>EC-173</td>
</tr>
<tr>
<td>ECM relay (Self-shutoff) circuit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>EC-220</td>
</tr>
<tr>
<td>ECM</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>EC-203, EC-218, EC-271</td>
</tr>
<tr>
<td>NATS (Nissan Anti-theft System)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EL-95</td>
</tr>
</tbody>
</table>

1 - 5: The numbers refer to the order of inspection.
Engine Control Component Parts Location

1. Glow relay
2. Cooling fan motor
3. Engine coolant temperature sensor
4. Mass air flow sensor
5. Camshaft position sensor
6. Glow plug
7. Fuel injector
8. Fuel rail pressure sensor
9. Fuel rail pressure relief valve
10. Fuel Pump
11. EGR volume control valve
12. Fuel filter

1. Fuel pump temperature sensor
2. Fuel pump
3. Fuel rail pressure relief valve

的方向：Vehicle front
1. Glow relay
   → Vehicle front

2. Engine coolant temperature sensor

1. Mass air flow sensor
   → Vehicle front

2. Fuel injector

1. Glow plug connecting plate
   → Vehicle front

2. Glow plug

3. Glow relay

1. Camshaft position sensor
   → Vehicle front

2. Crankshaft position sensor
### TROUBLE DIAGNOSIS

**1. ECM**  
2. PNP switch  
3. PNP switch harness connector  

[Vehicle front image]

**1. Cooling fan motor connector**  
2. Cooling fan motor  
3. Heat up switch  

[Vehicle front image]

**1. Accelerator pedal position sensor**  
2. Stop lamp switch
ECM Terminal and Reference Value

PREPARATION
1. ECM (1) is located behind the instrument lower panel.
2. Remove ECM cover.
3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown in the figure.
4. Connect a break-out box and Y-cable adapter between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.

ECM INSPECTION TABLE
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.
<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Signal name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (B)</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>2 (B)</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>3 (B)</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>4 (L)</td>
<td>Fuel injector power supply</td>
<td>[Engine is running]</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td></td>
<td>(For cylinder No. 1 and 3)</td>
<td>- Warm-up condition</td>
<td><img src="MBB1295E" alt="Graph" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Idle speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>NOTE:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The pulse cycle changes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>depending on rpm at idle</td>
<td></td>
</tr>
<tr>
<td>5 (P)</td>
<td>Fuel injector power supply</td>
<td>[Engine is running]</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td></td>
<td>(For cylinder No. 2 and 4)</td>
<td>- Warm-up condition</td>
<td><img src="MBB1296E" alt="Graph" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Engine speed: 2,000 rpm</td>
<td></td>
</tr>
<tr>
<td>7 (OR)</td>
<td>EGR volume control valve (Close)</td>
<td>[Ignition switch OFF]</td>
<td>1.0 - 2.0 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Warm-up condition</td>
<td>↑↓ (Periodically changes)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- For a few seconds after</td>
<td>BATTERY VOLTAGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>turning ignition switch</td>
<td>(11 - 14 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF.</td>
<td><img src="MBB1783E" alt="Graph" /></td>
</tr>
<tr>
<td>8 (Y)</td>
<td>EGR volume control valve (Open)</td>
<td>[Ignition switch OFF]</td>
<td>1.0 - 2.0 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Warm-up condition</td>
<td>↑↓ (Periodically changes)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- For a few seconds after</td>
<td>BATTERY VOLTAGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>turning ignition switch</td>
<td>(11 - 14 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF.</td>
<td><img src="MBB1783E" alt="Graph" /></td>
</tr>
</tbody>
</table>
# TROUBLE DIAGNOSIS

## [YD25DDTI]

### TERMINAL NO. (Wire color) Description | Condition | Value (Approx.)
--- | --- | ---
10 (G) | Fuel pump | [Engine is running]  
- Warm-up condition  
- Idle speed | Approximately 5.8 V ★

13 (BR) | Heat up switch | [Ignition switch ON]  
- Heat up switch: OFF | Approximately 0 V

- Heat up switch: ON  
BATTERY VOLTAGE  
(11 - 14 V)

21 (Y) | Fuel injector No. 4 | [Engine is running]  
- Warm-up condition  
- Idle speed  
**NOTE:**  
The pulse cycle changes depending on rpm at idle | Approximately 7.5 V ★

22 (R) | Fuel injector No. 4 | [Engine is running]  
- Warm-up condition  
- Idle speed | Approximately 0.3 V ★

23 (W) | Fuel injector No. 2 | [Engine is running]  
- Warm-up condition  
- Engine speed: 2,000 rpm | Approximately 0.3 V ★

24 (OR) | Fuel injector No. 2 | [Engine is running]  
- Warm-up condition  
- Engine speed: 2,000 rpm | Approximately 0.3 V ★

29 (B) | Fuel pump | [Engine is running]  
- Warm-up condition  
- Idle speed | Approximately 0.3 V ★
## TROUBLE DIAGNOSIS

### [YD25DDTi]

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>37 (L) 114 (B)</td>
<td>Glow relay</td>
<td>Refer to EC-173.</td>
<td></td>
</tr>
<tr>
<td>40 (G)</td>
<td>Fuel injector No. 3</td>
<td>[Engine is running]</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Idle speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOTE:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The pulse cycle changes depending on</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>rpm at idle</td>
<td></td>
</tr>
<tr>
<td>41 (BR) 114 (B)</td>
<td>Fuel injector No. 3</td>
<td>[Engine is running]</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Engine speed: 2,000 rpm</td>
<td></td>
</tr>
<tr>
<td>42 (PU)</td>
<td>Fuel injector No. 1</td>
<td>[Engine is running]</td>
<td>Approximately 5 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Engine speed: 2,000 rpm</td>
<td></td>
</tr>
<tr>
<td>43 (SB)</td>
<td>Fuel injector No. 1</td>
<td>[Engine is running]</td>
<td>Approximately 3.5 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Engine speed: 2,000 rpm</td>
<td></td>
</tr>
<tr>
<td>45 (W) 66 (B)</td>
<td>Camshaft position sensor power supply</td>
<td>[Ignition switch ON]</td>
<td>Approximately 3.5 V ★</td>
</tr>
<tr>
<td>46 (G) 65 (Y)</td>
<td>Crankshaft position sensor</td>
<td>[Engine is running]</td>
<td>Approximately 4.7 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Idle speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOTE:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The pulse cycle changes depending on</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>rpm at idle</td>
<td></td>
</tr>
<tr>
<td>47 (R) 66 (B)</td>
<td>Camshaft position sensor</td>
<td>[Engine is running]</td>
<td>Approximately 4.7 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Engine speed: 2,000 rpm</td>
<td></td>
</tr>
</tbody>
</table>
### TROUBLE DIAGNOSIS

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ —</td>
<td>Signal name</td>
<td>[Engine is running]</td>
<td>1.4 - 1.7 V</td>
</tr>
<tr>
<td>48 (W) 49 (W) 68 (B)</td>
<td>Fuel rail pressure sensor</td>
<td>- Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Idle speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Engine is running]</td>
<td>1.7 - 2.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Engine speed: 2,000 rpm</td>
<td></td>
</tr>
<tr>
<td>50 (BR) 69 (PU)</td>
<td>Fuel pump temperature sensor</td>
<td>[Engine is running]</td>
<td>Approximately 0 - 4.8 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Warm-up condition</td>
<td>Output voltage varies with fuel pump temperature</td>
</tr>
<tr>
<td>51 (GY) 70 (LG)</td>
<td>Engine coolant temperature sensor</td>
<td>[Engine is running]</td>
<td>Approximately 0 - 4.8 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Warm-up condition</td>
<td>Output voltage varies with engine coolant temperature</td>
</tr>
<tr>
<td>54 (G) 73 (B)</td>
<td>Mass air flow sensor</td>
<td>[Ignition switch ON]</td>
<td>Approximately 0.4 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Engine is running]</td>
<td>1.3 - 1.8 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Engine is running]</td>
<td>1.3 - 1.8 V to Approximately 4.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Warm-up condition</td>
<td>(Check for liner voltage rise in response to engine being increased to about 4,000 rpm)</td>
</tr>
<tr>
<td>63 (R) 68 (B)</td>
<td>Fuel rail pressure sensor power supply</td>
<td>[Ignition switch ON]</td>
<td>Approximately 5 V</td>
</tr>
<tr>
<td>65 (Y)</td>
<td>Crankshaft position sensor ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>66 (B)</td>
<td>Camshaft position sensor ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>67 (B)</td>
<td>Sensor ground (Sensor shield circuit)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>68 (B)</td>
<td>Fuel rail pressure sensor ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>69 (PU)</td>
<td>Fuel pump temperature sensor ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>70 (LG)</td>
<td>Engine coolant temperature sensor ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>73 (B)</td>
<td>Mass air flow sensor ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>74 (R)</td>
<td>Intake air temperature sensor ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>77 (SB)</td>
<td>EGR volume control valve control position sensor ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>81 (P) 77 (SB)</td>
<td>EGR volume control valve control position sensor</td>
<td>[Ignition switch OFF]</td>
<td>Voltage should fluctuates between 0.5 and 2.5 V, then drop to 0V.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- For a few seconds after turning ignition switch OFF.</td>
<td></td>
</tr>
<tr>
<td>82 (W) 84 (R)</td>
<td>Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor / EGR volume control valve control position sensor)</td>
<td>[Ignition switch ON]</td>
<td>Approximately 5 V</td>
</tr>
</tbody>
</table>
## TROUBLE DIAGNOSIS

### TERMINAL NO. (Wire color)

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>83 (B) 84 (R)</td>
<td>Accelerator pedal position sensor</td>
<td>[Ignition switch ON]</td>
<td>0.5 - 1.0 V</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>• Engine: Stopped</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Accelerator pedal: Fully released</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch ON]</td>
<td>3.7 - 4.7 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Engine: Stopped</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Accelerator pedal: Fully depressed</td>
<td></td>
</tr>
<tr>
<td>84 (R)</td>
<td>Accelerator pedal position sensor</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>87 (P)</td>
<td>CAN communication line</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>89 (LG)</td>
<td>Data link connector</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>90 (L) 92 (Y)</td>
<td>Accelerator pedal position sensor</td>
<td>[Ignition switch ON]</td>
<td>Approximately 5 V</td>
</tr>
<tr>
<td></td>
<td>2 power supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>91 (G) 92 (Y)</td>
<td>Accelerator pedal position sensor</td>
<td>[Ignition switch ON]</td>
<td>0.15 - 0.6 V</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>• Engine: Stopped</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Accelerator pedal: Fully released</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch ON]</td>
<td>1.85 - 2.4 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Engine: Stopped</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Accelerator pedal: Fully depressed</td>
<td></td>
</tr>
<tr>
<td>92 (Y)</td>
<td>Accelerator pedal position sensor</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>2 ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>95 (L)</td>
<td>CAN communication line</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>99 (R) 114 (B)</td>
<td>Start signal</td>
<td>[Ignition switch ON]</td>
<td>Approximately 0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch START]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td>100 (GY)</td>
<td>Stop lamp switch</td>
<td>[Ignition switch OFF]</td>
<td>Approximately 0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Brake pedal: Fully released</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Brake pedal: Slightly depressed</td>
<td></td>
</tr>
<tr>
<td>105 (G) 114 (B)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch ON]</td>
<td>0 - 1.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• More than a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
<tr>
<td>107 (L) 108 (L)</td>
<td>Ignition switch</td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td>110 (BR) 114 (B)</td>
<td>Park/neutral position switch</td>
<td>[Ignition switch ON]</td>
<td>Approximately 0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Shift lever: Neutral</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Except the above position</td>
<td></td>
</tr>
<tr>
<td>113 (G) 114 (B)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch ON]</td>
<td>0 - 1.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• More than a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
</tbody>
</table>
CONSULT-III Function (ENGINE)

<table>
<thead>
<tr>
<th>Diagnostic test mode</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work support</td>
<td>This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III unit.</td>
</tr>
<tr>
<td>Self-Diagnostic Results</td>
<td>Self-diagnostic results such as 1st/2nd trip DTC, DTC and freeze frame data can be read and erased quickly.*</td>
</tr>
<tr>
<td>Data Monitor</td>
<td>Input/Output data in the ECM can be read.</td>
</tr>
<tr>
<td>Active Test</td>
<td>Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMS and also shifts some parameters in a specified range.</td>
</tr>
<tr>
<td>Function Test</td>
<td>This mode is used to inform customers when their vehicle condition requires periodic maintenance.</td>
</tr>
<tr>
<td>ECM Part Number</td>
<td>ECM part number can be read.</td>
</tr>
</tbody>
</table>

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.
- Diagnostic trouble codes
- 1st/2nd trip diagnostic trouble codes
- Freeze frame data

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION
## TROUBLE DIAGNOSIS

### SELF-DIAG RESULTS

<table>
<thead>
<tr>
<th>Item</th>
<th>DTC*</th>
<th>FREEZE FRAME DATA</th>
<th>DATA MONITOR</th>
<th>ACTIVE TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crankshaft position sensor</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>Camshaft position sensor</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>Vehicle speed sensor</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>Fuel pump temperature sensor</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>Accelerator pedal position sensor 1</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerator pedal position sensor 2</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel rail pressure sensor</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass air flow sensor</td>
<td>×</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake air temperature sensor</td>
<td>×</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery voltage</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Park/neutral position (PNP) switch</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR volume control valve control position sensor</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop lamp switch</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat up switch</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ignition switch (Start signal)</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air conditioner switch signal</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barometric pressure sensor (built-into ECM)</td>
<td>×</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel pump</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>Fuel injector</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>Glow relay</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>Cooling fan relay</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>EGR volume control valve</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
</tbody>
</table>

### INPUT

- Crankshaft position sensor
- Camshaft position sensor
- Engine coolant temperature sensor
- Vehicle speed sensor
- Fuel pump temperature sensor
- Accelerator pedal position sensor 1
- Accelerator pedal position sensor 2
- Fuel rail pressure sensor
- Mass air flow sensor
- Intake air temperature sensor
- Battery voltage
- Park/neutral position (PNP) switch
- EGR volume control valve control position sensor
- Stop lamp switch
- Heat up switch
- Ignition switch (Start signal)
- Air conditioner switch signal
- Barometric pressure sensor (built-into ECM)

### OUTPUT

- Fuel pump
- Fuel injector
- Glow relay
- Cooling fan relay
- EGR volume control valve

X: Applicable
*: This item includes 1st/2nd trip DTCs.

### WORK SUPPORT MODE

#### WORK ITEM DESCRIPTION USAGE

<table>
<thead>
<tr>
<th>Work Item</th>
<th>Description</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTER INJCTR CALIB DATA</td>
<td>- Injector adjustment value is written onto ECM memory.</td>
<td>When performing Injector Adjustment Value Registration.</td>
</tr>
</tbody>
</table>
| EGR/V LEARN CLR                    | - EGR volume control valve learning value stored in ECM is cleared. | EGR volume control valve closed position learning value should be cleared under the following cases.  
  - EGR volume control valve is removed.  
  - EGR volume control valve is replaced. |
| INJ ADJ VAL CLR                    | - Injector adjustment value stored in ECM is initialized. | Before changing injector adjustment value stored in ECM, it is recommended to perform this work item.   |

### SELF-DIAGNOSTIC MODE
Self Diagnostic Item
Regarding items of DTC and 1st/2nd trip DTC, refer to EC-32, "Emission-Related Diagnostic Information".

Freeze Frame Data

<table>
<thead>
<tr>
<th>Freeze frame data item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIAG TROUBLE CODE [PXXXX]</td>
<td>The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-32, &quot;Emission-Related Diagnostic Information&quot;.)</td>
</tr>
<tr>
<td>CAL/LD VALUE [%]</td>
<td>The calculated load value at the moment a malfunction is detected is displayed.</td>
</tr>
<tr>
<td>COOLANT TEMP [°C] or [°F]</td>
<td>The engine coolant temperature at the moment a malfunction is detected is displayed.</td>
</tr>
<tr>
<td>ENGINE SPEED [rpm]</td>
<td>The engine speed at the moment a malfunction is detected is displayed.</td>
</tr>
<tr>
<td>VEHICL SPEED [km/h] or [mph]</td>
<td>The vehicle speed at the moment a malfunction is detected is displayed.</td>
</tr>
<tr>
<td>INT/A TEMP SE [°C] or [°F]</td>
<td>The intake air temperature at the moment a malfunction is detected is displayed.</td>
</tr>
<tr>
<td>FUEL/R PRESS [kPa]</td>
<td>The fuel rail pressure at the moment a malfunction is detected is displayed.</td>
</tr>
<tr>
<td>MASS AIRFLOW [g/s]</td>
<td>The mass air flow at the moment a malfunction is detected is displayed.</td>
</tr>
</tbody>
</table>

DATA MONITOR MODE

<table>
<thead>
<tr>
<th>Monitored item</th>
<th>Unit</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CKPS·RPM (TDC)</td>
<td>[rpm]</td>
<td>The engine speed computed from the crankshaft position sensor signal is displayed.</td>
<td>When the engine coolant temperature circuit is open or short, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.</td>
</tr>
<tr>
<td>COOLAN TEMP/S</td>
<td>[°C] or [°F]</td>
<td>The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.</td>
<td></td>
</tr>
<tr>
<td>VHCL SPEED SE</td>
<td>[km/h] or [mph]</td>
<td>The vehicle speed computed from the vehicle speed sensor signal is displayed.</td>
<td></td>
</tr>
<tr>
<td>FUEL TEMP SEN</td>
<td>[°C] or [°F]</td>
<td>The fuel temperature (determined by the signal voltage of the fuel pump temperature sensor) is displayed.</td>
<td></td>
</tr>
<tr>
<td>ACCEL POS SEN</td>
<td>[V]</td>
<td>The accelerator pedal position sensor 1 signal voltage is displayed.</td>
<td></td>
</tr>
<tr>
<td>ACCEL SEN 2</td>
<td>[V]</td>
<td>The accelerator pedal position sensor 2 signal voltage is displayed.</td>
<td></td>
</tr>
<tr>
<td>ACT CR PRESS</td>
<td>[MPa]</td>
<td>The Fuel rail pressure (determined by the signal voltage of the fuel rail pressure sensor) is displayed.</td>
<td></td>
</tr>
<tr>
<td>BATTERY VOLT</td>
<td>[V]</td>
<td>The power supply voltage of ECM is displayed.</td>
<td></td>
</tr>
<tr>
<td>P/N POSI SW</td>
<td>[ON/OFF]</td>
<td>Indicates [ON/OFF] condition from the park/neutral position switch signal.</td>
<td></td>
</tr>
<tr>
<td>START SIGNAL</td>
<td>[ON/OFF]</td>
<td>Indicates [ON/OFF] condition from the starter signal.</td>
<td></td>
</tr>
<tr>
<td>AIR COND SIG</td>
<td>[ON/OFF]</td>
<td>Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.</td>
<td></td>
</tr>
<tr>
<td>BRAKE SW</td>
<td>[ON/OFF]</td>
<td>Indicates [ON/OFF] condition from the stop lamp switch signal.</td>
<td></td>
</tr>
<tr>
<td>IGN SW</td>
<td>[ON/OFF]</td>
<td>Indicates [ON/OFF] condition from ignition switch signal.</td>
<td></td>
</tr>
<tr>
<td>WARM UP SW</td>
<td>[ON/OFF]</td>
<td>Indicates [ON/OFF] condition from heat up switch signal.</td>
<td></td>
</tr>
</tbody>
</table>
## TROUBLE DIAGNOSIS

### NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

*: The cooling fan rotation has two stages (OFF and ON) although the display of CONSULT-III has three stages (OFF,LOW and HI).

### ACTIVE TEST MODE

<table>
<thead>
<tr>
<th>TEST ITEM</th>
<th>CONDITION</th>
<th>JUDGMENT</th>
<th>CHECK ITEM (REMEDY)</th>
</tr>
</thead>
</table>
| **POWER BALANCE** | • Engine: After warming up, idle the engine.  
  • A/C switch: OFF  
  • Shift lever: Neutral position  
  • Cut off each injector signal one at a time using CONSULT-III. | Engine runs rough or dies. | • Harness and connectors  
  • Compression  
  • Fuel injector |
| **ENG COOLANT TEMP** | • Engine: Return to the original trouble condition  
  • Change the engine coolant temperature using CONSULT-III. | If trouble symptom disappears, see CHECK ITEM. | • Harness and connectors  
  • Engine coolant temperature sensor  
  • Fuel injector |
| **GLOW RLY** | • Ignition switch: ON (Engine stopped)  
  • Turn the glow relay ON and OFF using CONSULT-III and listen to operating sound. | Glow relay makes the operating sound. | • Harness and connectors  
  • Glow relay |
Generic Scan Tool (GST) Function

DESCRIPTION
Generic Scan Tool (OBD II scan tool) complying with ISO 15031-4 has 7 different functions explained below. ISO9141 is used as the protocol. The name “GST” or “Generic Scan Tool” is used in this service manual.

FUNCTION

<table>
<thead>
<tr>
<th>Diagnostic test mode</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service $01 READINESS TESTS</td>
<td>This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.</td>
</tr>
<tr>
<td>Service $02 (FREEZE DATA)</td>
<td>This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-32, “Emission-Related Diagnostic Information”.</td>
</tr>
<tr>
<td>Service $03 DTCs</td>
<td>This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.</td>
</tr>
<tr>
<td>Service $04 CLEAR DIAG INFO</td>
<td>This diagnostic service can clear all emission-related diagnostic information. This includes: • Clear number of diagnostic trouble codes (Service $01) • Clear diagnostic trouble codes (Service $03) • Clear trouble code for freeze frame data (Service $01) • Clear freeze frame data (Service $02) • Reset status of system monitoring test (Service $01) • Clear on board monitoring test results (Service $07)</td>
</tr>
<tr>
<td>Service $06 (ON BOARD TESTS)</td>
<td>This diagnostic service is not applicable on this vehicle.</td>
</tr>
<tr>
<td>Service $07 (ON BOARD TESTS)</td>
<td>This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.</td>
</tr>
<tr>
<td>Service $09 (CALIBRATION ID)</td>
<td>This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.</td>
</tr>
</tbody>
</table>

INSPECTION PROCEDURE
1. Turn ignition switch OFF.
TROUBLE DIAGNOSIS

2. Connect “GST” to data link connector (1), which is located under drivers side dash panel.
3. Turn ignition switch ON.

4. Enter the program according to instruction on the screen or in the operation manual.
   (*: Regarding GST screens in this section, sample screens are shown.)

5. Perform each diagnostic mode according to each service procedure.
   For further information, see the GST Operation Manual of the tool maker.

CONSULT-III Reference Value in Data Monitor Mode

## Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
- Specification data may not be directly related to their components signals/values/operations.

### MONITOR ITEM

<table>
<thead>
<tr>
<th>ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CKPS-RPM (TDC)</td>
<td>• Run engine and compare CONSULT-III value with the tachometer indication.</td>
<td>Almost the same speed as the tachometer indication</td>
</tr>
<tr>
<td>COOLAN TEMP/S</td>
<td>• Engine: After warming up</td>
<td>More than 70°C (158°F)</td>
</tr>
<tr>
<td>VHCL SPEED SE</td>
<td>• Turn drive wheels and compare CONSULT-III value with the speedometer indication</td>
<td>Almost the same speed as the speedometer indication</td>
</tr>
<tr>
<td>FUEL TEMP SEN</td>
<td>• Engine: After warming up</td>
<td>More than 40°C (104°F)</td>
</tr>
<tr>
<td>ACCEL POS SEN*1</td>
<td>• Ignition switch: ON (Engine stopped)</td>
<td>Accelerator pedal: Fully released 0.5 - 1.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accelerator pedal: Fully depressed 4.0 - 4.8 V</td>
</tr>
<tr>
<td>ACCEL SEN 2*1</td>
<td>• Ignition switch: ON (Engine stopped)</td>
<td>Accelerator pedal: Fully released 0.3 - 1.2 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accelerator pedal: Fully depressed 3.7 - 4.8 V</td>
</tr>
<tr>
<td>ACT CR PRESS</td>
<td>• Engine: After warming up</td>
<td>Idle 25 - 35 MPa</td>
</tr>
<tr>
<td></td>
<td>• Air conditioner switch: OFF</td>
<td>2,000 rpm 50 - 60 MPa</td>
</tr>
<tr>
<td></td>
<td>• Shift lever: Neutral</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• No load</td>
<td></td>
</tr>
</tbody>
</table>
## TROUBLE DIAGNOSIS

### MONITOR ITEM | CONDITION | SPECIFICATION
---|---|---
BATTERY VOLT | Ignition switch: ON (Engine stopped) | 11 - 14 V
P/N POSI SW | Ignition switch: ON | Shift lever: Neutral
| | | Except above
START SIGNAL | Ignition switch: ON → START → ON | OFF → ON → OFF
AIR COND SIG | Engine: After warming up, idle the engine | Air conditioner switch: OFF
| | Air conditioner switch: ON (Compressor operates.) | ON
BRAKE SW | Ignition switch: ON | Brake pedal: Fully released
| | Brake pedal: Slightly depressed | ON
IGN SW | Ignition switch: ON → OFF | ON → OFF
WARM UP SW | Ignition switch: ON | Heat up switch: OFF
| | Heat up switch: ON | OFF
MAS AIR/FL SE*1 | Engine: After warming up | Ignition switch: ON (Engine stopped)
| Air conditioner switch: OFF | Approximately 0.4 V
| Shift lever: Neutral | Idle
| No load | 1.3 - 1.8 V
| Engine is revving from idle to about 4,000 rpm. | 1.3 - 1.8 V to Approximately 4.0 V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)
MAIN INJ WID | Engine: After warming up | No load
| Shift lever: Neutral | Idle speed
| Idle speed | 0.50 - 0.70 msec
| Blower fan switch: ON | 0.50 - 0.80 msec
PUMP CURRENT | Engine: After warming up | Idle
| Air conditioner switch: OFF | 1,600 - 2,000 mA
| Shift lever: Neutral | 2,000 rpm
| No load | 1,500 - 1,900 mA
GLOW RLY | Refer to EC-273. | OFF
COOLING FAN*2 | When cooling fan is stopped. | OFF
| When cooling fans operate at low speed. | LOW
| When cooling fans operate at high speed. | HI
INT/A VOLUME | Engine: After warming up, idle the engine | Altitude
| | | Approx. 0m: Approx. 100.62 kPa (1,0062 bar, 1.026 kg/cm², 14.59 psi)
| | | Approx. 1,000 m: Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm², 12.90 psi)
| | | Approx. 1,500 m: Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm², 12.06 psi)
| | | Approx. 2,000 m: Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm², 11.36 psi)
BARO SEN | Ignition switch: ON | 1 → 3 → 4 → 2
CYL COUNT | Engine is running | 0 - 65,535 km
| | | (0 - 40,723 mile)
TRVL AFTER MIL | Ignition switch: ON | Vehicle has traveled after MI has turned ON.
EGR/V ANGLE | Ignition switch: ON (Engine stopped) | Approx. 0°
EGR V/POS SEN | Ignition switch: ON (Engine stopped) | 1,050 - 1,350 mV

**NOTE:**

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

*1: This signal is converted by ECM internally. Thus, this differs from ECM terminals voltage.

*2: The cooling fan rotation has two stages (OFF and ON) although the display of CONSULT-III has three stages (OFF,LOW and HI).
TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

Description

Intermittent incidents may occur. In many cases, the incident resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st/2nd trip) DTC visits. Realize also that the most frequent cause of intermittent incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

COMMON INTERMITTENT INCIDENTS REPORT SITUATIONS

<table>
<thead>
<tr>
<th>STEP in Work Flow</th>
<th>Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>The CONSULT-III is used. The SELF-DIAG RESULTS screen shows time data other than &quot;0&quot;.</td>
</tr>
<tr>
<td>III</td>
<td>The symptom described by the customer does not recur.</td>
</tr>
<tr>
<td>IV</td>
<td>(1st/2nd trip) DTC does not appear during the DTC Confirmation Procedure.</td>
</tr>
<tr>
<td>VI</td>
<td>The Diagnostic Procedure for XXXX does not indicate the malfunctioning area.</td>
</tr>
</tbody>
</table>

Diagnosis Procedure

1. INSPECTION START

Erase (1st/2nd trip) DTCs. Refer to EC-32, "Emission-Related Diagnostic Information".

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection. Refer to EC-81, "Ground Inspection".

OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT" in GI section, "INCIDENT SIMULATION TESTS".

OK or NG

OK >> INSPECTION END

NG >> Repair or replace.
Specification data are reference values and are measured between each terminal and ground.
### POWER SUPPLY AND GROUND CIRCUIT

#### [YD25DDTi]

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 105 (G)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch ON] [Ignition switch OFF]</td>
<td>0 - 1.0 V</td>
</tr>
<tr>
<td>- 114 (B)</td>
<td></td>
<td>• For a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
<tr>
<td>107 (L)</td>
<td>Ignition switch</td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td>108 (L)</td>
<td></td>
<td>[Ignition switch OFF]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td>113 (G)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch ON] [Ignition switch OFF]</td>
<td>0 - 1.0 V</td>
</tr>
<tr>
<td>119 (R)</td>
<td>Power supply for ECM</td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td>120 (OR)</td>
<td></td>
<td>[Ignition switch OFF]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td>121 (L)</td>
<td>Power supply for ECM (Back-up)</td>
<td>[Ignition switch OFF]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
</tbody>
</table>

[Wire color]: (G) Green, (B) Black, (L) Light Blue, (OR) Orange

**Condition:***
- **[Ignition switch ON]**: When the ignition switch is on.
- **[Ignition switch OFF]**: When the ignition switch is off.
Specification data are reference values and are measured between each terminal and ground.
## POWER SUPPLY AND GROUND CIRCUIT

### [YD25DDTi]

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Signal name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (B)</td>
<td>ECM ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 (B)</td>
<td>ECM ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 (B)</td>
<td>ECM ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>114 (B)</td>
<td>ECM ground</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Specification data are reference values and are measured between each terminal and ground.
<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>105 (G) 114 (B)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch ON] [Ignition switch OFF]</td>
<td>0 - 1.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td>BATTERY VOLTAGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• More than a few seconds after turning ignition switch OFF</td>
<td>(11 - 14 V)</td>
</tr>
<tr>
<td>107 (L) 108 (L) 114 (B)</td>
<td>Ignition switch</td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td>(11 - 14 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• More than a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
<tr>
<td>113 (G) 114 (B)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch ON]</td>
<td>0 - 1.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td>BATTERY VOLTAGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For a few seconds after turning ignition switch OFF</td>
<td>(11 - 14 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• More than a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
<tr>
<td>119 (R) 120 (OR) 114 (B)</td>
<td>Power supply for ECM</td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td>(11 - 14 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• More than a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
</tbody>
</table>
Specification data are reference values and are measured between each terminal and ground.
POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[YD25DDTi]

Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-82, "Ground Inspection".
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ground.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open or short to power in harness or connectors.

3. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Reconnect ECM harness connector.
2. Turn ignition switch ON.
3. Check voltage between ECM connector terminal as follows.

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ ➖</td>
<td>Signal name</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>1 (B)</td>
<td>ECM ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>2 (B)</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3 (B)</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>114 (B)</td>
<td>ECM ground</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECM Connector</th>
<th>Terminal</th>
<th>Ground</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>M32</td>
<td>1</td>
<td>Ground</td>
<td>Existed</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M33</td>
<td>114</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

[YD25DDTI]

OK or NG
OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No.21)
- 40A fusible link (letter f)
- Harness connectors E101, M5
- Fuse block harness connector M12
- Ignition switch
- Ignition switch harness connector M20
- Harness for open or short between ECM and fusible link

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Check the voltage between ECM connector terminal as follows.

OK or NG
OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- 20A fuse (No.36)
- Harness connectors E102, M13
- Harness for open or short between Battery and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

2. Turn ignition switch ON and then turn OFF.
3. Check the voltage between ECM harness connector.

<table>
<thead>
<tr>
<th>ECM relay</th>
<th>Ground</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td></td>
</tr>
<tr>
<td>E55</td>
<td>2</td>
<td>Ground</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Battery voltage</td>
</tr>
</tbody>
</table>

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- 20A fuse (No.36)
- Harness for open or short between Battery and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

Check the voltage between ECM harness connector.

<table>
<thead>
<tr>
<th>ECM</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Connector</td>
<td>Terminal</td>
</tr>
<tr>
<td>M33</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>M33</td>
<td>113</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery voltage</td>
<td></td>
</tr>
</tbody>
</table>

After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0 V.
POWER SUPPLY AND GROUND CIRCUIT

< SERVICE INFORMATION >

11. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect ECM relay.
3. Check the continuity between ECM harness connector and ECM relay harness connector.

<table>
<thead>
<tr>
<th>ECM</th>
<th>ECM relay</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>M33</td>
<td>105</td>
<td>E55</td>
</tr>
<tr>
<td></td>
<td>113</td>
<td></td>
</tr>
</tbody>
</table>

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E102, M13
- Harness for open or short between ECM and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ECM POWER SUPPLY CIRCUIT-VII

1. Disconnect ECM harness connector.
2. Disconnect ECM relay harness connector.
3. Check the continuity between ECM harness connector and ECM relay harness connector.

<table>
<thead>
<tr>
<th>ECM</th>
<th>ECM relay</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>M33</td>
<td>119</td>
<td>E55</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td></td>
</tr>
</tbody>
</table>

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E91, M241 (LHD models)
- Harness connectors E102, M13 (RHD models)
- Harness for open or short between ECM and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK ECM RELAY

Refer to EC-82

OK >> GO TO 16.
NG >> Replace ECM relay.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-70.
Component Inspection

**ECM RELAY**

1. Disconnect ECM relay.
2. Check continuity between ECM relay terminals under the following conditions.

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Conditions</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 and 5</td>
<td>12 V direct current supply between terminals 1 and 2</td>
<td>Existed</td>
</tr>
<tr>
<td></td>
<td>No current supply</td>
<td>Not existed</td>
</tr>
</tbody>
</table>

If NG, replace cooling fan relay.

**Ground Inspection**

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works. Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.

When inspecting a ground connection follow these rules:
- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to GROUND DISTRIBUTION in [EL section].
Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

This self-diagnosis has the one trip detection logic. The MI will not light up for this self-diagnosis.

<table>
<thead>
<tr>
<th>DTC No</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1000 1000</td>
<td>CAN communication line</td>
<td>When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) for 2 seconds or more.</td>
<td>Harness or connectors (CAN communication line is open or shorted)</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.
3. If DTC is detected, go to EC-84, "Diagnosis Procedure".
DTC U1000 CAN COMMUNICATION LINE

< SERVICE INFORMATION >

Wiring Diagram

INFOID:0000000003759342

EC-CAN-01

: Detectable line for DTC
: Non-detectable line for DTC
: Data line

Diagnosis Procedure

Go to EL-110, "CAN System Specification Chart".
NOTE:
If DTC P0016 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-214.

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-85, "Diagnosis Procedure".

Diagnosis Procedure

1. **CHECK CAMSHAFT POSITION SENSOR**
   Refer to EC-166, "Component Inspection".
   OK or NG
   OK >> GO TO 2.
   NG >> Replace camshaft position sensor.

2. **CHECK SPROCKET**
   Visually check for chipping signal plate gear tooth.
   OK or NG
   OK >> GO TO 3.
   NG >> Remove debris and clean the signal plate or replace sprocket.

3. **CHECK CRANKSHAFT POSITION SENSOR**
   Refer to EC-156, "Component Inspection".
   OK or NG
   OK >> GO TO 4.
   NG >> Replace crankshaft position sensor.

4. **CHECK GEAR TOOTH**
   Visually check for chipping signal plate gear tooth.
   OK or NG
   OK >> GO TO 5.
   NG >> Replace the signal plate.

5. **CHECK TIMING CHAIN**
   Refer to EM-5.
   OK or NG
   OK >> GO TO 6.
   NG >> Replace timing chain.

6. **CHECK INTERMITTENT INCIDENT**
DTC P0016 CKP - CMP CORRELATION

< SERVICE INFORMATION >

Refer to EC-70.

>> INSPECTION END
DTC P0088 FUEL SYSTEM

DTC P0088 FUEL SYSTEM

On Board Diagnosis Logic

NOTE:
If DTC P0088 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-214.

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Start engine and warm it up to normal operating temperature.
2. Keep engine speed more than 2,000 rpm for at least 20 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-87, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-131, "Component Inspection".
OK or NG
OK  >> GO TO 2.
NG  >> Replace fuel rail.

2. CHECK FUEL INJECTOR

Refer to EC-137, "Component Inspection".
OK or NG
OK  >> GO TO 4.
NG  >> GO TO 3.

3. REPLACE FUEL INJECTOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".

>> INSPECTION END

4. CHECK FUEL PUMP

Refer to EC-208, "Component Inspection".
OK or NG
OK  >> GO TO 6.
NG  >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace fuel pump.

>> INSPECTION END

6. CHECK INTERMITTENT INCIDENT

DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause
---|---|---|---
P0088 0088 | Fuel rail pressure too high | Fuel pressure is too much higher than the specified value. | • Fuel pump
• Fuel injector
• Fuel rail pressure sensor

> INSPECTION END

EC-87
DTC P0088 FUEL SYSTEM

Refer to EC-70.

>> INSPECTION END

Removal and Installation

FUEL INJECTOR
Refer to EM-8.

FUEL PUMP
Refer to EC-24.
DTC P0089 FUEL PUMP

On Board Diagnosis Logic

NOTE:
If DTC P0089 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-214.

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and warm it up to normal operating temperature.
2. Let engine idle for at least 30 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-89, "Diagnosis Procedure".

Diagnosis Procedure

1. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

□ With CONSULT-III
1. Turn ignition switch ON.
3. Start engine and let it idle for at least 60 seconds.
4. Select "SELF-DIAG RESULT" mode with CONSULT-III.
5. Touch "ERASE".
7. Is 1st trip DTC detected again?

□ With GST
1. Turn ignition switch ON.
3. Start engine and let it idle for at least 60 seconds.
4. Select Service $04 with GST.
6. Is 1st trip DTC detected again?

Yes or No

Yes   >> GO TO 2.
No    >> INSPECTION END

2. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-131, "Component Inspection".

OK or NG

OK    >> GO TO 3.
NG    >> Replace fuel rail.

3. CHECK FUEL PUMP

Perform EC-205, "DTC Confirmation Procedure".
DTC P0089 FUEL PUMP

< SERVICE INFORMATION >

[YD25DDTi]

OK or NG

OK  >> GO TO 5.
NG  >> GO TO 4.

4. REPLACE FUEL PUMP

1. Replace Fuel pump.

>> INSPECTION END

5. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Removal and Installation

INFOID:0000000003759362

FUEL PUMP
Refer to EC-24.
NOTE:
If DTC P0093 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-214.

Overall Function Check

Use this procedure to check the overall function of the fuel system. During this check, a 1st trip DTC might not be confirmed.

NOTE:
• Make sure that there is no fire hazard near the vehicle.
• Before performing the following procedure, cool down engine.

WITH CONSULT-III

1. Open engine hood and check if there are any signs of fuel leakage or not.
   If there are any signs, go to EC-92, "Diagnosis Procedure".
   If there is no signs, go to next step.
2. Check oil level.
   If oil level is above the proper range, go to EC-92, "Diagnosis Procedure".
   If oil level is within the proper range, go to next step.
3. Start engine and check fuel leakage in the engine room.
   If fuel leakage is found, go to EC-92, "Diagnosis Procedure".
   If fuel leakage is not found, go to next step.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check the fuel rail pressure at the idle speed.

   Fuel rail pressure: 25 - 35 MPa
6. If NG, go to EC-92, "Diagnosis Procedure".

WITH GST

1. Open engine hood and check if there are any signs of fuel leakage or not.
   If there are any signs, go to EC-92, "Diagnosis Procedure".
   If there is no signs, go to next step.
2. Check oil level.
   If oil level is above the proper range, go to EC-92, "Diagnosis Procedure".
   If oil level is within the proper range, go to next step.
3. Start engine and check fuel leakage in the engine room.
   If fuel leakage is found, go to EC-92, "Diagnosis Procedure".
   If fuel leakage is not found, go to next step.
4. Select Service $1 mode with GST.
5. Check the fuel rail pressure at the idle speed.

   Fuel rail pressure: 25 - 35 MPa
6. If NG, go to EC-92, "Diagnosis Procedure".
DTC P0093 FUEL SYSTEM

Diagnosis Procedure

1. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-III
1. Turn ignition switch ON.
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-III.
5. Touch “ERASE”.
7. Is the result NG again?

With GST
1. Turn ignition switch ON.
3. Start engine and let it idle for at least 60 seconds.
4. Select Service $04 with GST.
5. Perform EC-91, "Overall Function Check", again.
6. Is the result NG again?

Yes or No
Yes >> GO TO 2.
No >> INSPECTION END

2. CHECK FUEL LINE FOR LEAK

1. Start engine.
2. Visually check the following for fuel leak.
   - Fuel tube from fuel pump to fuel rail
   - Fuel rail
   - Fuel tube from fuel rail to fuel injector
3. Also check for improper connection or pinches.

OK or NG
OK >> GO TO 3.
NG >> Repair malfunctioning part.

3. CHECK FUEL RAIL PRESSURE RELIEF VALVE

Refer to EC-92, "Component Inspection".

OK or NG
OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

OK or NG
OK >> GO TO 5.
NG >> Repair or replace.

5. REPLACE FUEL PUMP

1. Replace fuel pump.

>> INSPECTION END

Component Inspection

FUEL RAIL PRESSURE RELIEF VALVE
With CONSULT-III

**WARNING:**
- Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.
1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve (1).

   ➡️ : Vehicle front

- Fuel rail pressure sensor (2)
3. Attach a blind cap or plug to removed hose.
4. Turn ignition switch ON.
5. Select “PRES REGULATOR” in “ACTIVE TEST” with CONSULT-III.
6. Start engine and keep engine speed 2,000 rpm.
7. Raise fuel pressure to 180 MPa with touching “UP” or “Qu” on the CONSULT-III screen.
8. Confirm that the fuel does not come out from the fuel rail pressure relief valve.

**WARNING:**
- Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.
- If the fuel comes out, stop the engine immediately.

Without CONSULT-III

**WARNING:**
- Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.
1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve (1).

   ➡️ : Vehicle front

- Fuel rail pressure sensor (2)
3. Attach a blind cap or plug to removed hose.
4. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
5. Confirm that the fuel does not come out from the fuel rail pressure relief valve.

**WARNING:**
- Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.
- If the fuel comes out, stop the engine immediately.

Removal and Installation

**FUEL RAIL**
Refer to **EM-8**.

**FUEL PUMP**
Refer to **EC-24**.
Component Description

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss. Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
</table>
| MAS AIR/FL SE* | • Engine: After warming up  
• Air conditioner switch: OFF  
• Shift lever: Neutral position  
• No load | Ignition switch: ON  
(Engine stopped) | Approximately 0.4 V |
|              |           | Idle          | 1.3 - 1.8 V |
|              |           | Engine is revving from idle to about 4,000 rpm. | 1.3 - 1.8 V to Approximately 4.0 V  
(Check for liner voltage rise in response to engine being increased to about 4,000 rpm) |

*: This signal is converted by ECM internally. Thus this differs from ECM terminal voltage.

On Board Diagnosis Logic

If DTC P0101 is displayed with DTC P0403, first perform trouble diagnosis for DTC P0403. Refer to EC-177.
If DTC P0101 is displayed with DTC P0409, first perform trouble diagnosis for DTC P0409. Refer to EC-190.
If DTC P0101 is displayed with DTC P0488, first perform trouble diagnosis for DTC P0488. Refer to EC-196.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P0101   | Mass air flow sensor circuit range/performance | Improper voltage from the sensor is sent to ECM compared with the driving condition. | • Harness or connectors  
(The sensor circuit is open or shorted.)  
• Mass air flow sensor  
• Intake air leaks  
• Air cleaner  
• Intake air temperature sensor  
• EGR volume control valve |

DTC Confirmation Procedure

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Start engine and let it idle for at least 40 seconds.
4. Drive vehicle under the following condition.

<table>
<thead>
<tr>
<th>CKPS-RPM</th>
<th>Approx. 2800 rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>VHCL SPEED SE</td>
<td>70 - 100 km/h (43 - 62 MPH)</td>
</tr>
<tr>
<td>Shift lever</td>
<td>4th position</td>
</tr>
</tbody>
</table>

5. Release accelerator pedal for at least 10 seconds.
   Do not depress brake pedal during this procedure.
6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to EC-99, "Diagnosis Procedure".

WITH GST
Follow the procedure “WITH CONSULT-III” above.
Specification data are reference values, and are measured between each terminal and ground.
### DTC P0101 MAF Sensor

**[YD25DDTi]**

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Signal name</td>
<td>[Ignition switch ON]</td>
<td>Approximately 0.4 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Engine is running]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Warm-up condition</td>
<td>1.3 - 1.8 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Idle speed</td>
<td></td>
</tr>
<tr>
<td>54 (G)</td>
<td>Mass air flow sensor</td>
<td>[Engine is running]</td>
<td>1.3 - 1.8 V to Approximately 4.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Warm-up condition</td>
<td>(Check for liner voltage rise in response to engine being increased to about 4,000 rpm)</td>
</tr>
<tr>
<td>67 (B)</td>
<td>Sensor ground (Sensor shield circuit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mass air flow sensor ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>105 (G)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch ON]</td>
<td>0 - 1.0 V</td>
</tr>
<tr>
<td>114 (B)</td>
<td></td>
<td>[Ignition switch OFF]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
<tr>
<td>119 (R)</td>
<td>Power supply for ECM</td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td>120 (OR)</td>
<td></td>
<td>[Ignition switch OFF]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• More than a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
</tbody>
</table>

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
Specification data are reference values, and are measured between each terminal and ground.
DTC P0101 MAF SENSOR

< SERVICE INFORMATION >

[YD25DDTi]

**Diagnosis Procedure**

1. **CHECK INTAKE SYSTEM**
   1. Check air cleaner for clogging.
   2. Check the following for connection and cracks.
      - Air duct
      - Vacuum hoses
      - Intake air passage between air duct and intake manifold

   **OK or NG**
   - **OK >> GO TO 2.**
   - **NG >> Reconnect or repair the parts.**

2. **CHECK GROUND CONNECTIONS**
   1. Turn ignition switch OFF.
   2. Loosen and retighten ground screws on the body.

   **Refer to EC-81, “Ground Inspection”.**
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

   **OK or NG**
   - **OK >> GO TO 3.**
   - **NG >> Repair or replace ground connections.**

3. **CHECK MAF SENSOR POWER SUPPLY CIRCUIT**

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F 54 (B)</td>
<td>Mass air flow sensor</td>
<td>[Ignition switch ON]</td>
<td>Approximately 0.4 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Engine is running]</td>
<td>1.3 - 1.7 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Idle speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Engine is running]</td>
<td>1.3 - 1.7 V to Approximately 4.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Warm-up condition</td>
<td>(Check for liner voltage rise in response to engine being increased to about 4,000 rpm)</td>
</tr>
<tr>
<td>G 67 (B)</td>
<td>Sensor ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>(Sensor shield circuit)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>B 73 (B)</td>
<td>Mass air flow sensor ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>B 105 (G)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch ON]</td>
<td>0 - 1.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td></td>
</tr>
<tr>
<td>G 113 (G)</td>
<td></td>
<td>• For a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
<tr>
<td>G 114 (B)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch OFF]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td>B 119 (R)</td>
<td>Power supply for ECM</td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td>OR 120</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
1. Disconnect mass air flow sensor (1) harness connector.

2. Turn ignition switch ON.

3. Check voltage between mass air flow sensor terminal 2 and ground with CONSULT-III or tester.

   **Voltage: Battery voltage**

   **OK or NG**
   - OK >> GO TO 5.
   - NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

   Check the following.
   - Harness for open or short between mass air flow sensor and ECM relay
   - Harness for open or short between mass air flow sensor and ECM
   - Harness connectors E91,M241 (LHD models)
   - Harness connectors E102,M13 (RHD models)

   >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

   1. Turn ignition switch OFF.
   2. Disconnect ECM harness connector.
   3. Check harness continuity between mass air flow sensor terminal 3 and ECM terminal 73.
      Refer to Wiring Diagram.

      **Continuity should exist.**

   4. Also check harness for short to ground and short to power.

   **OK or NG**
   - OK >> GO TO 7.
   - NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

   Check the following.
   - Harness connectors E101,M5
   - Harness for open or short between mass air flow sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

   1. Check harness continuity between mass air flow sensor terminal 4 and ECM terminal 54.
      Refer to Wiring Diagram.

      **Continuity should exist.**
DTC P0101 MAF SENSOR

2. Also check harness for short to ground and short to power.
   OK or NG
   OK  >> GO TO 9.
   NG  >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E101, M5
- Harness for open or short between mass air flow sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-114, "Component Inspection".

OK or NG
   OK  >> GO TO 10.
   NG  >> Replace mass air flow sensor (with intake air temperature sensor).

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-101, "Component Inspection".

OK or NG
   OK  >> GO TO 11.
   NG  >> Replace mass air flow sensor.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

OK or NG
   OK  >> GO TO 12.
   NG  >> Repair or replace.

12. REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-24, "EGR Volume Control Valve Closed Position Learning Value Clear".
3. Perform EC-24, "EGR Volume Control Valve Closed Position Learning".

>> INSPECTION END

Component Inspection

MASS AIR FLOW SENSOR

With CONSULT-III
1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select "DATA MONITOR" mode.
4. Select “MAS AIR/FL SE” and check indication under the following conditions.

<table>
<thead>
<tr>
<th>Condition</th>
<th>MAS AIR/FL SE (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition switch ON (Engine stopped.)</td>
<td>Approx. 0.4</td>
</tr>
<tr>
<td>Idle (Engine is warmed-up to normal operating temperature.)</td>
<td>1.3 - 1.8</td>
</tr>
<tr>
<td>Idle to about 4,000 rpm</td>
<td>1.3 - 1.8 to Approx. 4.0*</td>
</tr>
</tbody>
</table>

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
DTC P0101 MAF SENSOR

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-III
1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM harness connectors as follows.

<table>
<thead>
<tr>
<th>ECM</th>
<th>Condition</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>M32</td>
<td>Ignition switch ON (Engine stopped.)</td>
<td>Approx. 0.4 V</td>
</tr>
<tr>
<td></td>
<td>Idle (Engine is warmed-up to normal operating temperature.)</td>
<td>1.3 - 1.8 V</td>
</tr>
<tr>
<td></td>
<td>Idle to about 4,000 rpm</td>
<td>1.3 - 1.8 V to Approx. 4.0 V*</td>
</tr>
</tbody>
</table>

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 and 3 again.
   If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

MASS AIR FLOW SENSOR
Refer to EM-6.
Component Description

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss. Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
</table>
| MAS AIR/FL SE* | • Engine: After warming up  
• Air conditioner switch: OFF  
• Shift lever: Neutral position  
• No load  
Ignition switch: ON (Engine stopped) | Approximately 0.4 V |
| | Idle | 1.3 - 1.8 V |
| | Engine is revving from idle to about 4,000 rpm. | 1.3 - 1.8 V to Approximately 4.0 V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm) |

*: This signal is converted by ECM internally. Thus this differs from ECM terminal voltage.

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P0102 0102 | Mass air flow sensor circuit low input | An excessively low voltage from the sensor is sent to ECM. | • Harness or connectors  
(The sensor circuit is open or shorted.) |
| P0103 0103 | Mass air flow sensor circuit high input | An excessively high voltage from the sensor is sent to ECM. | • Mass air flow sensor |

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-107, "Diagnosis Procedure".
EC-MAFS-01

: Detectable line for DTC
: Non-detectable line for DTC

Specification data are reference values, and are measured between each terminal and ground.
<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Signal name</td>
<td>[Ignition switch ON]</td>
<td>Approximately 0.4 V</td>
</tr>
<tr>
<td>54 (G) 73 (B)</td>
<td>Mass air flow sensor</td>
<td>[Engine is running]</td>
<td>1.3 - 1.8 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Idle speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Engine is running]</td>
<td>1.3 - 1.8 V to Approximately 4.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Engine is revving from idle to about 4,000 rpm.</td>
<td></td>
</tr>
<tr>
<td>67 (B)</td>
<td>Sensor ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Sensor shield circuit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 (B)</td>
<td>Mass air flow sensor ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>105 (G) 114 (B)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch ON]</td>
<td>0 - 1.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For a few seconds after turning ignition switch OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Ignition switch OFF]</td>
<td>BATTERY VOLTAGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• More than a few seconds after turning ignition switch OFF</td>
<td>(11 - 14 V)</td>
</tr>
<tr>
<td>119 (R) 120 (OR)</td>
<td>Power supply for ECM</td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(11 - 14 V)</td>
</tr>
</tbody>
</table>
DTC P0102, P0103 MAF SENSOR
RHD MODELS

Specification data are reference values, and are measured between each terminal and ground.
**DTC P0102, P0103 MAF SENSOR**

**< SERVICE INFORMATION >**

**[YD25DDTi]**

---

### Diagnosis Procedure

1. **CHECK GROUND CONNECTIONS**

   1. Turn ignition switch OFF.
   2. Loosen and retighten ground screws on the body.
      - Refer to **EC-81, "Ground Inspection"**.
      - Body ground M97 (1)
      - Body ground M99 (2)
      - ECM (3)

   **OK** OR **NG**

      **OK** >> GO TO 2.
      **NG** >> Repair or replace ground connections.

2. **CHECK MAF SENSOR POWER SUPPLY CIRCUIT**

   1. Disconnect mass air flow sensor (1) harness connector.

      ![Diagram](image1)

      - Vehicle front

   2. Turn ignition switch ON.

      ![Diagram](image2)
3. Check voltage between mass air flow sensor terminal 2 and ground with CONSULT-III or tester.

**Voltage: Battery voltage**

OK or NG
- OK >> GO TO 4.
- NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between mass air flow sensor and ECM relay
- Harness for open or short between mass air flow sensor and ECM
- Harness connectors E91,M241 (LHD models)
- Harness connectors E102,M13 (RHD models)

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 3 and ECM terminal 73. Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG
- OK >> GO TO 6.
- NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E101,M5
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between mass air flow sensor terminal 4 and ECM terminal 54. Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to ground and short to power.

OK or NG
- OK >> GO TO 8.
- NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E101,M5
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.
8. CHECK MASS AIR FLOW SENSOR

Refer to EC-109, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

MASS AIR FLOW SENSOR

With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select “DATA MONITOR” mode.
4. Select “MAS AIR/FL SE” and check indication under the following conditions.

<table>
<thead>
<tr>
<th>Condition</th>
<th>MAS AIR/FL SE (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition switch ON (Engine stopped.)</td>
<td>Approx. 0.4</td>
</tr>
<tr>
<td>Idle (Engine is warmed-up to normal operating temperature.)</td>
<td>1.3 - 1.8</td>
</tr>
<tr>
<td>Idle to about 4,000 rpm</td>
<td>1.3 - 1.8 to Approx. 4.0*</td>
</tr>
</tbody>
</table>

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.
   a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
      - Crushed air ducts
      - Malfunctioning seal of air cleaner element
      - Uneven dirt of air cleaner element
      - Improper specification of intake air system parts
   b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again. If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM harness connectors as follows.
DTC P0102, P0103 MAF SENSOR

* Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.
   a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
      • Crushed air ducts
      • Malfunctioning seal of air cleaner element
      • Uneven dirt of air cleaner element
      • Improper specification of intake air system parts
   b. If NG, repair or replace malfunctioning part and perform step 2 and 3 again.
      If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

### Removal and Installation

**MASS AIR FLOW SENSOR**
Refer to EM-6.
Component Description

The intake air temperature sensor is built into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

<Reference data>

<table>
<thead>
<tr>
<th>Intake air temperature [°C (°F)]</th>
<th>Voltage* (V)</th>
<th>Resistance (kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 (77)</td>
<td>2.4</td>
<td>1.800 - 2.200</td>
</tr>
<tr>
<td>80 (176)</td>
<td>0.8</td>
<td>0.283 - 0.359</td>
</tr>
</tbody>
</table>

*: This data is reference values and is measured between ECM terminal 55 (Intake air temperature sensor) and 74 (sensor ground).

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0112 0112</td>
<td>Intake air temperature sensor circuit low input</td>
<td>An excessively low voltage from the sensor is sent to ECM.</td>
<td>Harness or connectors</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(The sensor circuit is open or shorted.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Intake air temperature sensor</td>
</tr>
<tr>
<td>P0113 0113</td>
<td>Intake air temperature sensor circuit high input</td>
<td>An excessively high voltage from the sensor is sent to ECM.</td>
<td></td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

**NOTE:**

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-112, "Diagnosis Procedure".

EC-111
Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

   1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-81, "Ground Inspection".
- Body ground M97 (1)
- Body ground M99 (2)
- ECM (3)

OK or NG
OK  >> GO TO 2.
NG   >> Repair or replace ground connections.

2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (intake air temperature sensor is built-into) (1) harness connector.
   
   : Vehicle front

2. Turn ignition switch ON.

3. Check voltage between mass air flow sensor terminal 5 and ground with CONSULT-III or tester.

   **Voltage: Approximately 5 V**

OK or NG
OK  >> GO TO 4.
NG   >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E101,M5
- Harness for open or short between mass air flow sensor (with intake air temperature sensor) and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 6 and ECM terminal 74. Refer to Wiring Diagram.

   **Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG
OK  >> GO TO 6.
NG   >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
DTC P0112, P0113 IAT SENSOR

[YD25DDTi]

- Harness connectors E101,M5
- Harness for open or short between mass air flow sensor (with intake air temperature sensor) and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-114, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

7. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor (1) terminals 5 and 6 under the following conditions.

<table>
<thead>
<tr>
<th>Intake air temperature [°C (°F)]</th>
<th>Resistance (kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 (77)</td>
<td>1.800 - 2.200</td>
</tr>
</tbody>
</table>

2. If NG, replace mass air flow sensor (with intake air temperature sensor).

Removal and Installation

MASS AIR FLOW SENSOR

Refer to EM-6.
DTC P0117, P0118 ECT SENSOR

Description

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

<table>
<thead>
<tr>
<th>Engine coolant temperature [°C (°F)]</th>
<th>Voltage* (V)</th>
<th>Resistance (kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>−10 (14)</td>
<td>4.7</td>
<td>7.0 - 11.4</td>
</tr>
<tr>
<td>20 (68)</td>
<td>3.8</td>
<td>2.1 - 2.9</td>
</tr>
<tr>
<td>50 (122)</td>
<td>2.6</td>
<td>0.68 - 1.00</td>
</tr>
<tr>
<td>90 (194)</td>
<td>1.3</td>
<td>0.236 - 0.260</td>
</tr>
</tbody>
</table>

*: This data is reference values and is measured between ECM terminal 51 (Engine coolant temperature sensor) and 70 (sensor ground).

On Board Diagnosis Logic

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-116, "Diagnosis Procedure".
Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
DTC P0117, P0118 ECT SENSOR

< SERVICE INFORMATION >

2. Loosen and retighten ground screws on the body.
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

OK or NG
OK  >> GO TO 2.
NG  >> Repair or replace ground connections.

2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor (1) harness connector.
   ![Diagram of engine components](image)

   ← Vehicle front

2. Turn ignition switch ON.

3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-III or tester.

   Voltage: Approximately 5 V

OK or NG
OK  >> GO TO 4.
NG  >> GO TO 3.

3. DETECT MALFUNCTIONING PART

   Check the following.
   - Harness connectors E351,E255
   - Harness connectors E237,M279
   - Harness for open or short between ECT sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECT sensor terminal 2 and ECM terminal 70.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG
OK  >> GO TO 6.
NG  >> GO TO 5.

5. DETECT MALFUNCTIONING PART
DTC P0117, P0118 ECT SENSOR

Check the following.
- Harness connectors E351,E255
- Harness connectors E237,M279
- Harness for open or short between ECT sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-118, "Component Inspection".

OK or NG
- OK >> GO TO 7.
- NG >> Replace engine coolant temperature sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.

<table>
<thead>
<tr>
<th>Engine coolant temperature [°C (°F)]</th>
<th>Resistance (kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 (68)</td>
<td>2.1 - 2.9</td>
</tr>
<tr>
<td>50 (122)</td>
<td>0.68 - 1.00</td>
</tr>
<tr>
<td>90 (194)</td>
<td>0.236 - 0.260</td>
</tr>
</tbody>
</table>

2. If NG, replace engine coolant temperature sensor.

Removal and Installation

ENGINE COOLANT TEMPERATURE SENSOR

Refer to “CYLINDER HEAD” in EM section.
DTC P0122, P0123 APP SENSOR

Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCEL POS SEN*</td>
<td>Ignition switch: ON (Engine stopped)</td>
<td>Accelerator pedal: Fully released 0.5 - 1.0 V, Accelerator pedal: Fully depressed 4.0 - 4.8 V</td>
</tr>
<tr>
<td>ACCEL SEN 2*</td>
<td>Ignition switch: ON (Engine stopped)</td>
<td>Accelerator pedal: Fully released 0.3 - 1.2 V, Accelerator pedal: Fully depressed 3.7 - 4.8 V</td>
</tr>
</tbody>
</table>

*: This signal is converted by ECM internally. Thus, this differs from ECM terminals voltage.

On Board Diagnosis Logic

These self-diagnoses have the one trip detection logic. MI will not light up for these self-diagnoses.

NOTE:
If DTC P0122 or P0123 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-210.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0122 0122</td>
<td>Accelerator pedal position sensor 1 circuit low input</td>
<td>An excessively low voltage from the APP sensor 1 is sent to ECM.</td>
<td>Harness or connectors (The APP sensor 1 circuit is open or shorted, Accelerator pedal position sensor 1)</td>
</tr>
<tr>
<td>P0123 0123</td>
<td>Accelerator pedal position sensor 1 circuit high input</td>
<td>An excessively high voltage from the APP sensor 1 is sent to ECM.</td>
<td>Accelerator pedal position sensor (Accelerator pedal position sensor 1)</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check DTC.
4. If DTC is detected, go to EC-121, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground.
DTC P0122, P0123 APP SENSOR

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 67 (B) —</td>
<td>Sensor ground (Sensor shield circuit)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>82 (W) 84 (R)</td>
<td>Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor / EGR volume control valve control position sensor)</td>
<td>[Ignition switch ON]</td>
<td>Approximately 5 V</td>
</tr>
<tr>
<td>83 (B) 84 (R)</td>
<td>Accelerator pedal position sensor 1</td>
<td>[Ignition switch ON]</td>
<td>0.5 - 1.0 V</td>
</tr>
<tr>
<td>84 (R) —</td>
<td>Accelerator pedal position sensor 1 ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>90 (L) 92 (Y)</td>
<td>Accelerator pedal position sensor 2 power supply</td>
<td>[Ignition switch ON]</td>
<td>Approximately 5 V</td>
</tr>
<tr>
<td>91 (G) 92 (Y)</td>
<td>Accelerator pedal position sensor 2</td>
<td>[Ignition switch ON]</td>
<td>0.15 - 0.6 V</td>
</tr>
<tr>
<td>92 (Y) —</td>
<td>Accelerator pedal position sensor 2 ground</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-81, "Ground Inspection".
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT
DTC P0122, P0123 APP SENSOR

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.

3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

   **Voltage: Approximately 5 V**

<table>
<thead>
<tr>
<th>OK or NG</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>&gt;&gt; GO TO 3.</td>
</tr>
<tr>
<td>NG</td>
<td>&gt;&gt; Repair open circuit or short to ground or short to power in harness or connectors.</td>
</tr>
</tbody>
</table>

4. Check APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

   1. Turn ignition switch OFF.
   2. Disconnect ECM harness connector.
   3. Check harness continuity between APP sensor terminal 1 and ECM terminal 84.
      Refer to Wiring Diagram.

   **Continuity should exist.**

   4. Also check harness for short to ground and short to power.

<table>
<thead>
<tr>
<th>OK or NG</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>&gt;&gt; GO TO 4.</td>
</tr>
<tr>
<td>NG</td>
<td>&gt;&gt; Repair open circuit or short to ground or short to power in harness or connectors.</td>
</tr>
</tbody>
</table>

5. CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

   1. Check harness continuity between APP sensor terminal 5 and ECM terminal 83.
      Refer to Wiring Diagram.

   **Continuity should exist.**

   2. Also check harness for short to ground and short to power.

<table>
<thead>
<tr>
<th>OK or NG</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>&gt;&gt; GO TO 5.</td>
</tr>
<tr>
<td>NG</td>
<td>&gt;&gt; Repair open circuit or short to ground or short to power in harness or connectors.</td>
</tr>
</tbody>
</table>

6. CHECK APP SENSOR

   Refer to EC-123, "Component Inspection".

<table>
<thead>
<tr>
<th>OK or NG</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>&gt;&gt; GO TO 6.</td>
</tr>
<tr>
<td>NG</td>
<td>&gt;&gt; Replace accelerator pedal assembly.</td>
</tr>
</tbody>
</table>

6. CHECK INTERMITTENT INCIDENT

   Refer to EC-70.

>> INSPECTION END
ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM harness connector terminal as follows.

<table>
<thead>
<tr>
<th>ECM</th>
<th>Condition</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>M33</td>
<td>Accelerator pedal</td>
<td>Fully released</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fully depressed</td>
</tr>
<tr>
<td>83</td>
<td>(APP sensor 1 signal)</td>
<td>Accelerator pedal</td>
</tr>
<tr>
<td></td>
<td>(Sensor ground)</td>
<td>Fully depressed</td>
</tr>
<tr>
<td>84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>91</td>
<td>(APP sensor 2 signal)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Sensor ground)</td>
<td></td>
</tr>
<tr>
<td>92</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. If NG, replace accelerator pedal assembly.

Removal and Installation

ACCELERATOR PEDAL
Refer to “ACCELERATOR CONTROL SYSTEM” in FE section.
DTC P0182, P0183 FUEL PUMP TEMPERATURE SENSOR

Description

Fuel pump temperature sensor (1) is built in the fuel pump (2). The sensor detects the fuel temperature in the fuel pump and calibrates the fuel injection amount change by fuel temperature.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUEL TEMP SEN</td>
<td>• Engine: After warming up</td>
<td>More than 40°C (104°F)</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0182 0182</td>
<td>Fuel pump temperature sensor circuit low input</td>
<td>An excessively low voltage from the sensor is sent to ECM.</td>
<td>• Harness or connectors (The sensor circuit is open or shorted)</td>
</tr>
<tr>
<td>P0183 0183</td>
<td>Fuel pump temperature sensor circuit high input</td>
<td>An excessively high voltage from the sensor is sent to ECM.</td>
<td>• Fuel pump temperature sensor</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-125, "Diagnosis Procedure".
Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. LOOSEN AND RETIGHTEN GROUND SCREWS ON THE BODY.
   Refer to EC-81, “Ground Inspection”.
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

OK or NG
   OK  >> GO TO 2.
   NG  >> Repair or replace ground connections.

2. CHECK FUEL PUMP TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. DISCONNECT FUEL PUMP TEMPERATURE SENSOR (1) HARNESS CONNECTOR.
   - Fuel pump (2)
2. TURN IGNITION SWITCH ON.

3. CHECK VOLTAGE BETWEEN FUEL PUMP TEMPERATURE SENSOR TERMINAL 1 AND GROUND WITH CONSULT-III OR TESTER.

   Voltage: Approximately 5V

OK or NG
   OK  >> GO TO 4.
   NG  >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following
   • Harness connectors E237, M279
   • Harness for open or short between fuel pump temperature sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PUMP TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. TURN IGNITION SWITCH OFF.
2. DISCONNECT ECM HARNESS CONNECTOR.
3. CHECK HARNESS CONTINUITY BETWEEN FUEL PUMP TEMPERATURE SENSOR TERMINAL 2 AND ECM TERMINAL 69.
   Refer to Wiring Diagram.

   Continuity should exist.

4. ALSO CHECK HARNESS FOR SHORT TO GROUND AND SHORT TO POWER.

OK or NG
   OK  >> GO TO 6.
   NG  >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following
DTC P0182, P0183 FUEL PUMP TEMPERATURE SENSOR

< SERVICE INFORMATION >

- Harness connectors E237, M279
- Harness for open or short between fuel pump temperature sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

OK or NG

OK >> GO TO 7.

NG >> Repair or replace.

7. REPLACE FUEL PUMP

1. Replace fuel pump.

>> INSPECTION END

Removal and Installation

FUEL PUMP

Refer to EC-24, "FUEL PUMP".
DTC P0192, P0193 FRP SENSOR

Description

The fuel rail pressure (FRP) sensor (2) is placed to the fuel rail. It measures the fuel pressure in the fuel rail. The sensor sends voltage signal to the ECM. As the pressure increases, the voltage rises. The ECM controls the fuel pressure in the fuel rail by the inlet throttling device. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT CR PRESS</td>
<td>• Engine: After warming up</td>
<td>Idle</td>
</tr>
<tr>
<td></td>
<td>• Air conditioner switch: OFF</td>
<td>25 - 35 MPa</td>
</tr>
<tr>
<td></td>
<td>• Shift lever: Neutral</td>
<td>40 - 50 MPa</td>
</tr>
<tr>
<td></td>
<td>• No load</td>
<td>2,000 rpm</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

NOTE:
If DTC P0192 or P0193 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-214.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0192</td>
<td>Fuel rail pressure sensor circuit low input</td>
<td>An excessively low voltage from the sensor is sent to ECM.</td>
<td>• Harness or connectors (The sensor circuit is open or short-ed.)</td>
</tr>
<tr>
<td>0192</td>
<td></td>
<td></td>
<td>• Fuel rail temperature sensor</td>
</tr>
<tr>
<td>P0193</td>
<td>Fuel rail temperature sensor circuit high input</td>
<td>An excessively high voltage from the sensor is sent to ECM.</td>
<td></td>
</tr>
<tr>
<td>0193</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-130, "Diagnosis Procedure".
DTC P0192, P0193 FRP SENSOR

Wiring Diagram

EC-FRPS-01

Specification data are reference values and are measured between each terminal and ground.
DTC P0192, P0193 FRP SENSOR

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-81, "Ground Inspection".
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel rail pressure sensor (2) harness connector.
2. Turn ignition switch ON.
3. Check voltage between fuel rail pressure sensor terminal 1 and ground with CONSULT-III or tester.

   Voltage: Approximately 5 V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.
3. CHECK FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel rail pressure sensor terminal 3 and ECM terminal 68.
   Refer to Wiring Diagram.

   **Continuity should exist.**

4. Also check harness for short to ground and short to power.

   **OK or NG**

   OK   >> GO TO 4.
   NG   >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 48, 49 and fuel rail pressure sensor terminal 2.
   Refer to Wiring Diagram.

   **Continuity should exist.**

2. Also check harness for short to ground and short to power.

   **OK or NG**

   OK   >> GO TO 5.
   NG   >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-131, "Component Inspection".

**OK or NG**

OK   >> GO TO 6.
NG   >> Replace fuel rail.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

**>> INSPECTION END**

Component Inspection

FUEL RAIL PRESSURE SENSOR

1. Reconnect harness connector disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM harness connector terminals as follows.

<table>
<thead>
<tr>
<th>ECM Connector</th>
<th>Terminal 48</th>
<th>Terminal 68</th>
<th>Condition</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Idle</td>
<td>1.4 - 1.7 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M32</td>
<td>2,000 rpm</td>
<td>1.7 - 2.0 V</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. If the voltage is out of specification, disconnect fuel rail pressure sensor harness connector and connect it again. Then repeat above check.

5. If NG, replace fuel rail.

Removal and Installation

FUEL RAIL

Refer to EM-8.
DTC P0200 FUEL INJECTOR

On Board Diagnosis Logic

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-132, "Diagnosis Procedure".

Diagnosis Procedure

1. INSPECTION START

With CONSULT-III
1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT-III.
3. Touch "ERASE".
5. Is 1st trip DTC P0200 displayed again?

With GST
1. Turn ignition switch ON.
2. Select Service $04 with GST.
4. Is 1st trip DTC P0200 displayed again?

Yes or No
Yes >> GO TO 2.
No >> INSPECTION END

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EL-96, "ECM Re-communicating Function".
3. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".
5. Perform EGR Volume Control Valve Closed Position Learning Value Clear. Refer to EC-24, "EGR Volume Control Valve Closed Position Learning Value Clear".
6. Perform EGR Volume Control Valve Closed Position Learning. Refer to EC-24, "EGR Volume Control Valve Closed Position Learning".

>> INSPECTION END
Component Description

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAIN INJ WID</td>
<td>• Engine: After warming up</td>
<td>No load</td>
</tr>
<tr>
<td></td>
<td>• Shift lever: Neutral position</td>
<td>Blower fan switch: ON</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0201 0201</td>
<td>No. 1 cylinder fuel injector circuit open</td>
<td>An improper voltage signal is sent to ECM through No. 1 cylinder fuel injector.</td>
<td>• Harness or connectors (The fuel injector circuit is open.)</td>
</tr>
<tr>
<td>P0202 0202</td>
<td>No. 2 cylinder fuel injector circuit open</td>
<td>An improper voltage signal is sent to ECM through No. 2 cylinder fuel injector.</td>
<td>• Fuel injector</td>
</tr>
<tr>
<td>P0203 0203</td>
<td>No. 3 cylinder fuel injector circuit open</td>
<td>An improper voltage signal is sent to ECM through No. 3 cylinder fuel injector.</td>
<td></td>
</tr>
<tr>
<td>P0204 0204</td>
<td>No. 4 cylinder fuel injector circuit open</td>
<td>An improper voltage signal is sent to ECM through No. 4 cylinder fuel injector.</td>
<td></td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION
Before performing the following procedure, confirm the ambient temperature is more than -20°C (-4°F).

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-136, "Diagnosis Procedure".
Specifications data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.
### DTC P0201 - P0204 FUEL INJECTOR

**< SERVICE INFORMATION >**

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ -</td>
<td>Signal name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 (L)</td>
<td>Fuel injector power supply (For cylinder No. 1 and 3)</td>
<td>[Engine is running] • Warm-up condition • Idle speed <strong>NOTE:</strong> The pulse cycle changes depending on rpm at idle</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td>5 (P)</td>
<td>Fuel injector power supply (For cylinder No. 2 and 4)</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>21 (Y)</td>
<td>Fuel injector No. 4</td>
<td>[Engine is running] • Warm-up condition • Idle speed <strong>NOTE:</strong> The pulse cycle changes depending on rpm at idle</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td>22 (R)</td>
<td>Fuel injector No. 4</td>
<td></td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>23 (W)</td>
<td>Fuel injector No. 2</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>24 (OR)</td>
<td>Fuel injector No. 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 (G)</td>
<td>Fuel injector No. 3</td>
<td>[Engine is running] • Warm-up condition • Idle speed <strong>NOTE:</strong> The pulse cycle changes depending on rpm at idle</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td>41 (BR)</td>
<td>Fuel injector No. 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42 (PU)</td>
<td>Fuel injector No. 1</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>43 (SB)</td>
<td>Fuel injector No. 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
DTC P0201 - P0204 FUEL INJECTOR

Diagnosis Procedure

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Disconnect fuel injector (1) harness connector.

してしまう：Vehicle front

3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>DTC</th>
<th>Terminal</th>
<th>Cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ECM</td>
<td>Fuel injector</td>
</tr>
<tr>
<td>P0201</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>P0202</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>P0203</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>P0204</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

Continuity should exist.

OK or NG
OK >> GO TO 2.
NG >> Repair open circuit in harness or connectors.

2. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN

Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>DTC</th>
<th>Terminal</th>
<th>Cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ECM</td>
<td>Fuel injector</td>
</tr>
<tr>
<td>P0201</td>
<td>42, 43</td>
<td>2</td>
</tr>
<tr>
<td>P0202</td>
<td>23, 24</td>
<td>2</td>
</tr>
<tr>
<td>P0203</td>
<td>40, 41</td>
<td>2</td>
</tr>
<tr>
<td>P0204</td>
<td>21, 22</td>
<td>2</td>
</tr>
</tbody>
</table>

Continuity should exist.

OK or NG
OK >> GO TO 3.
NG >> Repair open circuit in harness or connectors.

3. CHECK FUEL INJECTOR-I

Refer to EC-137, "Component Inspection".

OK or NG
OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK FUEL INJECTOR-II

With CONSULT-III
1. Remove two fuel injectors.

NOTE:
One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connectors.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".
6. Select "SELF DIAG RESULTS" mode with CONSULT-III.
7. Touch "ERASE".
8. Perform EC-133, "DTC Confirmation Procedure".
9. Is DTC displayed for the other cylinder?

With GST
1. Remove two fuel injectors.
   NOTE: One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".
6. Select Service $04 with GST.
7. Perform EC-133, "DTC Confirmation Procedure".
8. Is DTC displayed for the other cylinder?

   Yes or No
   Yes >> GO TO 5.
   No >> GO TO 6.

5. REPLACE FUEL INJECTOR
1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".

>> INSPECTION END
6. CHECK INTERMITTENT INCIDENT
   Refer to EC-70.

>> INSPECTION END

Component Inspection

FUEL INJECTOR
1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

   Resistance: 0.2 - 0.8 Ω [at 10 - 60°C (50 - 140°F)]
3. If NG, replace fuel injector.

Removal and Installation

FUEL INJECTOR
Refer to EM-8.
DTC P0217 ENGINE OVER TEMPERATURE

Description

SYSTEM DESCRIPTION

NOTE:
If DTC P0217 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-83.

Cooling Fan Control

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input Signal to ECM</th>
<th>ECM function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel sensor</td>
<td>Vehicle speed*</td>
<td>Cooling fan control</td>
<td>Cooling fan relay</td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Engine coolant temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air conditioner switch</td>
<td>Air conditioner ON signal*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: This signal is sent to ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, and air conditioner ON signal. The control system has 2-step control [ON/OFF].

Cooling Fan Operation

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR COND SIG</td>
<td>• Engine: After warming up, idle the engine</td>
<td>Air conditioner switch: OFF OFF</td>
</tr>
<tr>
<td></td>
<td>• Air conditioner switch: ON (Compressor operates)</td>
<td>ON</td>
</tr>
<tr>
<td>COOLING FAN*</td>
<td>• When cooling fan is stopped</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>• When cooling fan operate low speed</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td>• When cooling fan operate low speed</td>
<td>HI</td>
</tr>
</tbody>
</table>

*: The cooling fan rotation has two stages (OFF and ON) although the display of CONSULT-III has three stages (OFF, LOW and HI).

On Board Diagnosis Logic

This self-diagnosis has the one trip detection logic. MI will not light up for this self-diagnosis. If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.
**DTC P0217 ENGINE OVER TEMPERATURE**

< SERVICE INFORMATION >

**[YD25DDTi]**

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P0217 0217 | Engine over temperature  (Overheat) | • Cooling fan does not operate properly (Overheat).  
• Cooling fan system does not operate properly (Overheat).  
• Engine coolant was not added to the system using the proper filling method.  
• Engine coolant is not within the specified range. | • Harness or connectors  
(The cooling fan circuit is open or shorted.)  
• Cooling fan  
• Cooling fan (Crankshaft driven)  
• Radiator hose  
• Radiator  
• Radiator cap  
• Reservoir tank  
• Water pump  
• Thermostat  
For more information, refer to EC-145, "Main 12 Causes of Overheating". |

**CAUTION:**
When a malfunction is indicated, be sure to replace the coolant. Refer to “ENGINE MAINTENANCE” in [MA section]. Also, replace the engine oil. Refer to “ENGINE MAINTENANCE” in [MA section].

1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to “RECOMMENDE FLUIDS AND LUBRICANTS” in [MA section].
2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

**Overall Function Check**

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

**WARNING:**
• Never remove a radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator and/or the reservoir tank.
• Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

**WITH CONSULT-III**

1. Check the coolant level in the reservoir tank and radiator. **Allow engine to cool before checking coolant level.**
   
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-141, “Diagnosis Procedure”.
   
   2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-141, “Diagnosis Procedure”.
   
   3. Start engine and make sure that cooling fan (crankshaft driven) operates normally. If NG, refer to “ENGINE COOLING SYSTEM” in LC section If OK, go to the following step. **Be careful not to overheat engine.**
   
   4. Stop engine and turn ignition switch ON.
   5. Select “COOLANT TEMP” in “ACTIVE TEST” mode with CONSULT-III.
   6. Set “ENG COOLANT TEMP” to 100°C (212°F) by touching “Qu” and “UP” on CONSULT-III screen.
   7. Make sure that cooling fan operates.
      If the results are NG, go to EC-141, "Diagnosis Procedure".

**WITHOUT CONSULT-III**

MAX.  
MIN.  
OK  

SEF621W
1. Check the coolant level in the reservoir tank and radiator. 
   **Allow engine to cool before checking coolant level.**
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-141, "Diagnosis Procedure".

2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-141, "Diagnosis Procedure".

3. Start engine and make sure that cooling fan (crankshaft driven) operates normally.
   If NG, refer to "ENGINE COOLING SYSTEM" in LC section.
   If OK, go to the following step.
   **Be careful not to overheat engine.**

4. Turn ignition switch OFF.

5. Disconnect engine coolant temperature sensor harness connector.

6. Connect 150 Ω resistor to engine coolant temperature sensor harness connector.

7. Start engine and make sure that cooling fan operates.
   **Be careful not to overheat engine.**

8. If NG, go to EC-141, "Diagnosis Procedure".
Diagnosis Procedure

1. CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION

1. Start engine and let it idle.
2. Make sure that cooling fan (crankshaft driven) operates normally.

OK or NG

INFOID:0000000003759474
DTC P0217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

**OK (With CONSULT-III)>>GO TO 2.**
**OK (Without CONSULT-III)>>GO TO 3.**
**NG >> Check cooling fan (crankshaft driven). Refer to “ENGINE COOLING SYSTEM” in LC section.**

## 2. CHECK COOLING FAN OPERATION

### With CONSULT-III

1. Start engine and let it idle.
2. Select “ENG COOLANT TEMP” in “ACTIVE TEST” mode with CONSULT-III.
3. Set “ENG COOLANT TEMP” to 95°C (203°F) by “Qu” and “UP” on CONSULT-III screen.
4. Make sure that cooling fan operate.

#### OK or NG

OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to “PROCEDURE A”.)

### Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Connect 150 Ω resistor to engine coolant temperature sensor harness connector.
4. Start engine and make sure that cooling fan operates.

#### OK or NG

OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to “PROCEDURE A”.)

## 3. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops. Refer to “ENGINE COOLING SYSTEM” in LC section.

**CAUTION:**

Higher than the specified pressure may cause radiator damage. Pressure should not drop.

#### OK or NG

OK >> GO TO 5.
NG >> Check the following for leak. Refer to “ENGINE COOLING SYSTEM” in LC section.
   - Hose
   - Radiator
   - Radiator cap
   - Water pump
   - Reservoir tank

## 4. CHECK COMPONENT PARTS

Check the following.
   - Thermostat. Refer to “ENGINE COOLING SYSTEM” in LC section.
   - Engine coolant temperature sensor. Refer to EC-118, "Component Inspection".

#### OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning component.

## 5. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-145, "Main 12 Causes of Overheating".

>> INSPECTION END

**PROCEDURE A**

### 1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay E51.
3. Turn ignition switch ON.
DTC P0217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

4. Check voltage between cooling fan relay terminals 1, 5 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG
OK  >> GO TO 3.
NG  >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.
• 10A fuse (No.13)
• 30A fusible link (letter d)
• Harness connectors M5, E101
• Harness for open or short between cooling fan relay and fuse
• Harness for open or short between cooling fan relay and battery

>> Repair open circuit or short to ground in harness or connectors.

3. CHECK COOLING FAN MOTOR CIRCUIT FOR OPEN AND SHORT

1. Disconnect cooling fan motor (1) harness connector (2).

2. Check harness continuity between the following.
   cooling fan relay terminal 3 and cooling fan motor terminal 1.
   cooling fan motor terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG
OK  >> GO TO 4.
NG  >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect triple-pressure switch harness connector.

2. Check harness continuity between cooling fan relay terminal 2 and triple-pressure switch terminal 2.
   Check harness continuity between triple-pressure switch terminal 3 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG
OK  >> GO TO 5.
NG  >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK COOLING FAN MOTOR SIGNAL CIRCUIT FOR OPEN OR SHORT-II

1. Disconnect combination meter harness connector.

2. Check harness continuity between cooling fan relay terminal 2 and combination meter terminal 73.
   Check harness continuity between triple-pressure switch terminal 2 and combination meter terminal 73.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

EC-143
DTC P0217 ENGINE OVER TEMPERATURE

6. DETECT MALFUNCTIONING PART

Check the following.
• Harness connectors E101, M5
• Harness connectors M6, N1
• Harness for open or short between cooling fan relay and combination meter

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK COOLING FAN MOTOR SIGNAL CIRCUIT FOR OPEN OR SHORT-III

Check harness continuity between Combination Meter and ECM.
Refer to EL-117, "Main Line Between ECM and Combination Meter".

OK or NG

OK >> GO TO 8.
NG >> Repair the main line between the ECM and combination meter.

8. CHECK COOLING FAN RELAY

Refer to EC-145, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace cooling fan relay.

9. CHECK TRIPLE-PRESSURE SWITCH

Refer to "Electrical Components Inspection" in HA section.

OK or NG

OK >> GO TO 10.
NG >> Replace cooling fan relay.

10. CHECK COOLING FAN MOTOR

Refer to EC-145, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> Replace cooling fan motors.

11. CHECK COMBINATION METER

Refer to EL-54, "Self-Diagnosis Mode of Combination meter".

OK or NG

OK >> GO TO 12.
NG >> Replace cooling fan motors.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END
Main 12 Causes of Overheating

<table>
<thead>
<tr>
<th>Engine</th>
<th>Step</th>
<th>Inspection item</th>
<th>Equipment</th>
<th>Standard</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>1</td>
<td>Blocked radiator</td>
<td>Visual</td>
<td>No blocking</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blocked condenser</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blocked radiator grille</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blocked bumper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Coolant mixture</td>
<td>Coolant tester</td>
<td>50 - 50% coolant mixture</td>
<td>See “RECOMMENDED AND LUBRICANTS” in MA section</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Coolant level</td>
<td>Visual</td>
<td>Coolant up to MAX level in reservoir tank and radiator filler neck See “ENGINE MAINTENANCE” in MA section</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Radiator cap</td>
<td>Pressure tester</td>
<td>See “ENGINE COOLING SYSTEM” in LC section</td>
<td></td>
</tr>
<tr>
<td>ON-2</td>
<td>5</td>
<td>Coolant leaks</td>
<td>Visual</td>
<td>No leaks</td>
<td>See “ENGINE COOLING SYSTEM” in LC section</td>
</tr>
<tr>
<td>ON-2</td>
<td>6</td>
<td>Thermostat</td>
<td>Touch the upper and lower radiator hoses</td>
<td>Both hoses should be hot</td>
<td>See “ENGINE COOLING SYSTEM” in LC section</td>
</tr>
<tr>
<td>ON-1</td>
<td>7</td>
<td>Cooling fan</td>
<td>CONSULT-III</td>
<td>Operating</td>
<td>See trouble diagnosis for DTC P0217 (EC-138)</td>
</tr>
<tr>
<td>ON-2</td>
<td>7</td>
<td>Cooling fan (Crankshaft driven)</td>
<td>Visual</td>
<td>Operating See “ENGINE COOLING SYSTEM” in LC section</td>
<td></td>
</tr>
<tr>
<td>OFF</td>
<td>8</td>
<td>Combustion gas leak</td>
<td>Color checker chemical tester 4 Gas analyzer</td>
<td>Negative</td>
<td>—</td>
</tr>
<tr>
<td>ON-3</td>
<td>9</td>
<td>Coolant temperature gauge</td>
<td>Visual</td>
<td>Gauge less than 3/4 when driving</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coolant overflow to reservoir tank</td>
<td>Visual</td>
<td>No overflow during driving and idling See “ENGINE MAINTENANCE” in MA section</td>
<td></td>
</tr>
<tr>
<td>OFF-4</td>
<td>10</td>
<td>Coolant return from reservoir tank to radiator</td>
<td>Visual</td>
<td>Should be initial level in reservoir tank See “ENGINE MAINTENANCE” in MA section</td>
<td></td>
</tr>
<tr>
<td>OFF</td>
<td>11</td>
<td>Cylinder head</td>
<td>Straight gauge feeler gauge 0.1 mm (0.004 in) Maximum distortion (warping)</td>
<td>See “CYLINDER HEAD” in EM section</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Cylinder block and pistons</td>
<td>Visual</td>
<td>No scuffing on cylinder walls or piston See “CYLINDER BLOCK” in EM section</td>
<td></td>
</tr>
</tbody>
</table>

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.

For more information, refer to “OVERHEATING ANALYSIS” in LC section.

Component Inspection

COOLING FAN RELAY
1. Disconnect cooling fan relay harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Conditions</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 and 5</td>
<td>12 V direct current supply between terminals 1 and 2</td>
<td>Existed</td>
</tr>
<tr>
<td></td>
<td>No current supply</td>
<td>Not existed</td>
</tr>
</tbody>
</table>

If NG, replace cooling fan relay.
DTC P0217 ENGINE OVER TEMPERATURE

< SERVICE INFORMATION >

[YD25DDTi]

COOLING FAN MOTOR

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

<table>
<thead>
<tr>
<th>Cooling fan motor</th>
<th>terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Cooling fan motor should operate.
If NG, replace cooling fan motor.
DTC P0222, P0223 APP SENSOR

Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCEL POS SEN*</td>
<td>Ignition switch: ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Engine stopped)</td>
<td>Accelerator pedal: Fully released 0.5 - 1.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accelerator pedal: Fully depressed 4.0 - 4.8 V</td>
</tr>
<tr>
<td>ACCEL SEN 2*</td>
<td>Ignition switch: ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Engine stopped)</td>
<td>Accelerator pedal: Fully released 0.3 - 1.2 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accelerator pedal: Fully depressed 3.7 - 4.8 V</td>
</tr>
</tbody>
</table>

*: This signal is converted by ECM internally. Thus, this differs from ECM terminals voltage.

On Board Diagnosis Logic

These self-diagnoses have the one trip detection logic. MI will not light up for these self-diagnoses.

NOTE:
If DTC P0222 or P0223 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-214.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0222 0222</td>
<td>Accelerator pedal position sensor 2 circuit low input</td>
<td>An excessively low voltage from the APP sensor 2 is sent to ECM.</td>
<td>• Harness or connectors (The APP sensor 2 circuit is open or shorted.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Accelerator pedal position sensor (Accelerator pedal position sensor 2)</td>
</tr>
<tr>
<td>P0223 0223</td>
<td>Accelerator pedal position sensor 2 circuit high input</td>
<td>An excessively high voltage from the APP sensor 2 is sent to ECM.</td>
<td></td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check DTC.
4. If DTC is detected, go to EC-149, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground.
DTC P0222, P0223 APP SENSOR

< SERVICE INFORMATION >

[YD25DDTI]

**Diagnosis Procedure**

1. **CHECK GROUND CONNECTIONS**
   1. Turn ignition switch OFF.
   2. Loosen and retighten ground screws on the body.
      - Body ground M97 (1)
      - Body ground M99 (2)
      - ECM (3)

   OK or NG
   - OK >> GO TO 2.
   - NG >> Repair or replace ground connections.

2. **CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT**
   1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
   2. Turn ignition switch ON.
DTC P0222, P0223 APP SENSOR

3. Check voltage between APP sensor terminal 6 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG
OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 3 and ECM terminal 92.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG
OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 91 and APP sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG
OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-150, "Component Inspection".

OK or NG
OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM harness connector terminals as follows.
4. If NG, replace accelerator pedal assembly.

Removal and Installation

ACCELERATOR PEDAL
Refer to “ACCELERATOR CONTROL SYSTEM” in FE section.
DTC P0335 CKP SENSOR

Description

The crankshaft position (CKP) sensor is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution. The sensor consists of a permanent magnet and Hall IC. When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CKPS-RPM (TDC)</td>
<td>• Run engine and compare CONSULT-III value with the tachometer indication.</td>
<td>Almost the same speed as the tachometer indication</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

NOTE:
If DTC P0335 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-210.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P0335  | Crankshaft position sensor    | Crankshaft position sensor signal is not detect by the ECM when engine is running. | • Harness or connectors (The sensor circuit is open or shorted.)  
| 0335    | circuit                      |                                                              | • Crankshaft position sensor           |

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and let it idle for at least 5 seconds. 
   If engine could not start, keep ignition switch at START position for 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-154, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.
DTC P0335 CKP SENSOR

< SERVICE INFORMATION >

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-81, "Ground Inspection".
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

OK or NG
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (1) harness connector.
   : Vehicle front
2. Turn ignition switch ON.
DTC P0335 CKP SENSOR

3. Check voltage between CKP sensor terminal 3 and ground with CONSULT-III or tester.

   **Voltage: Approximately 5 V**

OK or NG
OK  >> GO TO 4.
NG  >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
• Harness connectors E237, M279
• Harness for open or short between CKP sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 65 and CKP sensor terminal 2.
   Refer to Wiring Diagram.

   **Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG
OK  >> GO TO 6.
NG  >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
• Harness connectors E237, M279
• Harness for open or short between CKP sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 46 and CKP sensor terminal 1.
   Refer to Wiring Diagram.

   **Continuity should exist.**

2. Also check harness for short to ground and short to power.

OK or NG
OK  >> GO TO 8.
NG  >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
• Harness connectors E237, M279
• Harness for open or short between CKP sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CRANKSHAFT POSITION SENSOR

Voltage: Approximately 5 V

Continuity should exist.

Voltage: Approximately 5 V

Continuity should exist.

Continuity should exist.
DTC P0335 CKP SENSOR

Refer to EC-156, "Component Inspection".

OK or NG
OK >> GO TO 9.
NG >> Replace crankshaft position sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

CRANKSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.
5. Check resistance as shown in the figure.

<table>
<thead>
<tr>
<th>Terminal No. (Polarity)</th>
<th>Resistance [Ω at 25°C (77°F)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (+) - 2 (-)</td>
<td>Except 0 or ∞</td>
</tr>
<tr>
<td>1 (+) - 3 (-)</td>
<td>Except 0</td>
</tr>
<tr>
<td>2 (+) - 3 (-)</td>
<td></td>
</tr>
</tbody>
</table>

6. If NG, replace crankshaft position sensor.

Removal and Installation

CRANKSHAFT POSITION SENSOR

Refer to MT-3.
DTC P0336 CKP SENSOR

Description

The crankshaft position (CKP) sensor is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC. When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
</table>
| CKPS-RPM (TDC) | • Tachometer: Connect  
                  • Run engine and compare CONSULT-III value with the tachometer indication. | Almost the same speed as the tachometer indication. |

On Board Diagnosis Logic

NOTE:
If DTC P0336 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-210.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P0336   | Crankshaft position sensor   | Crankshaft position sensor signal is not in the normal pattern when engine is running. | • Harness or connectors  
                                                (The sensor circuit is open or short- ed.)  
                                                • Crankshaft position sensor  
                                                • Signal plate |

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and let it idle for at least 5 seconds.  
   If engine could not start, keep ignition switch at START position for 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-159, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.
DTC P0336 CKP SENSOR

< SERVICE INFORMATION >

[YE25DDTI]

### Diagnosis Procedure

#### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   - Refer to [EC-81, "Ground Inspection".]
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

   **OK or NG**
   - **OK** >> GO TO 2.
   - **NG** >> Repair or replace ground connections.

#### 2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
</table>
| + 65 (G) 65 (Y)           | Crankshaft position sensor | [Engine is running]  
  - Warm-up condition  
  - Idle speed  
  **NOTE:** The pulse cycle changes depending on rpm at idle | Approximately 3.5 V ★ |
| 65 (Y)                    | Crankshaft position sensor ground | — | — |
| 67 (B)                    | Sensor ground  
  (Sensor shield circuit) | — | — |
| 82 (W) 65 (Y)             | Sensor power supply  
  (Accelerator pedal position sensor 1 / Crankshaft position sensor / EGR volume control valve control position sensor) | [Ignition switch ON] | Approximately 5 V |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
DTC P0336 CKP SENSOR

1. Disconnect crankshaft position (CKP) sensor (1) harness connector.

   : Vehicle front

2. Turn ignition switch ON.

3. Check voltage between CKP sensor terminal 3 and ground with CONSULT-III or tester.

   **Voltage: Approximately 5 V**

   OK or NG  
   OK >> GO TO 4.  
   NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

   Check the following.  
   - Harness connectors E237, M279  
   - Harness for open or short between CKP sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

   1. Turn ignition switch OFF.  
   2. Disconnect ECM harness connector.  
   3. Check harness continuity between ECM terminal 65 and CKP sensor terminal 2.  
      Refer to Wiring Diagram.  
      **Continuity should exist.**

   4. Also check harness for short to ground and short to power.

   OK or NG  
   OK >> GO TO 6.  
   NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

   Check the following.  
   - Harness connectors E237, M279  
   - Harness for open or short between CKP sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

   1. Check harness continuity between ECM terminal 46 and CKP sensor terminal 1.  
      Refer to Wiring Diagram.  
      **Continuity should exist.**

   2. Also check harness for short to ground and short to power.

   OK or NG
DTC P0336 CKP SENSOR

< SERVICE INFORMATION >

OK  >> GO TO 8.
NG  >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
• Harness connectors E237, M279
• Harness for open or short between CKP sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-161, "Component Inspection".

OK or NG

OK  >> GO TO 9.
NG  >> Replace crankshaft position sensor.

9. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK  >> GO TO 10.
NG  >> Replace the signal plate.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

CRANKSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.
5. Check resistance as shown in the figure.

<table>
<thead>
<tr>
<th>Terminal No. (Polarity)</th>
<th>Resistance Ω [at 25°C (77°F)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (+) - 2 (-)</td>
<td>Except 0 or ∞</td>
</tr>
<tr>
<td>1 (+) - 3 (-)</td>
<td>Except 0</td>
</tr>
<tr>
<td>2 (+) - 3 (-)</td>
<td></td>
</tr>
</tbody>
</table>

6. If NG, replace crankshaft position sensor.
DTC P0336 CKP SENSOR

< SERVICE INFORMATION >

Removal and Installation

INFOID:0000000003759517

CRANKSHAFT POSITION SENSOR
Refer to MT-3.
DTC P0340 CMP SENSOR

Description

The camshaft position (CMP) sensor senses the retraction with camshaft (left side) to identify a particular cylinder. The camshaft position (CMP) sensor senses the piston position. When the crankshaft position (CKP) sensor system becomes inoperative, the camshaft position (CMP) sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC. When engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes.

On Board Diagnosis Logic

NOTE: If DTC P0340 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-214.

DTC Confirmation Procedure

NOTE: If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and let it idle for at least 5 seconds. If engine could not start, keep ignition switch at START position for 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-165, "Diagnosis Procedure".

DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause
--- | --- | --- | ---
P0340 0340 | Camshaft position sensor circuit | Camshaft position sensor signal is not detect by the ECM when engine is running. | • Harness or connectors (The sensor circuit is open or shorted.)
• Camshaft position sensor
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.
DTC P0340 CMP SENSOR

< SERVICE INFORMATION >

[YD25DDTi]

Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

   1. Turn ignition switch OFF.
   2. Loosen and retighten ground screws on the body.
      Refer to EC-81, “Ground Inspection”.
      - Body ground M97 (1)
      - Body ground M99 (2)
      - ECM (3)

   OK or NG
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

   OK >> GO TO 2.
   NG >> Repair or replace ground connections.

2. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

   1. Disconnect camshaft position (CMP) sensor (1) harness connector.

      ◀ : Vehicle front

   2. Turn ignition switch ON.
3. Check voltage between CMP sensor terminal 3 and ground with CONSULT-III or tester.

**Voltage: Approximately 5 V**

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and CMP sensor terminal 2.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 47 and CMP sensor terminal 1.
   Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-166, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace camshaft position sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

CAMSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.

5. Check resistance as shown in the figure.

<table>
<thead>
<tr>
<th>Terminal No. (Polarity)</th>
<th>Resistance Ω [at 25°C (77°F)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (+) - 2 (-)</td>
<td>Except 0 or ∞</td>
</tr>
<tr>
<td>3 (+) - 1 (-)</td>
<td></td>
</tr>
<tr>
<td>3 (+) - 2 (-)</td>
<td></td>
</tr>
</tbody>
</table>

6. If NG, replace camshaft position sensor.

Removal and Installation

CAMSHAFT POSITION SENSOR
Refer to “CYLINDER HEAD” in EM section.
DTC P0341 CMP SENSOR

Description

The camshaft position (CMP) sensor senses the retraction with camshaft (left side) to identify a particular cylinder. The camshaft position (CMP) sensor senses the piston position. When the crankshaft position (CKP) sensor system becomes inoperative, the camshaft position (CMP) sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC. When engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes.

On Board Diagnosis Logic

NOTE:
If DTC P0341 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-214.

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-170, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.
## DTC P0341 CMP SENSOR

**SERVICE INFORMATION**

### Diagnosis Procedure

#### 1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

**Does the engine turn over?**

**Does the starter motor operate?**

- **Yes**
  - **Yes** >> GO TO 2.
  - **No** >> Check starting system. (Refer to "STARTING SYSTEM in EL section.")

- **No**
  - **>>** Repair or replace ground connections.

#### 2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   - Refer to EC-81, "Ground Inspection".
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

**OK or NG**

- **OK** >> GO TO 3.
- **NG** >> Repair or replace ground connections.

#### 3. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 66 (W)</td>
<td>Camshaft position sensor power supply</td>
<td>[Ignition switch ON]</td>
<td>Approximately 5 V</td>
</tr>
<tr>
<td>+ 45 (R)</td>
<td>Camshaft position sensor</td>
<td>[Engine is running]</td>
<td>Approximately 4.7 V</td>
</tr>
<tr>
<td>+ 47 (R)</td>
<td>—</td>
<td>Warm-up condition</td>
<td></td>
</tr>
<tr>
<td>— 66 (B)</td>
<td>Camshaft position sensor ground</td>
<td>Warm-up condition</td>
<td></td>
</tr>
<tr>
<td>— 67 (B)</td>
<td>Sensor ground (Sensor shield circuit)</td>
<td>Engine speed: 2,000 rpm</td>
<td></td>
</tr>
</tbody>
</table>

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
DTC P0341 CMP SENSOR

1. Disconnect camshaft position (CMP) sensor (1) harness connector.
   : Vehicle front

2. Turn ignition switch ON.

3. Check voltage between CMP sensor terminal 3 and ground with CONSULT-III or tester.
   **Voltage: Approximately 5 V**
   OK or NG
   OK >> GO TO 4.
   NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
   1. Turn ignition switch OFF.
   2. Disconnect ECM harness connector.
   3. Check harness continuity between ECM terminal 66 and CMP sensor terminal 2.
   **Continuity should exist.**
   4. Also check harness for short to ground and short to power.
   OK or NG
   OK >> GO TO 5.
   NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
   1. Check harness continuity between ECM terminal 47 and CMP sensor terminal 1.
      Refer to Wiring Diagram.
   **Continuity should exist.**
   2. Also check harness for short to ground and short to power.
   OK or NG
   OK >> GO TO 6.
   NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CAMSHAFT POSITION SENSOR
   Refer to EC-172, "Component Inspection".
   OK or NG
   OK >> GO TO 7.
   NG >> Replace camshaft position sensor.

7. CHECK CAMSHAFT (EXHAUST)
Check the following.
- Accumulation of debris to the signal plate of camshaft (left side) (1) rear end
- Chipping signal plate of camshaft (left side) rear end

OK or NG
OK  >> GO TO 8.
NG  >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

CAMSHAFT POSITION SENSOR
1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.
5. Check resistance as shown in the figure.

<table>
<thead>
<tr>
<th>Terminal No. (Polarity)</th>
<th>Resistance Ω [at 25°C (77°F)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (+) - 2 (-)</td>
<td>Except 0 or ∞</td>
</tr>
<tr>
<td>3 (+) - 1 (-)</td>
<td></td>
</tr>
<tr>
<td>3 (+) - 2 (-)</td>
<td></td>
</tr>
</tbody>
</table>

6. If NG, replace camshaft position sensor.

Removal and Installation

CAMSHAFT POSITION SENSOR
Refer to “CYLINDER HEAD” in EM section.
DTC P0380 GLOW RELAY

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0380 0380</td>
<td>Glow relay circuit</td>
<td>An excessively low voltage is sent to ECM through glow relay.</td>
<td>• Harness or connectors (The glow relay circuit is open or shorted.) • Glow relay</td>
</tr>
<tr>
<td></td>
<td></td>
<td>An excessively high voltage is sent to ECM through glow relay.</td>
<td>• Harness or connectors (The glow relay circuit is shorted.) • Glow relay</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-174, "Diagnosis Procedure".
Diagnosis Procedure

1. CHECK GLOW RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow relay (1).
3. Check voltage between ECM relay terminals 1, 3 and ground with CONSULT-III or tester.

**Voltage: Battery voltage**

<table>
<thead>
<tr>
<th>OK or NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
<tr>
<td>NG</td>
</tr>
</tbody>
</table>

2. **DETECT MALFUNCTIONING PART**

Check the following.
- 60A fusible link (letter b)
- Harness for open and short between glow relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. **CHECK GLOW RELAY OUTPUT SIGNAL CIRCUIT FOR SHORT TO GROUND**

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 37 and glow relay terminal 2.
   Refer to Wiring Diagram.

   **Continuity should exist.**

3. Also check harness for short to ground and short to power.

<table>
<thead>
<tr>
<th>OK or NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
<tr>
<td>NG</td>
</tr>
</tbody>
</table>

4. **DETECT MALFUNCTIONING PART**

Check the following.
- Harness connectors E101, M5
- Harness for open and short between glow relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. **CHECK GLOW RELAY**

Refer to EC-176, "Component Inspection".

<table>
<thead>
<tr>
<th>OK or NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
<tr>
<td>NG</td>
</tr>
</tbody>
</table>

6. **CHECK INTERMITTENT INCIDENT**

Refer to EC-70.
Component Inspection

GLOW RELAY
Check continuity between glow relay terminals 3 and 5 under the following conditions.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V direct current supply between terminals 1 and 2</td>
<td>Yes</td>
</tr>
<tr>
<td>No current supply</td>
<td>No</td>
</tr>
</tbody>
</table>

Operation takes less than 1 second.
DTC P0403 EGR SYSTEM

**Description**

**SYSTEM DESCRIPTION**

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input Signal to ECM</th>
<th>ECM Function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crankshaft position sensor</td>
<td>Engine speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Engine coolant temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass air flow sensor</td>
<td>Amount of intake air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerator pedal position sensor</td>
<td>Accelerator pedal position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle speed sensor</td>
<td>Vehicle speed*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ignition switch</td>
<td>Start signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air conditioner switch</td>
<td>Air conditioner operation*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake air temperature sensor</td>
<td>Intake air temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barometric pressure sensor</td>
<td>Barometric pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR volume control valve control position sensor</td>
<td>EGR volume control valve control position</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: This signal is sent to the ECM through CAN communication line.

This system controls the flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR passage in the EGR volume control valve changes to control the EGR flow rate. A built-in DC motor moves the valve continuously corresponding to the ECM output signal. The EGR volume control valve control position sensor detects the valve position and sends the voltage signals to the ECM. The ECM judges the current opening angle of the valve from this signals and the ECM controls the DC motor to make the valve opening angle properly.

The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.

The EGR volume control valve remains close under the following conditions.
- Engine stopped
- Engine starting
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Accelerator pedal fully depressed

**COMPONENT DESCRIPTION**

EGR Volume Control Valve
The EGR volume control valve consists of valve, actuator and position sensor, etc. The valve is installed in EGR passage, and operated by the actuator according to the output signal of the ECM. The actuator used DC motor and it opens or closes the valve to change the EGR flow rate.

The EGR volume control valve control position sensor consists of a permanent magnet and Hall IC. It senses the valve shaft movement and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the valve from this signals, and controls the DC motor to make the valve opening angle in response to driving conditions.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR/V ANGLE</td>
<td>Ignition switch: ON (Engine stopped)</td>
<td>Approx. 0°</td>
</tr>
<tr>
<td>EGR V/POS SEN</td>
<td>Ignition switch: ON (Engine stopped)</td>
<td>1,050 - 1,350 mV</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

NOTE:
If DTC P0403 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-210.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0403</td>
<td>EGR volume control valve</td>
<td>Excessively high duty voltage signal is sent to the valve for the specified time.</td>
<td>• Harness or connectors (The EGR volume control valve circuit is open or shorted.)</td>
</tr>
<tr>
<td>0403</td>
<td>stuck</td>
<td></td>
<td>• EGR volume control valve stuck closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• EGR passage clogged</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Restart engine and let it idle for 5 seconds.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to EC-180, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.
## DTC P0403 EGR SYSTEM

**INFOID:0000000003759544**

### Diagnosis Procedure

1. **CHECK GROUND CONNECTIONS**

   1. Turn ignition switch OFF.
   2. Loosen and retighten ground screws on the body.
      - Refer to EC-81, "Ground Inspection".
      - Body ground M97 (1)
      - Body ground M99 (2)
      - ECM (3)

   **OK** or **NG**
   - **OK** => GO TO 2.
   - **NG** => Repair or replace ground connections.

2. **CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT**

   1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve (1) harness connector.

3. Turn ignition switch ON.

4. Check voltage between EGR volume control valve terminal 3 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V

OK or NG
OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E254, M285
- Harness for open or short between EGR volume control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 77 and EGR volume control valve terminal 4.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG
OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E254, M285
- Harness for open or short between EGR volume control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 81 and EGR volume control valve terminal 5.
   Refer to Wiring Diagram.

Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG
- OK >> GO TO 8.
- NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E254, M285
- Harness for open or short between EGR volume control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>ECM terminal</th>
<th>EGR volume control valve terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG
- OK >> GO TO 10.
- NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E254, M285
- Harness for open or short between EGR volume control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK EGR PASSAGE

Check the following for clogging and cracks.
- EGR tube
- EGR hose
- EGR cooler

OK or NG
- OK >> GO TO 11.
- NG >> Repair or replace EGR passage.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

OK or NG
- OK >> GO TO 12.
- NG >> Repair or replace.

12. REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-24, "EGR Volume Control Valve Closed Position Learning Value Clear".
3. Perform EC-24, "EGR Volume Control Valve Closed Position Learning".

>> INSPECTION END
DTC P0403 EGR SYSTEM

Removal and Installation

EGR VOLUME CONTROL VALVE
Refer to EM-6.
DTC P0405, P0406 EGR SENSOR

Description

SYSTEM DESCRIPTION

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input Signal to ECM</th>
<th>ECM Function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crankshaft position sensor</td>
<td>Engine speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Engine coolant temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass air flow sensor</td>
<td>Amount of intake air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerator pedal position sensor</td>
<td>Accelerator pedal position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle speed sensor</td>
<td>Vehicle speed*</td>
<td>EGR volume control</td>
<td>EGR volume control valve</td>
</tr>
<tr>
<td>Ignition switch</td>
<td>Start signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air conditioner switch</td>
<td>Air conditioner operation*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake air temperature sensor</td>
<td>Intake air temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barometric pressure sensor</td>
<td>Barometric pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR volume control valve control position sensor</td>
<td>EGR volume control valve control position</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: This signal is sent to the ECM through CAN communication line.

This system controls the flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR passage in the EGR volume control valve changes to control the EGR flow rate. A built-in DC motor moves the valve continuously corresponding to the ECM output signal. The EGR volume control valve control position sensor detects the valve position and sends the voltage signals to the ECM. The ECM judges the current opening angle of the valve from this signals and the ECM controls the DC motor to make the valve opening angle properly.

The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.

The EGR volume control valve remains close under the following conditions.
  - Engine stopped
  - Engine starting
  - Low engine coolant temperature
  - Excessively high engine coolant temperature
  - High engine speed
  - Accelerator pedal fully depressed

COMPONENT DESCRIPTION

EGR Volume Control Valve
The EGR volume control valve consists of valve, actuator and position sensor, etc. The valve is installed in EGR passage, and operated by the actuator according to the output signal of the ECM. The actuator used DC motor and it opens or closes the valve to change the EGR flow rate.

The EGR volume control valve control position sensor consists of a permanent magnet and Hall IC. It senses the valve shaft movement and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the valve from this signals, and controls the DC motor to make the valve opening angle in response to driving conditions.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR/V ANGLE</td>
<td>• Ignition switch: ON (Engine stopped)</td>
<td>Approx. 0°</td>
</tr>
<tr>
<td>EGR V/POS SEN</td>
<td>• Ignition switch: ON (Engine stopped)</td>
<td>1,050 - 1,350 mV</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

NOTE:
If DTC P0405, P0406 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-210.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0405</td>
<td>EGR volume control valve control position sensor circuit low input</td>
<td>An excessively low voltage from the sensor is sent to ECM.</td>
<td>• Harness or connectors (The sensor circuit is open or shorted.)</td>
</tr>
<tr>
<td>P0406</td>
<td>EGR volume control valve control position sensor circuit high input</td>
<td>An excessively high voltage from the sensor is sent to ECM.</td>
<td>• EGR volume control valve control position sensor</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Restart engine and let it idle for 5 seconds.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to EC-187, "Diagnosis Procedure".
Wiring Diagram

DTC P0405, P0406 EGR SENSOR

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.
## DTC P0405, P0406 EGR SENSOR

### [YD25DDTi]

#### Diagnosis Procedure

1. **CHECK GROUND CONNECTIONS**
   
   1. Turn ignition switch OFF.
   2. Loosen and retighten ground screws on the body.
      - Refer to EC-81, "Ground Inspection".
      - Body ground M97 (1)
      - Body ground M99 (2)
      - ECM (3)

   OK or NG
   
   OK >> GO TO 2.
   
   NG >> Repair or replace ground connections.

2. **CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT**
   
   1. Turn ignition switch OFF.
DTC P0405, P0406 EGR SENSOR

2. Disconnect EGR volume control valve (1) harness connector.

3. Turn ignition switch ON.

4. Check voltage between EGR volume control valve terminal 3 and ground with CONSULT-III or tester.

   **Voltage: Approximately 5 V**

   **OK or NG**
   - **OK** >> GO TO 4.
   - **NG** >> GO TO 3.

3. DETECT MALFUNCTIONING PART

   Check the following.
   - Harness connectors E254, M285
   - Harness for open or short between EGR volume control valve and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

   1. Turn ignition switch OFF.
   2. Disconnect ECM harness connector.
   3. Check harness continuity between ECM terminal 77 and EGR volume control valve terminal 4.
      Refer to Wiring Diagram.

      **Continuity should exist.**

   4. Also check harness for short to ground and short to power.

   **OK or NG**
   - **OK** >> GO TO 6.
   - **NG** >> GO TO 5.

5. DETECT MALFUNCTIONING PART

   Check the following.
   - Harness connectors E254, M285
   - Harness for open or short between EGR volume control valve and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

   1. Check harness continuity between ECM terminal 81 and EGR volume control valve terminal 5.
      Refer to Wiring Diagram.

      **Continuity should exist.**
DTC P0405, P0406 EGR SENSOR

< SERVICE INFORMATION >

2. Also check harness for short to ground and short to power.

OK or NG

OK  >> GO TO 8.
NG  >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E254, M285
- Harness for open or short between EGR volume control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

OK or NG

OK  >> GO TO 9.
NG  >> Repair or replace.

9. REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-24, "EGR Volume Control Valve Closed Position Learning Value Clear".
3. Perform EC-24, "EGR Volume Control Valve Closed Position Learning".

>> INSPECTION END

Removal and Installation

EGR VOLUME CONTROL VALVE

Refer to EM-6.
DTC P0409 EGR SYSTEM

Description

SYSTEM DESCRIPTION

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input Signal to ECM</th>
<th>ECM Function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crankshaft position sensor</td>
<td>Engine speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Engine coolant temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass air flow sensor</td>
<td>Amount of intake air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerator pedal position sensor</td>
<td>Accelerator pedal position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle speed sensor</td>
<td>Vehicle speed*</td>
<td>EGR volume control valve</td>
<td></td>
</tr>
<tr>
<td>Ignition switch</td>
<td>Start signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air conditioner switch</td>
<td>Air conditioner operation*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake air temperature sensor</td>
<td>Intake air temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barometric pressure sensor</td>
<td>Barometric pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR volume control valve control position sensor</td>
<td>EGR volume control valve control position</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: This signal is sent to the ECM through CAN communication line.

This system controls the flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR passage in the EGR volume control valve changes to control the EGR flow rate. A built-in DC motor moves the valve continuously corresponding to the ECM output signal. The EGR volume control valve control position sensor detects the valve position and sends the voltage signals to the ECM. The ECM judges the current opening angle of the valve from this signals and the ECM controls the DC motor to make the valve opening angle properly.

The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.

The EGR volume control valve remains close under the following conditions.
- Engine stopped
- Engine starting
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Accelerator pedal fully depressed

COMPONENT DESCRIPTION

EGR Volume Control Valve
The EGR volume control valve consists of valve, actuator and position sensor, etc. The valve is installed in EGR passage, and operated by the actuator according to the output signal of the ECM. The actuator used DC motor and it opens or closes the valve to change the EGR flow rate.

The EGR volume control valve control position sensor consists of a permanent magnet and Hall IC. It senses the valve shaft movement and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the valve from this signals, and controls the DC motor to make the valve opening angle in response to driving conditions.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR/V ANGLE</td>
<td>• Ignition switch: ON (Engine stopped)</td>
<td>Approx. 0°</td>
</tr>
<tr>
<td>EGR V/POS SEN</td>
<td>• Ignition switch: ON (Engine stopped)</td>
<td>1,050 - 1,350 mV</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

**NOTE:**
If DTC P0409 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-210.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P0409   | EGR volume control valve does not operate properly. | The characteristic of EGR volume control valve is not in the specified range. | • Harness or connectors (EGR volume control valve circuit is open or shorted.)
| 0409    |                                               |                                                                                       | • EGR volume control valve                                                    |

DTC Confirmation Procedure

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**WITH CONSULT-III**

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Confirm that engine coolant temperature is more than 81°C (178°F).
4. Stop engine and wait at least 10 seconds.
5. Restart engine and let it idle for 5 seconds.
6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to EC-193, "Diagnosis Procedure".

**WITH GST**

Follow the procedure “WITH CONSULT-III” above.
DTC P0409 EGR SYSTEM

EC-EGRC1-01

- Detectable line for DTC
- Non-detectable line for DTC

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.
< SERVICE INFORMATION >

DTC P0409 EGR SYSTEM

[YD25DDTi]

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>★-average voltage for pulse signal</td>
</tr>
<tr>
<td>7 (OR)</td>
<td>EGR volume control valve (Close)</td>
<td>[Ignition switch OFF]</td>
<td>1.0 - 2.0 V (Periodically changes) BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>For a few seconds after turning ignition switch OFF.</td>
<td></td>
</tr>
<tr>
<td>8 (Y)</td>
<td>EGR volume control valve (Open)</td>
<td>[Ignition switch OFF]</td>
<td>1.0 - 2.0 V (Periodically changes) BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>For a few seconds after turning ignition switch OFF.</td>
<td></td>
</tr>
<tr>
<td>77 (SB)</td>
<td>EGR volume control valve control position sensor ground</td>
<td>[Ignition switch OFF]</td>
<td>Voltage should fluctuates between 0.5 and 2.5 V, then drop to 0 V.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>For a few seconds after turning ignition switch OFF.</td>
<td></td>
</tr>
<tr>
<td>81 (P)</td>
<td>EGR volume control valve control position sensor</td>
<td>[Ignition switch OFF]</td>
<td>Approximately 5 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>For a few seconds after turning ignition switch OFF.</td>
<td></td>
</tr>
<tr>
<td>82 (W)</td>
<td>Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor / EGR volume control valve control position sensor)</td>
<td>[Ignition switch ON]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

★★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   - Refer to EC-81, "Ground Inspection".
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)
3. OK or NG
   - OK >> GO TO 2.
   - NG >> Repair or replace ground connections.

2. CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve (1) harness connector.

3. Turn ignition switch ON.

4. Check voltage between EGR volume control valve terminal 3 and ground with CONSULT-III or tester.

   **Voltage: Approximately 5 V**

   OK or NG
   
   OK  >> GO TO 4.
   NG  >> GO TO 3.

3. DETECT MALFUNCTIONING PART

   Check the following.
   - Harness connectors E254, M285
   - Harness for open or short between EGR volume control valve and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

   1. Turn ignition switch OFF.
   2. Disconnect ECM harness connector.
   3. Check harness continuity between ECM terminal 77 and EGR volume control valve terminal 4.
      Refer to Wiring Diagram.

      **Continuity should exist.**

   4. Also check harness for short to ground and short to power.

   OK or NG
   
   OK  >> GO TO 6.
   NG  >> GO TO 5.

5. DETECT MALFUNCTIONING PART

   Check the following.
   - Harness connectors E254, M285
   - Harness for open or short between EGR volume control valve and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

   1. Check harness continuity between ECM terminal 81 and EGR volume control valve terminal 5.
      Refer to Wiring Diagram.

      **Continuity should exist.**
2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E254, M285
- Harness for open or short between EGR volume control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows.
Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>ECM terminal</th>
<th>EGR volume control valve terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

**Continuity should exist.**

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E254, M285
- Harness for open or short between EGR volume control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

11. REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-24, "EGR Volume Control Valve Closed Position Learning Value Clear".
3. Perform EC-24, "EGR Volume Control Valve Closed Position Learning".

>> INSPECTION END

Removal and Installation

EGR VOLUME CONTROL VALVE

Refer to EM-6.
## DTC P0488 EGR SYSTEM

### Description

INFOID:0000000003759601

**SYSTEM DESCRIPTION**

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input Signal to ECM</th>
<th>ECM Function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crankshaft position sensor</td>
<td>Engine speed</td>
<td></td>
<td>EGR volume control valve</td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Engine coolant temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass air flow sensor</td>
<td>Amount of intake air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerator pedal position sensor</td>
<td>Accelerator pedal position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle speed sensor</td>
<td>Vehicle speed</td>
<td></td>
<td>EGR volume control valve</td>
</tr>
<tr>
<td>Ignition switch</td>
<td>Start signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air conditioner switch</td>
<td>Air conditioner operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake air temperature sensor</td>
<td>Intake air temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barometric pressure sensor</td>
<td>Barometric pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR volume control valve control position sensor</td>
<td>EGR volume control valve control position</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: This signal is sent to the ECM through CAN communication line.

This system controls the flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR passage in the EGR volume control valve changes to control the EGR flow rate. A built-in DC motor moves the valve continuously corresponding to the ECM output signal. The EGR volume control valve control position sensor detects the valve position and sends the voltage signals to the ECM. The ECM judges the current opening angle of the valve from this signals and the ECM controls the DC motor to make the valve opening angle properly.

The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.

The EGR volume control valve remains close under the following conditions.

- Engine stopped
- Engine starting
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Accelerator pedal fully depressed

### COMPONENT DESCRIPTION

**EGR Volume Control Valve**
The EGR volume control valve consists of valve, actuator and position sensor, etc. The valve is installed in EGR passage, and operated by the actuator according to the output signal of the ECM. The actuator used DC motor and it opens or closes the valve to change the EGR flow rate. The EGR volume control valve control position sensor consists of a permanent magnet and Hall IC. It senses the valve shaft movement and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the valve from this signals, and controls the DC motor to make the valve opening angle in response to driving conditions.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR/V ANGLE</td>
<td>Ignition switch: ON (Engine stopped)</td>
<td>Approx. 0°</td>
</tr>
<tr>
<td>EGR V/POS SEN</td>
<td>Ignition switch: ON (Engine stopped)</td>
<td>1,050 - 1,350 mV</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

NOTE:
If DTC P0488 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-210.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P0488   | EGR driving circuit does not function properly. | The ECM internal circuit for driving the EGR volume control valve does not function properly due to high temperature or excessive current. | • Harness or connectors (The EGR volume control valve circuit is shorted.)  
• EGR volume control valve  
• ECM |

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Restart engine and let it idle for 5 seconds.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to EC-199, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.
DTC P0488 EGR SYSTEM

< SERVICE INFORMATION >

[YD25DDTi]

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>(Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>-</td>
<td>Signal name</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   - Refer to EC-81, "Ground Inspection".
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

![Diagram]

- EGR volume control valve (Close)
  - [Ignition switch OFF]
    - Warm-up condition
    - For a few seconds after turning ignition switch OFF.

- EGR volume control valve (Open)
  - [Ignition switch OFF]
    - Warm-up condition
    - For a few seconds after turning ignition switch OFF.

- EGR volume control valve control position sensor ground

- Sensor power supply
  - [Ignition switch ON]
    - Approximately 5 V

*: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
DTC P0488 EGR SYSTEM

< SERVICE INFORMATION >

1. Disconnect EGR volume control valve (1) harness connector.

   : Vehicle front

2. Disconnect ECM harness connector.

3. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows.
   Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>ECM terminal</th>
<th>EGR volume control valve terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

   Continuity should exist.

4. Also check harness for short to ground and short to power.

   OK or NG
   OK   >> GO TO 3.
   NG   >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTERMITTENT INCIDENT

   Refer to EC-70.

   OK or NG
   OK   >> GO TO 4.
   NG   >> Repair or replace.

4. REPLACE EGR VOLUME CONTROL VALVE

   1. Replace the EGR volume control valve.
   2. Perform EC-24, "EGR Volume Control Valve Closed Position Learning Value Clear".
   3. Perform EC-24, "EGR Volume Control Valve Closed Position Learning".

   >> INSPECTION END

Removal and Installation

EGR VOLUME CONTROL VALVE

Refer to EM-6.
**On Board Diagnosis Logic**

This self-diagnosis has the one trip detection logic. MI will not light up for this self-diagnosis.

### DTC Confirmation Procedure

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Start engine and let it idle for at least 35 seconds.
2. Check DTC.
3. If DTC is detected, go to EC-201, "Diagnosis Procedure".

### Diagnosis Procedure

1. **INSPECTION START**

   Are jumper cables connected for the jump starting?
   - Yes or No
     - Yes >> GO TO 3.
     - No >> GO TO 2.

2. **CHECK BATTERY AND ALTERNATOR**

   Check that the proper type of battery and type of alternator are installed. Refer to "BATTERY" and "CHARGING SYSTEM" in EL section.
   - OK or NG
     - OK >> GO TO 5.
     - NG >> Replace with a proper one.

3. **CHECK JUMPER CABLES INSTALLATION**

   Check that the jumper cables are connected in the correct sequence.
   - OK or NG
     - OK >> GO TO 4.
     - NG >> Reconnect jumper cables properly.

4. **CHECK BATTERY FOR BOOSTER**

   Check that the battery for the booster is a 12 V battery.
   - OK or NG
     - OK >> GO TO 5.
DTC P0563 BATTERY VOLTAGE

NG >> Change the vehicle for booster.

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

implified:

With CONSULT-III
1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
5. Is DTC P0563 displayed again?

With GST
1. Turn ignition switch ON.
2. Select Service $04 with GST.
4. Is DTC P0563 displayed again?

Yes or No
Yes >> GO TO 6.
No >> GO TO 7.

6. REPLACE ECM
1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EL-96, "ECM Re-communicating Function".
3. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".
5. Perform EGR Volume Control Valve Closed Position Learning Value Clear. Refer to EC-24, "EGR Volume Control Valve Closed Position Learning Value Clear".
6. Perform EGR Volume Control Valve Closed Position Learning. Refer to EC-24, "EGR Volume Control Valve Closed Position Learning".

>> INSPECTION END

7. CHECK ELECTRICAL PARTS DAMAGE

Check the following for damage.
• Wiring harness and harness connectors for burn
• Fuses for short

OK or NG
OK >> INSPECTION END
NG >> Repair or replace malfunctioning part.
DTC P0606 ECM

Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.

On Board Diagnosis Logic

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-203, "Diagnosis Procedure".

Diagnosis Procedure

1. INSPECTION START

With CONSULT-III
1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT-III.
3. Touch "ERASE".
5. Is 1st trip DTC P0606 displayed again?

With GST
1. Turn ignition switch ON.
2. Select Service $04 with GST.
4. Is 1st trip DTC P0606 displayed again?

Yes or No
Yes >> GO TO 2.
No >> INSPECTION END

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EL-96, "ECM Re-communicating Function".
3. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".
5. Perform EGR Volume Control Valve Closed Position Learning Value Clear. Refer to EC-24, "EGR Volume Control Valve Closed Position Learning Value Clear".

6. Perform EGR Volume Control Valve Closed Position Learning. Refer to EC-24, "EGR Volume Control Valve Closed Position Learning".

>> INSPECTION END
DTC P0628, P0629 FUEL PUMP

Description

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUMP CURRENT</td>
<td>Idle</td>
<td>1,600 - 2,000 mA</td>
</tr>
<tr>
<td></td>
<td>2,000 rpm</td>
<td>1,500 - 1,900 mA</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0628</td>
<td>Fuel pump control circuit low input</td>
<td>ECM detects a control circuit for the fuel pump is open or short to ground.</td>
<td>• Harness or connectors (The fuel pump circuit is open or shorted.)</td>
</tr>
<tr>
<td>P0629</td>
<td>Fuel pump control circuit high input</td>
<td>ECM detects a control circuit for the fuel pump is short to power.</td>
<td>• Fuel pump</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE: If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and warm it up to normal operating temperature.
2. Let engine idle for at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-207, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.
Diagnosis Procedure

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   **Continuity should exist.**
5. Also check harness for short to ground and short to power.

   **OK or NG**
   - OK >> GO TO 3.
   - NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E237, M279
DTC P0628, P0629 FUEL PUMP

- Harness for open or short between fuel pump and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2. Refer to Wiring Diagram.
   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.

NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E237, M279
- Harness for open or short between fuel pump and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL PUMP

Refer to EC-208, "Component Inspection".

OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

6. REPLACE FUEL PUMP

1. Replace fuel pump.

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0 Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.
DTC P0628, P0629 FUEL PUMP

< SERVICE INFORMATION >

Removal and Installation

INFOID:0000000003759655

FUEL PUMP
Refer to EC-24.
**DTC P0642, P0643 SENSOR POWER SUPPLY**

**On Board Diagnosis Logic**

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0642 0642</td>
<td>Sensor power supply circuit low</td>
<td>ECM detects a voltage of power source for sensor is excessively low.</td>
<td>• Harness or connectors (The APP sensor 1 power supply circuit is shorted.) (Crankshaft position sensor circuit is shorted.) (EGR volume control valve control position sensor circuit is shorted.)</td>
</tr>
<tr>
<td>P0643 0643</td>
<td>Sensor power supply circuit high</td>
<td>ECM detects a voltage of power source for Sensor is excessively high.</td>
<td>• Accelerator pedal position sensor (Accelerator pedal position sensor 1) • Crankshaft position sensor • EGR volume control valve control position sensor</td>
</tr>
</tbody>
</table>

**DTC Confirmation Procedure**

**NOTE:**

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-212, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground.
DTC P0642, P0643 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

[YD25DDTI]

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>67 (B)</td>
<td>Sensor ground (Sensor shield circuit)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>82 (W) 84 (R)</td>
<td>Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor / EGR volume control valve control position sensor)</td>
<td>[Ignition switch ON]</td>
<td>Approximately 5 V</td>
</tr>
<tr>
<td>83 (B) 84 (R)</td>
<td>Accelerator pedal position sensor 1</td>
<td>[Ignition switch ON]</td>
<td>0.5 - 1.0 V</td>
</tr>
<tr>
<td></td>
<td>• Engine: Stopped</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Accelerator pedal: Fully released</td>
<td></td>
<td></td>
</tr>
<tr>
<td>84 (R)</td>
<td>Accelerator pedal position sensor 1 ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>90 (L) 92 (Y)</td>
<td>Accelerator pedal position sensor 2 power supply</td>
<td>[Ignition switch ON]</td>
<td>Approximately 5 V</td>
</tr>
<tr>
<td>91 (G) 92 (Y)</td>
<td>Accelerator pedal position sensor 2</td>
<td>[Ignition switch ON]</td>
<td>0.15 - 0.6 V</td>
</tr>
<tr>
<td></td>
<td>• Engine: Stopped</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Accelerator pedal: Fully released</td>
<td></td>
<td></td>
</tr>
<tr>
<td>92 (Y)</td>
<td>Accelerator pedal position sensor 2 ground</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-81, "Ground Inspection".
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.
3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

   Voltage: Approximately 5 V

   OK or NG
   OK >> GO TO 5.
   NG >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

<table>
<thead>
<tr>
<th>ECM terminal</th>
<th>Sensor terminal</th>
<th>Reference Wiring Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>82</td>
<td>APP sensor terminal 4</td>
<td>EC-211</td>
</tr>
<tr>
<td></td>
<td>Crankshaft position sensor terminal 3</td>
<td>EC-153</td>
</tr>
<tr>
<td></td>
<td>EGR volume control valve terminal 3</td>
<td>EC-186</td>
</tr>
</tbody>
</table>

   OK or NG
   OK >> GO TO 4.
   NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-156, "Component Inspection".

   OK or NG
   OK >> GO TO 5.
   NG >> Replace crankshaft position sensor.

5. CHECK APP SENSOR

Refer to EC-123, "Component Inspection".

   OK or NG
   OK >> GO TO 6.
   NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

   OK or NG
   OK >> GO TO 7.
   NG >> Repair or replace.

7. REPLACE EGR VOLUME CONTROL VALVE

   1. Replace the EGR volume control valve.
   2. Perform EC-24, "EGR Volume Control Valve Closed Position Learning Value Clear".
   3. Perform EC-24, "EGR Volume Control Valve Closed Position Learning".

   >> INSPECTION END
On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0652 0652</td>
<td>Sensor power supply circuit low</td>
<td>ECM detects a voltage of power source for sensor is excessively low.</td>
<td>• Harness or connectors</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(APP sensor 2 power supply circuit is shorted.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Camshaft position sensor circuit is shorted.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Fuel rail pressure sensor circuit is shorted.)</td>
</tr>
<tr>
<td>P0653 0653</td>
<td>Sensor power supply circuit high</td>
<td>ECM detects a voltage of power source for Sensor is excessively high.</td>
<td>• Accelerator pedal position sensor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Accelerator pedal position sensor 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Camshaft position sensor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Fuel rail pressure sensor</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-216, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground.
DTC P0652, P0653 SENSOR POWER SUPPLY

< SERVICE INFORMATION >

INFOID:0000000003759667

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 45 (W) 66 (B)</td>
<td>Camshaft position sensor power supply</td>
<td>[Ignition switch ON]</td>
<td>Approximately 5 V</td>
</tr>
<tr>
<td>+ 63 (R) 68 (B)</td>
<td>Fuel rail pressure sensor power supply</td>
<td>[Ignition switch ON]</td>
<td>Approximately 5 V</td>
</tr>
<tr>
<td>+ 67 (B)</td>
<td>Sensor ground (Sensor shield circuit)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>+ 82 (W) 84 (R)</td>
<td>Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor / EGR volume control valve control position sensor)</td>
<td>[Ignition switch ON]</td>
<td>Approximately 5 V</td>
</tr>
<tr>
<td>+ 83 (B) 84 (R)</td>
<td>Accelerator pedal position sensor 1</td>
<td>[Ignition switch ON] • Engine: Stopped • Accelerator pedal: Fully released</td>
<td>0.5 - 1.0 V</td>
</tr>
<tr>
<td>+ 84 (R)</td>
<td>Accelerator pedal position sensor 1 ground</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>+ 90 (L) 92 (Y)</td>
<td>Accelerator pedal position sensor 2 power supply</td>
<td>[Ignition switch ON]</td>
<td>Approximately 5 V</td>
</tr>
<tr>
<td>+ 91 (G) 92 (Y)</td>
<td>Accelerator pedal position sensor 2</td>
<td>[Ignition switch ON] • Engine: Stopped • Accelerator pedal: Fully released</td>
<td>0.15 - 0.6 V</td>
</tr>
<tr>
<td>+ 92 (Y)</td>
<td>Accelerator pedal position sensor 2 ground</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-81, "Ground Inspection".
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT
1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.

3. Check voltage between APP sensor terminal 6 and ground with CONSULT-III or tester.

**Voltage: Approximately 5 V**

| OK or NG | 
|----------|----------|
| OK       | >> GO TO 5. |
| NG       | >> GO TO 3. |

3. **CHECK SENSOR POWER SUPPLY CIRCUITS**

Check the following.
Harness for short to power and short to ground, between the following terminals.

<table>
<thead>
<tr>
<th>ECM terminal</th>
<th>Sensor terminal</th>
<th>Reference Wiring Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>APP sensor terminal 6</td>
<td>EC-215</td>
</tr>
<tr>
<td>45</td>
<td>Camshaft position sensor terminal 3</td>
<td>EC-164</td>
</tr>
<tr>
<td>63</td>
<td>Fuel rail pressure sensor terminal 1</td>
<td>EC-129</td>
</tr>
</tbody>
</table>

| OK or NG | 
|----------|----------|
| OK       | >> GO TO 4. |
| NG       | Repair short to ground or short to power in harness or connectors. |

4. **CHECK COMPONENTS**

Check the following.
• Camshaft position sensor (Refer to EC-166, "Component Inspection").
• Fuel rail pressure sensor (Refer to EC-131, "Component Inspection").

| OK or NG | 
|----------|----------|
| OK       | >> GO TO 5. |
| NG       | Replace malfunctioning component. |

5. **CHECK APP SENSOR**

Refer to EC-150, "Component Inspection".

| OK or NG | 
|----------|----------|
| OK       | >> GO TO 6. |
| NG       | Replace accelerator pedal assembly. |

6. **CHECK INTERMITTENT INCIDENT**

Refer to EC-70.

>> INSPECTION END
DTC P0668, P0669 ECM

Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0668 0668</td>
<td>ECM internal temperature sensor circuit low input</td>
<td>An excessively low voltage from the sensor is sent to ECM.</td>
<td>ECM</td>
</tr>
<tr>
<td>P0669 0669</td>
<td>ECM internal temperature sensor circuit high input</td>
<td>An excessively high voltage from the sensor is sent to ECM.</td>
<td></td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-218, "Diagnosis Procedure".

Diagnosis Procedure

1. INSPECTION START

With CONSULT-III
1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
5. Is 1st trip DTC P0668 or P0669 displayed again?

With GST
1. Turn ignition switch ON.
2. Select Service $04 with GST.
4. Is 1st trip DTC P0668 or P0669 displayed again?

Yes or No

Yes   >> GO TO 2.
No    >> INSPECTION END

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EL-96, "ECM Re-communicating Function".
3. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".

EC-218
5. Perform EGR Volume Control Valve Closed Position Learning Value Clear. Refer to EC-24, "EGR Volume Control Valve Closed Position Learning Value Clear".
6. Perform EGR Volume Control Valve Closed Position Learning. Refer to EC-24, "EGR Volume Control Valve Closed Position Learning".

>> INSPECTION END
DTC P0686 ECM RELAY

On Board Diagnosis Logic

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P0686 0686 | ECM relay circuit | ECM detects ECM relay is stuck closed even if ignition switch OFF. | * Harness or connectors  
(The ECM relay circuit is shorted.)  
* ECM relay |

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Turn ignition switch ON and then turn OFF.
2. Wait at least 30 seconds.
3. Turn ignition switch ON.
4. Check DTC.
5. If DTC is detected, go to EC-224, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground.
<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 105 (G) 114 (B)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch ON]  [Ignition switch OFF]  • For a few seconds after turning ignition switch OFF</td>
<td>0 - 1.0 V</td>
</tr>
<tr>
<td>+ 113 (G)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch OFF]  • More than a few seconds after turning ignition switch OFF</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td>- 113 (G)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch OFF]  • More than a few seconds after turning ignition switch OFF</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td>+ 114 (B)</td>
<td>Ignition switch</td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td>+ 107 (L) 108 (L)</td>
<td>Ignition switch</td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
<tr>
<td>+ 119 (R) 120 (OR)</td>
<td>Power supply for ECM</td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
</tbody>
</table>
Specification data are reference values and are measured between each terminal and ground.
DTC P0686 ECM RELAY

1. CHECK ECM RELAY INPUT SIGNAL CIRCUIT

1. Turn ignition switch ON and then OFF.
2. Check voltage between ECM harness connector terminals as follows.

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>105 (G)</td>
<td>ECM relay (self shut-off)</td>
<td>[Ignition switch ON]</td>
<td>0 - 1.0 V</td>
</tr>
<tr>
<td>114 (B)</td>
<td></td>
<td>[Ignition switch OFF]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- For a few seconds after turning</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>switch OFF</td>
<td></td>
</tr>
<tr>
<td>113 (G)</td>
<td></td>
<td>[Ignition switch OFF]</td>
<td>BATTERY VOLTAGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- More than a few seconds after</td>
<td>(11 - 14 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>turning  ignition switch OFF</td>
<td></td>
</tr>
<tr>
<td>107 (L)</td>
<td>Ignition switch</td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE</td>
</tr>
<tr>
<td>108 (L)</td>
<td></td>
<td>/Ignore voltage (11 - 14 V)</td>
<td></td>
</tr>
<tr>
<td>119 (R)</td>
<td>Power supply for ECM</td>
<td>[Ignition switch ON]</td>
<td>BATTERY VOLTAGE</td>
</tr>
<tr>
<td>120 (OR)</td>
<td></td>
<td>/Ignore voltage (11 - 14 V)</td>
<td></td>
</tr>
</tbody>
</table>

Diagnostic Procedure

1. CHECK ECM RELAY INPUT SIGNAL CIRCUIT

1. Turn ignition switch ON and then OFF.
2. Check voltage between ECM harness connector terminals as follows.

<table>
<thead>
<tr>
<th>Connector Terminal</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>M33 119</td>
<td></td>
</tr>
<tr>
<td>M32 1</td>
<td>1</td>
</tr>
<tr>
<td>M32 2</td>
<td>2</td>
</tr>
<tr>
<td>M32 3</td>
<td>3</td>
</tr>
<tr>
<td>M33 114</td>
<td></td>
</tr>
<tr>
<td>M33 120</td>
<td></td>
</tr>
<tr>
<td>M32 1</td>
<td>1</td>
</tr>
<tr>
<td>M32 2</td>
<td>2</td>
</tr>
<tr>
<td>M32 3</td>
<td>3</td>
</tr>
<tr>
<td>M33 114</td>
<td></td>
</tr>
</tbody>
</table>

OK or NG

OK >> GO TO 10.
NG >> GO TO 2.

2. CHECK ECM RELAY SIGNAL CIRCUIT FOR SHORT TO GROUND

Check the voltage between ECM relay harness connector and ground.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Ground</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>E55 2</td>
<td></td>
<td>Ground</td>
<td>Battery voltage</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART
DTC P0686 ECM RELAY

Check the following.
- 20A fuse (No.36)
- Harness for open or short between Battery and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ECM RELAY OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF, and wait at least 10 seconds.
2. Check voltage between ECM harness connector terminals as follows.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>M33</td>
<td>105</td>
</tr>
<tr>
<td>M32</td>
<td>2</td>
</tr>
<tr>
<td>M33</td>
<td>114</td>
</tr>
</tbody>
</table>

OK or NG

OK >> GO TO 7.
NG >> GO TO 5.

5. CHECK ECM RELAY OUTPUT SIGNAL CIRCUIT FOR SHORT TO GROUND

1. Disconnect ECM harness connector.
2. Disconnect ECM relay harness connector.
3. Check the continuity between ECM harness connector and ECM relay harness connector.

<table>
<thead>
<tr>
<th>ECM</th>
<th>ECM relay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
</tr>
<tr>
<td>M33</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>E55</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E102, M13
- Harness for open or short between ECM and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ECM RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ECM relay harness connector.
DTC P0686 ECM RELAY

2. Also check harness for short to ground and short to power.
   OK or NG
   OK  >> GO TO 9.
   NG  >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E91, M241 (LHD models)
- Harness connectors E102, M13 (RHD models)
- Harness for open or short between ECM and ECM relay

   >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ECM RELAY

Refer to EC-81

   OK  >> GO TO 10.
   NG  >> Replace ECM relay.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

OK or NG
   OK  >> Replace ECM relay.
   NG  >> Repair open circuit or short to ground or short to power in harness or connectors.

Component Inspection

ECM RELAY

1. Disconnect ECM relay.
2. Check continuity between ECM relay terminals under the following conditions.

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Conditions</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 and 5</td>
<td>12 V direct current supply between terminals 1 and 2</td>
<td>Existed</td>
</tr>
<tr>
<td></td>
<td>No current supply</td>
<td>Not existed</td>
</tr>
</tbody>
</table>

If NG, replace cooling fan relay.
DTC P1268 - P1271 FUEL INJECTOR

Component Description

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAIN INJ WID</td>
<td>• Engine: After warming up&lt;br&gt;• Shift lever: Neutral&lt;br&gt;• Idle speed</td>
<td>No load</td>
</tr>
<tr>
<td></td>
<td>Blower fan switch: ON</td>
<td>0.50 - 0.80 msec</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

These self-diagnoses have the one trip detection logic. The MI will not light up for these self-diagnoses.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1268 1268</td>
<td>No. 1 cylinder fuel injector</td>
<td>The valve built into No. 1 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.</td>
<td>• Harness or connectors (The fuel pump circuit is open or shorted.)&lt;br&gt;• Fuel injector&lt;br&gt;• Injector adjustment value</td>
</tr>
<tr>
<td>P1269 1269</td>
<td>No. 2 cylinder fuel injector</td>
<td>The valve built into No. 2 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.</td>
<td></td>
</tr>
<tr>
<td>P1270 1270</td>
<td>No. 3 cylinder fuel injector</td>
<td>The valve built into No. 3 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.</td>
<td></td>
</tr>
<tr>
<td>P1271 1271</td>
<td>No. 4 cylinder fuel injector</td>
<td>The valve built into No. 4 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.</td>
<td></td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

**CAUTION:**
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. With CONSULT-III
   1. Start engine and let it idle for about 15 minutes.
   2. Check DTC.
   3. If DTC is detected, go to EC-231, "Diagnosis Procedure". If DTC is not detected, go to next step.
   4. Drive vehicle and maintain the following conditions for at least 60 seconds.
DTC P1268 - P1271 FUEL INJECTOR

5. Check DTC.
6. If DTC is detected, go to EC-231, "Diagnosis Procedure".

WITH GST
Follow the procedure "WITH CONSULT-III" above.
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.
<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>−</td>
<td>Signal name</td>
<td></td>
</tr>
<tr>
<td>4 (L)</td>
<td>Fuel injector power supply (For cylinder No. 1 and 3)</td>
<td>[Engine is running] • Warm-up condition • Idle speed</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOTE:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The pulse cycle changes depending on rpm at idle</td>
<td></td>
</tr>
<tr>
<td>5 (P)</td>
<td>Fuel injector power supply (For cylinder No. 2 and 4)</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>21 (Y)</td>
<td>Fuel injector No. 4</td>
<td>[Engine is running] • Warm-up condition • Idle speed</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOTE:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The pulse cycle changes depending on rpm at idle</td>
<td></td>
</tr>
<tr>
<td>22 (R)</td>
<td>Fuel injector No. 4</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>23 (W)</td>
<td>Fuel injector No. 2</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>24 (OR)</td>
<td>Fuel injector No. 2</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>40 (G)</td>
<td>Fuel injector No. 3</td>
<td>[Engine is running] • Warm-up condition • Idle speed</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOTE:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The pulse cycle changes depending on rpm at idle</td>
<td></td>
</tr>
<tr>
<td>41 (BR)</td>
<td>Fuel injector No. 3</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>42 (PU)</td>
<td>Fuel injector No. 1</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>43 (SB)</td>
<td>Fuel injector No. 1</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 8.0 V ★</td>
</tr>
</tbody>
</table>

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
Diagnosis Procedure

1. CHECK INJECTOR ADJUSTMENT VALUE

1. Turn ignition switch ON.
2. Select “ENTER INJECTR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-III.
3. Check injector adjustment values displayed on CONSULT-III screen.

   The value displayed on CONSULT-III screen should be same as injector adjustment value printed on each fuel injector.

OK or NG

OK >> GO TO 2.
NG >> Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".

2. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel injector (1) harness connector.

   
   : Vehicle front

3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG
DTC P1268 - P1271 FUEL INJECTOR

< SERVICE INFORMATION >

4. CHECK FUEL INJECTOR-I

Refer to EC-232, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

5. CHECK FUEL INJECTOR-II

With CONSULT-III
1. Remove two fuel injectors.
   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".
6. Select “SELF DIAG RESULTS” mode with CONSULT-III.
7. Touch “ERASE”.
8. Perform EC-227, "DTC Confirmation Procedure".
9. Is DTC displayed for the other cylinder?

With GST
1. Remove two fuel injectors.
   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".
6. Select Service $04 with GST.
7. Perform EC-227, "DTC Confirmation Procedure".
8. Is DTC displayed for the other cylinder?

Yes or No

Yes >> GO TO 6.
No >> GO TO 7.

6. REPLACE FUEL INJECTOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

**Resistance: 0.2 - 0.8 Ω [at 10 - 60°C (50 - 140°F)]**

3. If NG, replace fuel injector.

Removal and Installation

FUEL INJECTOR

Refer to EM-8.
DTC P1272 FUEL PUMP

Description

When the fuel pressure in fuel rail increases to excessively high, fuel pressure relief valve (1) opens to carry excess fuel to the return hose.

• Fuel rail pressure sensor (2)

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUMP CURRENT</td>
<td>• Engine: After warming up</td>
<td>Idle</td>
</tr>
<tr>
<td></td>
<td>• Air conditioner switch: OFF</td>
<td>1,600 - 2,000 mA</td>
</tr>
<tr>
<td></td>
<td>• Shift lever: Neutral</td>
<td>2,000 rpm</td>
</tr>
<tr>
<td></td>
<td>• No load</td>
<td>1,500 - 1,900 mA</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

NOTE:
If DTC P1272 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-214.

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds, then release the accelerator pedal.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-236, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.
**DTC P1272 FUEL PUMP**

**[YD25DDTI]**

### TERMINAL NO. (Wire color) | Description          | Condition                           | Value (Approx.)
---|------------------------|--------------------------------------|-----------------|
+ | −                      | Signal name                          |                 |
| 10 (G) 114 (B)          | Fuel pump                            | **[Engine is running]**              | Approximately 5.8 V ★ |
|                           |                                       | **[Engine is running]**              | ![Waveform Image](MBIB0885E) |
|                           |                                       | **[Engine is running]**              | ![Waveform Image](MBIB0886E) |
| 29 (B) 114 (B)           | Fuel pump                            | **[Engine is running]**              | Approximately 0.3 V ★   |
|                           |                                       | **[Engine is running]**              | ![Waveform Image](MBIB0887E) |
|                           |                                       | **[Engine is running]**              | ![Waveform Image](MBIB0888E) |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

**Diagnosis Procedure**

1. **PERFORM FUEL PUMP LEARNING VALUE CLEARING**

**NOTE:**
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

**With CONSULT-III**
1. Turn ignition switch ON.
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-III.
5. Touch “ERASE”.
7. Is 1st trip DTC detected again?

**With GST**
1. Turn ignition switch ON.
3. Start engine and let it idle for at least 60 seconds.
4. Select Service $04 with GST.
5. Perform **EC-234, "DTC Confirmation Procedure"**, again.
DTC P1272 FUEL PUMP

< SERVICE INFORMATION >

[Service Information]

<table>
<thead>
<tr>
<th>6. Is 1st trip DTC detected again?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes or No</td>
</tr>
<tr>
<td>Yes &gt;&gt; GO TO 2.</td>
</tr>
<tr>
<td>No &gt;&gt; INSPECTION END</td>
</tr>
</tbody>
</table>

2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   **Continuity should exist.**

4. Also check harness for short to ground and short to power.

   **OK or NG**
   - OK >> GO TO 4.
   - NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E237, M279
- Harness for open or short between fuel pump temperature sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   **Continuity should exist.**

2. Also check harness for short to ground and short to power.

   **OK or NG**
   - OK >> GO TO 6.
   - NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E237, M279
- Harness for open or short between fuel pump temperature sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL PUMP

Refer to EC-238, "Component Inspection".

   **OK or NG**
   - OK >> GO TO 8.
   - NG >> GO TO 7.

7. REPLACE FUEL PUMP

1. Replace fuel pump.

   >> INSPECTION END
DTC P1272 FUEL PUMP

< SERVICE INFORMATION >

8. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-131, "Component Inspection".

OK or NG

OK  >> GO TO 9.
NG  >> Replace fuel rail.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

   Resistance: 1.5 - 3.0 Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.

Removal and Installation

FUEL RAIL

Refer to EM-8.

FUEL PUMP

Refer to EC-24.
DTC P1273 FUEL PUMP

Description

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel pump increases, the fuel raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUMP CURRENT</td>
<td>Idle</td>
<td>1,600 - 2,000 mA</td>
</tr>
<tr>
<td></td>
<td>2,000 rpm</td>
<td>1,500 - 1,900 mA</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

NOTE:
- If DTC P1273 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-214.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P1273 1273 | Fuel pump insufficient flow | ECM detects the abnormal pulse of fuel pressure. | • Harness or connectors  
(The fuel pump circuit is open or shorted.)  
• Fuel pump  
• Injector adjustment value  
• Air mixed with fuel  
• Lack of fuel |

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Start engine and warm it up to normal operating temperature.
2. Keep engine speed more than 2,000 rpm for at least 10 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-241, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.
### Diagnosis Procedure

1. **CHECK INJECTOR ADJUSTMENT VALUE**

1. Turn ignition switch ON.
2. Select “ENTER INJCTR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-III.
3. Check injector adjustment values displayed on CONSULT-III screen.

   The value displayed on CONSULT-III screen should be same as injector adjustment value printed on each fuel injector.

**OK or NG**

- **OK** >> GO TO 2.
- **NG** >> Perform Injector Adjustment Value Registration. Refer to **EC-22, "Injector Adjustment Value Registration"**.

2. **PERFORM FUEL PUMP LEARNING VALUE CLEARING**

**NOTE:**

If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

---

### Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 10 (G) 114 (B)</td>
<td>Fuel pump</td>
<td>[Engine is running]</td>
<td>Approximately 5.8 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Idle speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Engine is running]</td>
<td>Approximately 5.5 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Engine speed: 2,000 rpm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Engine is running]</td>
<td>Approximately 0.3 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Idle speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[Engine is running]</td>
<td>Approximately 0.3 V ★</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Warm-up condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Engine speed: 2,000 rpm</td>
<td></td>
</tr>
</tbody>
</table>

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
With CONSULT-III
1. Turn ignition switch ON.
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-III.
5. Touch “ERASE”.
7. Is 1st trip DTC detected again?

With GST
1. Turn ignition switch ON.
3. Start engine and let it idle for at least 60 seconds.
4. Select Service $04 with GST.
6. Is 1st trip DTC detected again?

Yes or No
Yes >> GO TO 3.
No >> INSPECTION END

3. CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG
OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E237, M279
- Harness for open or short between fuel pump temperature sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG
OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E237, M279
- Harness for open or short between fuel pump temperature sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.
7. CHECK FUEL PUMP

Refer to EC-243, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. REPLACE FUEL PUMP

1. Replace fuel pump.

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

   Resistance: 1.5 - 3.0 Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.

Removal and Installation

FUEL PUMP

Refer to EC-24.
< SERVICE INFORMATION >

DTC P1274 FUEL PUMP

Description
INFOID:0000000003759709
To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-III Reference Value in Data Monitor Mode
INFOID:0000000003759710
Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUMP CURRENT</td>
<td>Idle</td>
<td>1,600 - 2,000 mA</td>
</tr>
<tr>
<td></td>
<td>2,000 rpm</td>
<td>1,500 - 1,900 mA</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic
INFOID:0000000003759711
This self-diagnosis has the one trip detection logic.
NOTE:
If DTC P1274 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-214.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P1274 1274 | Fuel pump protection  | Fuel pressure is too much higher than the target value. | • Harness or connectors  
(The fuel pump circuit is open or shorted.)  
• Fuel pump  
• Fuel rail pressure sensor |

DTC Confirmation Procedure
INFOID:0000000003759712
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Tuning ignition switch ON.
2. Start engine and let idle for at least 5 seconds.
3. Check DTC.
4. If DTC is detected, go to EC-246, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.
DTC P1274 FUEL PUMP

< SERVICE INFORMATION >

[YD25DDTi]

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
</table>
| + 10 (G) 114 (B)         | Fuel pump   | [Engine is running]  
  • Warm-up condition  
  • Idle speed        | Approximately 5.8 V ★ | MBIB0865E |
| - 10 (G) 114 (B)         | Fuel pump   | [Engine is running]  
  • Warm-up condition  
  • Engine speed: 2,000 rpm | Approximately 5.5 V ★ | MBIB0866E |
| + 29 (B) 114 (B)         | Fuel pump   | [Engine is running]  
  • Warm-up condition  
  • Idle speed        | Approximately 0.3 V ★ | MBIB0867E |
| - 29 (B) 114 (B)         | Fuel pump   | [Engine is running]  
  • Warm-up condition  
  • Engine speed: 2,000 rpm | Approximately 0.3 V ★ | MBIB0868E |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   **Continuity should exist.**

4. Also check harness for short to ground and short to power.
   OK or NG
   OK   >> GO TO 3.
   NG   >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.
DTC P1274 FUEL PUMP

[YE25DDTi]

- Harness connectors E237, M279
- Harness for open or short between fuel pump temperature sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.
   **Continuity should exist.**

2. Also check harness for short to ground and short to power.
   OK or NG
   OK >> GO TO 5.
   NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E237, M279
- Harness for open or short between fuel pump temperature sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-131, "Component Inspection".

OK or NG
OK >> GO TO 6.
NG >> Replace fuel rail.

6. CHECK FUEL PUMP

Refer to EC-247, "Component Inspection".

OK or NG
OK >> GO TO 8.
NG >> GO TO 7.

7. REPLACE FUEL PUMP

1. Replace fuel pump.

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

   **Resistance: 1.5 - 3.0 Ω [at 10 - 60°C (50 - 140°F)]**

3. If NG, replace fuel pump.

**Removal and Installation**

**FUEL PUMP**

Refer to **EC-24**.
Description

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to fuel pump to raise the injection pressure.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUMP CURRENT</td>
<td>Idle</td>
<td>1,600 - 2,000 mA</td>
</tr>
<tr>
<td></td>
<td>2,000 rpm</td>
<td>1,500 - 1,900 mA</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

This self-diagnosis has the one trip detection logic.

NOTE:
If DTC P1275 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-214.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1275</td>
<td>Fuel pump exchange</td>
<td>Fuel pressure is too much higher than the target value.</td>
<td>• Harness or connectors (The fuel pump circuit is open or shorted.)</td>
</tr>
<tr>
<td>1275</td>
<td></td>
<td></td>
<td>• Fuel pump</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Fuel rail pressure sensor</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and warm it up to normal operating temperature.
2. Keep engine speed more than 2,000 rpm for at least 60 seconds.
3. Check DTC.
4. If DTC is detected, go to EC-251, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.
< SERVICE INFORMATION >

**DTC P1275 FUEL PUMP**

**[YD25DDTi]**

### Diagnosis Procedure

1. **CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**
   1. Turn ignition switch OFF.
   2. Disconnect ECM harness connector and fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
   3. Check harness continuity between ECM terminal 10 and fuel pump terminal 1.
      Refer to Wiring Diagram.
      ![Wiring Diagram](MBB1751E)
      **Continuity should exist.**
   4. Also check harness for short to ground and short to power.
      OK or NG
      - OK >> GO TO 3.
      - NG >> GO TO 2.

2. **DETECT MALFUNCTIONING PART**
   Check the following.

---

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
</table>
| + G 114 (G)              | Fuel pump   | [Engine is running]  
  - Warm-up condition  
  - Idle speed          | Approximately 5.8 V ★ |
| + B 114 (B)              | Fuel pump   | [Engine is running]  
  - Warm-up condition  
  - Engine speed: 2,000 rpm | Approximately 5.5 V ★ |
| + B 114 (B)              | Fuel pump   | [Engine is running]  
  - Warm-up condition  
  - Idle speed          | Approximately 0.3 V ★ |
| + B 114 (B)              | Fuel pump   | [Engine is running]  
  - Warm-up condition  
  - Engine speed: 2,000 rpm | Approximately 0.3 V ★ |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
DTC P1275 FUEL PUMP

1. Harness connectors E237, M279
2. Harness for open or short between fuel pump temperature sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT
1. Check harness continuity between ECM terminal 29 and fuel pump terminal 2.
   Refer to Wiring Diagram.
   **Continuity should exist.**
2. Also check harness for short to ground and short to power.
   OK or NG
   OK >> GO TO 5.
   NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART
   Check the following.
   • Harness connectors E237, M279
   • Harness for open or short between fuel pump temperature sensor and ECM

   >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL RAIL PRESSURE SENSOR
   Refer to EC-131, "Component Inspection".
   OK or NG
   OK >> GO TO 6.
   NG >> Replace fuel rail.

6. CHECK FUEL PUMP
   Refer to EC-252, "Component Inspection".
   OK or NG
   OK >> GO TO 8.
   NG >> GO TO 7.

7. REPLACE FUEL PUMP
1. Replace fuel pump.

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT
   Refer to EC-70.

>> INSPECTION END

Component Inspection

FUEL PUMP
1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

   **Resistance:** 1.5 - 3.0 Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.

**Removal and Installation**

**FUEL PUMP**

Refer to [EC-24](#).
DTC P1622 INJECTOR ADJUSTMENT VALUE

Description

Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector. The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control. A performance of emission control and a drivability may effect when there is a mismatch between the following two values.
- The injector adjustment value stored in ECM
- The injector adjustment value of the fuel injector which is installed on the vehicle

Example: Injector adjustment value = D121ABCD1A0612340000000000000000E6

On Board Diagnosis Logic

This self-diagnosis has the one trip detection logic. The MI will not light up for this self-diagnosis.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1622 1622</td>
<td>Injector adjustment value data uninput</td>
<td>Injector adjustment value is not stored in ECM.</td>
<td>• Injector adjustment value (Injector adjustment value has not been written onto ECM memory yet, or the value has been initialized.)</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check DTC.
4. If DTC is detected, go to EC-254, "Diagnosis Procedure".

Diagnosis Procedure

1. PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".

>> INSPECTION END
DTC P1623 INJECTOR ADJUSTMENT VALUE

< SERVICE INFORMATION >

DTC P1623 INJECTOR ADJUSTMENT VALUE

Description

Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector. The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control. A performance of emission control and a drivability may effect when there is a mismatch between the following two values:

- The injector adjustment value stored in ECM
- The injector adjustment value of the fuel injector which is installed on the vehicle

On Board Diagnosis Logic

This self-diagnosis has the one trip detection logic. The MI will not light up for this self-diagnosis.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1623</td>
<td>Injector adjustment value data error</td>
<td>ECM detects the abnormal value of injector adjustment value.</td>
<td>• CONSULT-III communication status (The status of CONSULT-III communication becomes improper during Injector Adjustment Value Registration.)</td>
</tr>
<tr>
<td>1623</td>
<td></td>
<td></td>
<td>• ECM</td>
</tr>
</tbody>
</table>

NOTE:
This DTC is not detected when injector adjustment value (not correct but existent) is stored in ECM.

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check DTC.
4. If DTC is detected, go to EC-255, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK INJECTOR ADJUSTMENT VALUE

1. Turn ignition switch ON.
2. Select “ENTER INJCTR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-III.
3. Check injector adjustment values displayed on CONSULT-III screen.

The value displayed on CONSULT-III screen should be same as injector adjustment value printed on each fuel injector.
DTC P1623 INJECTOR ADJUSTMENT VALUE

< SERVICE INFORMATION >

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".

NOTE:
When two or more injector adjustment values are improper, it is useful to perform "INJ ADJ VAL CLR" in "WORK SUPPORT" mode with CONSULT-III. And then perform Injector Adjustment Value Registration.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III
1. Select “SELF DIAG RESULTS” mode with CONSULT-III.
2. Touch “ERASE”.
4. Is DTC P1623 displayed again?

With GST
1. Select Service $04 with GST.
3. Is DTC P1623 displayed again?

Yes or No

Yes >> GO TO 4.
No >> INSPECTION END

4. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EL-96, "ECM Re-communicating Function".
3. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".
5. Perform EGR Volume Control Valve Closed Position Learning Value Clear. Refer to EC-24, "EGR Volume Control Valve Closed Position Learning Value Clear".
6. Perform EGR Volume Control Valve Closed Position Learning. Refer to EC-24, "EGR Volume Control Valve Closed Position Learning".

>> INSPECTION END
DTC P2135 APP SENSOR

Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCEL POS SEN*</td>
<td>Ignition switch: ON</td>
<td>Accelerator pedal: Fully released 0.5 - 1.0 V</td>
</tr>
<tr>
<td></td>
<td>(Engine stopped)</td>
<td>Accelerator pedal: Fully depressed 4.0 - 4.8 V</td>
</tr>
<tr>
<td>ACCEL SEN 2*</td>
<td>Ignition switch: ON</td>
<td>Accelerator pedal: Fully released 0.3 - 1.2 V</td>
</tr>
<tr>
<td></td>
<td>(Engine stopped)</td>
<td>Accelerator pedal: Fully depressed 3.7 - 4.8 V</td>
</tr>
</tbody>
</table>

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

This self-diagnosis has the one trip detection logic. The MI will not light up for this self-diagnosis.

NOTE:
- If DTC P2135 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-210.
- If DTC P2135 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-214.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2135</td>
<td>Accelerator pedal position</td>
<td>The correlation between APP sensor 1 signal and APP sensor 2 signal is out of the</td>
<td>Harness or connectors (The APP sensor circuit is open or shorted.)</td>
</tr>
<tr>
<td>2135</td>
<td>sensor 1, 2 signal correlation</td>
<td>normal range.</td>
<td>Accelerator pedal position sensor (APP sensor 1 and 2).</td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Depress accelerator pedal slowly spending 5 seconds, and then release it slowly spending 5 seconds.
4. Check DTC.
5. If DTC is detected, go to EC-259, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground.
DTC P2135 APP SENSOR

TERMINAL NO. (Wire color) | Description | Condition | Value (Approx.)
--- | --- | --- | ---
+ - | Signal name | | |
67 (B) — | Sensor ground (Sensor shield circuit) | | |
82 (W) 84 (R) | Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor / EGR volume control valve control position sensor) | [Ignition switch ON] | Approximately 5 V
83 (B) 84 (R) | Accelerator pedal position sensor 1 | | |
84 (R) — | Accelerator pedal position sensor 1 ground | | |
90 (L) 92 (Y) | Accelerator pedal position sensor 2 power supply | [Ignition switch ON] | Approximately 5 V
91 (G) 92 (Y) | Accelerator pedal position sensor 2 | [Ignition switch ON] | 0.15 - 0.6 V
92 (Y) — | Accelerator pedal position sensor 2 ground | | |

☆: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-81, "Ground Inspection".
   - Body ground M97 (1)
   - Body ground M99 (2)
   - ECM (3)

OK or NG
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK APP SENSOR POWER SUPPLY CIRCUIT
DTC P2135 APP SENSOR

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.

3. Check voltage between APP sensor terminals 4, 6 and ground with CONSULT-III or tester.
   **Voltage: Approximately 5 V**
   - **OK or NG**
   - OK >> GO TO 3.
   - NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
   1. Turn ignition switch OFF.
   2. Disconnect ECM harness connector.
   3. Check harness continuity between APP sensor terminals 1 and ECM terminal 84, APP sensor terminal 3 and ECM terminal 92. Refer to Wiring Diagram.
      **Continuity should exist.**
   4. Also check harness for short to ground and short to power.
      - **OK or NG**
      - OK >> GO TO 4.
      - NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
   1. Check harness continuity between ECM terminal 83 and APP sensor terminal 5, ECM terminal 91 and APP sensor terminal 2. Refer to Wiring Diagram.
      **Continuity should exist.**
   2. Also check harness for short to ground and short to power.
      - **OK or NG**
      - OK >> GO TO 5.
      - NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR
   Refer to EC-261, "Component Inspection".
   - **OK or NG**
     - OK >> GO TO 6.
     - NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT
   Refer to EC-70.
Component Inspection

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM harness connector terminal as follows.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Condition</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>M33</td>
<td>83</td>
<td>Accelerator pedal</td>
<td>Fully released</td>
</tr>
<tr>
<td></td>
<td>(APP sensor 1 signal)</td>
<td></td>
<td>Fully depressed</td>
</tr>
<tr>
<td></td>
<td>84</td>
<td>(Sensor ground)</td>
<td></td>
</tr>
<tr>
<td>M33</td>
<td>91</td>
<td>Accelerator pedal</td>
<td>Fully released</td>
</tr>
<tr>
<td></td>
<td>(APP sensor 2 signal)</td>
<td></td>
<td>Fully depressed</td>
</tr>
<tr>
<td></td>
<td>92</td>
<td>(Sensor ground)</td>
<td></td>
</tr>
</tbody>
</table>

4. If NG, replace accelerator pedal assembly.

Removal and Installation

ACCELERATOR PEDAL
Refer to “ACCELERATOR CONTROL SYSTEM” in FE section
Component Description

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAIN INJ WID</td>
<td>• Engine: After warming up</td>
<td>No load</td>
</tr>
<tr>
<td></td>
<td>• Shift lever: Neutral position</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Idle speed</td>
<td>Blower fan switch: ON</td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2146 2146</td>
<td>No. 1 and 4 cylinder fuel injector power supply circuit open</td>
<td>An improper voltage signal is sent to ECM through No. 1 and 3 cylinder fuel injector.</td>
<td>• Harness or connectors (The fuel injector circuit is open.)</td>
</tr>
<tr>
<td>P2149 2149</td>
<td>No. 2 and 3 cylinder fuel injector power supply circuit open</td>
<td>An improper voltage signal is sent to ECM through No. 2 and 4 cylinder fuel injector.</td>
<td></td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION
Before performing the following procedure, confirm the ambient temperature is more than -20°C (-4°F).

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-265, "Diagnosis Procedure".

EC-262
DTC P2146, P2149 FUEL INJECTOR POWER SUPPLY

< SERVICE INFORMATION >

Wiring Diagram

EC-INJ/PW-01

- Detectable line for DTC
- Non-detectable line for DTC

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.
<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ L 114 (B)</td>
<td>Fuel injector power supply (For cylinder No. 1 and 3)</td>
<td>[Engine is running] • Warm-up condition • Idle speed</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td>+ P 114 (B)</td>
<td>Fuel injector power supply (For cylinder No. 2 and 4)</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>Y 21 114 (B)</td>
<td>Fuel injector No. 4</td>
<td>[Engine is running] • Warm-up condition • Idle speed</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td>R 22 114 (B)</td>
<td>Fuel injector No. 4</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>W 23 24 (OR)</td>
<td>Fuel injector No. 2</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td>G 40 114 (B)</td>
<td>Fuel injector No. 3</td>
<td>[Engine is running] • Warm-up condition • Idle speed</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>BR 41 114 (B)</td>
<td>Fuel injector No. 3</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td>PU 42 (SB)</td>
<td>Fuel injector No. 1</td>
<td>[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm</td>
<td>Approximately 8.0 V ★</td>
</tr>
</tbody>
</table>

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
DTC P2146, P2149 FUEL INJECTOR POWER SUPPLY

< SERVICE INFORMATION >

Diagnosis Procedure

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.
   Refer to Wiring Diagram.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECM</td>
<td>Fuel injector</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

Continuity should exist.

OK or NG

OK  >> GO TO 2.
NG  >> Repair open circuit in harness or connectors.

2. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END
Component Description

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAIN INJ WID</td>
<td>• Engine: After warming up</td>
<td>No load 0.50 - 0.70 msec</td>
</tr>
<tr>
<td></td>
<td>• Shift lever: Neutral</td>
<td>Blower fan switch: ON 0.50 - 0.80 msec</td>
</tr>
<tr>
<td></td>
<td>• Idle speed</td>
<td></td>
</tr>
</tbody>
</table>

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2147</td>
<td>Fuel injector circuit low input</td>
<td>ECM detects the fuel injector circuit is shorted to ground.</td>
<td>• Harness or connectors (The fuel injector circuit is shorted.)</td>
</tr>
<tr>
<td>2147</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P2148</td>
<td>Fuel injector circuit high input</td>
<td>ECM detects the fuel injector circuit is shorted to power.</td>
<td></td>
</tr>
<tr>
<td>2148</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-269, "Diagnosis Procedure".
Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.
### DTC P2147, P2148 FUEL INJECTOR CIRCUIT

#### [YD25DDTi]

<table>
<thead>
<tr>
<th>TERMINAL NO. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Signal name</td>
<td>[Engine is running]</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td>−</td>
<td></td>
<td>[Engine is running]</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>4 (L)</td>
<td>Fuel injector power supply (For cylinder No. 1 and 3)</td>
<td>[Engine is running]</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td>114 (B)</td>
<td></td>
<td>[Engine is running]</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>5 (P)</td>
<td>Fuel injector power supply (For cylinder No. 2 and 4)</td>
<td>[Engine is running]</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td>21 (Y)</td>
<td>Fuel injector No. 4</td>
<td>[Engine is running]</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td>22 (R)</td>
<td>Fuel injector No. 4</td>
<td>[Engine is running]</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>23 (W)</td>
<td>Fuel injector No. 2</td>
<td>[Engine is running]</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>24 (OR)</td>
<td>Fuel injector No. 2</td>
<td>[Engine is running]</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td>40 (G)</td>
<td>Fuel injector No. 3</td>
<td>[Engine is running]</td>
<td>Approximately 7.5 V ★</td>
</tr>
<tr>
<td>41 (BR)</td>
<td>Fuel injector No. 3</td>
<td>[Engine is running]</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>42 (PU)</td>
<td>Fuel injector No. 1</td>
<td>[Engine is running]</td>
<td>Approximately 8.0 V ★</td>
</tr>
<tr>
<td>43 (SB)</td>
<td>Fuel injector No. 1</td>
<td>[Engine is running]</td>
<td>Approximately 8.0 V ★</td>
</tr>
</tbody>
</table>

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect fuel injector (1) harness connector.

- Vehicle front

2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

4. Also check harness for short to ground and short to power.

OK or NG
OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL INJECTOR

Refer to EC-270, "Removal and Installation".

OK or NG
OK >> GO TO 4.
NG >> GO TO 3.

3. REPLACE FUEL INJECTOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".

>> INSPECTION END

4. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END
FUEL INJECTOR
1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

   Resistance: 0.2 - 0.8 Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel injector.

Removal and Installation

FUEL INJECTOR
Refer to EM-8.
DTC P2228, P2229 BARO SENSOR

Description

The barometric pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.

On Board Diagnosis Logic

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Trouble diagnosis name</th>
<th>DTC detecting condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2228</td>
<td>Barometric pressure sensor circuit low input</td>
<td>An excessively low voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.</td>
<td>ECM</td>
</tr>
<tr>
<td>P2229</td>
<td>Barometric pressure sensor circuit high input</td>
<td>An excessively high voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.</td>
<td></td>
</tr>
</tbody>
</table>

DTC Confirmation Procedure

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-271, "Diagnosis Procedure".

Diagnosis Procedure

1. **INSPECTION START**

   **With CONSULT-III**
   1. Turn ignition switch ON.
   2. Select “SELF DIAG RESULTS” mode with CONSULT-III.
   3. Touch “ERASE”.
   5. Is 1st trip DTC P2228 or P2229 displayed again?

   **With GST**
   1. Turn ignition switch ON.
   2. Select Service $04 with GST.
   4. Is 1st trip DTC P2228 or P2229 displayed again?

   Yes or No
   - Yes >> GO TO 2.
   - No >> **INSPECTION END**

2. **REPLACE ECM**
   1. Replace ECM.
   2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to EL-96, "ECM Re-communicating Function".
   3. Perform Injector Adjustment Value Registration. Refer to EC-22, "Injector Adjustment Value Registration".
DTC P2228, P2229 BARO SENSOR

5. Perform EGR Volume Control Valve Closed Position Learning Value Clear. Refer to EC-24, "EGR Volume Control Valve Closed Position Learning Value Clear".
6. Perform EGR Volume Control Valve Closed Position Learning. Refer to EC-24, "EGR Volume Control Valve Closed Position Learning".

>> INSPECTION END
GLOW CONTROL SYSTEM

Description

SYSTEM DESCRIPTION

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Input Signal to ECM</th>
<th>ECM Function</th>
<th>Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crankshaft position sensor</td>
<td>Engine speed</td>
<td>Glow control</td>
<td>Glow lamp</td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Engine coolant temperature</td>
<td></td>
<td>Glow relay</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Glow plugs</td>
</tr>
</tbody>
</table>

When engine coolant temperature is more than approximately 80°C (176°F), the glow relay turns off.
When coolant temperature is lower than approximately 80°C (176°F):
• Ignition switch ON
  After ignition switch has turned to ON, the glow relay turns ON for a certain period of time in relation to engine coolant temperature, allowing current to flow through glow plug.
• Cranking
  The glow relay turns ON, allowing current to flow through glow plug.
• Starting
  After engine has started, current continues to flow through glow plug (after-glow mode) for a certain period in relation to engine coolant temperature.
The glow indicator lamp turns ON for a certain period of time in relation to engine coolant temperature at the time glow relay is turned ON.

COMPONENT DESCRIPTION

Glow Plug
The glow plug is provided with a ceramic heating element to obtain a high-temperature resistance. It glows in response to a signal sent from the ECM, allowing current to flow through the glow plug via the glow relay.
GLOW CONTROL SYSTEM

Wiring Diagram

EC-GLOW-01

Diagram Procedure

1. INSPECTION START

Check fuel level, fuel supplying system, starter motor, etc.

OK or NG
2. CHECK INSTALLATION

Check that glow plug nut (1) and all glow plug connecting plate (2) nuts are installed properly.

\[ \text{Vehicle front} \]

OK or NG
OK >> GO TO 3.
NG >> Install properly.

3. CHECK GLOW INDICATOR LAMP OPERATION

\[ \text{With CONSULT-III} \]
1. Turn ignition switch ON.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
3. Confirm that “COOLAN TEMP/S” indicates below 80°C (176°F). If it indicates above 80°C (176°F), cool down engine.
4. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
5. Make sure that glow indicator lamp is turned ON for 1.5 seconds or more after turning ignition switch ON, and then glow indicator lamp turned OFF.

\[ \text{Without CONSULT-III} \]
1. Check voltage between ECM harness connector terminals as follows.

<table>
<thead>
<tr>
<th>ECM</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>M32</td>
<td>51</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>(Engine coolant temperature sensor)</td>
<td>(Sensor ground)</td>
</tr>
</tbody>
</table>

2. Confirm that the voltage indicates above 1.23 V. If it indicates below 1.23 V, cool down engine.
3. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
4. Make sure that glow indicator lamp is turned ON for 1.5 seconds or more after turning ignition switch ON, and then glow indicator lamp turned OFF.

OK or NG
OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK GLOW CONTROL SYSTEM OVERALL FUNCTION

\[ \text{With CONSULT-III} \]
1. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
2. Confirm that “COOLAN TEMP/S” indicates approximately 25°C (77°F). If NG, cool down engine.
3. Turn ignition switch OFF.
4. Set voltmeter probe between glow plug and engine body.
5. Turn ignition switch ON.
6. Check the voltage between glow plug and engine body under the following conditions.

**Without CONSULT-III**
1. Check voltage between ECM harness connector terminals as follows.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>For 20 seconds after turning switch ON</td>
<td>Battery voltage</td>
</tr>
<tr>
<td>More than 20 seconds after turning switch ON</td>
<td>Approx. 0 V</td>
</tr>
</tbody>
</table>

2. Confirm that the voltage indicates approximately 3.59 V. If NG, cool down engine.
3. Turn ignition switch OFF.
4. Set voltmeter probe between glow plug and engine body.
5. Turn ignition switch ON.

6. Check the voltage between glow plug and engine body under the following conditions.

**OK or NG**

OK  >> **INSPECTION END**
NG   >> GO TO 7.

**5. CHECK DTC**

Check that DTC U1000 is not displayed.

<table>
<thead>
<tr>
<th>Yes or No</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Perform trouble diagnoses for DTC U1000, refer to EC-83.</td>
</tr>
<tr>
<td>No</td>
<td>GO TO 6.</td>
</tr>
</tbody>
</table>

**6. CHECK COMBINATION METER OPERATION**

Does combination meter operate normally?

<table>
<thead>
<tr>
<th>Yes or No</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>GO TO 15.</td>
</tr>
<tr>
<td>No</td>
<td>Check combination meter circuit. Refer to EL-51.</td>
</tr>
</tbody>
</table>

**7. CHECK GLOW RELAY POWER SUPPLY CIRCUIT**

1. Turn ignition switch OFF.
2. Disconnect glow relay (1) harness connector.

   ←: Vehicle front

3. Check voltage between glow relay terminals 1, 3 and ground with CONSULT-III or tester.

   **Voltage: Battery voltage**

   **OK or NG**
   - OK >> GO TO 9.
   - NG >> GO TO 8.

8. **DETECT MALFUNCTIONING PART**

   Check the following.
   - 60 A fusible link (letter b)
   - Harness for open or short between glow relay and battery

     >> Repair harness or connectors.

9. **CHECK GLOW RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

   1. Disconnect ECM harness connector.
   2. Check harness continuity between ECM terminal 37 and glow relay terminal 2.
      Refer to Wiring Diagram.

     **Continuity should exist.**

   3. Also check harness for short to ground and short to power.

   **OK or NG**
   - OK >> GO TO 11.
   - NG >> GO TO 10.

10. **DETECT MALFUNCTIONING PART**

    Check the following.
    - Harness connectors E101, M5
    - Harness for open or short between glow relay and ECM

    >> Repair open circuit or short to ground or short to power in harness or connectors.

11. **CHECK HARNESS CONTINUITY BETWEEN GLOW RELAY AND GLOW PLUG FOR OPEN AND SHORT**

    1. Disconnect glow plug harness connector.
    2. Check harness continuity between glow relay terminal 5 and glow plug harness connector.
       Refer to Wiring Diagram.

     **Continuity should exist.**

    3. Also check harness for short to ground and short to power.
OK or NG
OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
• Harness connectors E72, E232
• Harness for open or short between glow relay and glow plug

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK GLOW RELAY

Refer to EC-278, "Component Inspection".

OK or NG
OK >> GO TO 14.
NG >> Replace glow relay.

14. CHECK GLOW PLUG

Refer to EC-278, "Component Inspection".

OK or NG
OK >> GO TO 15.
NG >> Replace glow plug.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

GLOW RELAY
Check continuity between glow relay terminals (3) and (5) under the following conditions.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 V direct current supply between terminals (1) and (2)</td>
<td>Yes</td>
</tr>
<tr>
<td>No current supply</td>
<td>No</td>
</tr>
</tbody>
</table>

Operation takes less than 1 second.

GLOW PLUG

1. Remove glow plug connecting plate (1).

   • Glow plug (2)

2. Check glow plug resistance.

   Resistance: Approximately 0.8 Ω [at 25°C (77°F)]

   **NOTE:**
   • Do not bump glow plug heating element. If it is bumped, replace glow plug with a new one.
   • If glow plug is dropped from a height of 10 cm (3.94 in) or higher, replace with a new one.
If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool.
- Hand-tighten glow plug by turning it two or three times, then tighten using a tool to specified torque.

\[ \text{\textbullet~20.1 N-m (2.1 kg-m, 15 ft-lb)} \]

**Removal and Installation**

**GLOW PLUG**
Refer to “CYLINDER HEAD” in **EM section**.
HEAT UP SWITCH

Description

The heat up switch (1) is located on the lower side of the instrument panel. This switch is used to speed up the heater's operation when the engine is cold. When the ECM received the heat up switch ON signal, the ECM increases the engine idle speed to 1,400 rpm to warm up engine quickly. This system works when all conditions listed below are met.

| Heat up switch | ON |
| Shift lever | Neutral |
| Accelerator pedal | Fully released |

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>WARM UP SW</td>
<td>Ignition switch: ON Heat up switch: OFF</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>Heat up switch: ON</td>
<td>ON</td>
</tr>
</tbody>
</table>
Specification data are reference values and are measured between each terminal and ground.
HEAT UP SWITCH

< SERVICE INFORMATION >

[YD25DDTi]

1. CHECK OVERALL FUNCTION-I

With CONSULT-III
1. Turn ignition switch ON.
2. Check “WARM UP SW” in “DATA MONITOR” mode with CONSULT-III under the following conditions.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>WARM UP SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat up switch: OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Heat up switch: ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

Without CONSULT-III
1. Turn ignition switch ON.
2. Check voltage between ECM harness connector terminals as follows.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Condition</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>M32</td>
<td>13</td>
<td>Heat up switch</td>
<td>Battery voltage</td>
</tr>
<tr>
<td>M32</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M32</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M33</td>
<td>114</td>
<td>OFF</td>
<td>Approx. 0 V</td>
</tr>
</tbody>
</table>

OK or NG
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

Check indicator in the heat up switch under the following condition.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>INDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat up switch: OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Heat up switch: ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

OK or NG
OK >> INSPECTION END
NG >> GO TO 7.

3. CHECK HEAT UP SWITCH POWER SUPPLY CIRCUIT

1. Turn heat up switch OFF.
2. Turn ignition switch OFF.
3. Disconnect heat up switch (1) harness connector.
4. Turn ignition switch ON.

5. Check voltage between heat up switch terminal 6 and ground with CONSULT-III or tester.

**Voltage: Battery voltage**

OK or NG
- OK  >> GO TO 5.
- NG  >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- 10 A fuse (No. 11)
- Harness connectors M7, N2
- Harness for open or short between heat up switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEAT UP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 13 and heat up switch terminal 5.
   Refer to Wiring Diagram.

   **Continuity should exist.**
4. Also check harness for short to ground and short to power.

OK or NG
- OK  >> GO TO 8.
- NG  >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors N2, M7
- Harness for open or short between ECM and heat up switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK HEAT UP SWITCH INDICATOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between heat up switch terminal 4 and ground.
   Refer to Wiring Diagram.

   **Continuity should exist.**
2. Also check harness for short to power.
HEAT UP SWITCH

< SERVICE INFORMATION >

OK or NG

OK  >> GO TO 8.
NG  >> Repair open circuit or short to power in harness or connectors.

8. CHECK HEAT UP SWITCH

Refer to EC-284, "Component Inspection".

OK or NG

OK  >> GO TO 9.
NG  >> Replace heat up switch.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

HEAT UP SWITCH

1. Turn ignition switch OFF.
2. Disconnect heat up switch harness connector.
3. Check continuity between heat up switch terminals 5 and 6 under the following conditions.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>CONTINUITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat up switch: OFF</td>
<td>Should not exist</td>
</tr>
<tr>
<td>Heat up switch: ON</td>
<td>Should exist</td>
</tr>
</tbody>
</table>

4. If NG, replace heat up switch.
   If OK, go to following step.

5. Check continuity between heat up switch terminals 4 and 6 under the following conditions.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>CONTINUITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat up switch: OFF</td>
<td>Should not exist</td>
</tr>
<tr>
<td>Heat up switch: ON</td>
<td>Should exist</td>
</tr>
</tbody>
</table>

6. If NG, replace heat up switch.
Description

STOP LAMP SWITCH
The stop lamp switch (1) is installed to brake pedal bracket. The switch senses brake pedal position and sends an ON-OFF signal to the ECM. The ECM uses the signal to control the fuel injection control system.

CONSULT-III Reference Value in Data Monitor Mode
Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRAKE SW</td>
<td>Ignition switch: ON</td>
<td></td>
</tr>
<tr>
<td>(Stop lamp switch)</td>
<td>Brake pedal: Fully released</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>Brake pedal: Slightly depressed</td>
<td>ON</td>
</tr>
</tbody>
</table>
Specification data are reference values and are measured between each terminal and ground.
BRAKE SWITCH

< SERVICE INFORMATION >

[YP25DDTi]

Diagnosis Procedure

1. CHECK OVERALL FUNCTION

With CONSULT-III
1. Turn ignition switch ON.
2. Select “BRAKE SW” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW” indication under the following conditions.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>INDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake pedal: Fully released</td>
<td>OFF</td>
</tr>
<tr>
<td>Brake pedal: Slightly depressed</td>
<td>ON</td>
</tr>
</tbody>
</table>

Without CONSULT-III
Check voltage between ECM harness connector terminals as follows.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Connector</th>
<th>Terminal</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>M33</td>
<td>100</td>
<td>M32</td>
<td>1</td>
<td>Slightly depressed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>Battery voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M33</td>
<td>114</td>
<td>JMBIA1428ZZ</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OK or NG
OK  >> INSPECTION END
NG  >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (2) harness connector.
3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.

**Voltage: Battery voltage**

OK or NG
OK  >> GO TO 4.
NG  >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- 10 A fuse (No. 2)
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 100 and stop lamp switch terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG
OK  >> GO TO 5.
NG  >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH

Refer to EC-288, "Component Inspection".

OK or NG
OK  >> GO TO 6.
NG  >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END

Component Inspection

STOP LAMP SWITCH

1. Disconnect stop lamp switch harness connector.
2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake pedal: Fully released</td>
<td>Should not exist</td>
</tr>
<tr>
<td>Brake pedal: Slightly depressed</td>
<td>Should exist</td>
</tr>
</tbody>
</table>

If NG, adjust stop lamp switch installation, refer to “BRAKE PEDAL AND BRACKET” in [BR section] and perform step 2 again.
PNP SWITCH

Description

When the gear position is in Neutral, park/neutral position is ON. ECM detects the position because the continuity of the line (the “ON” signal) exists.

CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

<table>
<thead>
<tr>
<th>MONITOR ITEM</th>
<th>CONDITION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>P/N POSI SW</td>
<td>• Ignition switch: ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shift lever: Neutral position</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>Shift lever: Except above</td>
<td>OFF</td>
</tr>
</tbody>
</table>
Specification data are reference values and are measured between each terminal and ground.
PNP SWITCH

< SERVICE INFORMATION >

[YD25DDTi]

Diagnosis Procedure

1. CHECK OVERALL FUNCTION

**With CONSULT-III**
1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-III.
3. Check “P/N POSI SW” signal under the following conditions.

<table>
<thead>
<tr>
<th>Shift lever position</th>
<th>P/N POSI SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral position</td>
<td>ON</td>
</tr>
<tr>
<td>Except the above position</td>
<td>OFF</td>
</tr>
</tbody>
</table>

**Without CONSULT-III**
1. Turn ignition switch ON.
2. Check voltage between ECM harness connector terminals as follows.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Condition</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>M33</td>
<td>110</td>
<td>Shift lever</td>
<td>Neutral</td>
</tr>
<tr>
<td>M32</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M33</td>
<td>114</td>
<td>Except above</td>
<td>BATTERY VOLTAGE</td>
</tr>
</tbody>
</table>

OK or NG
OK >>> INSPECTION END
NG >>> GO TO 2.

2. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch (1) harness connector (2).

\[\text{vehicle front}\]

3. Check harness continuity between PNP switch terminal 2 and ground.
   Refer to Wiring Diagram.
   **Continuity should exist.**
4. Also check harness for short to power.

OK or NG
OK >>> GO TO 4.
NG >>> GO TO 3.

3. DETECT MALFUNCTIONING PART
PNP SWITCH

< SERVICE INFORMATION >

Check the following.
- Harness connectors E249, E88
- Harness for open or short between PNP switch and ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 110 and PNP switch terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

   OK or NG
   OK   >> GO TO 6.
   NG   >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M285, E254
- Harness for open or short between PNP switch and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK PARK/NEUTRAL POSITION SWITCH

Refer to “ON-VEHICLE SERVICE” in [MT section]

OK or NG
OK   >> GO TO 7.
NG   >> Replace park/neutral position switch.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

>> INSPECTION END
START SIGNAL

INFOID:0000000003759835

Diagnosis Procedure

1. CHECK START SIGNAL OVERALL FUNCTION

With CONSULT-III
1. Turn ignition switch ON.
2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-III under the following conditions.

<table>
<thead>
<tr>
<th>Condition</th>
<th>START SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition switch: ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Ignition switch: START</td>
<td>ON</td>
</tr>
</tbody>
</table>

Without CONSULT-III
Check voltage between ECM harness connector terminals as follows.

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Description</th>
<th>Condition</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>99 (R)</td>
<td>Start signal</td>
<td>[Ignition switch ON]</td>
<td>Approximately 0 V</td>
</tr>
<tr>
<td>114 (B)</td>
<td></td>
<td>[Ignition switch START]</td>
<td>BATTERY VOLTAGE (11 - 14 V)</td>
</tr>
</tbody>
</table>

Continuity should exist.

2. CHECK START SIGNAL INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and ignition switch harness connector.
3. Check harness continuity between ECM terminal 99 and ignition switch terminal 6.
   Refer to Wiring Diagram.

OK or NG
OK >> INSPECTION END
NG >> GO TO 2.

3. DETECT MALFUNCTIONING PART

Check the following.
- 10 A fuse (No. 20)
- 40 A fusible link (letter f)
- Harness connectors E101, M5
- Fuse block (J/B) connectors M12
- Ignition switch harness connector M20
4. CHECK INTERMITTENT INCIDENT

Refer to EC-70.

⇒ INSPECTION END
**General Specification**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target idle speed No load* (in Neutral position)</td>
<td>750 ± 25 rpm</td>
</tr>
<tr>
<td>Air conditioner: ON In Neutral position</td>
<td>800 rpm or more</td>
</tr>
<tr>
<td>Maximum engine speed</td>
<td>4,900 rpm</td>
</tr>
</tbody>
</table>

*: Under the following conditions:
- Heat up switch: OFF
- Air conditioner switch: OFF
- Electric load: OFF (Lights & heater fan)
- Steering wheel: Kept in straight-ahead position

**Mass Air Flow Sensor**

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass Air Flow Sensor</td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td>Battery voltage (11 - 14 V)</td>
</tr>
<tr>
<td>Ignition switch ON (Engine stopped.)</td>
<td>Approx. 0.4 V (CONSULT-III DATA MONITOR)</td>
</tr>
<tr>
<td></td>
<td>Approx. 0.7 V (ECM terminal 54 and ground)</td>
</tr>
<tr>
<td>Idle (Engine is warmed up to normal operating temperature.)</td>
<td>1.3 - 1.8 V* (CONSULT-III DATA MONITOR)</td>
</tr>
<tr>
<td></td>
<td>1.7 - 2.1 V* (ECM terminal 54 and ground)</td>
</tr>
</tbody>
</table>

*: Engine is warmed up to normal operating temperature and running under no load.

**Intake Air Temperature Sensor**

<table>
<thead>
<tr>
<th>Temperature [°C (°F)]</th>
<th>Resistance (kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 (77)</td>
<td>1.800 - 2.200</td>
</tr>
<tr>
<td>80 (176)</td>
<td>0.283 - 0.359</td>
</tr>
</tbody>
</table>

**Engine Coolant Temperature Sensor**

<table>
<thead>
<tr>
<th>Temperature [°C (°F)]</th>
<th>Resistance (kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 (68)</td>
<td>2.1 - 2.9</td>
</tr>
<tr>
<td>50 (122)</td>
<td>0.68 - 1.00</td>
</tr>
<tr>
<td>90 (194)</td>
<td>0.236 - 0.260</td>
</tr>
</tbody>
</table>

**Fuel Rail Pressure Sensor**

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Approximately 5 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idle</td>
<td>1.7 - 2.0 V</td>
</tr>
<tr>
<td>2,000 rpm</td>
<td>2.0 - 2.3 V</td>
</tr>
</tbody>
</table>

**Fuel Injector**

| Resistance [at 10 - 60°C (50 - 140°F)] | 0.2 - 0.8 Ω |

**Crankshaft Position Sensor**

Refer to EC-156, "Component Inspection". 

---

EC-298
Camshaft Position Sensor

Refer to EC-166, "Component Inspection".

Glow Plug

<table>
<thead>
<tr>
<th>Resistance [at 25°C (77°F)]</th>
<th>Approximately 0.8 Ω</th>
</tr>
</thead>
</table>

Fuel Pump

<table>
<thead>
<tr>
<th>Resistance [at 10 - 60°C (50 - 140°F)]</th>
<th>1.5 - 3.0 Ω</th>
</tr>
</thead>
</table>