SQRE4T15C ENGINE MANAGEMENT SYSTEM

SQRE4T15C ENGINE MANAGEMENT SYSTEM 03 - 11
Warnings and precautions 03 - 11
Precautions 03 - 11
General Information 03 - 12
System Basic Principle 03 - 12
Basic Management Function of Engine 03 - 12
Control Signal: Input/Output Signal of ME17U6.1 System 03 - 13
System Function 03 - 13
System Malfunction Diagnosis Function Introduction 03 - 15
Control Strategy 03 - 16
Specifications 03 - 19
Torque Specifications 03 - 19
Circuit Diagram 03 - 19
Terminal Definition 03 - 19
Diagnosis & Test 03 - 22
Problem Symptoms Table 03 - 22
DTC Confirmation Procedure 03 - 25
Intermittent DTC Troubleshooting 03 - 25
Ground Inspection 03 - 25
Diagnostic Trouble Code (DTC) Chart 03 - 26
P049900 Canister Vent Valve Control Circuit Short to Power Supply 03 - 38
P049800 Canister Vent Valve Control Circuit Short to Ground 03 - 39
P044700 Canister Vent Valve Control Circuit Open 03 - 39
P242200 Canister Vent Valve Stuck Closed Problem 03 - 40
P150100 Airbag Communication Message Implausible 03 - 41
P209100 “B” Camshaft Position Actuator Control Circuit High Bank 1 03 - 41
P209000 “B” Camshaft Position Actuator Control Circuit Low Bank 1 03 - 41
P001300 “B” Camshaft Position Actuator Control Circuit Open Bank 1 03 - 42
P000B00 “B” Camshaft Position Slow Response Bank 1 03 - 42
P005A00 “B” Camshaft Profile Control Performance/Stuck Off Bank 1 03 - 43
P064500 A/C Compressor Relay Circuit Fault 03 - 43
P064700 A/C Compressor Relay Control Circuit High 03 - 44
P064600 A/C Compressor Relay Control Circuit Low 03 - 44
P057100 Brake Pedal Signal Synchronization Malfunction 03 - 44
P012800 Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature) 03 - 45
P012300 Electronic Throttle 1st Path Signal Voltage Maximum Problem / P022300 Electronic Throttle 2nd Path Signal Voltage Maximum Problem 03 - 45
P012100 Electronic Throttle 1st Path Signal Voltage Not Plausible Fault / P022100 Electronic Throttle 2nd Path Signal Voltage Not Plausible Fault 03 - 46
P151000 Diagnostic Fault Check Knock Control Signal Evaluation 03 - 47
P045128 EVAP System Pressure Sensor/ Switch Circuit Range Performance 03 - 47
P045300 Fuel Tank Pressure Sensor Signal Short to Power Supply 03 - 48
P045200 Fuel Tank Pressure Sensor Signal Short to Ground 03 - 48
P04512A EVAP System Pressure Sensor&Switch Circuit Range Performance 03 - 49
P045125 EVAP System Pressure Sensor&Switch Circuit Range Performance 03 - 49
P155400/ P155500/P156100 Electronic Throttle Spring Inspection Malfunction Minimum, Maximum / Deviation Between Throttle Target Opening Angle and Actual Opening Angle 03 - 50
P155C00 Electronic Throttle Limphome Position Self-learning Error 03 - 51
P155D00/P155E00 Electronic Throttle PID Adjustment Malfunction 03 - 51
P013300 O2 Sensor Circuit Slow Response Bank 1 Sensor 1 03 - 52
P062F42, P062F43 EEPROM Writing or Reading Failure 03 - 53
P208900 “A” Camshaft Position Actuator Control Circuit High Bank 1 03 - 53
P208800 “A” Camshaft Position Actuator Control Circuit Low Bank 1 03 - 53
P001000 Control Circuit of Camshaft Control Valve (Inlet) 03 - 54
P000A00 "A" Camshaft Position Slow Response Bank 1 03 - 54
P003C00 “A” Camshaft Profile Control Performance/Stuck Off Bank 1 03 - 55

SQRE4T15C ENGINE MANAGEMENT SYSTEM

P050B00 Cold Start Ignition Timing Performance 03 - 55
P034100 Intake Camshaft Phaser Sensor Signal Improper 03 - 56
P034300 Camshaft Position Sensor “A” Circuit High Bank 1 or Single Sensor 03 - 56
P034200 Camshaft Position Sensor “A” Circuit Low Bank 1 or Single Sensor 03 - 57
P036600 Exhaust Camshaft Phaser Sensor Signal Improper 03 - 58
P001776 Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor B 03 - 58
P036800 Exhaust Camshaft Phase Signal Circuit Short to Power Supply 03 - 58
P036700 Exhaust Camshaft Phase Signal Circuit Voltage Short to Ground 03 - 59
P033900 Crankshaft Position Sensor "A” 03 - 60
P046129 Fuel Level Sensor Unreasonable Malfunction 03 - 60
P209700 Post Catalyst Fuel Trim System Too Rich Bank 1 03 - 61
P209600 Post Catalyst Fuel Trim System Too Lean Bank 1 03 - 61
P013800 O2 Sensor Circuit High Voltage Bank 1 Sensor 2 03 - 62
P013700 O2 Sensor Circuit Low Voltage Bank 1 Sensor 2 03 - 63
P223200 O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 2 03 - 64
P013600 O2 Sensor Circuit Bank 1 Sensor 2 03 - 64
P005400 HO2S Heater Resistance Bank 1 Sensor 2 03 - 65
P003800 O2 Sensor Heater Control Circuit High (Downstream of the Catalyzer) 03 - 66
P003700 O2 Sensor Heater Control Circuit Low (Downstream of the Catalyzer) 03 - 66
P003600 HO2S Heater Control Circuit Bank 1 Sensor 2 03 - 67
P013A00 O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2 03 - 67
P227100 O2 Sensor Signal Biased&Stuck Rich Bank 1 Sensor 2 03 - 68
P227000 O2 Sensor Signal Biased&Stuck Lean Bank 1 Sensor 2 03 - 69
P223100 O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 1 03 - 70
P003200 HO2S Heater Control Circuit High Bank 1 Sensor 1 03 - 71
P003100 HO2S Heater Control Circuit Low Bank 1 Sensor 1 03 - 71
P003000 HO2S Heater Control Circuit Bank 1 Sensor 1 03 - 72
P005300 Upstream Oxygen Sensor Heater Circuit Failure 03 - 72
P005326 HO2S Heater Resistance Bank 1 Sensor 1 03 - 73
P013500 O2 Sensor Heater Circuit Bank 1 Sensor 1 03 - 73
P064D00 LSU Integrated Chip Failure 03 - 74
P064D16 Internal Control Module O2 Sensor Processor Performance Bank 1 03 - 74
P064D17 Internal Control Module O2 Sensor Processor Performance Bank 1 03 - 75
P064D81 Internal Control Module O2 Sensor Processor Performance Bank 1 03 - 75
P035100 Ignition Coil "A" Primary Control Circuit Open P035200 Ignition Coil "B" Primary Control Circuit Open P035300 Ignition Coil "C" Primary Control Circuit Open P035400 Ignition Coil "D" Primary Control Circuit Open 03 - 75
P230100 Ignition Coil “A” Primary Control Circuit High P230400 Ignition Coil “B” Primary Control Circuit High P230700 Ignition Coil “C” Primary Control Circuit High P231000 Ignition Coil “D” Primary Control Circuit High 03 - 76
P230000 Ignition Coil “A” Primary Control Circuit Low P230300 Ignition Coil “B” Primary Control Circuit Low P230600 Ignition Coil “C” Primary Control Circuit Low P230900 Ignition Coil “D” Primary Control Circuit Low 03 - 76
P062900 Fuel Pump Module "A" Control Circuit High 03 - 77
P062800 Fuel Pump “A” Control Circuit Low 03 - 77
P062700 Fuel Pump Module "A" Control Circuit Open 03 - 77
P032600 Knock Sensor 1 Circ. High Input 03 - 78
P032500 Knock Sensor 1 Circ. Low Input 03 - 78

SQRE4T15C ENGINE MANAGEMENT SYSTEM

P024300 Turbocharger Waste Gate Control Circuit Open 03 - 79
P023400 Turbocharger Boost Pressure Too High 03 - 79
P029900 Turbocharger Boost Pressure Too High 03 - 80
P050A21 Cold Start Idle Control System Performance 03 - 81
P050A22 Cold Start Idle Control System Performance 03 - 81
P050D00 Cold Start Rough Idle 03 - 81
P223700 O2 Sensor Positive Current Control Circuit Open Bank 1 Sensor 1 03 - 82
P013000 Upstream Oxygen Sensor Compensation Circuit Open 03 - 82
P030000 Random/Multiple Cylinder Misfire Detected P030100 Cylinder 1 Misfire Detected P030200 Cylinder 2 Misfire Detected P030300 Cylinder 3 Misfire Detected P030400 Cylinder 4 Misfire Detected P036300 Cylinder Selective Fuel Cutoff Active due to Catalyst Damaging Misfire 03 - 83
P154000 Engine Torque Control Adaption at Limit 03 - 84
P070000 TCU Requests to Illuminate MIL Light 03 - 84
P06AA00 Main relay Temperature Over Temperature Fault 03 - 84
P153000 Function Monitoring: Fault of ECU ADC - Null Load Test Pulse P153100 Function Monitoring: Fault of ECU ADC - Test Voltage P157300 Monitoring Fault Reaction Error P157500 Diagnostic Fault Check to Report "WDA active" Due to Overvoltage Detection 03 - 85
P060D00 Accelerator Pedal Second Layer Monitoring Failure 03 - 85
P152000 Function Monitoring: Check of Predicted Air Mass Failed P152100 Function Monitoring: Fault of ECU Check of Injection Cut-off P152200 Function Monitoring: Fault of ECU in Check of Cylinder Individual Fuel Corrections P152500 Function Monitoring: Fault of ECU or Sensor in rl-Comparison P152300 Function Monitoring: Fault of ECU or Sensor in Mixture Check P152400 Function Monitoring: Fault of ECU Comparison of Lambda and Operation Mode 03 - 86
P061C00 Electronic Throttle Security Monitoring Function Failure (Second Layer Engine Speed Monitoring Failure) 03 - 87
P152700 Function Monitoring: Monitoring of ICO From Level1 P152800 Function Monitoring: Monitoring of ICO From Level2 03 - 87
P152900 Function Monitoring: Fault of Starter Control 03 - 87
P061A00 Security Monitoring Torque Overlimit 03 - 88
P157600 OverVoltage of ECU VDD5 03 - 88
P157700 UnderVoltage of ECU VDD5 03 - 89
P001400 “B” Camshaft Position - Timing Over-Advanced or System Performance Bank 1 03 - 89
P001100 "A" Camshaft Position - Timing Over-Advanced or System Performance Bank 1 03 - 90
P021900 Engine Overspeed 03 - 90
P157800 Monitoring Module Inquiry Error 03 - 91
P218700 System Too Lean at Idle Bank 1 P218800 System Too Lean at Idle Bank 1 03 - 91
P055800 Brake Booster Pressure Sensor Circuit High 03 - 93
P055700 Brake Booster Pressure Sensor Circuit Low 03 - 93
P219500 O2 Sensor Signal Biased/Stuck Lean Bank 1 Sensor 1 03 - 94
P219600 O2 Sensor Signal Biased/Stuck Lean Bank 1 Sensor 1 03 - 94
P120000 Manifold Absolute Pressure Sensor Circuit Range/Performance P120100 Manifold Absolute Pressure Sensor Circuit Range/ Performance P120400 Turbocharger/ Supercharger Boost Sensor "A" Circuit Range/ Performance P120500 Turbocharger/ Supercharger Boost Sensor "A" Circuit Range/ Performance P023622 Turbocharger/ Supercharger Boost Sensor "A" Circuit Range/ Performance P023621 Turbocharger/ Supercharger Boost Sensor "A" Circuit Range/ Performance 03 - 95
P00C721 Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1 P00C722 Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1 03 - 95
P010700 Intake Manifold Pressure Sensor Short to Ground 03 - 96

SQRE4T15C ENGINE MANAGEMENT SYSTEM

P010800 Intake Manifold Pressure Sensor Short to Power Supply 03 - 96
P01062A Manifold Abs.Pressure Performance Non-plausible 03 - 97
P046800 EVAP Purge Flow Sensor Circuit High 03 - 98
P046700 EVAP Purge Flow Sensor Circuit Low 03 - 98
P128500 EVAP Purge Flow Sensor Circuit Range Performance 03 - 99
P128600 EVAP Purge Flow Sensor Circuit Range Performance 03 - 100
P222900 Barometric Pressure Sensor "A" Circuit High P222800 Barometric Pressure Sensor "A" Circuit Low Problem 03 - 100
P223000 Barometric Pressure Sensor Signal Failure P222722 Barometric Pressure Sensor "A" Circuit Range/Performance P222721 Barometric Pressure Sensor "A" Circuit Range/Performance P120200 Barometric Pressure Sensor "A" Circuit Range/Performance P120300 Barometric Pressure Sensor "A" Circuit Range/ Performance 03 - 101
P023700 Turbocharger/Supercharger Boost Sensor "A" Circuit Low 03 - 101
P023800 Turbocharger/Supercharger Boost Sensor "A" Circuit High 03 - 101
P212300/ P212800 Accelerator Pedal 1st/2nd Path Signal Voltage Too High Fault 03 - 102
P212200/P212700 Accelerator Pedal 1st/2nd Path Signal Voltage Too Low Fault 03 - 103
P261000 ECM/PCM Engine Off Timer Performance 03 - 103
P213800 Two-way Signal Deviation of Accelerator Pedal Out of Limit Fault 03 - 104
P064100 5 V Power Supply Module 1 Fault 03 - 104
P065100 5 V Power Supply Module 2 Fault 03 - 105
P063400 Cooling Fan Drive Chip Overheating 03 - 105
P00CE24 Cold Start Calibration of Manifold Intake Air Temperature Sensor Unreasonable (Positive Deviation) P00CE23 Cold Start Calibration of Supercharged Intake Air Temperature Sensor Unreasonable (Positive Deviation) P138024 Cold Start Calibration of Supercharged Intake Air Temperature Sensor Unreasonable (Positive Deviation) P138023 Cold Start Calibration of Supercharged Intake Air Temperature Sensor Unreasonable (Positive Deviation) 03 - 105
P011400 Poor Contact in Intake Manifold Temperature Sensor Circuit 03 - 106
P011300 Intake Manifold Temperature Sensor Signal Voltage Too High 03 - 106
P009800 Intake Air Temperature Sensor 2 Circuit High Bank 1 03 - 107
P009700 Intake Air Temperature Sensor 2 Circuit Low Bank 1 03 - 108
P009900 Intake Air Temperature Sensor 2 Circuit Intermittent Bank 1 03 - 108
P044200 EVAP System Leak Detected (Small Leak) 03 - 109
P045500 EVAP System Leak Detected (Large Leak) 03 - 110
P04F000 EVAP System High Pressure Purge Line Performance 03 - 110
P044400 Evaporative Emission System Purge Control Valve Circuit Open 03 - 111
P050C24 Cold Start Engine Coolant Temperature Performance P050C23 Cold Start Engine Coolant Temperature Performance 03 - 112
P011800 Cold Start Engine Coolant Temperature Performance 03 - 112
P011700 Coolant Temperature Sensor 1 Signal Voltage Low 03 - 113
P011900 Engine Coolant Temperature Sensor 1 Circuit Intermittent 03 - 113
P011623 Engine Coolant Temperature Sensor 1 Circuit Range/Performance 03 - 113
P042000 Catalyst System Efficiency Below Threshold Bank 1 03 - 114
P069000 ECM/PCM Power Relay Sense Circuit High 03 - 114
P056300 System Battery Voltage High 03 - 115
P056200 Battery Voltage Low 03 - 115
P056000 Battery Voltage Unreasonable 03 - 116
P241400 O2 Sensor Exhaust Sample Error Bank 1 Sensor 1 03 - 116
P063400 Cooling Fan Drive Chip Overheating 03 - 116
P121200 Vehicle Speed Sensor Performance Failure (Vehicle Speed Exceeds Maximum Range) 03 - 117

SQRE4T15C ENGINE MANAGEMENT SYSTEM

P050000 Vehicle Speed Sensor Input Signal Failure 03 - 117
P050165 Vehicle Speed Sensor "A" Circuit Intermittent/Erratic/High 03 - 117
P261D00 Coolant Pump "B" Control Circuit High 03 - 118
P261C00 Coolant Pump "B" Control Circuit Low 03 - 118
P025D00 Fuel Pump Module "A" Control Circuit High 03 - 119
P025A00 Fuel Pump Module "A" Control Circuit Open 03 - 119
P124A00 Booster Exhaust Gate Control Valve Control Circuit A Short 03 - 119
P2ABD00 Supercharged Waste Gate Control Valve Control Circuit A Current/ Temperature Too High 03 - 120
P00BD00 Air Flow Through Air Flow Meter Exceeds Upper Limit of Reasonable Range P00BC00 Air Flow Through Air Flow Meter Exceeds Lower Limit of Reasonable Range 03 - 120
P010122 Mass or Volume Air Flow "A" Circuit Range/Performance - Air Flow Too High P010121 Mass or Volume Air Flow Sensor "A" Circuit Range/Performance P01012A Mass or Volume Air Flow Sensor "A" Circuit Range/Performance 03 - 121
P010200 Air Flow Meter Circuit Voltage Too Low 03 - 121
P010300 Air Flow Meter Circuit Voltage Too High 03 - 121
P010000 Air Flow Meter Signal Period is 0 03 - 122
P053200 A/C Refrigerant Pressure Sensor "A" Circuit Low 03 - 122
P053300 A/C Refrigerant Pressure Sensor "A" Circuit High 03 - 122
P256400 Turbocharger Boost Control Position Sensor "A" Circuit Low 03 - 123
P256500 Turbocharger Boost Control Position Sensor "A" Circuit High 03 - 124
P003A00 First Zero Self-Learning Error of Turbocharger Electronic Wastegate 03 - 124
P024477 Turbocharger/Supercharger Wastegate Actuator "A" Range/ Performance 03 - 124
P024437 Turbocharger/Supercharger Wastegate Actuator "A" Range/ Performance 03 - 125
P138124 Intake Air Temperature Sensor 3 Multiple Check Bank 1 P138123 Intake Air Temperature Measurement System - Multiple Sensor Correlation Bank 3 03 - 125
P00EA00 Air Filter Rear Temperature Sensor 3 Circuit Voltage Too Low 03 - 126
P00EB00 Intake Air Temperature Sensor 3 Circuit High Bank 1 03 - 126
P00EC00 Intake Air Temperature Sensor 3 Circuit Intermittent Bank 1 03 - 127
P007000 Ambient Air Temperature Sensor Circuit "A" 03 - 128
P007200 Ambient Air Temperature Sensor Circuit "A" Low 03 - 128
P007300 Ambient Air Temperature Sensor Circuit "A" High 03 - 129
P150A00 Active Speed Limitation Input Signal Not Plausible P150B00 Clamping Switch of Active Speed Limitation Input Signal P150C00 Active Speed Limitation A/D Conversion Malfunction 03 - 129
P262600 O2 Sensor Pumping Current Trim Circuit Open Bank 1 Sensor 1 03 - 130
P124B00 Electric Waste Gate (E-WG) Actuator Control Chip SPI Bus Error 03 - 130
U010187 Lost Communication with TCM 03 - 131
P051300 / P063300 / P161000 / P161100 / P161200 / P161300 Immobilizer Malfunction 03 - 131
P261D00 Coolant Pump "B" Control Circuit High 03 - 132
P261C00 Coolant Pump "B" Control Circuit Low 03 - 132
P261A00 Coolant Pump "B" Control Circuit Low 03 - 133
P003200 HO2S Heater Control Circuit High Bank 1 Sensor 1 03 - 133
P003100 HO2S Heater Control Circuit Low Bank 1 Sensor 1 03 - 133
P003000 HO2S Heater Control Circuit Bank 1 Sensor 1 03 - 134
P013300 O2 Sensor Circuit Slow Response Bank 1 Sensor 1 03 - 134
P013100 O2 Sensor Circuit Low Voltage Bank 1 Sensor 1 03 - 135
DTC Diagnosis Procedure 03 - 135
P2091 00 03 - 135
P2090 00 03 - 135
P0013 00 03 - 135

SQRE4T15C ENGINE MANAGEMENT SYSTEM

P000B 00	03 - 135	P050C 24	03 - 172
P005A 00	03 - 135	P050C 23	03 - 172
P2089 00	03 - 140	P2183 24	03 - 176
P2088 00	03 - 140	P2183 23	03 - 176
P0010 00	03 - 140	P2184 00	03 - 176
P000A 00	03 - 140	P2185 00	03 - 176
P003C 00	03 - 140	P01E4 24	03 - 179
P050A 22	03 - 145	P01E4 23	03 - 179
P050A 21	03 - 145	P01E5 00	03 - 180
P050B 00	03 - 145	P01E6 00	03 - 180
P050B 20	03 - 145	P0262 00	03 - 183
P050D 00	03 - 146	P0261 00	03 - 183
P0420 00	03 - 146	P0201 00	03 - 183
P0030 00	03 - 148	P0265 00	03 - 187
P0031 00	03 - 148	P0264 00	03 - 187
P0032 00	03 - 148	P0202 00	03 - 187
P0053 00	03 - 148	P0268 00	03 - 191
P0131 00	03 - 148	P0267 00	03 - 191
P0132 00	03 - 148	P0203 00	03 - 191
P0133 00	03 - 148	P0271 00	03 - 194
P0134 00	03 - 148	P0270 00	03 - 194
P2231 00	03 - 148	P0204 00	03 - 194
P0036 00	03 - 153	P0351 00	03 - 198
P0037 00	03 - 153	P2301 00	03 - 198
P0038 00	03 - 153	P2300 00	03 - 198
P0054 00	03 - 153	P0352 00	03 - 202
P0136 00	03 - 153	P2304 00	03 - 202
P0137 00	03 - 153	P2303 00	03 - 202
P0138 00	03 - 153	P0353 00	03 - 206
P013A 00	03 - 153	P2307 00	03 - 206
P2232 00	03 - 153	P2306 00	03 - 206
P2270 00	03 - 153	P0354 00	03 - 211
P2271 00	03 - 153	P2310 00	03 - 211
P2195 00	03 - 160	P2309 00	03 - 211
P2196 00	03 - 160	P1555 00	03 - 215
P2096 00	03 - 163	P1554 00	03 - 215
P2097 00	03 - 163	P1561 00	03 - 215
P00C7 21	03 - 165	P2565 00	03 - 220
P00C7 22	03 - 165	P2564 00	03 - 220
P0106 22	03 - 165	P0244 77	03 - 220
P0106 21	03 - 165	P0244 37	03 - 221
P0106 2A	03 - 165	P003A 00	03 - 221
P1200 00	03 - 165	P0234 00	03 - 225
P1201 00	03 - 165	P0299 00	03 - 225
P0107 00	03 - 165	P0238 00	03 - 225
P0108 00	03 - 165	P0237 00	03 - 225
P0116 23	03 - 171	P1204 00	03 - 225
P0116 26	03 - 171	P1205 00	03 - 225
P0117 00	03 - 171	P0236 22	03 - 225
P0118 00	03 - 171	P0236 21	03 - 225
P0119 00	03 - 171	P1301 00	03 - 230

SQRE4T15C ENGINE MANAGEMENT SYSTEM

P261D 00 03 - 230
P261C 00 03 - 230
P261A 00 03 - 230
P1303 00 03 - 230
P1304 00 03 - 230
P1305 00 03 - 230
P1306 00 03 - 230
P1307 00 03 - 230
P1308 00 03 - 231
P1309 00 03 - 231
P0325 00 03 - 235
P0328 00 03 - 235
P0327 00 03 - 235
P04F0 00 03 - 239
P0496 00 03 - 239
P0497 00 03 - 239
P0459 00 03 - 239
P0458 00 03 - 239
P0444 00 03 - 239
P0442 00 03 - 244
P0455 00 03 - 244
P0219 00 03 - 247
P0558 00 03 - 248
P0557 00 03 - 248
P1450 00 03 - 248
P1451 00 03 - 248
P0571 00 03 - 253
P258D 00 03 - 256
P258C 00 03 - 256
P258A 00 03 - 256
P050F 00 03 - 256
P2123 00 03 - 259
P2122 00 03 - 259
P2127 00 03 - 259
P2128 00 03 - 259
P2138 00 03 - 259
P2177 00 03 - 261
P2178 00 03 - 261
P2187 00 03 - 262
P2188 00 03 - 262
P0480 00 03 - 266
P0691 00 03 - 266
P0692 00 03 - 266
P0481 00 03 - 269
P0693 00 03 - 269
P0694 00 03 - 269
P0597 00 03 - 272
P0599 00 03 - 272
P0598 00 03 - 272
P0128 00 03 - 272
P0645 00 03 - 276
P0647 00 03 - 276
P0646 00 03 - 276
P0560 00 03 - 279
P0562 00 03 - 279
P0563 00 03 - 279
U0073 88 03 - 280
U0101 87 03 - 280
U0126 87 03 - 280
U0129 87 03 - 280
U0140 87 03 - 280
U0151 87 03 - 280
U0155 87 03 - 280
U0164 87 03 - 280
U0214 87 03 - 280
P1212 00 03 - 282
P0503 00 03 - 282
P0500 00 03 - 282
P0501 66 03 - 282
P0501 65 03 - 282
P0460 00 03 - 284
P0461 29 03 - 284
P0462 00 03 - 284
P0463 00 03 - 284
P25B0 00 03 - 284
P0629 00 03 - 288
P0628 00 03 - 288
P0627 00 03 - 288
P0339 00 03 - 291
P2617 00 03 - 291
P050A 21 03 - 295
P0506 00 03 - 295
P0507 00 03 - 295
P0685 00 03 - 296
P0687 00 03 - 296
P0686 00 03 - 296
P0689 00 03 - 296
P0343 00 03 - 298
P0342 00 03 - 298
P0341 00 03 - 302
P0366 00 03 - 303
P0368 00 03 - 305
P0367 00 03 - 305
On-vehicle Service 03 - 308
Electronic throttle body 03 - 308
Absolute Brake Vacuum Sensor 03 - 310
VVT Control Valve 03 - 311
Coolant temperature sensor 03 - 312
Knock Sensor 03 - 314
Oxygen Sensor 03 - 315
Camshaft position sensor 03 - 319
Engine speed sensor 03 - 321

SQRE4T15C ENGINE MANAGEMENT SYSTEM

Fuel Rail Injector Assembly 03 - 322
Intake pressure sensor 03 - 323
Ignition coil 03 - 326
Fuel injector 03 - 327
Engine Control Unit (ECU) 03 - 328
Matching Learning 03 - 329
SQRE4T15C ENGINE MECHANICAL SYSTEM 03 - 335
Warnings and Precautions 03 - 335
Warnings 03 - 335
Description 03 - 335
Functional Principle 03 - 335
System Operation 03 - 335
Specifications 03 - 335
Engine Specifications 03 - 335
Engine Mechanical Specifications 03 - 336
Torque Specifications 03 - 338
Lubrication Areas During Engine Assembly 03 - 339
Lubrication Areas During Engine Assembly 03 - 339
Tools 03 - 340
General Tools 03 - 340
Special Tools 03 - 344
Diagnosis & Testing 03 - 346
Problem Symptoms Table 03 - 346
Inspection 03 - 346
On-vehicle Service 03 - 349
Accessory Pulley 03 - 349
Idler Pulley Assembly 03 - 350
Tensioner Assembly 03 - 351
Cylinder Head Cover 03 - 352
Crankshaft Front Oil Seal 03 - 354
Flywheel 03 - 355
Crankshaft Rear Oil Seal 03 - 356
Engine Timing Chain 03 - 357
Camshaft and Rocker Arm 03 - 364
Cylinder Head 03 - 368
Engine Mounting Assembly 03 - 378
Rear Mounting Assembly 03 - 378
Left Mounting Assembly 03 - 379
Right Mounting Assembly 03 - 380
Engine Assembly 03 - 382
Cylinder Block 03 - 385
Selection of Main Bearing Shell 03 - 397
Selection of Connecting Rod Bearing Shell 03 - 398
SQRE4T15C INTAKE SYSTEM 03 - 404
Warnings and Precautions 03 - 404
Warnings 03 - 404
Precautions 03 - 404
General Information 03 - 405
System Exploded Diagram 03 - 405
Functional Principle 03 - 406
System Operation 03 - 406
Specifications 03 - 406
Torque Specifications 03 - 406
Tools 03 - 407
General Tools 03 - 407
Diagnosis & Testing 03 - 407
Problem Symptoms Table 03 - 407
On-vehicle Service 03 - 408
Air Filter Element 03 - 408
Air Filter Assembly 03 - 409
Muffler and Muffler Hose 03 - 410
Electric Throttle Assembly 03 - 411
Intake Manifold Assembly 03 - 415
Electronic Accelerator Pedal 03 - 419
SQRE4T15C EXHAUST SYSTEM 03 - 421
Warnings and Precautions 03 - 421
Warnings 03 - 421
Precautions 03 - 421
General Information 03 - 421
System Exploded Diagram 03 - 421
Turbocharger 03 - 422
Functional Principle 03 - 423
System Operation 03 - 423
Specifications 03 - 423
Torque Specifications 03 - 423
Non-reusable Part 03 - 424
Tools 03 - 424
General Tools 03 - 424
Diagnosis & Testing 03 - 424
Problem Symptoms Table 03 - 424
Exhaust System Gas Leakage Inspection 03 - 425
On-vehicle Service 03 - 425
Turbocharger Heat Insulator Assembly 03 - 425
Turbocharger Assembly 03 - 427
Precatalytic Converter Assembly 03 - 430
Front Exhaust Pipe Assembly 03 - 432
Main Catalytic Converter Assembly 03 - 434
Front Muffler Assembly 03 - 435
Rear Muffler Assembly 03 - 436
Muffler Heat Insulator II 03 - 437
Front Muffler Heat Insulator 03 - 437
Muffler Heat Insulator I 03 - 438
SQRE4T15C IGNITION SYSTEM 03 - 440
Warnings and Precautions 03 - 440

SQRE4T15C ENGINE MANAGEMENT SYSTEM

- Warnings 03 - 440
- Precautions 03 - 440
- General Information 03 - 441
- System Exploded Diagram 03 - 441
- Functional Principle 03 - 441
- Operation 03 - 441
- Specifications 03 - 442
- Torque Specifications 03 - 442
- Spark Plug Specifications 03 - 442
- Tools 03 - 442
- General Tools 03 - 442
- Diagnosis & Testing 03 - 442
- Problem Symptoms Table 03 - 442
- Repair Precautions 03 - 443
- Spark Plug Common Problems 03 - 444
- On-vehicle Service 03 - 446
- Ignition Coil Assembly 03 - 446
- Spark Plug 03 - 448

SQRE4T15C EMISSION SYSTEM 03 - 450

- Warnings and Precautions 03 - 450
- Warnings 03 - 450
- Precautions 03 - 450
- General Information 03 - 451
- System Exploded Diagram 03 - 451
- Emission Control System Schematic Diagram 03 - 452
- Functional Principle 03 - 452
- System Operation 03 - 452
- Specifications 03 - 453
- Torque Specifications 03 - 453
- Tools 03 - 454
- General Tools 03 - 454
- Diagnosis & Testing 03 - 454
- Leakage Inspection 03 - 454
- Fuel Tank Cap Assembly Inspection 03 - 454
- On-vehicle Service 03 - 454
- Charcoal Canister Solenoid Valve 03 - 454
- Activated Charcoal Canister Assembly 03 - 455
- PCV Valve 03 - 457
- Upstream Oxygen Sensor 03 - 458
- Downstream Oxygen Sensor 03 - 460

SQRE4T15C COOLING SYSTEM 03 - 462

- Warnings and Precautions 03 - 462
- Warnings 03 - 462
- Precautions 03 - 462
- System Overview 03 - 463
- System Components Diagram 03 - 463
- Functional Principle 03 - 464
- System Operation 03 - 464
- Specifications 03 - 464
- Torque Specifications 03 - 464
- Coolant Capacity 03 - 465
- Coolant Freezing Point 03 - 465
- Cooling System Operation Flowchart 03 - 465
- Tools 03 - 466
- General Tools 03 - 466
- Diagnosis & Testing 03 - 466
- Problem Symptoms Table 03 - 466
- Cooling System Leakage Test 03 - 467
- Coolant Freezing Point Test 03 - 468
- On-vehicle Service 03 - 469
- Coolant Replacement 03 - 469
- Tank Upper Crossmember Assembly 03 - 473
- Expansion Tank 03 - 474
- Electronic Thermostat Assembly 03 - 475
- Electronic Thermostat Seat Assembly 03 - 477
- Discharge Steel Pipe Assembly 03 - 479
- Cooling Fan Assembly 03 - 481
- Radiator Assembly 03 - 483
- Water Pump Assembly 03 - 484
- Electric Water Pump Assembly 03 - 485
- Low Temperature Radiator Assembly 03 - 487

SQRE4T15C LUBRICATION SYSTEM 03 - 489

- Warnings and Precautions 03 - 489
- Warnings 03 - 489
- Precautions 03 - 489
- General Information 03 - 490
- System Exploded Diagram 03 - 490
- Functional Principle 03 - 491
- System Operation 03 - 491
- Specifications 03 - 491
- Oil Specifications 03 - 491
- Torque Specifications 03 - 491
- Tools 03 - 492
- General Tools 03 - 492
- Diagnosis & Testing 03 - 492
- Problem Symptoms Table 03 - 492
- Schematic Diagram of Lubrication 03 - 494
- Inspection of Engine Oil Level 03 - 494
- Oil Pressure Inspection 03 - 495
- On-vehicle Service 03 - 496
- Engine Oil Replacement 03 - 496
- Oil Filter 03 - 497
- Oil Pressure Switch 03 - 498

SQRE4T15C ENGINE MANAGEMENT SYSTEM

- Oil Filter Module Assembly 03 - 500
- Oil Pan 03 - 501
- Oil Strainer 03 - 503
- Oil Pump Assembly 03 - 504
- Oil Tube Assembly 03 - 505
- Oil Deflector 03 - 506

SQRE4T15C STARTING SYSTEM 03 - 507
- Warnings and Precautions 03 - 507
  - Warnings 03 - 507
  - Precautions 03 - 507
  - System Exploded Diagram 03 - 508
  - Operation 03 - 509
- Specifications 03 - 509
  - Torque Specifications 03 - 509
- Tools 03 - 509
  - General Tools 03 - 509
- Diagnosis & Testing 03 - 509
  - Problem Symptoms Table 03 - 509
  - On-vehicle Inspection 03 - 510
- On-vehicle Service 03 - 510
  - Starter Assembly 03 - 510
  - ENGINE START STOP Switch 03 - 513

SQRE4T15C CHARGING SYSTEM 03 - 516
- Warnings and Precautions 03 - 516
  - Warnings 03 - 516
  - Precautions 03 - 516
- General Information 03 - 516
  - System Exploded Diagram 03 - 516
  - Operation 03 - 517
- Specifications 03 - 517
- Tools 03 - 517
- Diagnosis & Testing 03 - 518
  - Diagnosis Specification for Alternator Malfunction 03 - 518
  - Charging System Charging Voltage Inspection 03 - 519
  - Usage of Battery Tester 03 - 520
  - Battery Fluid Leakage Test 03 - 521
  - Battery External Normal Malfunction 03 - 522
- On-vehicle Service 03 - 522
  - Battery 03 - 522
  - Battery Tray 03 - 523
  - Generator 03 - 524

SQRE4T15C FUEL SUPPLY SYSTEM 03 - 526
- Warnings and Precautions 03 - 526
  - Warnings 03 - 526
  - Precautions 03 - 526
- General Information 03 - 527
  - System Exploded Diagram 03 - 527
- Functional Principle 03 - 528
  - System Control Schematic Diagram 03 - 528
  - System Operation 03 - 528
- Tools 03 - 529
  - General Tools 03 - 529
  - Special Tools 03 - 530
- Diagnosis & Testing 03 - 530
  - Problem Symptoms Table 03 - 530
  - Fuel System Pressure Releasing 03 - 531
  - Fuel System Pressure Test 03 - 531
- On-vehicle Service 03 - 532
  - Electric Fuel Pump Assembly 03 - 532
  - Filler Tube Assembly 03 - 536
  - Fuel Tank 03 - 537
  - Fuel Rail Injector Assembly 03 - 540
  - Fuel Filler Cap Assembly 03 - 542

SQRE4T15C ENGINE MANAGEMENT SYSTEM

Warnings and precautions

Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

1. Digital multimeter can only be used to perform inspection for electronic injection system.
2. Use genuine components to perform service work, otherwise appropriate electronic injection system operation cannot be guaranteed.
3. Only use unleaded gasoline during service.
4. Please observe normative service and diagnostic flowchart to perform service work.
5. Never disassemble or remove components of electronic injection system during service.
6. When holding electronic elements (electronic control unit, sensor etc.), take extra care not to drop them on the ground.
7. Set up a consciousness of environmental protection and dispose of waste effectively that is produced during service.
8. Never use an needle multimeter to check electronic fuel injection system circuit.
9. Never use high power test light to measure when testing each pin voltage signal of sensor.
10. It is recommended that the measurement status when testing each pin voltage signal of sensor is on-line measurement.
11. It is recommended to use voltage drop method when measuring sensor, actuator connecting wire harness.
12. Do not causally remove any electronic injection system component or its connector from its installation position to prevent damaging accidentally, or foreign matter, such as moisture, oil from entering connectors, which will affect the normal operation of electronic injection system.
13. Be sure to turn ignition switch off when disconnecting and connecting connectors. Otherwise electronic elements may be damaged.
14. When simulating hot operating condition of malfunction and performing other service work that may cause temperature to rise, never allow temperature of electronic control unit to exceed 80℃.
15. As the supplying pressure of electronic injection system is high, high pressure resistant fuel pipes are adopted for all fuel lines. Fuel pressure in fuel lines is still high even when the engine is not running. Therefore, be careful not to casually remove fuel pipes during service; When it is necessary to service fuel system, discharge pressure in the fuel system before removing fuel pipes. The way to discharge pressure is as follows: After removing fuel pump controller power supply fuse, start engine and idle it until the engine stops running by itself. Removal of fuel pipes should be performed in a well-ventilated area by professional service men.
16. Do not energize electric fuel pump when removing it from fuel tank to prevent electric sparks, which will cause a fire.
17. It is not allowed to perform running test for fuel pump under dry state or in water. Otherwise service life will be reduced. In addition, do not inversely connect fuel pump positive and negative poles.
18. When performing inspection to ignition system, perform spark jump test only when necessary and make sure that the test time is as short as possible. Do not open the throttle during detection, otherwise a large amount of unburned gasoline will enter the exhaust pipe, thus damaging the three-way catalytic converter.
19. Since the adjustment of idle speed is completely completed by electronic injection system, manual adjustment is not required. Throttle limit screw of throttle body has been adjusted properly at the factory, and users are not allowed to change its original position at will.
20. Do not connect battery with its polarity reversed to prevent damage to electronic elements. This system adopts negative ground.

21. Never remove battery cable when engine is running.
22. The positive, negative battery cable wires and electronic control unit must be removed before performing welding on vehicle.
23. Do not puncture wire outer coat to detect electric signals input and output by components.

General Information

System Basic Principle

SQRE4T15C engine electronic control system of model adopts UAES ME17U6.1. The system mainly consists of Engine Control Unit (ECU), sensors and actuators, which controls intake air amount, injection volume and ignition timing, etc. when engine is operating. In the engine management system, sensors are used as the input part to measure various physical signals (temperature and pressure, etc.), and converts them into corresponding electrical signals; the function of ECU is to receive the input signals from sensors and perform calculation according to set procedure, producing corresponding control signals and outputting them to power drive circuit. The power drive circuit drives each actuator to perform various actions, thus making the engine run according to the preset program. Also, the trouble diagnosis system of ECU monitors each component and control function in this system. Once detecting and confirming a fault, it will store the trouble code. When detecting that fault has been eliminated, it will return to use normal value.The most important characteristic of ME17U6.1 engine electronic control management system is the use of torque based control strategy. The main purpose of the torque based control strategy is to associate a large number of different control objectives. This is the only way to flexibly choose to integrate various functions into different variants of ECU according to engine and vehicle model.

Basic Management Function of Engine

1. System structure based on torque.
2. Cylinder load is determined by intake pressure sensor.
3. Improved air-fuel mixture control function in static and dynamic conditions.
4. λ closed-loop control.
5. Fuel is injected from each cylinder sequentially.
6. Ignition timing, including cylinder-by-cylinder knock control.
7. Emission control function.
8. Catalytic converter heating.
9. Canister control.
10. Idle control.
11. Limp home.

Additional Function

1. Immobilizer function.
2. Communication with torque and external system (example: gear train or vehicle dynamic control).

Diagnosis On-line OBD

1. Complete a series of OBD functions.
2. Management system for diagnostic functions.

Torque structure: ME17U6.1 system based on torque control

In ME17U6.1 torque-based engine management system, all internal and external demands of engine are defined with the torque or efficiency requirements of the engine as shown in figure 2-3. By converting the various demands of engine into control variables for torque or efficiency, these variables are then first processed in central torque demand coordinator module.ME17U6.1 system can prioritize these conflicting requirements and execute the most important requirement. Obtain engine control parameters such as required fuel injection time and ignition timing with torque conversion module. The execution of this control variable has no effect on other variables. This is the advantage of the torque-based control system. Similarly, when engine matching is performed, due to the variable independence of the torque control

system, only the engine data is relied on when matching the engine characteristic curve and pulse diagram, and there is no interference with other functional functions and variables, thus avoiding repeated calibration, simplifying the matching process and reducing the matching cost.

Main features of ME17U6.1 system:

- New torque-variable engine functional structure is most compatible with other systems and has strong expandability.
- New modular software structure and hardware structure with strong portability.
- Model-based engine basic characteristic diagram is independent of each other, and simplifies the calibration process.
- Sequential fuel injection with phase sensor is used to improve emissions.
- Anti-theft function is incorporated in system.
- Improve driving performance through centralized coordination of various torque requirements.
- 32 bits CPU, 40 MHz clock frequency.

Control Signal: Input/Output Signal of ME17U6.1 System

Main sensor input signals of ECU in ME17U6.1 system

- Intake pressure signal.
- Electronic accelerator pedal signal.
- Intake temperature signal.
- Throttle rotation angle signal.
- Coolant temperature signal.
- Engine speed signal.
- Phase signal.
- Knock sensor signal.
- Oxygen sensor signal.
- A/C pressure signal.
- Boost pressure signal.

Control signals in ME17U6.1 system

- Electronic throttle opening.
- Injection timing and fuel injection duration.
- Fuel pump relay.
- Canister control valve opening.
- Ignition coil closing angle and ignition advance angle.
- A/C compressor relay.
- Cooling fan relay.
- Electronic waste gate actuator.

System Function

Start control

During starting, special calculation methods are used to control the filling, fuel injection and ignition timing. At the beginning of the process, the air in intake manifold is still, and the internal pressure of intake manifold is shown to be ambient pressure.The specific “injection timing” is designated as the initial injection pulse in a similar process.The fuel injection is changed according to engine temperature to promote the formation of oil film on intake manifold and cylinder wall, so the mixture should be enriched when the engine reaches a certain speed. Once the engine starts to run, the system starts to reduce the start and thicken immediately, until the start condition ends to completely cancel the start and thicken.

Ignition angle is constantly adjusted with starting conditions. It varies with engine temperature, intake air temperature and engine speed.

Heating control of engine warm-up and three-way catalyst

After engine is started at low temperature, cylinder volume, fuel injection and electronic ignition are adjusted to compensate higher engine torque request; And this process continues until temperature rises to a proper threshold.In this stage, rapid heating of three-way catalytic converter is the most important, since rapid transition to operation of three-way catalytic converter can greatly reduce exhaust emissions. Under this working condition, adopt moderate retard ignition advanced angle and use exhaust gas to perform “three-way catalytic converter heating”.

Acceleration/deceleration and motored fuel cut-off control

When the throttle opening increases, some of the injected fuel is absorbed by oil film. Therefore, it is necessary to inject the corresponding fuel amount to compensate and prevent the mixture from becoming lean during acceleration. Once the load factor is reduced, the additional fuel contained in the oil film on intake manifold wall will be released again, so the corresponding injection duration must be reduced during deceleration.Wheel drag or traction condition indicates that the power provided by engine at the flywheel is negative. In this case, engine friction and pump air loss can be used to slow down the vehicle. When the engine is in wheel drag or traction condition, the fuel is cut off to reduce fuel consumption and exhaust emissions, and more importantly to protect the three-way catalyst.Once the speed has been reduced to a specific recovery of the fuel supply speed above idle speed, the fuel injection system is resupplied. In fact, the ECU program has a range of recovery speed. They vary according to engine temperature, dynamic change of engine speed, etc., and they are calculated to prevent the speed from falling to the specified minimum threshold.Once the injection system is resupplied, the system begins to use the initial injection pulse to supply the fuel and rebuild the oil film on the intake manifold wall. After recovery of fuel injection, the torque-based control system increases the engine torque slowly and smoothly (smooth transition).

Idle control

Engine does not provide torque to the flywheel at idle. To ensure stable operation of the engine at as low an idle speed as possible, the closed-loop idle speed control system must maintain the balance between the generated torque and the engine power consumption. The idle speed requires a certain amount of power to meet the load requirements of all aspects. They include internal friction from the engine crankshaft and valve gear and auxiliary components such as the water pump.ME17U6.1 system uses torque based control strategy to determine engine output torque requested by maintaining required idling speed in all working conditions according to closed loop idle control. This output torque increases as engine speed reduces, and reduces as engine speed increases. System responses to the new “interference factor” through requesting higher torque, such as turning on/off air conditioning compressor or shifting of automatic transmission. When engine temperature is low, torque is also needed to be increased to compensate higher internal friction and/or maintain higher idling speed. The sum of these required output torque will be transmitted to torque coordinator which will process, calculate and obtain corresponding volumetric density, mixture contents and ignition timing.

λ closed-loop control

Exhaust aftertreatment in three-way catalytic converter is an effective method for reducing concentration of harmful substance in exhaust gas. Three-way catalytic converter can reduce hydrocarbon (HC), carbon monoxide (CO) and oxynitride (NO_2) up to 98% or more, and convert them into water (H_2O), carbon dioxide (CO_2) and nitrogen (N_2). However, such high efficiency can be achieved only within small range of engine excess air coefficient λ=1, λ closed loop control is aimed to ensure mixture concentration within this range.λ closed loop control system functions only when oxygen sensor is equipped. Oxygen sensor on side of three-way catalytic converter monitors oxygen content in exhaust gas, lean mixture (λ > 1) will generate about 100 mV sensor voltage, and rich mixture (λ < 1) will generate about 900 mV sensor voltage. When (λ = 1), sensor voltage will jump. λ closed loop control responses to input signal (λ > 1 = lean mixture, λ < 1 = rich mixture) to correct control variable, a correction factor is generated as a multiplier to correct the fuel injection duration.

Evaporative emission control

Due to external transfer of radiant heat and returned fuel heat, the fuel in fuel tank is heated and forms fuel vapor. Due to limits of evaporative emission regulations, these vapors containing a large amount of HC components are not allowed to be discharged directly into the atmosphere. In system, fuel vapor will be

collected in activated carbon canister through guide pipe and enters into engine and participates in the combustion process through scour at the right moment. Flow rate of scour airflow is realized by ECU controlling canister control valve. This control operates only under closed loop working condition of λ closed loop control system.

Knock control

System detects characteristic vibration at moment knock occurs through knock sensor installed in proper position of engine, and converts it into electrical signal to transmit it to ECU for processing. ECU uses special processing method to detect if knock occurs in each combustion cycle in each cylinder. Once knock is detected, knock closed loop control is triggered. After knock danger is eliminated, ignition of affected cylinder will be gradually advanced to predetermined ignition advance angle.Knock control threshold has good adaptability to different working conditions and different grades of fuel.

System Malfunction Diagnosis Function Introduction

Malfunction information record

Electronic control unit constantly monitors sensors, actuators, related circuits, malfunction indicator light, battery voltage and so on, and even electronic control unit itself. And it performs reliability detection for sensor output signal, actuator drive signal and internal signals (such as λ closed loop control, coolant temperature, knock control, idle speed control and battery voltage control, etc.). Once a certain step failure or untrusted signal value is found, electronic control unit will immediately set malfunction information record in RAM malfunction memory. Malfunction information record is stored in the form of trouble code and displays in the order in which malfunctions occurred.Frequency of malfunction can be divided into “steady state malfunction” and “intermittent malfunction” (for example, due to a short break of the wire harness or poor contact of the connector).

Malfunction light description and its control strategy

1. Activation of MIL light follows the below principles:
   a. ENGINE START STOP switch is turned to ON (not started), and MIL remains on.
   b. After the engine is started, if there is no malfunction request for turning on MIL in malfunction memory, MIL goes off.
   c. There is malfunction request for turning on MIL in malfunction memory, or there is request for turning on MIL at outside of ECU, MIL will turn on.
   d. When there is a MIL flashing request at outside of ECU, or there is a MIL flashing request in misfire cause, or there is malfunction request that flashes MIL as necessary in malfunction memory, MIL will flash at a frequency of 1Hz.
2. On vehicles equipped with an electronic throttle system, there is EPC indicator light that used to indicate engine electronic control system related faults besides MIL light. In general, EPC indicator light is used to indicate (electronic accelerator and electronic throttle) related faults.
3. Activation of EPC indicator light follows the below principles:
   e. ENGINE START STOP switch is turned to ON (not started), and EPC remains on.
   f. After the engine is started, if there is no malfunction request for turning on EPC indicator light in malfunction memory, EPC indicator light goes off.
   g. There is malfunction request for turning on EPC in malfunction memory, or there is request for turning on EPC at outside of ECU, EPC will turn on.

Diagnostic tester display

1. Engine parameter display:
   a. Engine speed, coolant temperature, throttle opening, ignition advance angle, injection pulse width, intake pressure, intake temperature, vehicle speed, system voltage, injection correction, canister scour rate, idle air control, oxygen sensor waveform;
   b. Target speed, relative engine load, ambient temperature, ignition closing time, evaporator temperature, intake air flow, fuel consumption amount;
   c. Throttle valve position sensor signal voltage, coolant temperature sensor signal voltage, intake temperature sensor signal voltage, intake pressure sensor signal voltage, knock sensor terminal 1 signal voltage, knock sensor terminal 2 signal voltage.

2. Actuator test function:
   a. Malfunction light, fuel pump, A/C relay, fan, canister purge valve and throttle opening.
3. Version information display:
   a. Frame number (VIN), ECU hardware number, ECU software number.
4. Malfunction display:
   a. Intake temperature/pressure sensor, boost temperature/pressure sensor, engine coolant temperature sensor, throttle valve position sensor, oxygen sensor, oxygen sensor heating line, air-fuel ratio correction, fuel injector of each cylinder, fuel pump, knock sensor, speed sensor, phase sensor, canister control valve, cooling fan relay, vehicle speed signal, idle speed, electronic throttle body, system voltage, ECU, A/C compressor relay, evaporator temperature sensor, malfunction light.

System features

- Multi-point sequential injection system.
- New torque-variable engine functional structure is most compatible with other systems and has strong expandability.
- New modular software structure and hardware structure with strong portability.
- Phase sensor signal is adopted (phase sensor).
- Signal plate with 60-2 teeth is used to identify speed signal (speed sensor).
- Electronic throttle body idle speed control is used.
- Realized idle torque closed-loop control.
- Cylinder-by-cylinder independent knock control (knock sensor).
- Equipped with function of heating and protecting catalytic converter.
- Equipped with limp home function, etc.

Control Strategy

A/C control strategy

1. 8s after engine is started, A/C compressor is allowed to operate. Within 8s of engine starting, even if the A/C request switch is pressed, A/C compressor will not engaged.
2. When coolant temperature is higher than 115 degrees, A/C is powered off. When coolant temperature is below 113 degrees, A/C control resumes. When coolant temperature is between 106 and 114 degrees, A/C control status does not change.
3. When engine speed exceeds 6520 rpm or below 560 rpm, A/C is powered off. A/C control resumes when engine speed is between 640 rpm and 6320 rpm. When the engine speed is in range of 6320 - 6520 rpm and 560 - 640 rpm, A/C maintains the previous state.
4. When the battery voltage is lower than 9.5 V, A/C is powered off, and A/C control resumes when battery voltage is higher than 11 V; When the battery voltage is higher than 16 V, A/C is powered off, and A/C control resumes when battery voltage is lower than 15 V.
5. Due to the large A/C engine torque consumption, this model has developed an accelerated disconnection A/C strategy. When the accelerator pedal is depressed firmly, A/C will be powered off to ensure dynamic property when overtaking. When the A/C is disconnected for more than a certain period of time or the driver accelerator pedal opening is reduced, A/C will be turned on again.

Fan control strategy

1. Fan control strategy when engine is running normally:

   Hint:
   This model equipped with a two-speed fan, and ECU judges and controls different fan speeds based on water temperature, A/C pressure signal and vehicle speed signal.

a. Speed limit thresholds of fan to stop rotation in each state are as follows:
   - When coolant temperature is higher than 94˚C and vehicle speed is lower than 80, low speed fan operates; After coolant temperature is lower than 91˚C, low speed fan stops operating.
   - When coolant temperature is higher than 105˚C and vehicle speed is lower than 80, high speed fan operates; After coolant temperature is lower than 102˚C, high speed fan stops operating.
   - When coolant temperature is higher than 110˚C and vehicle speed is higher than 80, high speed fan operates; After coolant temperature is lower than 107˚C, high speed fan stops operating.

b. Fan control strategy after stalling:
   - If coolant temperature is higher than 101˚C or air temperature in manifold is higher than 70˚C after engine stalls, fan will operate at high speed.
   - If coolant temperature is lower than 98˚C or air temperature in manifold is lower than 67˚C, fan stops operating at high speed.
   - Fan operates at most 40s after stalling.

Three-way catalytic converter protection control strategy

1. When engine is operating normally, if exhaust pipe model temperature exceeds 880˚C, exhaust temperature concentration protection function is activated, and ECU reduces the exhaust temperature by increasing the air-fuel ratio.
2. When exhaust pipe temperature drops below 830˚C, concentration protection stops operating and the air-fuel ratio returns to normal.
3. When engine is operating normally, if catalytic converter central model temperature exceeds 900˚C, catalytic converter protection function is activated and ECU reduces the catalytic converter temperature by increasing the air-fuel ratio.
4. When catalytic converter central temperature drops below 850˚C, concentration protection stops operating and air-fuel ratio returns to normal.

Canister solenoid valve control strategy

1. Canister solenoid valve opening conditions:
   a. Engine coolant temperature is higher than 60˚C.
   b. Engine air-fuel ratio control has entered the closed loop.
   c. Canister solenoid valve trouble-free.
2. Canister solenoid valve opening control:
   a. Openings of canister solenoid valve are different at different engine speeds and loads. ECU calculates the current opening of canister solenoid valve according to the conditions such as engine speed, load, and air-fuel ratio fluctuation.

Oxygen sensor heating logic

1. Oxygen sensor must reach a certain temperature in order to work normally, usually at 350˚C to 900˚C. It is not enough to heat by exhaust temperature only. Therefore, there is a fuse inside oxygen sensor for heating specially. Heating with low power before dew point and heating with high power or even full-power after the dew point. So that the oxygen sensor can reach the operating temperature as soon as possible.
2. Dew point mark is an important input for oxygen sensor heating, mainly to protect the oxygen sensor.

3. Physical background of dew point. After the engine is started and exhaust system temperature is lower for a certain period of time, water vapor may condense on exhaust system. If the oxygen sensor ceramic body exceeds a certain temperature during this period, and condensation splashes on oxygen sensor ceramic body, condensation may cause the ceramic body to break. Therefore, it is necessary to monitor oxygen sensor temperature and exhaust pipe wall temperature near the oxygen sensor in real time when engine is started. Waste water is always condensing on the exhaust pipe wall in general. When the temperature of exhaust pipe wall reaches a certain value, it will stagnate for a period of time or the rate of rise will be slower due to the condensation of water vapor and overlap of the evaporation process. Temperature at this point is called the dew point temperature. If the wall temperature continues to rise, water vapor in the exhaust will no longer condense and evaporate on exhaust pipe wall.

Knock control strategy

1. Knock control is activated when engine coolant temperature exceeds 40°C and engine load is more than 36%.
2. ECU performs knock control through feedback signal from knock sensor. When knock is detected, ECU delays the ignition angle by a fixed step of -3 degrees, and the maximum delay of ignition angle is 12 degrees. If no new knock is detected for several consecutive combustions, the delayed ignition angle will recover with a step size of 0.75 until the delayed ignition angle is fully recovered or a new knock is detected.
3. If there is a knock sensor failure, ECU will reduce the output ignition angle of the engine to ensure the safety of engine.

Ignition control strategy

1. Ignition coil charging control:
   a. Ignition coil magnetization time determines the ignition energy of the spark plug. Normally the supply voltage is close to 14V when the vehicle is working normally. If the vehicle generator is not working properly, the supply voltage may be much lower than 14V, and may even drop to 6V or lower. In order to get the same ignition energy, the ECU will change the charging time of primary coil.
2. Ignition advance angle calculation:
   a. Ignition angle control when starting: During the start-up stage of engine, system uses a separated ignition angle MAP to control the starting reliability of engine. When engine is started, system switches to normal ignition angle control mode.
   b. Ignition advance angle control at idle speed: Engine ignition angle does not operate at the optimum ignition angle when idling, but instead operates at an angle less than the optimal ignition angle. If the engine idle fluctuates or the external impact occurs, ECU can quickly correct the ignition angle to ensure the stability of idle speed.
   c. Ignition advance angle control during normal driving: When the engine is running at a constant speed, the engine is operating at the maximum ignition angle allowed under this operating condition.
   d. Ignition advance angle control during acceleration and deceleration: In order to ensure the smoothness during acceleration and deceleration, the ECU controls the ignition angle for torque intervention during acceleration and deceleration.

Fuel pump control strategy

1. When the ignition switch is turned to ON for the first time, ECU controls the operation of oil pump. After the oil pump flow reaches the set fuel supply, oil pump stops operating. If the engine has not been started, after the engine has been stopped for more than 100 seconds, oil pump will operate again after the ignition switch turned to ON each time and after three consecutive operations, oil pump will no longer operate after ignition switch turned to ON.
2. When ECU detects the engine starting, it will control the operation of oil pump.
3. When the engine is running normally, ECU controls oil pump to work continuously.

Specifications

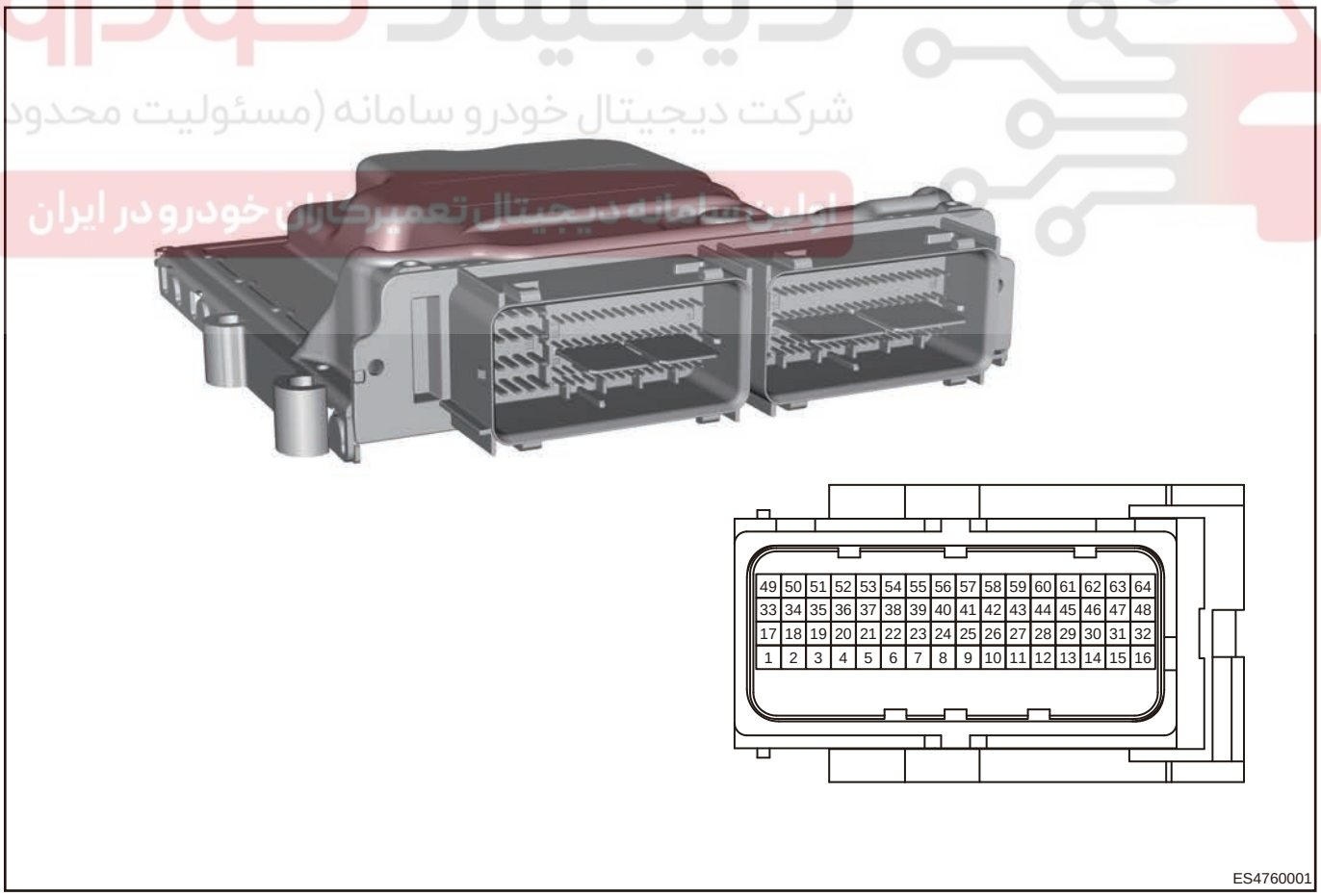
Torque Specifications

Description	Torque (N·m)
Intake Pressure Sensor Fixing Bolt	7 ± 1
Knock Sensor Fixing Bolt	20 ± 5
Engine Speed Sensor Fixing Bolt	8 ± 2
Camshaft Position Sensor Fixing Bolt	8 + 3
VVT Control Valve Fixing Bolt	8 ± 2
ECU Fixing Bolt	8 ± 2
Coolant temperature sensor	15 ± 1

Circuit Diagram

Terminal Definition

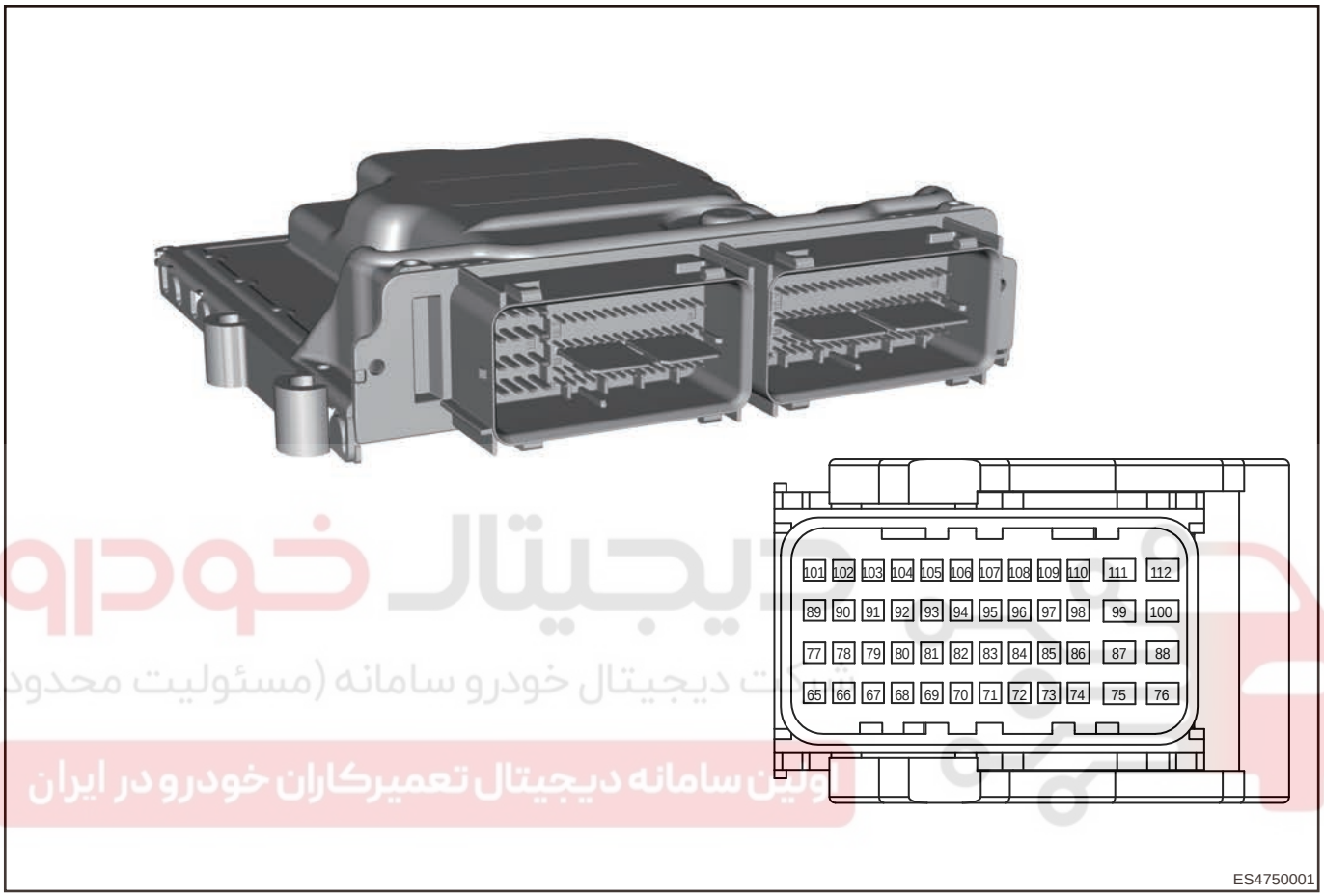
Terminal Definition



Pin	Definition	Pin	Definition
1	PCAN H	33	-
2	Front Oxygen Sensor Feedback Voltage	34	-
3	-	35	IGN Power
4	-	36	Electronic Accelerator Pedal Power Source
5	Main Relay	37	Electronic Accelerator Pedal Power Source
6	-	38	-
7	Electronic Accelerator Pedal Ground	39	-
8	-	40	-
9	Spiral Cable Signal	41	Oil Pump Relay
10	High/Low Pressure Switch	42	A/C Compressor Relay
11	Front Oxygen Sensor Virtual Ground Voltage	43	Rear Oxygen Sensor Ground
12	Absolute Brake Vacuum Sensor Signal	44	-
13	2nd Path Water Temp Sensor Signal	45	Electronic Accelerator Pedal Signal
14	Front Oxygen Sensor Control Signal	46	Boost Pressure Sensor Signal
15	Power Source	47	Sensor Ground
16	Power Source	48	Rear Oxygen Sensor Heating
17	PCAN L	49	-
18	-	50	-
19	Sensor Power Source	51	Fan Control High Speed
20	Power Source	52	-
21	Rear Oxygen Sensor Signal	53	-
22	-	54	Vacuum Pump Relay
23	Brake Switch Normal Close Signal	55	-
24	Medium Pressure Switch	56	Fan Control Low Speed
25	Brake Switch Normal Open Signal	57	-
26	-	58	-
27	-	59	Electronic Accelerator Pedal Ground
28	Front Oxygen Sensor Correction Resistance	60	3rd Path Water Temp Signal
29	-	61	-

03 - SQRE4T15C ENGINE MANAGEMENT SYSTEM

Pin	Definition	Pin	Definition
30	Electronic Accelerator Pedal Signal	62	Boost Pressure Sensor Signal
31	Exhaust Bypass Valve Motor +	63	Ground 2
32	Exhaust Bypass Valve Motor -	64	Ground 1



Pin	Definition	Pin	Definition
65	-	89	Knock Sensor Signal
66	-	90	Knock Sensor Ground
67	Cylinder 2 Injection Nozzle	91	Intake Pressure and Temperature Sensor Signal
68	Cylinder 1 Injection Nozzle	92	Electronic Water Pump 1
69	Variable Camshaft Timing (Exhaust)	93	Phase Sensor Signal 2
70	-	94	Canister Control Valve
71	Variable Camshaft Timing Valve (Intake)	95	Phase Sensor Ground
72	Cylinder 3 Injection Nozzle	96	Engine Speed Sensor Signal
73	Ignition Coil 2	97	-
74	Cylinder 4 Injection Nozzle	98	Phase Sensor Power Source

Pin	Definition	Pin	Definition
75	-	99	Electronic Throttle Body Actuator Motor +
76	Front Oxygen Sensor Heating	100	Electronic Throttle Body Actuator Motor -
77	Electronic Throttle Body Signal	101	Cooling Temperature Sensor Signal
78	Electronic Throttle Body Signal	102	Intake Pressure and Temperature Sensor Signal
79	Exhaust Bypass Valve Signal	103	Tank Pressure Sensor Signal
80	-	104	-
81	Ignition Coil 1	105	Phase Sensor Signal 1
82	Ignition Coil 3	106	Electronic Water Pump 2
83	Ignition Coil 4	107	Electronic Throttle Body Power Source
84	Engine Speed Sensor Ground	108	Engine Speed Sensor Power Source
85	Sensor Ground	109	Sensor Power Supply
86	Electronic Throttle Body Ground	110	-
87	-	111	Ground
88	Electronic Thermostat	112	Ground

Diagnosis & Test

Problem Symptoms Table

Hint:

Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Possible Cause
Engine does not crank or cranks slowly while starting.	Battery
	Starter
	Wire harness or ENGINE START STOP switch
	Starter Relay
	ECU, TCU
	Engine mechanical
Engine cranks normally but cannot start successfully while starting.	No fuel in tank
	Fuel Pump
	Fuel injector
	Engine speed sensor

Symptom	Possible Cause
	Ignition coil
	Engine immobilizer
	ECU
	Engine mechanical
Difficult to start with hot engine	Engine speed sensor
	Ignition coil
	Fuel Pump
	Coolant temperature sensor
	Engine mechanical
	Camshaft sensor
Difficult to start with cold engine	Fuel Pump
	Coolant temperature sensor
	Fuel injector
	Ignition coil
	Engine mechanical
Engine speed is normal, but it is difficult to start at anytime.	Fuel quality
	Fuel Pump
	Coolant temperature sensor
	Fuel injector
	Ignition coil
	Intake passage
	Ignition timing
	Spark plug
	Engine mechanical
Engine starts normally, but idles roughly at anytime.	Fuel quality
	Fuel Pump
	Coolant temperature sensor
	Fuel injector
	Electronic throttle body
	Intake passage
	Ignition timing

Symptom	Possible Cause
	Spark plug
	Engine mechanical
Engine starts normally, but idles roughly after warming up.	Fuel quality
	Coolant temperature sensor
	Electronic throttle body
	Intake passage
	Spark plug
	Engine mechanical
Engine starts normally, but idles roughly or stalls with part load (for example, A/C is ON).	Electronic Throttle
	Generator
Engine starts normally, but idle speed is too high.	Electronic throttle body
	Intake pipe air leaked
	Coolant temperature sensor
Low engine speed or stalls when accelerating	Intake pressure sensor
	Intake pipe
	Exhaust pipe
	Ignition timing
	Throttle position sensor
	Fuel injector
	Spark plug
Slow response when accelerating	Intake pressure sensor
	Intake pipe
	Exhaust pipe
	Ignition timing
	Throttle position sensor
	Fuel injector
	Spark plug
Lack of power and poor performance when accelerating.	Intake pressure sensor
	Intake pipe
	Exhaust pipe
	Ignition timing

Symptom	Possible Cause
	Throttle position sensor
	Fuel injector
	Spark plug

DTC Confirmation Procedure

Confirm that battery voltage is normal before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in engine system.
- Turn ENGINE START STOP switch to OFF and wait for several seconds.
- Turn ENGINE START STOP switch to “ON”, and then select read DTC.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Check engine system components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

1. Remove ground bolt or nut.
2. Check all contact surfaces for tarnish, dirt and rust, etc.
3. Clean as necessary to ensure that contact is in good condition.
4. Reinstall ground bolt or nut securely.
5. Check if any additional accessories interfere with ground circuit.
6. If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition
P049900	EVAP System Vent Valve Control Circuit High
P049800	EVAP System Vent Valve Control Circuit Low
P044700	EVAP System Vent Valve Stuck Closed
P242200	EVAP System Vent Valve Stuck Closed
P150000	EMS Received Crash Signal
P150100	Airbag Communicate Message Unplausible
P209100	“B” Camshaft Position Actuator Control Circuit High Bank 1
P209000	“B” Camshaft Position Actuator Control Circuit Low Bank 1
P001300	“B” Camshaft Position Actuator Control Circuit Open Bank 1
P000B00	“B” Camshaft Position Slow Response Bank 1
P005A00	“B” Camshaft Profile Control Performance/ Stuck Off Bank 1
P064500	A/C Compressor Relay Control Circuit
P064700	A/C Compressor Relay Control Circuit High
P064600	A/C Compressor Relay Control Circuit Low
P258D00	Vacuum Pump Control Circuit "A" High
P258C00	Vacuum Pump Control Circuit "A" Low
P258A00	Vacuum Pump Control Circuit Open
P050F00	Brake Assist Vacuum Too Low
P057100	Brake Signal Synchronization Error
U015187	Lost Communication with Restraints Control Module
U016487	Lost Communication With CLM
U014087	Lost Communication with BCM
U015587	Lost Communication with ICM
U021487	Lost Communication with Passive Entry Passive Start (PEPS)
U012687	Lost Communication with SAM
P218324	Engine Coolant Temperature Sensor 2 Circuit Range/Performance
P218323	Engine Coolant Temperature Sensor 2 Circuit Range/Performance

DTC	DTC Definition
P218500	Engine Coolant Temperature Sensor 2 Circuit High
P218400	Engine Coolant Temperature Sensor 2 Circuit Low
P059700	Thermostat Heater Control Circuit Open
P059900	Thermostat Heater Control Circuit High
P059800	Thermostat Heater Control Circuit Low
P012800	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)
U012987	Lost Communication with ESP Module
U010187	Lost Communication with TCM
P012300	Electronic Throttle Position Sensor 1 Signal Circuit Voltage Too High
P012200	Electronic Throttle Position Sensor 1 Signal Circuit Voltage Too Low
P012100	Throttle Position Sensor 1 Performance Non-plausible
P057500	Cruise Control Input Signal Not Plausible
P057800	Clamping Switch of Cruise Control
P022300	Electronic Throttle Position Sensor 2 Signal Circuit Voltage Too High
P022200	Electronic Throttle Position Sensor 2 Signal Circuit Voltage Too Low
P022100	Throttle Position Sensor 2 Performance Non-plausible
P151000	Diagnostic Fault Check Knock Control Signal Evaluation
P045128	EVAP System Pressure Sensor/Switch Circuit Range Performance
P045300	EVAP System Pressure Sensor&Switch Circuit High
P045200	EVAP System Pressure Sensor&Switch Circuit Low
P04512A	EVAP System Pressure Sensor&Switch Circuit Range Performance
P045125	EVAP System Pressure Sensor&Switch Circuit Range Performance
P155500	Throttle Actuator Electrical Malfunction
P210300	Electronic Throttle Drive Level Malfunction (Short Circuit)

DTC	DTC Definition
P211800	Electronic Throttle Drive Level Malfunction (-Overheating or Overcurrent)
P210600	Electronic Throttle Drive Level Malfunction (Non-plausible)
P210000	Electronic Throttle Drive Level Malfunction (Open Circuit)
P155400	Return Spring Check Max Error
P156100	Not Plausible Error of DV-E Position Deviation
P155C00	Throttle Limphome Position Self Learning Error
P155D00	Throttle PID Adjustment Max Error
P155E00	Throttle PID Adjustment Min Error
P155000	Throttle Self Learning Condition Not Fulfilled
P155F00	System Voltage Cannot Meet the Electronic Throttle Self-learning Condition
P156600	Throttle Mechanism Bottom Dead Center Relearning Error
P155100	Not Plausible Error of UMA Learning
P013300	O2 Sensor Circuit Slow Response Bank 1 Sensor 1
P062F41	Internal Control Module EEPROM Error
P062F42	Internal Control Module EEPROM Error
P062F43	Internal Control Module EEPROM Error
P208900	“A” Camshaft Position Actuator Control Circuit High Bank 1
P208800	“A” Camshaft Position Actuator Control Circuit Low Bank 1
P001000	“A” Camshaft Position Actuator Control Circuit Open Bank 1
P000A00	"A" Camshaft Position Slow Response Bank 1
P003C00	“A” Camshaft Profile Control Performance/ Stuck Off Bank 1
P050B00	Cold Start Ignition Timing Performance
P050B20	Cold Start Ignition Timing Performance
P026200	Cylinder 1 Injector "A" Circuit High
P026100	Cylinder 1 Injector "A" Circuit Low
P020100	Cylinder 1 - Injector Circuit Open

03 - SQRE4T15C ENGINE MANAGEMENT SYSTEM

DTC	DTC Definition
P026800	Cylinder 3 Injector "A" Circuit High
P026700	Cylinder 3 Injector "A" Circuit Low
P020300	Cylinder 3 - Injector Circuit Open
P027100	Cylinder 4 Injector "A" Circuit High
P027000	Cylinder 4 Injector "A" Circuit Low
P020400	Cylinder 4 - Injector Circuit Open
P026500	Cylinder 2 Injector "A" Circuit High
P026400	Cylinder 2 Injector "A" Circuit Low
P020200	Cylinder 2 - Injector Circuit Open
P138824	Ambient Air Temperature Sensor "A" Multiple Check
P138823	Ambient Air Temperature Sensor "A" Multiple Check
P034100	Camshaft Position Sensor "A" Circuit Range/ Performance Bank 1 or Single Sensor
P001676	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A
P034300	Camshaft Position Sensor "A" Circuit High Bank 1 or Single Sensor
P034200	Camshaft Position Sensor "A" Circuit Low Bank 1 or Single Sensor
P001678	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A
P036600	Camshaft Position Sensor “B” Circuit Range/ Performance (Bank1)
P001776	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor B
P036800	Camshaft Position Sensor “B” Circuit High (Bank1)
P036700	Camshaft Position Sensor “B” Circuit Low (Bank1)
P001778	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor B
P033900	Crankshaft Position Sensor “A” Circuit Intermittent
P261700	Crankshaft Position Signal Output Circuit Open
P057500	Cruise Control Input Signal Not Plausible
P057800	Clamping Switch of Cruise Control

DTC	DTC Definition
P058500	Cruise Control A/D Conversion Malfunction
P217700	System Too Lean Off Idle Bank 1
P217800	System Too Rich Off Idle Bank 1
P046300	Fuel Level Sensor "A" Circuit High
P046200	Fuel Level Sensor “A” Circuit Low
U067600	Lost Communication with Fuel Level Sensor "A"
P25B000	Fuel Level Sensor "A" Stuck
P128400	Fuel Level Sensor "A" Circuit Range Performance
P046129	Fuel Level Sensor "A" Circuit Range Performance
P048000	Fan 1 Control Circuit
P048100	Fan 2 Control Circuit
P069200	Fan 1 Control Circuit High
P069400	Fan 2 Control Circuit High
P069100	Fan 1 Control Circuit Low
P069300	Fan 2 Control Circuit Low
P013400	O2 Sensor Circuit No Activity Detected Bank 1 Sensor 1
P219600	O2 Sensor Signal Biased/Stuck Rich Bank 1 Sensor 1
P219500	O2 Sensor Signal Biased/Stuck Lean Bank 1 Sensor 1
P013800	Downstream oxygen sensor signal circuit short to power supply
P013700	Downstream oxygen sensor signal circuit short to ground
P223200	O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 2
P013600	O2 Sensor Circuit Bank 1 Sensor 2
P005400	HO2S Heater Resistance Bank 1 Sensor 2
P003800	HO2S Heater Control Circuit High Bank 1 Sensor 2
P003700	HO2S Heater Control Circuit Low Bank 1 Sensor 2
P003600	HO2S Heater Control Circuit Bank 1 Sensor 2
P013A00	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2
P227100	O2 Sensor Signal Biased&Stuck Rich Bank 1 Sensor 2

DTC	DTC Definition
P227000	O2 Sensor Signal Biased&Stuck Lean Bank 1 Sensor 2
P223100	O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 1
P003200	HO2S Heater Control Circuit High Bank 1 Sensor 1
P003100	HO2S Heater Control Circuit Low Bank 1 Sensor 1
P003000	HO2S Heater Control Circuit Bank 1 Sensor 1
P005300	HO2S Heater Resistance Bank 1 Sensor 1
P005326	HO2S Heater Resistance Bank 1 Sensor 1
P013500	O2 Sensor Heater Circuit Bank 1 Sensor 1
P064D17	Internal Control Module O2 Sensor Processor Performance Bank 1
P064D16	Internal Control Module O2 Sensor Processor Performance Bank 1
P064D81	Internal Control Module O2 Sensor Processor Performance Bank 1
P064D00	Internal Control Module O2 Sensor Processor Performance Bank 1
P035100	Ignition Coil "A" Primary Control Circuit Open
P035300	Ignition Coil "C" Primary Control Circuit Open
P035400	Ignition Coil "D" Primary Control Circuit Open
P035200	Ignition Coil "B" Primary Control Circuit Open
P230100	Ignition Coil “A” Primary Control Circuit High
P230700	Ignition Coil “C” Primary Control Circuit High
P231000	Ignition Coil “D” Primary Control Circuit High
P230400	Ignition Coil “B” Primary Control Circuit High
P230000	Ignition Coil “A” Primary Control Circuit Low
P230600	Ignition Coil “C” Primary Control Circuit Low
P230900	Ignition Coil “D” Primary Control Circuit Low
P230300	Ignition Coil “B” Primary Control Circuit Low
P062900	Fuel Pump “A” Control Circuit High
P062800	Fuel Pump “A” Control Circuit Low
P062700	Fuel Pump “A” Control Circuit Open
P032600	Knock Sensor Signal Circuit Voltage Too High
P032500	Knock Sensor Signal Circuit Voltage Too Low

DTC	DTC Definition
P070400	Clutch Switch Input Circuit
P032800	Knock/Combustion Vibration Sensor 1 Circuit High Bank 1 or Single Sensor
P032700	Knock/Combustion Vibration Sensor 1 Circuit Low Bank 1 or Single Sensor
P032815	Knock/Combustion Vibration Sensor 1 Circuit High Bank 1 or Single Sensor
P032714	Knock/Combustion Vibration Sensor 1 Circuit Low Bank 1 or Single Sensor
P124A00	Wastegate Actuator “A” Control Circuit Shorted
P2ABD00	Turbocharger/Supercharger Waste Gate Actuator "A" Driver Current/Temperature Too High
P124B00	Electric Waste Gate (E-WG) Actuator Control Chip SPI Bus Error
P024300	Turbocharger/Supercharger Waste Gate Solenoid "A"
P023400	Turbocharger/Supercharger Overboost Condition
P029900	Turbocharger/Supercharger "A" Underboost Condition
P050A22	Cold Start Idle Control System Performance
P050A21	Cold Start Idle Control System Performance
P050D00	Cold Start Rough Idle
P050700	Idle Control System RPM - Higher Than Expected
P050600	Idle Control System RPM - Lower Than Expected
P050500	Idle Control System
P262600	O2 Sensor Pumping Current Trim Circuit Open Bank 1 Sensor 1
P223700	O2 Sensor Positive Current Control Circuit Open Bank 1 Sensor 1
P013200	O2 Sensor Circuit High Voltage Bank 1 Sensor 1 (UN, VM, IA, IP)
P013100	O2 Sensor Circuit Low Voltage Bank 1 Sensor 1 (UN, VM, IA, IP)
P224300	O2 Sensor Reference Voltage Circuit Open Bank 1 Sensor 1
P225100	O2 Sensor Negative Current Control Circuit Open Bank 1 Sensor 1
P013000	O2 Sensor Circuit Bank 1 Sensor 1

03 - SQRE4T15C ENGINE MANAGEMENT SYSTEM

DTC	DTC Definition
P030000	Random/Multiple Cylinder Misfire Detected
P154000	Engine Torque Control Adaption at Limit
P030100	Cylinder 1 Misfire Detected
P030300	Cylinder 3 Misfire Detected
P030400	Cylinder 2 Misfire Detected
P030200	Cylinder 2 Misfire Detected
P036300	Cylinder Selective Fuel Cutoff Active due to Catalyst Damaging Misfire
P070000	Transmission Control System (MIL Request)
P06AA00	Control Module Internal Temperature "B" Too High
P068600	ECM/PCM Power Relay Control Circuit Low
P153000	Function Monitoring: Fault of ECM ADC - Null Load Test Pulse
P153100	Function Monitoring: Fault of ECM ADC - Test Voltage
P157000	Function Monitoring:Fault of ECU Monitoring Module Error
P060D00	Internal Control Module Accelerator Pedal Position Performance
P152000	Function Monitoring: Check of Predicted Air Mass Failed
P152100	Function Monitoring: Fault of ECU Check of Injection Cut-off
P152200	Function Monitoring: Fault of ECU in Check of Cylinder Individual Fuel Corrections
P061C00	Internal Control Module Engine RPM Performance
P152300	Function Monitoring: Fault of ECU or Sensor in Mixture Check
P152700	Function Monitoring: Monitoring of ICO From Level1
P152800	Function Monitoring: Monitoring of ICO From Level2
P152400	Function Monitoring: Fault of ECU Comparison of Lambda and Operation Mode
P152500	Function Monitoring: Fault of ECU or Sensor in rl-Comparison
P152900	Function Monitoring: Fault of Starter Control
P061A00	Internal Control Module Torque Performance

DTC	DTC Definition
P152600	Function Monitoring: Fault of ECU Ignition Timing
P157600	OverVoltage of ECU VDD5
P157700	UnderVoltage of ECU VDD5
P001400	"B" Camshaft Position - Timing Over-Advanced or System Performance Bank 1
P001100	"A" Camshaft Position - Timing Over-Advanced or System Performance Bank 1
P021900	Engine Overspeed Condition
P157800	Diagnostic Fault Check to Report "WDA Active"
P157300	Diagnostic Fault Check to Report "WDA active" Due to Errors in Query/Response Communication
P157500	Diagnostic Fault Check to Report "WDA active" Due to Overvoltage Detection
P218700	System Too Lean at Idle Bank 1
P218800	System Too Rich at Idle Bank 1
P055800	Brake Booster Pressure Sensor Circuit High
P055700	Brake Booster Pressure Sensor Circuit Low
P145000	Brake Booster Pressure Sensor Circuit Range/ Performance (High)
P145100	Brake Booster Pressure Sensor Circuit Range/ Performance (Low)
P120000	Manifold Absolute Pressure Sensor Circuit Range/ Performance
P120100	Manifold Absolute Pressure Sensor Circuit Range/ Performance
P00C721	Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1
P00C722	Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1
P010800	Manifold Absolute Pressure Sensor Circuit High
P010700	Manifold Absolute Pressure Sensor Circuit Low
P010621	Manifold Absolute Pressure Sensor Circuit Range/ Performance
P010601	Manifold Absolute Pressure Sensor Circuit Range/ Performance
P01062A	Manifold Absolute Pressure Sensor Circuit Range/ Performance
P046800	EVAP Purge Flow Sensor Circuit High

DTC	DTC Definition
P046700	EVAP Purge Flow Sensor Circuit Low
P128500	EVAP Purge Flow Sensor Circuit Range Performance
P128600	EVAP Purge Flow Sensor Circuit Range Performance
P222900	Barometric Pressure Sensor "A" Circuit High
P222800	Barometric Pressure Sensor "A" Circuit Low
P223000	Barometric Pressure Sensor "A" Circuit Intermittent/Erratic
P120200	Barometric Pressure Sensor "A" Circuit Range/ Performance
P120300	Barometric Pressure Sensor “A” Circuit Range/ Performance
P222722	Barometric Pressure Sensor "A" Circuit Range/ Performance
P222721	Barometric Pressure Sensor “A” Circuit Range/ Performance
P023800	Turbocharger/Supercharger Boost Sensor "A" Circuit High
P023700	Turbocharger/Supercharger Boost Sensor "A" Circuit Low
P120400	Turbocharger/Supercharger Boost Sensor "A" Circuit Range/Performance
P120500	Turbocharger/Supercharger Boost Sensor "A" Circuit Range/Performance
P023622	Turbocharger/Supercharger Boost Sensor "A" Circuit Range/Performance
P023621	Turbocharger/Supercharger Boost Sensor "A" Circuit Range/Performance
P212300	Pedal Pos.Sensor 1 Circ. High Input
P212800	Throttle/Pedal Position Sensor/Switch “E” Circuit High
P212200	Throttle/Pedal Position Sensor/Switch “D” Circuit Low
P212700	Throttle/Pedal Position Sensor/Switch “E” Circuit Low
P201000	Intake Manifold Runner Control Circuit High Bank 1
P200900	Intake Manifold Runner Control Circuit Low Bank 1
P200800	Intake Manifold Runner Control Circuit/Open Bank 1

DTC	DTC Definition
P261000	ECM/PCM Engine Off Timer Performance
P061500	Starter Relay “A” Circuit
P061700	Starter Relay “A” Circuit High
P213800	Throttle/Pedal Position Sensor/Switch “D”/ “E” Voltage Correlation
P064100	Sensor Reference Voltage "A" Circuit Open
P065100	Sensor Reference Voltage "B" Circuit Open
P063442	Control Module Internal Temperature "A" Too High
P00CE24	Intake Air Temperature Sensor 1 Multiple Check Bank 1
P00CE23	Intake Air Temperature Measurement System - Multiple Sensor Correlation Bank 1
P011300	Intake Air Temperature Sensor 1 Circuit High Bank 1
P011200	Intake Air Temperature Sensor 1 Circuit Low Bank 1
P011400	Intake Air Temperature Sensor 1 Circuit Intermittent Bank 1
P138024	Intake Air Temperature Sensor 2 Multiple Check Bank1
P138023	Intake Air Temperature Measurement System - Multiple Sensor Correlation Bank 2
P009800	Intake Air Temperature Sensor 2 Circuit High Bank 1
P009700	Intake Air Temperature Sensor 2 Circuit Low Bank 1
P009900	Intake Air Temperature Sensor 2 Circuit Intermittent Bank 1
P044200	EVAP System Leak Detected (Small Leak)
P045500	EVAP System Leak Detected (Large Leak)
P04F000	EVAP System High Pressure Purge
P049600	EVAP System High Purge Flow
P049700	EVAP System Low Purge Flow
P045900	Evaporative Emission System Purge Control Valve Circuit High
P045800	Evaporative Emission System Purge Control Valve Circuit Low

03 - SQRE4T15C ENGINE MANAGEMENT SYSTEM

DTC	DTC Definition
P044400	Evaporative Emission System Purge Control Valve Circuit Open
P01E424	Engine Coolant Temperature Sensor 3 Circuit Range/Performance
P01E423	Engine Coolant Temperature Sensor 3 Circuit Range/Performance
P01E600	Engine Coolant Temperature Sensor 3 Circuit High
P01E500	Engine Coolant Temperature Sensor 3 Circuit Low
P050C24	Cold Start Engine Coolant Temperature Performance
P050C23	Cold Start Engine Coolant Temperature Performance
P011800	Engine Coolant Temperature Sensor 1 Circuit High
P011700	Engine Coolant Temperature Sensor 1 Circuit Low
P011900	Engine Coolant Temperature Sensor 1 Circuit Intermittent
P011623	Engine Coolant Temperature Sensor 1 Circuit Range/Performance
P011626	Engine Coolant Temperature Sensor 1 Circuit Range/Performance
P007200	Ambient Air Temperature Sensor Circuit "A" Low
P007300	Ambient Air Temperature Sensor Circuit "A" High
P007000	Ambient Air Temperature Sensor Circuit "A"
P209700	Post Catalyst Fuel Trim System Too Rich Bank 1
P209600	Post Catalyst Fuel Trim System Too Lean Bank 1
P042000	Catalyst System Efficiency Below Threshold Bank 1
P069000	ECM/PCM Power Relay Sense Circuit High
P056300	System Voltage High
P056200	System Voltage Low
P056000	System Voltage Unstable
P241400	O2 Sensor Exhaust Sample Error Bank 1 Sensor 1
P256500	Turbocharger Boost Control Position Sensor "A" Circuit High
P256400	Turbocharger Boost Control Position Sensor "A" Circuit Low
P063443	Control Module Internal Temperature "A" Too High

DTC	DTC Definition
P121200	Vehicle Speed Sensor "A" Circuit Range/ Performance
P050300	Vehicle Speed Sensor "A" Circuit Intermittent/ Erratic/High
P050000	Vehicle Speed Sensor "A" Circuit
P050166	Vehicle Speed Sensor "A" Circuit Range/ Performance
P050165	Vehicle Speed Sensor "A" Circuit Range/ Performance
P161300	EMS Anti-theft Configuration Inconsistent with Model
P051300	Incorrect Immobilizer Key
P063300	Immobilizer Key Not Programmed-ECU/PCM
P161000	No Response Received by ECM/PCM After Challenge Sent
P161200	Internal Error When Writing Data to EEPROM
P161100	Invalid Initial Value in EEPROM
P024477	Turbocharger/Supercharger Wastegate Actuator "A" Range/Performance
P024437	Turbocharger/Supercharger Wastegate Actuator "A" Range/Performance
P003A00	Turbocharger/Supercharger Boost Control "A" Position Exceeded Learning Limit
P130100	Auxiliary Water Pump Dry Run Error
P261D00	Coolant Pump "B" Control Circuit High
P261C00	Coolant Pump "B" Control Circuit Low
P261A00	Coolant Pump "B" Control Circuit Open
P130300	Auxiliary Water Pump Out Of Voltage Error
P130400	Auxiliary Water Pump Over Current
P130500	Auxiliary Water Pump Over Temperature Error
P130600	Auxiliary Water Pump Feedback Signal High
P130700	Auxiliary Water Pump Feedback Signal Low
P130800	Auxiliary Water Pump Stall Error
P130900	Auxiliary Water Pump Under Voltage

P049900 Canister Vent Valve Control Circuit Short to Power Supply

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Canister vent valve control circuit is short to power supply.
   - Canister vent valve control circuit pin corresponding to ECU terminal is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Canister vent valve control circuit is short to power supply.	Yes	Repair wire harness
		No	Next
2	Canister vent valve control circuit pin corresponding to ECU terminal is short to power supply.	Yes	Check and repair ECU
		No	Diagnostic Help

P049800 Canister Vent Valve Control Circuit Short to Ground

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Canister vent valve control circuit is short to ground.
   - Canister vent valve control circuit pin corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Canister vent valve control circuit is short to ground.	Yes	Repair wire harness
		No	Next
2	Canister vent valve control circuit pin corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P044700 Canister Vent Valve Control Circuit Open

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Connector is not connected securely or is in poor contact.
   - Canister vent valve control circuit is open.
   - Canister vent valve control circuit power supply terminal is open or short to ground.
   - Canister vent valve control circuit fuse is blown or damaged.
   - Canister vent valve control circuit pin corresponding to ECU terminal is open or there is an internal circuit damage.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
2	Canister vent valve control circuit is open.	Yes	Repair wire harness

No.	Operation Step	Test Result	Subsequent Step
		No	Next
3	Canister vent valve control circuit power supply terminal is open or short to ground.	Yes	Repair wire harness
		No	Next
4	Canister vent valve control circuit fuse is blown or damaged.	Yes	Repair relay
		No	Next
5	Canister vent valve control circuit pin corresponding to ECU terminal is open or there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P242200 Canister Vent Valve Stuck Closed Problem

DTC reporting condition: Fuel tank pressure is lower than threshold.

1. Possible cause:
   - Voltage of canister vent valve pin is low, which makes the canister vent valve close.
   - Canister vent valve is stuck at normally closed position and cannot be opened.
   - Canister vent valve pipe is blocked.
   - Canister valve is stuck at normally open position.
   - Fuel tank pressure sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”		Next
2	Read and store fault freeze frame information.		Next
3	Keep sensor connector normal. Using a multimeter, check if voltage of canister vent valve pin is low and if it is short to ground.	Yes	Check wire harness and connector
		No	Next
4	Remove canister vent valve pipe and observe if it is blocked.	Yes	Replace pipe
		No	Next
5	Check if canister vent valve hardware is stuck at closed position.	Yes	Replace canister vent valve
		No	Next
6	Check if canister valve is stuck at normally open position.	Yes	Check canister valve wire harness and connector or replace canister valve
		No	Next
7	Replace fuel tank pressure sensor, start vehicle and run it for 10 minutes to check if malfunction reappears.	Yes	Diagnostic Help
		No	End

P150100 Airbag Communication Message Implausible

DTC reporting condition: Verification of signal sent from airbag controller to engine ECU is not passed.

1. Possible cause:
   - There is wire harness interference or unreliable signal transmission.
   - Verification of signal sent from airbag controller to engine ECU is not passed, and check if signal is abnormal.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	There is wire harness interference or unreliable signal transmission.	Yes	Interference is shielded
		No	Next
2	Verification of signal sent from airbag controller to engine ECU is not passed, and check if signal is abnormal.	Yes	Check airbag controller
		No	Diagnostic Help

P209100 “B” Camshaft Position Actuator Control Circuit High Bank 1

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Exhaust VVT control solenoid valve signal terminal is short to power supply.
   - Exhaust VVT control solenoid valve signal terminal pin corresponding to ECU terminal is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Exhaust VVT control solenoid valve signal terminal is short to power supply.	Yes	Repair wire harness
		No	Next
2	Exhaust VVT control solenoid valve signal terminal pin corresponding to ECU terminal is short to power supply.	Yes	Check and repair ECU
		No	Diagnostic Help

P209000 “B” Camshaft Position Actuator Control Circuit Low Bank 1

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Exhaust VVT control solenoid valve signal terminal is short to ground.
   - Exhaust VVT control solenoid valve power supply terminal is short to ground.
   - Exhaust VVT control solenoid valve signal terminal pin corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Exhaust VVT control solenoid valve signal terminal is short to power supply.	Yes	Repair wire harness
		No	Next

No.	Operation Step	Test Result	Subsequent Step
2	Exhaust VVT control solenoid valve signal terminal pin corresponding to ECU terminal is short to power supply.	Yes	Repair wire harness
		No	Next
3	Exhaust VVT control solenoid valve signal terminal pin corresponding to ECU is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P001300 “B” Camshaft Position Actuator Control Circuit Open Bank 1

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Pin corresponding to exhaust VVT control circuit is open.
   - Connector is in poor contact or is open.
   - Actuator side circuit is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Pin corresponding to exhaust VVT control circuit is open.	Yes	Repair, replace wire harness
		No	Next
2	Connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
3	Exhaust VVT circuit is damaged.	Yes	Replace VVT
		No	Next
4	ECU control pin corresponding to VVT is malfunctioning.	Yes	Check and repair ECU
		No	Diagnostic Help

P000B00 “B” Camshaft Position Slow Response Bank 1

DTC reporting condition: Actual position of VVT has poor following performance to the target position.

1. Possible cause:
   - OCV oil valve pressure is insufficient.
   - OCV oil valve is blocked or leaks.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if operating condition of cam phase regulator is normal (dirt blockage, oil leakage, sticking).	Yes	Next
		No	Perform necessary check, repair and maintenance
2	Check if operating condition of OCV oil control valve is normal.	Yes	Diagnostic Help

No.	Operation Step	Test Result	Subsequent Step
		No	Perform necessary check, repair and maintenance

P005A00 “B” Camshaft Profile Control Performance/Stuck Off Bank 1

DTC reporting condition: Actual position of VVT cannot be moved near the target position.

1. Possible cause:
   - OCV oil valve pressure is insufficient.
   - OCV oil valve is blocked or leaks.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if operating condition of cam phase regulator is normal (dirt blockage, oil leakage, sticking).	Yes	Next
		No	Perform necessary check, repair and maintenance
2	Check if operating condition of OCV oil control valve is normal.	Yes	Diagnostic Help
		No	Perform necessary check, repair and maintenance

P064500 A/C Compressor Relay Circuit Fault

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Connector is not connected securely or is in poor contact.
   - A/C compressor relay control circuit is open.
   - A/C compressor relay control circuit power supply terminal is open or short to ground.
   - A/C compressor relay fuse is blown or damaged.
   - A/C compressor control pin corresponding to ECU terminal is open or there is an internal circuit damage.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
2	A/C compressor relay control circuit is open.	Yes	Repair wire harness
		No	Next
3	A/C compressor relay control circuit power supply terminal is open or short to ground.	Yes	Repair wire harness
		No	Next
4	A/C compressor relay fuse is blown or damaged.	Yes	Repair relay
		No	Next

No.	Operation Step	Test Result	Subsequent Step
5	A/C compressor control pin corresponding to ECU terminal is open or there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P064700 A/C Compressor Relay Control Circuit High

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - A/C compressor relay circuit is short to power supply.
   - A/C compressor relay pin corresponding to ECU terminal is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	A/C compressor relay circuit is short to power supply.	Yes	Repair wire harness
		No	Next
2	A/C compressor relay pin corresponding to ECU terminal is short to power supply.	Yes	Check and repair ECU
		No	Diagnostic Help

P064600 A/C Compressor Relay Control Circuit Low

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - A/C compressor relay circuit is short to ground.
   - A/C compressor relay pin corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	A/C compressor relay circuit is short to ground.	Yes	Repair wire harness
		No	Next
2	A/C compressor relay pin corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P057100 Brake Pedal Signal Synchronization Malfunction

DTC reporting condition: When synchronization error occurs between two brake signals Brk_stMn and Brk_stRed for more than 1 second and consecutive times exceeds Brk_cntrSynErrThd_C, a fault will be reported.

1. Troubleshooting method:

Step	Operation	Yes	No
1	Collect brake switch main signal Brk_stMn and brake redundancy signal Brk_stRed, and check if they meet the requirements of UMC: Stroke of two asynchronous sections cannot be too long	Replace vehicle controller, and then go to step 3.	Go to step 2
2	Check if brake pedal wire harness is connected reliably and if mechanical structure of brake pedal is abnormal.	Replace wire harness or brake pedal, and then go to step 3.	Go to step 3
3	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troubleshooted, and system is normal.	Replace vehicle controller

P012800 Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)

DTC reporting condition: Coolant temperature does not reach the standard opening temperature of thermostat.

1. Possible cause:
   - Thermostat is in normally open position.
   - The measured value of coolant temperature sensor is offset.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if thermostat is in normally open position or is damaged.	Yes	Check and repair thermostat
		No	Next
2	Coolant temperature sensor signal pin terminal corresponding to ECU is short to power supply, open or there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P012300 Electronic Throttle 1st Path Signal Voltage Maximum Problem / P022300 Electronic Throttle 2nd Path Signal Voltage Maximum Problem

DTC reporting condition: The voltage value of a certain path of throttle signal is higher than a certain value for a certain time.

1. Possible cause:
   - Electronic throttle 1st path / 2nd path signal circuit is short to 5 V power supply.
   - Open in electronic throttle signal ground wire will cause two faults to be reported at the same time.
2. DTC clearing condition: DTC is deleted after 40 consecutive warm-up cycles without faults.
3. Troubleshooting method:

Step	Operation	Yes	No
1	Collect two signal voltage values of electronic throttle ThrVlv_uRawSens1B1, ThrVlv_uRawSens2B1, and observe if it is pulled near 5 V.	Go to step 2	Repeat the measurement until it reappears
2	The actions such as unplugging and plugging connector, shaking wire harness, etc. will affect the occurrence frequency of faults.	Go to step 3	Go to step 4
3	Verify if wire harness resistance is the cause by electronic throttle flying wire connection.	Replace wire harness, and then go to step 5	Go to step 4
4	Replace throttle body to determine if there is an internal problem in throttle.	Go to step 5	Replace vehicle controller, and then go to step 5
5	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troubleshooted, and system is normal	Replace vehicle controller

P012100 Electronic Throttle 1st Path Signal Voltage Not Plausible Fault / P022100 Electronic Throttle 2nd Path Signal Voltage Not Plausible Fault

DTC reporting condition: Compare the 1st path signal of electronic throttle body with the difference value measured by 5 V minus 2nd path signal, if the deviation exceeds threshold and it is confirmed by a period of time, compare the two paths signals with the signal after inflation pressure conversion respectively, if the deviation from the main charging signal exceeds a certain value and it is confirmed by a period of time, fault will be reported from the path.

1. Possible cause:
   - 1st and 2nd path signal circuits of electronic throttle are short.
   - Resistance on 5 V power supply line or GND line of electronic throttle causes 5 V signal terminal voltage to be pulled down or zero voltage to be increased.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Collect and observe if the voltage sum of two DVE signals ThrVlv_uRawSens1B1 and ThrVlv_ uRawSens2B1 deviates from 5 V.	Go to step 2	Repeat the measurement until it reappears
2	The actions such as unplugging and plugging connector, shaking wire harness, etc. will affect the occurrence frequency of faults.	Go to step 3	Go to step 5
3	Measure the voltage drop of each section on wire harness through AD-Scan. If wire harness is ideal, there is no voltage drop, and if there is a voltage drop, it means that there is resistance in wire harness or connector.	Go to step 4	Go to step 5

Step	Operation	Yes	No
4	Verify if wire harness is the cause by electronic throttle flying wire connection.	Replace wire harness, and then go to step 6	Go to step 5
5	Replace throttle body to determine if there is an internal problem in throttle.	Go to step 6	Replace vehicle controller, and then go to step 6
6	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troubleshooted, and system is normal	Replace vehicle controller

P151000 Diagnostic Fault Check Knock Control Signal Evaluation

DTC reporting condition: The occurrence number of window length error is greater than 4, and the occurrence number of window output without measurement is greater than 28.

1. Possible cause:
   - Sensor is damaged.
   - ECU is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if knock sensor is damaged.	Yes	Replace sensor
		No	Next
2	Check if ECU is damaged.	Yes	Check and repair ECU
		No	Diagnostic Help

P045128 EVAP System Pressure Sensor/Switch Circuit Range Performance

DTC reporting condition: The difference between fuel tank pressure value and the reference fuel tank pressure value during cold start exceeds threshold.

1. Possible cause:
   - Fuel tank pressure sensor is damaged.
   - Pipe from fuel tank to canister is blocked.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Replace fuel tank pressure sensor, check if malfunction reappears.	Yes	End
		No	Next
4	Check if pipe from fuel tank to canister is blocked.	Yes	Replace pipe

No.	Operation Step	Test Result	Subsequent Step
		No	Next
5	Replace ECU, check if malfunction reappears.	Yes	Diagnostic Help
		No	End

P045300 Fuel Tank Pressure Sensor Signal Short to Power Supply

DTC reporting condition: Pressure sensor voltage signal exceeds 4.8 V.

1. Possible cause:
   - Fuel tank pressure sensor signal terminal is short to power supply.
   - Fuel tank pressure sensor signal pin corresponding to ECU terminal is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Use a multimeter to measure if fuel tank pressure signal circuit voltage is close to or equal to 5 V.	Yes	Replace sensor
		No	Next
4	Measure if wire harness terminal voltage corresponding to fuel tank pressure signal is close to or equal to 5 V.	Yes	Check wire harness
		No	Next
5	Check if intake pressure sensor signal pin corresponding to ECU terminal is short to power supply, or if there is an internal circuit damage.	Yes	Check and repair or replace ECU
		No	Diagnostic Help

P045200 Fuel Tank Pressure Sensor Signal Short to Ground

DTC reporting condition: Pressure sensor voltage signal is lower than 0.2 V.

1. Possible cause:
   - Fuel tank pressure sensor signal terminal is short to ground.
   - Fuel tank pressure sensor signal pin corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Use a multimeter to measure if fuel tank pressure signal circuit voltage is close to or equal to 0V.	Yes	Replace sensor
		No	Next
4	Measure if wire harness terminal voltage corresponding to fuel tank pressure signal is close to or equal to 0V.	Yes	Check wire harness
		No	Next

No.	Operation Step	Test Result	Subsequent Step
5	Check if intake pressure sensor signal pin corresponding to ECU terminal is short to ground, or if there is an internal circuit damage.	Yes	Check and repair or replace ECU
		No	Diagnostic Help

P04512A EVAP System Pressure Sensor&Switch Circuit Range Performance

DTC reporting condition: The difference between maximum fuel tank pressure and minimum fuel tank pressure is lower than threshold.

1. Possible cause:
   - Charcoal canister solenoid valve is stuck at normally closed position or normally open position.
   - Pipe from fuel tank to canister is blocked or disconnected.
   - Pipe from canister to canister valve is blocked or disconnected.
   - Fuel tank pressure sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check if charcoal canister solenoid valve is stuck at normally closed position or normally open position.	Yes	Replace canister solenoid valve
		No	Next
4	Check if pipe from fuel tank to canister is blocked/ disconnected.	Yes	Replace pipe
		No	Next
5	Check if pipe from canister to canister valve is blocked/ disconnected.	Yes	Replace pipe
		No	Next
6	Replace fuel tank pressure sensor. Start vehicle and run it for 10 minutes to check if malfunction reappears.	Yes	Diagnostic Help
		No	End

P045125 EVAP System Pressure Sensor&Switch Circuit Range Performance

DTC reporting condition: The fluctuation amount of fuel tank pressure exceeds threshold continually.

1. Possible cause:
   - Fuel tank pressure sensor is damaged.
   - Canister valve is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next

No.	Operation Step	Test Result	Subsequent Step
3	Replace fuel tank pressure sensor, start vehicle again, wait for 10 minutes to check if malfunction reappears.	Yes	Next
		No	End
4	Replace ECU. Start vehicle again, wait for 10 minutes to check if malfunction reappears.	Yes	Next
		No	End
5	Check canister valve wire harness and replace canister valve, start vehicle again, wait for 10 minutes to check if malfunction reappears.	Yes	Diagnostic Help
		No	End

P155400/ P155500/P156100 Electronic Throttle Spring Inspection Malfunction Minimum, Maximum / Deviation Between Throttle Target Opening Angle and Actual Opening Angle

DTC reporting condition: After ignition switch is turned to ON, the system will command DVE to open to a certain opening by ECU, and check if DVE can be reached within the specified time, and then check if DVE can be returned within the specified time; if it cannot reach the specified position within the specified time, it is determined as P1555; if it cannot return to the specified range within the specified time after opening, it is determined as P1554. When ECU drives throttle, ECU will always compare the target opening with the actual throttle feedback opening. When deviation between the target and the actual exceeds a certain value and it is confirmed after a period of time, it will be determined as P1561.

1. Possible cause:
   - Electronic throttle drive motor pin is open or short somewhere.
   - Electronic throttle body valve plate is dirty or there are foreign matters, so that the valve plate is stuck.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Check if the actual opening ThrVlv_ratActIntB1 is consistent with the target opening ThrVlv_ratDesB1.	Go to step 2	Repeat the measurement until it reappears
2	The actions such as unplugging and plugging connector, shaking wire harness, etc. will affect the occurrence frequency of faults.	Go to step 3	Go to step 4
3	Verify if wire harness is the cause by electronic throttle flying wire connection.	Replace wire harness, and then go to step 5	Go to step 4
4	Replace throttle body to determine if there is an internal problem in throttle.	Go to step 5	Replace vehicle controller, and then go to step 5
5	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troubleshooted, and system is normal	Replace vehicle controller

P155C00 Electronic Throttle Limphome Position Self-learning Error

DTC reporting condition: NLP position learned by throttle is out of the reasonable range, and a fault is reported.

1. Possible cause:
   - Throttle or ECU is abnormal during throttle self-learning.
2. Troubleshooting method:

Step	Operation	Yes	No
1	In an environment with temperature greater than 5 degrees, turn ignition switch to ON again, wait for 40 seconds, observe if throttle can complete the self-learning once again	Go to step 2	Replace ECU or throttle
2	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troubleshooted, and system is normal	Replace ECU or throttle

P155D00/P155E00 Electronic Throttle PID Adjustment Malfunction

DTC reporting condition: When throttle duty ratio exceeds the limit for a short time, P155E (DVERmin) will be reported; When throttle duty ratio exceeds the limit for a long time, P155D (DVERmax) will be reported.

1. Possible cause:
   - Electronic throttle drive motor pin is open or short somewhere.
   - Electronic throttle body valve plate is dirty or there are foreign matters, so that the valve plate resistance is large or valve plate is stuck.
   - Throttle drive chip in ECU is abnormal.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Observe if fault occurs together with P1561 (DFC_ DVELnpl).	It is likely that motor pin is faulty, go to step 2	There may be a number of causes: Throttle valve plate is stuck by foreign matter (the possibility is greater); It may be caused by throttle drive motor pin failure; It may also be caused by the hardware failure in DVE drive module in ECU (the possibility is small), go to step 2
2	Replace throttle body to determine if there is an internal problem in throttle.	Go to step 4	Go to step 3
3	Replace ECU to determine if there is a throttle drive module failure in ECU.	Go to step 4	Troubleshoot other DTCs
4	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troubleshooted, and system is normal	Replace vehicle controller

P013300 O2 Sensor Circuit Slow Response Bank 1 Sensor 1

DTC reporting condition: The dynamic factor of upstream oxygen sensor is less than the threshold.

1. Possible cause:
   - Oxygen sensor is aging and response becomes slower.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check intake system and exhaust system for air leakage.	Yes	Repair leaking area
		No	Next
4	Replace the upstream LSU oxygen sensor. Check if malfunction reappears after returning vehicle to customer.	Yes	Diagnostic Help
		No	End

P062F42, P062F43 EEPROM Writing or Reading Failure

DTC reporting condition: EEPROM reading and writing operations fail.

1. Possible cause:
   - The data written by PAV is incomplete.
   - Storage structure changes after software is refreshed.
   - Flash module is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	After ECU is completely powered off, no faults will be reported.	Yes	End
		No	Next
2	Replace ECU.	Yes	Check and repair ECU

P208900 “A” Camshaft Position Actuator Control Circuit High Bank 1

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Intake VVT control solenoid valve signal terminal is short to power supply.
   - Intake VVT control solenoid valve signal terminal pin corresponding to ECU terminal is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Intake VVT control solenoid valve signal terminal is short to power supply.	Yes	End
		No	Next
2	Intake VVT control solenoid valve signal terminal pin corresponding to ECU terminal is short to power supply.	Yes	Check and repair ECU
		No	Diagnostic Help

P208800 “A” Camshaft Position Actuator Control Circuit Low Bank 1

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Intake VVT control solenoid valve signal terminal is short to ground.
   - Intake VVT control solenoid valve power supply terminal is short to ground.
   - Intake VVT control solenoid valve signal terminal pin corresponding to ECU is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Intake VVT control solenoid valve signal terminal is short to ground.	Yes	Repair wire harness
		No	Next

No.	Operation Step	Test Result	Subsequent Step
2	Intake VVT control solenoid valve power supply terminal is short to ground.	Yes	Repair wire harness
		No	Next
3	Intake VVT control solenoid valve signal terminal pin corresponding to ECU is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P001000 Control Circuit of Camshaft Control Valve (Inlet)

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Intake VVT control circuit corresponding pin is open.
   - Connector is in poor contact or is open.
   - Actuator side circuit is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Intake VVT control circuit corresponding pin is open.	Yes	Repair, replace wire harness
		No	Next
2	Connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
3	Intake VVT circuit is damaged.	Yes	Replace VVT actuator
		No	Next
4	ECU control pin corresponding to VVT is malfunctioning.	Yes	Check and repair ECU
		No	Diagnostic Help

P000A00 "A" Camshaft Position Slow Response Bank 1

DTC reporting condition: Actual position of VVT has poor following performance to the target position.

1. Possible cause:
   - OCV oil valve pressure is insufficient.
   - OCV oil valve is blocked or leaks.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if operating condition of cam phase regulator is normal (dirt blockage, oil leakage, sticking).	Yes	Next
		No	Perform necessary check, repair and maintenance

No.	Operation Step	Test Result	Subsequent Step
2	Check if operating condition of OCV oil control valve is normal.	Yes	Diagnostic Help
		No	Perform necessary check, repair and maintenance

P003C00 “A” Camshaft Profile Control Performance/Stuck Off Bank 1

DTC reporting condition: Actual position of VVT cannot be moved near the target position.

1. Possible cause:
   - OCV oil valve pressure is insufficient.
   - OCV oil valve is blocked or leaks.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if operating condition of cam phase regulator is normal (dirt blockage, oil leakage, sticking).	Yes	Next
		No	Perform necessary check, repair and maintenance
2	Check if operating condition of OCV oil control valve is normal.	Yes	Diagnostic Help
		No	Perform necessary check, repair and maintenance

P050B00 Cold Start Ignition Timing Performance

DTC reporting condition: The ignition angle efficiency during parking idling catalytic converter heating exceeds the set threshold.

1. Possible cause:
   - There are other DTCs such as throttle failure or misfire failure, resulting in a decrease in intake air flow and abnormity in ignition angle efficiency;
   - The electronic throttle is stuck in a position with a small opening;
   - Check if intake manifold is leaking; exhaust resistance is too large; supplying pressure is too low;
   - ECU is malfunctioning;
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Using a diagnostic tester, check if there are other faults such as misfire faults and throttle faults.	Yes	Troubleshoot these faults
		No	Next
2	The electronic throttle is stuck in a position with a small opening.	Yes	Repair throttle system
		No	Next

No.	Operation Step	Test Result	Subsequent Step
3	Check if intake manifold is leaking; exhaust resistance is too large; supplying pressure is too low;	Yes	Troubleshoot corresponding system faults
		No	Next
4	If ECU is malfunctioning	Yes	Replace ECU
		No	Diagnostic Help

P034100 Intake Camshaft Phaser Sensor Signal Improper

DTC reporting condition: Sensor signal failure counter of intake camshaft phase sensor exceeds the threshold.

1. Possible cause:
   - Connector is not connected securely or disconnected;
   - Relative installation position between intake phase sensor and its signal plate does not meet the installation requirements;
   - There is mechanical malfunction in intake phase signal plate teeth.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
2	Check wire harness for external interference.	Yes	Shield the wire harness
		No	Next
3	Check if relative installation position between intake phase sensor and its signal plate does not meet the installation requirements (such as too far, misaligned, etc.)	Yes	Reinstall it
		No	Next
4	Check for mechanical malfunction in intake phase signal plate teeth	Yes	Replace phase signal plate
		No	Diagnostic Help

P034300 Camshaft Position Sensor “A” Circuit High Bank 1 or Single Sensor

DTC reporting condition: Sensor signal failure counter of intake camshaft phase sensor exceeds the threshold.

1. Possible cause:
   - Intake phase sensor ground terminal is malfunctioning;
   - Intake phase sensor signal terminal is short to power supply;
   - Intake phase sensor signal terminal ECU pin is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Unplug connector from intake phase sensor on wire harness, and use a multimeter to check if the voltage between power supply terminal and ground terminal pin of phase sensor is about 12 V.	Yes	Next
		No	Step 3
2	Check if the voltage between signal terminal and power supply terminal pin of intake phase sensor is 12 V.	Yes	Repair wire harness
		No	Step 4
3	Check if intake phase sensor ground terminal pin is open or short to power supply.	Yes	Repair wire harness
		No	Next
4	Check if intake phase sensor signal terminal pin is short to power supply or open.	Yes	Repair wire harness
		No	Next
5	Check if intake phase sensor signal terminal pin corresponding to ECU is short to power supply or open, or if there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P034200 Camshaft Position Sensor “A” Circuit Low Bank 1 or Single Sensor

DTC reporting condition: Sensor signal failure counter of intake camshaft phase sensor exceeds the threshold.

1. Possible cause:
   - Intake phase sensor power supply is malfunctioning;
   - Intake phase sensor signal terminal is short to ground;
   - Intake phase sensor signal terminal ECU pin is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Unplug connector from intake phase sensor on wire harness, and use a multimeter to check if the voltage between power supply terminal and ground terminal pin of phase sensor is about 12 V.	Yes	Next
		No	Step 3
2	Check if the voltage between signal terminal and ground terminal pin of intake phase sensor is 0 V.	Yes	Repair wire harness
		No	Step 4
3	Check if intake phase sensor power supply terminal pin is open or short to ground, and if ground terminal pin is in poor contact.	Yes	Repair wire harness
		No	Next
4	Check if intake phase sensor signal terminal pin is short to ground.	Yes	Repair wire harness
		No	Next
5	Check if intake phase sensor signal terminal pin corresponding to ECU is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P036600 Exhaust Camshaft Phaser Sensor Signal Improper

DTC reporting condition: Sensor signal failure counter of exhaust camshaft phase sensor exceeds the threshold.

1. Possible cause:
   - Connector is not connected securely or disconnected;
   - Relative installation position between exhaust phase sensor and its signal plate does not meet the installation requirements;
   - There is mechanical malfunction in exhaust phase signal plate teeth.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
2	Check wire harness for external interference.	Yes	Shield the wire harness
		No	Next
3	Check if relative installation position between exhaust phase sensor and its signal plate does not meet the installation requirements (such as too far, misaligned, etc.).	Yes	Reinstall it
		No	Next
4	Check for mechanical malfunction in exhaust phase signal plate teeth.	Yes	Replace phase signal plate
		No	Diagnostic Help

P001776 Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor B

DTC reporting condition: The absolute value of relative position self-learning deviation between exhaust camshaft and crankshaft is greater than 20° crankshaft angle.

1. Possible cause:
   - Installation deviation;
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if relative installation position of crankshaft and exhaust camshaft is correct.	Yes	Diagnostic Help
		No	Reinstall correctly

P036800 Exhaust Camshaft Phase Signal Circuit Short to Power Supply

DTC reporting condition: Sensor signal failure counter of exhaust camshaft phase sensor exceeds the threshold.

1. Possible cause:
   - Exhaust phase sensor ground terminal is malfunctioning.
   - Exhaust phase sensor signal terminal is short to power supply.
   - Exhaust phase sensor signal terminal ECU pin is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Unplug connector from exhaust phase sensor on wire harness, and use a multimeter to check if the voltage between power supply terminal and ground terminal pin of phase sensor is about 12 V.	Yes	Next
		No	Step 3
2	Check if the voltage between signal terminal and power supply terminal pin of exhaust phase sensor is 12 V.	Yes	Repair wire harness
		No	Step 4
3	Check if exhaust phase sensor ground terminal pin is open or short to power supply.	Yes	Repair wire harness
		No	Next
4	Check if exhaust phase sensor signal terminal pin is short to power supply or open	Yes	Repair wire harness
		No	Next
5	Check exhaust phase sensor signal terminal pin corresponding to ECU is short to power supply, open, or there is an internal circuit damage	Yes	Check and repair ECU
		No	Diagnostic Help

P036700 Exhaust Camshaft Phase Signal Circuit Voltage Short to Ground

DTC reporting condition: Sensor signal failure counter of exhaust camshaft phase sensor exceeds the threshold.

1. Possible cause:
   - Exhaust phase sensor power supply is malfunctioning.
   - Exhaust phase sensor signal terminal is short to ground.
   - Exhaust phase sensor signal terminal ECU pin is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Unplug connector from exhaust phase sensor on wire harness, and use a multimeter to check if the voltage between power supply terminal and ground terminal pin of phase sensor is about 12 V.	Yes	Next
		No	Step 3
2	Check if the voltage between signal terminal and ground terminal pin of exhaust phase sensor is 0 V.	Yes	Repair wire harness
		No	Step 4
3	Check if exhaust phase sensor power supply terminal pin is open or short to ground, ground terminal pin is in poor contact.	Yes	Repair wire harness
		No	Next
4	Check if exhaust phase sensor signal terminal pin is short to ground.	Yes	Repair wire harness
		No	Next
5	Check exhaust phase sensor signal terminal pin corresponding to ECU is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P033900 Crankshaft Position Sensor "A"

DTC reporting condition: The absolute value of deviation between exhaust camshaft and crankshaft is greater than 15° crankshaft angle.

1. Possible cause:
   - Connector is not connected securely or detached.
   - Signal terminal is open.
   - Sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connector is not connected securely or detached.	Yes	Reconnect it
		No	Diagnostic Help
2	Speed sensor signal terminal is open.	Yes	Repair, replace wire harness or sensor
		No	Next
3	Sensor signal terminal pin is short to power supply or ground, or short circuit between pins.	Yes	Repair wire harness
		No	Next
4	Sensor is damaged.	Yes	Replace sensor
		No	Next
5	Fault in pin corresponding to speed sensor signal on ECU.	Yes	Check and repair ECU
		No	Diagnostic Help

P046129 Fuel Level Sensor Unreasonable Malfunction

DTC reporting condition: There is a large difference between fuel level change and calculated fuel consumption.

1. Possible cause:
   - ECU CAN signal is abnormal.
   - Fuel level sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to "ON".		Next
2	Read and store fault freeze frame information.		Next
3	Check if CAN signal is normal.	No	Repair CAN signal
		Yes	Next
4	Replace ECU, check if malfunction reappears.	Yes	Next
		No	End

No.	Operation Step	Test Result	Subsequent Step
5	Replace fuel level sensor, check if malfunction reappears.	Yes	Diagnostic Help
		No	End

P209700 Post Catalyst Fuel Trim System Too Rich Bank 1

DTC reporting condition: Offset value of upstream oxygen characteristic based on downstream oxygen exceeds the upper limit threshold.

1. Possible cause:
   - Upstream oxygen has a negative characteristic offset (richer).
   - A certain degree of aging occurs in downstream oxygen.
   - There is air leakage in intake and exhaust systems.
   - Catalytic converter is severely deteriorated.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Check intake system and exhaust system for air leakage.	Yes	Repair leaking area
		No	Next
4	Replace the upstream LSU oxygen sensor. Check if malfunction reappears after returning vehicle to customer.	Yes	Next
		No	End
5	Replace downstream oxygen sensor, check if malfunction reappears.	Yes	Next
		No	End
6	Check if catalytic converter is deteriorated.	Yes	Next
		No	Diagnostic Help
7	Replace catalytic converter, check if malfunction reappears.	Yes	Diagnostic Help
		No	End

P209600 Post Catalyst Fuel Trim System Too Lean Bank 1

DTC reporting condition: Offset value of upstream oxygen characteristic based on downstream oxygen is lower than the lower limit threshold.

1. Possible cause:
   - Upstream oxygen has a positive characteristic offset (lean).
   - A certain degree of aging occurs in downstream oxygen.
   - There is air leakage in intake and exhaust systems.
   - Catalytic converter is severely deteriorated.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check intake system and exhaust system for air leakage.	Yes	Repair leaking area
		No	Next
4	Replace the upstream LSU oxygen sensor. Check if malfunction reappears after returning vehicle to customer.	Yes	Next
		No	End
5	Replace downstream oxygen sensor, check if malfunction reappears.	Yes	Next
		No	End
6	Check if catalytic converter is deteriorated.	Yes	Next
		No	Diagnostic Help
7	Replace catalytic converter, check if malfunction reappears.	Yes	Diagnostic Help
		No	End

P013800 O2 Sensor Circuit High Voltage Bank 1 Sensor 2

DTC reporting condition: The voltage range of downstream oxygen sensor is greater than 1.2 V.

1. Possible cause:
   - Signal circuit of downstream oxygen sensor is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Do not disconnect oxygen sensor connector and measure if voltage of downstream oxygen sensor wire oxygen sensor terminal No.1 wire (white, heater power supply positive) is 12 V.	Yes	Next
		No	Check wire harness and connector
4	Do not disconnect oxygen sensor connector and measure if voltage of downstream oxygen sensor wire oxygen sensor terminal No.2 wire (white, heater power supply grounded) is 12 V.	Yes	Next
		No	Check wire harness and connector
5	Do not disconnect oxygen sensor connector, measure if voltage between downstream oxygen sensor wire ECU terminal No.4 wire (black, oxygen sensor signal wire) and No.3 wire (gray, oxygen sensor signal grounded) is about 0.45 V.	Yes	Next
		No	Replace oxygen sensor
6	Start and keep vehicle idling until coolant temperature reaches normal value. Do not disconnect oxygen sensor connector, measure if	Yes	Next
		No	Replace oxygen sensor

No.	Operation Step	Test Result	Subsequent Step
	voltage between downstream oxygen sensor wire harness ECU terminal No.4 wire (black, oxygen sensor signal wire) and No.3 wire (gray, oxygen sensor signal grounded) is changed in range of 0 V - 1 V.		
7	Disconnect downstream oxygen sensor connector and measure if there is short circuit between sensor terminal No. 1 wire (white, heater power supply positive) and No. 4 wire (black, oxygen sensor signal wire) with a multimeter.	Yes	Replace oxygen sensor
		No	Next
8	Connect downstream oxygen sensor connector properly, repeat steps 5-6 and check if voltage signal changes between 0.44 V and 0.46 V, 0 V and 1 V respectively.	Yes	End
		No	Diagnostic Help

P013700 O2 Sensor Circuit Low Voltage Bank 1 Sensor 2

DTC reporting condition: The voltage range of downstream oxygen sensor is less than 0.06 V.

1. Possible cause:
   - Signal line of downstream oxygen sensor is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Do not disconnect oxygen sensor connector, measure if voltage between downstream oxygen sensor wire ECU terminal No.4 wire (black, oxygen sensor signal wire) and No.3 wire (gray, oxygen sensor signal grounded) is about 0.45 V.	Yes	Next
		No	Check wire harness and connector
4	Start and keep vehicle idling until coolant temperature reaches normal value. Do not disconnect oxygen sensor connector, measure if voltage between downstream oxygen sensor wire ECU terminal No.4 wire (black, oxygen sensor signal wire) and No.3 wire (gray, oxygen sensor signal grounded) is changed in range of 0 V - 1 V.	Yes	Next
		No	Replace oxygen sensor
5	Disconnect downstream oxygen sensor connector and check for short circuit in sensor terminal No.3 wire (gray, oxygen sensor signal grounded) and No.4 wire (black, oxygen sensor signal wire) with a multimeter.	Yes	Replace oxygen sensor
		No	Diagnostic Help
6	Connect downstream oxygen sensor connector properly, repeat steps 3-4 and check if voltage signal changes between 0.44 V and 0.46 V, 0 V and 1 V respectively.	Yes	End
		No	Diagnostic Help

P223200 O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 2

DTC reporting condition: Within a certain number of times that downstream oxygen sensor heater is turned off, the change in voltage of downstream oxygen sensor is greater than the threshold.

1. Possible cause:
   - The wire harness and connector of downstream oxygen sensor are abnormal.
   - Oxygen sensor terminal heater power supply ground is short to oxygen sensor signal line
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Do not disconnect oxygen sensor connector and measure if heater power supply positive voltage of downstream oxygen sensor wire harness oxygen sensor terminal is 12 V.	Yes	Next
		No	Check wire harness and connector
4	Do not disconnect oxygen sensor connector and measure if heater power supply ground voltage of downstream oxygen sensor wire harness oxygen sensor terminal is 12 V.	Yes	Next
		No	Check wire harness and connector
5	Do not disconnect oxygen sensor connector and measure if voltage between downstream oxygen sensor wire harness ECU terminal oxygen sensor signal line and oxygen sensor signal ground is about 0.45 V.	Yes	Next
		No	Check wire harness and connector
6	Start and keep vehicle idling until coolant temperature reaches normal value. Do not disconnect oxygen sensor connector and measure if voltage between oxygen sensor signal line and oxygen sensor signal ground of downstream oxygen sensor wire harness ECU terminal jumps between 0 V and 1 V.	Yes	Next
		No	Replace oxygen sensor
7	Start and keep vehicle idling until coolant temperature reaches normal value. Disconnect downstream oxygen sensor connector and check for short circuit between oxygen sensor terminal heater power supply ground and oxygen sensor signal line.	Yes	Replace oxygen sensor
		No	Diagnostic Help
8	Connect downstream oxygen sensor connector properly, repeat steps 5-6 and check if voltage signal changes between 0.44 V and 0.46 V, 0 V and 1 V respectively.	Yes	End
		No	Diagnostic Help

P013600 O2 Sensor Circuit Bank 1 Sensor 2

DTC reporting condition: The voltage range of downstream oxygen sensor exceeds the limit.

1. Possible cause:
   - Oxygen sensor signal line is short to heater power supply ground line.
   - Oxygen sensor is damaged.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Do not disconnect oxygen sensor connector and measure if voltage of downstream oxygen sensor wire oxygen sensor terminal No.1 wire (white, heater power supply positive) is 12 V.	Yes	Next
		No	Check wire harness and connector
4	Do not disconnect oxygen sensor connector and measure if voltage of downstream oxygen sensor wire oxygen sensor terminal No.2 wire (white, heater power supply grounded) is 12 V.	Yes	Next
		No	Check wire harness and connector
5	Do not disconnect oxygen sensor connector, measure if voltage between downstream oxygen sensor wire ECU terminal No.4 wire (black, oxygen sensor signal wire) and No.3 wire (gray, oxygen sensor signal grounded) is about 0.45 V.	Yes	Next
		No	Check wire harness and connector
6	Start and keep vehicle idling until coolant temperature reaches normal value. Do not disconnect oxygen sensor connector, measure if voltage between downstream oxygen sensor wire ECU terminal No.4 wire (black, oxygen sensor signal wire) and No.3 wire (gray, oxygen sensor signal grounded) is changed in range of 0 V - 1 V.	Yes	Next
		No	Replace oxygen sensor
7	Start and keep vehicle idling until coolant temperature reaches normal value. Disconnect downstream oxygen sensor connector, and check for short circuit between oxygen sensor terminal No.2 wire (white, heater power grounded) and No.4 wire (-black, oxygen sensor signal wire).	Yes	Replace oxygen sensor
		No	Diagnostic Help
8	Connect downstream oxygen sensor connector properly, repeat steps 5-6 and check if voltage signal changes between 0.44 V and 0.46 V, 0 V and 1 V respectively.	Yes	End
		No	Diagnostic Help

P005400 HO2S Heater Resistance Bank 1 Sensor 2

DTC reporting condition: The current internal resistance value is greater than the threshold value of corresponding working condition.

1. Possible cause:
   - Heater circuit is malfunctioning.
   - Oxygen sensor resistance is aging.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Do not disconnect oxygen sensor connector and measure if voltage of downstream oxygen sensor wire oxygen sensor terminal No.1 wire (white, heater power supply positive) is 12 V.	Yes	Next
		No	Check wire harness and connector
4	Do not disconnect oxygen sensor connector and measure if voltage of downstream oxygen sensor wire oxygen sensor terminal No.2 wire (white, heater power supply grounded) is 12 V.	Yes	Next
		No	Check wire harness and connector
5	Disconnect downstream oxygen sensor wire connector to remove downstream oxygen sensor. Place the oxygen sensor at room temperature to cool it down. Measure if resistance between sensor terminal No.1 interface (white, heater power supply positive) and No.2 interface (white, heater power supply grounded) is higher than 15 Ω with a multimeter when temperature of oxygen sensor cools down to room temperature ①.	Yes	Replace oxygen sensor
		No	Diagnostic Help

P003800 O2 Sensor Heater Control Circuit High (Downstream of the Catalyzer)

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Downstream oxygen sensor heater control circuit pin terminal is short to power supply.
   - Downstream oxygen sensor heater pin corresponding to ECU terminal is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if downstream oxygen sensor heater control circuit pin terminal is short to power supply.	Yes	Repair wire harness
		No	Next
2	Check if downstream oxygen sensor heater pin corresponding to ECU terminal is short to power supply.	Yes	Check and repair ECU
		No	Diagnostic Help

P003700 O2 Sensor Heater Control Circuit Low (Downstream of the Catalyzer)

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Downstream oxygen sensor heater control circuit pin terminal is short to ground.
   - Downstream oxygen sensor heater control circuit power supply terminal is grounded.
   - Downstream oxygen sensor heater pin corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if downstream oxygen sensor heater control circuit pin terminal is short to ground.	Yes	Repair wire harness
		No	Next
2	Check if downstream oxygen sensor heater control circuit power supply terminal is grounded.	Yes	Repair wire harness
		No	Next
3	Check if downstream oxygen sensor heater pin corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P003600 HO2S Heater Control Circuit Bank 1 Sensor 2

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Connector is not connected securely or is in poor contact.
   - Downstream oxygen sensor heater control pin is open.
   - Downstream oxygen sensor heater power supply terminal is not connected to main relay.
   - Sensor is damaged.
   - Downstream oxygen sensor heater pin corresponding to ECU terminal is open, or there is an internal circuit damage.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
2	Check if downstream oxygen sensor heater control pin is open.	Yes	Repair wire harness
		No	Next
3	Check if downstream oxygen sensor heater circuit power supply terminal is not connected to main relay.	Yes	Repair wire harness
		No	Next
4	Check if sensor is damaged.	Yes	Replace sensor
		No	Next
5	Check if downstream oxygen sensor heater pin corresponding to ECU terminal is open, or there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P013A00 O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2

DTC reporting condition: The transition time of downstream oxygen sensor voltage signal from rich to lean exceeds the threshold.

1. Possible cause:
   - Downstream oxygen sensor is aging.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Replace downstream oxygen sensor and connect wire harness properly. Start and keep vehicle idling until coolant temperature reaches normal value. Release accelerator pedal to coast after vehicle speed reaches about 70 many times, the fault reappears.	Yes	Diagnostic Help
		No	End

P227100 O2 Sensor Signal Biased&Stuck Rich Bank 1 Sensor 2

DTC reporting condition: Downstream oxygen voltage is low continuously.

1. Possible cause:
   - There is air leakage in exhaust system.
   - Oxygen sensor is aging.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Check exhaust system for leakage, gasket for damage.	Yes	Repair leaking area
		No	Next
4	Downstream oxygen sensor: Puncture wire harness connector near ECU terminal No.4 wire insulation layer (black, oxygen sensor signal wire) with red pole of multimeter, and puncture wire harness connector near ECU terminal No.3 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage is in range of 0.44 V - 0.46 V.	Yes	Next
		No	Replace oxygen sensor
5	Start and keep vehicle idling until coolant temperature reaches normal value. Downstream oxygen sensor: Puncture wire harness connector near ECU terminal No.4 wire insulation layer (black, oxygen sensor signal wire) with red pole of multimeter, and puncture wire harness connector near ECU terminal No.3 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage changes in range of 0 V - 1 V.	Yes	Next
		No	Replace oxygen sensor

No.	Operation Step	Test Result	Subsequent Step
6	Start and keep vehicle idling until coolant temperature reaches normal value. Depress and release accelerator pedal frequently and alternately for 90 s, at the same time, puncture downstream oxygen sensor wire harness connector near ECU terminal No.4 wire insulation layer (black, oxygen sensor signal wire) with red pole of multimeter, and puncture wire harness connector near ECU terminal No.3 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage is beyond ② range of 0.55 V - 0.65 V.	Yes	End
		No	Diagnostic Help

P227000 O2 Sensor Signal Biased&Stuck Lean Bank 1 Sensor 2

DTC reporting condition: Downstream voltage is high continuously.

1. Possible cause:
   - There is air leakage in exhaust system.
   - Oxygen sensor is aging.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to "ON".		Next
2	Read and store fault freeze frame information.		Next
3	Check exhaust system for leakage, gasket for damage.	Yes	Repair leaking area
		No	Next
4	Downstream oxygen sensor: Puncture wire harness connector near ECU terminal No.4 wire insulation layer (black, oxygen sensor signal wire) with red pole of multimeter, and puncture wire harness connector near ECU terminal No.3 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage is in range of 0.44 V - 0.46 V.	Yes	Next
		No	Replace oxygen sensor
5	Start and keep vehicle idling until coolant temperature reaches normal value. Downstream oxygen sensor: Puncture wire harness connector near ECU terminal No.4 wire insulation layer (black, oxygen sensor signal wire) with red pole of multimeter, and puncture wire harness connector near ECU terminal No.3 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage changes in range of 0 V - 1 V.	Yes	Next
		No	Replace oxygen sensor

No.	Operation Step	Test Result	Subsequent Step
6	Start and keep vehicle idling until coolant temperature reaches normal value. Depress and release accelerator pedal frequently and alternately for 90 s, at the same time, puncture downstream oxygen sensor wire harness connector near ECU terminal No.4 wire insulation layer (black, oxygen sensor signal wire) with red pole of multimeter, and puncture wire harness connector near ECU terminal No.3 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage is beyond ① range of 0.55 V - 0.65 V.	Yes	End
		No	Diagnostic Help

P223100 O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 1

DTC reporting condition: Within a certain number of times that upstream oxygen sensor heater is turned off, the change in voltage of upstream oxygen sensor is greater than the threshold.

1. Possible cause:
   - The wire harness and connector of upstream oxygen sensor are abnormal.
   - Oxygen sensor terminal heater power supply ground is short to oxygen sensor signal line.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Do not disconnect oxygen sensor connector and measure if voltage of upstream oxygen sensor wire harness oxygen sensor terminal No.1 wire (white, heater power supply positive) is 12 V.	Yes	Next
		No	Check wire harness and connector
4	Do not disconnect oxygen sensor connector and measure if voltage of upstream oxygen sensor wire harness oxygen sensor terminal No.2 wire (white, heater power supply grounded) is 12 V.	Yes	Next
		No	Check wire harness and connector
5	Do not disconnect oxygen sensor connector and measure if voltage between upstream oxygen sensor wire harness ECU terminal oxygen sensor signal line and oxygen sensor signal ground is about 0.45 V.	Yes	Next
		No	Check wire harness and connector
6	Start and keep vehicle idling until coolant temperature reaches normal value. Do not disconnect oxygen sensor connector and measure if voltage between oxygen sensor signal line and oxygen sensor signal ground of upstream oxygen sensor wire harness ECU terminal jumps between 0 V and 1 V.	Yes	Next
		No	Replace oxygen sensor
7	Start and keep vehicle idling until coolant temperature reaches normal value. Disconnect upstream oxygen sensor connector and check for	Yes	Replace oxygen sensor
		No	Diagnostic Help

No.	Operation Step	Test Result	Subsequent Step
	short circuit between oxygen sensor heater power supply and oxygen sensor signal line.		
8	Connect upstream oxygen sensor connector properly, repeat steps 5-6 and check if voltage signal changes between 0.44 V and 0.46 V, 0 V and 1 V respectively.	Yes	End
		No	Diagnostic Help

P003200 HO2S Heater Control Circuit High Bank 1 Sensor 1

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Upstream oxygen sensor heater control circuit pin terminal is short to power supply.
   - Upstream oxygen sensor heater pin corresponding to ECU terminal is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if upstream oxygen sensor heater control circuit pin terminal is short to power supply.	Yes	Repair wire harness
		No	Next
2	Check if upstream oxygen sensor heater pin corresponding to ECU terminal is short to power supply.	Yes	Check and repair ECU
		No	Diagnostic Help

P003100 HO2S Heater Control Circuit Low Bank 1 Sensor 1

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Upstream oxygen sensor heater control circuit pin terminal is short to ground.
   - Upstream oxygen sensor heater control circuit power supply terminal is grounded.
   - Upstream oxygen sensor heater pin corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if upstream oxygen sensor heater control circuit pin terminal is short to ground.	Yes	Repair wire harness
		No	Next
2	Check if upstream oxygen sensor heater control circuit power supply terminal is grounded.	Yes	Repair wire harness
		No	Next
3	Check if upstream oxygen sensor heater pin corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P003000 HO2S Heater Control Circuit Bank 1 Sensor 1

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Connector is not connected securely or is in poor contact.
   - Open circuit in upstream oxygen sensor heater control circuit pin terminal.
   - Upstream oxygen sensor heater control circuit power supply terminal is not connected to main relay.
   - Sensor is damaged.
   - Upstream oxygen sensor heater pin circuit corresponding to ECU terminal is open, or there is an internal circuit damage.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
2	Open circuit in upstream oxygen sensor heater control circuit pin terminal.	Yes	Repair wire harness
		No	Next
3	Upstream oxygen sensor heater control circuit power supply terminal is not connected to main relay.	Yes	Repair wire harness
		No	Next
4	Sensor is damaged.	Yes	Replace sensor
		No	Next
5	Upstream oxygen sensor heater pin circuit corresponding to ECU terminal is open, or there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P005300 Upstream Oxygen Sensor Heater Circuit Failure

DTC reporting condition: The current internal resistance value is greater than the threshold value of corresponding working condition.

1. Possible cause:
   - Heater circuit is malfunctioning.
   - Oxygen sensor resistance is aging.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Do not disconnect oxygen sensor connector and measure if voltage of upstream oxygen sensor wire harness oxygen sensor terminal No.1 wire (white, heater power supply positive) is 12 V.	Yes	Next
		No	Check wire harness and connector

No.	Operation Step	Test Result	Subsequent Step
4	Do not disconnect oxygen sensor connector and measure if voltage of upstream oxygen sensor wire harness oxygen sensor terminal No.2 wire (white, heater power supply grounded) is 12 V.	Yes	Next
		No	Check wire harness and connector
5	Disconnect upstream oxygen sensor wire connector to remove upstream oxygen sensor. Place the oxygen sensor at room temperature to cool it down. Measure if resistance between sensor terminal No.1 interface (white, heater power supply positive) and No.2 interface (white, heater power supply grounded) is higher than 15 Ω with a multimeter when temperature of oxygen sensor cools down to room temperature ①.	Yes	Replace oxygen sensor
		No	Diagnostic Help

P005326 HO2S Heater Resistance Bank 1 Sensor 1

DTC reporting condition: The temperature of ceramic body is lower than the target temperature.DTC clearing condition: The temperature of ceramic body is no less than the target temperature

1. Possible cause:
   - Oxygen sensor is malfunctioning.
   - Wire harness is malfunctioning.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check if oxygen sensor connector is abnormal.	Yes	Replace connector
		No	Next
4	Disconnect upstream oxygen sensor wire harness connector to remove upstream oxygen sensor. Place the oxygen sensor at room temperature to cool it down. Measure if resistance between sensor terminal heater power supply positive and heater power supply ground is greater than 3 Ω with a multimeter when temperature of oxygen sensor cools down to room temperature ①.	Yes	Replace oxygen sensor
		No	Next
5	Check if there is contact resistance in oxygen sensor heater wire harness.	Yes	Replace wire harness
		No	Diagnostic Help

P013500 O2 Sensor Heater Circuit Bank 1 Sensor 1

DTC reporting condition: There is electrical malfunction in heater pole of upstream oxygen sensor.

1. Possible cause:
   - Oxygen sensor is malfunctioning.

- Wire harness is malfunctioning.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check if oxygen sensor connector is abnormal.	Yes	Replace connector
		No	Next
4	Disconnect upstream oxygen sensor wire harness connector to remove upstream oxygen sensor. Place the oxygen sensor at room temperature to cool it down. Measure if resistance between sensor terminal heater power supply positive and heater power supply ground is greater than 3 Ω with a multimeter when temperature of oxygen sensor cools down to room temperature.	Yes	Replace oxygen sensor
		No	Next
5	Check if there is contact resistance in oxygen sensor heater wire harness.	Yes	Replace wire harness
		No	Diagnostic Help

P064D00 LSU Integrated Chip Failure

DTC clearing condition: Chip communication self-diagnosis.

1. Possible cause:

- LSU oxygen sensor is damaged.
- ECU internal communication is abnormal.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Replace oxygen sensor, check if malfunction reappears.	Yes	Next
		No	End
4	Replace ECU, check if malfunction reappears.	Yes	Diagnostic Help
		No	End

P064D16 Internal Control Module O2 Sensor Processor Performance Bank 1

DTC reporting condition: Chip power supply voltage is lower than the threshold.

1. Possible cause:

- Oxygen sensor is malfunctioning.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Replace ECU. Start and keep vehicle idling until coolant temperature reaches normal value. The fault reappears.	Yes	Diagnostic Help
		No	End

P064D17 Internal Control Module O2 Sensor Processor Performance Bank 1

DTC clearing condition: The oxygen sensor voltage is higher than the threshold.

1. Possible cause:
   - Oxygen sensor voltage is lower than the threshold.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Replace ECU. Start and keep vehicle idling until coolant temperature reaches normal value. The fault reappears.	Yes	Diagnostic Help
		No	End

P064D81 Internal Control Module O2 Sensor Processor Performance Bank 1

DTC reporting condition: Chip self-diagnosis.

1. Possible cause:
   - Oxygen sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Replace ECU. Start and keep vehicle idling until coolant temperature reaches normal value. The fault reappears.	Yes	Diagnostic Help
		No	End

P035100 Ignition Coil "A" Primary Control Circuit Open P035200 Ignition Coil "B" Primary Control Circuit Open P035300 Ignition Coil "C" Primary Control Circuit Open P035400 Ignition Coil "D" Primary Control Circuit Open

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:

- Ignition coil circuit is short to ground or open.
- Ignition coil control pin corresponding to ECU is short to ground or open.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if ignition coil circuit is short to ground or open.	Yes	Repair wire harness
		No	Next
2	Check if ignition coil control pin corresponding to ECU is short to ground or open.	Yes	Check and repair ECU
		No	Diagnostic Help

P230100 Ignition Coil "A" Primary Control Circuit High P230400 Ignition Coil "B" Primary Control Circuit High P230700 Ignition Coil "C" Primary Control Circuit High P231000 Ignition Coil "D" Primary Control Circuit High

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Ignition coil circuit is short to power supply.
   - Ignition coil power supply terminal is short to power supply.
   - Ignition coil control pin corresponding to ECU is short to power supply
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if corresponding ignition coil circuit is short to power supply.	Yes	Repair wire harness
		No	Next
2	Check if ignition coil control pin corresponding to ECU is short to power supply.	Yes	Check and repair ECU
		No	Diagnostic Help

P230000 Ignition Coil "A" Primary Control Circuit Low P230300 Ignition Coil "B" Primary Control Circuit Low P230600 Ignition Coil "C" Primary Control Circuit Low P230900 Ignition Coil "D" Primary Control Circuit Low

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Connector is short to ground.
   - Ignition coil circuit is short to ground.
   - Ignition coil control pin corresponding to ECU is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if connector is short to ground.	Yes	Reconnect it

No.	Operation Step	Test Result	Subsequent Step
		No	Next
2	Check if corresponding ignition coil circuit is short to ground.	Yes	Repair, replace wire harness or ignition coil
		No	Next
3	Check if ignition coil control pin corresponding to ECU is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P062900 Fuel Pump Module "A" Control Circuit High

DTC reporting condition: Hardware circuit self-diagnosis.

1. Possible cause:
   - Low pressure oil pump control circuit is short to power supply;
   - Low pressure oil pump pin corresponding to ECU is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if actuator terminal is short to power supply.	Yes	Repair wire harness
		No	Next
2	Check if actuator pin corresponding to ECU terminal is short to power supply.	Yes	Check and repair ECU
		No	Diagnostic Help

P062800 Fuel Pump “A” Control Circuit Low

DTC reporting condition: Hardware circuit self-diagnosis.

1. Possible cause:
   - Low pressure oil pump control circuit is short to ground;
   - Low pressure oil pump pin corresponding to ECU is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if actuator terminal is short to ground.	Yes	Repair wire harness
		No	Next
2	Check if actuator pin corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P062700 Fuel Pump Module "A" Control Circuit Open

DTC reporting condition: Hardware circuit self-diagnosis.

1. Possible cause:

- Low pressure oil pump control circuit is open;
- Low pressure oil pump pin corresponding to ECU is open.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if actuator terminal is open.	Yes	Repair wire harness
		No	Next
2	Check if actuator pin corresponding to ECU terminal is open.	Yes	Check and repair ECU
		No	Diagnostic Help

P032600 Knock Sensor 1 Circ. High Input

DTC reporting condition: Knock background noise is greater than the maximum signal threshold of noise.

1. Possible cause:
   - Sensor is damaged.
   - ECU is damaged.
   - Engine is abnormal.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if knock sensor is damaged.	Yes	Replace sensor
		No	Next
2	Check if ECU is damaged.	Yes	Check and repair ECU
		No	Next
3	If engine is abnormal.	Yes	Check engine
		No	Diagnostic Help

P032500 Knock Sensor 1 Circ. Low Input

DTC reporting condition: The average value of knock sensor port voltage is less than 0.7 V.

1. Possible cause:
   - Connector is not connected securely or detached.
   - Signal terminal is open.
   - Sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if connector is not connected securely or is in poor contact.	Yes	Reconnect or replace connector
		No	Next
2	Check if knock sensor signal terminal is short to ground or open.	Yes	Repair wire harness

No.	Operation Step	Test Result	Subsequent Step
		No	Next
3	Check if knock sensor connecting wire harness is non-standard shielding wire and is subjected to electromagnetic interference.	Yes	Use standard shielding wire
		No	Next
4	Check if knock sensor is damaged.	Yes	Replace sensor
		No	Next
5	Check if knock sensor pin or circuit corresponding to ECU terminal is damaged.	Yes	Check and repair ECU
		No	Diagnostic Help

P024300 Turbocharger Waste Gate Control Circuit Open

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Control valve drive circuit is open.
   - Connector is not connected securely or detached.
   - Pin corresponding to ECU is open.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connector is not connected securely or detached.	Yes	Reconnect it
		No	Next
2	Waste gate control valve drive circuit pin is open.	Yes	Repair wire harness
		No	Next
3	Waste gate control valve power supply terminal is open.	Yes	Repair wire harness
		No	Next
4	Drive pin corresponding to ECU is open, or there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P023400 Turbocharger Boost Pressure Too High

DTC reporting condition: The boost pressure is higher than the target pressure plus a certain offset.

1. Possible cause:
   - Turbocharger relief valve is damaged.
   - Exhaust by-pass valve is damaged (normally closed state).
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Turbocharger relief valve is damaged.	Yes	Replace relief valve

No.	Operation Step	Test Result	Subsequent Step
		No	Next
2	Exhaust by-pass valve is damaged (normally closed state).	Yes	Replace exhaust valve
		No	Diagnostic Help

P029900 Turbocharger Boost Pressure Too High

DTC reporting condition: The actual boost pressure is higher than the target boost pressure minus a certain offset.

1. Possible cause:
   - The pipeline between compressor outlet and throttle leaks.
   - The pipeline between turbine and exhaust pipe leaks.
   - Exhaust by-pass valve or discharge valve is failed.
   - Turbocharger is damaged.
   - Working part such as compressor impeller is dirty or damaged.
   - Exhaust manifold leaks or is blocked.
   - Air filter is dirty.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	The pipeline between compressor outlet and throttle leaks.	Yes	Repair pipeline
		No	Next
2	The pipeline between turbine and exhaust pipe leaks.	Yes	Repair pipeline
		No	Next
3	Exhaust manifold leaks or is blocked.	Yes	Repair pipeline
		No	Next
4	Air filter is dirty.	Yes	Clean, replace air filter
		No	Next
5	Exhaust by-pass valve or discharge valve is failed and it is in normally open status.	Yes	Replace faulty parts
		No	Next
6	Working part such as compressor impeller is dirty or damaged.	Yes	Clean, replace faulty parts
		No	Next
7	Turbocharger is damaged.	Yes	Replace turbocharger
		No	Diagnostic Help

P050A21 Cold Start Idle Control System Performance

DTC reporting condition: Idle control speed is lower than the target idle by 100 r/min.

1. Possible cause:
   - The electronic throttle is stuck in a position with small opening.
   - If intake manifold leaks; fuel injector is blocked; exhaust resistance is excessive; oil supply pressure is low.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if electronic throttle is stuck in smaller opening position due to ice or oil.	Yes	Repair or replace electronic throttle
		No	Next
2	If intake manifold leaks; fuel injector is blocked; exhaust resistance is excessive; oil supply pressure is low.	Yes	Perform necessary repair
		No	Diagnostic Help

P050A22 Cold Start Idle Control System Performance

DTC reporting condition: Idle control speed is lower than the target idle by 100 r/min.

1. Possible cause:
   - The electronic throttle is stuck in a position with large opening.
   - If intake manifold leaks; fuel injector is blocked; oil supply pressure is high.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if electronic throttle is stuck in larger open position due to ice or oil.	Yes	Repair or replace electronic throttle
		No	Next
2	If intake manifold leaks; fuel injector leaks; oil supply pressure is high.	Yes	Perform necessary repair
		No	Diagnostic Help

P050D00 Cold Start Rough Idle

1. Possible cause:
   - The electronic throttle is stuck in a position with small opening.
   - Air leakage in system; leakage in fuel injector; excessively high fuel supply pressure.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if electronic throttle is stuck in larger open position due to ice or oil.	Yes	Repair or replace electronic throttle
		No	Next

No.	Operation Step	Test Result	Subsequent Step
2	Air leakage in system; leakage in fuel injector; excessively high fuel supply pressure.	Yes	Perform necessary repair
		No	Diagnostic Help

P223700 O2 Sensor Positive Current Control Circuit Open Bank 1 Sensor 1

DTC reporting condition: Closed-loop control oscillation is greater than the threshold.

1. Possible cause:
   - Oxygen sensor is malfunctioning.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check if oxygen sensor wire harness and connector are disconnected or poorly connected.	Yes	End
		No	Next
4	Replace upstream oxygen sensor. Start and keep vehicle idling until coolant temperature reaches normal value. The fault reappears.	Yes	Diagnostic Help
		No	End

P013000 Upstream Oxygen Sensor Compensation Circuit Open

DTC reporting condition: Under the conditions of low exhaust temperature and oil cut off, oxygen sensor voltage signal is high for a long time.

1. Possible cause:
   - Upstream oxygen sensor compensation circuit is open.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check for poor contact in pin corresponding to green wire at oxygen sensor connector.	Yes	Check and repair connector
		No	Next
2	Check for continuity of oxygen sensor wire harness to check if the line is open.	Yes	Replace wire harness
		No	Next
3	Check for abnormal pin at connector between wire harness and ECU, which may result in poor contact.	Yes	Check and repair ECU or wire harness terminal connector
		No	Replace oxygen sensor

No.	Operation Step	Test Result	Subsequent Step
4	Clear DTC, start and keep vehicle idling until coolant temperature reaches normal value. Check if malfunction is reported again.	Yes	Next
		No	End
5	Check for abnormality in LSU processing circuit in ECU.	Yes	Check and repair or replace ECU
		No	Diagnostic Help

P030000 Random/Multiple Cylinder Misfire Detected P030100 Cylinder 1 Misfire Detected P030200 Cylinder 2 Misfire Detected P030300 Cylinder 3 Misfire Detected P030400 Cylinder 4 Misfire Detected P036300 Cylinder Selective Fuel Cutoff Active due to Catalyst Damaging Misfire

DTC reporting condition: Misfire counter exceeds the threshold.

1. Possible cause:
   - Ignition coil circuit is malfunctioning.
   - Fuel injector circuit is malfunctioning.
   - Fuel injector control pin or ignition coil pin corresponding to ECU is malfunctioning.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check for DTCs related to injector in corresponding cylinder.	Yes	Go to DTCs related to injector in corresponding cylinder
		No	Next
2	Connector is not connected securely or detached.	Yes	Reconnect it
		No	Next
3	Check if ignition coil signal terminal is open or short to ground or power supply.	Yes	Repair or replace wire harness
		No	Next
4	Check if ignition coil power supply terminal is open or short to ground.	Yes	Repair or replace wire harness
		No	Next
5	Check if ignition coil grounded terminal is open or short to power supply.	Yes	Repair or replace wire harness
		No	Next
6	Check if ignition coil itself is malfunctioning.	Yes	Replace ignition coil
		No	Next
7	Check if spark plug is abnormal.	Yes	Replace spark plug.

No.	Operation Step	Test Result	Subsequent Step
		No	Next
8	Check if ignition coil control pin corresponding to ECU is open, or there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P154000 Engine Torque Control Adaption at Limit

DTC reporting condition: Application layer torque limit is continuously activated for more than 600 seconds.

1. Possible cause:
   - Security monitoring data is not set correctly or there is internal fault in ECU.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Check if security monitoring data is not set correctly.	Modify monitoring data, go to step 2	Go to step 2
2	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troublesho-oted, and system is normal	Replace vehicle controller

P070000 TCU Requests to Illuminate MIL Light

DTC reporting condition: TCU requests to Illuminate MIL light.

1. Possible cause:
   - TCU is malfunctioning.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if TCU fault memory is faulty.	Yes	Check and repair TCU
		No	Diagnostic Help

P06AA00 Main relay Temperature Over Temperature Fault

DTC reporting condition: Main relay detects over temperature (>150°C) or over current (>0.6 A).

1. Possible cause:
   - External relay or wire harness is short.
   - Internal resistance of relay is too small.
   - Component is invalid.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	After ECU is completely powered off, no faults will be reported.	Yes	End
		No	Next
2	Check if relay is damaged, wire harness is short.	Yes	Check and repair wire harness
		No	Next
3	Replace ECU.	Yes	Check and repair ECU

P153000 Function Monitoring: Fault of ECU ADC - Null Load Test Pulse P153100 Function Monitoring: Fault of ECU ADC - Test Voltage P157300 Monitoring Fault Reaction Error P157500 Diagnostic Fault Check to Report "WDA active" Due to Overvoltage Detection

DTC reporting condition: Error occurs in underlying data of hardware.

1. Possible cause:
   - ECU internal fault.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Replace ECU	Go to step 2	Troubleshoot other DTCs
2	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troublesho-oted, and system is normal	

P060D00 Accelerator Pedal Second Layer Monitoring Failure

DTC reporting condition: In the second layer monitoring, when the deviation of two paths of pedal signals exceeds the limit, a fault will be reported.

1. Possible cause:
   - ECU data settings are incorrect, usually because the EGAS security monitoring function is not matched or preset.
   - During data setting, the application layer data of pedal module does not match the monitoring layer data.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Communicate with EGAS security monitoring matching engineer to confirm if it is necessary to perform security monitoring presets or matching	After matching is completed, go to step 3	Go to step 2
2	Confirm if pedal model has been changed with the customer	Match it again, go to step 3 after completion	Check matching data, go to step 3
3	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troublesho-oted, and system is normal	Replace vehicle controller

P152000 Function Monitoring: Check of Predicted Air Mass Failed P152100 Function Monitoring: Fault of ECU Check of Injection Cut-off P152200 Function Monitoring: Fault of ECU in Check of Cylinder Individual Fuel Corrections P152500 Function Monitoring: Fault of ECU or Sensor in rl-Comparison P152300 Function Monitoring: Fault of ECU or Sensor in Mixture Check P152400 Function Monitoring: Fault of ECU Comparison of Lambda and Operation Mode

DTC reporting condition: In the second layer monitoring, it is recognized that there is a deviation between the calculation of load to fuel injection volume in the calculation of ECU application layer and the calculation of monitoring layer, a fault is reported.

1. Possible cause:
   - ECU data settings are incorrect, usually because the EGAS security monitoring function is not matched or preset.
   - Error occurs in calculation of load to fuel injection volume in the calculation of application layer.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Communicate with EGAS security monitoring matching engineer to confirm if it is necessary to perform security monitoring presets or matching.	After matching is completed, go to step 3	Go to step 2
2	Check if calculation process of load to fuel injection in the calculation of application layer is incorrect.	Match it again, go to step 3 after completion	Replace vehicle controller
3	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troublesho-oted, and system is normal	Replace vehicle controller

P061C00 Electronic Throttle Security Monitoring Function Failure (Second Layer Engine Speed Monitoring Failure)

DTC reporting condition: The monitoring layer speed signal is inconsistent with the application layer speed signal.

1. Possible cause:
   - ECU internal fault.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Replace ECU.	Go to step 2	Troubleshoot other DTCs
2	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troublesho-oted, and system is normal	

P152700 Function Monitoring: Monitoring of ICO From Level1 P152800 Function Monitoring: Monitoring of ICO From Level2

DTC reporting condition: The monitoring layer has identified an abnormal safety oil cut.

1. Possible cause:
   - ECU internal fault.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Replace ECU.	Go to step 2	Troubleshoot other DTCs
2	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troublesho-oted, and system is normal	

P152900 Function Monitoring: Fault of Starter Control

DTC reporting condition: The second layer monitoring identifies an abnormal start and stop function.

1. Possible cause:
   - ECU internal fault.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Replace ECU.	Go to step 2	Troubleshoot other DTCs
2	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troublesho-oted, and system is normal	

P061A00 Security Monitoring Torque Overlimit

DTC reporting condition: In the second layer monitoring, when actual torque calculated by ECU exceeds the second layer allowable torque for more than 520 ms, a fault is reported.

1. Possible cause:
   - ECU data settings are incorrect, usually because the EGAS security monitoring function is not matched or preset.
   - External torque increase request is not considered during data setting.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Communicate with EGAS security monitoring matching engineer to confirm if it is necessary to perform security monitoring presets or matching.	After matching is completed, go to step 3	Go to step 2
2	Confirm if there is an external torque increase request with the customer (ESP torque increase request, TCU torque increase request, etc.).	Match it again, go to step 3 after completion	Check matching data, go to step 3
3	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troublesho-oted, and system is normal	Replace vehicle controller

P157600 OverVoltage of ECU VDD5

DTC reporting condition: 5 V power supply voltage in ECU is too high and out of the limit.

1. Possible cause:
   - ECU internal fault.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Replace ECU.	Go to step 2	Troubleshoot other DTCs
2	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troublesho-oted, and system is normal	

P157700 UnderVoltage of ECU VDD5

DTC reporting condition: 5 V power supply voltage in ECU is too low and out of the limit.

1. Possible cause:
   - ECU internal fault.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Replace ECU.	Go to step 2	Troubleshoot other DTCs
2	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troublesho-oted, and system is normal	

P001400 “B” Camshaft Position - Timing Over-Advanced or System Performance Bank 1

DTC reporting condition: When starting, deviation between exhaust camshaft and locked position exceeds the threshold.

1. Possible cause:
   - Exhaust VVT lock pin is abnormal.
   - There is a wire harness interference.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check if lock pin is damaged.	Yes	Replace VVT assembly
		No	Next
4	Check wire harness for external interference.	Yes	Shield the wire harness
		No	Diagnostic Help

P001100 "A" Camshaft Position - Timing Over-Advanced or System Performance Bank 1

DTC reporting condition: When starting, deviation between intake camshaft and locked position exceeds the threshold.

1. Possible cause:
   - Intake VVT lock pin is abnormal.
   - There is a wire harness interference.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check if lock pin is damaged.	Yes	Replace VVT assembly
		No	Next
4	Check wire harness for external interference.	Yes	Shield the wire harness
		No	Diagnostic Help

P021900 Engine Overspeed

DTC reporting condition: The maximum engine speed is greater than 7500 r/min.

1. Possible cause:
   - Engine speed is increased artificially beyond the maximum safe speed.
   - Electronic accelerator pedal is stuck in a position with large opening, and cannot return to original position.
   - The throttle is stuck in a position with larger opening.
   - The speed calculation is incorrect.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Is the engine speed increased artificially beyond the maximum safe speed?	Yes	Clear DTCs and end operations
		No	Next
2	If electronic accelerator pedal is stuck in a position with large opening, and cannot return to original position.	Yes	Check and repair electronic accelerator pedal
		No	Next
3	If throttle is stuck in a position with large opening and cannot close.	Yes	Check and repair throttle
		No	Next

No.	Operation Step	Test Result	Subsequent Step
4	Check if speed sensor and speed calculation are correct.	Yes	Correct error
		No	Diagnostic Help

P157800 Monitoring Module Inquiry Error

DTC reporting condition: Check underlying close path of software.

1. Possible cause:
   - ECU internal fault.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Replace ECU	Go to step 2	Troubleshoot other DTCs
2	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troubleshooted, and system is normal	

P218700 System Too Lean at Idle Bank 1 P218800 System Too Lean at Idle Bank 1

DTC reporting condition: The self-learning factor exceeds the threshold.

1. Possible cause:
   - Oil circuit system hardware leaks or is blocked.
   - Intake pipe is malfunctioning.
   - Oxygen sensor wire harness connector circuit is malfunctioning.
   - Oxygen sensor is malfunctioning.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Connect fuel pressure gauge (the connection position is the front end of fuel distribution pipe assembly inlet pipe), start engine and check if fuel pressure is normal when fuel pressure is under idling conditions and when fuel pressure regulator vacuum tube is removed.	Yes	Next
		No	Check oil supply system
4	Check fuel injector for leakage or blockage with special tool.	Yes	Perform troubleshooting
		No	Next

No.	Operation Step	Test Result	Subsequent Step
5	Check fuel condition and ask customer if specified number of gasoline is filled. After refueling, does the vehicle work abnormally?	Yes	Replace fuel
		No	Next
6	If intake pipe is blocked, leaking, squashed or damaged; if canister control valve is stuck; if valve clearance is abnormal; if throttle body is contaminated, causing the air passage to be blocked.	Yes	Check, repair and clean throttle body
		No	Next
7	Check if ignition coil, cylinder wire, and spark plug work abnormally.	Yes	Perform troubleshooting
		No	Next
8	Do not disconnect oxygen sensor connector and measure if voltage of upstream oxygen sensor wire harness oxygen sensor terminal No.1 wire (white, heater power supply positive) is 12 V.	Yes	Next
		No	Check wire harness and connector
9	Do not disconnect oxygen sensor connector and measure if voltage of upstream oxygen sensor wire harness oxygen sensor terminal No.2 wire (white, heater power supply grounded) is 12 V.	Yes	Next
		No	Check wire harness and connector
10	Puncture wire harness connector near ECU terminal No.1 wire insulation layer (white, heater power source positive) with red pole of multimeter, and puncture wire harness connector near ECU terminal No.2 wire insulation layer (white, heater power source grounded) with black pole of multimeter. Check if voltage between two ends is about 12 V.	Yes	Next
		No	Check relay fuse
11	Do not disconnect oxygen sensor connector, measure if voltage between downstream oxygen sensor wire ECU terminal No.4 wire (black, oxygen sensor signal wire) and No.3 wire (gray, oxygen sensor signal grounded) is about 0.45 V.	Yes	Next
		No	Replace oxygen sensor
12	Start and keep vehicle idling until coolant temperature reaches normal value. Puncture wire harness connector near ECU terminal No.4 wire insulation layer (black, oxygen sensor signal wire) with red pole of multimeter, and puncture wire harness connector near ECU terminal No.3 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage is between 0 V and 1 V.	Yes	Next
		No	Replace oxygen sensor
13	Disconnect upstream oxygen sensor connector and check for short circuit between sensor terminal No.3 connector (gray, oxygen sensor signal grounded) and No.4 connector (black, oxygen sensor signal wire) with a multimeter.	Yes	Replace oxygen sensor
		No	Next

No.	Operation Step	Test Result	Subsequent Step
14	Disconnect upstream oxygen sensor connector and check for short circuit between sensor terminal No.3 connector (gray, oxygen sensor signal grounded) and No.4 connector (black, oxygen sensor signal wire) with a multimeter.	Yes	End
		No	Diagnostic Help

P055800 Brake Booster Pressure Sensor Circuit High

DTC reporting condition: Sensor voltage is higher than the threshold.

1. Possible cause:
   - Brake vacuum sensor signal terminal is short to power supply or open.
   - Brake vacuum sensor reference ground terminal is open.
   - Brake vacuum sensor signal pin terminal corresponding to ECU terminal is short to power supply or open.
   - Sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to "ON". Do not start engine, use a multimeter to measure if voltage between brake vacuum sensor signal terminal and ground is close to or equal to 5 V.	Yes	Next
2	Turn ignition switch to "OFF" and check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
3	Check if brake vacuum sensor signal terminal is short to power supply or open.	Yes	Repair wire harness
		No	Next
4	Check if sensor reference ground terminal is open.	Yes	Repair wire harness
		No	Next
5	Check if sensor is damaged.	Yes	Replace sensor
		No	Next
6	Check if brake vacuum sensor signal pin terminal corresponding to ECU terminal is short to power supply or open, or if there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P055700 Brake Booster Pressure Sensor Circuit Low

DTC reporting condition: Sensor voltage is lower than the threshold.

1. Possible cause:
   - Brake vacuum sensor signal terminal is short to ground.
   - Sensor 5 V reference voltage terminal is open.
   - Brake vacuum sensor signal pin terminal corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”. Do not start engine, use a multimeter to measure if voltage of brake vacuum sensor signal terminal is close to or equal to 0 V.	Yes	Next
2	Turn ignition switch to “OFF”, check if brake vacuum sensor signal terminal is short to ground.	Yes	Repair wire harness
		No	Next
3	Check if sensor 5 V reference voltage terminal is open.	Yes	Repair wire harness
		No	Next
4	Check if brake vacuum sensor signal pin terminal corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P219500 O2 Sensor Signal Biased/Stuck Lean Bank 1 Sensor 1

DTC reporting condition: Downstream control integral value exceeds the upper limit.

1. Possible cause:
   - There is air leakage in exhaust system.
   - Oxygen sensor is aging.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check intake system and exhaust system for air leakage.	Yes	Repair leaking area
		No	Next
4	Replace the upstream LSU oxygen sensor. Check if malfunction reappears after returning vehicle to customer.	Yes	Diagnostic Help
		No	End

P219600 O2 Sensor Signal Biased/Stuck Lean Bank 1 Sensor 1

DTC reporting condition: Downstream control integral value exceeds the lower limit.

1. Possible cause:
   - There is air leakage in exhaust system.
   - Oxygen sensor is aging.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next

No.	Operation Step	Test Result	Subsequent Step
3	Check intake system and exhaust system for air leakage.	Yes	Repair leaking area
		No	Next
4	Replace the upstream LSU oxygen sensor. Check if malfunction reappears after returning vehicle to customer.	Yes	Diagnostic Help
		No	End

P120000 Manifold Absolute Pressure Sensor Circuit Range/Performance P120100 Manifold Absolute Pressure Sensor Circuit Range/Performance P120400 Turbocharger/Supercharger Boost Sensor "A" Circuit Range/Performance P120500 Turbocharger/Supercharger Boost Sensor "A" Circuit Range/Performance P023622 Turbocharger/Supercharger Boost Sensor "A" Circuit Range/Performance P023621 Turbocharger/Supercharger Boost Sensor "A" Circuit Range/Performance

DTC reporting condition: Boost pressure value exceeds the reasonable threshold.

1. Possible cause:
   - Sensor is icy and oily.
   - Sensor is aging.
   - Intake pipe is disconnected or leaks seriously.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Turn ignition switch to “OFF”, check if there is any freeze, oil stain, etc. on measurement terminal of sensor, which will affect normal measurement.	Yes	Repair, replace sensor
		No	Next
3	Check if boost pressure sensor installation position is incorrect, intake pipe is disconnected or seriously leaked.	Yes	Repair intake pipe, sensor
		No	Diagnostic Help

P00C721 Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1 P00C722 Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1

DTC reporting condition: Intake pressure value exceeds the reasonable threshold.

1. Possible cause:
   - Sensor is icy and oily.
   - Sensor is aging.
   - Intake pipe is disconnected or leaks seriously.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Do not start engine, and observe if “Intake Pressure” item in data flow is seriously deviated from ambient pressure by about 101 kpa (specific value is related to current pressure).	Yes	Repair, replace sensor
		No	Next
3	Turn ignition switch to “OFF”, check if there is any freeze, oil stain, etc. on measurement terminal of sensor, which will affect normal measurement.	Yes	Repair, replace sensor
		No	Next
4	Check if intake pressure sensor installation position is incorrect, intake pipe is disconnected or seriously leaked.	Yes	Repair intake pipe, sensor
		No	Diagnostic Help

P010700 Intake Manifold Pressure Sensor Short to Ground

DTC reporting condition: Sensor voltage is lower than the threshold.

1. Possible cause:
   - Intake pressure sensor signal terminal is short to ground.
   - Sensor 5 V reference voltage terminal is open.
   - Intake pressure sensor signal pin terminal corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”. Do not start engine, use a multimeter to measure if voltage of intake manifold pressure sensor signal terminal is close to or equal to 0 V.	Yes	Next
2	Turn ignition switch to “OFF”, check if pressure sensor signal terminal is short to ground.	Yes	Repair wire harness
		No	Next
3	Check if sensor 5 V reference voltage terminal is open.	Yes	Repair wire harness
		No	Next
4	Check if intake pressure sensor signal pin terminal corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P010800 Intake Manifold Pressure Sensor Short to Power Supply

DTC reporting condition: Intake manifold pressure sensor is short to power supply.

1. Possible cause:
   - Intake manifold pressure sensor signal terminal is short to power supply or open.
   - Sensor reference ground terminal is open.
   - Intake pressure sensor signal pin terminal corresponding to ECU terminal is short to power supply or open.

- Sensor is damaged.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”. Do not start engine, use a multimeter to measure if voltage between intake manifold pressure sensor signal terminal and ground is close to or equal to 5 V.	Yes	Next
2	Turn ignition switch to “OFF” and check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
3	Check if intake manifold pressure sensor signal terminal is short to power supply or open.	Yes	Repair wire harness
		No	Next
4	Check if sensor reference ground terminal is open.	Yes	Repair wire harness
		No	Next
5	Check if sensor is damaged.	Yes	Replace sensor
		No	Next
6	Check if intake pressure sensor signal pin terminal corresponding to ECU terminal is short to power supply or open, or if there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P01062A Manifold Abs.Pressure Performance Non-plausible

DTC reporting condition: The difference between intake pressure value and pressure value at the start-up initialization is always less than 20 hPa.

1. Possible cause:

- Sensor is icy and oily.
- Installation position of sensor is incorrect.
- Intake pipe is disconnected or leaks seriously.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Do not start engine, and observe if “Intake Pressure” item in data flow is seriously deviated from ambient pressure by about 101 kpa (specific value is related to current pressure).	Yes	Repair, replace sensor
		No	Next
3	Turn ignition switch to “OFF”, check if there is any freeze, oil stain, etc. on measurement terminal of sensor, which will affect normal measurement.	Yes	Repair, replace sensor
		No	Next

No.	Operation Step	Test Result	Subsequent Step
4	Check if intake pressure sensor installation position is incorrect, intake pipe is disconnected or seriously leaked.	Yes	Repair intake pipe, sensor
		No	Diagnostic Help

P046800 EVAP Purge Flow Sensor Circuit High

DTC reporting condition: The voltage signal of high load desorption pipeline pressure sensor exceeds 4.88 V.

1. Possible cause:
   - Pressure sensor signal terminal is short to power supply.
   - High load desorption pipeline pressure sensor signal pin corresponding to ECU terminal is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Use a multimeter to measure if high load desorption pipeline pressure sensor signal line voltage is close to or equal to 5 V.	Yes	Repair, replace sensor
		No	Next
4	Measure if pressure sensor wire harness terminal voltage is close to or equal to 5 V.	Yes	Check wire harness
		No	Next
5	Check if high load desorption pipeline pressure sensor signal pin terminal corresponding to ECU terminal is short to power supply, or if there is an internal circuit damage.	Yes	Check, repair or replace ECU
		No	Diagnostic Help

P046700 EVAP Purge Flow Sensor Circuit Low

DTC reporting condition: The voltage signal of high load desorption pipeline pressure sensor is lower than 0.2 V.

1. Possible cause:
   - Pressure sensor signal terminal is short to ground.
   - High load desorption pipeline pressure sensor signal pin corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next

No.	Operation Step	Test Result	Subsequent Step
3	Use a multimeter to measure if high load desorption pipeline pressure sensor signal line voltage is close to or equal to 0V.	Yes	Replace sensor
		No	Next
4	Measure if pressure sensor wire harness terminal voltage is close to or equal to 0V.	Yes	Check wire harness
		No	Next
5	Check if high load desorption pipeline pressure sensor signal pin terminal corresponding to ECU terminal is short to ground, or if there is an internal circuit damage.	Yes	Check, repair or replace ECU
		No	Diagnostic Help

P128500 EVAP Purge Flow Sensor Circuit Range Performance

DTC reporting condition: The pressure signal of high load desorption pipeline pressure sensor exceeds the threshold.

1. Possible cause:
   - Pressure sensor signal terminal is short to power supply.
   - High load desorption pipeline pressure sensor signal pin corresponding to ECU terminal is short to power supply.
   - High load desorption pipeline pressure sensor is damaged.
   - The low load desorption pipeline check valve is damaged and cannot function properly.
   - Venturi tube is disconnected.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Use a multimeter to measure if high load desorption pipeline pressure sensor signal line voltage is close to or equal to 5 V.	Yes	Replace sensor
		No	Next
4	Measure if pressure sensor wire harness terminal voltage is close to or equal to 5 V.	Yes	Check wire harness
		No	Next
5	Check if high load desorption pipeline pressure sensor signal pin terminal corresponding to ECU terminal is short to power supply, or if there is an internal circuit damage.	Yes	Check, repair or replace ECU
		No	Next
6	Replace high load desorption pipeline pressure sensor, start vehicle and drive with a heavy load, check if malfunction reappears.	Yes	Next
		No	End
7	Replace low load desorption pipeline check valve, start vehicle and drive with a heavy load, check if malfunction reappears.	Yes	Next
		No	End
8	Check if venturi tube is disconnected.	Yes	Replace venturi tube

No.	Operation Step	Test Result	Subsequent Step
		No	Diagnostic Help

P128600 EVAP Purge Flow Sensor Circuit Range Performance

DTC reporting condition: The pressure signal of high load desorption pipeline pressure sensor is lower than the threshold.

1. Possible cause:
   - Pressure sensor signal terminal is short to ground.
   - High load desorption pipeline pressure sensor signal pin corresponding to ECU terminal is short to ground.
   - High load desorption pipeline pressure sensor is damaged.
   - Venturi tube or high load desorption pipeline check valve is blocked.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Use a multimeter to measure if high load desorption pipeline pressure sensor signal line voltage is close to or equal to 0V.	Yes	Replace sensor
		No	Next
4	Measure if pressure sensor wire harness terminal voltage is close to or equal to 0V.	Yes	Check wire harness
		No	Next
5	Check if high load desorption pipeline pressure sensor signal pin terminal corresponding to ECU terminal is short to ground, or if there is an internal circuit damage.	Yes	Check, repair or replace ECU
		No	Next
6	Replace high load desorption pipeline pressure sensor, start and drive vehicle, check if malfunction reappears.	Yes	Next
		No	End
7	Replace high load desorption pipeline check valve or venturi tube, start and drive vehicle, check if malfunction reappears.	Yes	Diagnostic Help
		No	End

P222900 Barometric Pressure Sensor "A" Circuit High P222800 Barometric Pressure Sensor "A" Circuit Low Problem

DTC reporting condition: The sensor sends fault information by itself.

1. Possible cause:
   - The built-in ambient pressure sensor in ECU is malfunctioning.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if ambient pressure sensor signal valve is too high or low.	Yes	Check and repair ECU
		No	Diagnostic Help

P223000 Barometric Pressure Sensor Signal Failure P222722 Barometric Pressure Sensor "A" Circuit Range/Performance P222721 Barometric Pressure Sensor "A" Circuit Range/Performance P120200 Barometric Pressure Sensor "A" Circuit Range/Performance P120300 Barometric Pressure Sensor "A" Circuit Range/Performance

DTC reporting condition: The sensor sends fault information by itself.

1. Possible cause:
   - The built-in ambient pressure sensor in ECU is malfunctioning.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if ambient pressure sensor signal valve is significantly different from the current atmospheric pressure.	Yes	Check and repair ECU
		No	Diagnostic Help

P023700 Turbocharger/Supercharger Boost Sensor "A" Circuit Low

DTC reporting condition: Boost pressure sensor voltage is lower than 0.15 V.

1. Possible cause:
   - Sensor signal terminal pin is short to ground.
   - Sensor signal terminal pin corresponding to ECU is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Sensor signal terminal pin is short to ground.	Yes	Repair wire harness
		No	Next
2	Sensor power supply terminal pin is short to ground.	Yes	Repair wire harness
		No	Next
3	Offset or damage to sensor resistance and other characteristics.	Yes	Replace sensor
		No	Next
4	Sensor signal terminal pin corresponding to ECU is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P023800 Turbocharger/Supercharger Boost Sensor "A" Circuit High

DTC reporting condition: Boost pressure sensor voltage is higher than 4.85 V.

1. Possible cause:
   - Sensor signal terminal pin is short to power supply or open.
   - Connector is not connected securely or detached.
   - Sensor signal terminal pin corresponding to ECU is short to power supply or open.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connector is not connected securely or detached.	Yes	Reconnect it
		No	Next
2	Sensor signal terminal pin is short to power supply or open.	Yes	Repair wire harness
		No	Next
3	Sensor power supply terminal and grounded terminal pin are open.	Yes	Repair wire harness
		No	Next
4	Offset or damage to sensor resistance and other characteristics.	Yes	Replace sensor
		No	Next
5	Sensor signal terminal pin corresponding to ECU is short to power supply or open, or there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P212300/ P212800 Accelerator Pedal 1st/2nd Path Signal Voltage Too High Fault

DTC reporting condition: A path of pedal voltage value is higher than APP_uRaw1SRCHigh_C / APP_uRaw2SRCHigh_C and lasts for TUPWGO.

1. Possible cause:
   - The ground wire GND of accelerator pedal 1st/2nd path signal is open.
   - 1st/2nd path signal wires of accelerator pedal are short to 5 V power supply.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Collect two paths of accelerator pedal voltage values APP_uRaw1, APP_uRaw2, and observe if it is pulled near 5 V when fault reappears.	Go to step 2	Repeat the measurement until it reappears
2	The actions such as unplugging and plugging connector, shaking wire harness, etc. will affect the occurrence frequency of faults.	Go to step 3	Go to step 4
3	Verify if wire harness is the cause by accelerator pedal flying wire connection.	Replace wire harness, and then go to step 5	Go to step 4
4	Replace pedal, check if it is caused by pedal.	Replace pedal, and then go to step 5	Replace vehicle controller, and then go to step 5

Step	Operation	Yes	No
5	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troubleshooted, and system is normal	Replace vehicle controller

P212200/P212700 Accelerator Pedal 1st/2nd Path Signal Voltage Too Low Fault

DTC reporting condition: A path of pedal voltage value is lower than APP_uRaw1SRCLow_C / APP_uRaw2SRCLow_C and lasts for TUPWGU.

1. Possible cause:
   - The 5 V power supply line of accelerator pedal 1st/2nd path signal is open.
   - The accelerator pedal 1st/2nd path signal line is open.
   - The accelerator pedal 1st/2nd path signal line is short to GND.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Collect two paths of accelerator pedal voltage values APP_uRaw1, APP_uRaw2, and observe if it drops near zero when fault reappears.	Go to step 2	Repeat the measurement until it reappears
2	The actions such as unplugging and plugging connector, shaking wire harness, etc. will affect the occurrence frequency of faults.	Go to step 3	Go to step 4
3	Verify if wire harness is the cause by accelerator pedal flying wire connection.	Replace wire harness, and then go to step 5	Go to step 4
4	Replace pedal, check if it is caused by pedal.	Replace pedal, and then go to step 5	Replace vehicle controller, and then go to step 5
5	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troubleshooted, and system is normal	Replace vehicle controller

P261000 ECM/PCM Engine Off Timer Performance

DTC reporting condition: In ECU power-on stage, engine off timer data is unreasonable.

1. Possible cause:
   - Engine off timer data is unreasonable.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Turn key to OFF position until power supply of ECU is completely cut off, then turn key to ON position to check if the fault is troubleshooted.	Yes	Troubleshoot the fault
		No	Consult ECU supplier

P213800 Two-way Signal Deviation of Accelerator Pedal Out of Limit Fault

DTC reporting condition: Compare the two paths of accelerator pedal signal voltage, when the deviation exceeds the threshold and it is confirmed after a period of time, a fault is reported.

1. Possible cause:
   - There is a short circuit or resistance between accelerator pedal 1st and 2nd path signal lines.
   - There is resistance on accelerator pedal 1st/2nd path 5 V power supply line or GND line, which causes 5 V voltage of pedal terminal to be pulled down or zero voltage to be increased.
2. Troubleshooting method:

Step	Operation	Yes	No
1	Collect two paths of accelerator pedal voltage values APP_uRaw1, APP_uRaw2, and observe if the relationship between them is twice at the moment the fault reappears.	Go to step 2	Repeat the measurement until it reappears
2	The actions such as unplugging and plugging connector, shaking wire harness, etc. will affect the occurrence frequency of faults.	Go to step 3	Go to step 5
3	Measure the voltage drop of each section on wire harness through AD-Scan. If wire harness is ideal, there is no voltage drop, and if there is a voltage drop, it means that there is resistance in wire harness or connector.	Go to step 4	Go to step 5
4	Verify if wire harness resistance is the cause by accelerator pedal flying wire connection.	Replace wire harness, and then go to step 6	Go to step 5
5	Replace pedal to determine if there is an internal problem in pedal.	Replace pedal, and then go to step 6	Replace vehicle controller, and then go to step 6
6	Clear DTC, restart vehicle and check if DTC is cleared.	Malfunction is troubleshooted, and system is normal	Replace vehicle controller

P064100 5 V Power Supply Module 1 Fault

DTC reporting condition: 5 V power supply module 1 has an overvoltage or undervoltage problem.

1. Possible cause:

- 5 V power supply module 1 has an overvoltage or undervoltage problem.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	There is wire harness signal interference.	Yes	Shield the wire harness
		No	Consult ECM supplier

P065100 5 V Power Supply Module 2 Fault

DTC reporting condition: 5 V power supply module 2 has an overvoltage or undervoltage problem.

1. Possible cause:

- 5 V power supply module 2 has an overvoltage or undervoltage problem.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	There is wire harness signal interference.	Yes	Shield the wire harness
		No	Consult ECM supplier

P063400 Cooling Fan Drive Chip Overheating

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:

- Cooling fan relay control circuit is short to power supply.
- Cooling fan relay control pin corresponding to ECU terminal is short to power supply.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Cooling fan relay control circuit is short to power supply.	Yes	Shield the wire harness
		No	Consult ECM supplier
2	If there is a fault in the internal chip of ECU.	Yes	Check and repair ECU
		No	Diagnostic Help

P00CE24 Cold Start Calibration of Manifold Intake Air Temperature Sensor Unreasonable (Positive Deviation) P00CE23 Cold Start Calibration of Supercharged Intake Air Temperature Sensor Unreasonable (Positive Deviation) P138024 Cold Start Calibration of Supercharged Intake Air Temperature Sensor Unreasonable

(Positive Deviation) P138023 Cold Start Calibration of Supercharged Intake Air Temperature Sensor Unreasonable (Positive Deviation)

DTC reporting condition: Intake temperature sensor greatly deviates from the average model during cold start.

1. Possible cause:
   - Internal resistance of intake temperature sensor is unreasonable.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if there is contact resistance in wire harness.	Yes	Repair wire harness
		No	Next
2	Check if internal resistance value of sensor greatly deviates from the normal value.	Yes	Replace sensor
		No	Diagnostic Help

P011400 Poor Contact in Intake Manifold Temperature Sensor Circuit

DTC reporting condition: Temperature sensor voltage is higher than 4.9 V.

1. Possible cause:
   - Intake manifold temperature sensor signal is in poor contact.
   - Connector is in poor contact.
   - Intake manifold temperature sensor signal pin corresponding to ECU terminal is in poor contact.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Use a multimeter to measure if voltage between intake manifold temperature sensor signal terminal and ground is close to or equal to 5 V.	Yes	Next
2	Turn ignition switch to “OFF” and check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
3	Check if sensor signal terminal is in poor contact.	Yes	Repair wire harness
		No	Next
4	Check if intake manifold temperature sensor signal pin corresponding to ECU terminal is in poor contact.	Yes	Check and repair ECU
		No	Diagnostic Help

P011300 Intake Manifold Temperature Sensor Signal Voltage Too High

DTC reporting condition: Temperature sensor voltage is higher than 4.9 V.

1. Possible cause:
   - Intake manifold pressure sensor signal terminal is short to power supply or open.
   - Sensor reference ground is open.
   - Intake manifold temperature sensor signal pin corresponding to ECU terminal is short to power supply or open, or there is an internal circuit damage.

- Sensor is damaged

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Use a multimeter to measure if voltage between intake manifold temperature sensor signal terminal and ground is close to or equal to 5 V.	Yes	Next
2	Turn ignition switch to “OFF” and check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
3	Check if sensor signal terminal is short to power supply or open.	Yes	Repair wire harness
		No	Next
4	Check if sensor reference ground is open.	Yes	Repair or replace wire harness or sensor
		No	Next
5	Check if sensor is damaged.	Yes	Replace sensor
		No	Next
6	Check if intake manifold temperature sensor signal pin corresponding to ECU terminal is short to power supply or open, or if there is an internal circuit damage	Yes	Check and repair ECU
		No	Diagnostic Help

P009800 Intake Air Temperature Sensor 2 Circuit High Bank 1

DTC reporting condition: Temperature sensor voltage is higher than 4.9 V.

1. Possible cause:

- Boost temperature sensor signal terminal is short to power supply or open.
- Sensor reference ground is open.
- Boost temperature sensor signal pin corresponding to ECU terminal is short to power supply or open, or there is an internal circuit damage.
- Sensor is damaged.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”. Do not start engine, and observe if “Intake Temperature Sensor Measured Value” in data flow is too low. If value is lower than normal condition, observe minimum intake manifold temperature range. You can also use a multimeter to measure if voltage between boost temperature sensor signal terminal and ground is close to or equal to 5 V.	Yes	Next
2	Turn ignition switch to “OFF” and check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next

No.	Operation Step	Test Result	Subsequent Step
3	Check if sensor signal terminal is short to power supply or open.	Yes	Repair wire harness
		No	Next
4	Check if sensor reference ground is open.	Yes	Repair, replace wire harness or sensor
		No	Next
5	Check if sensor is damaged.	Yes	Replace sensor
		No	Next
6	Check if boost temperature sensor signal pin corresponding to ECU terminal is short to power supply or open, or if there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P009700 Intake Air Temperature Sensor 2 Circuit Low Bank 1

DTC reporting condition: Temperature sensor voltage is lower than 0.1 V.

1. Possible cause:
   - Boost temperature sensor signal terminal is short to ground.
   - Boost temperature sensor signal pin corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”. Do not start engine, and observe if “Intake Temperature Sensor Measured Value” in data flow is too low. If value is lower than normal condition, observe minimum intake manifold temperature range. You can also use a multimeter to measure if voltage between boost temperature sensor signal terminal and ground is close to or equal to 5 V.	Yes	Next
2	Turn ignition switch to “OFF” and check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
3	Check if sensor signal terminal is short to ground.	Yes	Repair wire harness
		No	Next
4	Check if boost temperature sensor signal pin corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P009900 Intake Air Temperature Sensor 2 Circuit Intermittent Bank 1

DTC reporting condition: Boost temperature sensor voltage is intermittently higher than 4.9 V.

1. Possible cause:
   - Boost temperature sensor signal terminal is in poor contact.
   - Connector is in poor contact.

- Boost temperature sensor signal pin corresponding to ECU terminal is in poor contact.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”. Do not start engine, and observe if “Intake Temperature Sensor Measured Value” in data flow is too low. If value is lower than normal condition, observe minimum boost temperature range. You can also use a multimeter to measure if voltage between boost temperature sensor signal terminal and ground is close to or equal to 5 V.	Yes	Next
2	Turn ignition switch to “OFF” and check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
3	Check if sensor signal terminal is in poor contact.	Yes	Repair wire harness
		No	Next
4	Check if boost temperature sensor signal pin corresponding to ECU terminal is in poor contact.	Yes	Check and repair ECU
		No	Diagnostic Help

P044200 EVAP System Leak Detected (Small Leak)

DTC reporting condition: Vacuum attenuation gradient of evaporation system exceeds the threshold.

1. Possible cause:

- Fuel tank cap is not tightened or there is leaking port.
- Canister vent valve cannot be closed completely.
- Leakage exists among oil tank - pipeline - canister valve - canister solenoid valve - canister vent valve.
- Canister solenoid valve cannot be completely closed.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check if fuel tank cap is tightened.	No	End
		Yes	Next
4	Check for leakage/blockage in fuel tank - pipeline - canister valve - canister solenoid valve - canister ventilation valve, and if connector is installed correctly.	No	End
		Yes	Next
5	Check if canister vent valve can be completely closed, which can be achieved by shorting to pin.	No	Replace canister vent valve
		Yes	Next

No.	Operation Step	Test Result	Subsequent Step
6	Check if canister solenoid valve is completely closed with power ON.	No	End
		Yes	Diagnostic Help

P045500 EVAP System Leak Detected (Large Leak)

DTC reporting condition: Vacuum degree during evaporation system vacuuming cannot reach the target vacuum degree.

1. Possible cause:
   - Fuel tank cap is not tightened or there is leaking port.
   - Canister vent valve cannot be closed completely.
   - Leakage exists among oil tank - pipeline - canister valve - canister solenoid valve - canister vent valve.
   - Canister solenoid valve cannot be completely closed.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check if fuel tank cap is tightened.	No	End
		Yes	Next
4	Check for leakage/blockage in fuel tank - pipeline - canister valve - canister solenoid valve - canister ventilation valve, and if connector is installed correctly.	No	End
		Yes	Next
5	Check if canister vent valve can be completely closed, which can be achieved by shorting to pin.	No	Replace canister vent valve
		Yes	Next
6	Check if canister solenoid valve is completely closed with power ON.	No	End
		Yes	Diagnostic Help

P04F000 EVAP System High Pressure Purge Line Performance

DTC reporting condition: The pressure fluctuation of high load desorption pipeline does not reach the threshold.

1. Possible cause:
   - High load desorption pipeline, check valve, venturi tube and connection between canister valve and engine are blocked or disconnected.
   - Check valve of low load pipeline is damaged and cannot function properly.
   - Canister valve is stuck at normally open position or normally closed position.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Check if desorption pipeline, check valve (if equipped), venturi tube (if equipped) and connection between canister valve and engine are blocked or disconnected.	No	Go to step 5
		Yes	Next
4	Replace the corresponding line.	No	End
5	Check if low load pipeline check valve is damaged and cannot function properly.	Yes	Replace low load pipeline check valve
		No	Next
6	Check if canister valve hardware is stuck at normally closed/normally open position.	No	Diagnostic Help
		Yes	Next
7	Replace canister valve.		End

P044400 Evaporative Emission System Purge Control Valve Circuit Open

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Connector is not connected securely or is in poor contact.
   - Canister control valve circuit is open.
   - Canister control valve circuit corresponding to ECU is open
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
2	Canister control valve signal terminal pin is open.	Yes	Repair wire harness
		No	Next
3	Canister control valve power supply terminal pin is open.	Yes	Repair wire harness
		No	Next
4	Canister control valve is damaged.	Yes	Replace canister valve
		No	Next
5	Canister control terminal pin corresponding to ECU terminal is open, or there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P050C24 Cold Start Engine Coolant Temperature Performance P050C23 Cold Start Engine Coolant Temperature Performance

DTC reporting condition: Cold start of coolant temperature sensor 1 greatly deviates from the model value.

1. Possible cause:
   - Connector is not connected securely or is in poor contact. Internal resistance of coolant temperature sensor is unreasonable.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if there is contact resistance in wire harness.	Yes	Repair wire harness
		No	Next
2	Check if internal resistance value of sensor greatly deviates from the normal value.	Yes	Replace sensor
		No	Diagnostic Help

P011800 Cold Start Engine Coolant Temperature Performance

DTC reporting condition: Coolant temperature sensor 1 voltage is higher than 4.9 V.

1. Possible cause:
   - Connector is not connected securely or is in poor contact.
   - Coolant temperature sensor signal terminal is short to power supply or open.
   - Coolant temperature sensor signal pin corresponding to ECU terminal is short to power supply or open.
   - Sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”. Do not start engine and observe if “Intake Temperature Sensor Measured Value” in data flow is much lower than current ambient temperature. You can also use a multimeter to measure if voltage between coolant temperature sensor 1 signal terminal and ground is close to or equal to 5V.	Yes	Next
2	Turn ignition switch to “OFF” and check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
3	Check if sensor signal terminal is short to power supply or open.	Yes	Repair wire harness
		No	Next
4	Sensor reference ground is open.	Yes	Repair wire harness
		No	Next
5	Sensor is damaged.	Yes	Replace sensor
		No	Next

No.	Operation Step	Test Result	Subsequent Step
6	Coolant temperature sensor signal pin terminal corresponding to ECU is short to power supply, open or there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P011700 Coolant Temperature Sensor 1 Signal Voltage Low

DTC reporting condition: Coolant temperature sensor 1 voltage is lower than 0.09 V.

1. Possible cause:
   - Coolant temperature sensor 1 signal terminal is short to ground.
   - Coolant temperature sensor 1 signal pin corresponding to ECU terminal is short to ground.
   - Sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”. Do not start engine and observe if “Intake Temperature Sensor Measured Value” in data flow is much lower than current ambient temperature. You can also use a multimeter to measure if voltage between coolant temperature sensor 1 signal terminal and ground is close to or equal to 0 V.	Yes	Next
2	Turn ignition switch to “OFF” and check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
3	Check if sensor is damaged.	Yes	Replace sensor
		No	Next
4	Check if coolant temperature sensor 1 signal pin terminal corresponding to ECU is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P011900 Engine Coolant Temperature Sensor 1 Circuit Intermittent

DTC reporting condition: Coolant temperature sensor voltage jumps.

1. Possible cause:
   - Coolant temperature sensor signal terminal circuit is in poor contact.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if coolant temperature sensor signal terminal circuit is in poor contact.	Yes	Repair wire harness
		No	Diagnostic Help

P011623 Engine Coolant Temperature Sensor 1 Circuit Range/Performance

DTC reporting condition: Coolant temperature sensor 1 signal is less than the lowest model value by 30℃/ coolant temperature sensor 1 signal remains unchanged.

1. Possible cause:
   - Internal resistance of coolant temperature sensor is unreasonable.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if there is contact resistance in wire harness.	Yes	Repair wire harness
		No	Next
2	Check if internal resistance value of sensor greatly deviates from the normal value.	Yes	Replace sensor
		No	Diagnostic Help

P042000 Catalyst System Efficiency Below Threshold Bank 1

DTC reporting condition: Calculated value of catalyst converter oxygen storage capacity is lower than the threshold.

1. Possible cause:
   - Check exhaust system for leakage, gasket for damage.
   - The catalytic converter is deteriorated.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check exhaust system for leakage, gasket for damage.	Yes	Repair leaking area
		No	Next
4	Replace the catalytic converter. Check if malfunction reappears after returning vehicle to customer.	Yes	Diagnostic Help
		No	End

P069000 ECM/PCM Power Relay Sense Circuit High

DTC reporting condition: The voltage behind main relay is higher than the threshold.

1. Possible cause:
   - Alternator system is malfunctioning.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check if there is a problem in alternator system.	Yes	Repair alternator
		No	Diagnostic Help

P056300 System Battery Voltage High

DTC reporting condition: Power supply voltage value is higher than 20 V.

1. Possible cause:
   - Engine wire harness grounded point is malfunctioning.
   - Alternator regulator is malfunctioning, and motor power generation cannot be controlled effectively.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch “OFF”. Measure battery voltage with a multimeter and check if it is too high.	Yes	Next
2	Check if engine wire harness grounded point is malfunctioning.	Yes	Repair wire harness
		No	Next
3	Alternator regulator is malfunctioning, and motor power generation cannot be controlled effectively.	Yes	Repair regulator
		No	Diagnostic Help

P056200 Battery Voltage Low

DTC reporting condition: Power supply voltage value is lower than 6 V.

1. Possible cause:
   - All ECU pins connecting to battery or main relay are open.
   - Battery leaks or is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch “OFF”. Measure battery voltage with a multimeter and check if it is too low.	Yes	Next
2	Check if all ECU pins connecting to battery or main relay are open.	Yes	Repair wire harness
		No	Next
3	Check if engine wire harness grounded point is malfunctioning.	Yes	Repair wire harness
		No	Next
4	Regulator is invalid.	Yes	Repair regulator
		No	Next
5	Battery leaks or is damaged.	Yes	Replace battery
		No	Next
6	Alternator is malfunctioning.	Yes	Repair alternator
		No	Diagnostic Help

P056000 Battery Voltage Unreasonable

DTC reporting condition: Battery voltage is lower than the threshold.

1. Possible cause:
   - Battery is depleted.
   - Alternator is malfunctioning.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check if battery is depleted and cannot be used properly after charging.	Yes	Replace battery
		No	Next
4	Check if there is a problem in alternator system.	Yes	Repair alternator
		No	Diagnostic Help

P241400 O2 Sensor Exhaust Sample Error Bank 1 Sensor 1

DTC reporting condition: LSU senses faults such as lean, no circuit and lean target air-fuel ratio.

1. Possible cause:
   - LSU is exposed to the air or LSU connector is in poor contact.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if oxygen sensor is not installed correctly, installed outside the exhaust manifold and exposed into air.	Yes	Reinstall oxygen sensor
		No	Next
2	Check if adjusting resistance in oxygen sensor connector is invalid, the resistance is infinite.	Yes	Replace connector
		No	Next
3	Check oxygen sensor processing circuit part inside ECU, resistance between IA and IP circuit is infinite.	Yes	Check and repair or replace ECU
		No	Diagnostic Help

P063400 Cooling Fan Drive Chip Overheating

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Cooling fan relay control circuit is short to power supply.
   - Cooling fan relay control pin corresponding to ECU terminal is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Cooling fan relay control circuit is short to power supply.	Yes	Repair wire harness
		No	Next
2	If there is a fault in the internal chip of ECU.	Yes	Check and repair ECU
		No	Diagnostic Help

P121200 Vehicle Speed Sensor Performance Failure (Vehicle Speed Exceeds Maximum Range)

DTC reporting condition: Overvoltage (>6.5 V) occurs in 6 V power supply input of chip power supply.

1. Possible cause:
   - ESP sends incorrect vehicle speed signal;
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if CAN signal sent by ESP is too high.	Yes	Check and repair ESP
		No	Diagnostic Help

P050000 Vehicle Speed Sensor Input Signal Failure

DTC reporting condition: CAN vehicle speed signal error is received by ECU.

1. Possible cause:
   - ESP sends incorrect vehicle speed signal;
   - ESP loses communication with ECU vehicle speed signal frame.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if communication between ESP and ECU is lost.	Yes	Check and repair CAN
		No	Next
2	Check if CAN signal sent by ESP is always 0.	Yes	Check and repair ESP
		No	Diagnostic Help

P050165 Vehicle Speed Sensor "A" Circuit Intermittent/Erratic/High

DTC reporting condition: Vehicle speed sensor performance is malfunctioning (vehicle speed is too low when vehicle coasts and fuel is cut off).

1. Possible cause:
   - There is a wire harness interference;
   - Vehicle speed sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Check wire harness for external interference.	Yes	Shield the wire harness
		No	Next
4	Check if vehicle speed sensor is damaged.	Yes	Replace vehicle speed sensor
		No	Diagnostic Help

P261D00 Coolant Pump "B" Control Circuit High

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Turbine cooling electronic water pump control circuit is short to power supply;
   - Turbine cooling electronic water pump control pin corresponding to ECU terminal is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Turbine cooling electronic water pump control circuit is short to power supply.	Yes	Repair wire harness
		No	Next
2	Turbine cooling electronic water pump control pin corresponding to ECU terminal is short to power supply.	Yes	Check and repair ECU
		No	Diagnostic Help

P261C00 Coolant Pump "B" Control Circuit Low

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Turbine cooling electronic water pump control circuit is short to ground;
   - Turbine cooling electronic water pump control pin corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Turbine cooling electronic water pump control circuit is short to ground.	Yes	Repair wire harness
		No	Next
2	Turbine cooling electronic water pump control pin corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P025D00 Fuel Pump Module "A" Control Circuit High

DTC reporting condition: Hardware circuit self-diagnosis.

1. Possible cause:
   - Low pressure oil pump control circuit is short to power supply;
   - Low pressure oil pump pin corresponding to ECU is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if actuator terminal is short to power supply.	Yes	Repair wire harness
		No	Next
2	Check if actuator pin corresponding to ECU terminal is short to power supply.	Yes	Check and repair ECU
		No	Diagnostic Help

P025A00 Fuel Pump Module "A" Control Circuit Open

DTC reporting condition: Hardware circuit self-diagnosis.

1. Possible cause:
   - Low pressure oil pump control circuit is open;
   - Low pressure oil pump pin corresponding to ECU is open.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if actuator terminal is open.	Yes	Repair wire harness
		No	Next
2	Check if actuator pin corresponding to ECU terminal is open.	Yes	Check and repair ECU
		No	Diagnostic Help

P124A00 Booster Exhaust Gate Control Valve Control Circuit A Short

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Waste gate control valve drive circuit pin is short to ground;
   - Drive pin corresponding to ECU is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Waste gate control valve control circuit is short to power supply.	Yes	Repair wire harness
		No	Next
2	Waste gate control circuit pin corresponding to ECU terminal is short to power supply.	Yes	Check and repair ECU
		No	Diagnostic Help

P2ABD00 Supercharged Waste Gate Control Valve Control Circuit A Current/ Temperature Too High

DTC reporting condition: Supercharged waste gate control valve control circuit A current exceeds limit/ temperature is too high.

1. Possible cause:
   - Supercharged waste gate control valve control circuit is short to ground or short to power supply;
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if supercharged waste gate control valve control circuit is short.	Yes	Repair wire harness
		No	Next
2	Check if TMM control circuit pin corresponding to ECU is short.	Yes	Check and repair ECU
		No	Diagnostic Help

P00BD00 Air Flow Through Air Flow Meter Exceeds Upper Limit of Reasonable Range P00BC00 Air Flow Through Air Flow Meter Exceeds Lower Limit of Reasonable Range

DTC reporting condition: Intake flow value exceeds the reasonable range.

1. Possible cause:
   - Sensor is icy and oily.
   - Sensor is aging.
   - Intake pipe is disconnected or leaks seriously.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Check the sensor for damage or contact resistance.	Yes	Repair, replace sensor
		No	Next
3	Turn ignition switch to “OFF”, check if there is any freeze, oil stain, etc. on measurement terminal of sensor, which will affect normal measurement.	Yes	Repair, replace sensor
		No	Next
4	Check if air flow sensor installation position is incorrect, intake pipe is disconnected or seriously leaked.	Yes	Repair intake pipe, sensor
		No	Diagnostic Help

P010122 Mass or Volume Air Flow "A" Circuit Range/Performance - Air Flow Too High P010121 Mass or Volume Air Flow Sensor "A" Circuit Range/Performance P01012A Mass or Volume Air Flow Sensor "A" Circuit Range/Performance

DTC reporting condition: Intake flow value exceeds the reasonable range.

1. Possible cause:
   - Sensor is icy and oily.
   - Sensor is aging.
   - Intake pipe is disconnected or leaks seriously.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Check the sensor for damage or contact resistance.	Yes	Repair, replace sensor
		No	Next
3	Turn ignition switch to “OFF”, check if there is any freeze, oil stain, etc. on measurement terminal of sensor, which will affect normal measurement.	Yes	Repair, replace sensor
		No	Next
4	Check if air flow sensor installation position is incorrect, intake pipe is disconnected or seriously leaked.	Yes	Repair intake pipe, sensor
		No	Diagnostic Help

P010200 Air Flow Meter Circuit Voltage Too Low

DTC reporting condition: Air flow meter circuit voltage is lower than the threshold.

1. Possible cause:
   - Sensor circuit is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if air flow meter circuit is short to ground.	Yes	Repair sensor or wire harness
		No	Diagnostic Help

P010300 Air Flow Meter Circuit Voltage Too High

DTC reporting condition: Air flow meter circuit voltage is higher than the threshold.

1. Possible cause:
   - Sensor circuit is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if air flow meter circuit is short to power supply.	Yes	Repair sensor or wire harness
		No	Diagnostic Help

P010000 Air Flow Meter Signal Period is 0

DTC reporting condition: The signal period of air flow meter is 0.

1. Possible cause:
   - Sensor circuit is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if air flow meter circuit is short to power supply or ground.	Yes	Repair sensor or wire harness
		No	Diagnostic Help

P053200 A/C Refrigerant Pressure Sensor "A" Circuit Low

DTC reporting condition: Sensor voltage is lower than the threshold.

1. Possible cause:
   - Air conditioning pressure sensor signal terminal is short to ground.
   - Sensor 5 V reference voltage terminal is open.
   - Air conditioning pressure sensor signal pin terminal corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”. Do not start the engine, use a multimeter to measure if the voltage of air conditioning pressure sensor signal terminal is close to or equal to 0 V.	Yes	Next
2	Turn ignition switch to “OFF”, check if pressure sensor signal terminal is short to ground.	Yes	Repair wire harness
		No	Next
3	Check if sensor 5 V reference voltage terminal is open.	Yes	Repair wire harness
		No	Next
4	Check if intake pressure sensor signal pin terminal corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P053300 A/C Refrigerant Pressure Sensor "A" Circuit High

DTC reporting condition: Sensor voltage is higher than the threshold.

1. Possible cause:

- Intake manifold pressure sensor signal terminal is short to power supply or open.
- Sensor reference ground terminal is open.
- Intake pressure sensor signal pin terminal corresponding to ECU terminal is short to power supply or open.
- Sensor is damaged

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”. Do not start engine, use a multimeter to measure if voltage between intake manifold pressure sensor signal terminal and ground is close to or equal to 5 V.	Yes	Next
2	Turn ignition switch to “OFF” and check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
3	Check if intake manifold pressure sensor signal terminal is short to power supply or open.	Yes	Repair wire harness
		No	Next
4	Check if sensor reference ground terminal is open.	Yes	Repair wire harness
		No	Next
5	Check if sensor is damaged.	Yes	Replace sensor
		No	Next
6	Check if intake pressure sensor signal pin terminal corresponding to ECU terminal is short to power supply or open, or if there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P256400 Turbocharger Boost Control Position Sensor "A" Circuit Low

DTC reporting condition: The voltage of turbocharger electronic waste gate position sensor is below the limit.

1. Possible cause:
   - Sensor circuit is short to ground. Sensor is frozen and oily.
   - Pin corresponding to ECU is short to ground.

2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check if electronic waste gate position sensor wire harness is short to ground.	Yes	End
		No	Diagnostic Help

P256500 Turbocharger Boost Control Position Sensor "A" Circuit High

DTC reporting condition: The voltage of turbocharger electronic waste gate position sensor is higher than the limit.

1. Possible cause:
   - Sensor circuit is short to power supply or open.
   - Pin corresponding to ECU is short to power supply or open.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check if electronic waste gate position sensor wire harness is short to power supply or open.	Yes	End
		No	Diagnostic Help

P003A00 First Zero Self-Learning Error of Turbocharger Electronic Wastegate

DTC reporting condition: The zero point voltage learned for the first time exceeds the upper or lower limit.

1. Possible cause:
   - Actuator status is inconsistent with SPEC.
   - The closed position of actuator is blocked by foreign objects.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Push the turbocharger to closed position manually, read position voltage to check if it is out of the range of SPEC.	Yes	Replace turbocharger assembly
		No	Check for occasional sticking
2	Check for foreign matter near turbocharger closed position.	Yes	Remove foreign objects
		No	Check for occasional sticking

P024477 Turbocharger/Supercharger Wastegate Actuator "A" Range/Performance

DTC reporting condition: Deviation between target position and actual position of turbocharger electronic waste gate exceeds the threshold.

1. Possible cause:
   - Actuator status is inconsistent with SPEC.
   - The closed position of actuator is blocked by foreign objects.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Check if electronic waste gate is stuck.	Yes	Replace electronic waste gate
		No	Next
4	Check if wire harness and connector are aging	Yes	End
		No	Diagnostic Help

P024437 Turbocharger/Supercharger Wastegate Actuator "A" Range/Performance

DTC reporting condition: The duty radio of turbocharger electronic waste gate control exceeds the limit.

1. Possible cause:
   - Actuator status is inconsistent with SPEC.
   - The closed position of actuator is blocked by foreign objects.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Check if electronic waste gate is stuck.	Yes	Replace electronic waste gate
		No	Next
4	Check if wire harness and connector are aging.	Yes	End
		No	Diagnostic Help

P138124 Intake Air Temperature Sensor 3 Multiple Check Bank 1 P138123 Intake Air Temperature Measurement System - Multiple Sensor Correlation Bank 3

DTC reporting condition: Clutch water pump control circuit is open.

1. Possible cause:
   - Clutch water pump control circuit pin is open.
   - Clutch water pump power supply terminal is not connected to main relay.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if clutch water pump control circuit pin terminal is short to ground.	Yes	Repair wire harness
		No	Next

No.	Operation Step	Test Result	Subsequent Step
2	Check if clutch water pump control circuit pin corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P00EA00 Air Filter Rear Temperature Sensor 3 Circuit Voltage Too Low

DTC reporting condition: Temperature sensor voltage is lower than 0.1 V.

1. Possible cause:
   - Air filter rear temperature sensor signal terminal is short to ground.
   - Air filter rear temperature sensor signal pin corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”. Do not start engine, and observe if “Intake Temperature Sensor Measured Value” in data flow is too low. If value is lower than normal condition, observe minimum air filter rear temperature range. You can also use a multimeter to measure if voltage between air filter rear temperature sensor signal terminal and ground is close to or equal to 5 V.	Yes	Next
2	Turn ignition switch to “OFF” and check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
3	Check if sensor signal terminal is short to ground.	Yes	Repair wire harness
		No	Next
4	Check if air filter rear temperature sensor signal pin corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P00EB00 Intake Air Temperature Sensor 3 Circuit High Bank 1

DTC reporting condition: Temperature sensor voltage is higher than 4.9 V.

1. Possible cause:
   - Air filter rear temperature sensor signal terminal is short to power supply or open.
   - Sensor reference ground is open.
   - Air filter rear temperature sensor signal pin corresponding to ECU terminal is short to power supply or open, or there is an internal circuit damage.
   - Sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”. Do not start engine, and observe if “Intake Temperature Sensor Measured Value” in data flow is too low. If value is lower than normal condition, observe minimum air filter rear temperature range. You can also use a multimeter to measure if voltage between air filter rear temperature sensor signal terminal and ground is close to or equal to 5 V.	Yes	Next
2	Turn ignition switch to “OFF” and check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
3	Check if sensor signal terminal is short to power supply or open.	Yes	Repair wire harness
		No	Next
4	Check if sensor reference ground is open.	Yes	Repair, replace wire harness or sensor
		No	Next
5	Check if sensor is damaged.	Yes	Replace sensor
		No	Next
6	Check if air filter rear temperature sensor signal pin corresponding to ECU terminal is short to power supply or open, or if there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P00EC00 Intake Air Temperature Sensor 3 Circuit Intermittent Bank 1

DTC reporting condition: Air filter rear temperature sensor voltage is intermittently higher than 4.9 V.

1. Possible cause:
   - Air filter rear temperature sensor signal terminal is in poor contact.
   - Connector is in poor contact.
   - Air filter rear temperature sensor signal pin corresponding to ECU terminal is in poor contact.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”. Do not start engine, and observe if “Intake Temperature Sensor Measured Value” in data flow is too low. If value is lower than normal condition, observe minimum air filter rear temperature range. You can also use a multimeter to measure if voltage between air filter rear temperature sensor signal terminal and ground is close to or equal to 5 V.	Yes	Next
2	Turn ignition switch to “OFF” and check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next

No.	Operation Step	Test Result	Subsequent Step
3	Check if sensor signal terminal is in poor contact.	Yes	Repair wire harness
		No	Next
4	Check if air filter rear temperature sensor signal pin corresponding to ECU terminal is in poor contact.	Yes	Check and repair ECU
		No	Diagnostic Help

P007000 Ambient Air Temperature Sensor Circuit "A"

DTC reporting condition: Ambient temperature sensor signal received by ECU is incorrect.

1. Possible cause:
   - ECU CAN signal or A/C CAN signal is abnormal.
   - Ambient temperature sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Check if CAN signal is normal.	No	Repair ECU CAN signal or A/C CAN signal
		Yes	Next
4	Replace ECU, check if malfunction reappears.	Yes	Next
		No	End
5	Replace ambient temperature sensor, check if malfunction reappears.	Yes	Diagnostic Help
		No	End

P007200 Ambient Air Temperature Sensor Circuit "A" Low

DTC reporting condition: Ambient temperature sensor circuit continuity self-diagnosis.

1. Possible cause:
   - Ambient temperature sensor wire harness connection is abnormal.
   - Ambient temperature sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON”.		Next
2	Read and store fault freeze frame information.		Next
3	Using a multimeter, check if sensor pin voltage is normal; check if CAN signal is normal	No	Replace sensor
		Yes	Next

No.	Operation Step	Test Result	Subsequent Step
4	Check if wire harness is normal.	No	Repair wire harness
		Yes	Next
5	Replace ECU, check if malfunction reappears.	Yes	Diagnostic Help
		No	End

P007300 Ambient Air Temperature Sensor Circuit "A" High

DTC reporting condition: Ambient temperature sensor signal circuit continuity self-diagnosis.

1. Possible cause:
   - Ambient temperature sensor wire harness connection is abnormal.
   - Ambient temperature sensor is damaged.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Using a multimeter, check if sensor pin voltage is normal; check if CAN signal is normal	No	Replace sensor
		Yes	Next
4	Check if wire harness is normal.	No	Repair wire harness
		Yes	Next
5	Replace ECU, check if malfunction reappears.	Yes	Diagnostic Help
		No	End

P150A00 Active Speed Limitation Input Signal Not Plausible P150B00 Clamping Switch of Active Speed Limitation Input Signal P150C00 Active Speed Limitation A/D Conversion Malfunction

DTC reporting condition: Active speed limit control switch circuit signal is unreasonable.

1. Possible cause:
   - Active speed limit controller connector is not connected securely or is in poor contact.
   - Active speed limit controller control circuit is open.
   - Each button for active speed limit control is stuck at "Normally Pressed" state.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Active speed limit controller connector is not connected securely or is in poor contact.	Yes	Repair wire harness
		No	Next
2	Active speed limit controller control circuit is open.	Yes	Repair wire harness

No.	Operation Step	Test Result	Subsequent Step
		No	Next
3	Each button for active speed limit control is stuck at "-Normally Pressed" state.	Yes	Repair button
		No	Next
4	Active speed limit control pin corresponding to ECU is open, or circuit is malfunctioning.	Yes	Check and repair ECU
		No	Diagnostic Help

P262600 O2 Sensor Pumping Current Trim Circuit Open Bank 1 Sensor 1

DTC reporting condition: After heating control in oxygen sensor start stage ends, sensor voltage when oil is cut off is higher than 4.8 V.

1. Possible cause:
   - IA line is disconnected.
   - Sensor or wire harness connector is malfunctioning.
   - Sensor is invalid, such as ceramic body is damaged.
   - Adjustable resistance of Lambda connector is invalid (resistance between IA line and IP line is infinite).
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if pin corresponding to green (IA) line at oxygen sensor connector is in poor contact.	Yes	Repair wire harness
		No	Next
2	Check for continuity of oxygen sensor wire harness to check if the line is open.	Yes	Repair wire harness
		No	Next
3	Check for abnormal pin at connector between wire harness and ECU, which may result in poor contact.	Yes	Repair button
		No	Next
4	Replace LSU oxygen sensor, start vehicle and run it until coolant temperature reaches the normal value, drive in a steady state at about 50 yards of 2nd gear , release accelerator pedal 3 to 4 times, check if malfunction reappears.	Yes	Check and repair ECU
		No	Diagnostic Help
5	Check for abnormality in LSU processing circuit in ECU.	Yes	Check and repair or replace ECU
		No	Diagnostic Help

P124B00 Electric Waste Gate (E-WG) Actuator Control Chip SPI Bus Error

DTC reporting condition: E-WG control circuit communication protocol is malfunctioning.

1. Possible cause:
   - E-WG control circuit communication is malfunctioning.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if there is a problem in E-WG control circuit.	Yes	Check and repair circuit
		No	Diagnostic Help

U010187 Lost Communication with TCM

DTC reporting condition: ECU receiving TCM message times out.

1. Possible cause:
   - TCM connector is not connected securely or is disconnected.
   - Transmission line between TCM and ECU is damaged or interrupted.
   - TCM is damaged and signal cannot be transmitted to ECU normally.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	TCM connector is not connected securely or is disconnected.	Yes	Reconnect it
		No	Next
2	There is wire harness signal interference.	Yes	Shield the wire harness
		No	Next
3	Transmission line between TCM and ECU is damaged or interrupted.	Yes	Repair wire harness
		No	Next
4	Check if there is CAN hardware circuit fault.	Yes	Refer to repair procedures of U0001
		No	Next
5	TCM is damaged and signal cannot be transmitted to ECU normally.	Yes	Consult the TCM supplier
		No	Diagnostic Help

P051300 / P063300 / P161000 / P161100 / P161200 / P161300 Immobilizer Malfunction

DTC reporting condition: Immobilizer data authentication is failed.

1. Possible cause:
   - ECU does not perform immobilizer matching or immobilizer status is wrong.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Immobilizer connector is not connected securely or disconnected.	Yes	Reconnect it
		No	Next
2	Immobilizer circuit is malfunctioning.	Yes	Repair wire harness

No.	Operation Step	Test Result	Subsequent Step
		No	Next
3	If ECU has been replaced, check if anti-theft authentication code is incorrect or not updated.	Yes	Refresh anti-theft code
		No	Next
4	Immobilizer is malfunctioning.	Yes	Consult the immobilizer supplier
		No	Next
5	Immobilizer module circuit corresponding to ECU terminal is malfunctioning.	Yes	Check and repair ECU
		No	Diagnostic Help

P261D00 Coolant Pump "B" Control Circuit High

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Turbine cooling electronic water pump control circuit is short to power supply.
   - Turbine cooling electronic water pump control pin corresponding to ECU terminal is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Turbine cooling electronic water pump control circuit is short to power supply.	Yes	Repair wire harness
		No	Next
2	Turbine cooling electronic water pump control pin corresponding to ECU terminal is short to power supply.	Yes	Check and repair ECU
		No	Diagnostic Help

P261C00 Coolant Pump "B" Control Circuit Low

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Turbine cooling electronic water pump control circuit is short to ground.
   - Turbine cooling electronic water pump control pin corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Turbine cooling electronic water pump control circuit is short to ground.	Yes	Repair wire harness
		No	Next
2	Turbine cooling electronic water pump control pin corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P261A00 Coolant Pump "B" Control Circuit Low

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Turbine cooling electronic water pump control circuit is open.
   - Connector is not connected securely or detached.
   - Turbine cooling electronic water pump control pin corresponding to ECU terminal is open.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connector is not connected securely or detached.	Yes	Reconnect it
		No	Next
2	Turbine cooling electronic water pump control circuit pin is open.	Yes	Repair wire harness
		No	Next
3	Drive pin corresponding to ECU is open, or there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P003200 HO2S Heater Control Circuit High Bank 1 Sensor 1

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Upstream oxygen sensor heater control circuit pin terminal is short to power supply.
   - Upstream oxygen sensor heater pin corresponding to ECU terminal is short to power supply.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if upstream oxygen sensor heater control circuit pin terminal is short to power supply.	Yes	Repair wire harness
		No	Next
2	Check if upstream oxygen sensor heater pin corresponding to ECU terminal is short to power supply.	Yes	Check and repair ECU
		No	Diagnostic Help

P003100 HO2S Heater Control Circuit Low Bank 1 Sensor 1

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Upstream oxygen sensor heater control circuit pin terminal is short to ground.
   - Upstream oxygen sensor heater control circuit power supply terminal is grounded.
   - Upstream oxygen sensor heater pin corresponding to ECU terminal is short to ground.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if upstream oxygen sensor heater control circuit pin terminal is short to ground.	Yes	Repair wire harness
		No	Next
2	Check if upstream oxygen sensor heater control circuit power supply terminal is grounded.	Yes	Repair wire harness
		No	Next
3	Check if upstream oxygen sensor heater pin corresponding to ECU terminal is short to ground.	Yes	Check and repair ECU
		No	Diagnostic Help

P003000 HO2S Heater Control Circuit Bank 1 Sensor 1

DTC reporting condition: Drive channel self-diagnosis is malfunctioning.

1. Possible cause:
   - Connector is not connected securely or is in poor contact.
   - Open circuit in upstream oxygen sensor heater control circuit pin terminal.
   - Upstream oxygen sensor heater control circuit power supply terminal is not connected to main relay.
   - Sensor is damaged.
   - Upstream oxygen sensor heater pin circuit corresponding to ECU terminal is open, or there is an internal circuit damage.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Check if connector is not connected securely or is in poor contact.	Yes	Reconnect it
		No	Next
2	Open circuit in upstream oxygen sensor heater control circuit pin terminal.	Yes	Repair wire harness
		No	Next
3	Upstream oxygen sensor heater control circuit power supply terminal is not connected to main relay.	Yes	Repair wire harness
		No	Next
4	Sensor is damaged.	Yes	Replace sensor
		No	Next
5	Upstream oxygen sensor heater pin circuit corresponding to ECU terminal is open, or there is an internal circuit damage.	Yes	Check and repair ECU
		No	Diagnostic Help

P013300 O2 Sensor Circuit Slow Response Bank 1 Sensor 1

DTC reporting condition: The dynamic factor of upstream oxygen sensor is less than the threshold.

1. Possible cause:
   - Oxygen sensor is aging and response becomes slower.
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Check intake system and exhaust system for air leakage.	Yes	Repair leaking area
		No	Next
4	Replace the upstream LSU oxygen sensor. Check if malfunction reappears after returning vehicle to customer.	Yes	Diagnostic Help
		No	End

P013100 O2 Sensor Circuit Low Voltage Bank 1 Sensor 1

DTC reporting condition: Signals of upstream oxygen sensor signal lines IA, IP, UN, VM are zero.

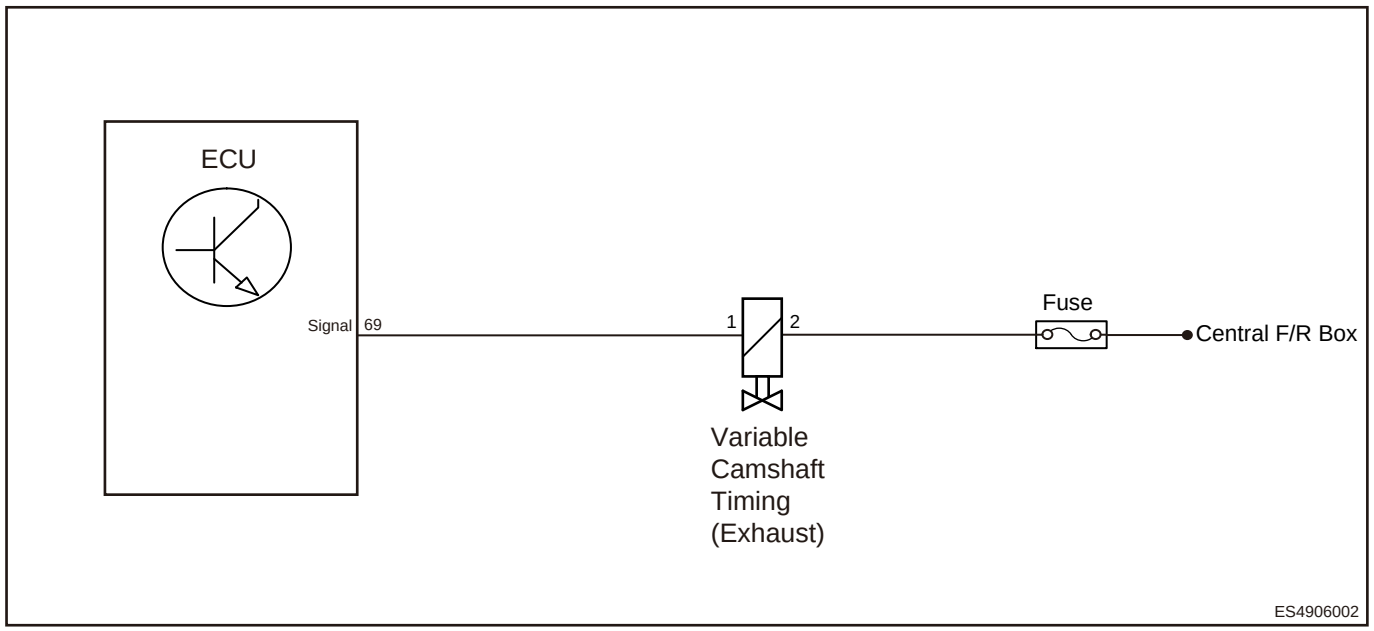
1. Possible cause:
   - Upstream oxygen sensor signal circuit voltage is too low (APE IPE RE lines are short to ground).
2. Troubleshooting method:

No.	Operation Step	Test Result	Subsequent Step
1	Connect diagnostic tester, turn ignition switch to “ON” .		Next
2	Read and store fault freeze frame information.		Next
3	Start vehicle, idle it and slightly change accelerator pedal opening for a period of time, pierce wire harness connector with red tip of a multimeter to close to red (IP), yellow (VM), green (IA), and black (UN) wire insulation layer of ECU terminal, connect black tip to ground, and check if voltage is short.	Yes	Next
		No	Check wire harness and connector
4	Replace LSU oxygen sensor, and track the progress to check if fault is reported again.	Yes	Next
		No	End
5	Check for abnormality in LSU processing circuit in ECU.	Yes	Check and repair or replace ECU
		No	Diagnostic Help

DTC Diagnosis Procedure

DTC	**P2091 00**	**“B” Camshaft Position Actuator Control Circuit High Bank 1**
DTC	**P2090 00**	**“B” Camshaft Position Actuator Control Circuit Low Bank 1**
DTC	**P0013 00**	**“B” Camshaft Position Actuator Control Circuit Open Bank 1**
DTC	**P000B 00**	**“B” Camshaft Position Slow Response Bank 1**
DTC	**P005A 00**	**“B” Camshaft Profile Control Performance/Stuck Off Bank 1**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P2-09100	“B” Camshaft Position Actuator Control Circuit High Bank 1	/	/	/	/	• Variable Camshaft Timing (Exhaust) • Wire harness or connector • ECU	/	Engine malfunction light comes on
P2-09000	“B” Camshaft Position Actuator Control Circuit Low Bank 1	/	/	/	/		/	
P0-01300	“B” Camshaft Position	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	Actuator Control Circuit Open Bank 1							
P0-00B00	“B” Camshaft Position Slow Response Bank 1	/	/	/	/		/	
P0-05A00	“B” Camshaft Profile Control Performance/ Stuck Off Bank 1	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Oil Pressure Inspection**

(a) Check if oil pressure is normal.

NG → **Repair oil pressure fault.**

OK

2	Check fuse

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if variable camshaft timing (exhaust) fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

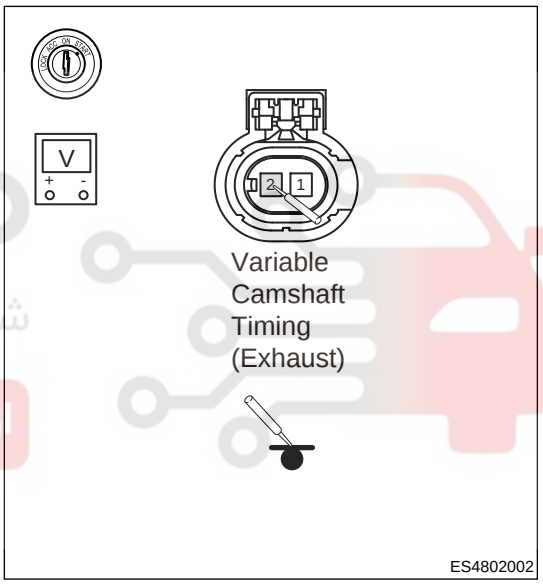
OK

3	Check variable camshaft timing (exhaust) power supply

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Variable camshaft timing (exhaust) (2) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Check for open fault in variable camshaft timing (exhaust) power supply.**

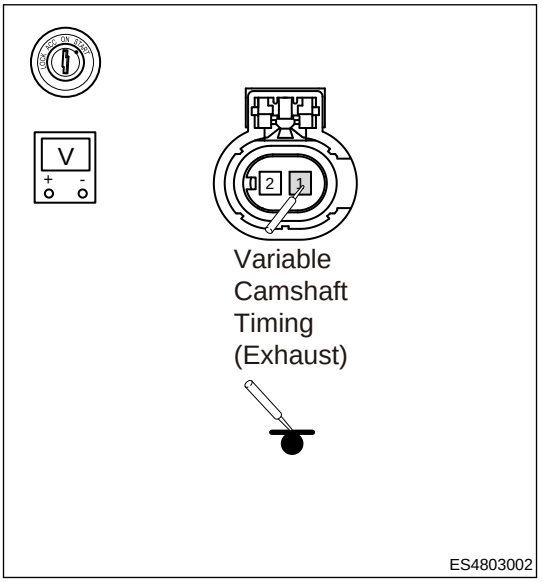
OK

4	Check variable camshaft timing (exhaust) control circuit

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Variable camshaft timing (exhaust) (1) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short to power supply in variable camshaft timing (exhaust) control circuit.**

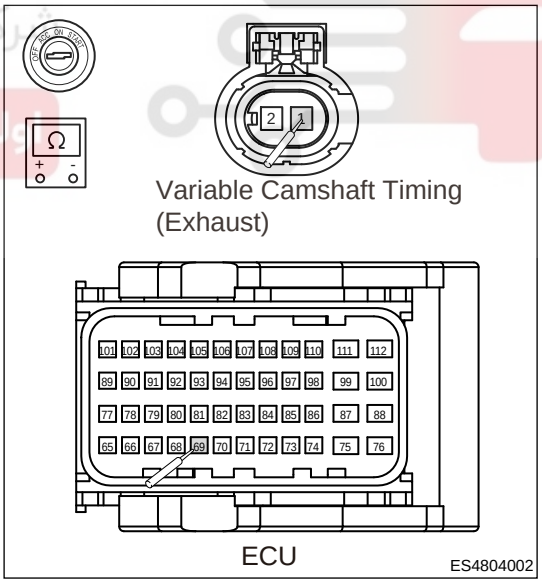
OK →

5	Check variable camshaft timing (exhaust) control circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Variable camshaft timing (exhaust) (1) - ECU (69)	Always	Less than 1 Ω
Variable camshaft timing (exhaust) (1) - Body ground	Always	∞



NG → **Repair variable camshaft timing (exhaust) control circuit fault.**

OK →

6	Check variable camshaft timing (exhaust) connector

(a) Check if variable camshaft timing (exhaust) connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

7	**Check variable camshaft timing (exhaust)**

(a) Remove the variable camshaft timing (exhaust).

(b) Check variable camshaft timing (exhaust) for blockage, oil leakage or seizing.

(c) Check the variable camshaft timing (exhaust).

Battery Connection	Condition	Specified Condition
Positive to variable camshaft timing (exhaust) 1 pin - Negative to variable camshaft timing (exhaust) 2 pin	12 V ON	Control valve should move quickly

NG → **Replace variable camshaft timing (exhaust).**

OK

8	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

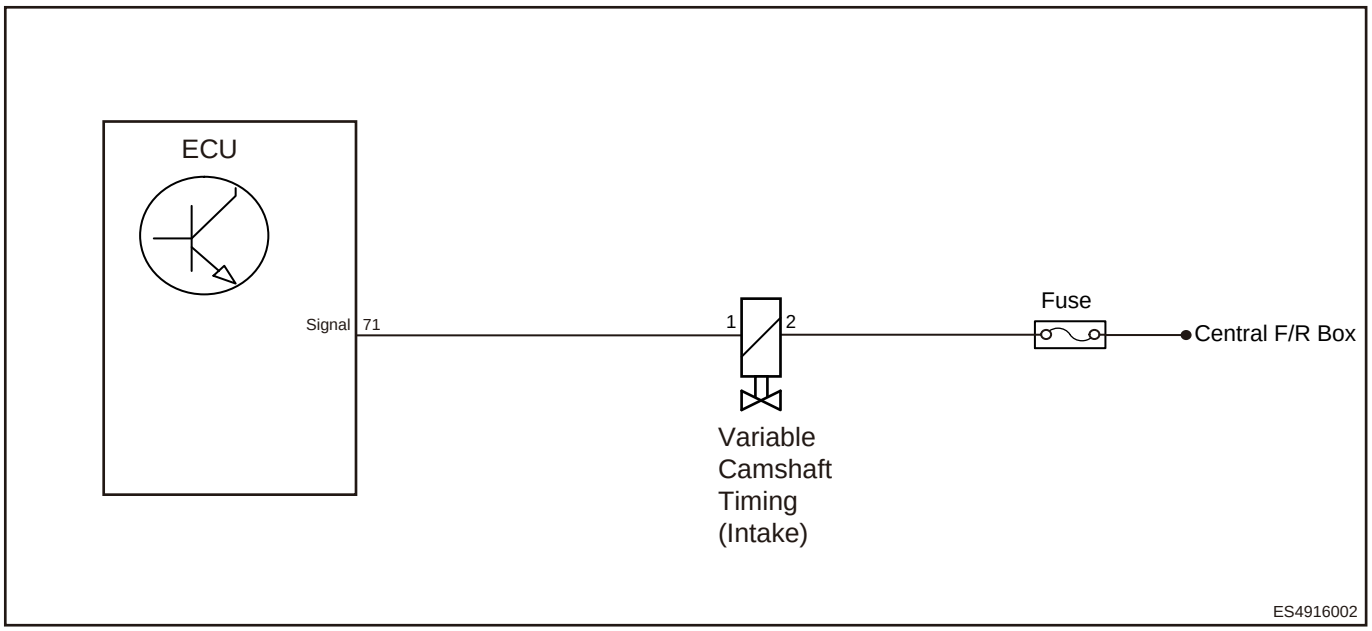
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P2089 00**	**“A” Camshaft Position Actuator Control Circuit High Bank 1**
DTC	**P2088 00**	**“A” Camshaft Position Actuator Control Circuit Low Bank 1**
DTC	**P0010 00**	**“A” Camshaft Position Actuator Control Circuit Open Bank 1**
DTC	**P000A 00**	**"A" Camshaft Position Slow Response Bank 1**
DTC	**P003C 00**	**“A” Camshaft Profile Control Performance/Stuck Off Bank 1**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P2-089 00	“A” Camshaft Position Actuator Control Circuit High Bank 1	/	/	/	/	• Variable Camshaft Timing (Intake) • Fuse • Wire harness or connector • ECU	/	Engine malfunction light comes on
P2-088 00	“A” Camshaft Position Actuator Control Circuit Low Bank 1	/	/	/	/		/	
P0-010 00	“A” Camshaft Position	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	Actuator Control Circuit Open Bank 1							
P0-00A00	"A" Camshaft Position Slow Response Bank 1	/	/	/	/		/	
P0-03C00	"A" Camshaft Profile Control Performance/ Stuck Off Bank 1	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Oil Pressure Inspection**

(a) Check if oil pressure is normal.

NG → **Repair oil pressure fault.**

OK

2	Check fuse

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if variable camshaft timing (intake) fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

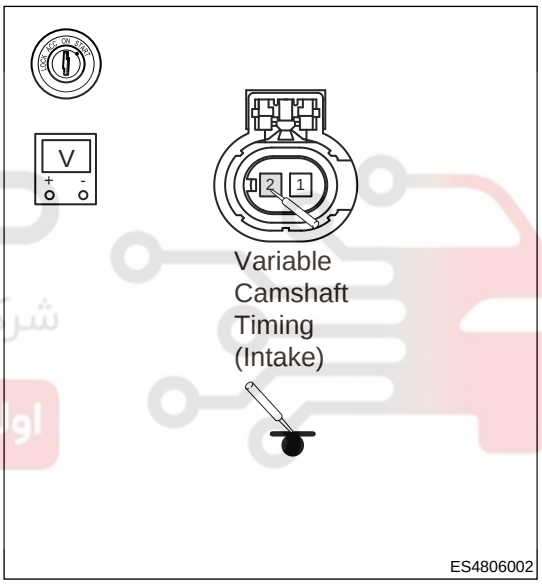
OK

3	Check variable camshaft timing (intake) power supply

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Variable camshaft timing (intake) (2) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Repair open fault to power supply in variable camshaft timing (intake).**

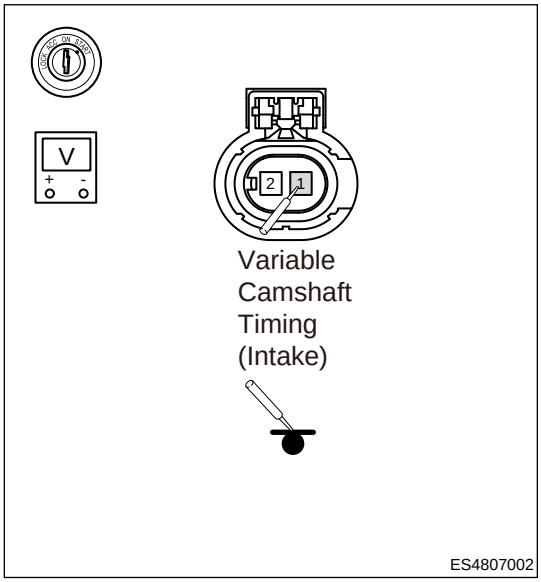
OK

4	Check variable camshaft timing (intake) power supply control circuit

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Variable camshaft timing (intake) (1) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short to power supply in variable camshaft timing (intake) control circuit.**

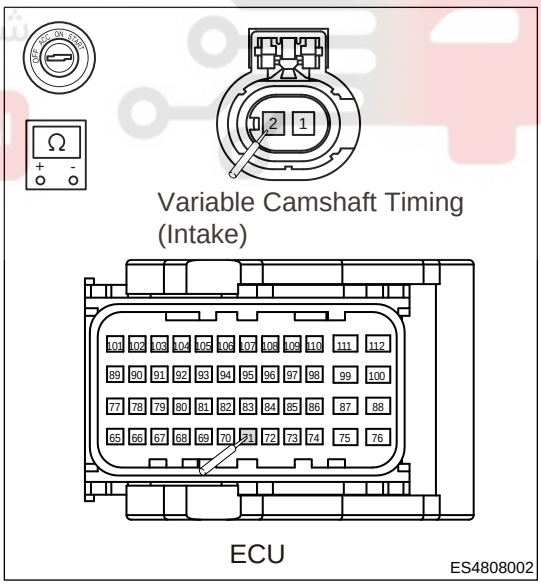
OK

5	Check variable camshaft timing (intake) control circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Variable camshaft timing (intake) (1) - ECU (71)	Always	Less than 1 Ω



NG → **Repair variable camshaft timing (intake) control circuit fault.**

OK

6	Check variable camshaft timing (intake) connector

(a) Check if variable camshaft timing (intake) connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

7	**Check variable camshaft timing (intake)**

(a) Remove the variable camshaft timing (intake).

(b) Check variable camshaft timing (intake) for blockage, oil leakage or seizing.

(c) Check the variable camshaft timing (intake).

Battery Connection	Condition	Specified Condition
Positive to variable camshaft timing (intake) 2 pin - Negative to variable camshaft timing (intake) 1 pin	12 V ON	Control valve should move quickly

NG → **Replace variable camshaft timing (intake).**

OK

8	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P050A 22**	**Cold Start Idle Control System Performance**
DTC	**P050A 21**	**Cold Start Idle Control System Performance**
DTC	**P050B 00**	**Cold Start Ignition Timing Performance**
DTC	**P050B 20**	**Cold Start Ignition Timing Performance**

DTC	P050D 00	Cold Start Rough Idle
DTC	P0420 00	Catalyst System Efficiency Below Threshold Bank 1

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P050A22	Cold Start Idle Control System Performance	/	/	/	/	• Electronic Throttle • Oil supply system • Intake system • Fuel injector • ECU	/	Engine malfunction light comes on
P050A21	Cold Start Idle Control System Performance	/	/	/	/		/	
P050B00	Cold Start Ignition Timing Performance	/	/	/	/		/	
P050B20	Cold Start Ignition Timing Performance	/	/	/	/		/	
P050D00	Cold Start Rough Idle	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-42000	Catalyst System Efficiency Below Threshold Bank 1	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check electronic throttle**

(a) Check if electronic throttle is stuck in maximum position due to ice or oil.

NG → **Repair or replace electronic throttle.**

OK ↓

2	**Check intake system**

(a) Check intake system for air leakage.

NG → **Repair intake system.**

OK ↓

3	**Check oil supply system**

(a) Check if oil supply pressure is normal.

NG → **Repair oil supply system.**

OK ↓

4	**Check fuel injector**

(a) Check if fuel injector leaks.

NG → **Replace fuel injector.**

OK

5	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0030 00**	**HO2S Heater Control Circuit Bank 1 Sensor 1**
DTC	**P0031 00**	**HO2S Heater Control Circuit Low Bank 1 Sensor 1**
DTC	**P0032 00**	**O2 Sensor Heater Control Circuit High (Upstream of the Catalyzer)**
DTC	**P0053 00**	**HO2S Heater Resistance Bank 1 Sensor 1**
DTC	**P0131 00**	**O2 Sensor Circuit Low Voltage Bank 1 Sensor 1**
DTC	**P0132 00**	**O2 Sensor Circuit High Voltage Bank 1 Sensor 1**
DTC	**P0133 00**	**O2 Sensor Circuit Slow Response Bank 1 Sensor 1**
DTC	**P0134 00**	**O2 Sensor Circuit No Activity Detected Bank 1 Sensor 1**
DTC	**P2231 00**	**O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 1**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-030 00	HO2S Heater Control Circuit Bank 1 Sensor 1	/	/	/	/	• Upstream Oxygen Sensor • Wire harness or connector • ECU	/	Engine malfunction light comes on

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-03100	HO2S Heater Control Circuit Low Bank 1 Sensor 1	/	/	/	/		/	
P0-03200	HO2S Heater Control Circuit High Bank 1 Sensor 1	/	/	/	/		/	
P0-05300	HO2S Heater Resistance Bank 1 Sensor 1	/	/	/	/		/	
P0-13100	O2 Sensor Circuit Low Voltage Bank 1 Sensor 1	/	/	/	/		/	
P0-13200	O2 Sensor Circuit	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	High Voltage Bank 1 Sensor 1							
P013300	O2 Sensor Circuit Slow Response Bank 1 Sensor 1	/	/	/	/		/	
P013400	O2 Sensor Circuit No Activity Detected Bank 1 Sensor 1	/	/	/	/		/	
P223100	O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 1	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

(a) Check if upstream oxygen sensor fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

OK ↓

2	**Check upstream oxygen sensor connector**

(a) Check if upstream oxygen sensor is not connected securely or loose.

NG → **Reinstall or repair, replace connector.**

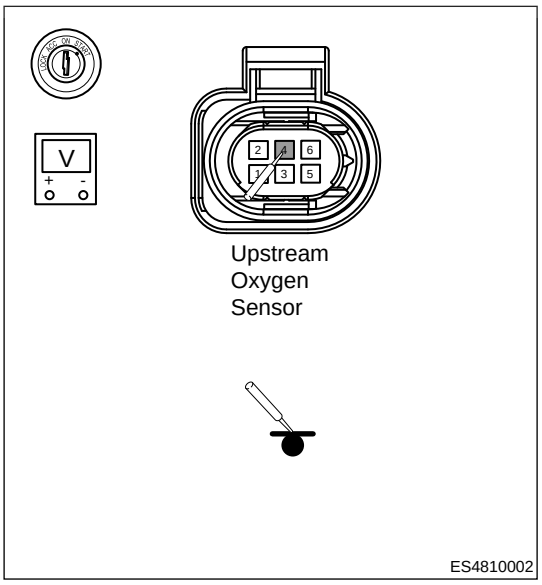
OK ↓

3	**Check upstream oxygen sensor heater power supply voltage**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Upstream oxygen sensor (4) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Check wire harness between upstream oxygen sensor (4) and main relay.**

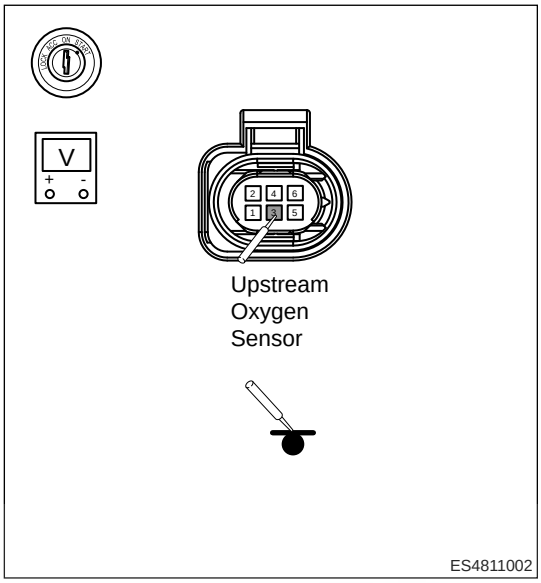
OK

4	Check upstream oxygen sensor heater voltage

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Upstream oxygen sensor (3) - Body ground	Always	Changed between 0.8 and 0.9V



NG → **Repair or replace related wire harness**

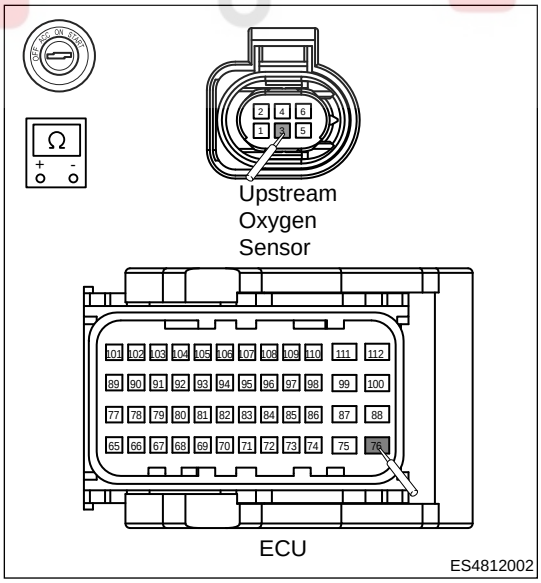
OK

5	Check upstream oxygen sensor heater wire harness

(a) Disconnect the upstream oxygen sensor connector.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Upstream oxygen sensor (3) - ECU (76)	Always	Less than 1 Ω



NG → **Repair or replace wire harness.**

OK

6	**Check upstream oxygen sensor heater resistance**

(a) Disconnect the upstream oxygen sensor connector.
(b) Disconnect the ECU connector.
(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Upstream oxygen sensor (3) - Upstream oxygen sensor (4)	At room temperature	4 - 5 Ω

NG → **Replace oxygen sensor.**

OK

7	**Reconfirm DTCs**

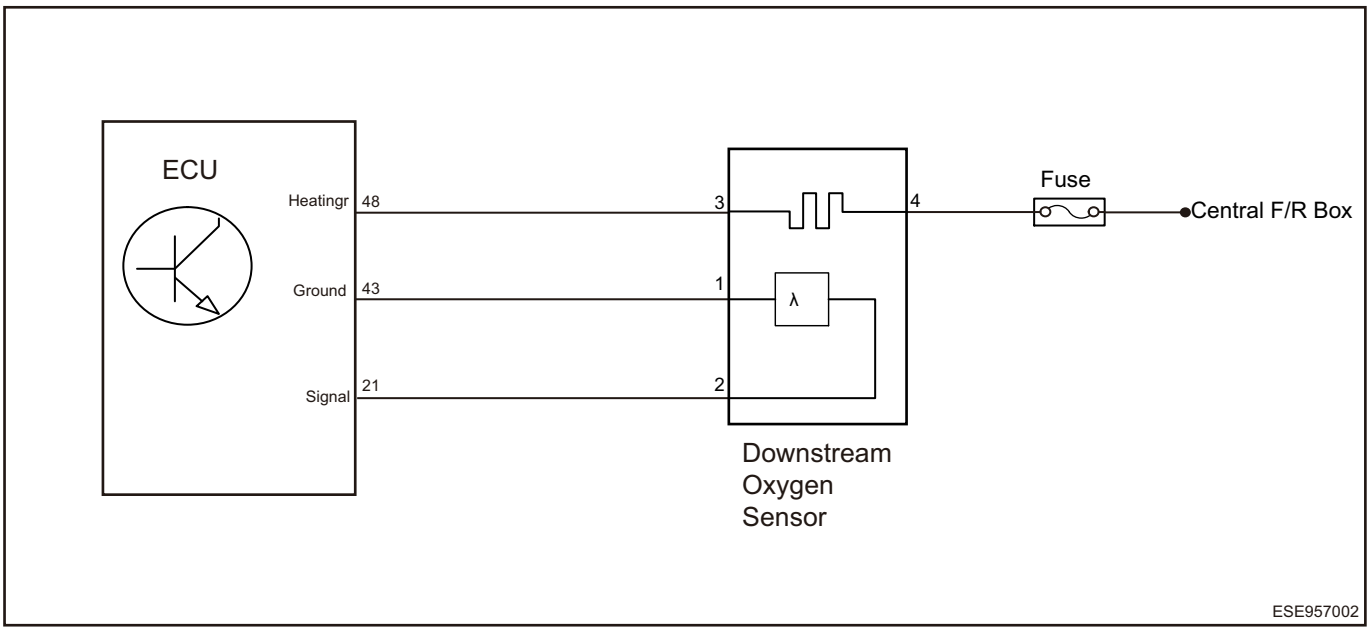
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P0036 00	HO2S Heater Control Circuit Bank 1 Sensor 2
DTC	P0037 00	HO2S Heater Control Circuit Low Bank 1 Sensor 2
DTC	P0038 00	HO2S Heater Control Circuit High Bank 1 Sensor 2
DTC	P0054 00	HO2S Heater Resistance Bank 1 Sensor 2
DTC	P0136 00	O2 Sensor Circuit Bank 1 Sensor 2
DTC	P0137 00	Downstream oxygen sensor signal circuit short to ground
DTC	P0138 00	Downstream oxygen sensor signal circuit short to power supply
DTC	P013A 00	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2
DTC	P2232 00	O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 2
DTC	P2270 00	O2 Sensor Signal Biased&Stuck Lean Bank 1 Sensor 2
DTC	P2271 00	O2 Sensor Signal Biased&Stuck Rich Bank 1 Sensor 2

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0036 00	HO2S Heater Control Circuit Bank 1 Sensor 2	/	/	/	/	• Downstream Oxygen Sensor • Wire harness or connector • ECU	/	Engine malfunction light comes on
P0037 00	HO2S Heater Control Circuit Low Bank 1 Sensor 2	/	/	/	/		/	
P0038 00	HO2S Heater Control Circuit High	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	Bank 1 Sensor 2							
P0054 00	HO2S Heater Resistance Bank 1 Sensor 2	/	/	/	/		/	
P0136 00	O2 Sensor Circuit Bank 1 Sensor 2	/	/	/	/		/	
P0137 00	Downstream oxygen sensor signal circuit short to ground	/	/	/	/		/	
P0138 00	Downstream oxygen sensor signal circuit short to power	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	supply							
P0-13A00	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2	/	/	/	/		/	
P2-23200	O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 2	/	/	/	/		/	
P2-27000	O2 Sensor Signal Biased&-Stuck Lean Bank 1 Sensor 2	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P2-27100	O2 Sensor Signal Biased&-Stuck Rich Bank 1 Sensor 2	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

(a) Check if downstream oxygen sensor fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

OK

2	**Check downstream oxygen sensor connector**

(a) Check if downstream oxygen sensor is not connected securely or loose.

NG → **Reinstall or repair, replace connector.**

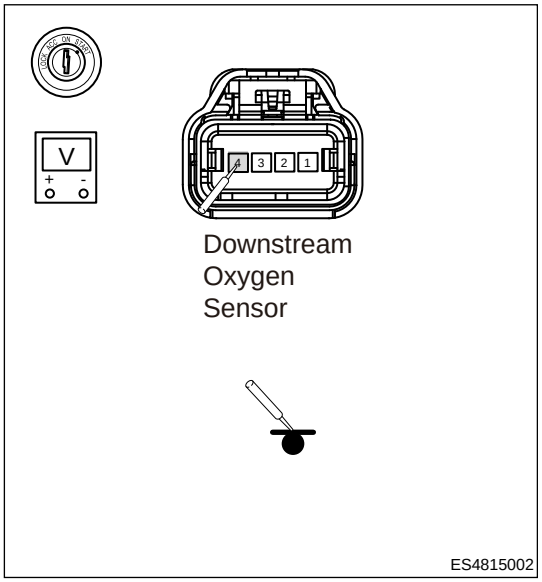
OK

3	**Check downstream oxygen sensor heater power supply voltage**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Downstream oxygen sensor (4) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Check wire harness between downstream oxygen sensor (4) and engine compartment relay box.**

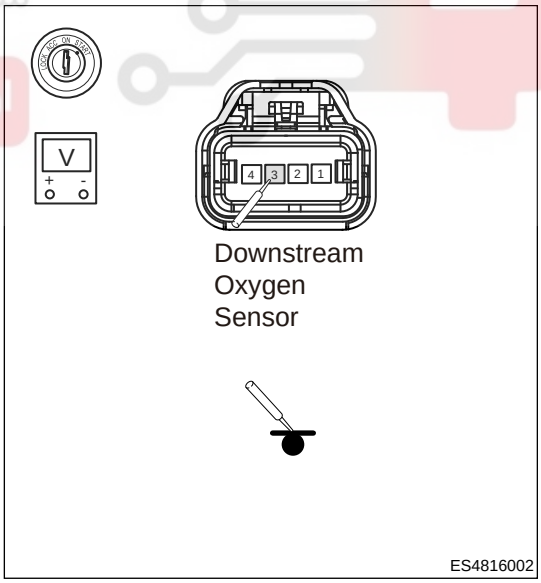
OK

4	**Check downstream oxygen sensor heater voltage**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Downstream oxygen sensor (3) - Body ground	Always	12 V



NG → **Repair or replace related wire harness**

OK

5	**Check downstream oxygen sensor heating resistance**

(a) Disconnect the downstream oxygen sensor connector.
(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Downstream oxygen sensor (3) - Downstream oxygen sensor (4)	Always	Less than 1 Ω

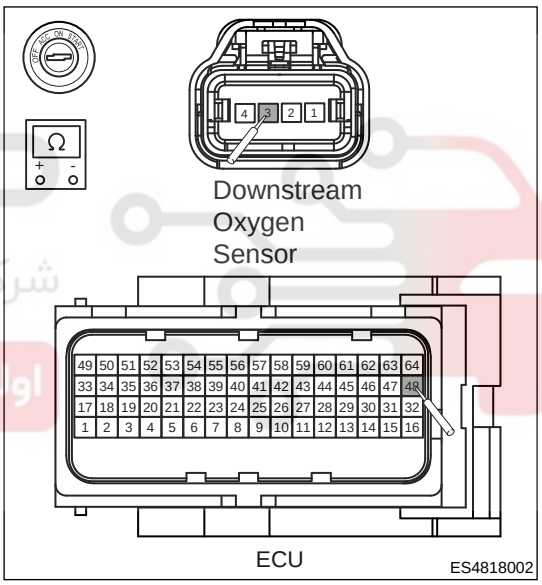
NG → **Repair or replace related wire harness**

OK

6	Check downstream oxygen sensor heater heating wire harness

(a) Disconnect the downstream oxygen sensor connector.
(b) Disconnect the ECU connector.
(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Downstream oxygen sensor (3) - ECU (48)	Always	Less than 1 Ω



NG → **Repair or replace wire harness.**

OK

7	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P2195 00	O2 Sensor Signal Biased/Stuck Lean Bank 1 Sensor 1
DTC	P2196 00	O2 Sensor Signal Biased/Stuck Rich Bank 1 Sensor 1

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P2-195 00	O2 Sensor Signal Biased/ Stuck Lean Bank 1 Sensor 1	/	/	/	/	• There is air leakage in exhaust system • Upstream oxygen sensor	/	Engine malfunction light comes on
P2-196 00	O2 Sensor Signal Biased/ Stuck Rich Bank 1 Sensor 1	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check exhaust system**

(a) Check exhaust system for leakage, gasket for damage.

NG → **Repair leaking area.**

OK

2	**Check upstream oxygen sensor connector**

(a) Check if upstream oxygen sensor is not connected securely or loose.

NG → **Reinstall or repair, replace connector.**

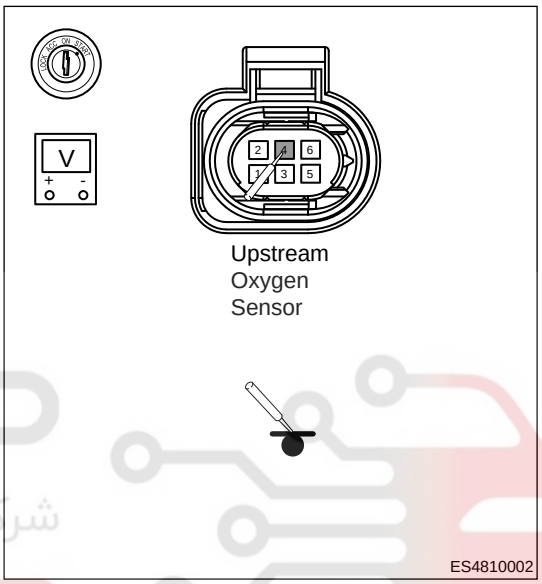
OK

3	**Check upstream oxygen sensor heater power supply voltage**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Upstream oxygen sensor (4) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Check wire harness between upstream oxygen sensor (4) and main relay.**

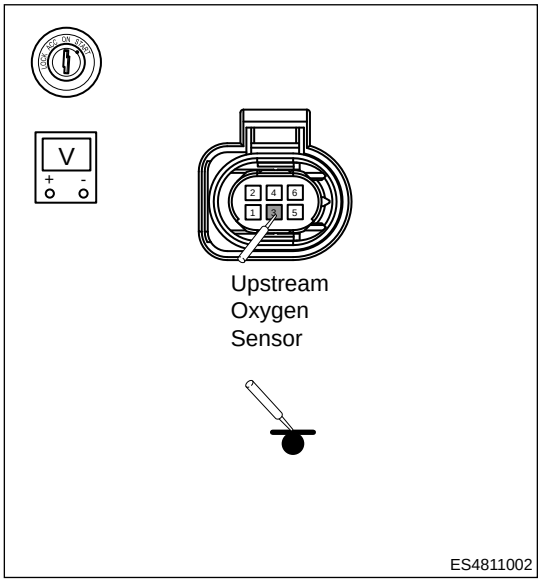
OK

4	**Check upstream oxygen sensor heater voltage**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Upstream oxygen sensor (3) - Body ground	Always	Changed between 0.8 and 0.9V



NG → **Repair or replace related wire harness**

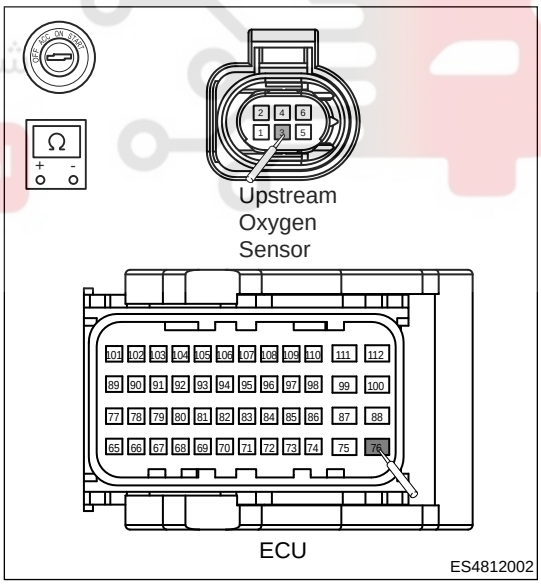
OK

5 Check upstream oxygen sensor heater wire harness

(a) Disconnect the upstream oxygen sensor connector.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Upstream oxygen sensor (3) - ECU (76)	Always	Less than 1 Ω



NG → **Repair or replace wire harness.**

OK

6 Check upstream oxygen sensor heater resistance

(a) Disconnect the upstream oxygen sensor connector.
(b) Disconnect the ECU connector.
(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Upstream oxygen sensor (3) - Upstream oxygen sensor (4)	At room temperature	4 - 5 Ω

NG → **Replace oxygen sensor.**

OK →

7	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P2096 00	Post Catalyst Fuel Trim System Too Lean Bank 1
DTC	P2097 00	Post Catalyst Fuel Trim System Too Rich Bank 1

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P2-09600	Post Catalyst Fuel Trim System Too Lean Bank 1	/	/	/	/	• There is air leakage in exhaust system • Upstream oxygen sensor • Downstream oxygen sensor • Catalytic converter is deteriorated	/	Engine malfunction light comes on
P2-09700	Post Catalyst Fuel Trim System Too Rich Bank 1	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check intake and exhaust systems**

(a) Check intake and exhaust systems for leakage, gasket for damage.

NG → **Repair air leakage in intake and exhaust systems.**

OK

2	**Check upstream oxygen sensor**

(a) Check if upstream oxygen sensor is normal.

NG → **Replace upstream oxygen sensor.**

OK

3	Check downstream oxygen sensor

(a) Check if downstream oxygen sensor is normal.

NG → **Replace downstream oxygen sensor.**

OK

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new catalytic converter to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P00C7 21	Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1
DTC	P00C7 22	Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1
DTC	P0106 22	Manifold Absolute Pressure Sensor Circuit Range/Performance
DTC	P0106 21	Manifold Absolute Pressure Sensor Circuit Range/Performance
DTC	P0106 2A	Manifold Absolute Pressure Sensor Circuit Range/Performance
DTC	P1200 00	Manifold Absolute Pressure Sensor Circuit Range/Performance
DTC	P1201 00	Manifold Absolute Pressure Sensor Circuit Range/Performance
DTC	P0107 00	Manifold Absolute Pressure Sensor Circuit Low
DTC	P0108 00	Manifold Absolute Pressure Sensor Circuit High

Control Schematic Diagram

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-0C721	Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1	/	/	/	/	• Intake Pressure/ Temperature Sensor • Wire harness or connector • ECU	/	Engine malfunction light comes on

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-0C722	Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1	/	/	/	/		/	
P0-03800	HO2S Heater Control Circuit High Bank 1 Sensor 2	/	/	/	/		/	
P0-05400	HO2S Heater Resistance Bank 1 Sensor 2	/	/	/	/		/	
P0-13600	O2 Sensor Circuit Bank 1 Sensor 2	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P013700	Downstream oxygen sensor signal circuit short to ground	/	/	/	/		/	
P013800	Downstream oxygen sensor signal circuit short to power supply	/	/	/	/		/	
P013A00	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P2-23200	O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 2	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check installation of intake pressure/temperature sensor**

(a) Check intake pressure/temperature sensor connector for poor contact or looseness.

NG → **Reinstall or repair or replace intake pressure/temperature sensor.**

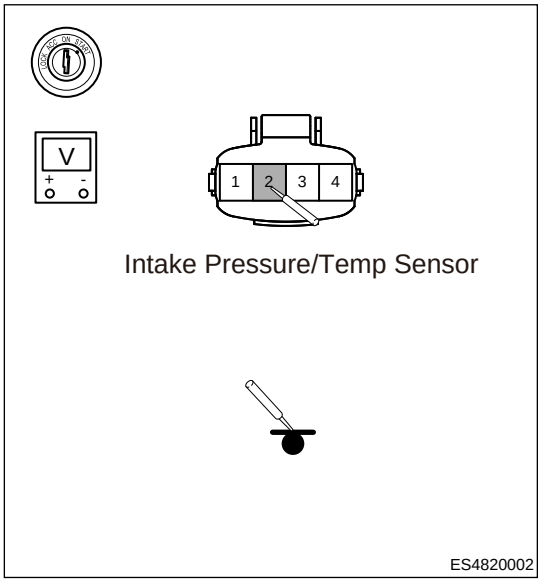
OK

2	**Check intake pressure/temperature sensor power supply voltage**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Intake pressure/ temperature sensor (2) - Body ground	ENGINE START STOP switch ON	5 V



NG → **Check and repair wire harness between intake pressure sensor power supply wire and ECU**

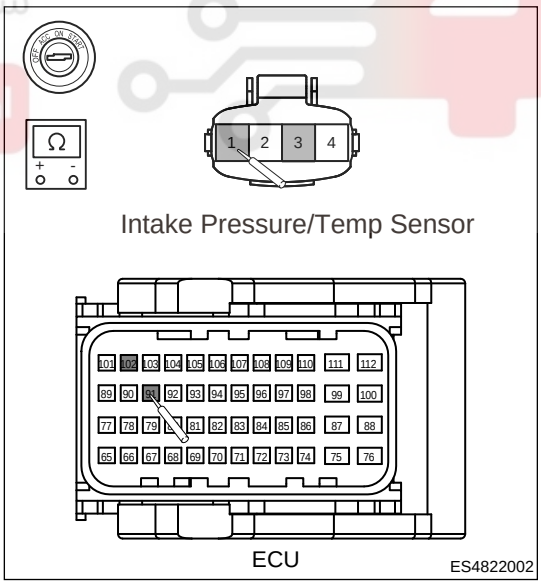
OK

3	**Check intake pressure/temperature sensor signal circuit**

(a) Disconnect intake pressure/temperature sensor and ECU connectors.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
ECU (91) - Intake pressure/ temperature sensor (1)	Always	Less than 1 Ω
ECU (102) - Intake pressure/ temperature sensor (3)	Always	Less than 1 Ω



NG → **Repair or replace related wire harness**

OK

4	**Read data flow of intake pressure/temperature sensor**

(a) Observe if “Intake Pressure” item in data flow seriously deviated from ambient pressure by about 101 kpa (value changes with current atmospheric pressure).

NG → **Repair or replace intake pressure/ temperature sensor.**

OK

5	Check intake pressure/temperature sensor

(a) Check sensor connection part for debris, ice, oil and damage.

NG → **Replace intake pressure/temperature sensor.**

OK

6	Check intake system

(a) Check if intake pressure/temperature sensor installation position is incorrect, intake pipe is disconnected or seriously leaked.

NG → **Repair faulty components of intake system.**

OK

7	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

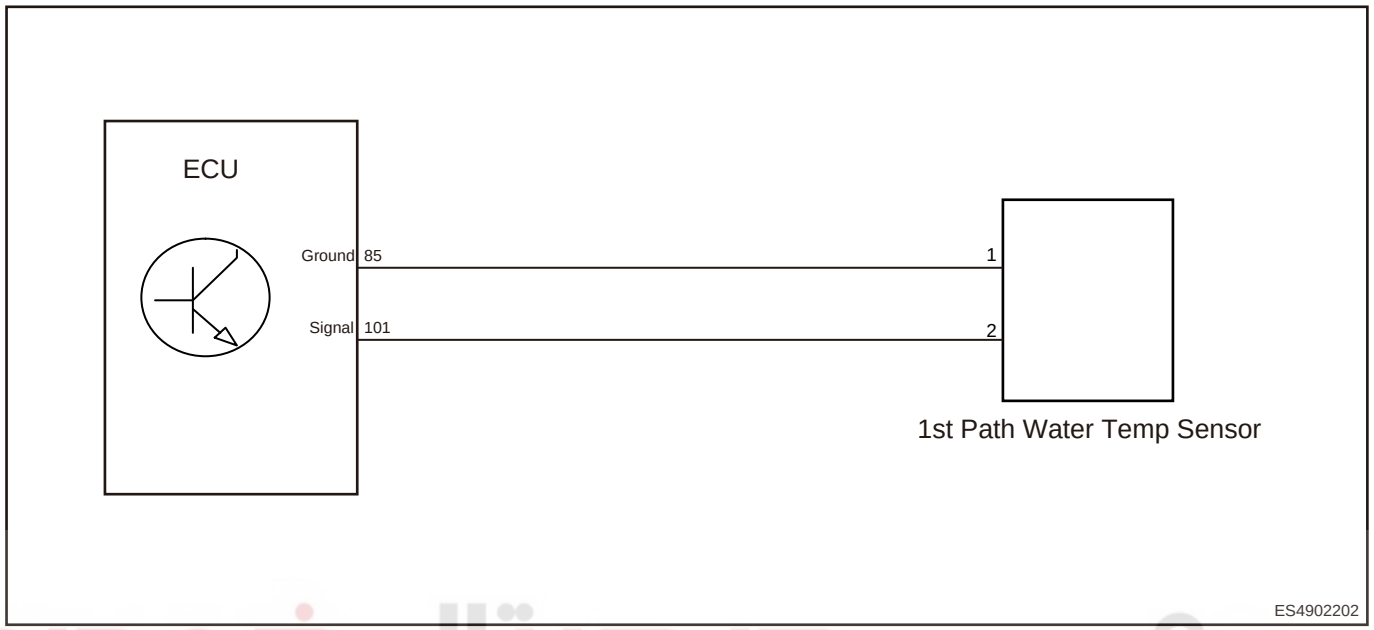
NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P0116 23	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance
DTC	P0116 26	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance
DTC	P0117 00	Engine Coolant Temperature Sensor 1 Circuit Low
DTC	P0118 00	Engine Coolant Temperature Sensor 1 Circuit High
DTC	P0119 00	Engine Coolant Temperature Sensor 1 Circuit Intermittent

DTC	**P050C 24**	**Cold Start Engine Coolant Temperature Performance**
DTC	**P050C 23**	**Cold Start Engine Coolant Temperature Performance**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-11623	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance	/	/	/	/	• Coolant temperature sensor • Wire harness or connector • ECU	/	Engine malfunction light comes on

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P011626	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance	/	/	/	/		/	
P011700	Engine Coolant Temperature Sensor 1 Circuit Low	/	/	/	/		/	
P011800	Engine Coolant Temperature Sensor 1 Circuit High	/	/	/	/		/	
P011900	Engine Coolant Temperature Sensor 1	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	Circuit Intermittent							
P0-50C24	Cold Start Engine Coolant Temperature Performance	/	/	/	/		/	
P0-50C23	Cold Start Engine Coolant Temperature Performance	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

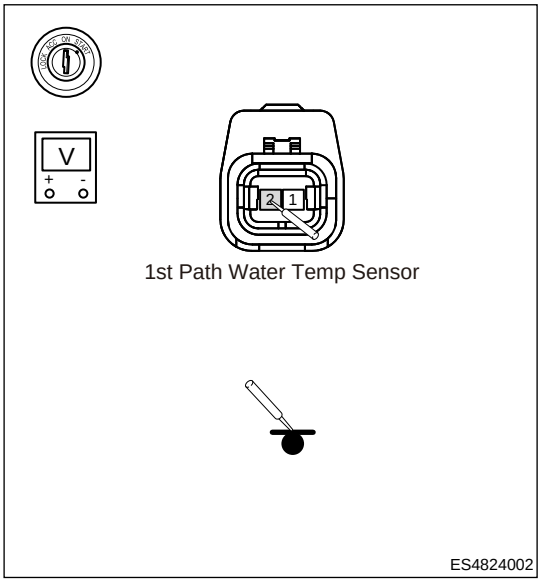
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check coolant temperature sensor 1 power supply voltage**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Coolant temperature sensor 1 (2) - Body ground	ENGINE START STOP switch ON	5 V



NG → **Check and repair wire harness between coolant temperature sensor and ECU**

OK

2	**Check engine coolant temperature sensor 1**

(a) Turn ENGINE START STOP switch to OFF.

(b) Check for open.

Multimeter Connection	Condition	Specified Condition
Coolant temperature sensor 1 (1) - Coolant temperature sensor 1 (2)	Always	Resistance is 2.5 kΩ ± 5% at normal temperature (20 °C), 300 - 400 Ω in boiled water (80 °C) (value changes with boiled water temperature)

NG → **Clean or replace engine coolant temperature sensor 1.**

OK

3	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

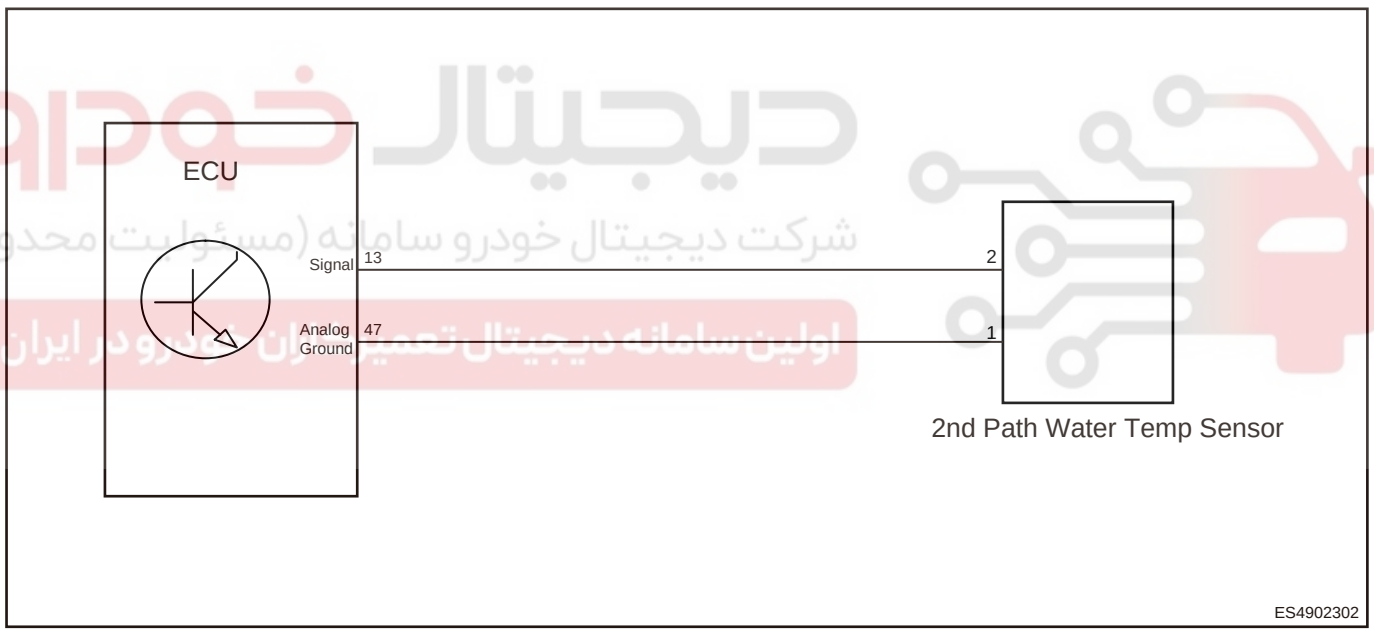
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P2183 24**	**Engine Coolant Temperature Sensor 2 Circuit Range/ Performance**
DTC	**P2183 23**	**Engine Coolant Temperature Sensor 2 Circuit Range/ Performance**
DTC	**P2184 00**	**Engine Coolant Temperature Sensor 2 Circuit Low**
DTC	**P2185 00**	**Engine Coolant Temperature Sensor 2 Circuit High**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P2-18324	Engine Coolant Temperature Sensor 2 Circuit Range/ Performance	/	/	/	/	• Coolant temperature sensor 2 • Wire harness or connector • ECU	/	Engine malfunction light comes on
P2-18323	Engine Coolant Temperature Sensor 2 Circuit Range/ Performance	/	/	/	/		/	
P2-18400	Engine Coolant Temperature Sensor 2 Circuit Low	/	/	/	/		/	
P2-18500	Engine Coolant Temperature	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	Sensor 2 Circuit High							

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

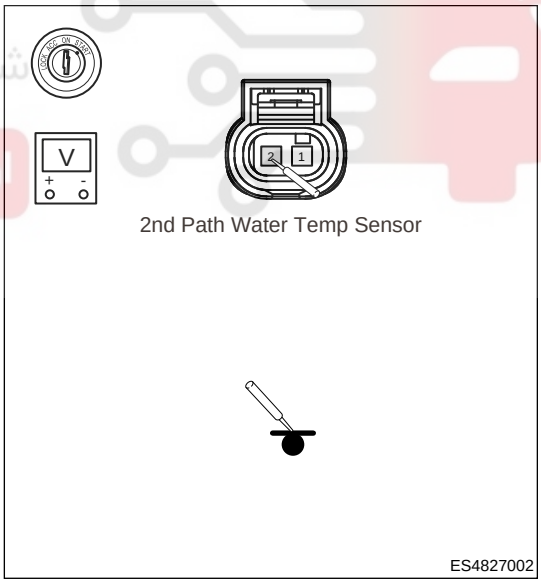
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check 2nd coolant temperature sensor power supply voltage**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
2nd coolant temperature sensor (2) - Body ground	ENGINE START STOP switch ON	5 V



NG → **Check and repair wire harness between 2nd coolant temperature sensor and ECU.**

OK →

2	**Read 2nd coolant temperature sensor data flow**

(a) Turn ENGINE START STOP switch to ON.

(b) Do not start engine, read "Coolant Temperature Sensor Measured Value" and check if it is within the normal range.

OK → **Check and repair wire harness between 2nd coolant temperature sensor and ECU.**

NG

3	Check engine 2nd coolant temperature sensor

(a) Turn ENGINE START STOP switch to OFF.

(b) Check for open.

Multimeter Connection	Condition	Specified Condition
2nd coolant temperature sensor (1) - 2nd coolant temperature sensor (2)	Always	Resistance is 2.5 kΩ ± 5% at normal temperature (20 °C), 300 - 400 Ω in boiled water (80 °C) (value changes with boiled water temperature)

NG → **Clean or replace 2nd coolant temperature sensor.**

OK

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

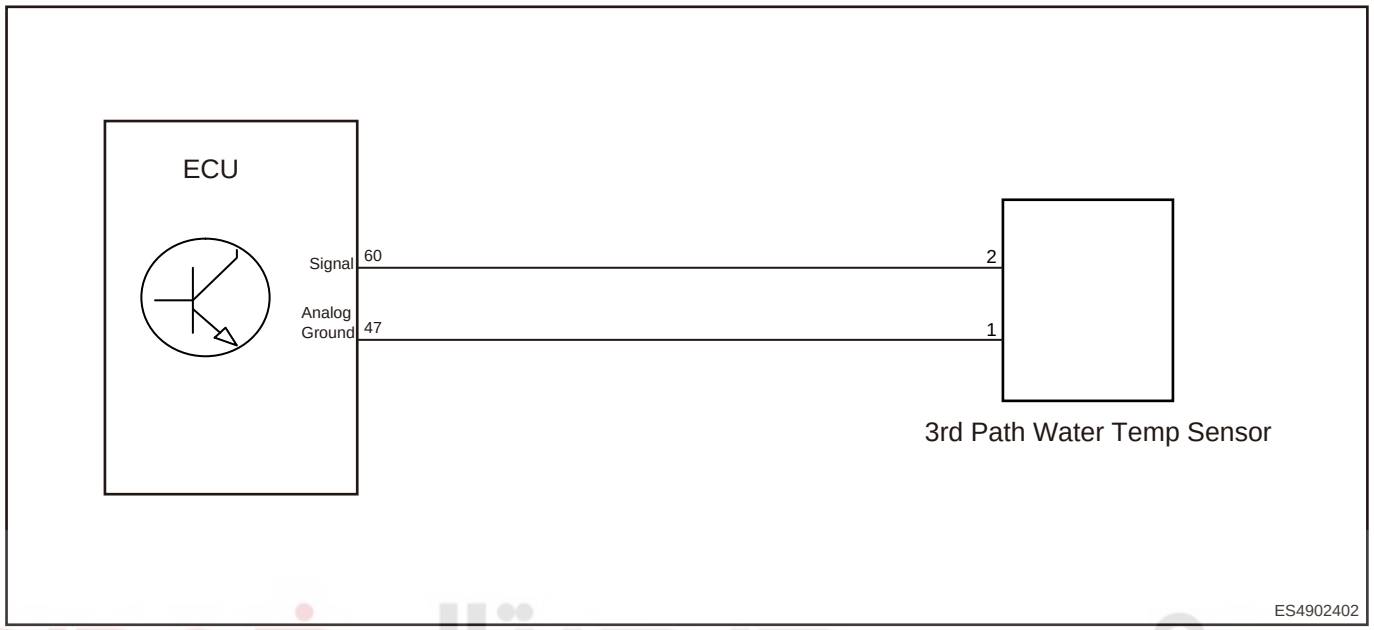
NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P01E4 24	Engine Coolant Temperature Sensor 3 Circuit Range/ Performance
DTC	P01E4 23	Engine Coolant Temperature Sensor 3 Circuit Range/ Performance

DTC	**P01E5 00**	**Engine Coolant Temperature Sensor 3 Circuit Low**
DTC	**P01E6 00**	**Engine Coolant Temperature Sensor 3 Circuit High**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-1E424	Engine Coolant Temperature Sensor 3 Circuit Range/ Performance	/	/	/	/	• Coolant temperature sensor 3 • Wire harness or connector • ECU	/	Engine malfunction light comes on

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P01E423	Engine Coolant Temperature Sensor 3 Circuit Range/ Performance	/	/	/	/		/	
P01E500	Engine Coolant Temperature Sensor 3 Circuit Low	/	/	/	/		/	
P01E600	Engine Coolant Temperature Sensor 3 Circuit High	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

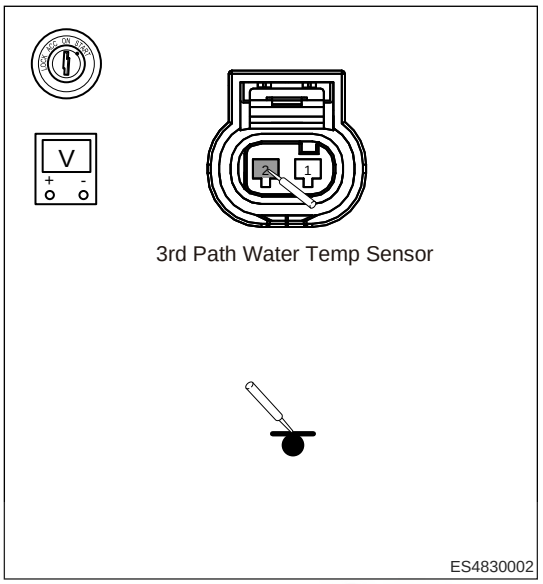
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check 3rd coolant temperature sensor power supply voltage**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
3rd coolant temperature sensor (2) - Body ground	ENGINE START STOP switch ON	5 V



NG → **Check and repair wire harness between 3rd coolant temperature sensor and ECU.**

OK

2	**Read 3rd coolant temperature sensor data flow**

(a) Turn ENGINE START STOP switch to ON.

(b) Do not start engine, read "Coolant Temperature Sensor Measured Value" and check if it is within the normal range.

OK → **Check and repair wire harness between 3rd coolant temperature sensor and ECU.**

NG

3	**Check engine 3rd coolant temperature sensor**

(a) Turn ENGINE START STOP switch to OFF.

(b) Check for open.

Multimeter Connection	Condition	Specified Condition
3rd coolant temperature sensor (1) - 3rd coolant temperature sensor (2)	Always	Resistance is 2.5 kΩ ± 5% at normal temperature (20 °C), 300 - 400 Ω in boiled water (80 °C) (value changes with boiled water temperature)

NG → **Clean or replace engine 3rd coolant temperature sensor.**

OK →

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

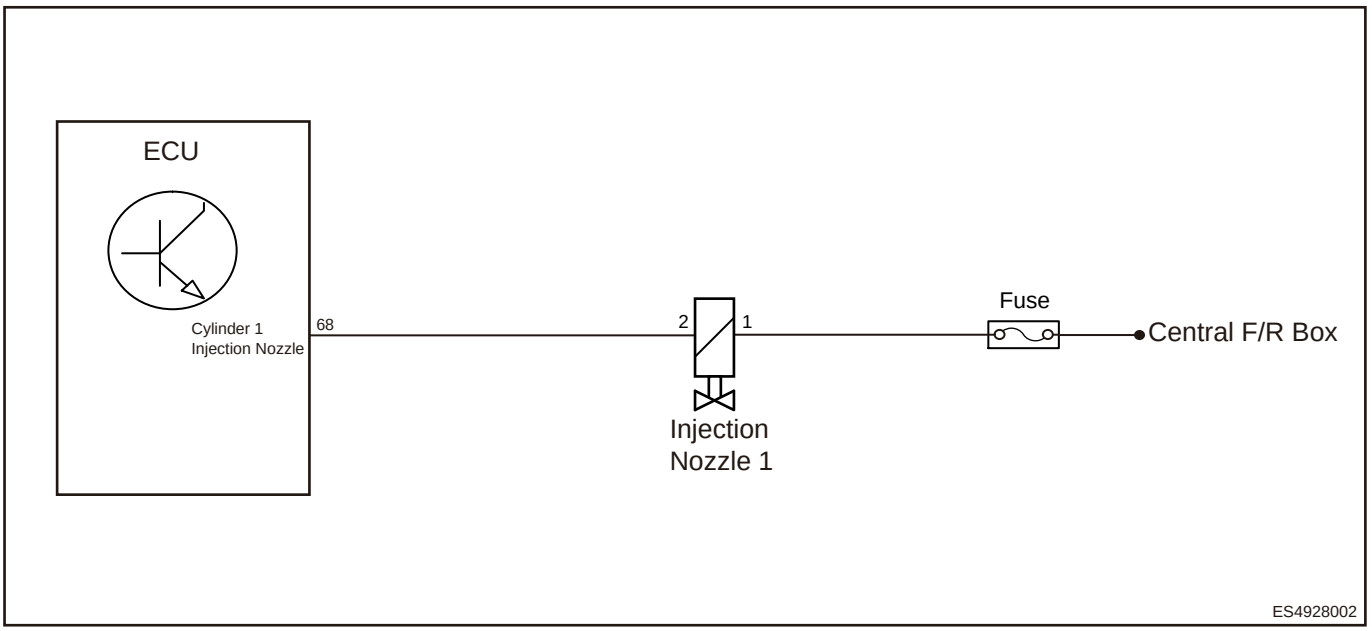
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0262 00**	**Cylinder 1 Injector "A" Circuit High**
DTC	**P0261 00**	**Cylinder 1 Injector "A" Circuit Low**
DTC	**P0201 00**	**Cylinder 1 - Injector Circuit Open**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-26200	Cylinder 1 Injector "A" Circuit High	/	/	/	/	• Fuel Injector 1 • Fuse • Wire harness or connector • ECU	/	Engine malfunction light comes on
P0-26100	Cylinder 1 Injector "A" Circuit Low	/	/	/	/		/	
P0-20100	Cylinder 1 - Injector Circuit Open	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

(a) Check if fuel injector fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

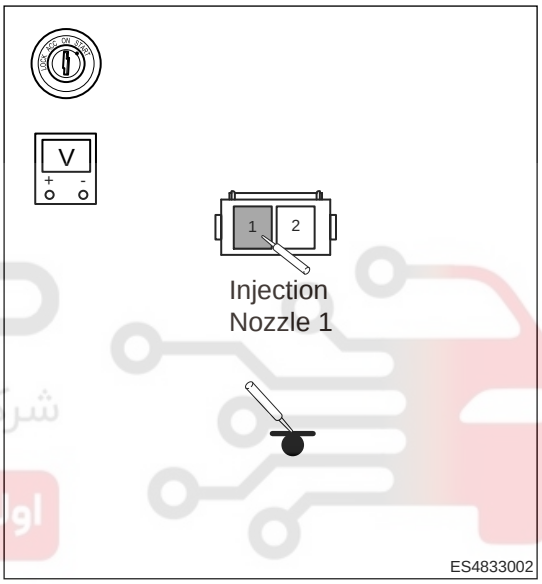
OK

2	**Check fuel injector 1 power supply**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Cylinder 1 fuel injector (1) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Repair open fault in fuel injector 1 power supply.**

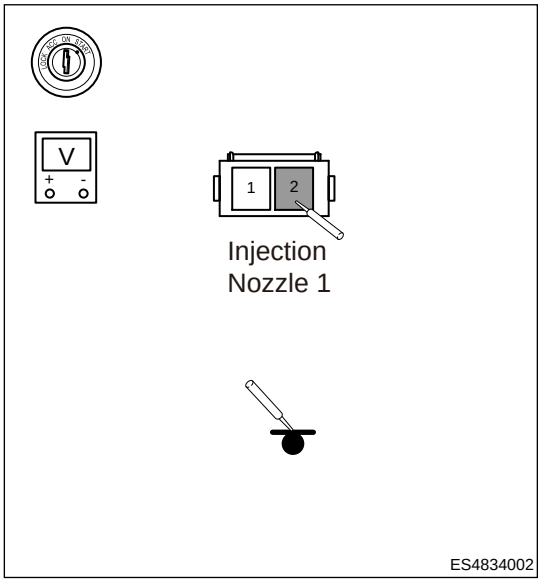
OK

3	**Check fuel injector 1 control circuit**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Cylinder 1 fuel injector (2) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in fuel injector 1 control circuit.**

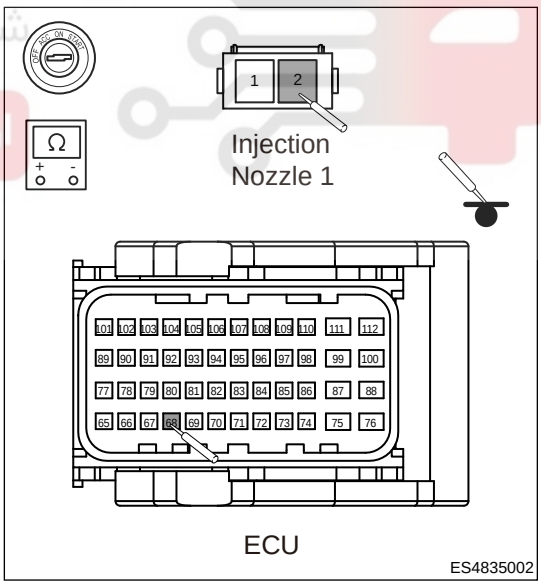
OK

4	Check fuel injector 1 control circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Cylinder 1 fuel injector (2) - ECU (68)	Always	Less than 1 Ω
Cylinder 1 fuel injector (2) - Body ground	Always	∞



NG → **Repair fuel injector 1 control circuit fault.**

OK

5	Check fuel injector 1 connector

(a) Check if fuel injector 1 connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

6	**Check fuel injector 1**

(a) Check if fuel injector 1 is normal.

NG → **Replace the fuel injector 1.**

OK

7	**Reconfirm DTCs**

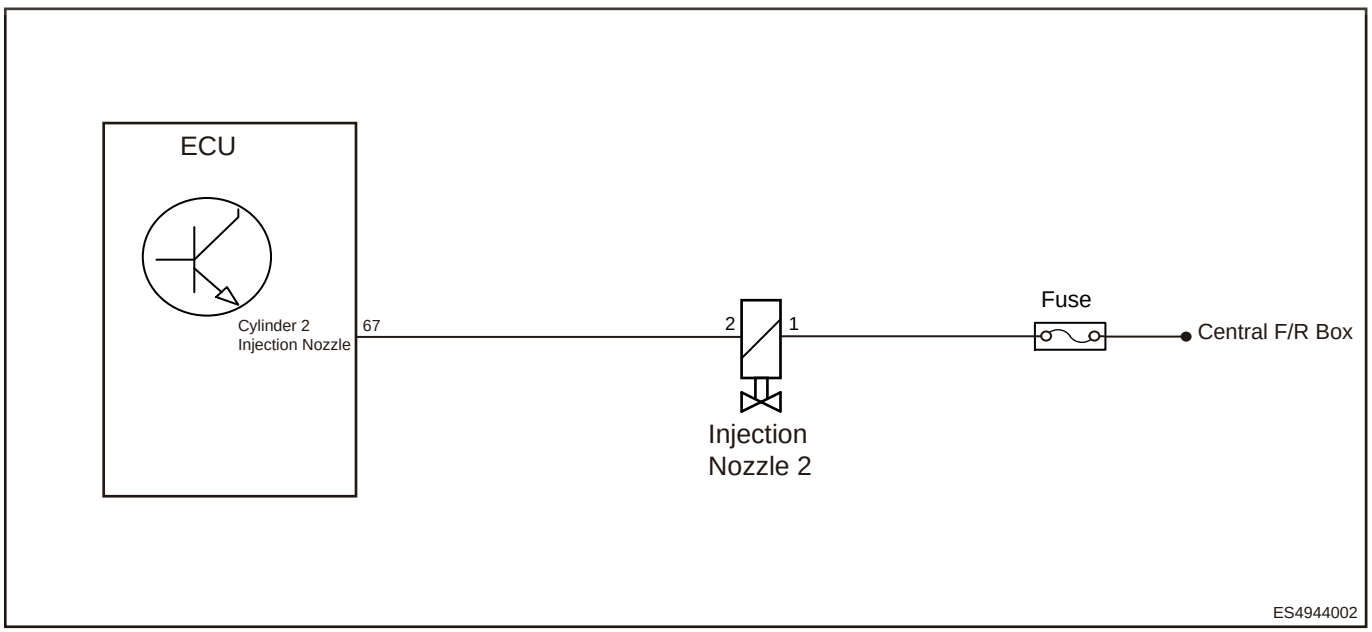
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0265 00**	**Cylinder 2 Injector "A" Circuit High**
DTC	**P0264 00**	**Cylinder 2 Injector "A" Circuit Low**
DTC	**P0202 00**	**Cylinder 2 - Injector Circuit Open**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-26500	Cylinder 2 Injector "A" Circuit High	/	/	/	/	• Fuel Injector 2 • Fuse • Wire harness or connector • ECU	/	Engine malfunction light comes on
P0-26400	Cylinder 2 Injector "A" Circuit Low	/	/	/	/		/	
P0-20200	Cylinder 2 - Injector Circuit Open	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

(a) Check if fuel injector fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

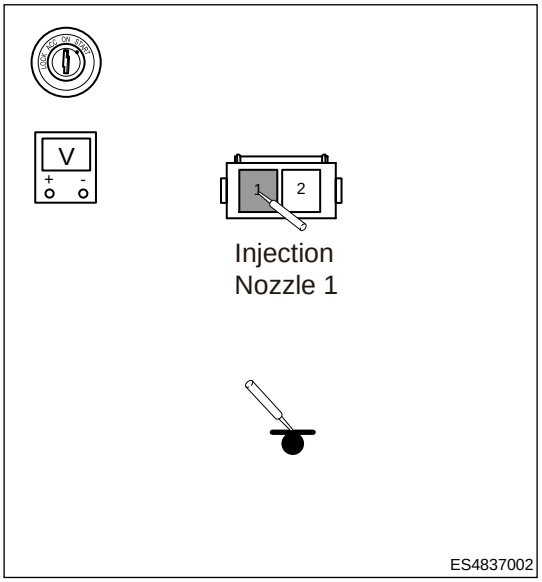
OK

2	**Check fuel injector 2 power supply**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Cylinder 1 fuel injector (2) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Repair open fault in fuel injector 2 power supply.**

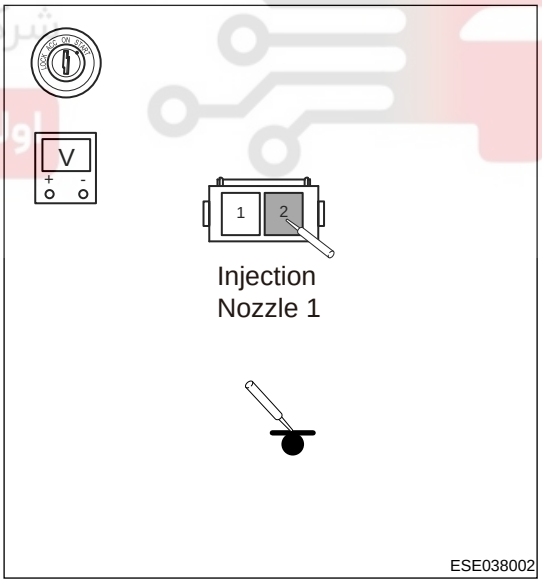
OK →

3	**Check fuel injector 2 control circuit**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Cylinder 2 fuel injector (2) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in fuel injector 2 control circuit.**

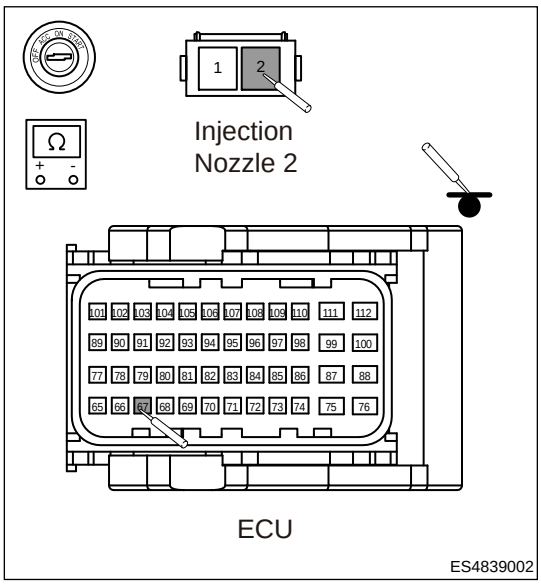
OK →

4	**Check fuel injector 2 control circuit**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Cylinder 2 fuel injector (2) - ECU (67)	Always	Less than 1 Ω
Cylinder 2 fuel injector (2) - Body ground	Always	∞



NG → **Repair fuel injector 2 control circuit fault.**

OK

5 Check fuel injector 2 connector

(a) Check if fuel injector 2 connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

6 Check fuel injector 2

(a) Check if fuel injector 2 is normal.

NG → **Replace the fuel injector 2.**

OK

7 Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

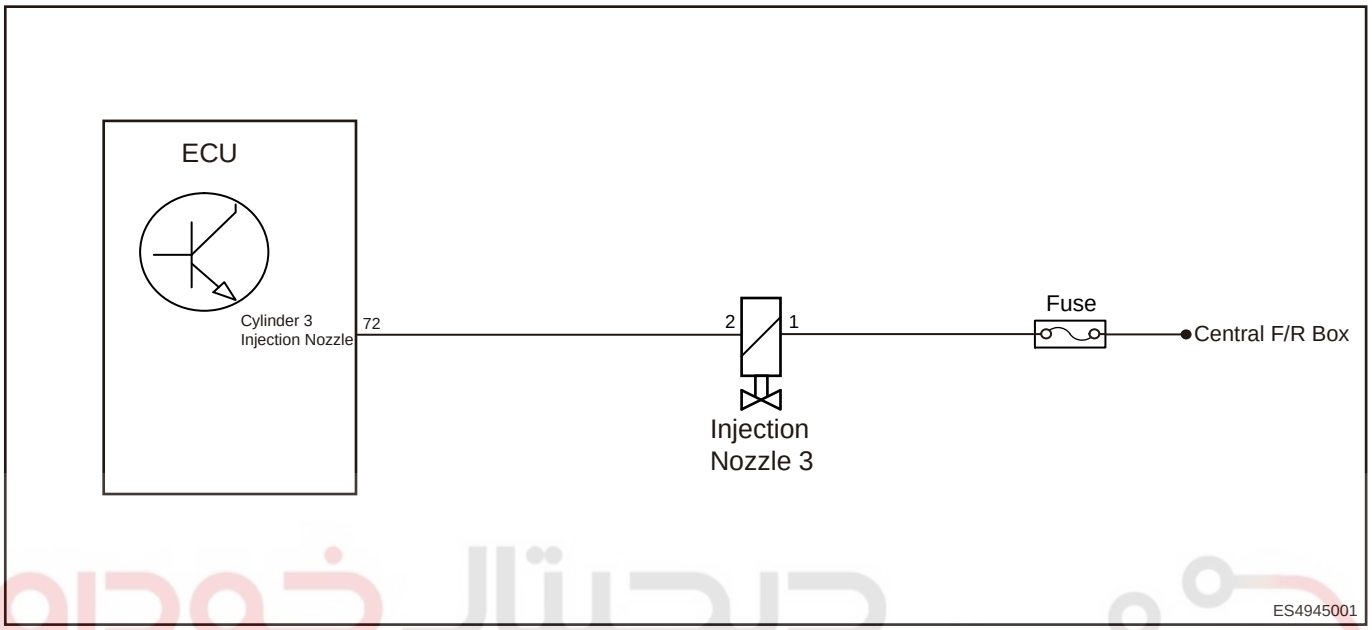
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0268 00**	**Cylinder 3 Injector "A" Circuit High**
DTC	**P0267 00**	**Cylinder 3 Injector "A" Circuit Low**
DTC	**P0203 00**	**Cylinder 3 - Injector Circuit Open**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-26800	Cylinder 3 Injector "A" Circuit High	/	/	/	/	• Fuel Injector 3 • Fuse • Wire harness or connector • ECU	/	Engine malfunction light comes on
P0-26700	Cylinder 3 Injector "A" Circuit Low	/	/	/	/		/	
P0-20300	Cylinder 3 - Injector Circuit Open	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if fuel injector fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

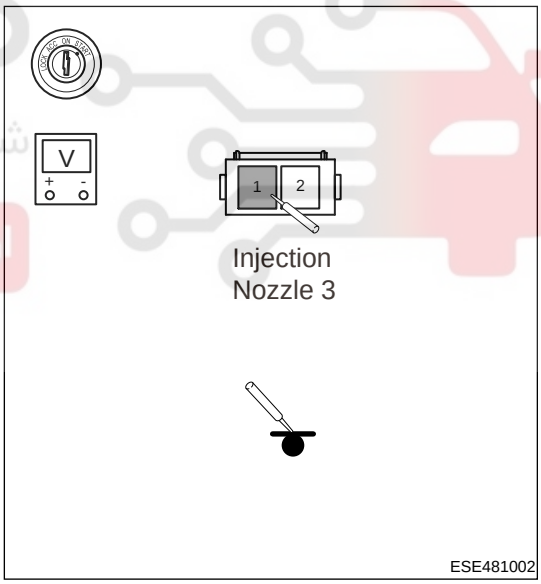
OK

2	**Check fuel injector 3 power supply**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Cylinder 3 fuel injector (1) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Repair open fault in fuel injector 3 power supply.**

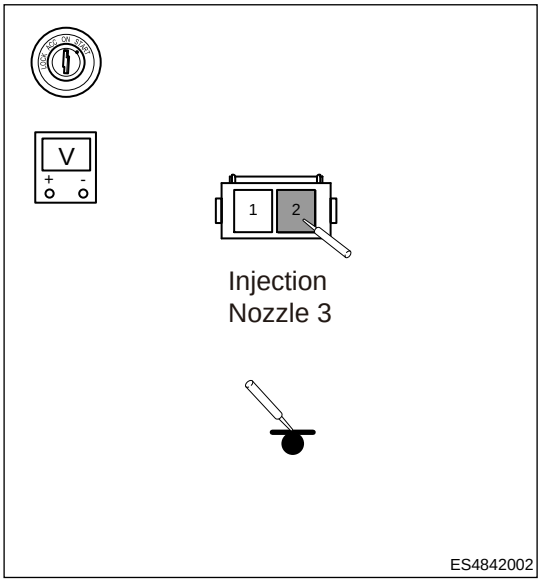
OK

3	**Check fuel injector 3 control circuit**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Cylinder 3 fuel injector (2) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in fuel injector 3 control circuit.**

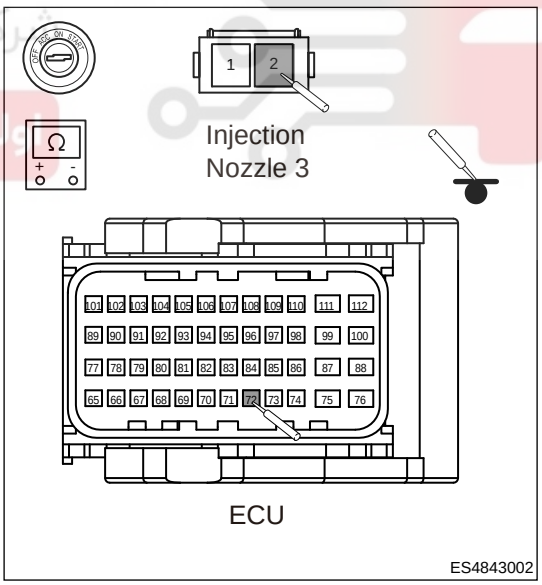
OK →

4	Check fuel injector 3 control circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Cylinder 3 fuel injector (2) - ECU (72)	Always	Less than 1 Ω
Cylinder 3 fuel injector (2) - Body ground	Always	∞



NG → **Repair fuel injector 3 control circuit fault.**

OK →

5	Check fuel injector 3 connector

(a) Check if fuel injector 3 connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

6	Check fuel injector 3

(a) Check if fuel injector 3 is normal.

NG → **Replace the fuel injector 3.**

OK

7	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

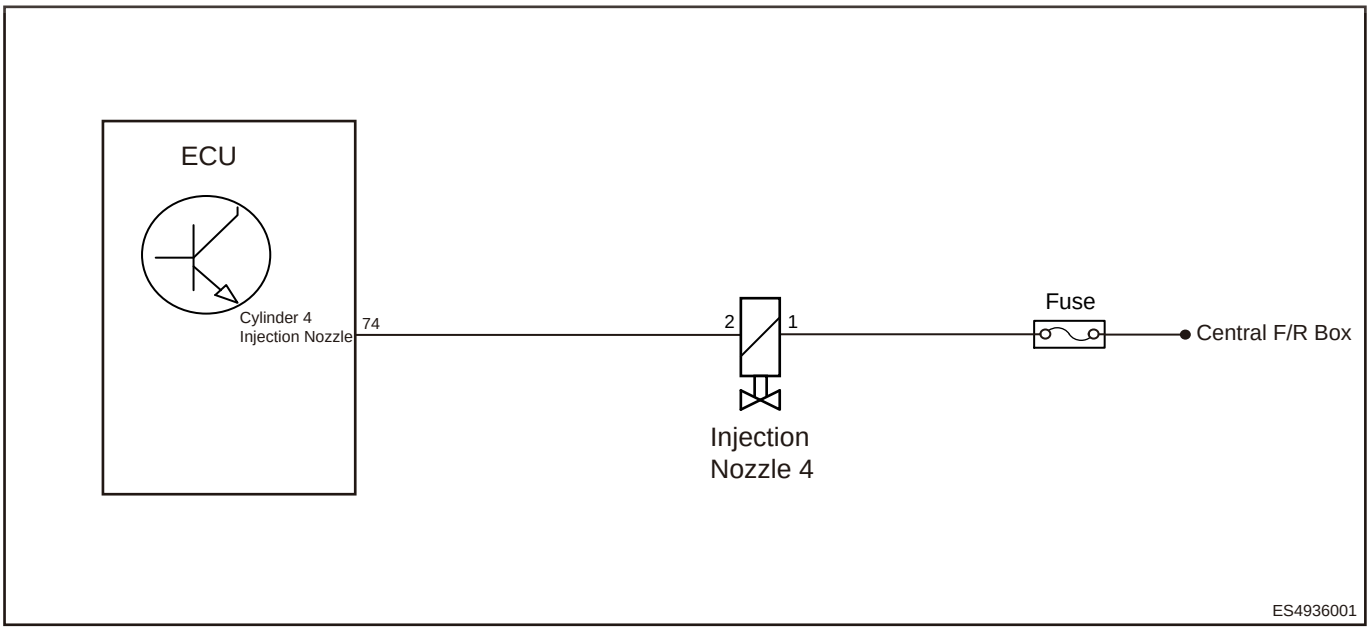
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P0271 00	Cylinder 4 Injector "A" Circuit High
DTC	P0270 00	Cylinder 4 Injector "A" Circuit Low
DTC	P0204 00	Cylinder 4 - Injector Circuit Open

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-27100	Cylinder 4 Injector "A" Circuit High	/	/	/	/	• Fuel Injector 4 • Fuse • Wire harness or connector • ECU	/	Engine malfunction light comes on
P0-27000	Cylinder 4 Injector "A" Circuit Low	/	/	/	/		/	
P0-20400	Cylinder 4 - Injector Circuit Open	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if fuel injector fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

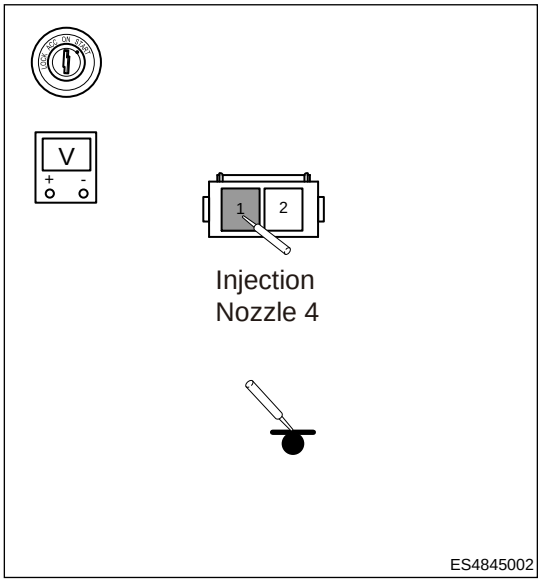
OK

2	**Check fuel injector 4 power supply**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Cylinder 4 fuel injector (1) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Repair open fault in fuel injector 4 power supply.**

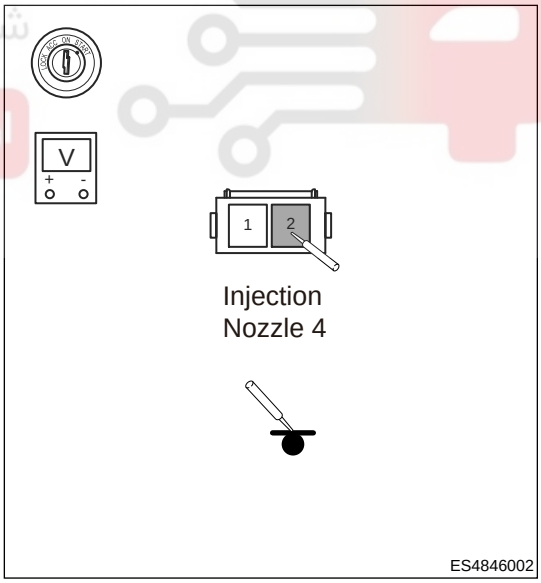
OK

3	**Check fuel injector 4 control circuit**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Cylinder 4 fuel injector (2) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in fuel injector 4 control circuit.**

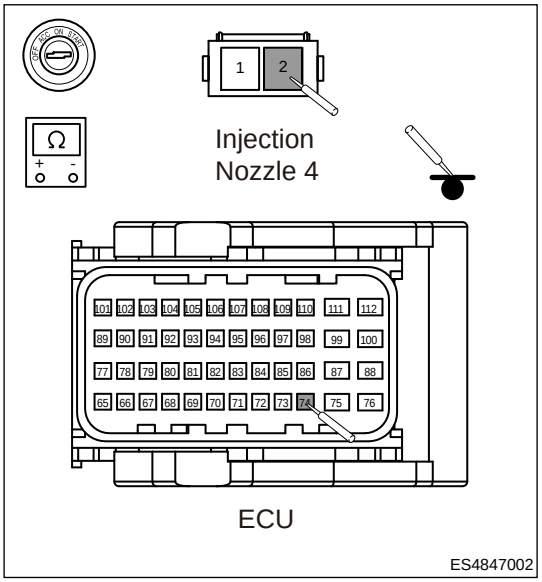
OK

4	**Check fuel injector 4 control circuit**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Cylinder 4 fuel injector (2) - ECU (74)	Always	Less than 1 Ω
Cylinder 4 fuel injector (2) - Body ground	Always	∞



NG → **Repair fuel injector 4 control circuit fault.**

OK →

5 Check fuel injector 4 connector

(a) Check if fuel injector 4 connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK →

6 Check fuel injector 4

(a) Check if fuel injector 4 is normal.

NG → **Replace the fuel injector 4.**

OK →

7 Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

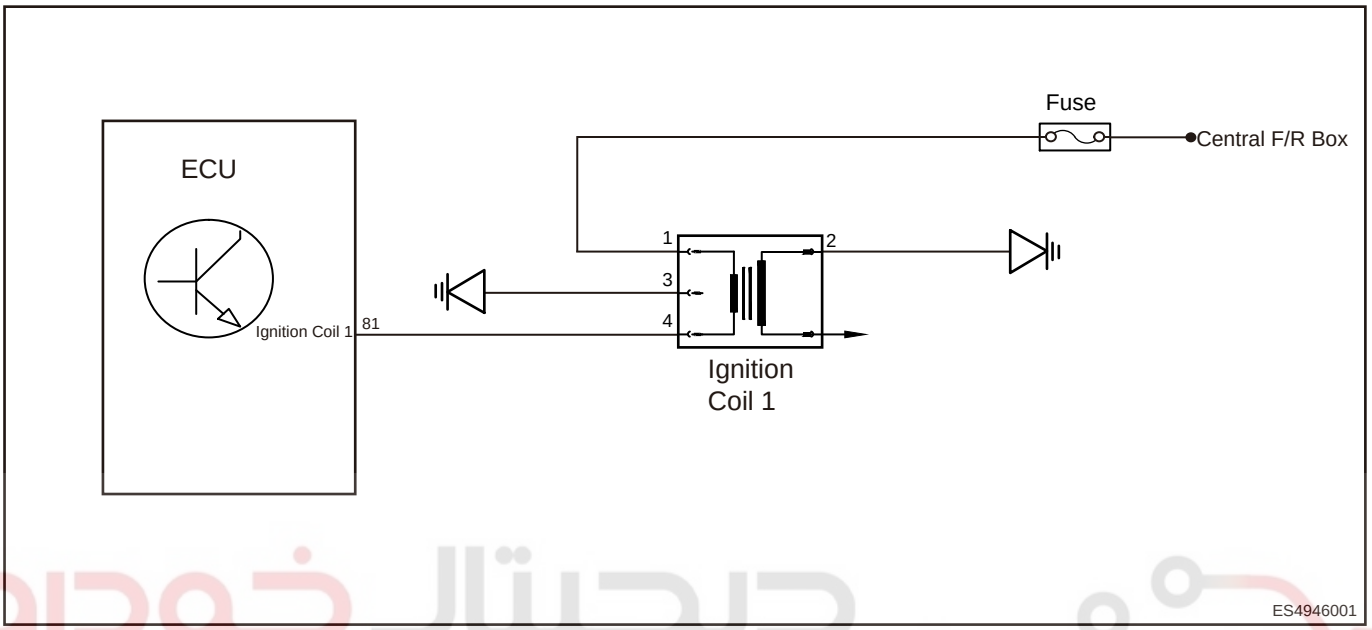
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0351 00**	**Ignition Coil "A" Primary Control Circuit Open**
DTC	**P2301 00**	**Ignition Coil “A” Primary Control Circuit High**
DTC	**P2300 00**	**Ignition Coil “A” Primary Control Circuit Low**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-351 00	Ignition Coil "A" Primary Control Circuit Open	/	/	Drive channel self-diagnosis is malfunctioning	/	• Ignition Coil-1 • Fuse • Wire harness or connector • ECU	/	Engine malfunction light comes on
P2-301 00	Ignition Coil “A” Primary Control Circuit High	/	/	Drive channel self-diagnosis is malfunctioning	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P230000	Ignition Coil "A" Primary Control Circuit Low	/	/	Drive channel self-diagnosis is malfunctioning	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if ignition coil fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

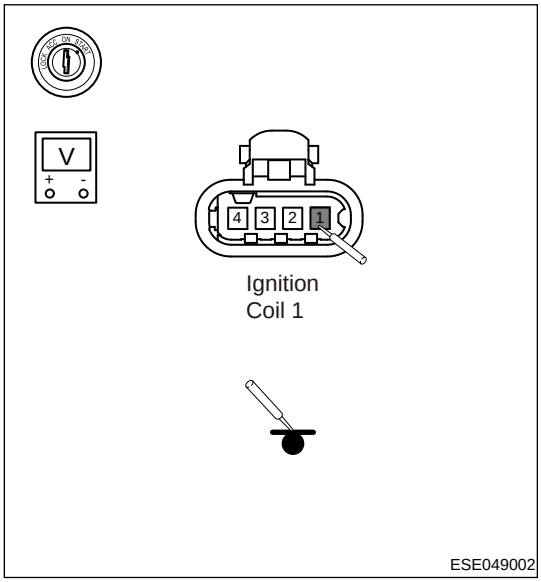
OK

2	**Check ignition coil-1 power supply**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-1 (1) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Repair open fault to power supply in ignition coil-1.**

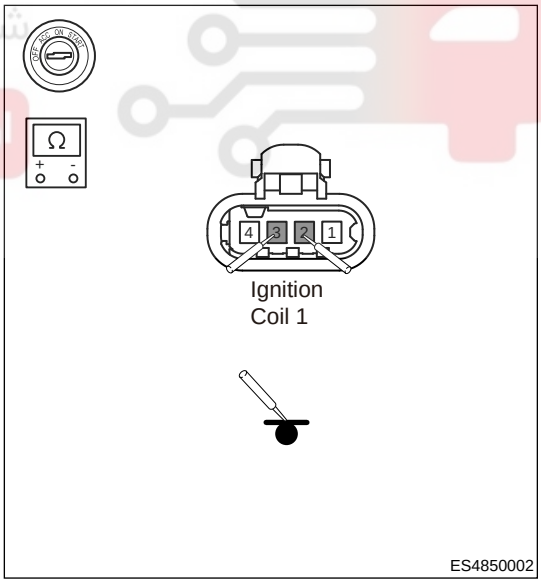
OK

3	**Check ignition coil-1 ground**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-1 (2) - Body ground	Always	Less than 1 Ω
Ignition coil-1 (3) - Body ground	Always	Less than 1 Ω



NG → **Repair open fault to ground in ignition coil-1.**

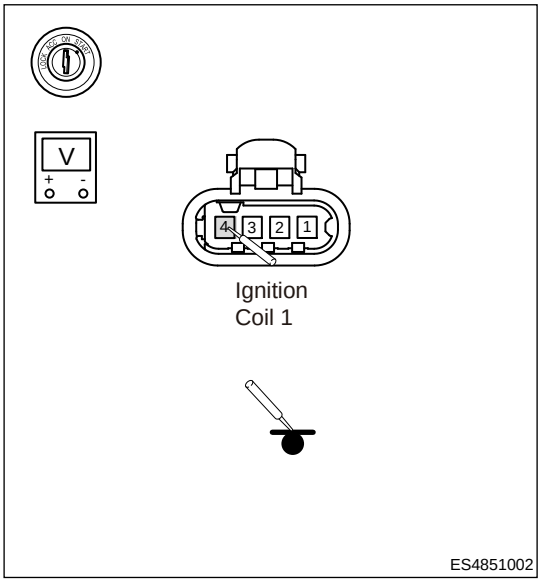
OK

4	**Check ignition coil-1 control circuit**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-1 (4) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in ignition coil-1 control circuit**

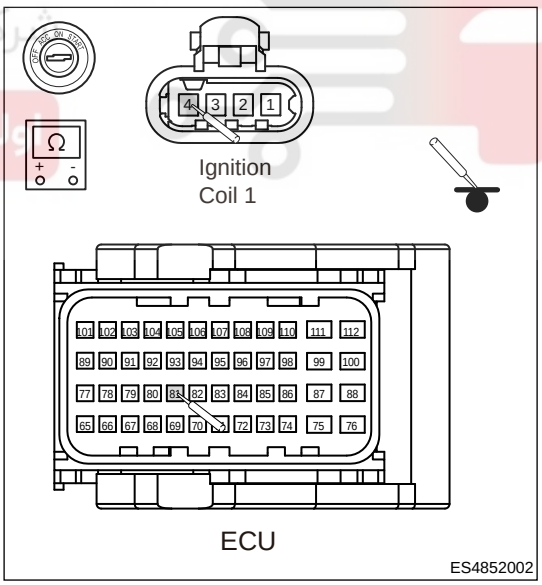
OK

5	Check ignition coil-1 control circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-1 (4) - ECU (81)	Always	Less than 1 Ω
Ignition coil-1 (4) - Body ground	Always	∞



NG → **Repair ignition coil-1 control circuit fault.**

OK

6	Check ignition coil-1 connector

(a) Check if ignition coil-1 connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

7	Check ignition coil-1

(a) Check if ignition coil-1 is normal.

NG → **Replace ignition coil-1.**

OK

8	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

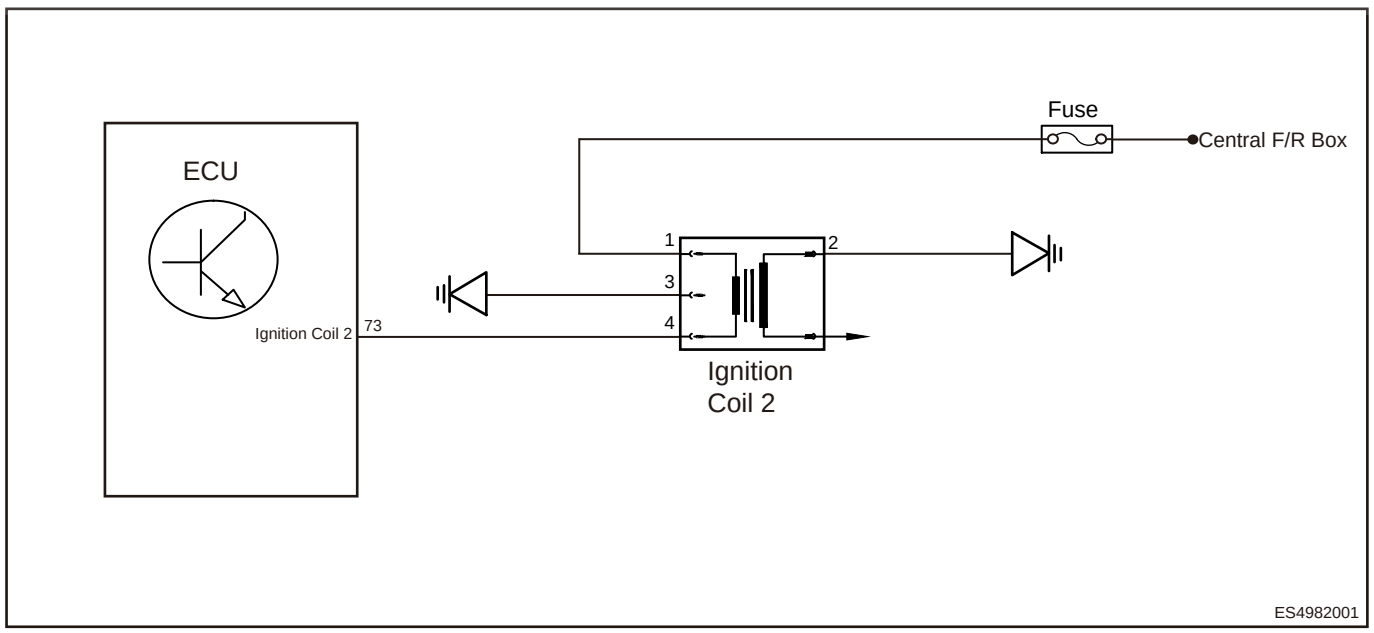
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P0352 00	Ignition Coil "B" Primary Control Circuit Open
DTC	P2304 00	Ignition Coil “B” Primary Control Circuit High
DTC	P2303 00	Ignition Coil “B” Primary Control Circuit Low

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-35200	Ignition Coil "B" Primary Control Circuit Open	/	/	Drive channel self-diagnosis is malfunctioning	/	• Ignition Coil-2 • Fuse • Wire harness or connector • ECU	/	Engine malfunction light comes on
P2-30400	Ignition Coil “B” Primary Control Circuit High	/	/	Drive channel self-diagnosis is malfunctioning	/		/	
P2-30300	Ignition Coil “B” Primary Control Circuit Low	/	/	Drive channel self-diagnosis is malfunctioning	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if ignition coil fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

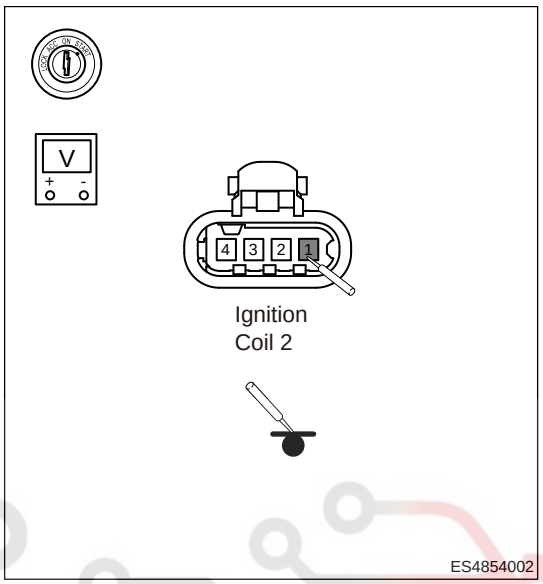
OK ↓

2	Check ignition coil-2 power supply

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-2 (1) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Repair open fault to power supply in ignition coil-2.**

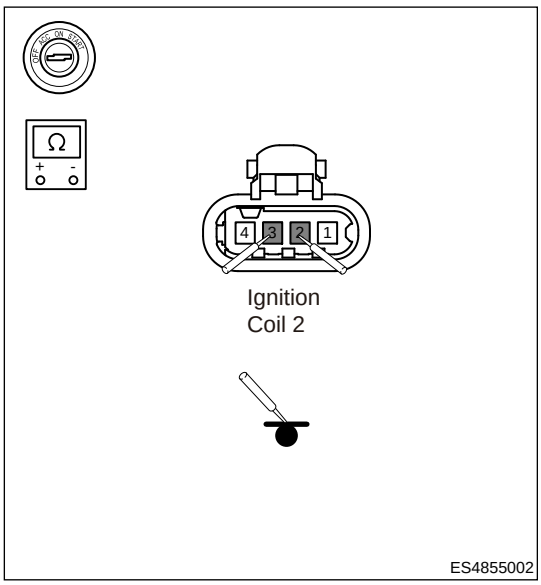
OK ↓

3	Check ignition coil-2 ground

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-2 (2) - Body ground	Always	Less than 1 Ω
Ignition coil-2 (3) - Body ground	Always	Less than 1 Ω



NG → **Repair open fault to ground in ignition coil-2.**

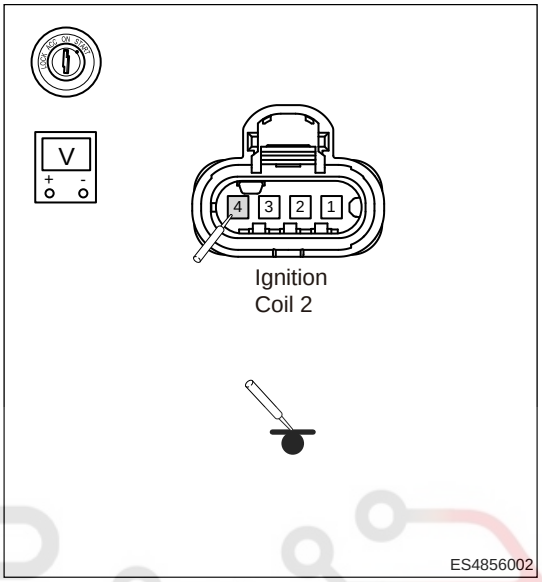
OK

4	Check ignition coil-2 control circuit

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-2 (4) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in ignition coil-2 control circuit**

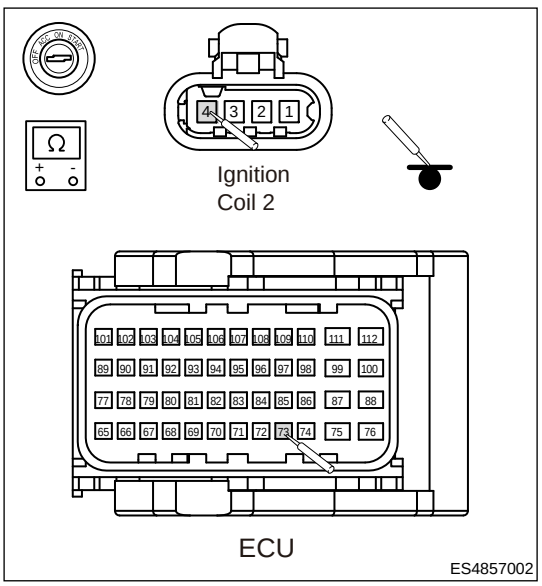
OK

5	Check ignition coil-2 control circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-2 (4) - ECU (73)	Always	Less than 1 Ω
Ignition coil-2 (4) - Body ground	Always	∞



NG → **Repair ignition coil-2 control circuit fault.**

OK

6	Check ignition coil-2 connector

(a) Check if ignition coil-2 connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

7	Check ignition coil-2

(a) Check if ignition coil-2 is normal.

NG → **Replace ignition coil-2.**

OK

8	Reconfirm DTCs

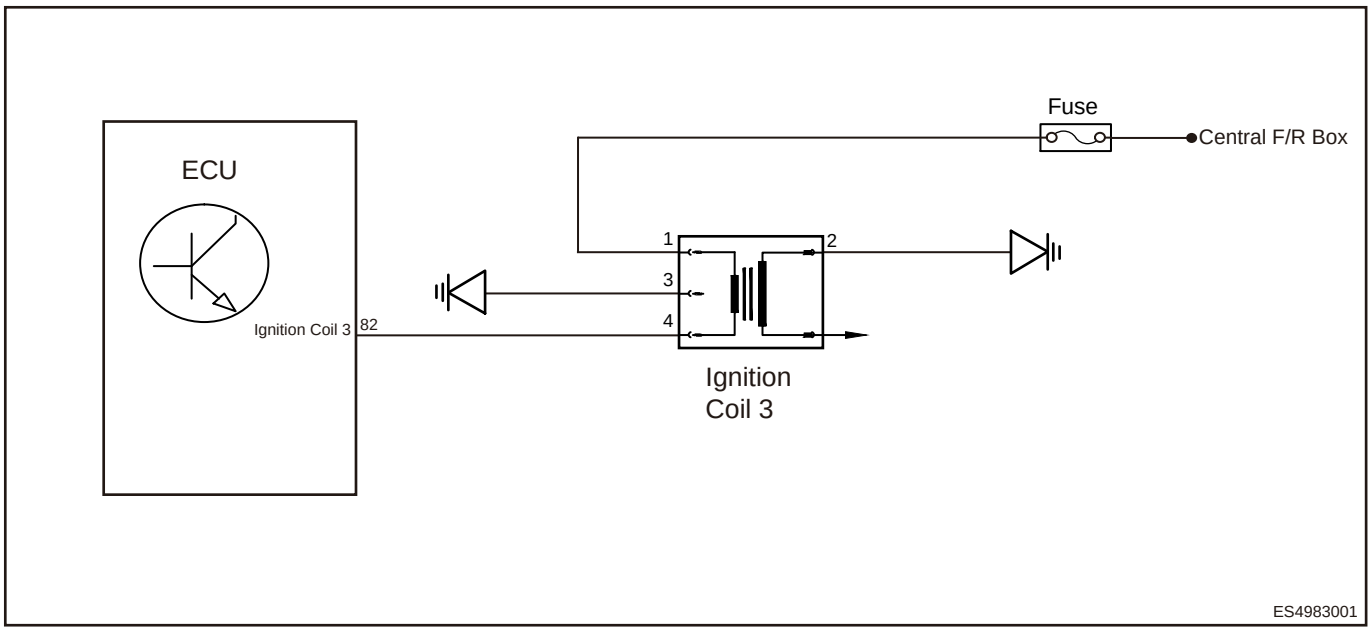
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0353 00**	**Ignition Coil "C" Primary Control Circuit Open**
DTC	**P2307 00**	**Ignition Coil "C" Primary Control Circuit High**
DTC	**P2306 00**	**Ignition Coil "C" Primary Control Circuit Low**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-35300	Ignition Coil "C" Primary Control Circuit Open	/	/	Drive channel self-diagnosis is malfunctioning	/	• Ignition Coil-3 • Fuse • Wire harness or connector • ECU	/	Engine malfunction light comes on
P2-30700	Ignition Coil “C” Primary Control Circuit High	/	/	Drive channel self-diagnosis is malfunctioning	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P230600	Ignition Coil "C" Primary Control Circuit Low	/	/	Drive channel self-diagnosis is malfunctioning	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if ignition coil fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

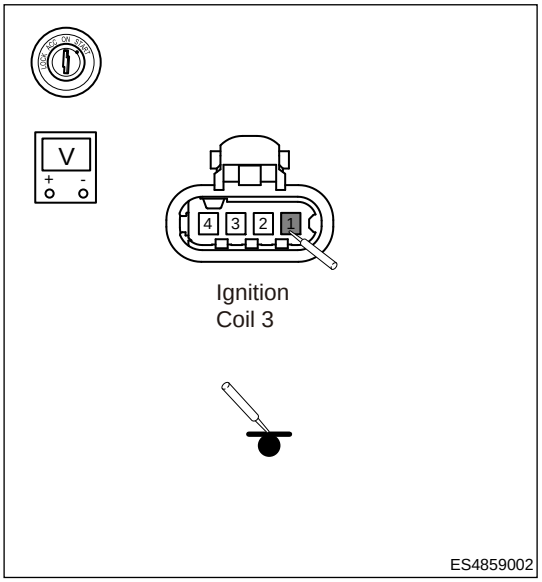
OK

2	**Check ignition coil-3 power supply**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-3 (1) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Repair open fault to power supply in ignition coil-3.**

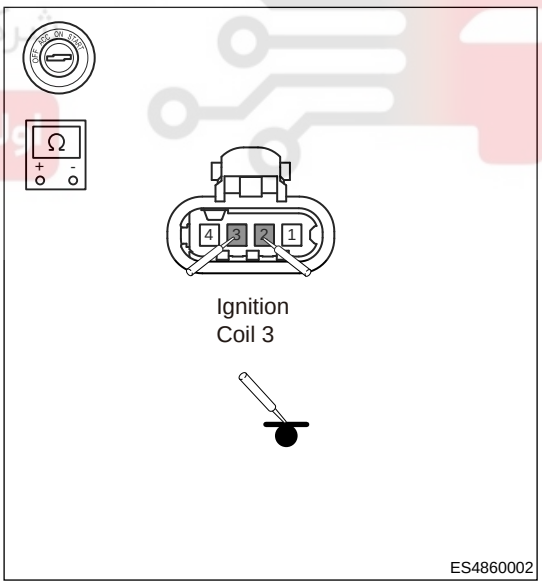
OK

3	Check ignition coil-3 ground

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-3 (2) - Body ground	Always	Less than 1 Ω
Ignition coil-3 (3) - Body ground	Always	Less than 1 Ω



NG → **Repair open fault to ground in ignition coil-3.**

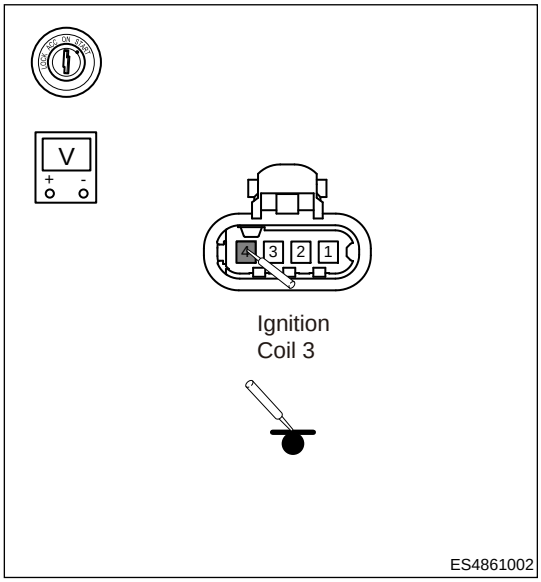
OK

4	Check ignition coil-3 control circuit

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-3 (4) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in ignition coil-3 control circuit**

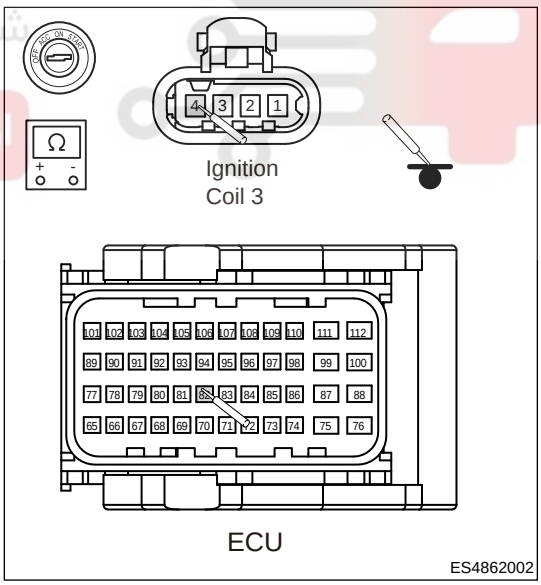
OK

5	Check ignition coil-3 control circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-3 (4) - ECU (82)	Always	Less than 1 Ω
Ignition coil-3 (4) - Body ground	Always	∞



NG → **Repair ignition coil-3 control circuit fault.**

OK

6	Check ignition coil-3 connector

(a) Check if ignition coil-3 connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

7	**Check ignition coil-3**

(a) Check if ignition coil-3 is normal.

NG → **Replace ignition coil-3.**

OK

8	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

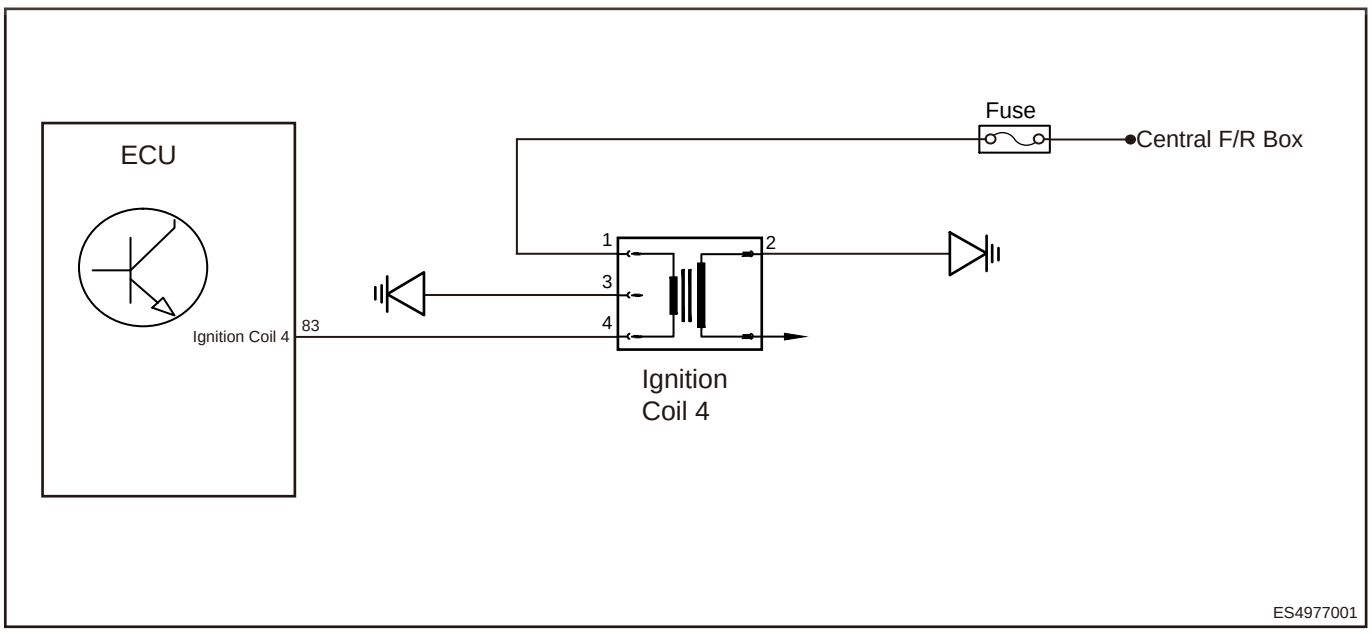
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0354 00**	**Ignition Coil "D" Primary Control Circuit Open**
DTC	**P2310 00**	**Ignition Coil "D" Primary Control Circuit High**
DTC	**P2309 00**	**Ignition Coil "D" Primary Control Circuit Low**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-35400	Ignition Coil "D" Primary Control Circuit Open	/	/	Drive channel self-diagnosis is malfunctioning	/	• Ignition Coil-4 • Fuse • Wire harness or connector • ECU	/	Engine malfunction light comes on
P2-31000	Ignition Coil “D” Primary Control Circuit High	/	/	Drive channel self-diagnosis is malfunctioning	/		/	
P2-30900	Ignition Coil “D” Primary Control Circuit Low	/	/	Drive channel self-diagnosis is malfunctioning	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

(a) Check if ignition coil fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

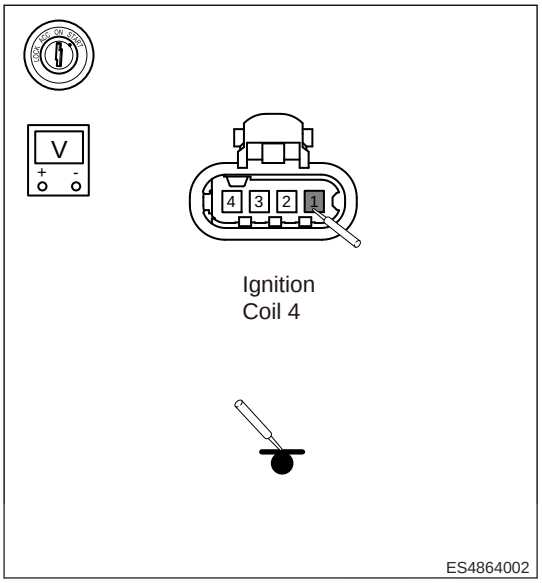
OK

2	Check ignition coil-4 power supply

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-4 (1) - Body ground	ENGINE START STOP switch ON	12 V



NG

Repair open fault to power supply in ignition coil-4.

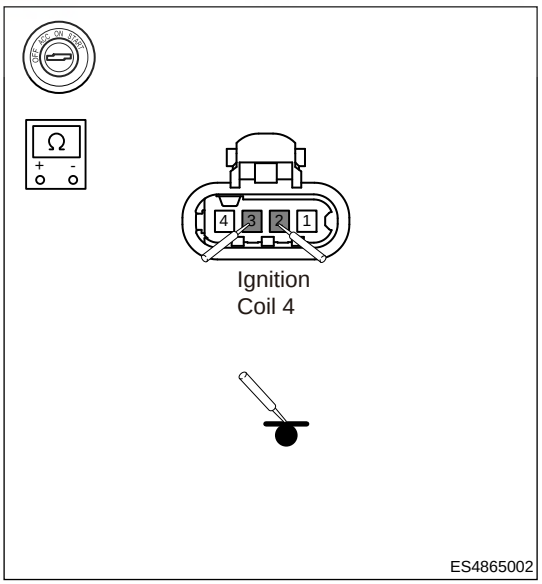
OK

3	Check ignition coil-4 ground

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-4 (2) - Body ground	Always	Less than 1 Ω
Ignition coil-4 (3) - Body ground	Always	Less than 1 Ω



NG

Repair open fault to ground in ignition coil-4.

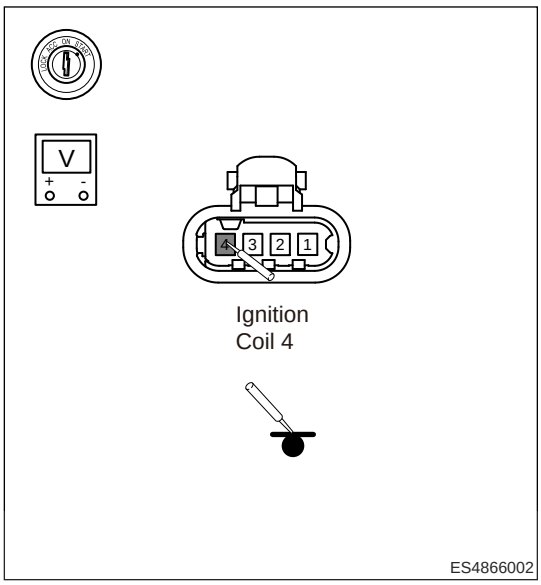
OK

4	Check ignition coil-4 control circuit

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-4 (4) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in ignition coil-4 control circuit**

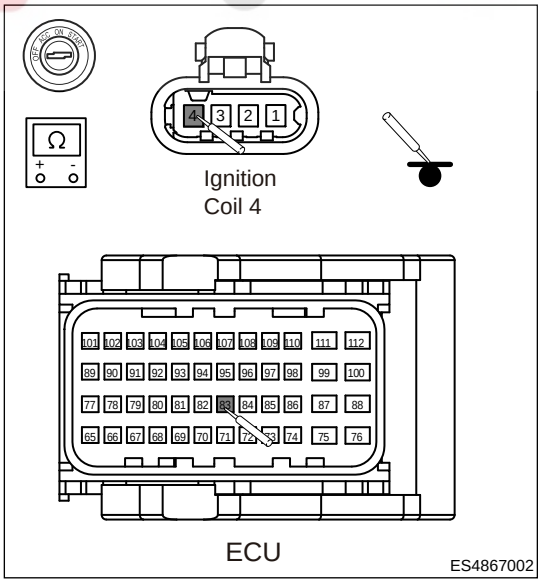
OK

5	Check ignition coil-4 control circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Ignition coil-4 (4) - ECU (83)	Always	Less than 1 Ω
Ignition coil-4 (4) - Body ground	Always	∞



NG → **Repair ignition coil-4 control circuit fault.**

OK

6	**Check ignition coil-4 connector**

(a) Check if ignition coil-4 connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK ↓

7	**Check ignition coil-4**

(a) Check if ignition coil-4 is normal.

NG → **Replace ignition coil-4.**

OK ↓

8	**Reconfirm DTCs**

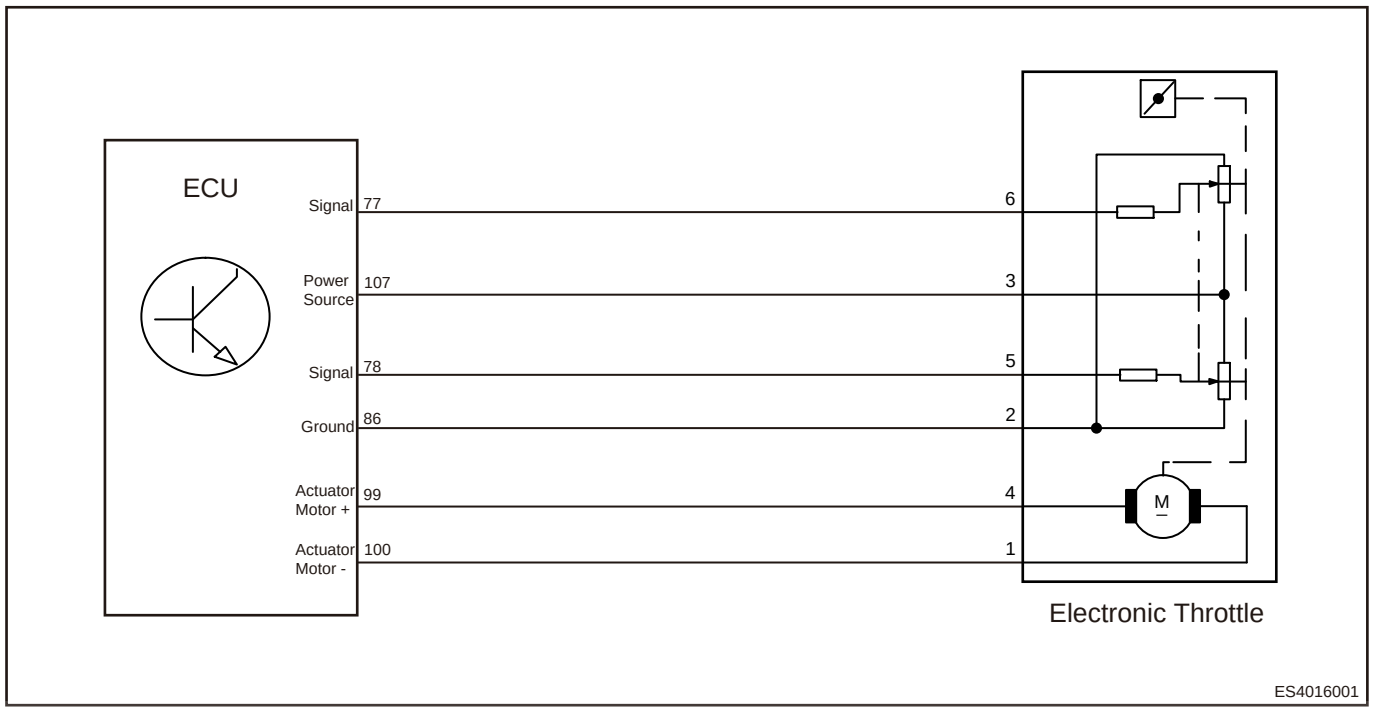
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P1555 00**	**Throttle Actuator Electrical Malfunction**
DTC	**P1554 00**	**Return Spring Check Max Error**
DTC	**P1561 00**	**Not Plausible Error of DV-E Position Deviation**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P1-55500	Throttle Actuator Electrical Malfunction	/	/	After ignition switch is turned to ON, the system will command DVE to open to a certain opening by ECU, and check if DVE can be reached within the specified time, and then check if DVE can be returned within the specified time; if it cannot reach the specified position within the specified time, it is determined as P1555; if it cannot return to the specified range within the specified time after opening, it is determined as P1554. When ECU drives throttle, ECU will always compare the target opening with the actual throttle feedback opening. When deviation between the target and the	DTC is deleted after 40 consecutive warm-up cycles without faults	• Electronic Throttle • Wire harness or connector • ECU	/	Engine malfunction light comes on
P1-55400	Return Spring Check Max Error	/	/				/	
P1-56100	Not Plausible Error of DVE Position Deviation	/	/				/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
				actual exceeds a certain value and it is confirmed after a period of time, it will be determined as P1561.				

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check electronic throttle connector**

(a) Check if electronic throttle connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

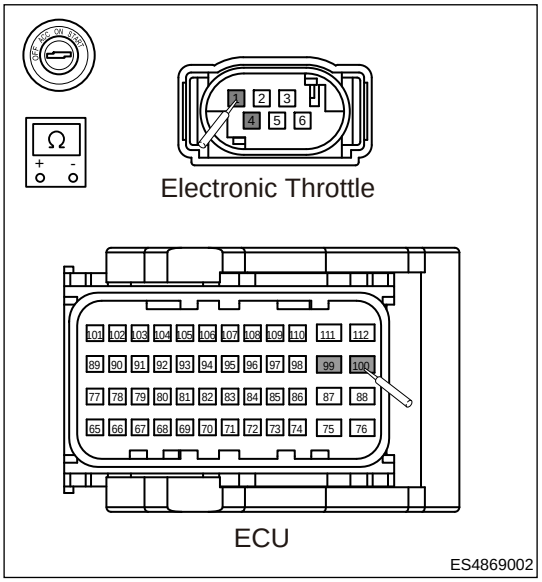
OK

2	**Check electronic throttle motor wire harness**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Electronic throttle (1) - ECU (100)	Always	Less than 1 Ω
Electronic throttle (4) - ECU (99)	Always	Less than 1 Ω



NG → **Repair electronic throttle motor wire harness.**

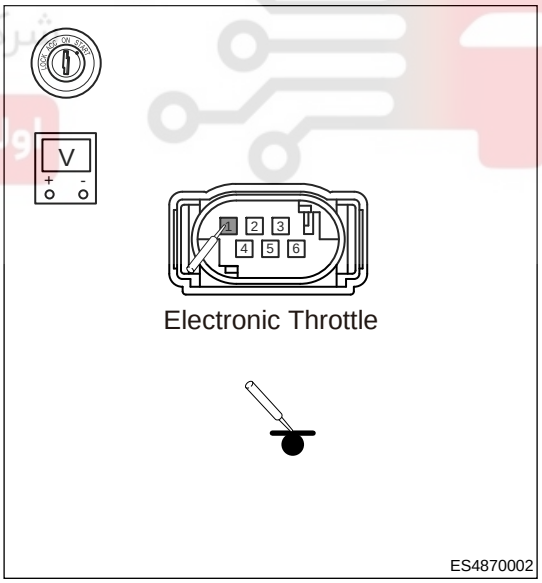
OK

3	Check voltage of electronic throttle connector

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Electronic throttle (1) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in electronic throttle connector.**

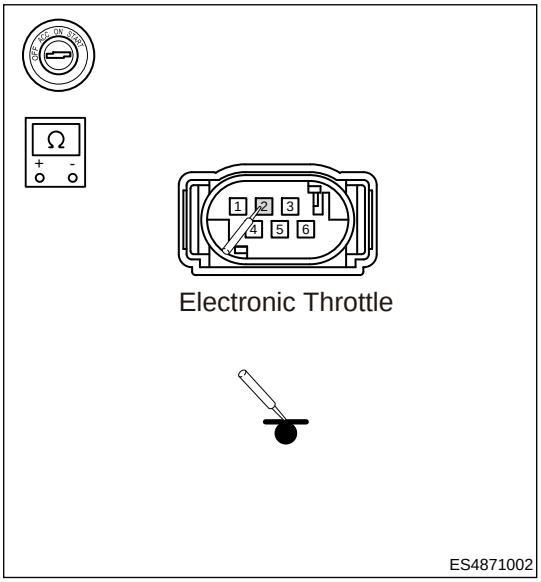
OK

4	Check electronic throttle connector resistance

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Electronic throttle (2) - Body ground	Always	Ground



NG → **Repair short to ground in electronic throttle connector wire harness**

OK

5	Check electronic throttle

(a) Check if electronic throttle is normal.

NG → **Replace electronic throttle.**

OK

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P2565 00**	**Turbocharger Boost Control Position Sensor "A" Circuit High**
DTC	**P2564 00**	**Turbocharger Boost Control Position Sensor "A" Circuit Low**
DTC	**P0244 77**	**Turbocharger/Supercharger Wastegate Actuator "A" Range/ Performance**

DTC	**P0244 37**	**Turbocharger/Supercharger Wastegate Actuator "A" Range/ Performance**
DTC	**P003A 00**	**Turbocharger/Supercharger Boost Control "A" Position Exceeded Learning Limit**

Control Schematic Diagram

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P2-56500	Turbocharger Boost Control Position Sensor "A" Circuit High	/	/	Vehicle power-on	/	• Electronic Waste Gate • Wire harness or connector • ECU	/	Engine malfunction light comes on
P2-56400	Turbocharger Boost Control Position Sensor "A" Circuit Low	/	/		/		/	
P0-24477	Turbocharger/ Supercharger Wastegate Actuator "A" Range/	/	/	Ignition switch is turned ON, 9 V≤ battery voltage ≤ 16 V	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	Performance							
P0-24437	Turbocharger/ Supercharger Wastegate Actuator "A" Range/ Performance	/	/		/		/	
P0-03A00	Turbocharger/ Supercharger Boost Control "A" Position Exceeded Learning Limit	/	/		/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

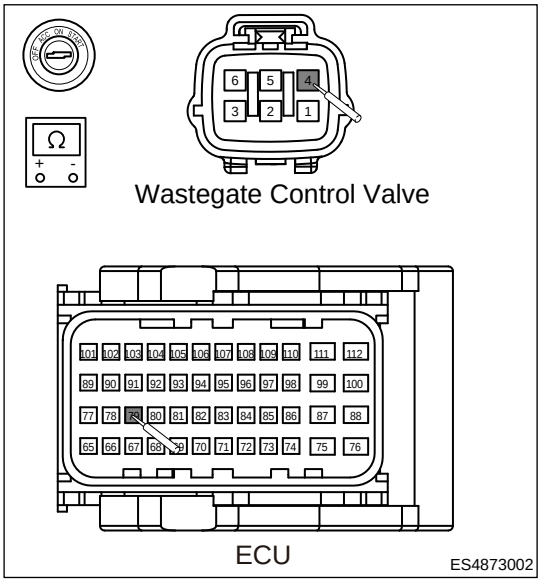
1	**Check electronic waste gate control circuit**

(a) Disconnect ECU connector and electronic waste gate connector.

(b) Turn ENGINE START STOP switch to OFF.

(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Electronic waste gate (4) - ECU (79)	Always	Less than 1 Ω



NG → **Repair electronic waste gate control wire harness.**

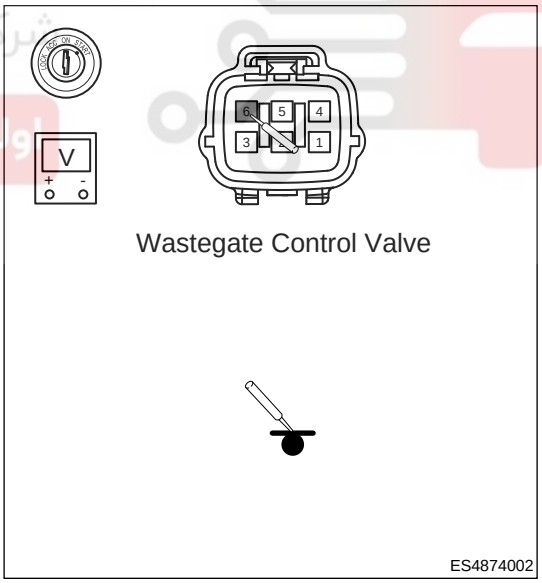
OK

2	Check electronic waste gate wire harness voltage

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Electronic waste gate (6) - Body ground	ENGINE START STOP switch ON	5 V



NG → **Repair short fault to power supply in electronic waste gate wire harness.**

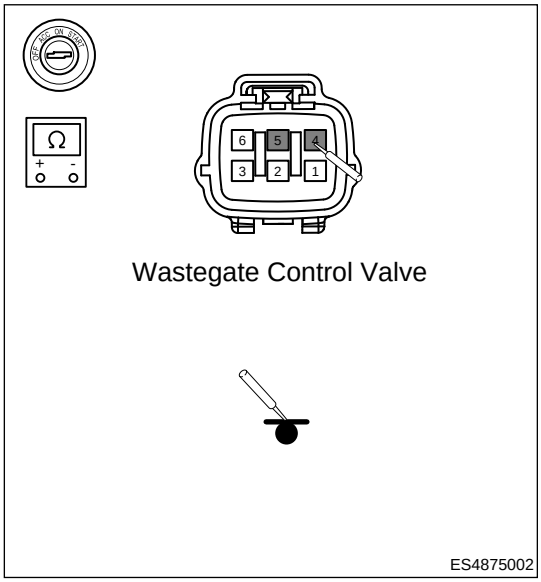
OK

3	Check electronic waste gate wire harness resistance

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Electronic waste gate (4) - Body ground	Always	∞
Electronic waste gate (5) - Body ground	Always	∞



NG → **Repair short fault to ground in electronic waste gate wire harness.**

OK

4 Check electronic waste gate connector

(a) Check if electronic waste gate is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

5 Check electronic waste gate

(a) Check if electronic waste gate is normal.

NG → **Replace electronic waste gate.**

OK

6 Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0234 00**	**Turbocharger/Supercharger Overboost Condition**
DTC	**P0299 00**	**Turbocharger/Supercharger "A" Underboost Condition**
DTC	**P0238 00**	**Turbocharger/Supercharger Boost Sensor "A" Circuit High**
DTC	**P0237 00**	**Turbocharger/Supercharger Boost Sensor "A" Circuit Low**
DTC	**P1204 00**	**Turbocharger/Supercharger Boost Sensor "A" Circuit Range/ Performance**
DTC	**P1205 00**	**Turbocharger/Supercharger Boost Sensor "A" Circuit Range/ Performance**
DTC	**P0236 22**	**Turbocharger/Supercharger Boost Sensor "A" Circuit Range/ Performance**
DTC	**P0236 21**	**Turbocharger/Supercharger Boost Sensor "A" Circuit Range/ Performance**

Control Schematic Diagram

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P023400	Turbocharger/Supercharger Overboost Condition	/	/	/	/	• Boost pressure/temperature sensor • Wire harness or connector • ECU	/	Engine malfunction light comes on
P029900	Turbocharger/Supercharger "A" Underboost Condition	/	/	/	/		/	
P023800	Turbocharger/Supercharger Boost Sensor "A" Circuit High	/	/	/	/		/	
P023700	Turbocharger/Supercharger Boost Sensor "A" Circuit Low	/	/	/	/		/	
P120400	Turbocharger/Supercharger	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	Boost Sensor "A" Circuit Range/ Performance							
P120500	Turbocharger/ Supercharger Boost Sensor "A" Circuit Range/ Performance	/	/	/	/		/	
P023622	Turbocharger/ Supercharger Boost Sensor "A" Circuit Range/ Performance	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P023621	Turbocharger/ Supercharger Boost Sensor "A" Circuit Range/ Performance	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check turbocharger assembly line**

(a) Check if boost pressure sensor is installed in place.

(b) Check each pipeline of turbocharger assembly for cracks or falling off.

NG → **Check and repair wire harness between boost pressure sensor and ECU.**

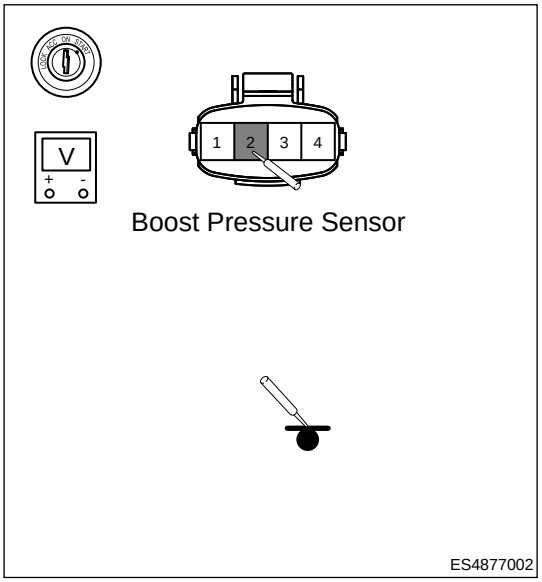
OK

2	**Check boost pressure/temperature sensor power supply circuit voltage**

(a) Turn ENGINE START STOP switch to ON and start engine.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Boost pressure/ temperature sensor (2) - Body ground	Always	5 V



NG → **Check and repair wire harness between boost pressure sensor and ECU.**

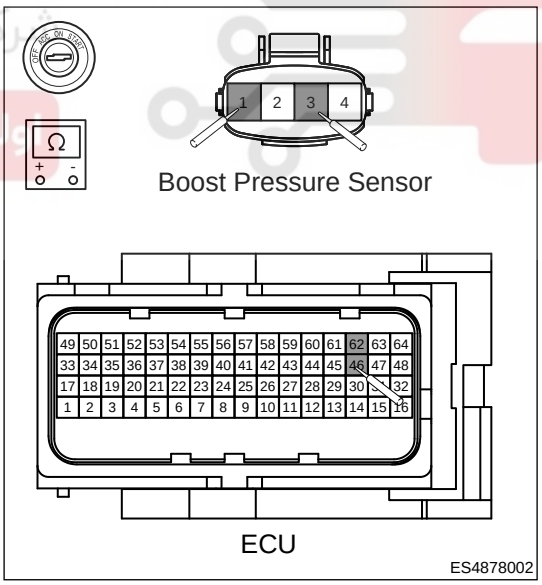
OK →

3	Check boost pressure/temperature sensor signal circuit

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Boost pressure/ temperature sensor (1) - ECU (46)	Always	Less than 1 Ω
Boost pressure/ temperature sensor (3) - ECU (62)	Always	Less than 1 Ω



NG → **Check and repair wire harness between boost pressure sensor and ECU.**

OK →

4	Check boost pressure/temperature sensor

(a) Check sensor connection part for debris and damage.

NG → **Clean or replace boost pressure/ temperature sensor.**

OK ↓

5	Check boost relief valve

(a) Check boost relief valve for damage or poor connection.

NG → **Clean or replace boost relief valve.**

OK ↓

6	Check exhaust gas by-pass valve

(a) Check exhaust by-pass valve for damage or poor connection.

NG → **Clean or replace exhaust by-pass valve.**

OK ↓

7	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

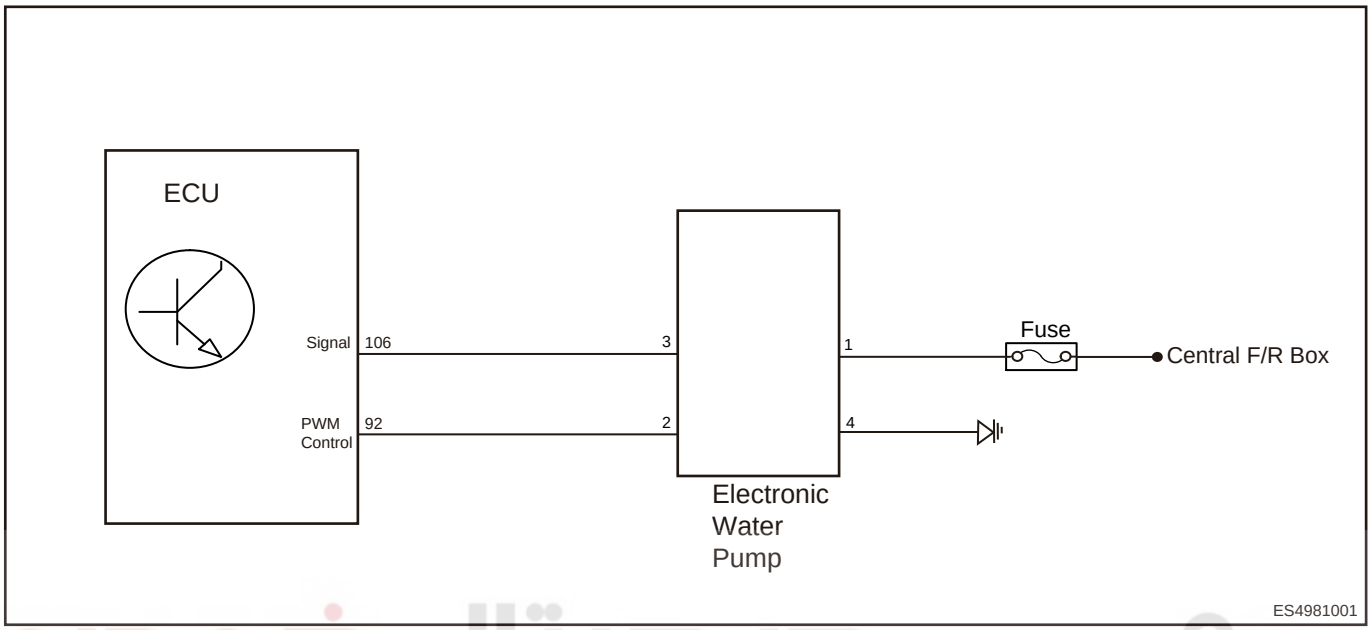
NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P1301 00	Auxiliary Water Pump Dry Run Error
DTC	P261D 00	Coolant Pump "B" Control Circuit High
DTC	P261C 00	Coolant Pump "B" Control Circuit Low
DTC	P261A 00	Coolant Pump "B" Control Circuit Open
DTC	P1303 00	Auxiliary Water Pump Out Of Voltage Error
DTC	P1304 00	Auxiliary Water Pump Over Current
DTC	P1305 00	Auxiliary Water Pump Over Temperature Error
DTC	P1306 00	Auxiliary Water Pump Feedback Signal High
DTC	P1307 00	Auxiliary Water Pump Feedback Signal Low

DTC	**P1308 00**	**Auxiliary Water Pump Stall Error**
DTC	**P1309 00**	**Auxiliary Water Pump Under Voltage**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P1-301 00	Auxiliary Water Pump Dry Run Error	/	/	/	/	• Electric Water Pump • Wire harness or connector • ECU	/	Engine malfunction light comes on
P2-61D 00	Coolant Pump "B" Control Circuit High	/	/	/	/		/	
P2-61C 00	Coolant Pump "B" Control Circuit Low	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P2-61A00	Coolant Pump "B" Control Circuit Open	/	/	/	/		/	
P1-30300	Auxiliary Water Pump Out Of Voltage Error	/	/	/	/		/	
P1-30400	Auxiliary Water Pump Over Current	/	/	/	/		/	
P1-30500	Auxiliary Water Pump Over Temperature Error	/	/	/	/		/	
P1-30600	Auxiliary Water Pump Feedback Signal High	/	/	/	/		/	
P1-30700	Auxiliary Water Pump Feedback	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	Signal Low							
P1-30800	Auxiliary Water Pump Stall Error	/	/	/	/		/	
P1-30900	Auxiliary Water Pump Under Voltage	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

(a) Check if battery terminals are corroded or loose.

(b) Check battery voltage with a digital multimeter.

NG → **Check and repair battery.**

OK

2	**Check fuse**

(a) Check if electric water pump fuse is blown or no power.

NG → **Replace electric water pump fuse or check the cause for no power.**

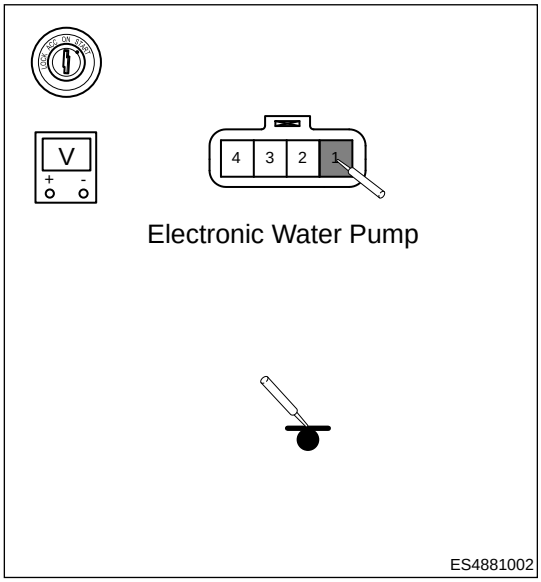
OK

3	**Check electric water pump power supply**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Electric water pump (1) - Body ground	Always	12 V



NG → **Repair or replace wire harness between electric water pump terminal (1) and engine compartment fuse and relay box.**

OK →

4	Check electric water pump control circuit

(a) Turn ENGINE START STOP switch to OFF.

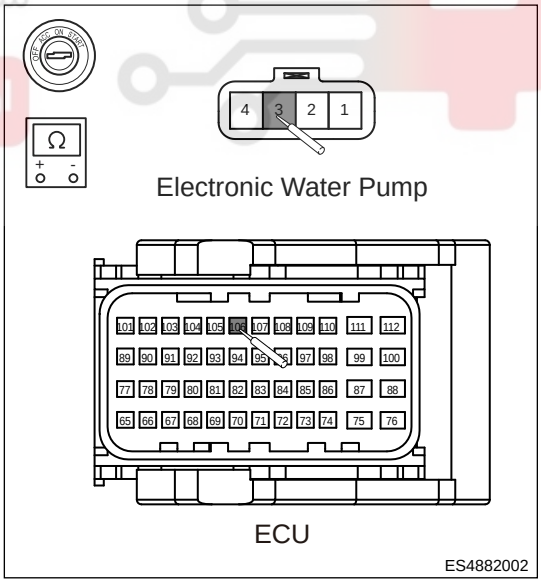
(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Electric water pump (3) - ECU (106)	Always	Less than 1 Ω

(c) Turn ENGINE START STOP switch to ON.

(d) Perform the resistance inspection

Multimeter Connection	Condition	Specified Condition
Electric water pump (3) or ECU (106) - Body ground	Always	∞
Electric water pump (3) or ECU (106) - Battery positive	Always	∞



NG → **Repair or replace wire harness or connector (ECU - electric water pump).**

OK

5	Check electric water pump signal feedback circuit

(a) Turn ENGINE START STOP switch to OFF.

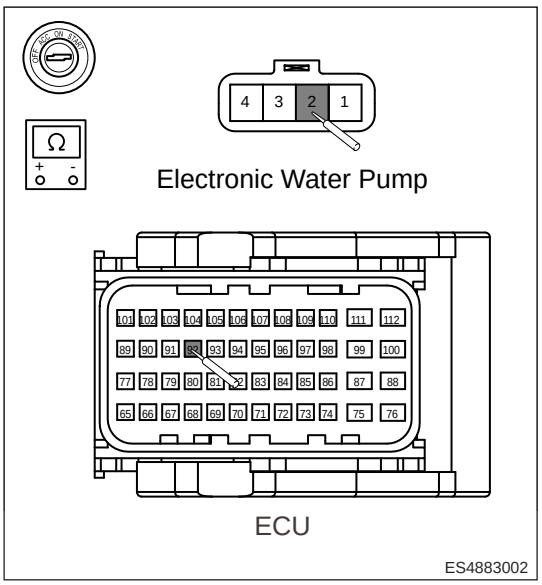
(b) Perform the resistance inspection

Multimeter Connection	Condition	Specified Condition
Electric water pump (2) - ECU (92)	Always	Less than 1 Ω

(c) Turn ENGINE START STOP switch to ON.

(d) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Electric water pump (2) or ECU (92) - Body ground	Always	∞
Electric water pump (2) or ECU (92) - Battery positive	Always	∞



NG → **Repair or replace wire harness or connector (ECU - electric water pump).**

OK

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

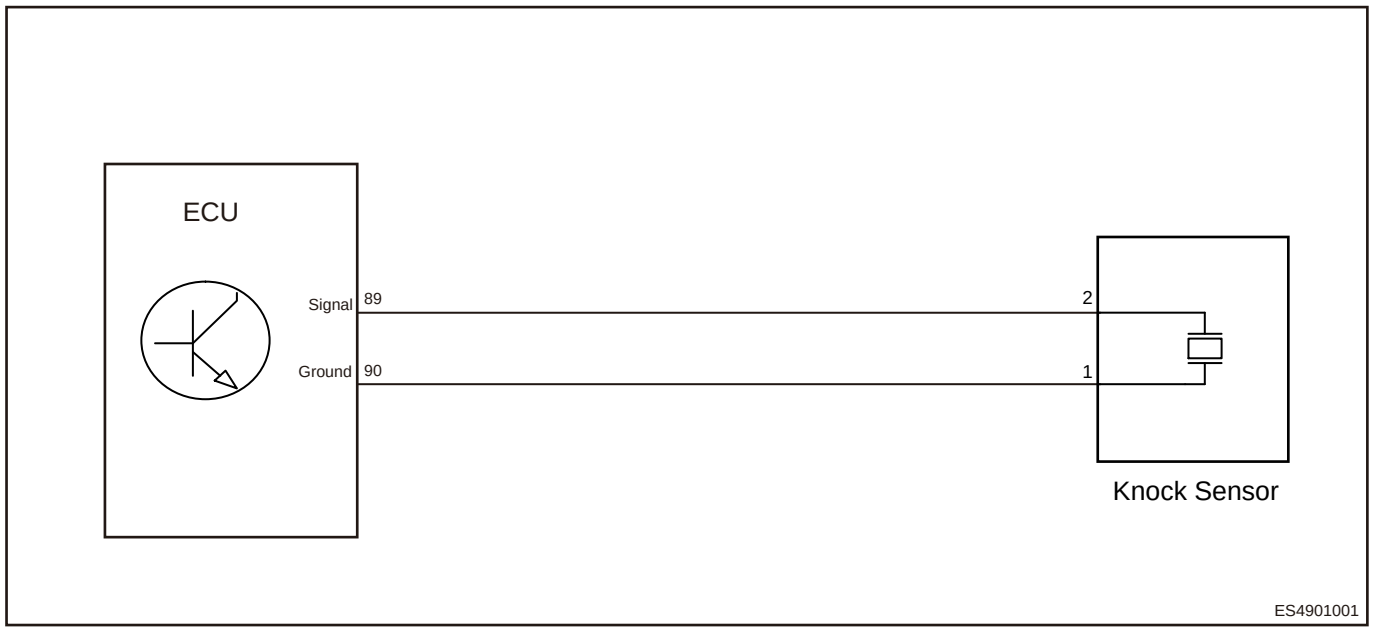
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P0325 00	Knock Sensor Signal Circuit Voltage Too Low
DTC	P0328 00	Knock/Combustion Vibration Sensor 1 Circuit High Bank 1 or Single Sensor
DTC	P0327 00	Knock/Combustion Vibration Sensor 1 Circuit Low Bank 1 or Single Sensor

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-32500	Knock Sensor Signal Circuit Voltage Too Low	/	/	/	/	• Knock Sensor • Wire harness or connector • ECU	/	Engine malfunction light comes on
P0-32800	Knock/ Combustion Vibration Sensor 1 Circuit High Bank 1 or Single Sensor	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-32700	Knock/ Combustion Vibration Sensor 1 Circuit Low Bank 1 or Single Sensor	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

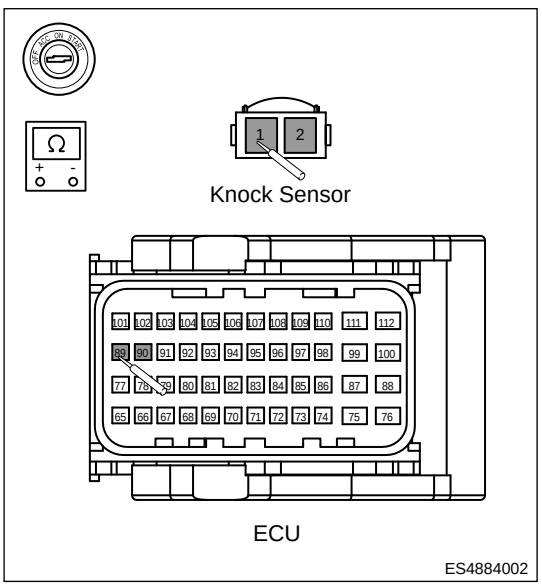
1	**Check knock sensor signal circuit**

(a) Disconnect ECU connector and knock sensor connector.

(b) Turn ENGINE START STOP switch to OFF.

(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
ECU (89) - Knock sensor (2)	Always	Less than 1 Ω
ECU (90) - Knock sensor (1)	Always	Less than 1 Ω



NG → **Repair or replace wire harness.**

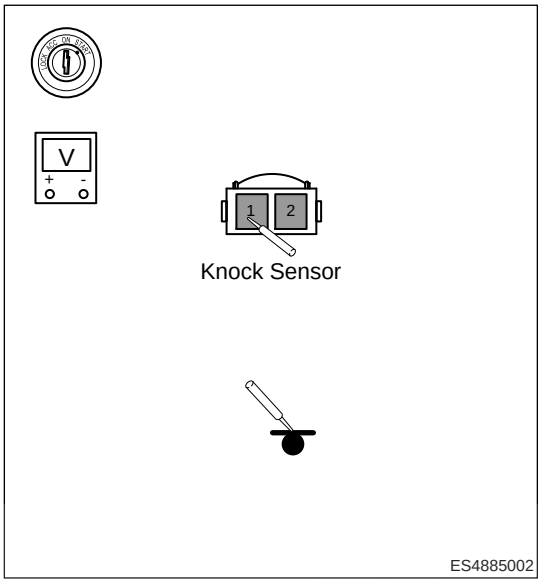
OK

2	Check knock sensor connector voltage

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Knock sensor (2) - Body ground	ENGINE START STOP switch ON	0 V
Knock sensor (1) - Body ground	ENGINE START STOP switch ON	0 V



NG

Repair short fault to power supply in knock sensor connector

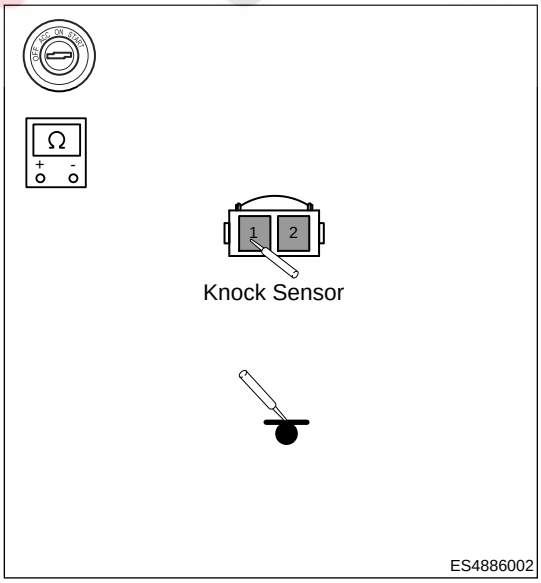
OK

3	Check knock sensor connector resistance

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Knock sensor (2) - Body ground	Always	∞
Knock sensor (1) - Body ground	Always	∞



NG

Repair short fault to ground in knock sensor connector wire harness.

OK

4	**Check knock sensor connector**

(a) Check if knock sensor connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

5	**Check knock sensor**

(a) Check if knock sensor is normal.

NG → **Replace knock sensor.**

OK

6	**Reconfirm DTCs**

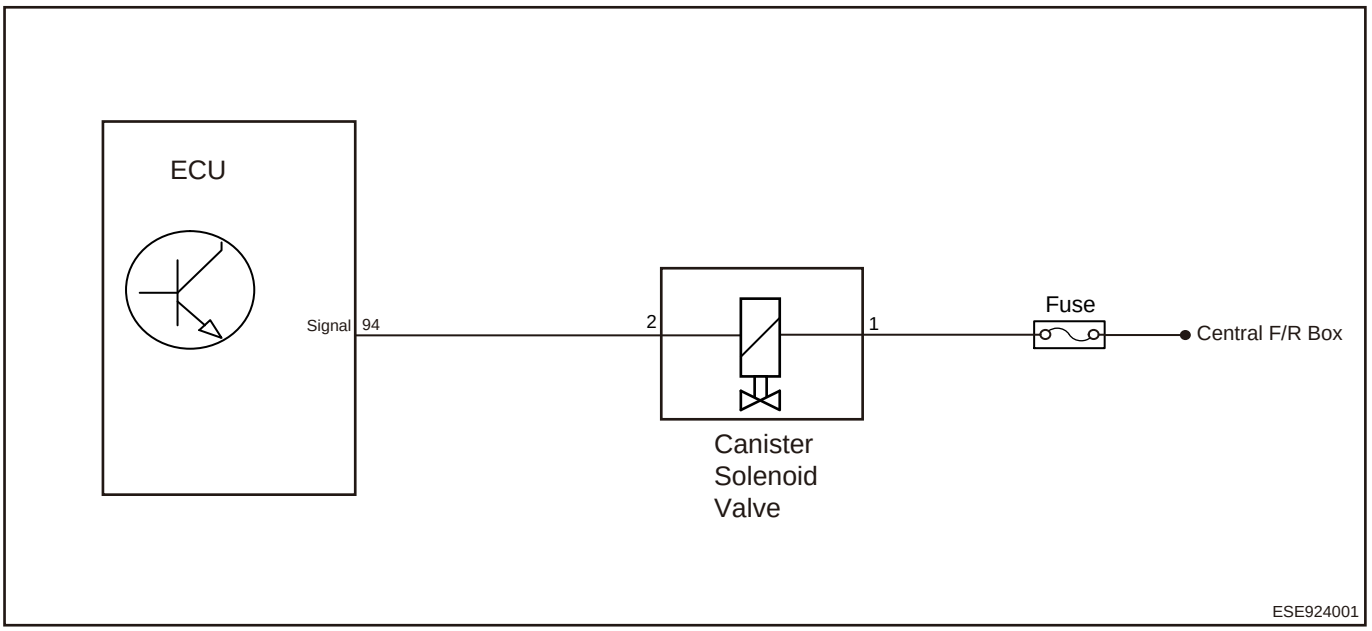
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P04F0 00**	**EVAP System High Pressure Purge Line Performance**
DTC	**P0496 00**	**EVAP System High Purge Flow**
DTC	**P0497 00**	**EVAP System Low Purge Flow**
DTC	**P0459 00**	**Evaporative Emission System Purge Control Valve Circuit High**
DTC	**P0458 00**	**Evaporative Emission System Purge Control Valve Circuit Low**
DTC	**P0444 00**	**Evaporative Emission System Purge Control Valve Circuit Open**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-4F000	EVAP System High Pressure Purge Line Performance	/	/	Ignition switch ON	/	• Canister Control Valve • Fuse • Wire harness or connector • ECU	/	Engine malfunction light comes on
P0-49600	EVAP System High Purge Flow	/	/		/		/	
P0-49700	EVAP System Low Purge Flow	/	/		/		/	
P0-45900	Evaporative Emission System	/	/		/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
	Purge Control Valve Circuit High							
P045800	Evaporative Emission System Purge Control Valve Circuit Low	/	/		/		/	
P044400	Evaporative Emission System Purge Control Valve Circuit Open	/	/		/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

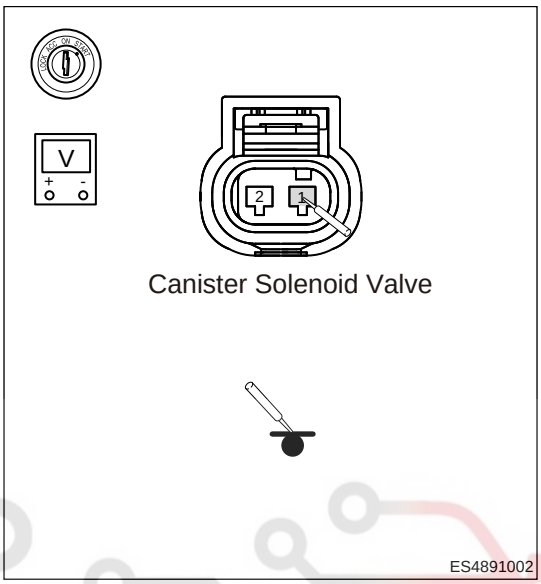
OK ↓

2	Check canister control valve power supply

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Canister control valve (1) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Repair open fault in canister control valve power supply.**

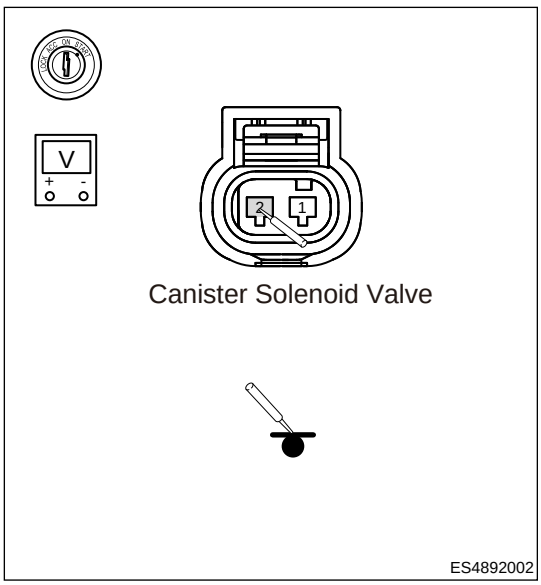
OK ↓

3	Check canister control valve control circuit

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Canister control valve (2) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in canister control valve control circuit.**

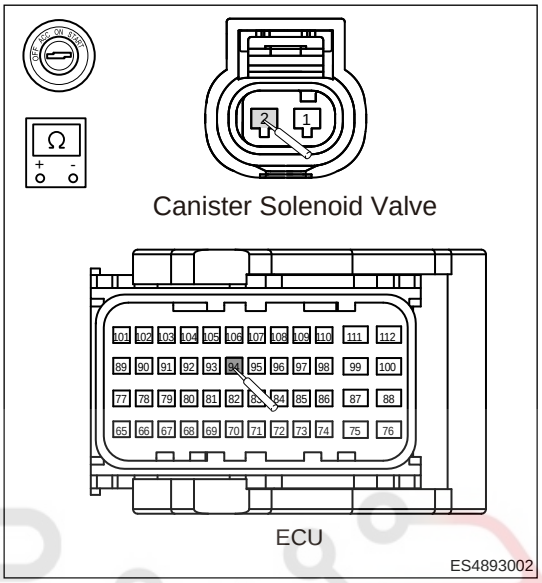
OK →

4	Check canister control valve control circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Canister control valve (2) - ECU (94)	Always	Less than 1 Ω
Canister control valve (2) - Body ground	Always	∞



NG → **Repair canister control valve control circuit fault.**

OK →

5	Check canister control valve connector

(a) Check if canister control valve connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK →

6	Check canister control valve

(a) Disconnect the canister control valve.

(b) Check the canister control valve.

Battery Connection	Condition	Specified Condition
Power supply positive to canister control valve No. 1 pin - Power supply negative to canister control valve No. 2 pin	12 V not connected	Canister control valve is not venting
	12 V connected	Canister control valve is venting

NG → **Replace canister control valve.**

OK

7	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0442 00**	**EVAP System Leak Detected (Small Leak)**
DTC	**P0455 00**	**EVAP System Leak Detected (Large Leak)**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P044200	EVAP System Leak Detected (-Small Leak)	/	/	0℃ < ambient temperature < 45℃, ratio of intake manifold pressure to ambient pressure < 0.6406, ambient pressure >= 70000 Pa, -4000 Pa < fuel tank pressure < 2000 Pa, 11 V < system voltage < 16 V, engine starting time > 700s, gas mixture is stable and there is no fault, engine idling control activated, vehicle speed <= 4 km/h, 2-0.5*1.5 L < fuel level < 45 +0.5*1.5 L, all fuel injectors activated, air-fuel ratio closed-loop control activated, mass and flow through canister valve meet the conditions, 0℃ < coolant temperature when engine starts < 45℃, engine starting time > 150s, delay time for	/	• Canister Control Valve • Canister Closed Valve • Fuel tank cap • Pipe • ECU	/	Engine malfunction light comes on
P045500	EVAP System Leak Detected (-Large Leak)	/	/		/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
				entering diagnosis when canister exits high load >= 20s				

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuel tank cap**

(a) Check if fuel tank cap is not tightened.

NG → **Tighten fuel tank cap.**

OK ↓

2	**Check canister control valve**

(a) Disconnect the canister control valve.

(b) Check the canister control valve.

Battery Connection	Condition	Specified Condition
Power supply positive to canister control valve No. 2 pin - Power supply negative to canister control valve No. 1 pin	12 V not connected	Canister control valve is not venting
	12 V connected	Canister control valve is venting

NG → **Replace canister control valve.**

OK ↓

3	**Check canister closed valve**

(a) Check if canister closed valve is normal.

NG → **Replace canister closed valve.**

OK

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P0219 00	Engine Overspeed Condition

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0219 00	Engine Overspeed Condition	/	/	Engine starts	/	• Electronic Accelerator Pedal • Electronic Throttle • Speed Sensor • ECU	/	Engine malfunction light comes on

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	General inspection

(a) Check if the engine speed increased artificially beyond the maximum safe speed.

NG → **Clear DTCs.**

OK

2	Check electronic accelerator pedal

(a) Check if electronic accelerator pedal is in the maximum position, and cannot return to original position.

NG → **Replace electronic accelerator pedal.**

OK

3	Check electronic throttle

(a) Check if electronic throttle is stuck in the maximum position.

NG → **Replace electronic throttle.**

OK

4	Check speed sensor

(a) Check if speed sensor and speed calculation are correct.

NG → **Replace speed sensor.**

OK

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

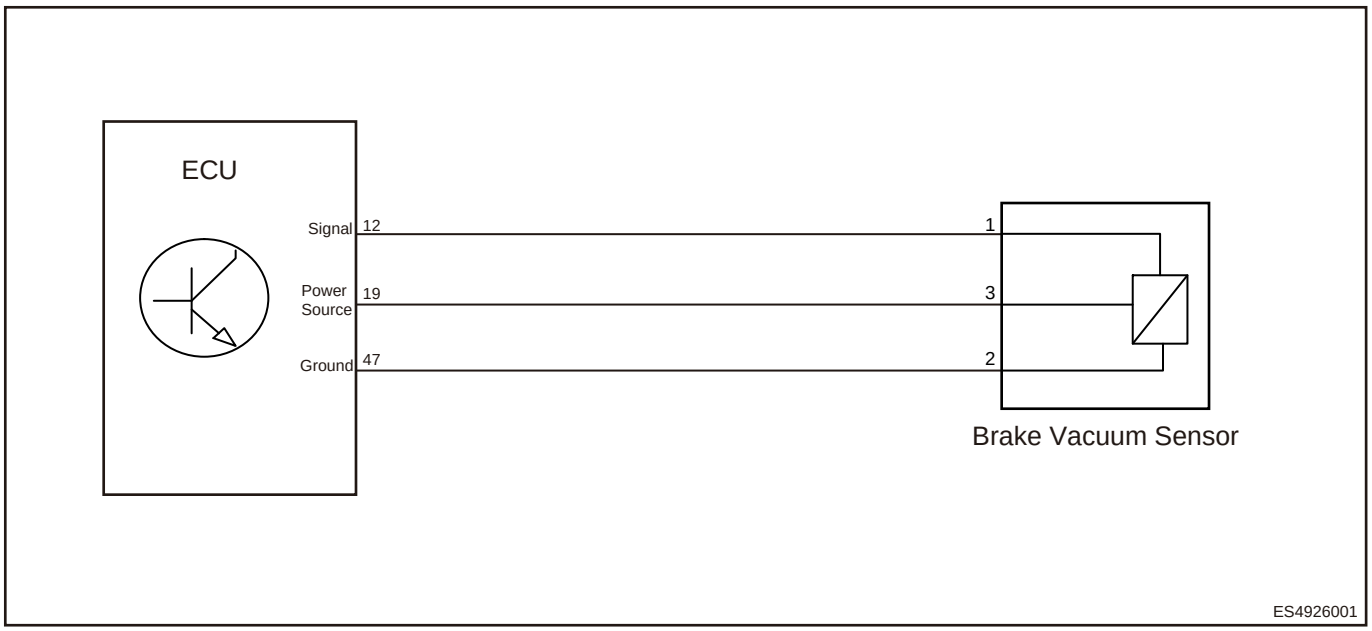
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0558 00**	**Brake Booster Pressure Sensor Circuit High**
DTC	**P0557 00**	**Brake Booster Pressure Sensor Circuit Low**
DTC	**P1450 00**	**Brake Booster Pressure Sensor Circuit Range/Performance (High)**
DTC	**P1451 00**	**Brake Booster Pressure Sensor Circuit Range/Performance (Low)**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-55800	Brake Booster Pressure Sensor Circuit High	/	/	Vehicle power-on	/	• Brake Vacuum Sensor • Wire harness or connector • ECU	/	Engine malfunction light comes on
P0-55700	Brake Booster Pressure Sensor Circuit Low	/	/		/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P145000	Brake Booster Pressure Sensor Circuit Range/ Performance (High)	/	/		/		/	
P145100	Brake Booster Pressure Sensor Circuit Range/ Performance (Low)	/	/		/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

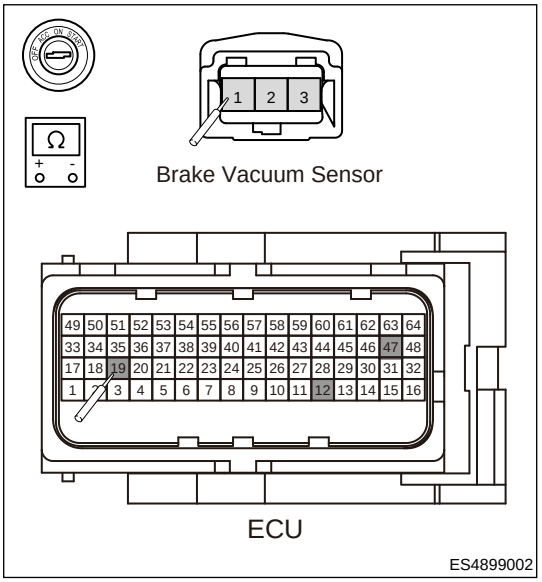
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check brake vacuum sensor wire harness**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Brake vacuum sensor (1) - ECU (12)	Always	Less than 1 Ω
Brake vacuum sensor (2) - ECU (47)	Always	Less than 1 Ω
Brake vacuum sensor (3) - ECU (19)	Always	Less than 1 Ω



NG → **Repair open fault in brake vacuum sensor wire harness.**

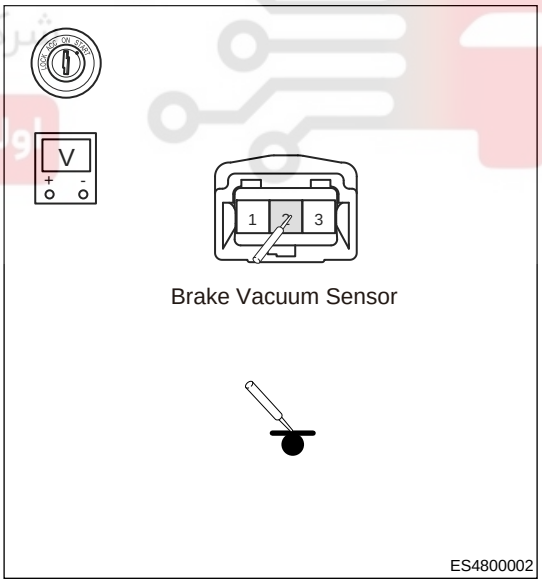
OK

2	**Check voltage between brake vacuum sensor wire harness and ground**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Brake vacuum sensor (2) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in brake vacuum sensor wire harness.**

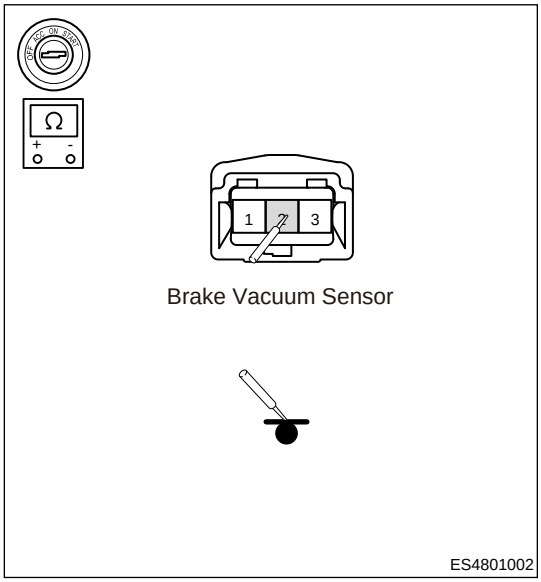
OK

3	**Check resistance between brake vacuum sensor wire harness and ground**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Brake vacuum sensor (2) - Body ground	Always	⩽ 1 Ω



NG → **Repair short fault to ground in brake vacuum sensor wire harness.**

OK

4	Check brake vacuum sensor connector

(a) Check if brake vacuum sensor connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

5	Check brake vacuum sensor

(a) Check if brake vacuum sensor is normal.

NG → **Replace brake vacuum sensor.**

OK

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P0571 00	Brake Signal Synchronization Error

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0571 00	Brake Signal Synchronization Error	/	/	Brake switch malfunction counter > 20	/	• Brake Switch	/	Engine malfunction light does not come on

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check fuse

(a) Check if fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

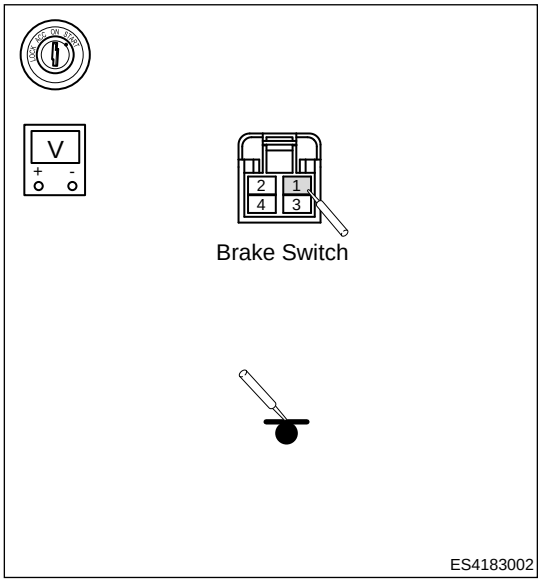
OK

2	Check brake switch power supply circuit

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Brake switch (1) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Repair open fault in brake switch power supply circuit.**

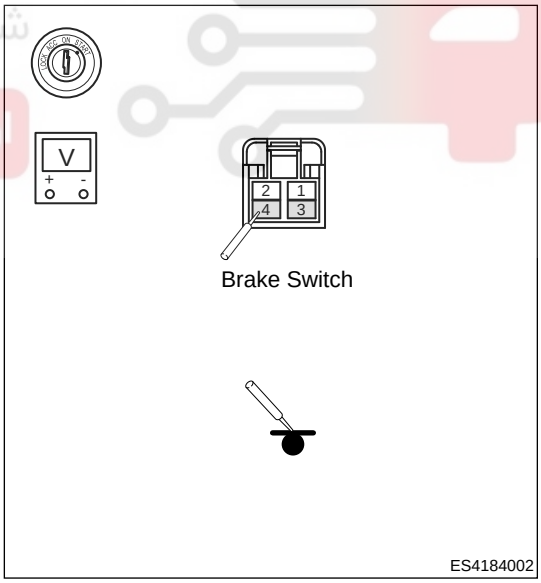
OK

3	**Check voltage of brake switch signal wire harness**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Brake switch (3) - Body ground	ENGINE START STOP switch ON	0 V
Brake switch (4) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in brake switch signal wire harness.**

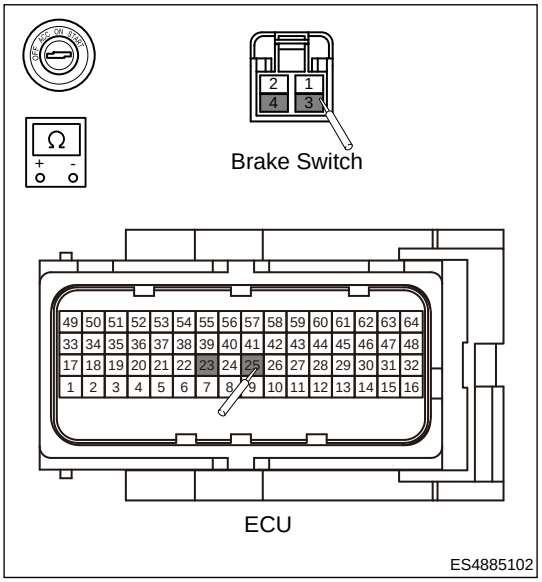
OK

4	**Check brake switch signal wire harness resistance**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Brake switch (3) - ECU (25)	Always	Less than 1 Ω
Brake switch (4) - ECU (23)	Always	Less than 1 Ω



NG → **Repair open fault in brake switch signal wire harness.**

OK ↓

5	Check brake switch connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Check connector for bad contact, bending, distortion, poor contact, etc.

NG → **Repair or replace connector.**

OK ↓

6	Check brake switch

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect brake switch connector and check resistance.

Multimeter Connection	Condition	Specified Condition
Brake switch pin 1 - Brake switch pin 3	Not depressed	∞
	Depressed	Less than 1 Ω
Brake switch pin 2 - Brake switch pin 4	Not depressed	Less than 1 Ω
	Depressed	∞

NG → **Replace brake switch.**

OK ↓

7	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

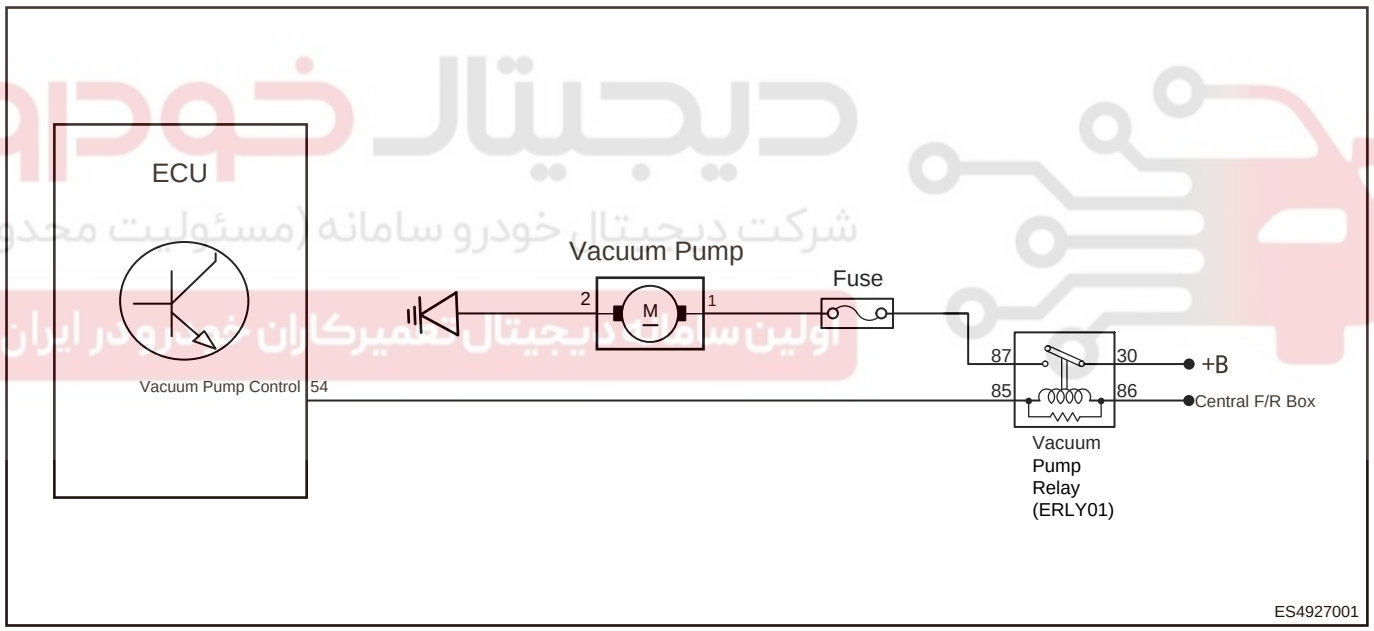
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P258D 00	Vacuum Pump Control Circuit "A" High
DTC	P258C 00	Vacuum Pump Control Circuit "A" Low
DTC	P258A 00	Vacuum Pump Control Circuit Open
DTC	P050F 00	Brake Assist Vacuum Too Low

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P2-58D00	Vacuum Pump Control Circuit "A" High	/	/	Ignition switch is turned ON, 9 V> battery voltage<= 16 V	/	• Brake vacuum pump • Wire harness or connector • ECU • Battery	/	Engine malfunction light comes on
P2-58C00	Vacuum Pump Control Circuit "A" Low	/	/		/		/	
P2-58A00	Vacuum Pump Control Circuit Open	/	/		/		/	
P0-50F00	Brake Assist Vacuum Too Low	/	/		/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check vacuum pump relay and fuse**

(a) Check if fuse is blown or no power.

(b) Check if relay terminal is corroded or broken.

(c) Directly apply battery voltage to 2 relay control terminals, check if relay closes.

NG → **Repair or replace fuse or relay or check the cause for no power.**

OK

2	Check electric vacuum pump connector

(a) Check if electric vacuum pump connector is loose or in poor contact.

NG → **Repair or replace connector.**

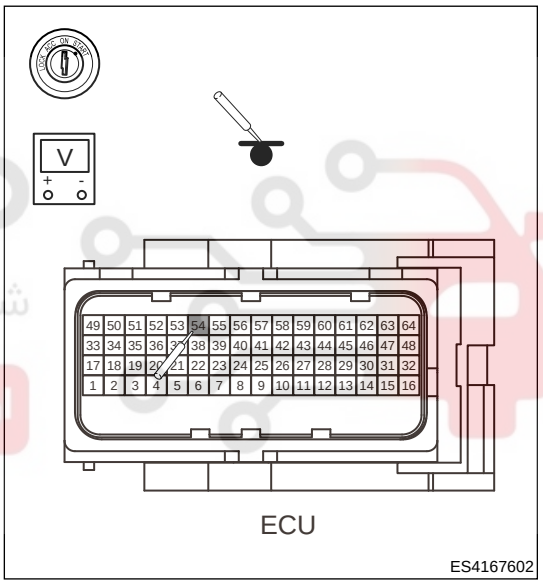
OK

3	Check electric vacuum pump control circuit

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
ECU (54) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in vacuum pump relay control circuit.**

OK

4	Check vacuum pump relay control circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Vacuum pump relay (85) - ECU (54)	Always	Less than 1 Ω
Vacuum pump relay (85) - Body ground	Always	∞

NG → **Repair vacuum pump relay control circuit fault.**

OK

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P2123 00**	**Pedal Pos.Sensor 1 Circ. High Input**
DTC	**P2122 00**	**Throttle/Pedal Position Sensor/Switch “D” Circuit Low**
DTC	**P2127 00**	**Throttle/Pedal Position Sensor/Switch “E” Circuit Low**
DTC	**P2128 00**	**Throttle/Pedal Position Sensor/Switch “E” Circuit High**
DTC	**P2138 00**	**Throttle/Pedal Position Sensor/Switch “D” / “E” Voltage Correlation**

Control Schematic Diagram

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P2-12300	Pedal Pos. Sensor 1 Circ. High Input	/	/	Power-on	/	• Electronic Accelerator Pedal • Wire harness or connector • ECU	/	Engine malfunction light comes on
P2-12200	Throttle/ Pedal Position Sensor/ Switch “D” Circuit Low	/	/		/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check electronic accelerator pedal position sensor**

(a) Check if electronic accelerator pedal position sensor is connected normally.

NG → **Reinstall or repair, replace connector.**

OK ↓

2	**Clear and read DTCs again**

(a) Connect diagnostic tester, and then turn ENGINE START STOP switch to ON.

(b) Clear DTCs, and then slowly and quickly depress the accelerator pedal several times.

OK → **End.**

NG ↓

3	**Read data flow of accelerator pedal voltage signal**

(a) Connect diagnostic tester connector, read data flow of accelerator pedal 1 and 2 voltage signal.

(b) Then slowly depress the accelerator pedal, observe if the voltage values displayed on two digital multimeters change with the depression amount of accelerator pedal.

NG → **Repair or replace wire harness corresponding to unchanged voltage signal.**

OK ↓

4	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P2177 00**	**System Too Lean Off Idle Bank 1**
DTC	**P2178 00**	**System Too Rich Off Idle Bank 1**

DTC	P2187 00	System Too Lean at Idle Bank 1
DTC	P2188 00	System Too Rich at Idle Bank 1

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P2177 00	System Too Lean Off Idle Bank 1	/	/	The self-learning factor exceeds the threshold.	/	• Oil supply system • Intake system • Ignition system • Upstream Oxygen Sensor • Downstream Oxygen Sensor • Wire harness or connector • ECU	/	Engine malfunction light comes on
P2178 00	System Too Rich Off Idle Bank 1	/	/		/		/	
P2187 00	System Too Lean at Idle Bank 1	/	/		/		/	
P2188 00	System Too Rich at Idle Bank 1	/	/		/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check oil supply system

(a) Check if fuel system is normal.

NG → **Repair oil supply system.**

OK

2	**Check gasoline**

(a) Check if gasoline number is normal.

NG → **Replace gasoline.**

OK

3	**Check fuel injector**

(a) Check fuel injector for leakage or blockage.

NG → **Replace fuel injector.**

OK

4	**Check ignition system**

(a) Check if ignition coil and spark plug work normally.

NG → **Repair or replace ignition coil or spark plug.**

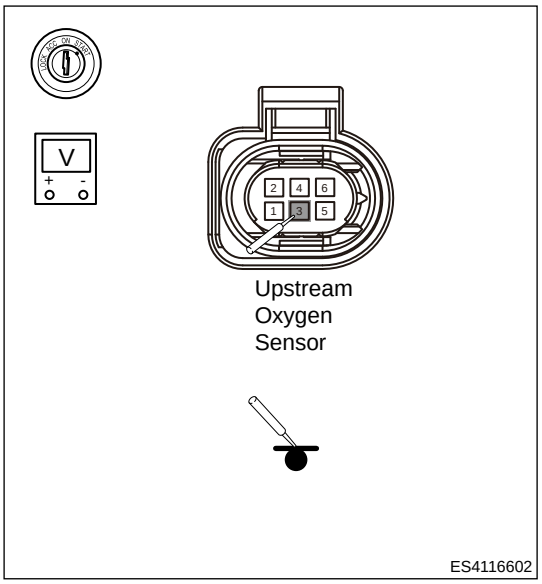
OK

5	**Check upstream oxygen sensor heater power supply voltage**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Upstream oxygen sensor (3) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Check wire harness between upstream oxygen sensor (3) and main relay**

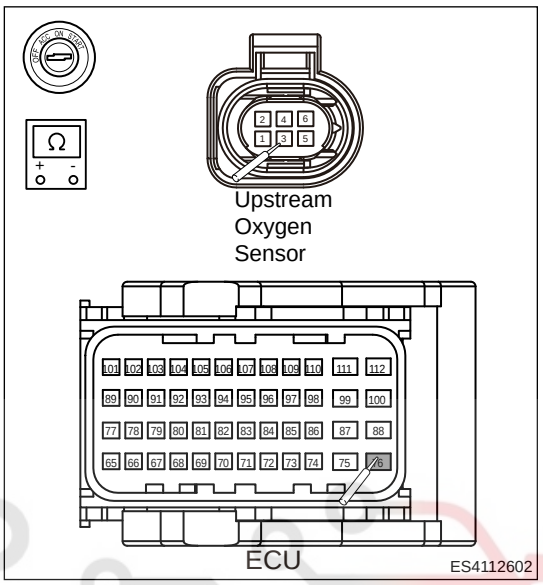
OK ↓

6	**Check upstream oxygen sensor heater wire harness**

(a) Disconnect the upstream oxygen sensor connector.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Upstream oxygen sensor (3) - ECU (76)	Always	Less than 1 Ω



NG → **Repair or replace wire harness.**

OK ↓

7	**Check upstream oxygen sensor heater resistance**

(a) Disconnect the upstream oxygen sensor connector.

(b) Disconnect the ECU connector.

(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Upstream oxygen sensor (3) - Upstream oxygen sensor (4)	At room temperature	4 - 5 Ω

NG → **Replace oxygen sensor**

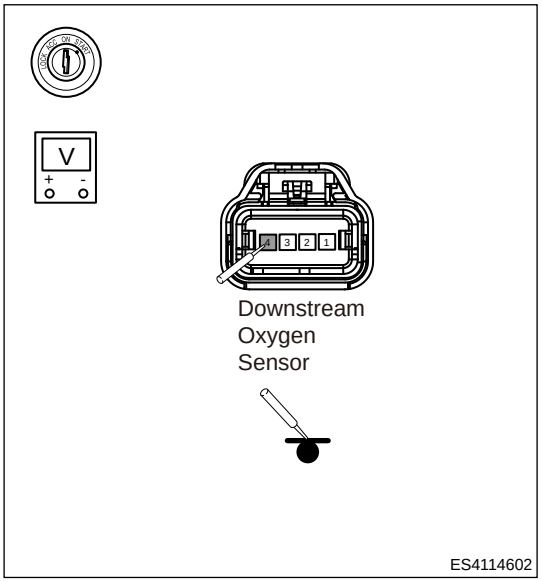
OK ↓

8	**Check downstream oxygen sensor power supply**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Downstream oxygen sensor (4) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Repair short fault to power supply in downstream oxygen sensor signal circuit.**

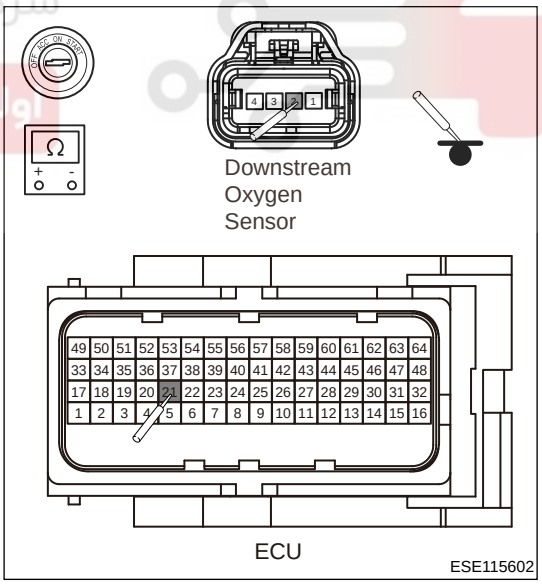
OK

9	**Check downstream oxygen sensor signal circuit**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Downstream oxygen sensor (2) - ECU (21)	Always	Less than 1 Ω
Downstream oxygen sensor (2) - Body ground	Always	∞



NG → **Repair downstream oxygen sensor signal circuit fault.**

OK

10	**Check downstream oxygen sensor connector**

(a) Check if downstream oxygen sensor connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

11	Check downstream oxygen sensor signal voltage changes in dynamic condition

(a) Start vehicle and run it until coolant temperature reaches normal value, then keep the engine idling.

(b) Reconnect oxygen sensor connector, measure if voltage between downstream oxygen sensor wire harness 1 and 2 jumps between 0 V and 1 V, and changes 5 to 8 times within 10 seconds.

Multimeter Connection	Condition	Specified Condition
Downstream oxygen sensor 1 - Downstream oxygen sensor 2	Always	0 V -1 V (change 5 to 8 times within 10 seconds)

NG → **Replace downstream oxygen sensor.**

OK

12	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P0480 00	Fan 1 Control Circuit
DTC	P0691 00	Fan 1 Control Circuit Low
DTC	P0692 00	Fan 1 Control Circuit High

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-48000	Fan 1 Control Circuit	/	/	/	/	• Cooling fan low speed control relay • Wire harness or connector • ECU	/	Engine malfunction light comes on
P0-69100	Fan 1 Control Circuit Low	/	/	/	/		/	
P0-69200	Fan 1 Control Circuit High	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check cooling fan fuse**

(a) Check if cooling fan fuse is blown or no power.

NG → **Replace fuse or check the cause for no power.**

OK

2	**Check cooling fan control relay power supply voltage**

(a) Measure voltage of cooling fan low speed control relay connector terminal (using a digital multimeter).

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Fan relay 1 (1) - Body ground	Always	12 V

NG → **Repair or replace engine compartment fuse and relay box.**

OK

3	Check cooling fan control circuit

(a) Disconnect the cooling fan ECU connector.
(b) Disconnect the cooling fan motor connector.
(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
ECU (56) - Fan relay 2 (4)	Always	Less than 1 Ω

(d) Check for short to ground in ECU terminal corresponding to cooling fan.
(e) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
ECU (56) - Body ground	Always	∞

NG → **Repair or replace ECU.**

OK

4	Check circuit between cooling fan and engine compartment fuse and relay box

(a) Disconnect the cooling fan connector.
(b) Check circuit between cooling fan and engine compartment fuse and relay box.
(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Cooling fan (2) - B-145	Always	Less than 1 Ω

(d) Check for short to ground in circuit between cooling fan and engine compartment fuse and relay box.
(e) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Cooling fan (2) or B-145 - Body ground	Always	∞

NG → **Repair or replace ECU.**

OK

5	Check cooling fan motor

(a) Directly apply battery voltage to cooling fan motor, check if cooling fan motor operates (do not run the motor in dry state or water for a long time).

NG → **Repair or replace cooling fan motor.**

OK

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0481 00**	**Fan 2 Control Circuit**
DTC	**P0693 00**	**Fan 2 Control Circuit Low**
DTC	**P0694 00**	**Fan 2 Control Circuit High**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0480 00	Fan 2 Control Circuit	/	/	/	/	• Cooling fan high speed control relay • Wire harness or connector • ECU	/	Engine malfunction light comes on
P0693 00	Fan 2 Control Circuit Low	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P069400	Fan 2 Control Circuit High	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check cooling fan fuse**

(a) Check if cooling fan fuse is blown or no power.

NG → **Replace fuse or check the cause for no power.**

OK

2	**Check cooling fan control relay power supply voltage**

(a) Measure voltage of cooling fan high speed control relay connector terminal (using a digital multimeter).

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Fan relay 1 (4) - Body ground	ENGINE START STOP switch ON	12 V

NG → **Repair or replace engine compartment fuse and relay box.**

OK

3	**Check cooling fan control circuit**

(a) Disconnect the cooling fan ECU connector.
(b) Disconnect the cooling fan motor connector.
(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Cooling fan (51) - Fan relay 2 (1)	Always	Less than 1 Ω

(d) Check for short to ground in ECU terminal corresponding to cooling fan.
(e) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Cooling fan (51) - Body ground	Always	∞

NG → **Repair or replace ECU.**

OK

4	Check circuit between cooling fan and engine compartment fuse and relay box

(a) Disconnect the cooling fan connector.
(b) Check circuit between cooling fan and engine compartment fuse and relay box.
(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Cooling fan (3) - B-146	Always	Less than 1 Ω

(d) Check for short to ground in circuit between cooling fan and engine compartment fuse and relay box.
(e) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
B-146 or cooling fan (3) - Body ground	Always	∞

NG → **Repair or replace ECU.**

OK

5	Check cooling fan motor

(a) Directly apply battery voltage to cooling fan motor, check if cooling fan motor operates (do not run the motor in dry state or water for a long time).

NG → **Repair or replace cooling fan motor.**

OK

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

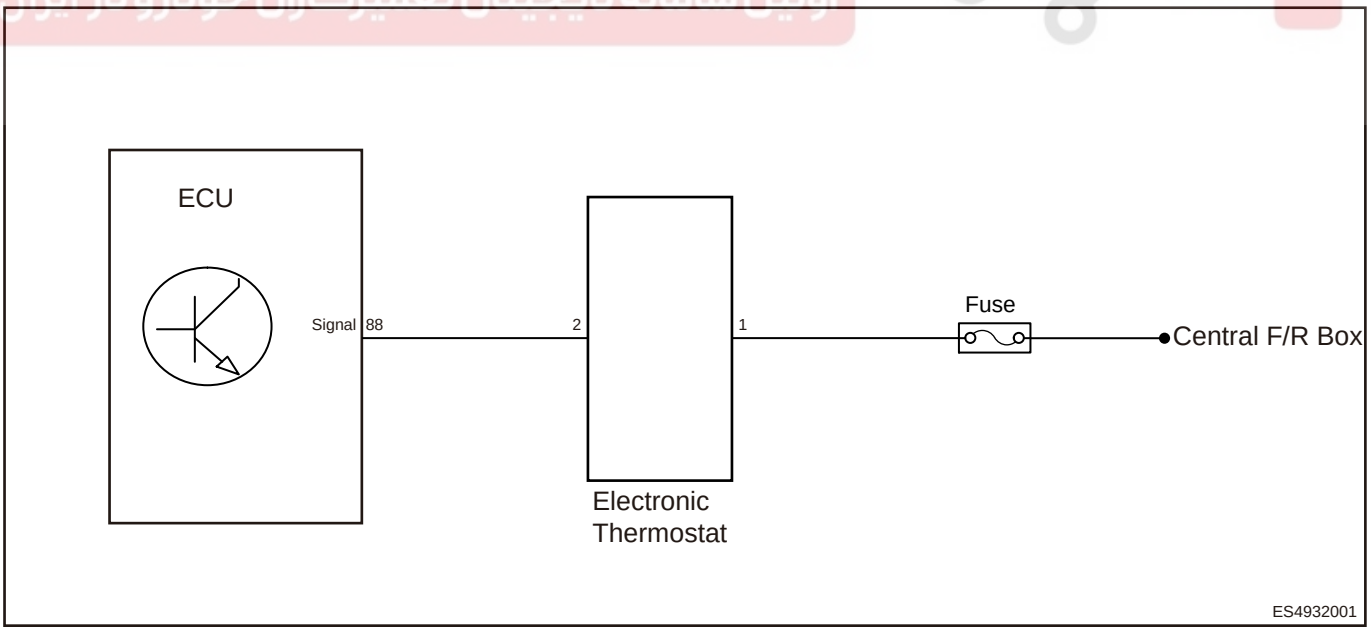
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P0597 00	Thermostat Heater Control Circuit Open
DTC	P0599 00	Thermostat Heater Control Circuit High
DTC	P0598 00	Thermostat Heater Control Circuit Low
DTC	P0128 00	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P059700	Thermostat Heater Control Circuit Open	/	/	ECU is power-on, 9 V < battery voltage ⩽ 16 V, shutting off path inspection is completed, drive level is in operating status, 2 driving cycles, idlingSpeed > 400 rpm, duration after vehicle power-on < 1800 s, ambient temperature ⩾ - 10 °C, -10°C ⩽ coolant temperature at initial start ⩽ calibration amount 58°C	/	• Electronic Thermostat • Coolant Temperature Sensor • ECU	/	Engine malfunction light comes on
P059900	Thermostat Heater Control Circuit High	/	/		/		/	
P059800	Thermostat Heater Control Circuit Low	/	/		/		/	
P012800	Coolant Thermostat (-Coolant Temperature Below Thermostat Regulating Temperature)	/	/		/		/	

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

(a) Check if battery terminals are corroded or loose.
(b) Check battery voltage (Not less than 12 V) with a digital multimeter.

NG → **Check and repair battery.**

OK

2	**Check electronic thermostat fuse**

(a) Check if fuse is blown or no power.

NG → **Replace fuse or check the cause for no power.**

OK

3	**Check electronic thermostat connector**

(a) Check if electronic thermostat connector is loose or in poor contact.

NG → **Repair or replace connector.**

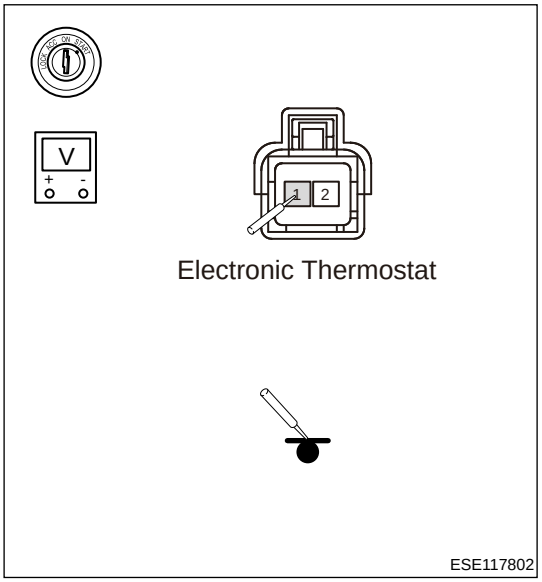
OK

4	**Check electronic thermostat power supply voltage**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Electronic thermostat (1) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Repair wire harness fault of electronic thermostat power supply.**

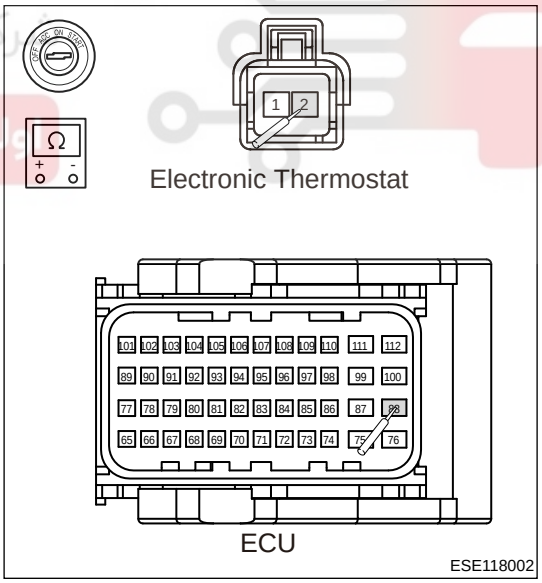
OK

5	Check electronic thermostat control circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
ECU (88) - Electronic thermostat (2)	Always	Less than 1 Ω



NG → **Replace wire harness or connector.**

OK

6	Check electronic thermostat

(a) Measure resistance of electronic thermostat, and check for short or open in it.

NG → **Replace electronic thermostat.**

OK

7	**Reconfirm DTCs**

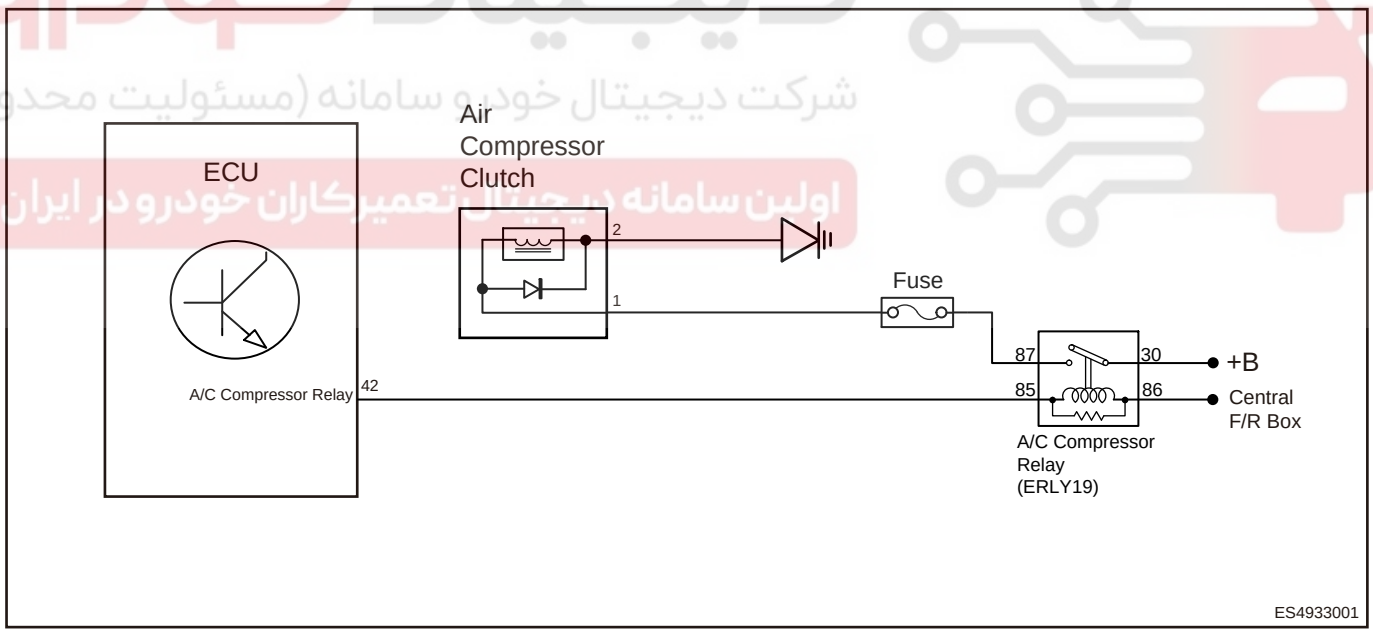
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0645 00**	**A/C Compressor Relay Control Circuit**
DTC	**P0647 00**	**A/C Compressor Relay Control Circuit High**
DTC	**P0646 00**	**A/C Compressor Relay Control Circuit Low**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P064500	A/C Compressor Relay Control Circuit	/	/	Ignition switch is turned ON, 9 V> battery voltage<= 16 V	/	• A/C compressor relay. • Wire harness or connector • ECU • Battery	/	Engine malfunction light does not come on
P064700	A/C Compressor Relay Control Circuit High	/	/		/		/	
P064600	A/C Compressor Relay Control Circuit Low	/	/		/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check A/C compressor relay**

(a) Check if A/C compressor relay is normal.

NG → **Replace A/C compressor relay**

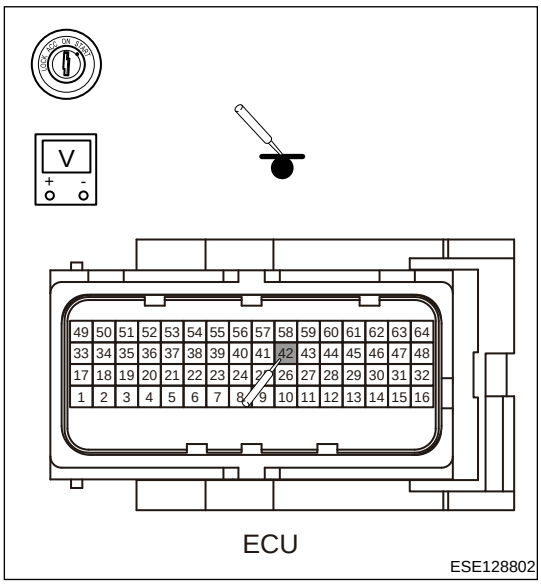
OK

2	**Check compressor control circuit**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
ECU (42) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in compressor relay control circuit.**

OK

3	Check compressor relay control circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Relay (85) - ECU (42)	Always	Less than 1 Ω
Relay (85) - Body ground	Always	∞

NG → **Repair compressor relay control circuit fault.**

OK

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0560 00**	**System Voltage Unstable**
DTC	**P0562 00**	**System Voltage Low**
DTC	**P0563 00**	**System Voltage High**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0560 00	System Voltage Unstable	/	/	Vehicle speed > 20 s, time after starting > 180 s	/	• Generator • Battery • ECU	/	Engine malfunction light comes on

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Checking Alternator**

(a) Check if alternator voltage is between 12 and 14 V.

NG → **Replace generator.**

OK

2	**Check battery**

(a) Check if battery is leaking or damaged.

NG → **Replace battery.**

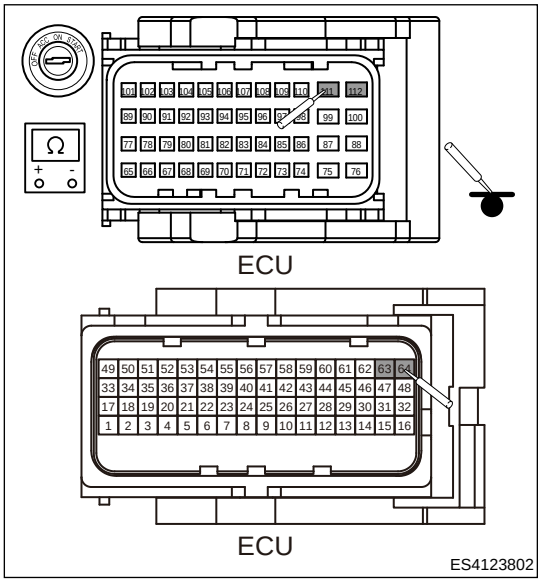
OK

3	**Check ECU ground**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Battery Connection	Condition	Specified Condition
ECU (63) - Body ground	Always	Less than 1 Ω
ECU (64) - Body ground	Always	Less than 1 Ω
ECU (111) - Body ground	Always	Less than 1 Ω
ECU (112) - Body ground	Always	Less than 1 Ω



NG → **Repair open fault in ECU ground wire harness.**

OK

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**U0073 88**	**Control Module Communication Bus "A" Off**
DTC	**U0101 87**	**Lost Communication with TCM**
DTC	**U0126 87**	**Lost Communication with SAM**
DTC	**U0129 87**	**Lost Communication with ESP Module**
DTC	**U0140 87**	**Lost Communication with BCM**
DTC	**U0151 87**	**Lost Communication with Restraints Control Module**
DTC	**U0155 87**	**Lost Communication with ICM**
DTC	**U0164 87**	**Lost Communication With CLM**
DTC	**U0214 87**	**Lost Communication with Passive Entry Passive Start (PEPS)**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
U0073 88	Control Module Communication Bus "A" Off	/	/	ENGINE START STOP switch ON, power-on time > 2.5s, 8.95 V + 0.09 V < battery voltage < 16.02V +0.09 V	/	• Wire harness or connector • CAN fault	/	Engine malfunction light comes on
U0101 87	Lost Communication with TCM	/	/		/		/	
U0126 87	Lost Communication with SAM	/	/		/		/	
U0129 87	Lost Communication with ESP Module	/	/		/		/	
U0140 87	Lost Communication with BCM	/	/		/		/	
U0151 87	Lost Communication with Restraints Control Module	/	/		/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
U0-15587	Lost Communication with ICM	/	/		/		/	
U0-16487	Lost Communication With CLM	/	/		/		/	
U0-21487	Lost Communication with Passive Entry Passive Start (PEPS)	/	/		/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**(Refer to CAN system)**

DTC	**P1212 00**	**Vehicle Speed Sensor "A" Circuit Range/Performance**
DTC	**P0503 00**	**Vehicle Speed Sensor "A" Circuit Intermittent/Erratic/High**
DTC	**P0500 00**	**Vehicle Speed Sensor "A" Circuit**
DTC	**P0501 66**	**Vehicle Speed Sensor "A" Circuit Range/Performance**
DTC	**P0501 65**	**Vehicle Speed Sensor "A" Circuit Range/Performance**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P1-21200	Vehicle Speed Sensor "A" Circuit Range/ Performance	/	/	Starting completed	/	• ESP • CAN line	/	Engine malfunction light comes on
P0-50300	Vehicle Speed Sensor "A" Circuit Intermittent/ Erratic/ High	/	/	10 km/h < vehicle speed < 250km/h	/		/	
P0-50000	Vehicle Speed Sensor "A" Circuit	/	/		/		/	
P0-50166	Vehicle Speed Sensor "A" Circuit Range/ Performance	/	/	Fuel cut-off, engine coolant >-10℃, 1520 rpm ⩽ engine speed ⩽ 4000 rpm	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P050165	Vehicle Speed Sensor "A" Circuit Range/ Performance	/	/	Engine coolant temperature > -10 ℃, all intake valves are in activated states and two camshaft cycles have elapsed after fuel cut-off, engine speed > 2000 rpm, intake load > 86.25%	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check CAN signal sent by ESP**

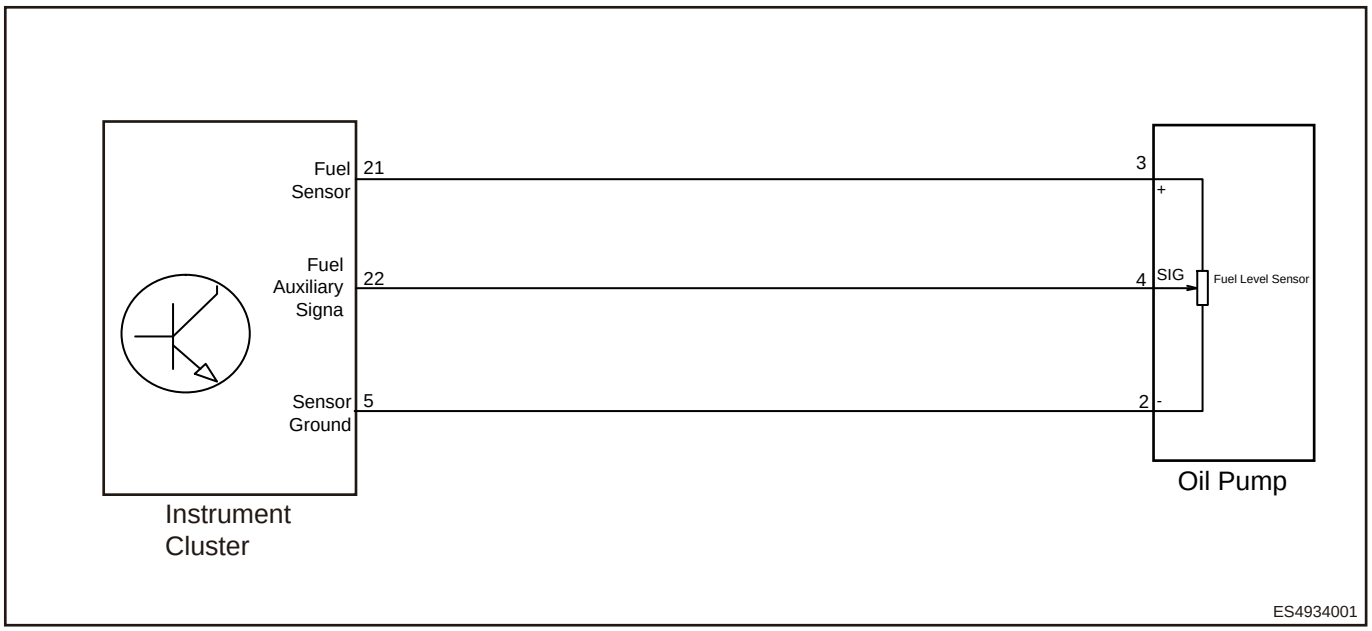
(a) Check if CAN signal sent by ESP is too high.

NG → **Replace ESP.**

OK → **Check CAN communication system**

DTC	**P0460 00**	**Fuel Level Sensor "A" Circuit**
DTC	**P0461 29**	**Fuel Level Sensor "A" Circuit Range Performance**
DTC	**P0462 00**	**Fuel Level Sensor "A" Circuit Low**
DTC	**P0463 00**	**Fuel Level Sensor "A" Circuit High**
DTC	**P25B0 00**	**Fuel Level Sensor "A" Stuck**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-46300	Fuel Level Sensor "A" Circuit High	/	/	/	/	• Fuel Level Sensor • Wire harness or connector • Instrument cluster	/	Engine malfunction light comes on
P0-46200	Fuel Level Sensor “A” Circuit Low	/	/	/	/		/	
U0-67600	Lost Communication with Fuel Level Sensor "A"	/	/	/	/		/	

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P046129	Fuel Level Sensor "A" Circuit Range Performance	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

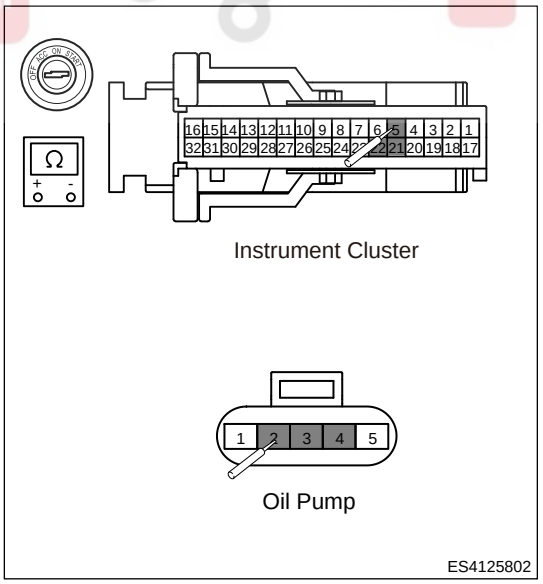
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check oil level sensor wire harness**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Instrument cluster (21) - Fuel pump (3)	Always	Less than 1 Ω
Instrument cluster (5) - Fuel pump (2)	Always	Less than 1 Ω
Instrument cluster (22) - Fuel pump (4)	Always	Less than 1 Ω



NG → **Repair open fault in oil level sensor wire harness.**

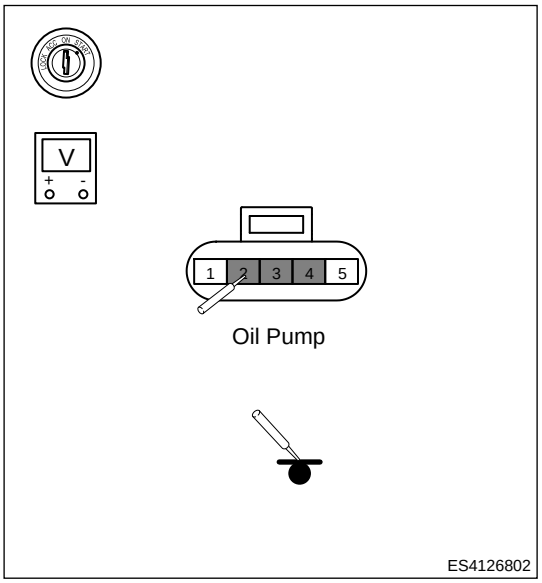
OK

2	Check oil level sensor connector voltage

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Fuel pump (2) - Body ground	ENGINE START STOP switch ON	0 V
Fuel pump (3) - Body ground	ENGINE START STOP switch ON	0 V
Fuel pump (4) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short fault to power supply in oil level sensor connector.**

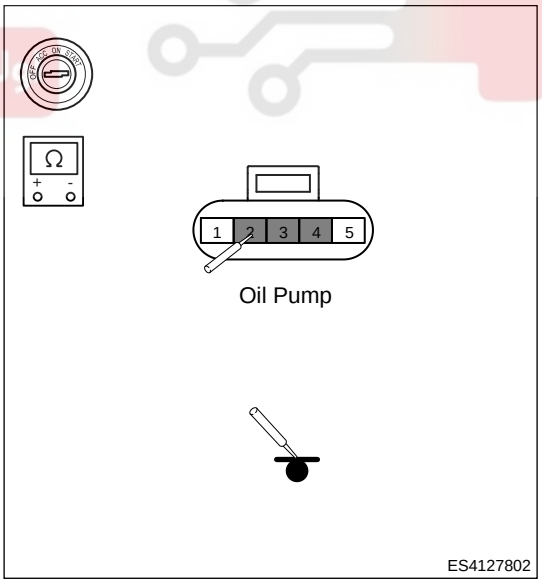
OK

3	Check oil level sensor connector resistance

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Fuel pump (2) - Body ground	Always	∞
Fuel pump (3) - Body ground	Always	∞
Fuel pump (4) - Body ground	Always	∞



NG → **Repair short fault to ground in oil level sensor connector wire harness.**

OK

4	Check oil level sensor connector

(a) Check if oil level sensor connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

5	Check oil level sensor

(a) Check if oil level sensor is normal.

NG → **Replace oil level sensor.**

OK

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

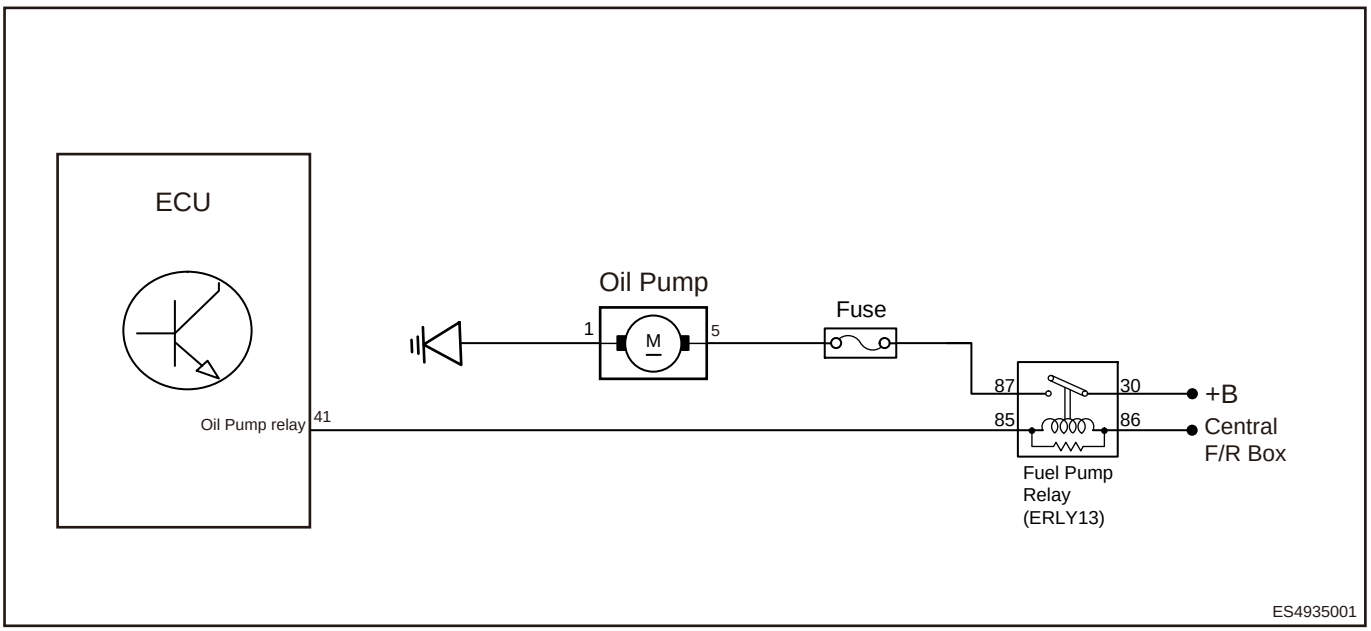
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new instrument cluster to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P0629 00	Fuel Pump "A" Control Circuit High
DTC	P0628 00	Fuel Pump "A" Control Circuit Low
DTC	P0627 00	Fuel Pump "A" Control Circuit Open

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-62700	Fuel Pump "A" Control Circuit Open	/	/	/	/	• Fuel pump relay • Wire harness or connector • Instrument cluster	/	Engine malfunction light comes on
P0-62800	Fuel Pump "A" Control Circuit Low	/	/	/	/		/	
P0-62900	Fuel Pump "A" Control Circuit High	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

(a) Check if battery terminals are corroded or loose.

(b) Check battery voltage with a digital multimeter.

NG → **Check and repair battery.**

OK

2	**Check fuel pump relay and fuse**

(a) Check if fuel pump fuse is blown or no power.

(b) Check if relay terminal is corroded or broken.

(c) Directly apply battery voltage to 2 relay control terminals, check if relay closes.

(d) Turn ENGINE START STOP switch to ON.

(e) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Fuel pump relay (30) - Body ground	Always	12 V
Fuel pump relay (86) - Body ground	ENGINE START STOP switch ON	12 V

NG → **Repair or replace fuse or relay**

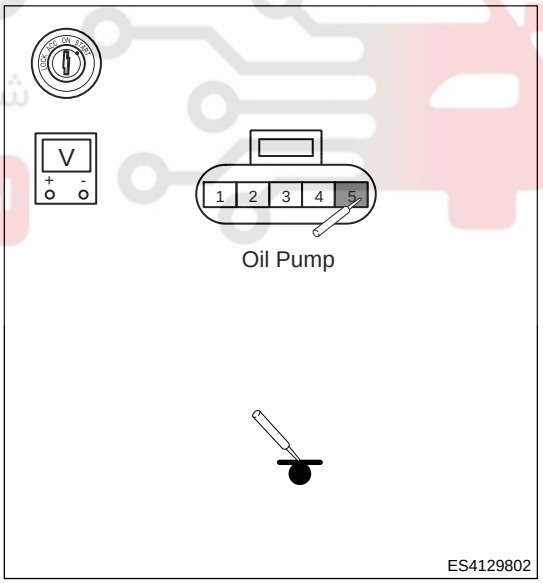
OK

3	Check fuel pump circuit voltage

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Fuel pump (5) - Body ground	Always	12 V



NG → **Repair or replace wire harness.**

OK

4	Check fuel pump connector

(a) Check if fuel pump connector is infirmly connected or poorly contacted.

NG → **Repair or replace connector.**

OK

5	**Check fuel pump relay control circuit**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Fuel pump relay (85) - ECU (41)	Always	Less than 1 Ω

(c) Perform the resistance inspection

Multimeter Connection	Condition	Specified Condition
Fuel pump relay (85) or ECU (41) - Body ground	Always	∞

NG → **Replace oil level sensor.**

OK

6	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0339 00**	**Crankshaft Position Sensor “A” Circuit Intermittent**
DTC	**P2617 00**	**Crankshaft Position Signal Output Circuit Open**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-33900	Crankshaft Position Sensor "A" Circuit Intermittent	/	/	Speed sensor signal failure counter exceeds the threshold	/	• Speed Sensor • Wire harness or connector • ECU	/	Engine malfunction light comes on
P2-61700	Crankshaft Position Signal Output Circuit Open	/	/	Speed sensor signal failure counter exceeds the threshold	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

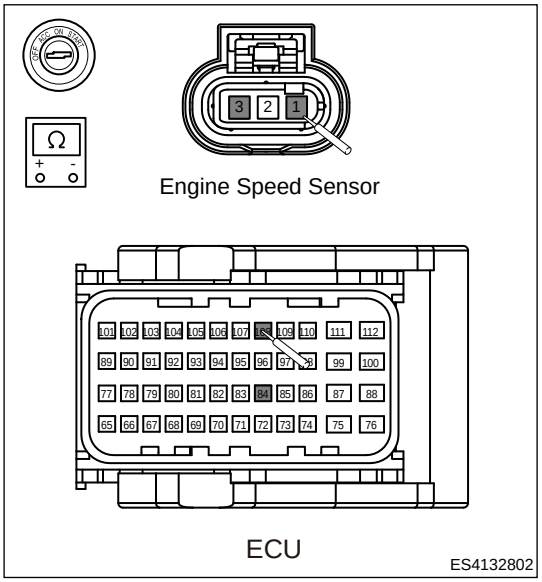
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check speed sensor power supply wire harness**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Speed sensor (1) - ECU (108)	Always	Less than 1 Ω
Speed sensor (3) - ECU (84)	Always	Less than 1 Ω



NG → **Repair speed sensor power supply wire harness.**

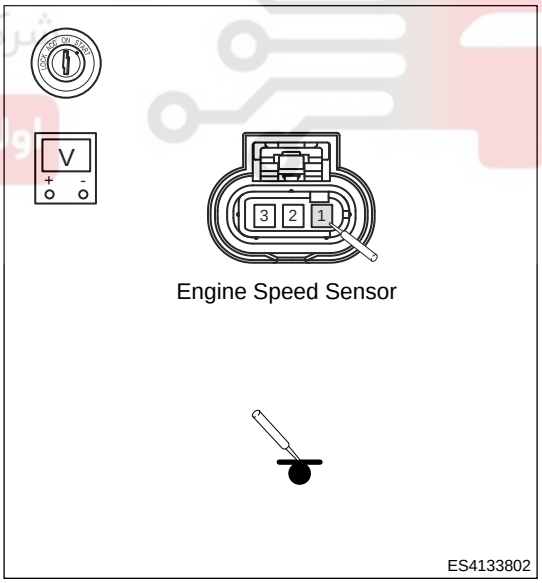
OK

2	**Check speed sensor power supply**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Speed sensor (1) - Body ground	ENGINE START STOP switch ON	5 V



NG → **Replace ECU.**

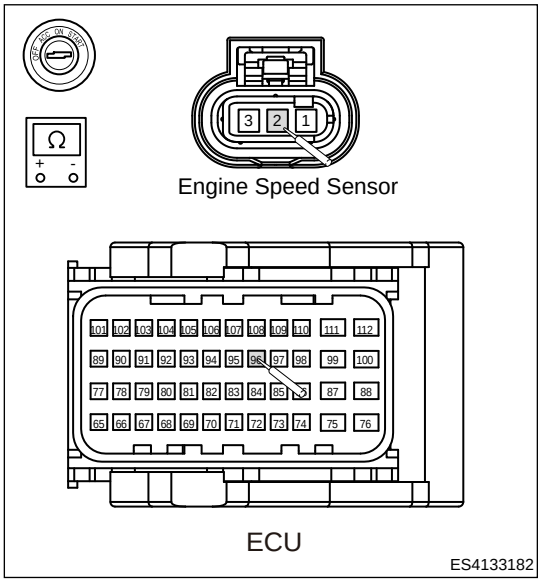
OK

3	**Check speed sensor signal wire harness**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Speed sensor (2) - ECU (96)	Always	Less than 1 Ω



NG → **Repair speed sensor signal wire harness.**

OK ↓

4	Check speed sensor connector

(a) Check if speed sensor connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK ↓

5	Check speed sensor

NG → **Replace speed sensor.**

OK ↓

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P050A 21**	**Idle Control System**
DTC	**P0506 00**	**Idle Control System RPM - Lower Than Expected**
DTC	**P0507 00**	**Idle Control System RPM - Higher Than Expected**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P050A 21	Idle Control System	/	/	/	/	• Electronic Throttle • Oil supply system • Exhaust system • Fuel injector • ECU	/	Engine malfunction light comes on
P0506 00	Idle Control System RPM - Lower Than Expected	/	/	/	/		/	
P0507 00	Idle Control System RPM - Higher Than Expected	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check electronic throttle**

(a) Check if electronic throttle is stuck in minimum position due to ice or oil.

NG → **Repair or replace electronic throttle.**

OK

2	**Check exhaust system**

(a) Check exhaust system for blockage.

NG → **Repair exhaust system.**

OK

3	**Check oil supply system**

(a) Check if oil supply pressure is normal.

NG → **Repair oil supply system.**

OK

4	**Check fuel injector**

(a) Check fuel injector for blockage.

NG → **Replace fuel injector.**

OK

5	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0685 00**	**ECM/PCM Main Relay Control Circuit Open**
DTC	**P0687 00**	**ECM/PCM Main Relay Control Circuit Short to Power Supply**
DTC	**P0686 00**	**ECM/PCM Power Relay Control Circuit Low**
DTC	**P0689 00**	**Main Relay Voltage Too Low**

Control Schematic Diagram

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P068500	ECM/PCM Main Relay Control Circuit Open	/	/	/	/	• Main Relay • Wire harness or connector • ECU	/	Engine malfunction light comes on
P068700	ECM/PCM Main Relay Control Circuit Short to Power Supply	/	/	/	/		/	
P068600	ECM/PCM Power Relay Control Circuit Low	/	/	/	/		/	
P068900	Main Relay Voltage Too Low	/	/	/	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check main relay**

(a) Check if main relay is damaged.

NG → **Replace main relay.**

OK ↓

2	**Check main relay control wire harness**

(a) Disconnect the ECU connector.
(b) Turn ENGINE START STOP switch to OFF.
(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
ECU (5) - Body ground	Always	∞

NG → **Repair or replace main replay wire harness.**

OK ↓

3	**Reconfirm DTCs**

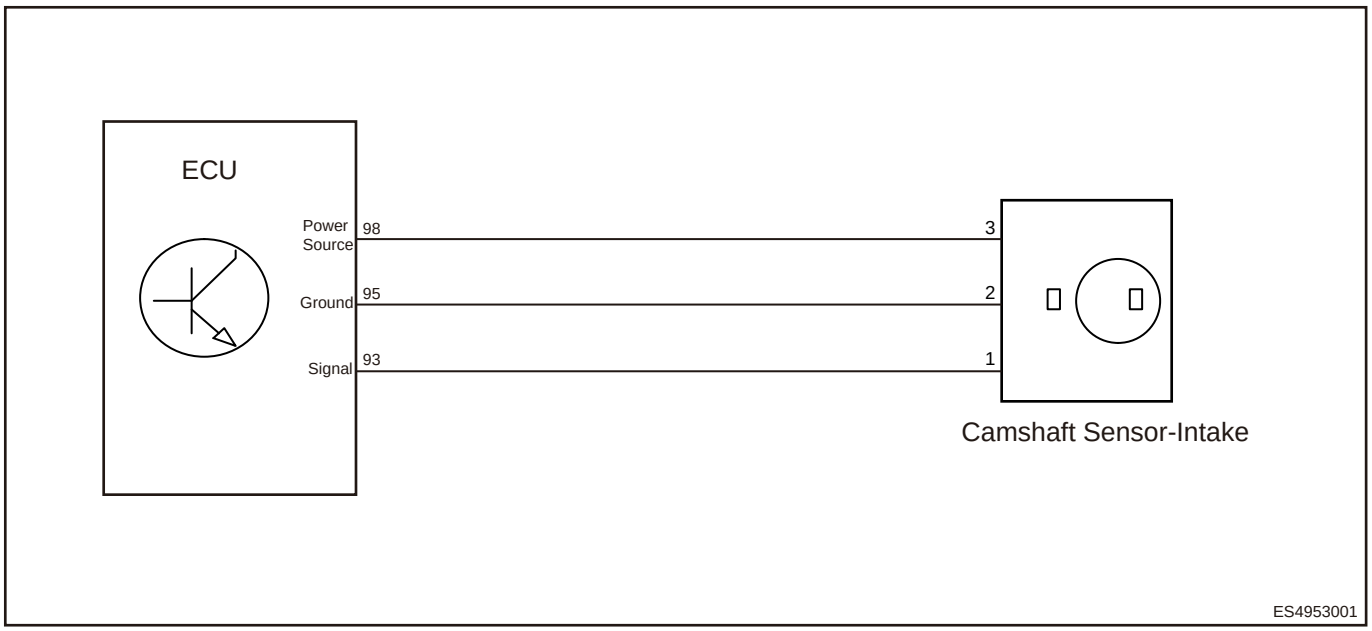
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0343 00**	**Camshaft Position Sensor "A" Circuit High Bank 1 or Single Sensor**
DTC	**P0342 00**	**Camshaft Position Sensor "A" Circuit Low Bank 1 or Single Sensor**

Control Schematic Diagram



DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0-34300	Camshaft Position Sensor "A" Circuit High Bank 1 or Single Sensor	/	/	Sensor signal failure counter of intake camshaft phase sensor exceeds the threshold	/	• Intake camshaft sensor • Wire harness or connector • ECU	/	Engine malfunction light comes on
P0-34200	Camshaft Position Sensor "A" Circuit Low Bank 1 or Single Sensor	/	/	Sensor signal failure counter of intake camshaft phase sensor exceeds the threshold	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.

- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

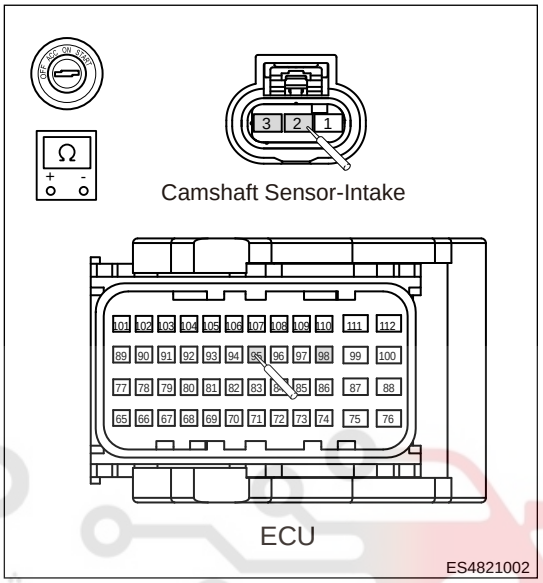
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check intake camshaft sensor power supply wire harness**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Intake camshaft sensor (2) - ECU (95)	Always	Less than 1 Ω
Intake camshaft sensor (3) - ECU (98)	Always	Less than 1 Ω



NG → **Repair intake camshaft sensor power supply wire harness.**

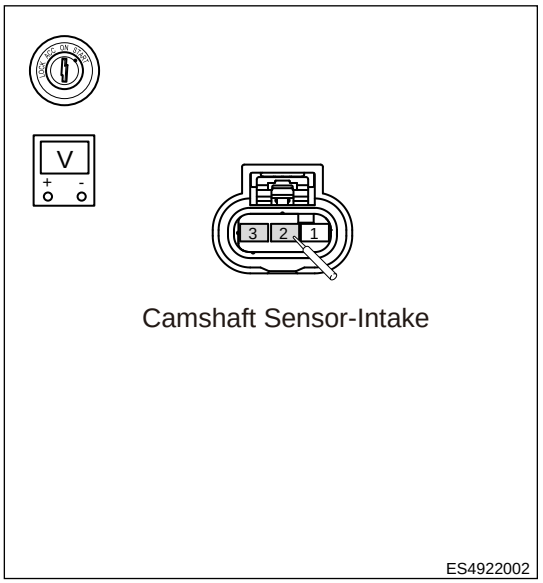
OK

2	**Check intake camshaft sensor power supply**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Intake camshaft sensor (2) - Intake camshaft sensor (3)	ENGINE START STOP switch ON	5 V



NG → **Repair intake camshaft sensor power supply wire harness.**

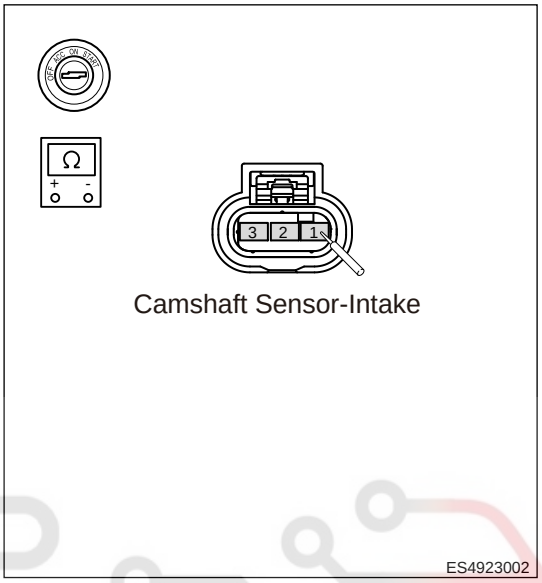
OK

3	Check intake camshaft sensor signal wire harness

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Intake camshaft sensor (1) - Intake camshaft sensor (2)	Always	∞
Intake camshaft sensor (1) - Intake camshaft sensor (3)	Always	∞



NG → **Repair intake camshaft sensor signal wire harness.**

OK

4	Check intake camshaft sensor connector

(a) Check if intake camshaft position sensor connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

5	Check intake camshaft sensor

(a) Check if intake camshaft sensor is normal.

NG → **Replace intake camshaft sensor.**

OK

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P0341 00	Camshaft Position Sensor "A" Circuit Range/Performance Bank 1 or Single Sensor

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0341 00	Camshaft Position Sensor "A" Circuit Range/Performance Bank 1 or Single Sensor	/	/	Sensor signal failure counter of intake camshaft phase sensor exceeds the threshold	/	• Intake camshaft sensor • Camshaft signal plate • ECU	/	Engine malfunction light comes on

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check intake camshaft sensor connector

(a) Check if intake camshaft position sensor connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

2	**Check intake camshaft sensor**

(a) Check if intake camshaft sensor is normal.

NG → **Replace intake camshaft sensor.**

OK

3	**Check intake camshaft signal plate**

(a) Check intake camshaft signal plate for damage, tooth missing, etc.

NG → **Replace intake camshaft.**

OK

4	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	**P0366 00**	**Camshaft Position Sensor “B” Circuit Range/Performance(-Bank 1)**

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0366 00	Camshaft Position Sensor "B" Circuit Range/ Performance(- Bank 1)	/	/	Sensor signal failure counter of exhaust camshaft phase sensor exceeds the threshold	/	• Exhaust camshaft sensor • Camshaft signal plate • ECU	/	Engine malfunction light comes on

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check exhaust camshaft sensor connector**

(a) Check if exhaust camshaft sensor connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

2	**Check exhaust camshaft sensor**

(a) Check if exhaust camshaft sensor is normal.

NG → **Replace exhaust camshaft sensor.**

OK

3	**Check exhaust camshaft signal plate**

(a) Check exhaust camshaft signal plate for damage, tooth missing, etc.

NG → **Replace exhaust camshaft.**

OK

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	P0368 00	Camshaft Position Sensor “B” Circuit High (Bank 1)
DTC	P0367 00	Camshaft Position Sensor “B” Circuit Low (Bank 1)

Control Schematic Diagram

DTC	Description	Fault Class Definition	Fault Type	Store Current DTC	Save as History DTC	Possible Causes	Malfunction Protection Measures	Malfunction Light
P0368 00	Camshaft Position Sensor "B" Circuit High (Bank 1)	/	/	Sensor signal failure counter of exhaust camshaft phase sensor exceeds the threshold	/	• Exhaust camshaft sensor • Wire harness or connector • ECU	/	Engine malfunction light comes on
P0367 00	Camshaft Position Sensor "B" Circuit Low (Bank 1)	/	/	Sensor signal failure counter of exhaust camshaft phase sensor exceeds the threshold	/		/	

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

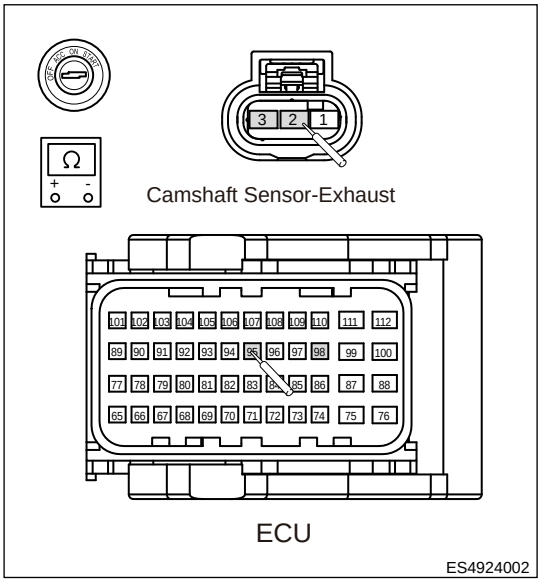
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check exhaust camshaft sensor power supply wire harness**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Exhaust camshaft sensor (2) - ECU (95)	Always	Less than 1 Ω
Exhaust camshaft sensor (3) - ECU (98)	Always	Less than 1 Ω



NG → **Repair exhaust camshaft sensor power supply wire harness.**

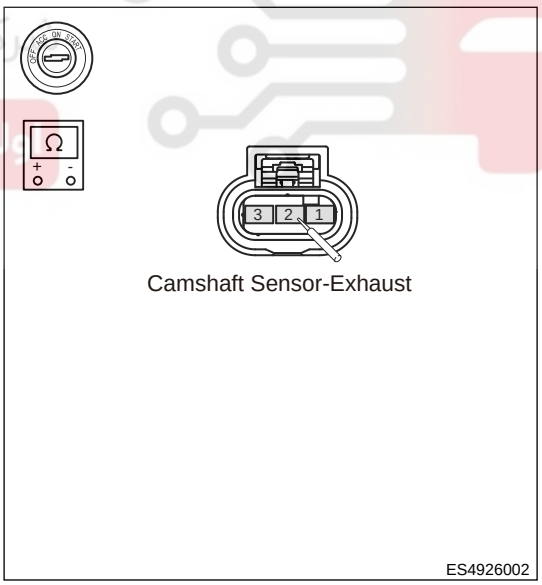
OK →

2	Check exhaust camshaft sensor signal wire harness

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Exhaust camshaft sensor (1) - Exhaust camshaft sensor (2)	Always	∞
Exhaust camshaft sensor (1) - Exhaust camshaft sensor (3)	Always	∞



NG → **Repair exhaust camshaft sensor signal wire harness.**

OK →

3	Check exhaust camshaft sensor connector

(a) Check if exhaust camshaft sensor connector is not connected securely or is in poor contact.

NG → **Reinstall or repair, replace connector.**

OK

4	Check exhaust camshaft sensor

(a) Check if exhaust camshaft sensor is normal.

NG → **Replace exhaust camshaft sensor.**

OK

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs.**

OK → **Conduct test and confirm malfunction has been repaired.**

On-vehicle Service

Electronic throttle body

Description

Electronic throttle body is a critical part for engine intake system. Its main function is to control intake air volume by adjusting intake passage area according to driver’ s driving intention to meet intake requirements in different engine operating conditions, and send back position signals of throttle valve plate to control unit to achieve accurate control.

1	Motor Negative	4	Motor Positive
2	Sensor Ground	5	Signal 2
3	Sensor Power Supply	6	Signal 1

Operation

Electric throttle body consists of four parts: drive module, train module, executive module and feedback module, and all components are integrated into the same throttle valve housing. Throttle feedback module uses two redundant structures. When malfunction occurs, throttle valve plate will stop at the limp home position (above mechanical bottom dead center) determined by mechanical way. Electronic throttle body performs control only by corresponding electronic control unit or electronic test circuit. In principle, it is necessary to ensure that the throttle valve plate does not operate dynamically to the mechanical dead center.

Throttle Self-learning

Be sure to perform throttle body self-learning once after installing electronic throttle body (turn ENGINE START STOP switch to ON, wait for 15 seconds and turn it back to OFF, then vehicle can be ignited normally). Start vehicle and observe if it operates normally after self-learning is finished.

Common Problem Symptoms and Judgment Methods

Common problem symptoms caused by electronic throttle body itself are: lack of power when accelerating, seizure or frequent return of throttle valve plate. EPC light comes on (use diagnostic tester to read related electronic throttle DTCs), vehicle speed does not increase even if accelerator pedal is fully depressed.

1. General problem causes:
   - ECU detects incorrectly due to improper harness or sensor operation, and electronic throttle is forcibly controlled in small opening condition;
   - Internal components (such as magnetic steel) are cracked due to dropping or hitting during use or repair;
   - Vibration level at engine manifold is out of specified range;
   - Excessive carbon deposit in electronic throttle body due to use of engine or vehicle.
2. Repair precaution:
   - Never hit electronic throttle body during service, and never use it after dropping;
   - It can be verified by simply measuring resistance change of terminals and crossover test if malfunction occurs caused by electronic throttle body.
3. Simple detection method for electronic throttle body malfunction:
   a. Judgment methods for specific mechanical damage: Valve plate should be in default position with power off and can rotate smoothly when flipping it by hand. If catching occurs, it indicates that internal components may be damaged.
   b. Perform the simple measurement for throttle internal sensor in following steps:

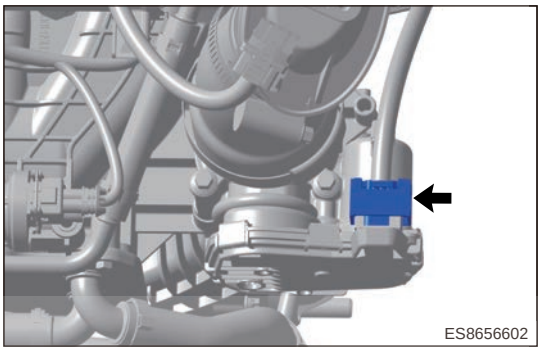
Step	Operation	Test Value	Test Result	Subsequent Step
1	Apply 5V direct current to terminal 3 (+) and 2 (-), close valve plate to full close manually, and measure voltages between terminals 5 and 2, and between terminals 6 and 2 with voltage band of multimeter. Voltage between terminals 6 and 2 is within 0.25 V and 0.75 V, voltage between terminals 5 and 2 is within 4.25 V and 4.75 V, and the sum of both voltages is about 5 V	/	Yes	Next
		/	No	Replace electronic throttle
2	Apply 5V direct current to terminal 3 (+) and 2 (-), turn valve plate to full open manually, and measure voltages between terminals 5 and 2, and between terminals 6 and 2 with voltage band of multimeter. Voltage between terminals 6 and 2 is within 4.4 V and 4.9 V, voltage between terminals 5 and 2 is within 0.1 V and 0.6 V, and the sum of both voltages is about 5 V	/	Yes	Next
		/	No	Replace electronic throttle
3	Turn the multimeter to ohm band, directly measure resistance of copper windings on DC motor between terminals 1 and 4. It is usually between 1.5 and 3.0 Ω at normal temperature, this value does not change with the valve plate opening.	/	Yes	Check wire harness or perform diagnostic help
		/	No	Replace electronic throttle

4. DTC troubleshooting:
   a. If DTC P0121, P0122 or P0123 is output, refer to methods in previous DIAGNOSIS & TESTING section to perform test.

b. If DTC P2106 is output, it indicates that electronic throttle is not malfunctioning, perform ECU and throttle self-learning again, and do not replace electronic throttle.
c. If it is other malfunction related to electronic throttle, unplug and plug connector again, remove carbon on throttle, to confirm that there is no foreign matter during valve plate opening or closing. Perform other related inspection.

Removal

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the electronic throttle.
   a. Disconnect electronic throttle connector (arrow), remove 4 fixing bolts and electronic throttle.



Hint:

- Before removing throttle, make sure the ENGINE START STOP switch is turned to OFF and always keep vehicle power off, otherwise it will cause idling problems.
- Do not remove the electrified electronic throttle body.
- Do not remove the electronic throttle body until the vehicle is cooled to room temperature to prevent the overheating antifreeze from wetting the black cap and connectors etc.
- During the removal, the mounting bolts shall be removed diagonally and the force shall be uniform and vertical. The upper and lower mounting surfaces shall not be damaged, and also ensure that the electronic throttle body does not drop or hit.
- The power of return spring inside electronic throttle body is greater, be careful not to clamp your hand during pushing valve plate slightly.

Installation

1. Installation is in the reverse order of removal.

Absolute Brake Vacuum Sensor

Description

Absolute brake vacuum sensor is installed on brake vacuum tube.

1	Sensor Voltage Signal Output	3	To 5 V Power Supply
2	Ground		

Installation Position

1. Pressure sensor is installed on brake vacuum tube.
2. Installation precautions:
   a. Always make sure the O-ring is not damaged during installation. Apply a light coat of oil to O-ring surface before installation, and do not use silicon grease.
   b. Press sensor detecting sleeve into installation hole manually during installation, and do not install sensor with striking tool.
   c. Tightening torque during installation: 4 - 7 N • m is recommended.
   d. Connect wire harness with specified matched connector.

Operation

Absolute pressure sensing element consists of a piece of silicon chip. Etch a piece of pressure diaphragm on silicon chip. There are 4 piezoresistors on pressure diaphragm, and the 4 piezoresistors form a Wheatstone bridge as strain element. Except for the pressure diaphragm, silicon chip is also integrated with signal processing circuit and temperature compensating circuit. Reference vacuum chamber is integrated into silicon chip, and absolute pressure in reference space is near zero. This will form a microelectronic mechanical system. The pressure to be measured acts on side which can sense pressure on silicon film from top side. Thickness of silicon chip is only several micrometer (μm), so the silicon chip will deform mechanically as pressure changes, and 4 piezoresistors will also deform, thus changing the resistance. Voltage signal linearly related to the pressure is generated after processing by signal processing circuit of silicon chip.

Common Problem Symptoms and Judgment Methods

Problem symptom: Vacuum booster does not operate properly.

1. General problem causes:
   - Chip is damaged due to abnormal high voltage or reverse large current during operation;
   - Pressure component is damaged during service;
   - Chip is corroded and damaged due to external environment;
   - Sensor itself malfunction.
2. Precautions during service:
   - Do not impact pressure component with high pressure gas during service;
   - Check if alternator output voltage and current are normal when there is a fault and replacing sensor.

VVT Control Valve

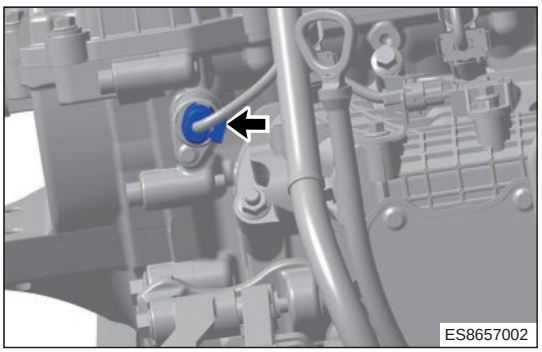
Operation

There are two solenoid valves in camshaft phaser assembly, one is the intake solenoid valve and the other is the exhaust solenoid valve. The main function is that solenoid valve is controlled by ECU, different oil passages can be opened and the phase can be changed ultimately depending on operating conditions; Variable valve timing technology can improve the power performance of engine and fuel economy by adjusting the timing of valve closing according to different operating status of engine.

Removal

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the intake VVT control valve.
   a. Disconnect intake VVT control valve connector (arrow), and then remove intake VVT control valve fixing bolt.

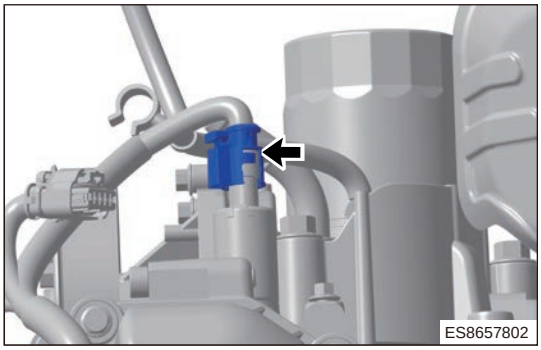
      Tightening torque: 8 ± 2 N·m



   b. Remove the intake VVT control valve.
4. Remove the exhaust VVT control valve.

a. Disconnect exhaust VVT control valve connector (-arrow), and then remove exhaust VVT control valve fixing bolt.

Tightening torque: 8 ± 2 N·m



b. Remove the exhaust VVT control valve.

Inspection

1. Observe if there is oil stain or oil sludge on control valve. If so, clean it in time.
2. Measure resistance of solenoid valve with a multimeter. Normal value: 8 ± 0.5 Ω (at 20℃).

Coolant temperature sensor

Description

Coolant temperature sensor is a negative temperature coefficient sensor.Coolant temperature sensor terminal: Sensor has 2 terminals, and they can be interchanged.

Installation Position

Coolant temperature sensors are installed on engine thermostat seat and radiator assembly respectively.

Operation

NTC thermistor packaged inside temperature sensor is used for coolant temperature sensor, its resistance changes in accordance with ambient temperature, thus accurately reflecting the small changes in outside temperature. The temperature of contact medium can be reflected by measuring its output resistance, and the signals from both terminals of resistor are output to ECU. Engine load can be obtained by ECU according to output signal of the sensor, thus judging the engine operating condition.

Installation Precautions

1. Uniformly apply anaerobic seal gum to threads before installation.
2. Pre-tighten it manually during installation, so as to avoid sensor thread damage caused by wrong tooth engagement of thread. Tighten it with socket wrench after manual pre-tightening.
3. If the coolant temperature sensor is installed with level wrench, make sure that the wrench is perpendicular to the axis of sensor during installation, to avoid damage to coolant temperature sensor due to excessive lateral force.

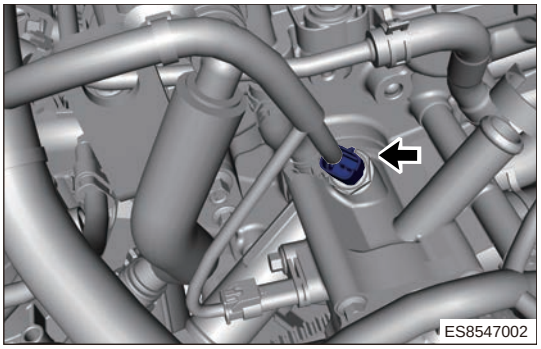
Removal

⚠ Caution
• Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.

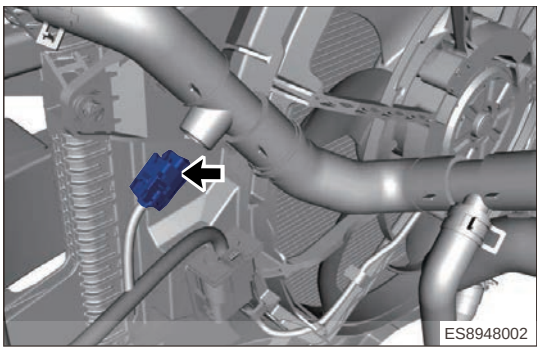
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the coolant temperature sensor.

a. Disconnect coolant temperature sensor 1 connector (-arrow) and remove coolant temperature sensor.

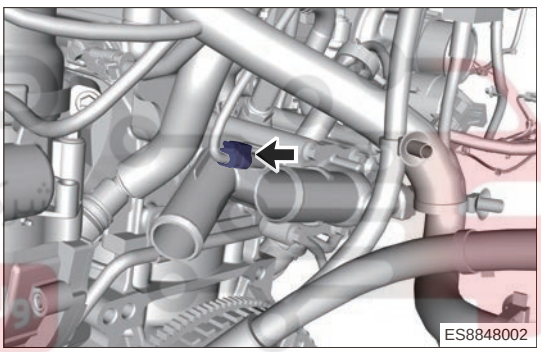
Tightening torque: 15 ± 1 N·m



b. Disconnect coolant temperature sensor 2 connector (-arrow) and remove coolant temperature sensor.



c. Disconnect coolant temperature sensor 3 connector (-arrow) and remove coolant temperature sensor.



Common Problem Symptoms and Judgment Methods

Common problem symptoms related to this sensor: abnormal water temperature indication, difficult to start, fan constantly runs, etc.

1. General problem causes:
   - Abnormal high voltage or reverse large current during operation;
   - Sensor housing is damaged, water enters inside during service.
2. Precautions during service: Check if alternator output voltage and current are normal when there is a fault and replacing sensor.
3. Simple detection method for coolant temperature sensor malfunction:

a. Disconnect wire harness connector (remove connector), turn digital multimeter to ohm band, connect two probes to two terminals of sensor respectively, rated resistance is 2.5 KΩ ± 5% at 20℃, blow air to sensor with a hair dryer (be careful not to get too close), obverse the changes of resistance, it should decrease with the increase of temperature.

Step	Operation	Test Value	Test Result	Subsequent Step
1	Remove coolant temperature sensor wire harness connector, use a multimeter to measure if resistance between two terminals of sensor is normal	The resistance between the two terminals is determined according to ambient temperature near sensor when testing	Yes	Next
			No	Replace coolant temperature sensor
2	Remove coolant temperature sensor wire harness connector, turn ENGINE START STOP switch to ON, measure the voltage between two terminals of coolant temperature sensor wire harness	5 ± 0.5 V	Yes	Diagnostic Help
			No	Check for continuity and ground of wire harness

Installation

1. Installation is in the reverse order of removal.

Knock Sensor

Description

1. Knock sensor is installed on cylinder block. It is used to detect engine vibration caused by detonation.

Operation

1. Knock sensor is installed on cylinder block, and used to detect engine vibration caused by detonation. You can install one or more. The sensitive element of knock sensor is a piezoelectric ceramic. Vibration of engine cylinder block is transferred to the piezoelectric ceramic through a mass block in the sensor. Due to the pressure generated by vibration of mass block, the piezoelectric ceramic generates a voltage at both electrode faces, and converts the vibration signal to an A/C voltage signal to output it. As intensity of vibration increases, knock sensor output voltage increases accordingly.
2. Because frequency of vibration signal caused by engine knocking is far more than that of normal engine vibration signal, Engine Control Unit (ECU) can distinguish between knock or non-knock signals by processing these signals from knock sensor.

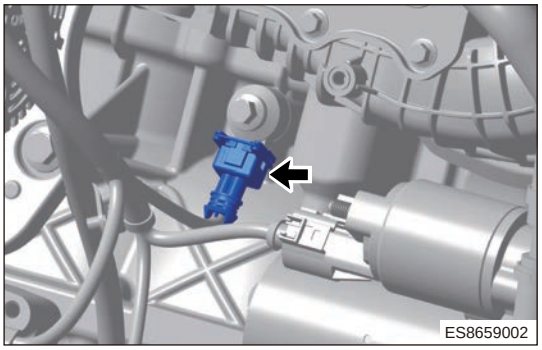
Installation Precautions

Because frequency of vibration signal caused by engine knocking is far more than that of normal engine vibration signal, Engine Control Unit (ECU) can distinguish between knock or non-knock signals by processing these signals from knock sensor.

Removal

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the knock sensor.

a. Disconnect knock sensor connector (arrow), and remove knock sensor.



Common Problem Symptoms and Judgment Methods

Problem symptom: poor acceleration, etc.

1. General problem causes: Liquids such as oil, coolant, brake fluid and water contacted with sensor will cause corrosion to the sensor.
2. Simple detection method for knock sensor malfunction:

Step	Operation	Test Value	Test Result	Subsequent Step
1	Turn multimeter to ohm band, detect resistance between terminals 1 and 2 of knock sensor, resistance is (4.9 ± 20%) MΩ at normal temperature	/	Yes	Next
		/	No	Replace knock sensor
2	Turn multimeter to mV band, use a small hammer to tap near knock sensor, there should be a voltage signal	/	Yes	Check wire harness or perform diagnostic help
		/	No	Replace sensor

Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- Never install any kinds of gasket and washer between sensor and engine block. Only the metal part of sensor can contact with engine block directly.
- Be careful not to allow liquids such as oil, coolant and brake fluid to contact the sensor for a long periods of time.
- DO NOT apply lubricant, grease or seal gum when installing knock sensor. Keep engine block clean and dry, and never allow any foreign matter (such as oil) on the installation area of knock sensor.
- Never tap knock sensor when installing it.

Oxygen Sensor

Description

1. Upstream oxygen sensor is LSU 4.9 and downstream oxygen sensor is LSF 4.2.

Operation

1. Sensing element of LSF oxygen sensor is a ceramic planar body with pores, and the outside of ceramic body is surrounded by engine exhaust, and the inside is ventilated. Sensing ceramic body wall is a type of solid electrolyte with heating electrodes inside. Operation of oxygen sensor is realized by converting the concentration difference of oxygen ions inside and outside the sensing ceramic body into voltage signals for output. When the temperature of sensing ceramic body reaches 350 ℃, it will have the characteristics of solid electrolyte. Oxygen ions can freely pass through it due to special material of ceramic body. It is precisely by taking advantage of this characteristic, it converts the concentration difference into the potential difference, thus forming the electrical signal output. If the gas mixture is rich, oxygen ion concentration difference in and out of the ceramic is high, electric potential difference is high, a large number of oxygen ions move from the inside to the outside, and the output voltage is higher (approximately 800mV-1000mV); If the mixture concentration is too lean, oxygen ion concentration difference in and out of the ceramic is low, electric potential difference is low, only a small amount of oxygen ion moves from the inside to the outside, and the output voltage is lower (approximately 100mV). Signal voltage changes abruptly at about the theoretical equivalent air fuel ratio (λ=1).
2. LSU oxygen sensor is much more advanced than LSH and LSF in function. It is a ceramic body principle and a “micro pump” for oxygen ion transportation. Pump provides enough oxygen to the electrodes on the contact side of the exhaust to maintain a constant voltage on both sides, about 450mV. Electric energy consumption of the pump is converted into the excess air coefficient by the electronic controller, output current is almost linear with λ. λ = 0.65 ~ ∞, so it is also called linear oxygen sensor. It can not only determine whether λ is greater than 1 or less than 1, but also measure in the thin and thick areas The specific value of λ can be determined, so the excess air coefficient in a wide range (broadband) can be measured, and the continuous control of λ < 1 to λ > 1 can be realized.

Installation Position

Upstream oxygen sensor is installed on front of pre-catalytic converter, and downstream oxygen sensor is installed behind the three-way catalytic converter.

Installation Precautions

1. Applying detergent, oily liquid or volatile solid to the oxygen sensor connector is prohibited.
2. Oxygen sensor shall be installed on the exhaust pipe at a position that can represent the exhaust gas composition and can meet the specified temperature limit. Installation position should be as close to the engine as possible. Upstream oxygen sensor is installed on front of exhaust pipe three-way catalytic converter, and downstream oxygen sensor is installed behind the three-way catalytic converter.
3. Installation method of oxygen sensor: Oxygen sensor shall be installed at an included angle of 10 degrees or more to the horizontal plane with the sensor tip facing downward to prevent condensed water from accumulating between the sensor housing and the sensing ceramic tube during cold start.
4. The sensor mounting probe does not face the airflow direction.
5. When installing the oxygen sensor, it should be handled with care and not allowed to fall to the ground, because there are ceramics inside the oxygen sensor and it is fragile.
6. During installation, do not wipe off the special anti-high temperature grease in the tightening thread.

LSF Characteristic Data

Description	New Status		After 500 Hours of Platform Test	
Exhaust temperature when characteristic data is established	350°C	850°C	350°C	850°C
Sensing element voltage (mV) when λ=0.97 (CO=1%)	800 ± 55	700 ± 55	800 ± 60	700 ± 60
Sensing element voltage (mV) when λ=1.10	50 ± 30	50 ± 30	50 ± 40	50 ± 40

Description	New Status		After 500 Hours of Platform Test	
Sensing element internal resistance (kW)	⩽ 0.5	⩽ 0.25	⩽ 1	⩽ 0.5
Response Time (ms) (600 mV to 300 mV)	< 250	< 250	< 400	< 250
Response Time (ms) (300mV to 600mV)	< 100	< 60	< 200	< 60

LSF Sensor Electrical Data

Description		Value	Unit
Power supply voltage on connector	Rated voltage	12	V
	Continuous operating voltage	12-14	V
	Operating voltage which can be maintained 1% of the total life at most (- exhaust temperature ⩽ 850°C)	15	V
	Operating voltage which can be maintained 75 seconds at most (- exhaust temperature ⩽ 350°C)	18	V
	Test voltage	13	V
Heating power for 13 V of operating voltage, and 350°C of exhaust temperature		7	W
Short time heating current at 13 V of operating voltage and -40 ˚C of ambient temperature		⩽ 2.1	A

LSU Characteristic Data

Description	New	After Platform Test
λ signal accuracy when λ = 1.7	1.70 ± 0.05	1.70 ± 0.15
λ signal accuracy when λ = 0.8	0.80 ± 0.01	0.80 ± 0.04

LSU Sensor Electrical Data

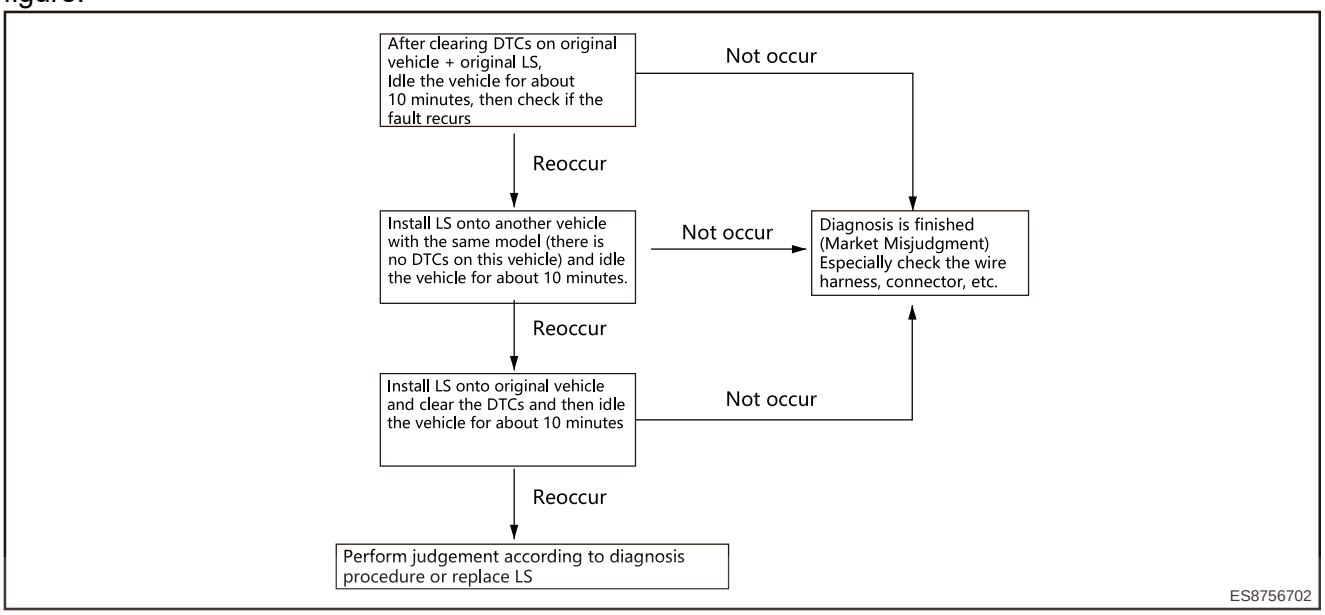
Description		Value	Unit
Power supply voltage on connector	Rated voltage	7.5	V
	Continuous operating voltage	⩽ 12	V
	Maximum system power supply voltage	⩽ 16.5	V

Description		Value	Unit
	Short time voltage peak value within 60 ms (10 times in life cycle, ceramic temperature ⩾ 20 ˚C)	18	V
	Minimum system power supply voltage	⩾ 10.8	V
Heating power for 7.5 V of operating voltage		7.5	W

Common Problem Symptoms and Judgment Methods

1. Problem symptoms: Poor engine idle, poor acceleration, emissions exceeding, excessive fuel consumption, etc.
2. Main problem causes:
   - Poor wire harness: connector terminal looseness, rust, terminal uneven; or wire breakage, poor connection, etc., resulting in oxygen sensor signal failure and oxygen sensor heating failure displayed on diagnostic tester;
   - Mechanical shock (such as flying rock) damage to the sensor;
   - Moisture, condensation or contaminants enters inside the sensor, causing the sensor failure or poor signal;
   - Post-combustion of exhaust pipe due to the misfire, causing the oxygen sensor sensing element to be burned;
   - Oxygen sensor “poisoning” (such as Pb, S, Br, Si or Mn).
3. Simple measurement method for downstream oxygen sensor:
   - (Remove the connector) Turn digital multimeter to ohm band, connect two probes to sensor pin 1# (white) and pin 2# (white) respectively, the resistance should be 7 ～ 11 Ω at normal temperature.
   - (Connect the connector) Under idling status and waiting until temperature of oxygen sensor reaches its operation temperature (350˚C), turn digital multimeter to DC voltage band, connect two probes to sensor pin 3# (gray) and pin 4# (black) respectively, voltage should rapidly fluctuates between 0.1 and 0.9 V at the same time.

4. Upstream oxygen sensor detection method:
   - In order to avoid misjudgment, for LS with intact appearance, cross-verification method should be adopted to further confirm whether LS itself is invalid. The cross-verification method is shown in the figure.



Removal

1. Refer to Emission Control System.

> **⚠ Caution**
>
> - Applying detergent, oily liquid or volatile liquid to the oxygen sensor connector is prohibited.
> - The oxygen sensor wire harness must not be twisted, taut, or attached to objects with sharp edge or high temperature.

Installation

1. Refer to Emission Control System.

> **⚠ Caution**
>
> - Applying detergent, oily liquid or volatile liquid to the oxygen sensor connector is prohibited.
> - The oxygen sensor wire harness must not be twisted, taut, or attached to objects with sharp edge or high temperature.

Camshaft position sensor

Description

There are two camshaft position sensors, which are installed on cylinder head behind camshaft.

1	Output Signal Wire	3	To 5 V Power Supply
2	Ground		

Operation

Camshaft position sensor is a Hall type sensor. A phaser is installed on camshaft. When phaser is in high teeth, the applicable circuit outputs high voltage; when phaser is in missing teeth, the applicable circuit outputs low voltage. As a result, the crankshaft phase information is provided to Engine Control Unit

(ECU), so that the compression top dead center and exhaust top dead center of crankshaft can be distinguished.

Installation Precautions

1. The sensor must always be in the original packaging material before installation or test.
2. Take out the sensor from packaging material, check the sensor and ensure that it must not be damaged or contaminated.
3. Apply mineral oil to phase sensor O-ring, then press the sensor (do not tap with tool) and tighten with fixing bolt.
4. Never repair the sensor.

> ⚠ **Caution**
>
> - The sensor contains strong magnet. Since most electronic storage devices (such as disk, tape.) are sensitive to magnetic fields, they must be stored separately from the permanent magnets.

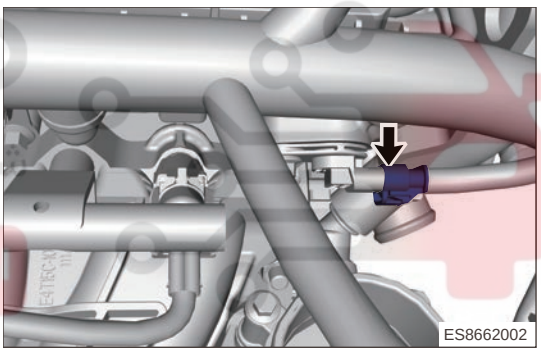
Common Problem Symptom

Problem symptoms: difficult to start engine, engine speed limited, etc.

Removal

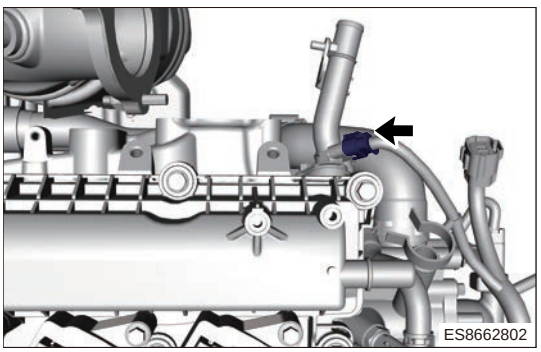
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the intake camshaft position sensor.
   a. Disconnect intake camshaft position sensor connector (arrow) and remove intake camshaft position sensor fixing bolt.

      Tightening torque: 8 ± 1N·m



4. Remove the exhaust camshaft position sensor.
   a. Disconnect exhaust camshaft position sensor connector (arrow) and remove exhaust camshaft position sensor fixing bolt.

      Tightening torque: 8 ± 1N·m



Installation

1. Installation is in the reverse order of removal.

> ⚠ **Caution**
>
> - Sensor should be pressed into mounting hole. Never use tools (such as a hammer) to strike sensor into mounting hole forcibly.

Engine speed sensor

Description

Engine speed sensor is installed on transmission case and against flywheel teeth. It is used to detect the speed and position of crankshaft.

Operation

This sensor is installed on engine block, and used to detect crankshaft position and speed. Rotation of the signal plate causes the magnetic field at the induction point inside the speed sensor to alternate. The alternating magnetic field is induced by the differential Hall chip, and the induced alternating magnetic signal is converted into an electrical signal by the internal processing circuit of the sensor to output.

Installation Precautions

1. The sensor must always be in the original packaging material before installation or test.
2. Take out the sensor from packaging material, check the sensor and ensure that it must not be damaged or contaminated.
3. Press the sensor (do not tap with tool), and then secure it with fixing bolt and gasket.
4. Never repair the sensor.

⚠ Caution

- The sensor contains strong magnet. Since most electronic storage devices (such as disk, tape.) are sensitive to magnetic fields, they must be stored separately from the permanent magnets. Users with cardiac pacemakers should take precautions before operation.

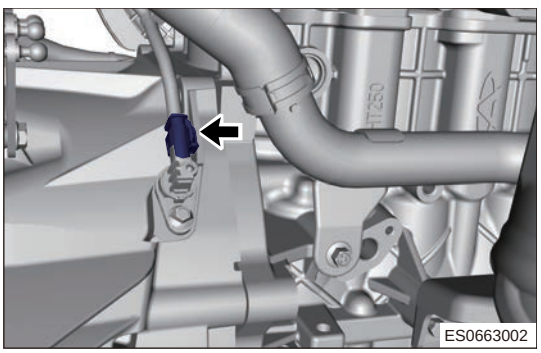
Common Problem Symptoms and Judgment Methods

1. Problem symptoms: Engine cannot start, etc.
2. Repair precaution:
   - Never repair the sensor!
   - Press in engine speed sensor rather than tapping during service.
3. Simple detection method for speed sensor malfunction:
   a. (Remove the connector) Turn LCR meter to ohm band (in-line mode, test frequency is 10 kHz), connect two probes to sensor connector terminals 1 and 3, rated resistance is 100 Ω ± 20%; Turn LCR meter to capacitance band (in-parallel mode, est frequency is 1 kHz), connect two probes to sensor connector terminals 1 and 3, rated capacitance is 100 nF ± 20%;Turn LCR meter to capacitance band (in-parallel mode, est frequency is 1 kHz), connect two probes to sensor connector terminals 2 and 3, rated capacitance is 4.7 nF ± 20%.

Removal

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the engine speed sensor.
   a. Disconnect engine speed sensor connector (arrow), and remove engine speed sensor fixing bolt.

      Tightening torque: 8 ± 2 N·m



Installation

1. Installation is in the reverse order of removal.

> **⚠ Caution**
>
> - Ensure that the sensor is clean and the sensor is allowed to be removed from the package before it is installed in the engine or test bench. Users with cardiac pacemakers should take precautions before operation.
> - The sensor is only allowed to be pressed into installation hole by press-in. It is not allowed to install the sensor with a tapping tool (such as hammer).
> - If the engine speed sensor falls, never pick it up to install and it need to return to factory for testing.

Fuel Rail Injector Assembly

Operation

1. Fuel distribution pipe assembly is installed to intake manifold to store and distribute fuel.
2. Fuel distribution pipe assembly consists of fuel distribution pipe and fuel injector etc. Fuel distribution pipe is connected to fuel supply pipe through pipe joint to receive the fuel from fuel tank. Fuel injector sprays fuel into the intake passage accurately under the control of ECU electric pulse.

> **⚠ Caution**
>
> - Excessive storage of gasoline can cause it to oxidize and deteriorate, which may cause the injector to become clogged or even damaged.

Precautions

1. Removal precautions:
   - If it is necessary to remove the fuel rail assembly, unplug the fuel injector connector, remove fixing bolt, and remove the wire harness from wire harness clamp; then grasp the injector with both hands and gently remove the fuel rail assembly from intake manifold, and the O-ring should not remain in cylinder head.
   - Clean the dirt on the outer surface of fuel rail assembly to prevent the dirt from being introduced into the fuel rail assembly during reassembly, resulting in damage to other components.
   - If the injector O ring is damaged during reassembly, never use it.
2. Installation precautions:
   - Make sure the fuel distribution pipe assembly is intact, undamaged, or uncontaminated, and there are no cracks, scars, grooves, burrs and rust on tube joint surface before use. Do not install fuel distribution pipe assembly that does not meet the requirement.
   - Lubricate the lower O-ring of fuel injector with clean lubricant before assembly.
   - Fuel injector should be prevented from being subjected to excessive impact during assembly, and tighten the mounting bolt until fuel injector is installed in place.
   - If it is necessary to secure wire harness, avoid deformation or damage of wire harnesses bracket caused by excessive shock to fuel distribution pipe assembly during installation.
   - When removing fuel distribution pipe assembly from engine and reinstalling it, it is necessary to replace fuel injector lower O-ring.
   - When the temperature is below zero, try to avoid installation or maintenance of fuel distribution pipe assembly, so as to avoid fuel leakage.
   - For after-sale maintenance, it is only allowed to replace the assembly.

Common Problem Symptoms and Judgment Methods

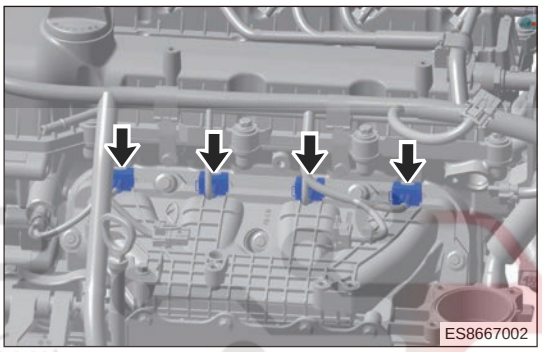
1. Problem symptoms: fuel leaks into engine compartment, which may cause vehicle burning in severe case.

2. Repair precaution:
   - Weld cracking of fuel distribution pipe;
   - Aging of injector o-ring;
   - Poor connection between fuel pipe and fuel distribution pipe assembly.
3. Simple detection method for fuel rail injector malfunction:
   - Remove fuel distribution pipe assembly from engine, apply compressed air of 4.5 bar from oil inlet port, place the injector connector upward, and immerse the fuel distribution pipe assembly into water so that the injection end of the injector does not contact with water. Observe if there is air bubble in the fuel rail injector assembly. If there are air bubbles in the fuel rail, there is a risk of fuel rail leakage.

Removal

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the fuel rail injector assembly.
   a. Disconnect 4 injector connectors (arrow), and remove fixing bolts from fuel rail injector assembly.

      Tightening torque: 8 ± 2 N·m



Installation

1. Installation is in the reverse order of removal.

Intake pressure sensor

Description

Intake pressure sensor is installed on intake manifold.

1	Ground Signal	3	To 5 V Power Supply
2	Temperature Signal	4	Pressure Signal

Operation

1. Intake manifold absolute pressure sensing element consists of a piece of silicon chip. Etch a piece of pressure diaphragm on silicon chip. There are 4 piezoresistors on pressure diaphragm, and the 4 piezoresistors form a Wheatstone bridge as strain element. Except for the pressure diaphragm, silicon chip is also integrated with signal processing circuit and temperature compensating circuit. Reference vacuum chamber is integrated into silicon chip, and absolute pressure in reference space is near zero. This will form a microelectronic mechanical system. Intake manifold absolute pressure to be measured acts on side which can sense pressure on silicon film from top side. Thickness of silicon chip is only several micrometers (μm), so the silicon chip will deform mechanically as intake manifold absolute pressure changes, and 4 piezoresistors will also deform, thus changing the resistance. Voltage signal linearly related to the pressure is generated after processing by signal processing circuit of silicon chip. Intake temperature sensing element is a negative temperature coefficient (NTC) resistor, whose resistance changes with the intake temperature. This sensor sends a voltage of intake temperature change to controller.

2. In other words, pressure sensing element and temperature sensing element are integrated into intake pressure/temperature sensor, which are used to detect actual intake pressure and temperature in intake manifold during engine running, and engine electronic control unit module calculates instantaneous intake air volume of engine quickly based on data provided by intake pressure/ temperature sensor and signals from other sensors of engine electronic control system.

Installation Precautions

1. The sensor is designed to be installed on the plane of intake manifold of engine. The pressure connecting pipe protrudes into the intake manifold, sealing the atmosphere with an O-ring.
2. If it is installed to the vehicle in a suitable way (if extracting pressure from intake manifold, pressure connecting pipe will tilt downward, etc.), thus ensuring that no condensation will form on the pressure sensitive element.
3. Drilling and fixing on intake manifold must be performed in accordance with the delivery drawings to ensure long-term sealing and be able to withstand erosion of media.
4. The reliable contact of the connector electrical connection is related to the material quality and dimension accuracy of the matching connector on the wire harness, expect for the influence of component connector.

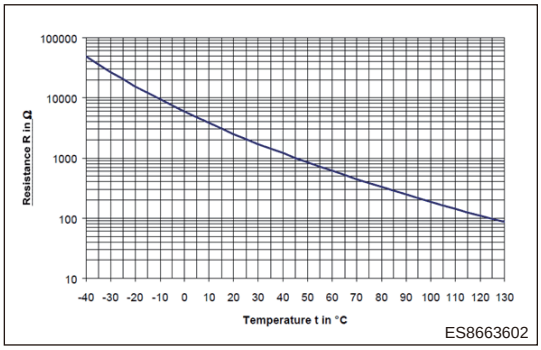
Common Problem Symptoms and Judgment Methods

1. Common problem symptoms related to this sensor: flameout, poor engine idle, etc.
2. General problem causes:
   - Abnormal high voltage or reverse large current during operation;
   - Pressure chip is damaged during service.
3. Precautions during service:
   - Never impact vacuum element with high pressure gas during service;
   - Check if alternator output voltage and current are normal when there is a fault and replacing sensor.

4. Simple measurement method:

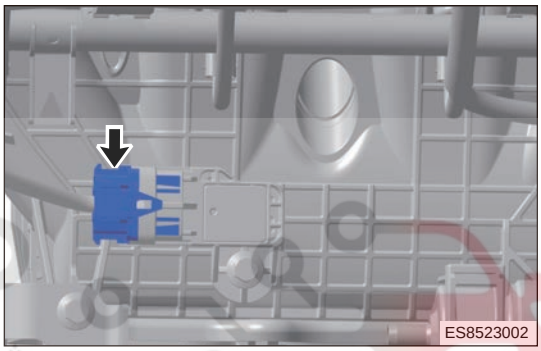
Step	Operation	Test Value	Test Result	Subsequent Step
1	Temperature sensor part: Remove intake pressure/temperature sensor wire harness connector, and measure resistance of terminals 1 and 2 of sensor separately with a multimeter;	The resistance of terminals 1 and 2 are determined according to ambient temperature near the sensor at the time of test. (rated resistance is 2.5 kΩ ± 5% at 20 ℃, and refer to temperature-resistance characteristic curve below for details)	Yes	Next
	Measurement can also be performed by simulating. Specific operations are to send wind to the sensor with blow drier (be careful that blow drier shouldn't be too close to the sensor) and observe the changes of sensor resistance. The resistance should reduce at the moment.		No	Replace intake pressure/ temperature sensor
2	Pressure sensor part: measure resistance between terminals 1 and 4, terminals 3 and 4 of intake pressure/temperature sensor;	Resistance between terminals 1 and 4, terminals 3 and 4 is 1.5 ± 0.5 kΩ	Yes	Next
			No	Replace intake pressure/ temperature sensor
3	Pressure sensor part: Connect intake pressure/temperature sensor wire harness connector, turn ENGINE START STOP switch to ON, the voltage between terminals 1 and 3 of intake pressure/temperature sensor wire harness should be 5 ± 0.5 V;	/	Yes	Diagnostic Help
	Under idling status, measure voltage of terminal 4 of sensor with a multimeter, the voltage should be about 0.7 V (value changes with model); under unloaded status, slowly open the throttle, the voltage of terminal 4 has not changed too much; quickly open the throttle, the voltage of terminal 4 can reach about 4 V instantaneously (value changes with model), and then drops to about 1.8 V (value changes with model).		No	Check for continuity and ground of wire harness

5. Temperature - resistance curve of intake pressure/ temperature sensor



Removal

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the intake pressure/temperature sensor.
   a. Disconnect the intake pressure/temperature sensor connector (arrow).
   b. Remove fixing bolt and intake pressure/temperature sensor.



Installation

1. Installation is in the reverse order of removal.

Ignition coil

Description

Ignition coil converts low voltage of primary winding into high voltage of secondary winding, and discharges spark plug electrode to produce sparks which will ignite the combustible air-fuel mixture in cylinder.

1	Positive Power Supply Wire	3	Ground Wire
2	Ground Wire	4	ECU Control Signal

Operation

Ignition coil consists of primary winding, secondary winding, iron core and housing etc. When the ground passage of a primary winding is on, this primary winding is charged. If ECU cuts off the primary winding circuit, the charging will be suspended, and a high voltage will be induced in the secondary winding at same time, cause spark plugs to discharge.

Technical Characteristic Parameters

Primary Current	8.5AX (1 ± 8%)
Secondary Voltage	⩾ 37 KV (40 pF ± 5 pF of load)
Load	1000 ± 20V
Ignition Energy	⩾ 90mJ

Problem Symptoms and Judgment Methods

1. Problem symptoms: engine jitter, engine cannot start normally, misfire, etc.
2. General problem causes: burned due to excessive current, damaged by external force, etc.
3. Service precautions: It is prohibited to use high-voltage cable to perform ignition spark test during repair; otherwise it may cause damage to electronic controller.
4. Simple measurement method:
   a. Remove connector, turn digital multimeter to ohm band, connect two probes to two terminals of primary winding respectively, the resistance should be 0.5 ～ 0.64 Ω at normal temperature.
   b. When connecting to secondary winding, the resistance is 8.36 ～ 10.64 kΩ.

Removal

1. Refer to Ignition System for removal part.

Installation

1. Refer to Ignition System for installation part.

Fuel injector

Description

Fuel injector is located on the cylinder head near intake valve, and nozzle end is located directly above the intake port.

1	Positive Power Supply Wire	2	ECU Control Ground

Operation

In the non-operating condition, the injector spring presses the needle valve set against the valve seat and seals the fuel injection port. When the ECU drives the fuel injector to operate, the electromagnetic coil energizes and generates electromagnetic force, and the needle valve set is sucked up, and separated from valve seat set, and the fuel is atomized and sprayed through the orifice plate. When the injection pulse is cut off, the pressure of return spring returns and closes the needle valve.

Problem Symptoms and Judgment Methods

1. Problem symptoms: poor engine idle, poor acceleration, engine cannot start (different to start), etc.

⚠ Caution

- A failure phenomenon is that injector body surface is wet after the vehicle is running for a while, customer will misunderstand that “leakage” occurs in injector, in fact, it is the phenomenon of thermal diffusion of lubricant (applied to injector O-ring) on the injector body. It does not affect the use of injector. This phenomenon will not occur again after drying.

2. General problem causes:
   a. Lack of maintenance. Since the fuel added to fuel tank last time is stored too long, and it is more than 2 months, fuel colloidal material is produced due to fuel oxidation, so that abnormal injection or no fuel injection due to accumulation of colloidal material in fuel injector, resulting in injector failure.

⚠ Caution

- If the customer does not drive the vehicle frequently, it is suggested to store a small amount of fuel in the tank. The purpose is to consume the fuel in the tank in time, and avoid fuel deterioration in tank as much as possible.

3. Simple detection method for injector malfunction:

a. Check if the injector itself is malfunctioning.
b. Check the cause of fuel leakage in the injector.
c. Check if the fuel injector is leaked oil.
d. Check if the fuel leakage is caused by fuel rail.
e. Turn digital multimeter to ohm band (remove connector), connect two probes to two terminals of fuel injector respectively, the rated resistance should be 12 ± 1 Ω at 20℃. Resistance is 12 ± 3 Ω at normal temperature.

Removal

1. Refer to FUEL SUPPLY SYSTEM.

Installation

1. Refer to FUEL SUPPLY SYSTEM.

Engine Control Unit (ECU)

Operation

Engine Control Unit (ECU) is a pre-programmed microprocessor digital computer, which is used to adjust ignition timing, air-fuel ratio, emission control device, speed control, A/C compressor and idle speed etc. Engine Control Unit (ECU) enables the program to suit ever-changing operation conditions.

Installation Precautions

1. Pay attention to static electricity protection during installation.
2. Take care to protect connector terminals.
3. Avoid water stains entering the connector during installation.

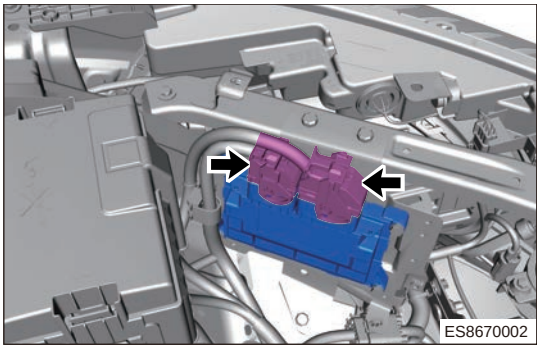
Common Problem Symptoms and Judgment Methods

1. Problem symptoms: Engine idles roughly, poor acceleration, engine cannot start, too high idle speed, exhaust exceeding, different to start, A/C failure, injector control failure, stalls, etc.
2. General problem causes:
   - ECU internal parts are burned and faulty due to the electrical overload of external device;
   - Circuit board is rusted due to water enters ECU.
3. Repair precaution:
   - Do not remove ECU casually during service;
   - Disconnect the negative battery cable for more than 1 minute before removing ECU;
   - Make sure to remove ECU before performing welding operation, and the removed ECU should be stored carefully;
   - Do not install any wire on ECU connecting wire.
4. Simple measurement method:
   a. Connect ECU connector, turn ENGINE START STOP switch to ON, use diagnostic tester to read engine DTCs and datastream or record;
   b. Remove ECU connector, check if ECU and its connecting wire are in good condition, mainly check if ECU power supply wire and ground wire are normal;
   c. Check if the external sensor is operating properly, output signal is reliable and its circuit is in good condition;
   d. Check if the actuator is operating properly and its circuit is in good condition;
   e. Perform test with a new ECU to check if fault reoccurs.

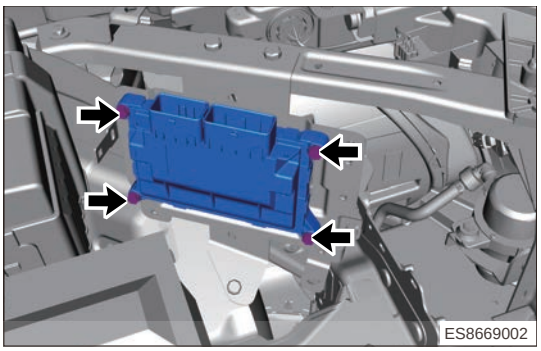
Removal

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the Engine Control Unit (ECU).

a. Disconnect the ECU connectors (arrow).



b. Remove 4 fixing bolts (arrow) and ECU.
Tightening torque: 8 ± 2 N·m



Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- Pay attention to static electricity protection during installation.
- Take care to protect connector terminals.
- To prevent water droplets from accumulating on connector joint, face it down.

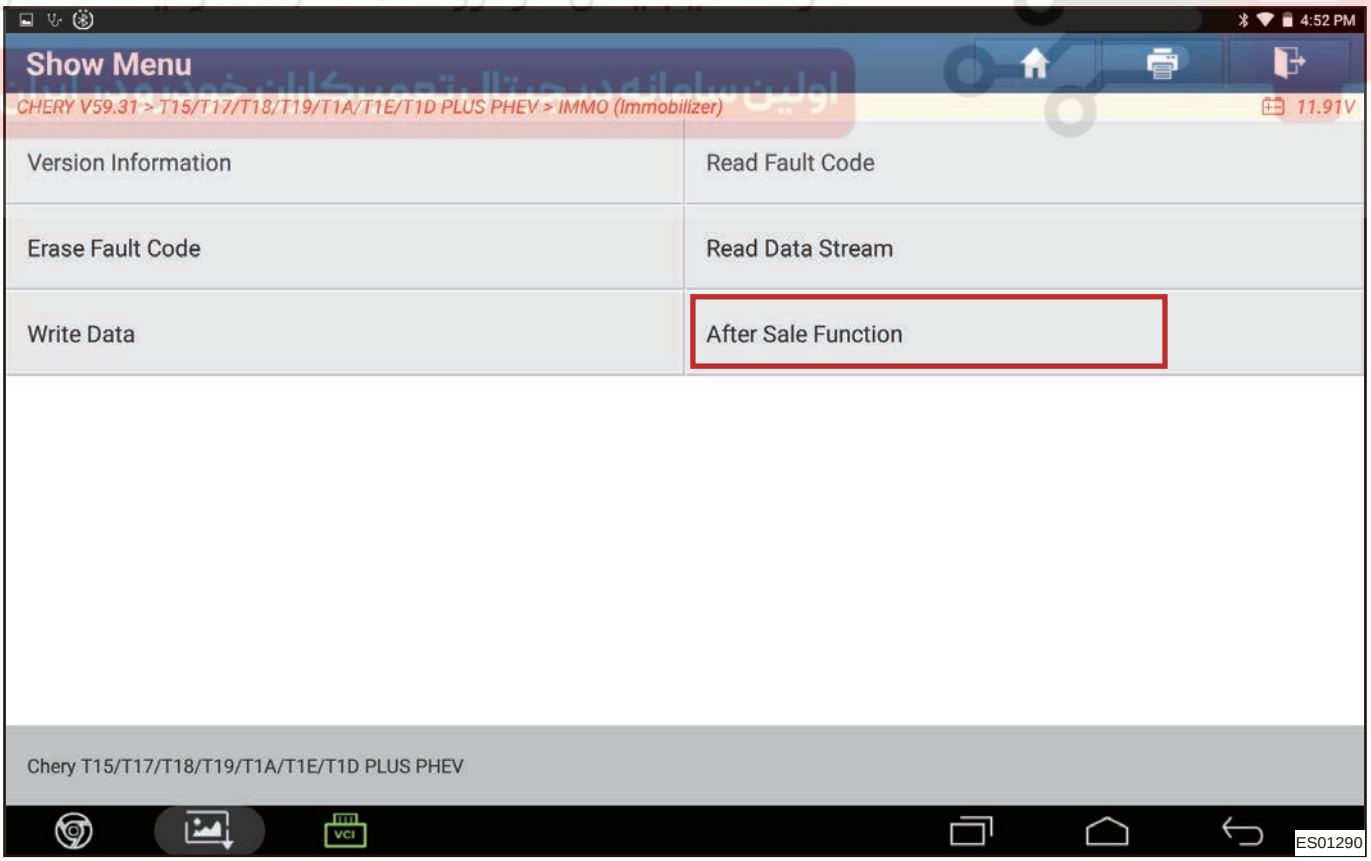
Matching Learning

Write VIN Code

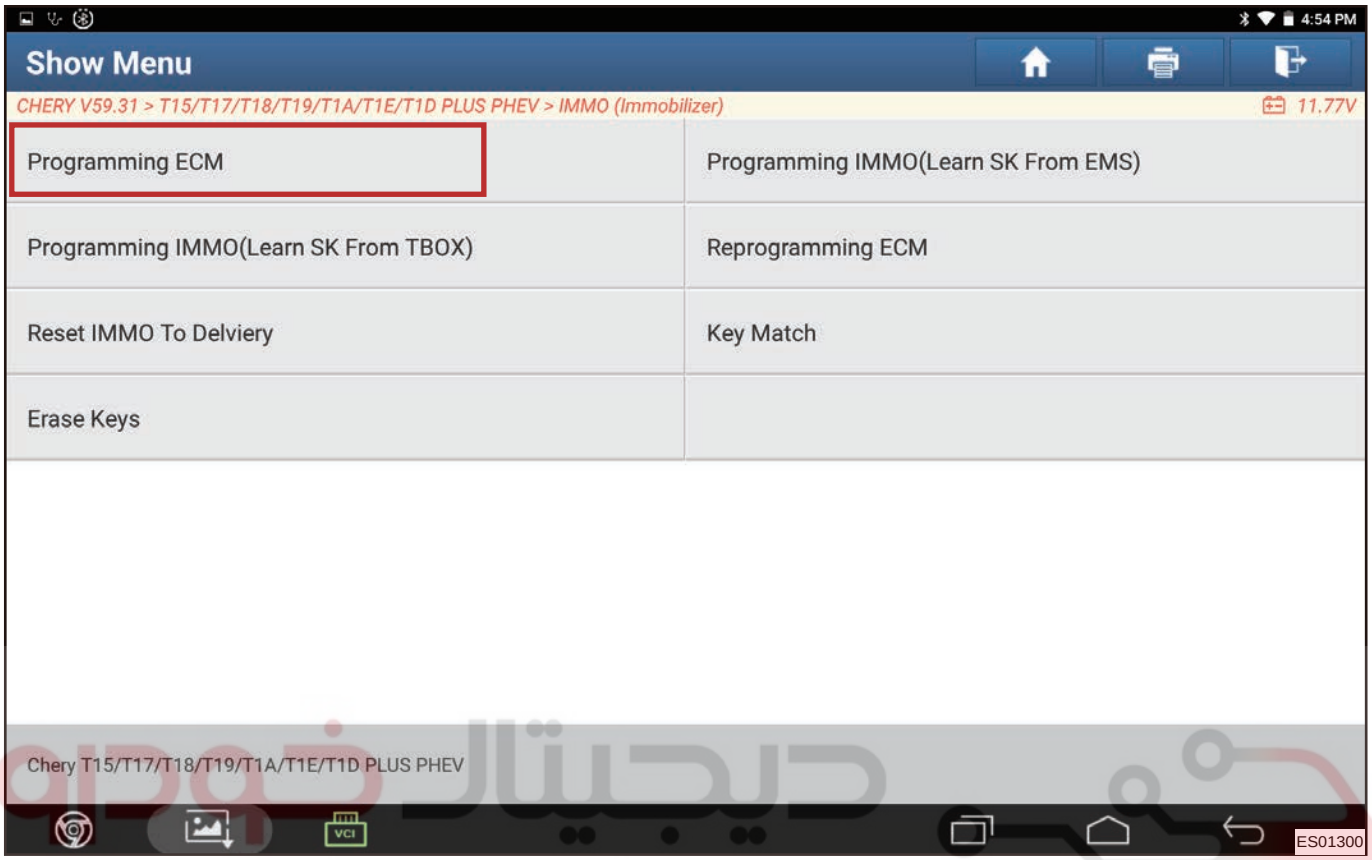
1. Connect diagnostic tester, and select corresponding model.

2. Click “IMMO (Immobilizer)”.

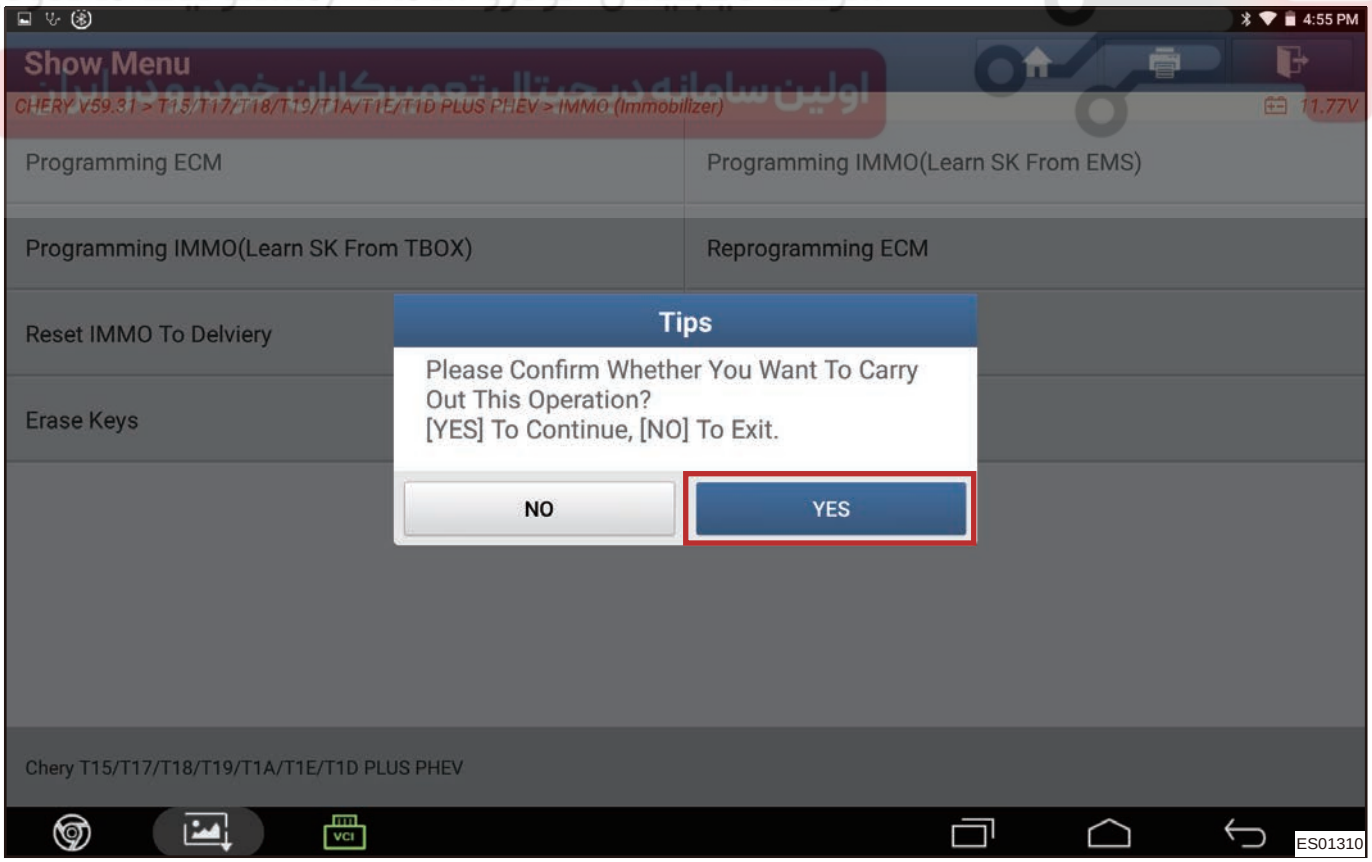
3. Click “Immobilizer Matching”.



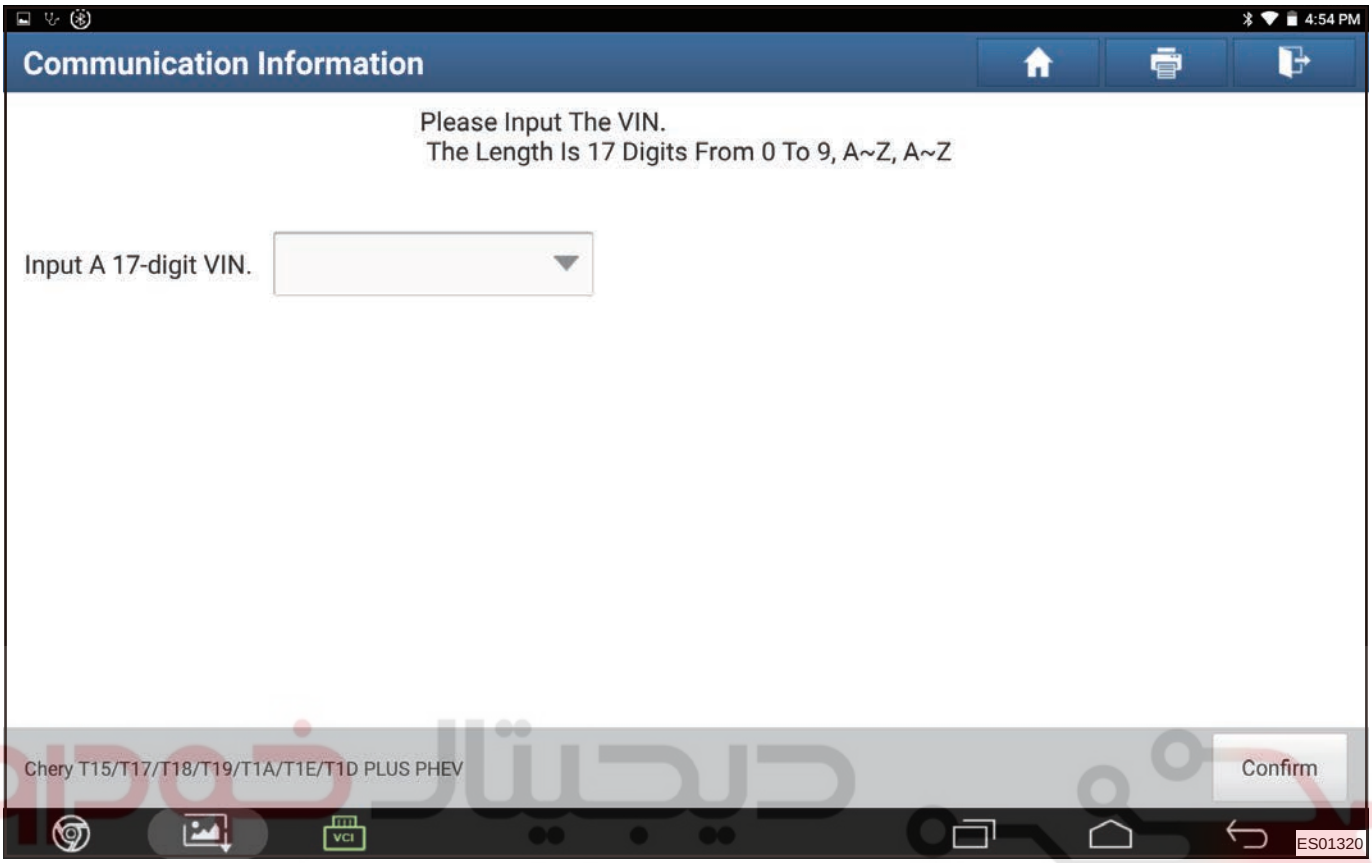
4. Click “Programming Engine Control Module (ECM)”.



5. Display shows execution condition, confirm it and click “Yes”.



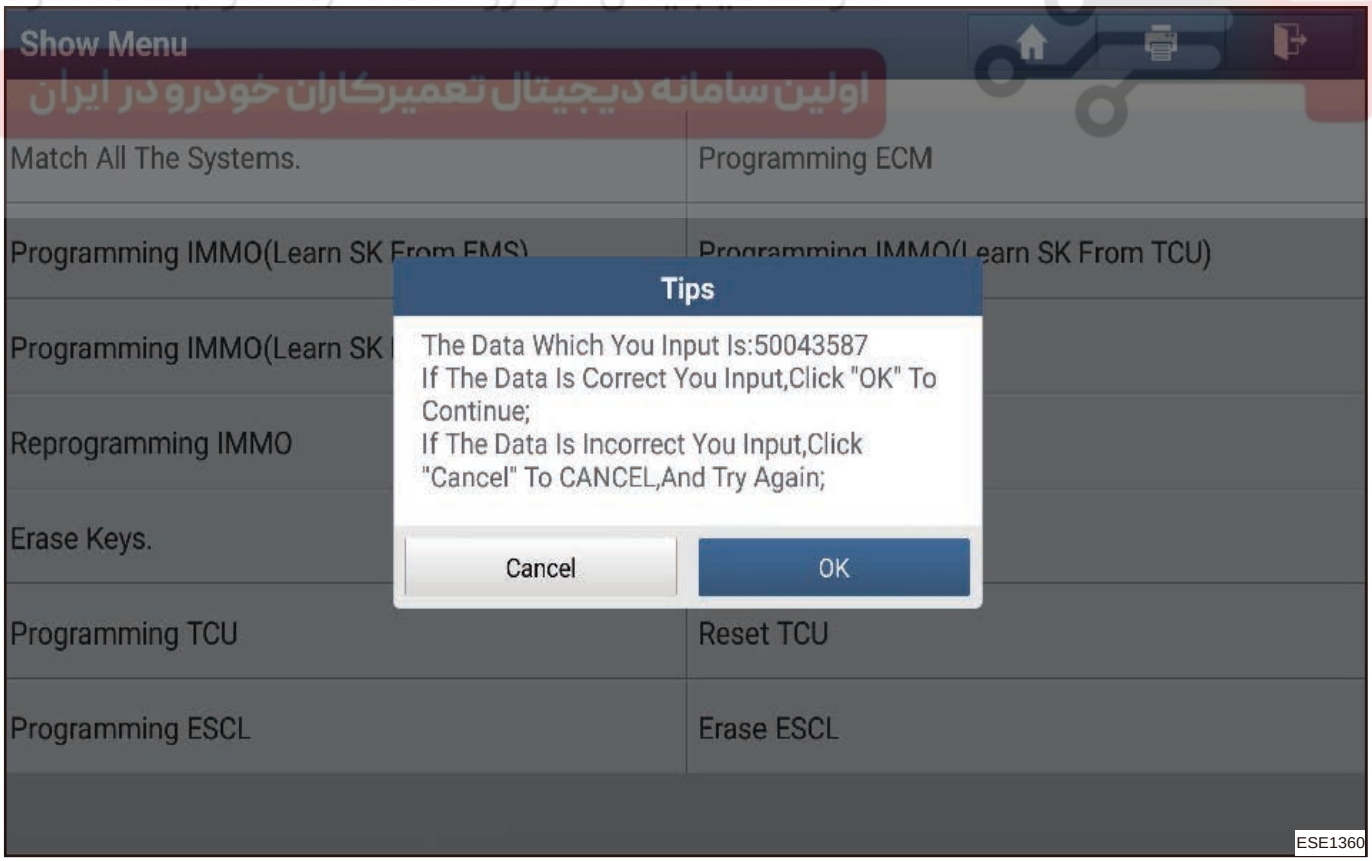
6. Input 17-digit VIN code, and click “OK”.



7. Confirm and click “OK”.
8. Display shows that VIN is written successfully, then click “OK”.

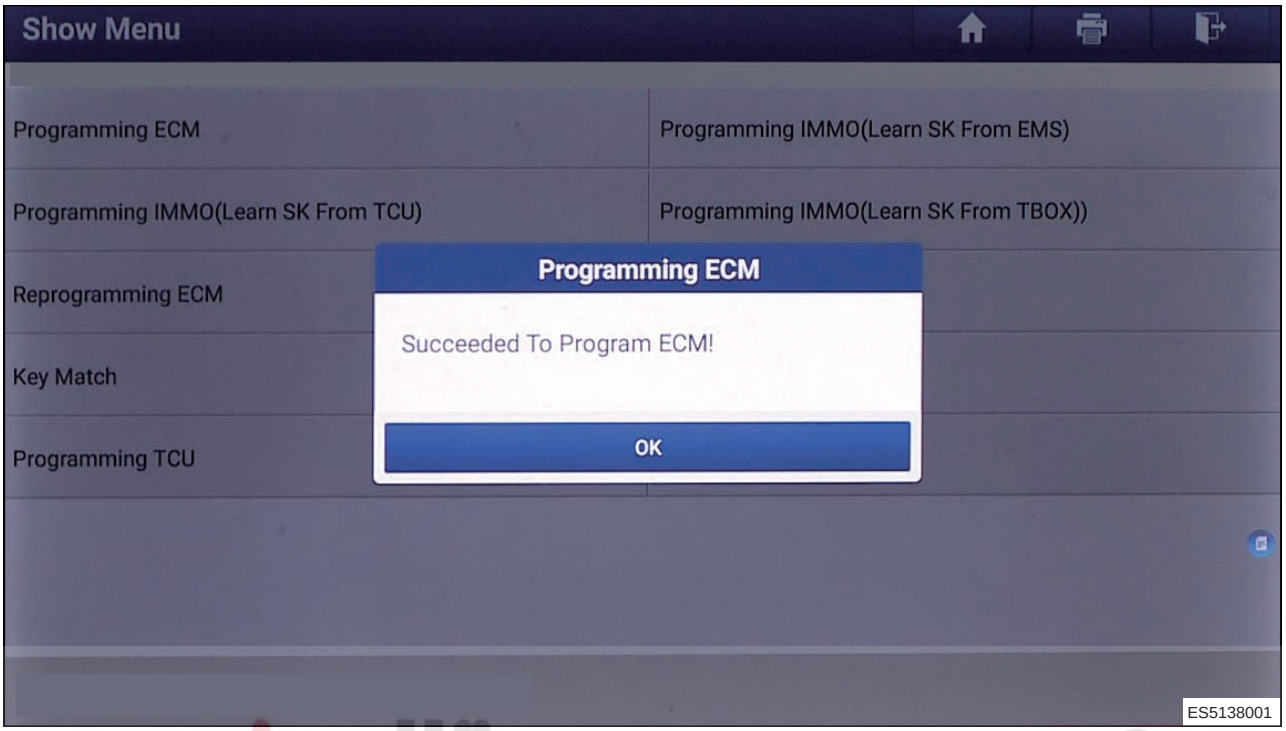
9. After entering 8-digit anti-theft security code, click “OK”.

10. After entering 8-digit anti-theft security code again, click “OK”.



11. Display shows that write user authorization code successfully! Click “OK”.

12. Display shows that Engine Control Module (ECM) is programmed successfully, then click “OK”.



Diagnosis & Testing

Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Valve mechanism noise	Engine oil (oil level high or low, oil lean or rich)
	Rocker arm (abnormal wear)
	Hydraulic lifter assembly (fails and wear)
	Valve spring seat (excessive runout)
	Valve (excessive clearance between valve and guide)
	Camshaft (Bend, deformation, abnormal wear, axial/radial clearance increased)
Connecting rod noise	Engine oil (insufficient oil, low viscosity, low pressure)
	Connecting rod (misaligned)
	Bend, deformation of connecting rod
	Connecting rod bearing shell (excessive radial clearance)
	Connecting rod journal (out-of roundness)
Main bearing noise	Engine oil (insufficient oil, low viscosity, low pressure)
	Main bearing shell (excessive clearance)
	Crankshaft axial clearance (excessive)
	Crankshaft journal (out-of roundness or worn)
	Flywheel or clutch (loose)
Oil loss or spark plug blockage	Piston ring (worn, scratched or damaged)
	Piston ring groove (carbon deposited)
	Valve oil seal (worn or damaged)
	Valve (excessive clearance between valve and guide)

Inspection

1. Check the coolant.
2. Check the engine oil.
3. Check the battery.

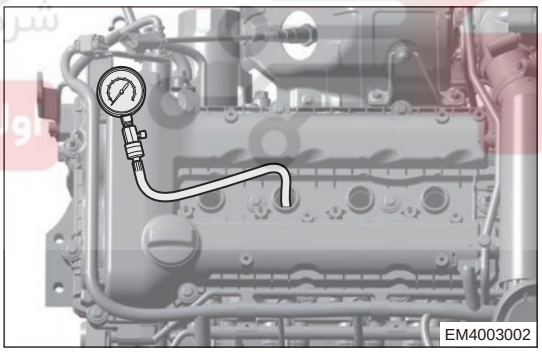
4. Check the air filter element.
   a. Remove the air filter element.
   b. Visually check that there is no dirt, blockage or damage in the air filter element.

      Hint:
      If there is any dirt or blockage in air filter element, clean it with compressed air.
      If any dirt or blockage remains, even after cleaning air filter element with compressed air, replace it.
5. Check the spark plug.
6. Test cylinder compression pressure.
   - Cylinder pressure is the main index to judge engine operation and also can be used to definitely judge whether some system of engine operates well or not. Therefore, it is necessary to perform cylinder pressure measurement when servicing engine.
   - Ensure battery is fully charged and engine starter is in good operating condition. Otherwise, indicated compression pressure used for diagnosis may be invalid.

⚠ Caution

- Recommended compression pressure is only used as a guide for diagnosing engine malfunction.
- Never determine cause of low pressure by disassembling engine unless there are some malfunctions.
- Use a cylinder pressure gauge with accurate reading and reset it to zero, or it will influence accuracy of reading.

   a. Turn off all electrical equipment and ENGINE START STOP switch.
   b. Remove the ignition coil.
   c. Remove the spark plug.
   d. Slowly screw the cylinder pressure gauge connector vertically into the spark plug mounting hole. Do not tighten it excessively to prevent difficult removal.



   e. With transmission in P/N (for CVT models) position, depress accelerator pedal fully, then start engine and keep it racing for 3 to 5 seconds; Record the measured pressure value.
   f. Press the bleeder button of cylinder pressure gauge to reset it to zero. Use same method to repeat this test three times and then calculate average value. Cylinder pressure value is within 7 - 10 bar (180 - 250 r/min).

⚠ Caution

- DO NOT screw the cylinder pressure gauge excessively to prevent difficult removal.
- During measurement, do not turn ENGINE START STOP switch to “START” for more than 10 seconds. Otherwise, engine may be damaged.
- Ensure battery is fully charged when cranking engine. Correct cylinder pressure can be measured only when engine is running at 180 - 250 r/min.
- Use same method to measure pressure of other cylinders.

Standard cylinder pressure value is within 7 - 10 bar (180 - 250 r/min). The value will drop slightly with usage of engine, but the lowest value cannot be below 7 bar and pressure difference between each

cylinder should not be above 3 bar.If engine cylinder pressure is lower than standard value, it indicates that cylinder pressure is insufficient. Add a small amount of engine oil to cylinder through spark plug hole and perform measurement again.If pressure increases after adding oil, piston ring or cylinder bore may be worn or damaged. If pressure remains low, the valve may be stuck or damaged, or there may be air leakage in cylinder head gasket.

g. Install the spark plug.
h. Connect all injector connectors.
i. Install the ignition coil.

7. Test cylinder head gasket for leakage.

Hint:
Cylinder head gasket leakage may be present between adjacent cylinder and water jacket or from an oil passage to the external of engine.

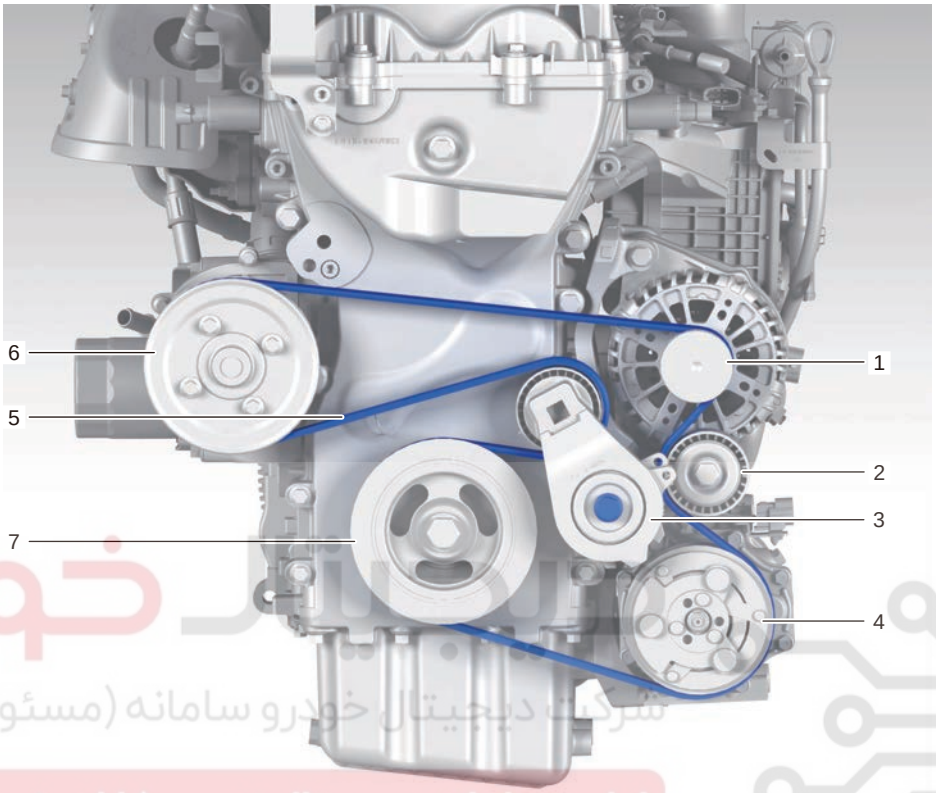
a. Possible trouble symptoms caused by cylinder head gasket leakage between adjacent cylinders are as follows:
   - Engine power loss.
   - Engine stall.
   - Low fuel economy.

b. Possible trouble symptoms caused by cylinder head gasket leakage between cylinder and adjacent water jacket are as follows:
   - Engine overheats.
   - Coolant loss.
   - Excessive steam (white smoke) emitted from exhaust system.
   - Coolant foaming.

On-vehicle Service

Accessory Pulley

Description



EM4004001

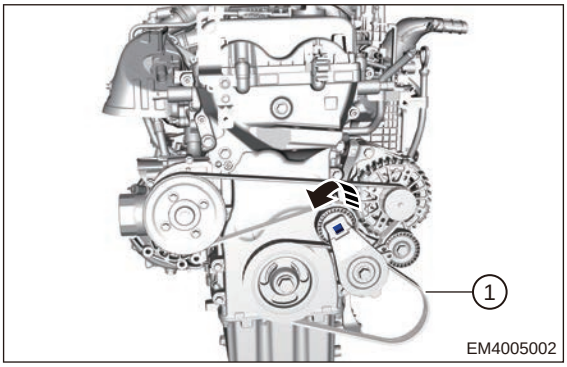
1	Alternator Assembly	5	Accessory Drive Belt
2	Idler Pulley Assembly	6	Water Pump Pulley
3	Tensioner Assembly	7	Crankshaft Pulley
4	Compressor Assembly		

Removal

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the accessory drive belt.

a. Insert tip of ratchet rod into tensioner pin hole (arrow) and pull it upward in direction of arrow as shown in illustration, then remove accessory drive belt assembly (1).

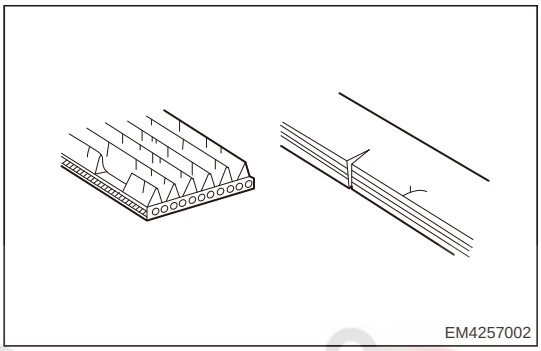
Hint:
Prevent hand from contacting belt tensioner when raising it upward, causing unnecessary hurt.



Inspection

1. Visually check accessory drive belt for excessive wear and cords for wear, etc. If any of these defects is found, replace accessory drive belt.

Hint:
If accessory drive belt has chunks missing from ribs, it should be replaced.
After installing accessory drive belt, check that it fits properly in the ribbed grooves. Check that belt has not slipped out of grooves on bottom of the crankshaft pulley by hand.



Installation

⚠ Caution

- Before installation, remove the dirt from accessory drive belt.
- Rotate crankshaft after installation, make sure that accessory drive belt is installed in place and does not interfere with other separate parts.

1. Installation is in the reverse order of removal.

Idler Pulley Assembly

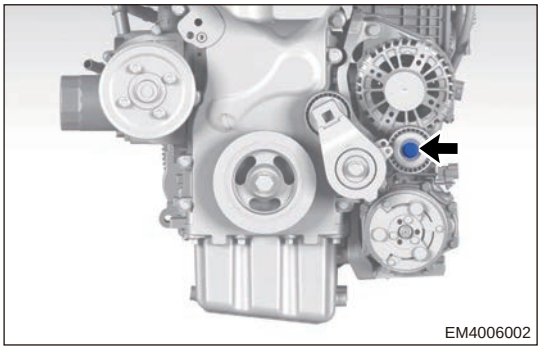
Removal

⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the accessory drive belt.
4. Remove the idler pulley assembly.

a. Remove fixing bolt (arrow) from idler pulley assembly.
Tightening torque: 50 + 5 N m


EM4006002

b. Remove the idler pulley assembly.

Inspection

1. Rotate idler pulley by hands and check if rotation is smooth and if abnormal noise occurs.
2. Wiggle idler pulley in axial and radial directions to check bearing for looseness.
3. Check if there is damage on idler pulley assembly operating surface.

Installation

> **⚠ Caution**
>
> - After installation, turn crankshaft to run accessory drive belt several circles, and check if crankshaft turns smoothly and belt runs well. If it cannot turn smoothly, reinstall accessory drive belt.
> - Make sure to correctly install accessory drive belt, and it does not interfere with other components.

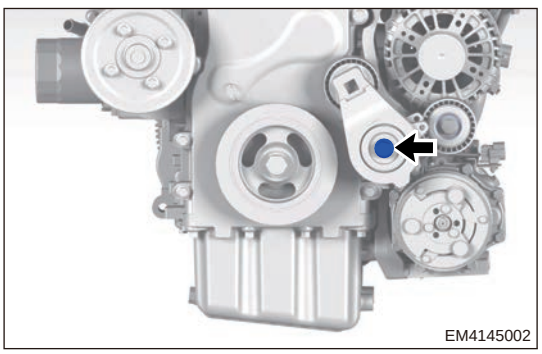
1. Installation is in the reverse order of removal.

Tensioner Assembly

Removal

> **⚠ Caution**
>
> - Be sure to wear necessary safety equipment to prevent accidents when repairing.
> - Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the accessory drive belt.
4. Remove the tensioner assembly.
   a. Remove the tensioner assembly fixing bolt (arrow).
   Tightening torque: 40 + 5 N m

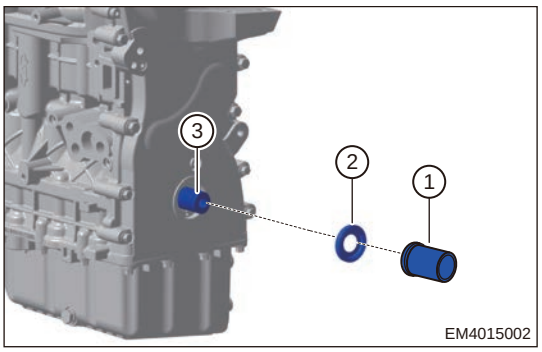

EM4145002

b. Remove the tensioner assembly.

1. Install the crankshaft front oil seal.
   a. Install new oil seal (2) to crankshaft (3), then install new oil seal evenly and fully into oil seal retainer with a crankshaft front oil seal installer (1).

      Hint:
      Oil seal surface should be lower than timing chain cover oil seal hole end surface by 0 ～ 1 mm.
      Ensure that oil seal lip has no damage during assembly.
      Never allow tilting it by more than 5°, oil seal external rubber breakage or flanges during oil seal press fitting.

   b. Other installation procedures are in the reverse order of removal.



Flywheel

Removal

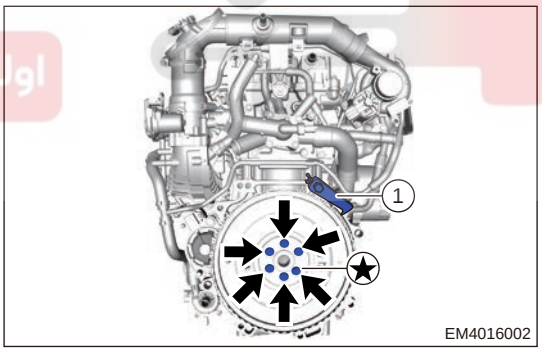
⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the automatic transmission assembly.
4. Remove the flywheel assembly.
   a. Install flywheel holding tool (1) to lock flywheel.
   b. Remove 6 fixing bolts (arrow) and flywheel assembly.

      Tightening torque: 1st step: 35 ± 5 N·m; 2nd step: 45° ± 5°

      Hint:
      Pay attention to personal safety during operation.
      DO NOT remove all fixing bolts without any auxiliary measures.
      Flywheel fixing bolts must be disposed after removal. Never reuse them.



Inspection

1. Check if crankshaft position signal gear is distorted or deformed. If damaged, replace flywheel. Clean signal gear before installation.
2. Check if starter driven gear ring is worn. If excessively worn, replace flywheel.

Installation

⚠ Caution

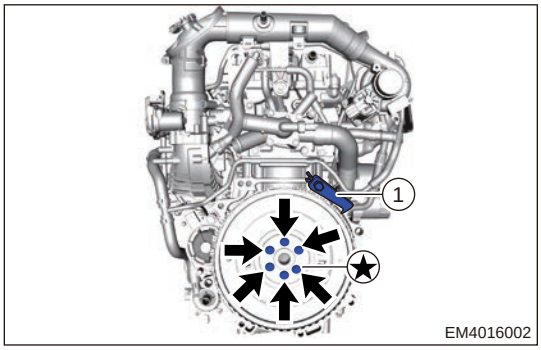
- Six bolt holes on the flywheel have asymmetrical positions. During installation, pay attention to that flywheel fixing bolts are aligned with crankshaft bolt holes.
- Lightly push flywheel after alignment during assembly. Do not tap flywheel with a hammer.
- Replace flywheel fixing bolts with new ones.

1. Install the flywheel.

a. When installing flywheel assembly, pretighten fixing bolts (arrow), and install flywheel holding tool, then tighten each flywheel bolt diagonally in order.

Tightening torque: 1st step: 25 ± 5 N·m 2nd step: 30° ± 5°

★ - Non-reusable Parts



Crankshaft Rear Oil Seal

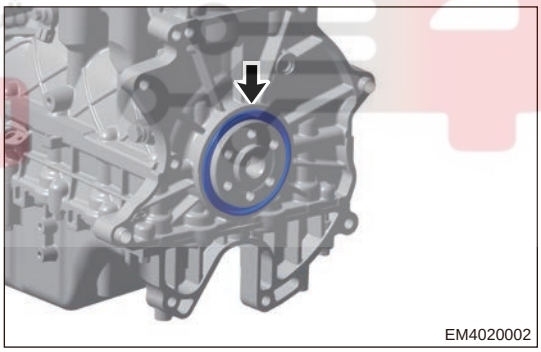
Removal

⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the transmission assembly.
4. Remove the flywheel assembly.
5. Remove the crankshaft rear oil seal.
   a. Using a screwdriver with the tip wrapped with protective tape, remove crankshaft rear oil seal (arrow).

   Hint:
   Be careful not to scratch cylinder block, when removing oil seal.



Installation

⚠ Caution

- Be sure to clean dirt around oil seal retainer and on inside wall before installation.
- Check oil seal for damage before installation. If there is any damage, replace it.
- Be sure to prevent the lip of crankshaft rear oil seal from being scratched during installation.
- Be careful not to damage oil seal retainer during installation.

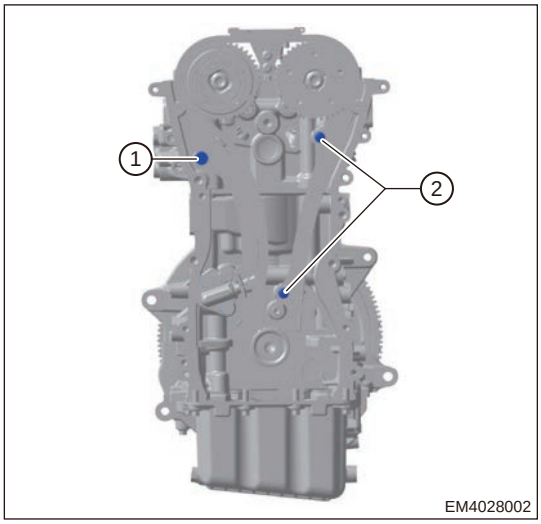
1. Install the crankshaft rear oil seal.
   a. Apply engine lubricant to crankshaft oil seal outer retainer and lip.

c. Remove fixing bolt (1) and movable guide rail assembly.

Tightening torque: 9 + 3 N m

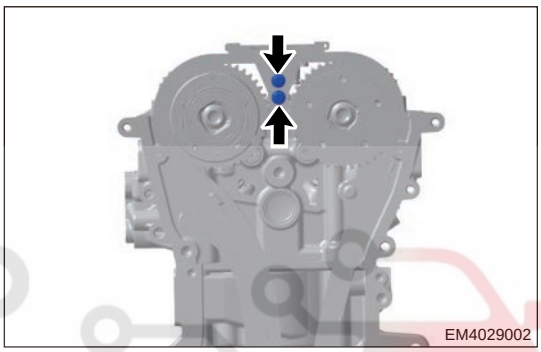
d. Remove 2 fixing bolts (2) and fixing guide rail assembly.

Tightening torque: 9 + 3 N m



e. Remove 2 fixing bolts (arrow) and upper guide rail assembly.

Tightening torque: 9 + 3 N m



f. Remove the engine timing chain assembly.

⚠ Caution

- Mark front side and back side of chain with a marking pen after removing chain, so as to keep same direction during installation. Long time movement in one direction of timing chain will cause wear difference between two sides of chain, so it is necessary to remove and install the chain in same direction.

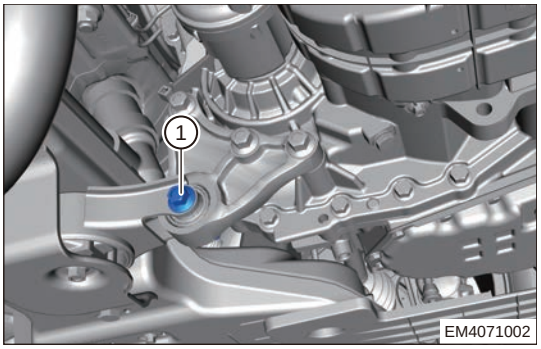
Inspection

1. Check the timing chain.
   a. Check the timing chain in detail, the timing chain and the engine life, if the tooth surface without serious wear or crack, you can continue to use.
   b. If the timing chain is to be replaced, the full set of sprockets, chains and guide rails should be replaced together.
2. Inspect the engine timing chain movable guide rail.
   a. Measure depth of engine timing chain movable guide rail with a vernier caliper.

      Hint:
      Wear limit is 1 mm.
3. Check tensioner.

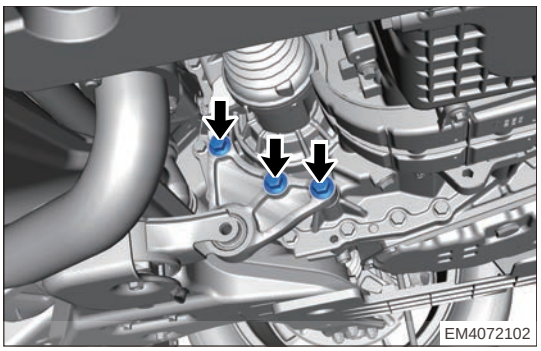
a. Remove the through bolt (1) between rear mounting cushion assembly I and rear mounting cushion assembly.

Tightening torque: 120 ± 10 N m



b. Remove 2 coupling bolts (arrow) between rear mounting cushion assembly I and transmission.

Tightening torque: 80 ± 5 N m

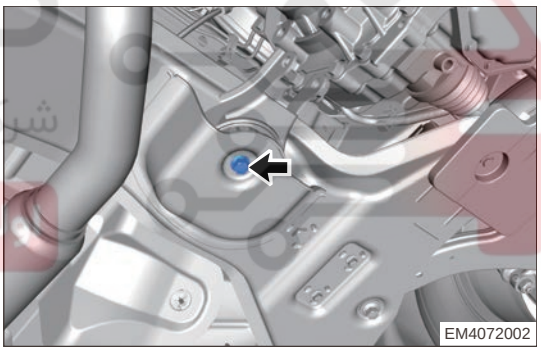


c. Remove rear mounting cushion assembly I.

4. Remove the rear mounting cushion assembly.

a. Remove the coupling bolt (arrow) between rear mounting cushion assembly and sub frame.

Tightening torque: 120 ± 10 N m



b. Remove rear mounting cushion assembly.

Installation

1. Installation is in the reverse order of removal.

⚠ Caution
• Pre-tighten 2 or 3 threads manually first during assembly of bolts and nuts, then pre-tighten and tighten it to specified torque with a tool.

Left Mounting Assembly

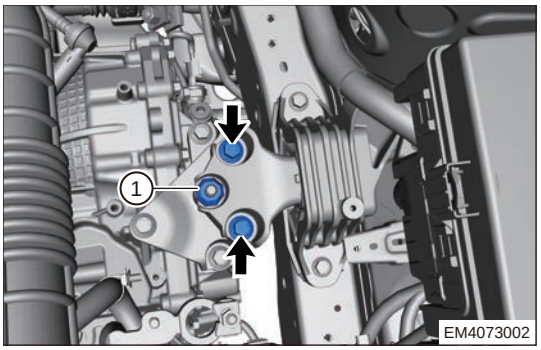
Removal

⚠ Caution
• Be sure to wear necessary safety equipment to prevent accidents when repairing. • Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and ENGINE START STOP switch.

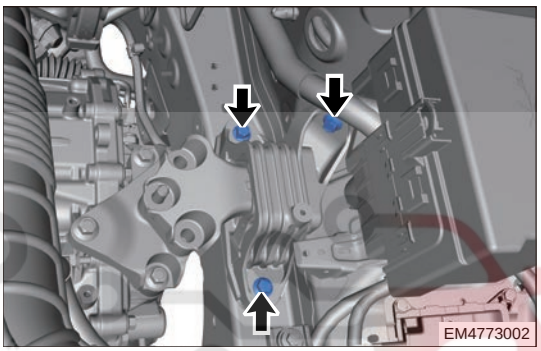
2. Disconnect the negative battery cable.
3. Remove the air filter assembly.
4. Remove the battery assembly.
5. Remove the battery tray bracket.
6. Remove the left mounting cushion assembly.
   a. Remove 2 fixing nuts (arrow) and 1 coupling bolt (1) between left mounting cushion assembly and left mounting bracket.

      Tightening torque: 100 ± 10 N m



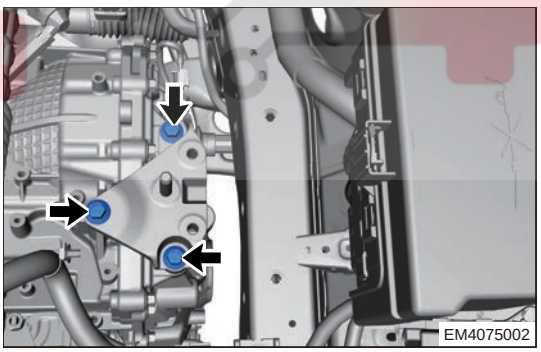
   b. Remove 3 fixing bolts (arrow) between left mounting cushion assembly and left side rail wheel house assembly.

      Tightening torque: 65 ± 5 N m



7. Remove the left mounting bracket.
   a. Remove 4 fixing bolts (arrow) between left mounting bracket and transmission case.

      Tightening torque: 65 ± 5 N m



   b. Remove the left mounting bracket.

Installation

1. Installation is in the reverse order of removal.

Right Mounting Assembly

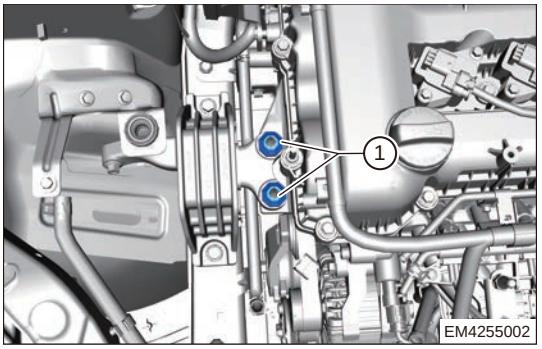
Removal

> ⚠ **Caution**
>
> - Be sure to wear necessary safety equipment to prevent accidents when repairing.
> - Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and ENGINE START STOP switch.

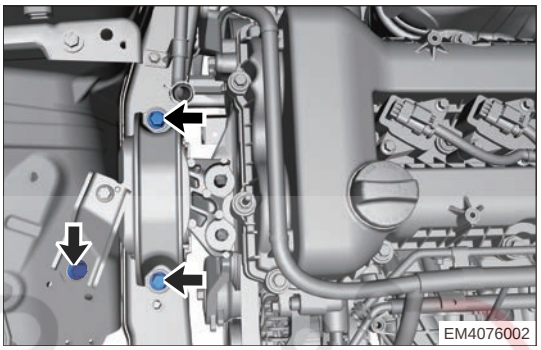
2. Disconnect the negative battery cable.
3. Remove the expansion tank assembly.
4. Remove the engine right mounting cushion assembly.
   a. Remove 2 fixing nuts (1) between right mounting cushion assembly and engine.

      Tightening torque: 100 ± 10 N m



   b. Remove 3 coupling bolts (arrow) between right mounting cushion assembly and body.

      Tightening torque: 65 ± 5 N m



   c. Remove the engine right mounting cushion assembly.

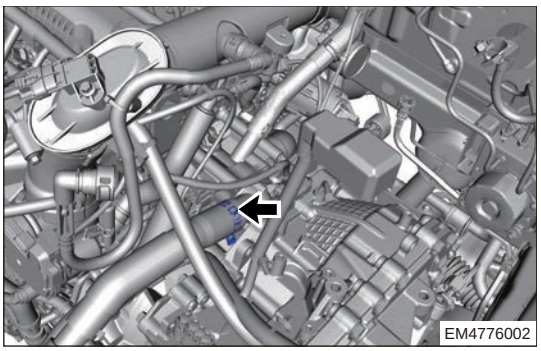
Installation

1. Installation is in the reverse order of removal.

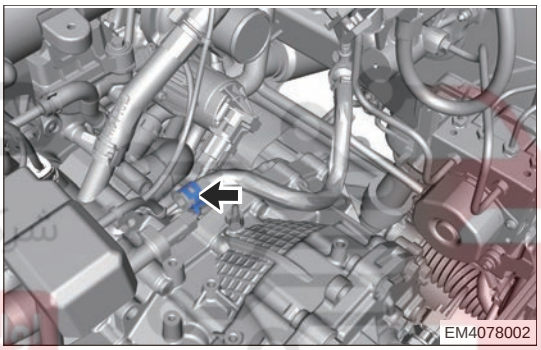
⚠ Caution

- When installing right side rail wheel house on right mounting cushion assembly, first tighten the other locating bolt on side rail, and finally tighten the bolt on wheel house.
- Pre-tighten 2 or 3 threads manually first during assembly of bolts and nuts, then pre-tighten and tighten them to specified torque with a tool.

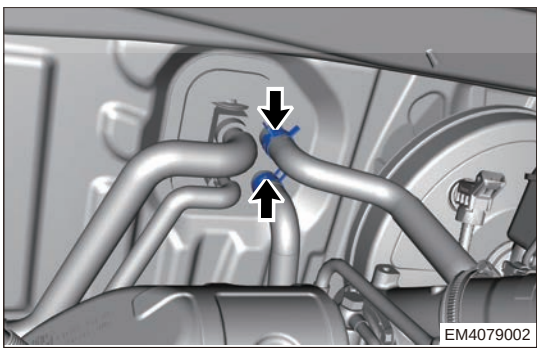
7. Drain the transmission oil.
8. Drain the coolant.
9. Recover the refrigerant.
10. Remove the electric water pump and mounting bracket.
11. Remove the precatalytic converter assembly.
12. Remove the turbocharger assembly.
13. Disconnect engine inlet and outlet hoses.
    a. Loosen elastic clamps (arrow) and disconnect connections between engine inlet and outlet hoses and thermostat seat.



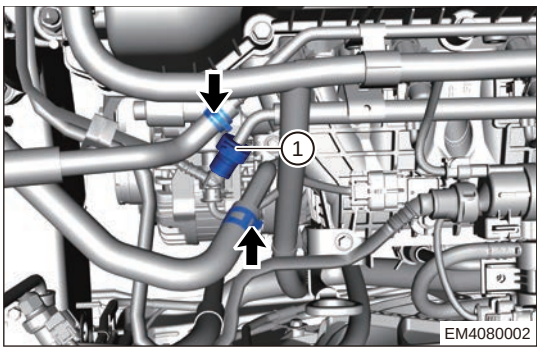
14. Disconnect the vacuum pipe.
    a. Loosen elastic clamp (arrow) and disconnect connection between brake vacuum hose and brake vacuum steel pipe.



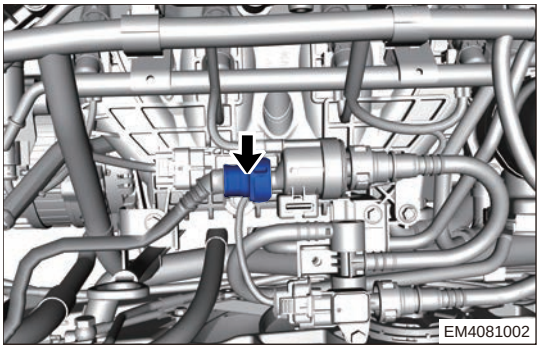
15. Disconnect connection between hose and heater core.
    a. Loosen elastic clamp (arrow) and disconnect connection between heater core inlet/outlet hose and heater core.



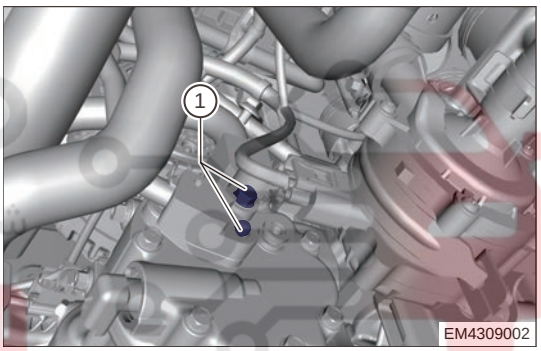
16. Loosen 2 elastic clamps (arrow) and disconnect water pipe.
17. Disconnect connection (1) between inlet pipe and fuel rail injector assembly.



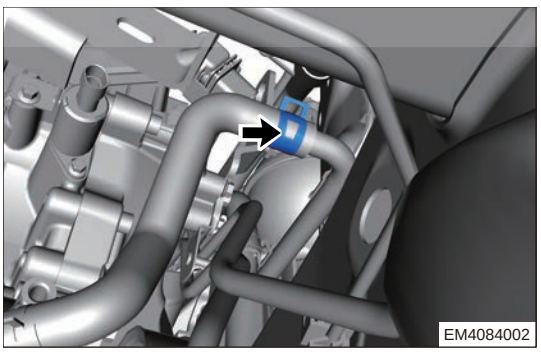
18. Disconnect connection (arrow) between fuel vapor pipe and canister solenoid valve.



19. Disconnect all wire harnesses.
20. Remove the front wheel.
21. Remove the drive shaft.
22. Remove the sub frame assembly.
23. Disconnect the transmission oil cooling pipe.
    a. Remove the tightening clamp and disconnect transmission oil cooling pipe.
24. Disconnect the A/C compressor high and low pressure pipes.
    a. Remove coupling bolts (1) between high/low pressure pipes and A/C compressor assembly, and disconnect high and low pressure pipes.

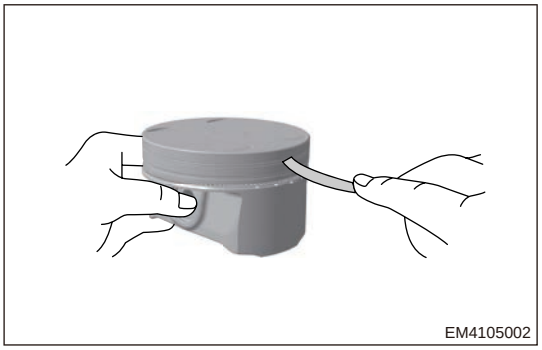


25. Disconnect the water supply pipe.
    a. Loosen elastic clamp (arrow) and disconnect connection between expansion tank water supply pipe and oil filter module assembly.



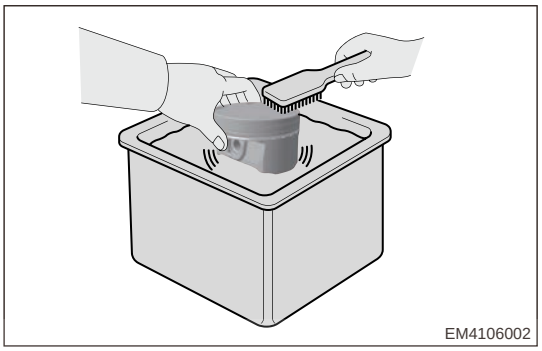
26. Lower vehicle to the position where engine assembly can be placed steadily in maintenance platform.
27. Remove the rear mounting assembly.
28. Remove the left mounting assembly.
29. Remove the right mounting assembly.
30. Check that engine assembly is separated with external components.
31. Raise vehicle to the position where engine assembly can be separated from body.
32. Remove engine wire harness and battery wire harness from engine.
33. Separate transmission assembly from engine assembly.
34. Install engine assembly to engine service platform.

b. Using a piston ring, remove carbon deposits from piston ring grooves.



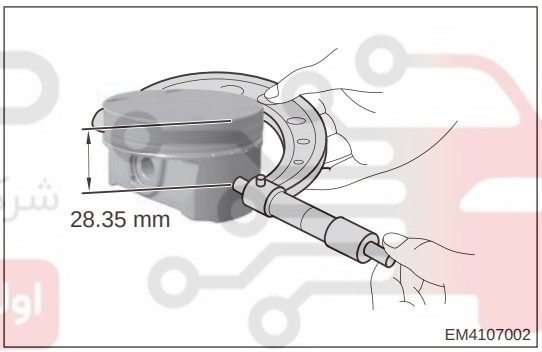
c. Using a brush and solvent, thoroughly clean piston.

Hint:
DO NOT use a wire brush to clean.



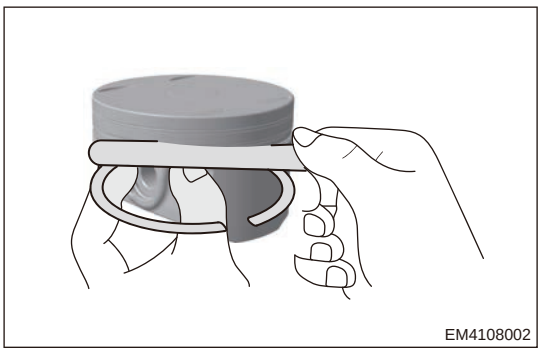
d. Measure the piston diameter with a micrometer at 10 mm of lower end of the piston skirt along the vertical direction of piston pin.

Measurement Item	Specification (mm)
Piston Diameter	76.950 ± 0.009



4. Check clearance between piston ring and ring groove side:
   a. Using a feeler gauge, measure clearance between new piston ring and ring groove side.

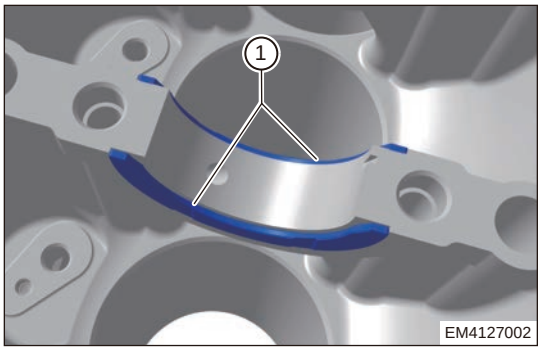
Measurement Item	Specification (mm)	Limit Value (mm)
First Compression Ring Side Clearance	0.02 - 0.065	0.13
Second Compression Ring Side Clearance	0.02 - 0.06	0.12



Hint:
If piston ring side clearance exceeds specified range, replace piston ring and piston assembly.

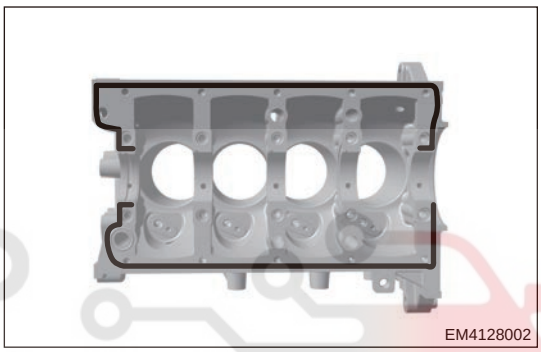
5. Check the piston ring end gap:

a. Clean thrust washers and cylinder block inner wall before installation.
b. Apply engine oil to thrust washers.
c. There are 2 thrust washers on the cylinder, which are installed on the front and rear thrust surfaces of 3rd main bearing seat respectively.
d. As shown in illustration, the side of crankshaft thrust washers (1) without groove should face cylinder block side while the other side with groove should face crankshaft side.



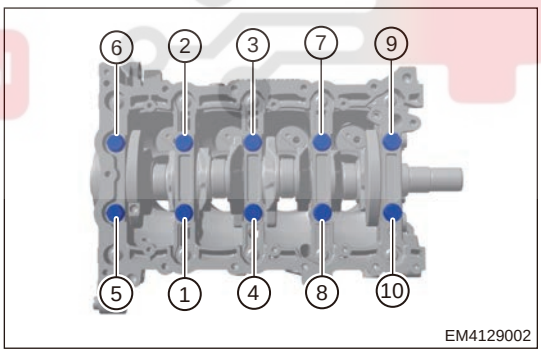
4. Install the crankshaft.
a. Apply seal gum to installation surface of crankshaft frame before installation.

Hint:
DO NOT apply seal gum to bearing shell when applying seal gum.
Seal gum should not be applied too thick. Avoid seal gum entering bearing shell installation area due to compression.



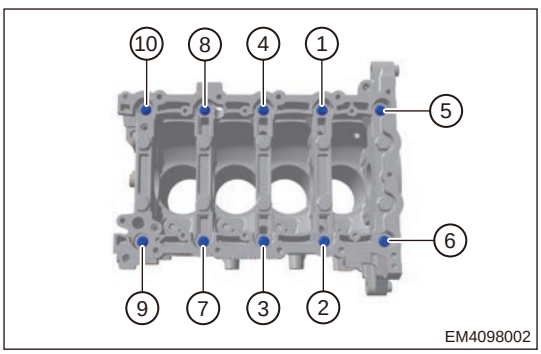
b. Place crankshaft on cylinder block carefully.
c. Install crankshaft main bearing cap fixing bolts in place by hands, and then tighten 10 crankshaft main bearing cap fixing bolts in order shown in illustration.

Tightening torque: 1st step: 45 ± 5 N·m; 2nd step: 180° ± 10°



d. Evenly tighten 10 crankshaft frame fixing bolts in order shown in illustration.

Tightening torque: 27 + 3 N m



5. Assemble piston and piston connecting rod.

Hint:
Apply clean engine oil to outer surface of piston pin and inner surface of piston hole before assembly.

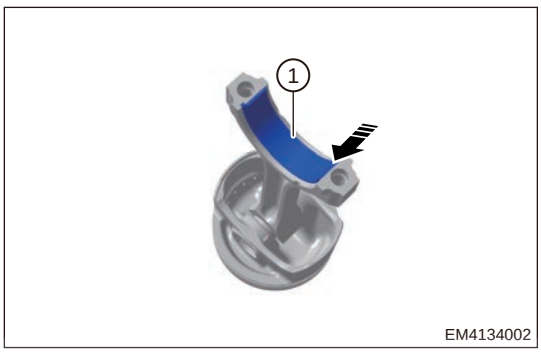
c. Rotate piston ring several turns after addling engine oil to piston ring groove, and note that the position of ring notch should be the same with that described above; clean crankshaft connecting rod journal and cylinder with a non-woven fabric cloth.

7. Install the connecting rod bearing shells.

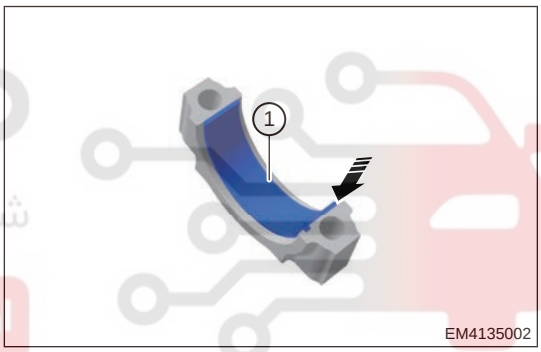
⚠ Caution

- Apply a coat of engine oil to inner surface of connecting rod bearing shell before installation.
- Back side of connecting rod bearing shell should be clean without any foreign matter during assembly.

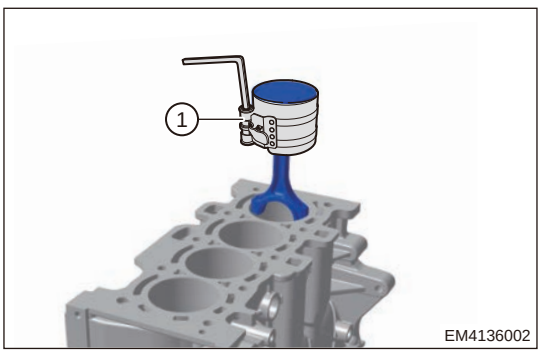
a. Carefully install the connecting rod bearing upper shell (1) in direction of arrow, and keep notch of each connecting rod bearing upper shell face the cutout of connecting rod bearing.



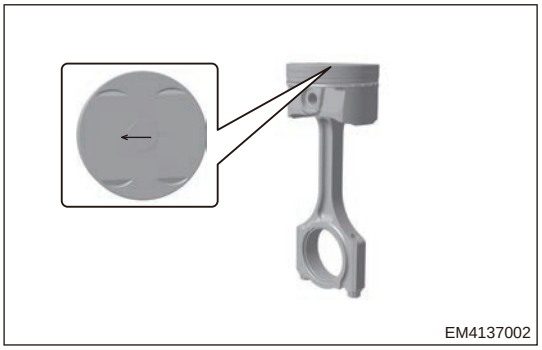
b. Carefully install connecting rod bearing lower shell (1) in direction of arrow, and keep notch of each connecting rod bearing lower shell face the cutout of connecting rod bearing cap.



8. Install the piston connecting rod assembly.
   a. Rotate crankshaft to top dead center of cylinder 1 and cylinder 4.
   b. Apply a coat of engine oil to piston surface and cylinder inner wall.
   c. As shown in illustration, install piston connecting rod assembly to cylinder with piston installer (1).

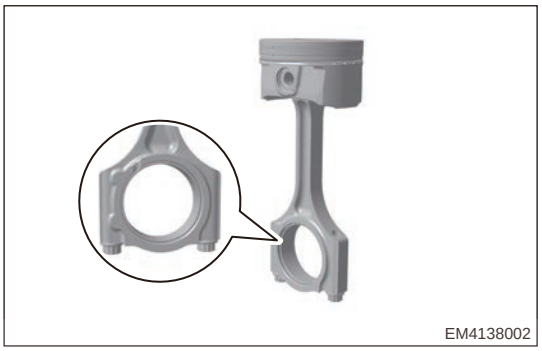


d. Pay attention to front marks on piston and connecting rod during assembly, without being reversed.



9. Install the connecting rod bearing cap.

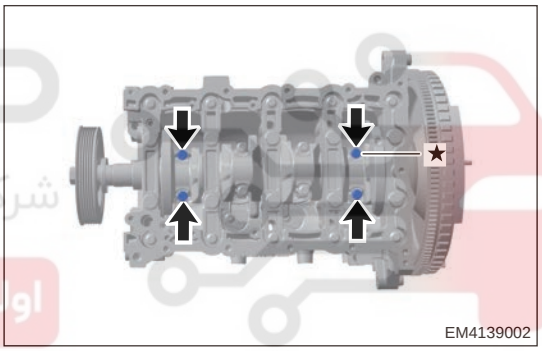
Hint:
Protrusion points on connecting rod and connecting rod bearing cap are in same side.



a. Install connecting rod bearing caps in place, and screw connecting rod bearing cap fixing bolts (arrow) by hands, then tighten connecting rod bearing cap fixing bolts in 2 steps with a torque wrench.

Tightening torque: 1st step: 15 + 3 N·m 2nd step: 60° ± 5°

Hint:
Apply a small amount of engine lubricant to connecting rods, connecting rod bearing caps and thread joint surfaces.



10. Other assembly is in the reverse order of disassembly.

SQRE4T15C INTAKE SYSTEM

Warnings and Precautions

Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

1. Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.

Precautions

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

1. Wasted air filter element should be handled by the specialized department according to local laws and regulations. Never discard it at will.
2. Check for foreign matter in air filter and hose when installing. Avoid inhaling foreign matter after engine running, causing damage to the components.
3. After removing electronic throttle, block intake manifold intake port with suitable blocking pieces to prevent foreign matter from entering, causing damage to the components.

Installation

1. Clean the air filter upper housing and lower housing.
2. Install a new air filter element.
3. Other installation procedures are in the reverse order of removal.

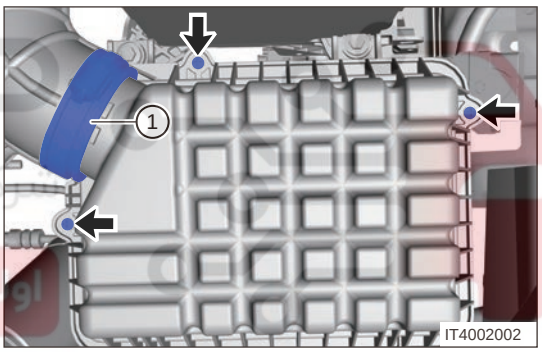
⚠ Warning
• Wasted air filter element should be handled by the specialized department according to local laws and regulations. Never discard it at will.

Air Filter Assembly

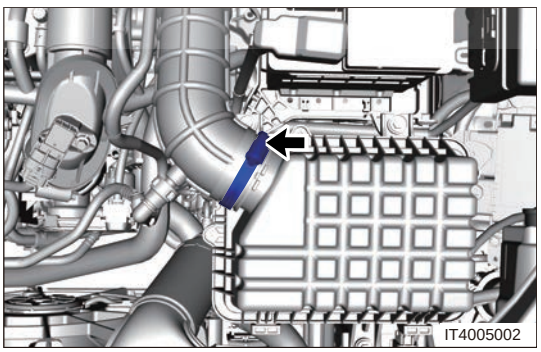
Removal

⚠ Caution
• Be sure to wear necessary safety equipment to prevent accidents when repairing.

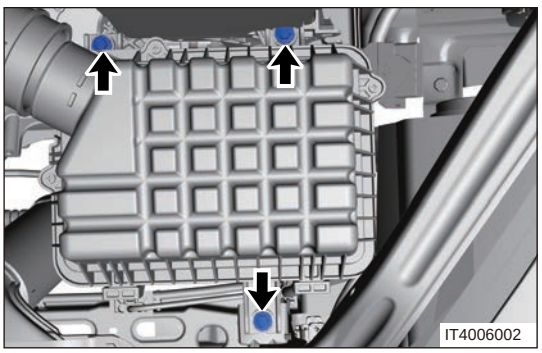
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the air filter assembly.
   a. Remove 2 fixing bolts (arrow) from air direct pipe.



   b. Loosen worm clamp (arrow) and disconnect connection between air filter and intake hose.
      Tightening torque: 3 ± 0.5 N·m



   c. Remove 3 fixing bolts (arrow) from air filter assembly.
      Tightening torque: 7 ± 1 N·m



d. Remove the air filter assembly.

Hint:
After removing air filter assembly, block intake hose with suitable blocking pieces to prevent foreign matter from entering, causing damage to the components.

Installation

1. Installation is in the reverse order of removal.

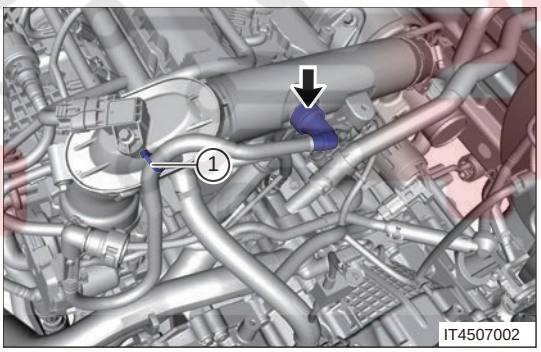
⚠ Caution
• Check for foreign matter in air filter and hose when installing, avoid inhaling foreign matter after engine running, causing damage to components.

Muffler and Muffler Hose

Removal

⚠ Caution
• Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the intake hose assembly.
4. Remove the muffler assembly.
   a. Disconnect the canister solenoid valve outlet pipe II assembly (arrow) and detach fixing clip (1).

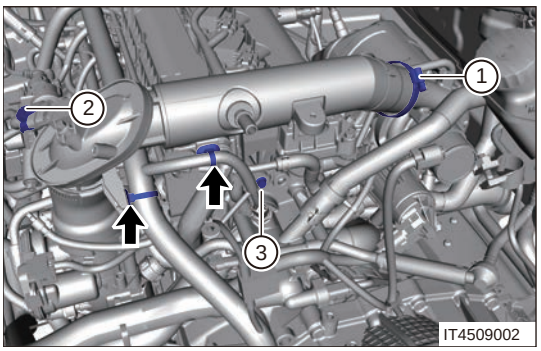


   b. Remove engine wire harness and fixing clip (arrow) from muffler assembly.
   c. Loosen worm clamp (1), disconnect the connection between muffler assembly and turbocharger.

      Tightening torque: 5 ± 1 N · m

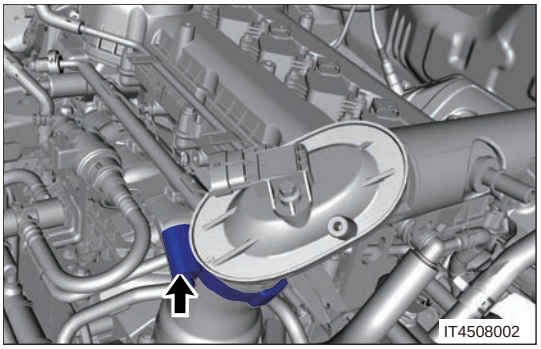
   d. Disconnect the boost pressure sensor connector (2).
   e. Remove the muffler assembly fixing bolt (3).

      Tightening torque: 9 ± 1.5 N · m



f. Loosen worm clamp (arrow), disconnect the connection between muffler assembly and muffler hose.

Tightening torque: 5 ± 1 N · m



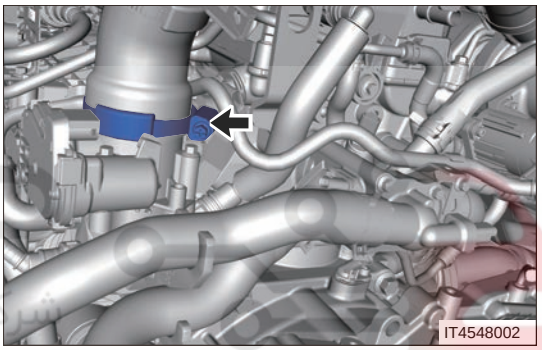
g. Remove the muffler assembly.

Hint:
After removing muffler assembly, block outlet side of turbocharger with suitable blocking pieces to prevent foreign matter from entering, causing damage to the components.

5. Remove the muffler hose.

a. Loosen worm clamp (arrow) and disconnect the connection between muffler hose and throttle assembly.

Tightening torque: 3 ± 0.5 N · m



b. Remove the muffler hose assembly.

Hint:
After removing muffler hose assembly, block throttle with suitable blocking pieces to prevent foreign matter from entering, causing damage to the components.

Installation

1. Installation is in the reverse order of removal.

⚠ Caution
• Check for foreign matter in muffler and hose when installing. Avoid inhaling foreign matter after engine running, causing damage to the components.

Electric Throttle Assembly

On-vehicle Inspection

1. Check the electronic throttle assembly.
   a. When flipping it by hand with power off and it can rotate smoothly. If catching occurs, it indicates that internal components may be damaged, and replace the electronic throttle assembly.
   b. Connect the diagnostic tester to diagnostic interface.
   c. Turn ENGINE START STOP switch to ON and turn on the diagnostic tester.

d. Read datastream on diagnostic tester.

Hint:
Accelerator pedal released

Datastream Name	Specification (V)
Sensor voltage from throttle potentiometer 1	0.77
Sensor voltage from throttle potentiometer 2	4.23

Hint:
Accelerator pedal depressed fully

Datastream Name	Specification (V)
Sensor voltage from throttle potentiometer 1	4.27
Sensor voltage from throttle potentiometer 2	0.73

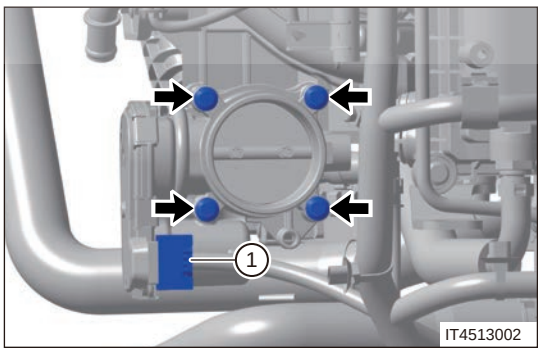
If result is not as specified, check wire harness, ECM, or replace electronic throttle assembly.

Removal

⚠ Caution

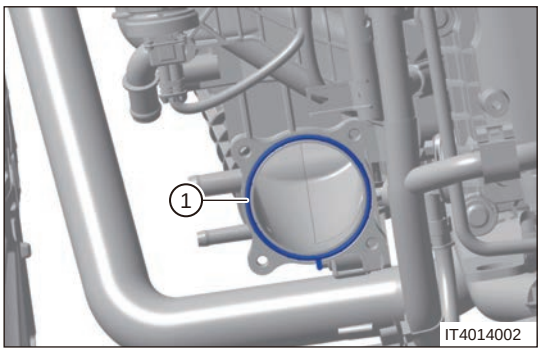
- Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the muffler and muffler hose.
4. Remove the electronic throttle assembly.
   a. Disconnect the electronic throttle assembly connector (1).
   b. Remove 4 fixing bolts (arrow) from electronic throttle assembly.
      Tightening torque: 8 ± 1 N·m



   c. Remove the electronic throttle assembly.

d. Remove throttle gasket (1) from intake manifold assembly.

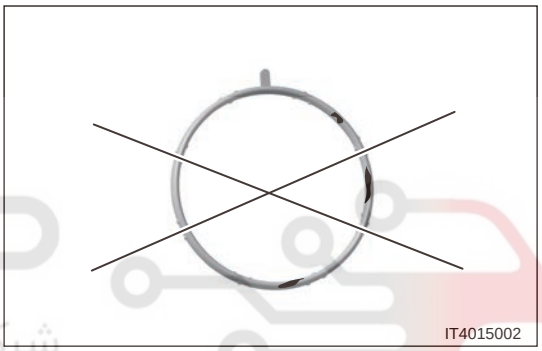


⚠ Caution

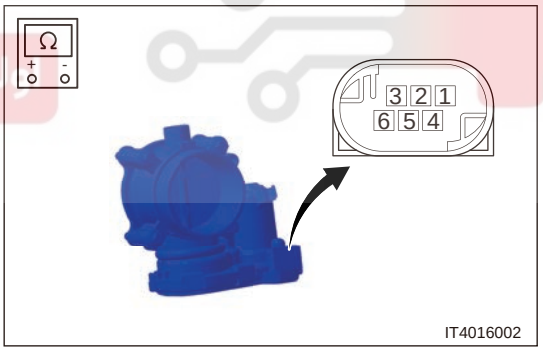
- After removing throttle assembly, block intake manifold intake port with suitable blocking pieces to prevent foreign matter from entering, causing damage to the components.

Inspection

1. Check electronic throttle assembly gasket for wear or deterioration. If there is wear or deterioration, replace electronic throttle assembly gasket.



2. Check the electronic throttle assembly. Measure resistance of electronic throttle assembly according to the right table.



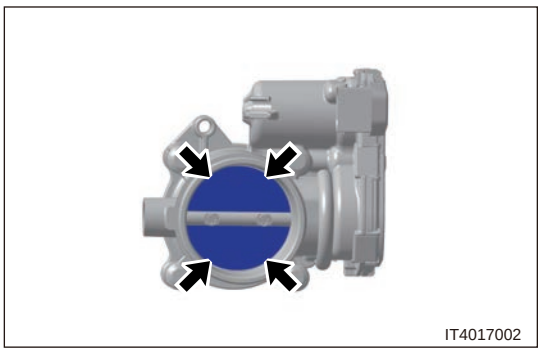
Multimeter Connection Terminal	Standard Condition
Terminal 2 - Terminal 3	1.067 kΩ (resistance at ambient temperature)
Terminal 6 - Terminal 2	As throttle opens, resistance between terminals 6 and 2 increases. And resistance between terminals 6 and 3 decreases.
Terminal 6 - Terminal 3	
Terminal 5 - Terminal 2	As throttle opens, resistance between terminals 5 and 2 decreases. And resistance between terminals 5 and 3 increases.
Terminal 5 - Terminal 3	

Cleaning

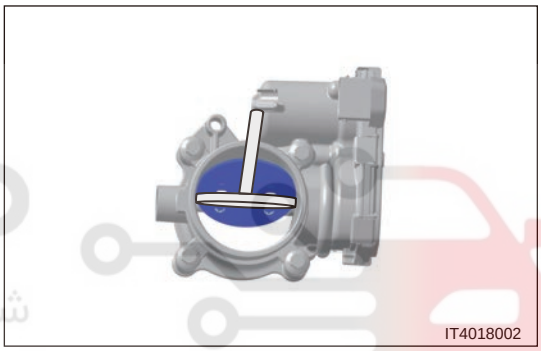
1. Cleaning tools.

a. Thin stick: Used to support throttle valve plate for cleaning the carbon deposited on contact wall between valve plate and throttle. Please use plastic, wooden or bamboo thin stick. Do not use metal thin stick to avoid scratching or deforming the valve plate.
b. Clean cloth or paper towel.

2. Cleaning process.
   a. Remove electronic throttle assembly, and make the valve plate face upward in free condition. Avoid cleaner flowing into electronic element through valve plate shaft, resulting in functional failure.
   b. Start to clean when it is as shown in illustration.
   c. Apply appropriate amount of cleaner to the inner wall of throttle valve body, and wipe off the carbon with clean cloth.


IT4017002

   d. Support the throttle valve plate with a thin stick, and clean the carbon on valve plate and throttle valve body inner wall.
   e. Turn over throttle, and clean with the same procedures as above. Repeat several times until it is clean.
   f. Push the valve plate by hand, and check if it rotates smoothly. If it is stuck, clean again according to the cleaning procedures.
   g. After cleaning, wipe off the cleaner in throttle valve body with absorbent paper.


IT4018002

⚠ Caution

- Cleaner is a kind of flammable and corrosive fluid. Follow safety cautions to prevent accidents, and avoid skin contacting with cleaner.
- Pay attention to that the amount of cleaner should not be too much, so as to overflows into sensor and motor, resulting in functional failure.

Installation

⚠ Caution

- Clean fitting surface of electronic throttle assembly.
- Perform throttle self-learning procedures after installation. After self-learning is completed, start the vehicle and check for proper operation.

1. Installation is in the reverse order of removal.

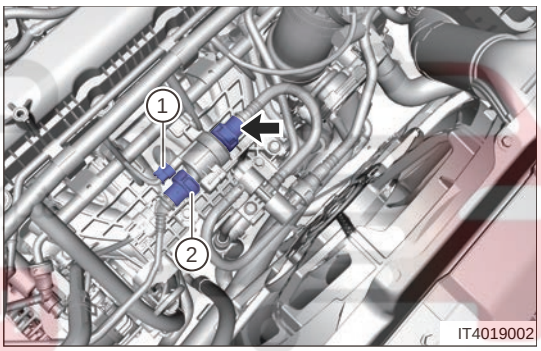
Intake Manifold Assembly

Removal

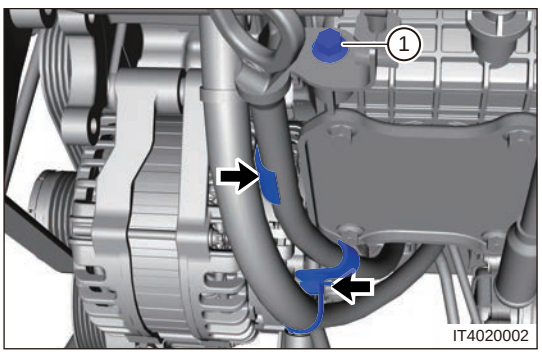
⚠ Caution

- Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Release the fuel system pressure.
2. Turn off all electrical equipment and ENGINE START STOP switch.
3. Disconnect the negative battery cable.
4. Remove the fuel rail injector assembly.
5. Remove the air filter assembly.
6. Remove the muffler assembly and muffler hose.
7. Remove the electronic throttle assembly.
8. Remove the charcoal canister solenoid valve assembly.
   a. Disconnect the charcoal canister solenoid valve connector (1).
   b. Disconnect connection between fuel vapor pipe (2) and canister solenoid valve.
   c. Disconnect the connection between canister solenoid valve outlet pipe (arrow) and canister solenoid valve.



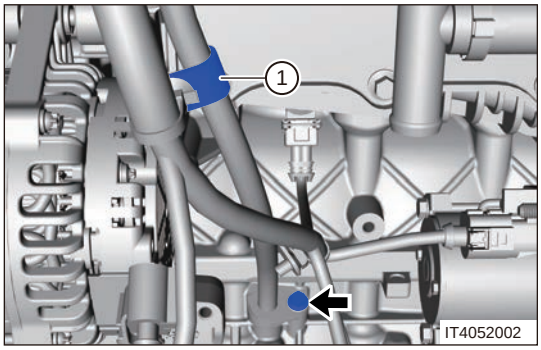
   d. Remove the canister solenoid valve assembly.
9. Remove the oil dipstick guide assembly.
   a. Disconnect the engine wire harness fixing clips (arrow).
   b. Remove fixing bolt (1) between oil dipstick guide and intake manifold assembly.



c. Disconnect the engine wire harness fixing clip (1).

d. Remove coupling bolt (arrow) between oil dipstick guide and cylinder block frame assembly.

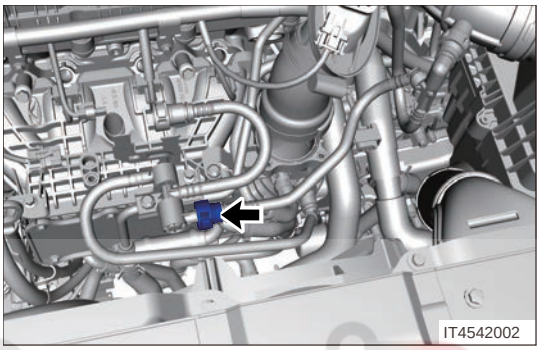
Tightening torque: 8 + 3 N m



e. Remove the oil dipstick tube assembly.

10. Remove canister desorption pressure sensor.

a. Disconnect the canister solenoid valve outlet pipe assembly (arrow).



11. Remove the intake manifold assembly.

a. Loosen clamping ring (1) and disconnect the connection between outlet pipe set - intercooler and intercooler assembly.

b. Loosen elastic clamp (2) and disconnect the connection between outlet pipe set - intercooler and low temperature radiator inlet pipe.

c. Remove fixing bolt (3) and outlet pipe set - intercooler.

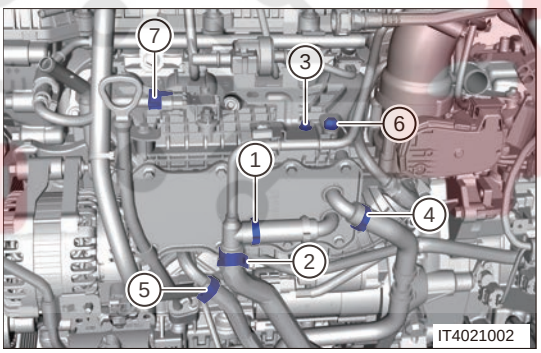
d. Loosen clamping ring (4) and disconnect the connection between inlet pipe set and intercooler assembly.

e. Loosen elastic clamp (5) and disconnect the connection between water inlet steel pipe and low temperature radiator outlet pipe set.

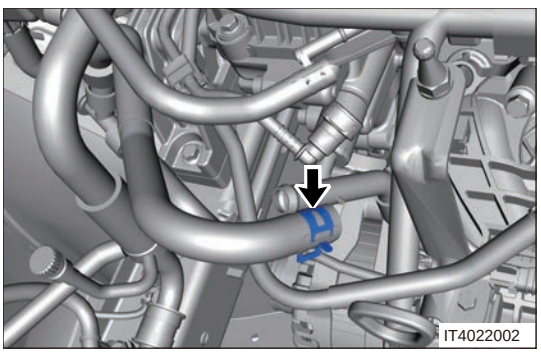
f. Remove fixing bolt (6) from brake vacuum pipe bracket.

Tightening torque: 8 + 3 N m

g. Disconnect the intake pressure/temperature sensor connector (7).



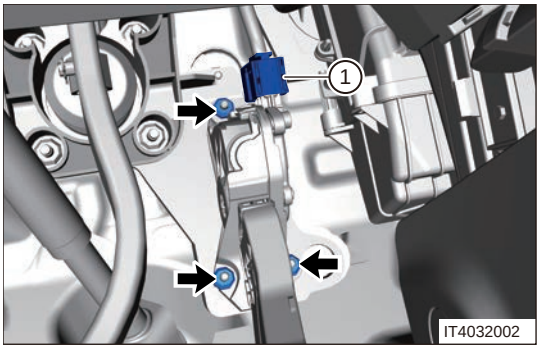
h. Loosen elastic clamp (arrow) and disconnect the connection between expansion tank water outlet pipe set and water inlet steel pipe.



a. Disconnect the electronic accelerator pedal connector (1).

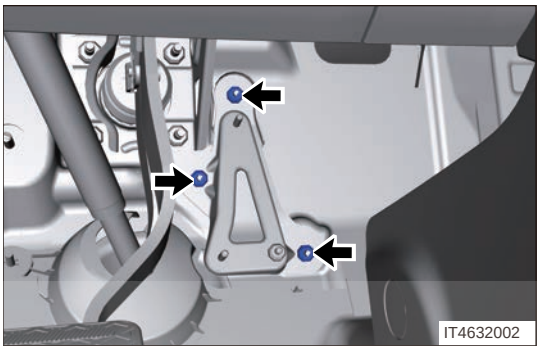
b. Remove 3 fixing nuts (arrow) from electronic accelerator pedal.

Tightening torque: 9 ± 1.5 N · m



c. Remove the electronic accelerator pedal.

d. Remove 3 fixing nuts (arrow) from electronic accelerator pedal bracket.



e. Remove the electronic accelerator pedal bracket.

Installation

1. Installation is in the reverse order of removal.

SQRE4T15C EXHAUST SYSTEM

Warnings and Precautions

Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

2. Before repairing the exhaust system, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

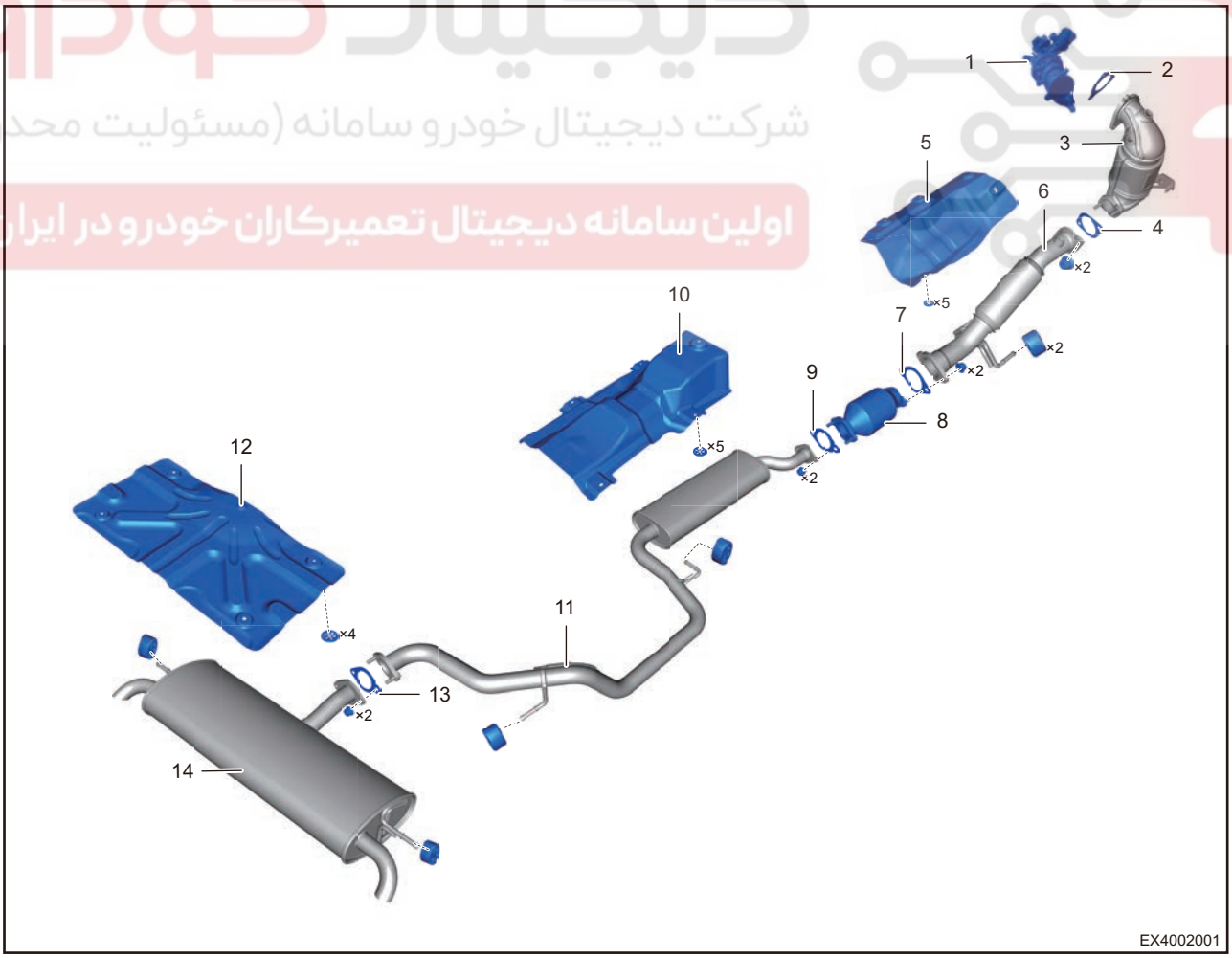
Precautions

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

1. If exhaust gasket is damaged, replace it, and remove foreign matters on joints and threads.
2. Check exhaust gas for leakage. If gas leaks, tighten malfunctioning part to prevent leakage. Replace damaged parts as necessary.

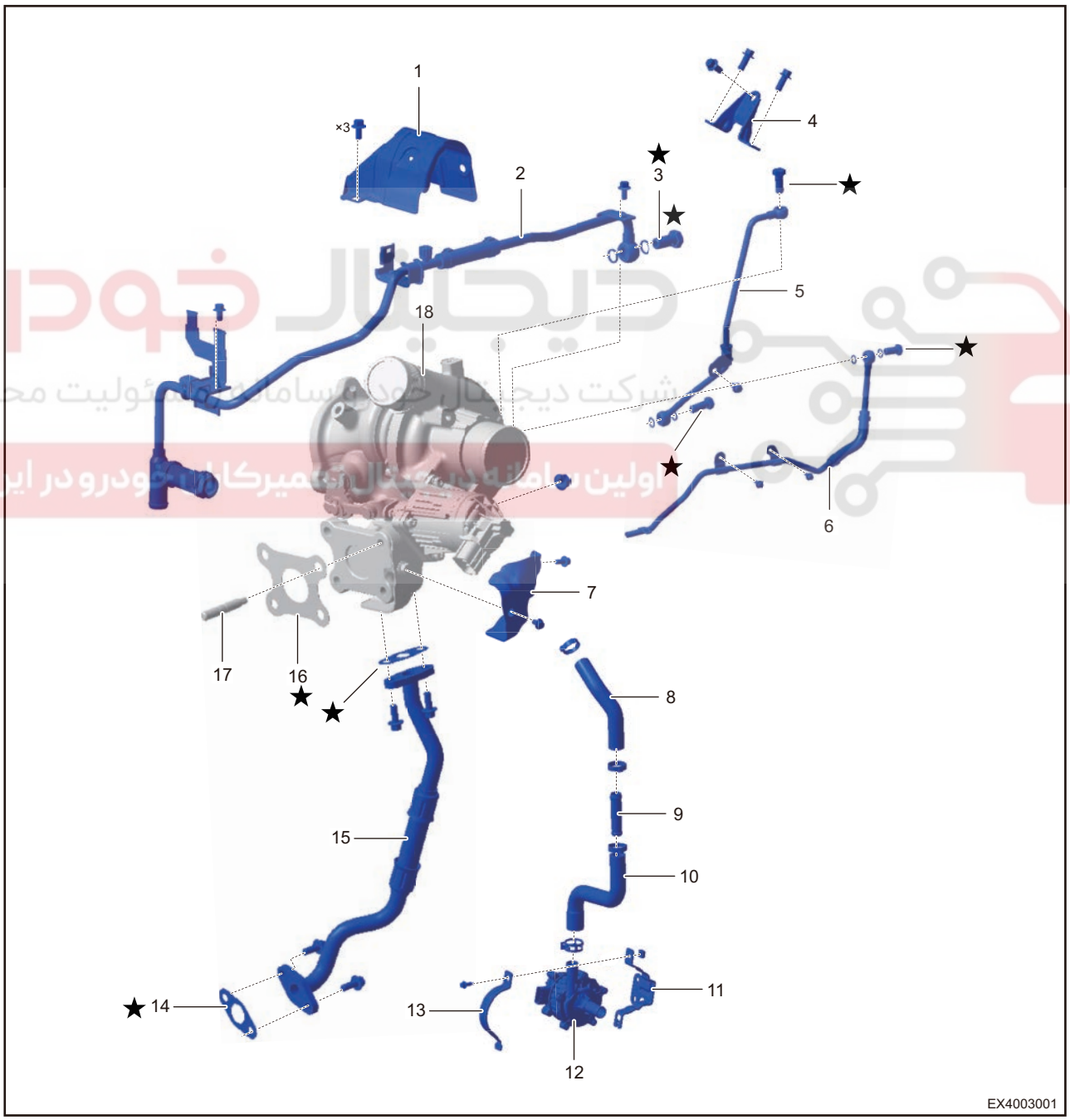
General Information

System Exploded Diagram



1	Turbocharger Assembly	8	Main Catalytic Converter Assembly
2	Catalytic Converter Washer	9	Gasket
3	Precatalytic Converter Assembly	10	Front Muffler Heat Insulator
4	Gasket behind Precatalytic Converter	11	Front Muffler Assembly
5	Muffler Heat Insulator II	12	Muffler Heat Insulator I
6	Front Exhaust Pipe Assembly	13	Gasket
7	Gasket	14	Rear Muffler Assembly

Turbocharger



1	Turbocharger Heat Insulator	11	Electric Water Pump Bracket 1
2	Turbocharger Water Outlet Pipe Set	12	Electric Water Pump Assembly
3	Hollow Bolt	13	Electric Water Pump Bracket 2
4	Turbocharger Bracket	14	Oil Return Pipe Washer
5	Turbocharger Inlet Pipe	15	Turbocharger Oil Return Pipe
6	Turbocharger Water Inlet Pipe Set	16	Turbocharger Washer
7	Turbocharger Heat Insulator II	17	High Temperature Stud
8	Water Outlet Hose	18	Turbocharger
9	Water Outlet Hose Connection	★	Non-reusable Part
10	Water Outlet Hose		

Functional Principle

System Operation

- Exhaust system controls engine exhaust, reducing vehicle emissions by precatalytic converter and main catalytic converter, and eliminating exhaust noise by muffler. When exhaust system discharges exhaust gas, oxygen sensor monitors oxygen content in exhaust gas. Engine control module adjusts air-fuel ratio of combustible gas mixture to control vehicle emissions and achieve optimal fuel economy according to feedback signals of oxygen sensor and combining with other sensor signals.
- Turbocharger use motor to drive the turbo impeller to rotate, then drive compressor impeller to pressurize the air pressed through air filter and send it into cylinder. As more air enters into cylinder, more fuel is allowed to be injected, which results in higher engine power. In addition, the turbocharger can also make the engine obtain power compensation when working at high altitude.

Specifications

Torque Specifications

Description	Torque (N·m)
High Temperature Stud	15 ± 2.5
High Temperature Nut	27 ± 4
Turbocharger Corresponding Water Inlet Threaded Hole Hollow Bolt	25 + 3
Turbocharger Oil Return Pipe Hexagon Flange Face Bolt	8 + 3
Heat Insulator Bolt	8 + 3
Turbocharger Bracket Fixing Bolt	33 ± 3.5
Turbocharger Fixing Nut	25 ± 5
Electronic Water Pump Assembly Fixing Bolt	8 + 3
Electronic Water Pump Bracket Fixing Bolt	8 + 3
Front Exhaust Pipe Assembly Fixing Nut	45 ± 5

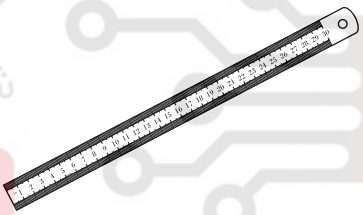
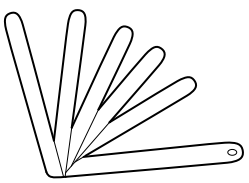
Description	Torque (N·m)
Main Catalytic Converter Fitting Nut	45 ± 5
Front Muffler Assembly Fixing Nut	45 ± 5
Rear Muffler Assembly Fixing Nut	45 ± 5

Non-reusable Part

Non-reusable Part	
High Temperature Nut (Turbocharger)	Replacement required
Turbocharger Washer	Replacement required
Washer (Hollow Bolt)	Replacement required
Oil Return Pipe Washer	Replacement required

Tools

General Tools

Tool Name	Tool Drawing
Precision Straightedge	 RCH0063006
Feeler Gauge	 RCH006006

Diagnosis & Testing

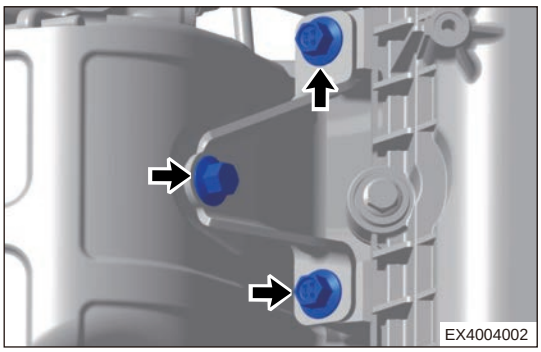
Problem Symptoms Table

Warning

- Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

a. Remove 3 fixing bolts (arrow) from turbocharger fixing bracket.

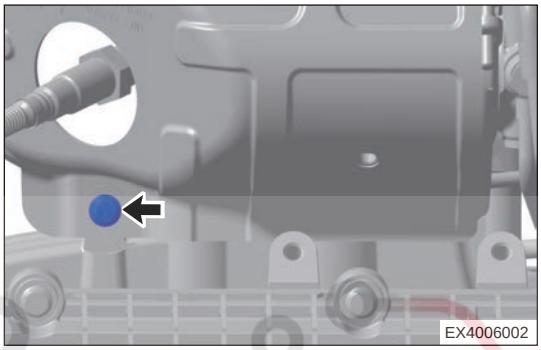
Tightening torque: 33 ± 3.5 N·m



b. Remove the turbocharger fixing bracket.

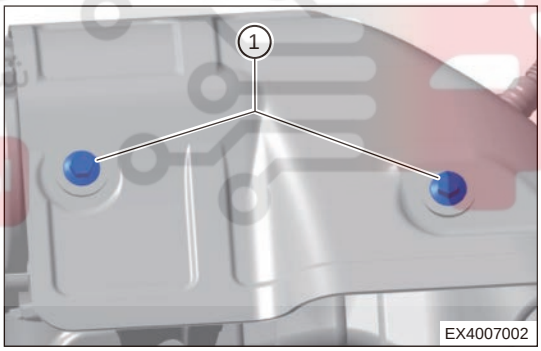
4. Remove the turbocharger heat insulator.
   a. Disconnect the upstream oxygen sensor connector.
   b. Remove turbocharger heat insulator fixing bolt (arrow).

      Tightening torque: 9 ± 1.5 N·m



   c. Remove 2 fixing bolts (1) from turbocharger heat insulator.

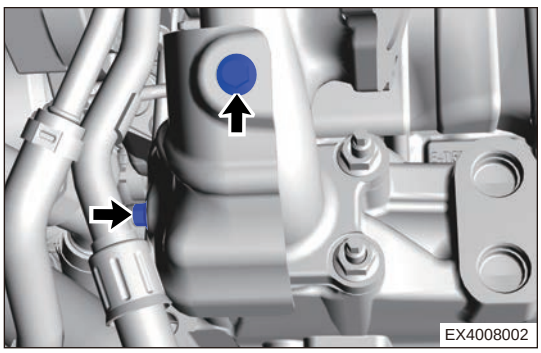
      Tightening torque: 8 ± 3 N·m



   d. Remove turbocharger heat insulator assembly.

5. Remove the turbocharger heat insulator Ⅱ.
   a. Remove 2 fixing bolts (arrow) from turbocharger heat insulator Ⅱ.

      Tightening torque: 8 + 3 N m



   b. Remove turbocharger heat insulator Ⅱ.

Installation

1. Installation is in the reverse order of removal.

Turbocharger Assembly

Removal

⚠ Warning

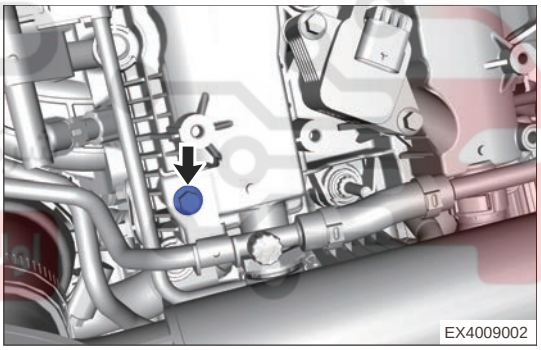
- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.

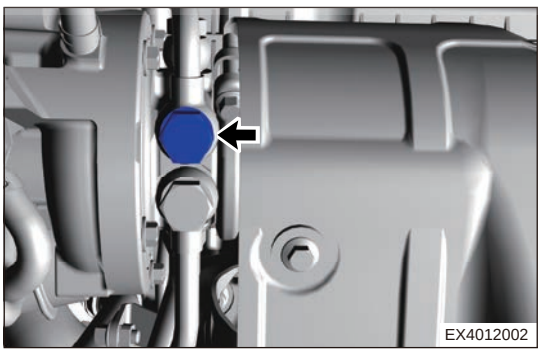
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Drain the coolant.
4. Remove the muffler assembly.
5. Remove the precatalytic converter assembly.
6. Remove the intake hose.
   a. Loosen worm clamp and disconnect intake hose assembly.
7. Remove turbocharger water outlet pipe set assembly.
   a. Remove 1 fixing bolt (arrow) between turbocharger outlet hose bracket and muffler.

      Tightening torque: 8 + 3 N m



   b. Remove the hollow bolt (arrow) between turbocharger water outlet pipe set and turbocharger assembly.

      Tightening torque: 20 + 3 N m



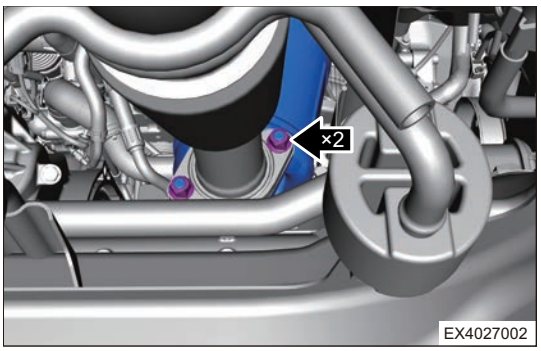
   c. Remove the turbocharger water outlet pipe set.

      Hint:
      Pay attention not to drop upper and lower washers of hollow bolt during removal and do not reuse them.
8. Remove the turbocharger water inlet pipe set assembly.

a. Raise the vehicle to a proper position.

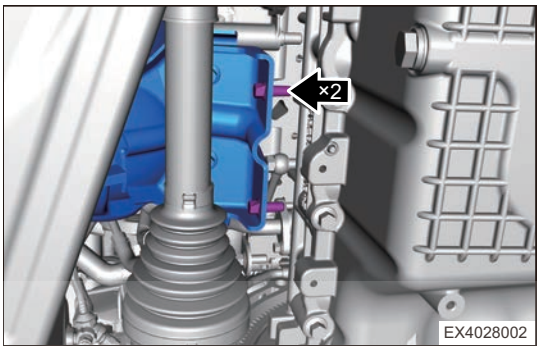
b. Remove 2 fixing nuts (arrow) between precatalytic converter assembly and front exhaust pipe.

Tightening torque: 45 ± 5 N·m



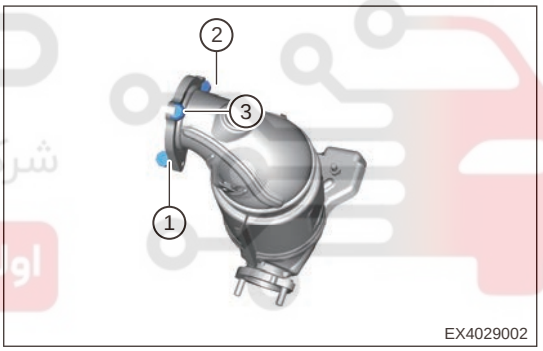
c. Remove 2 fixing bolts (arrow) from precatalytic converter assembly bracket.

Tightening torque: 25 ± 3.5 N·m



d. Remove 3 fixing nuts (1) (2) (3) between precatalytic converter assembly and turbocharger.

Hint:
Replace the nut with a new one after each removal/ installation, and not reuse it.



e. Remove the precatalytic converter assembly.

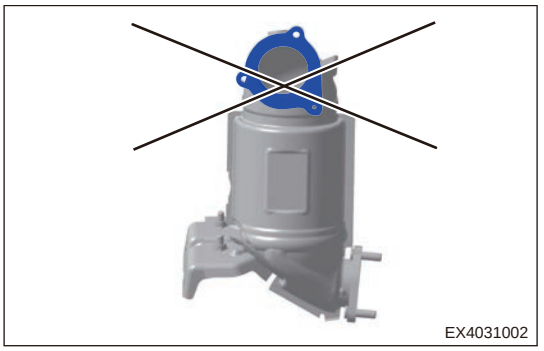
f. Remove the upstream oxygen sensor from precatalytic converter assembly.

Tightening torque: 45 ± 5 N·m

Inspection

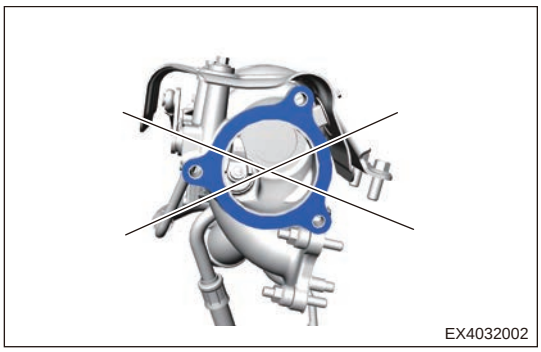
1. Inspect warpage on precatalytic converter connection surface:

a. Using a precision straightedge and feeler gauge, measure the connection surface between precatalytic converter body and turbocharger, replace it if the surface warpage is above 0.5 mm.

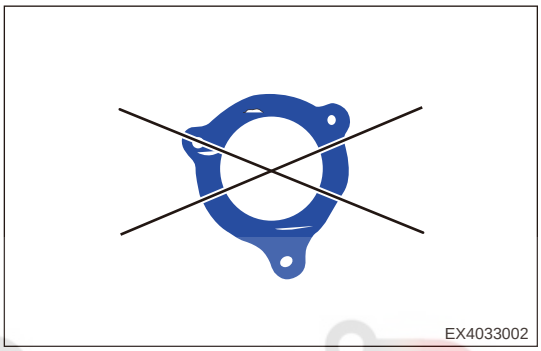


b. Check precatalytic converter internal carrier for cracked or blocked. Replace precatalytic converter assembly if damaged.

2. Check bending on turbocharger connection surface:
   a. Using a precision straightedge and feeler gauge, measure the connection surface between turbocharger body and precatalytic converter, replace it if the surface bending is above 0.04 mm.


EX4032002

3. Check the gasket:
   a. Check the gasket, there should be no scratches or rough, otherwise replace it.


EX4033002

Installation

⚠ Caution

- If gasket is damaged, replace it, and remove foreign matters on joints and threads.
- If there is any crack or leakage in precatalytic converter assembly, replace it.
- Check that there is no exhaust gas leakage in connecting part of upstream oxygen sensor.
- Check that there is no exhaust gas leakage between precatalytic converter assembly and turbocharger, precatalytic converter assembly and front exhaust pipe assembly after installation.

1. Installation is in the reverse order of removal.

Front Exhaust Pipe Assembly

Removal

⚠ Warning

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

⚠ Caution

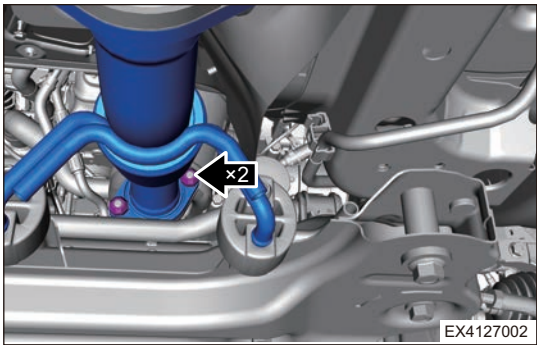
- Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Raise vehicle to a proper height.
4. Remove the front exhaust pipe assembly.

a. Take off and disconnect downstream oxygen sensor connector from bracket.

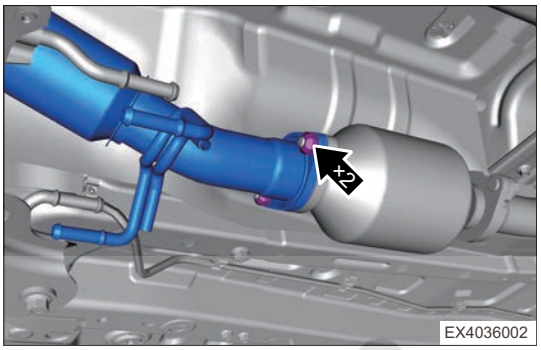
b. Remove 2 fixing nuts (arrow), then disconnect connection between front exhaust pipe assembly and precatalytic converter assembly, and take off the gasket from connecting part.

Tightening torque: 45 ± 5 N m

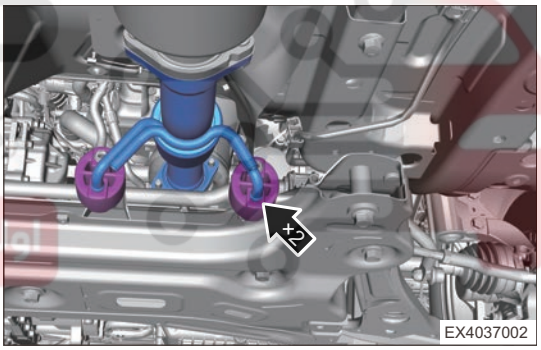


c. Remove 2 coupling nuts (arrow), then disconnect connection between front exhaust pipe assembly and main catalytic converter assembly, and take off the gasket from connecting part.

Tightening torque: 45 ± 5 N • m



d. Separate 2 fixing hanger blocks (arrow) between front exhaust pipe assembly and body hook.



e. Remove the front exhaust pipe assembly.

f. Remove downstream oxygen sensor from front exhaust pipe assembly.

Tightening torque: 45 ± 5 N m

Installation

⚠ Warning

- If gasket is damaged, replace it, and remove foreign matters on joints and threads.
- Check exhaust gas for leakage. If gas leaks, tighten malfunctioning part to prevent leakage. Replace damaged parts as necessary.
- Check that there is no exhaust gas leakage in connecting part of downstream oxygen sensor.

1. Installation is in the reverse order of removal.

Main Catalytic Converter Assembly

Removal

Warning

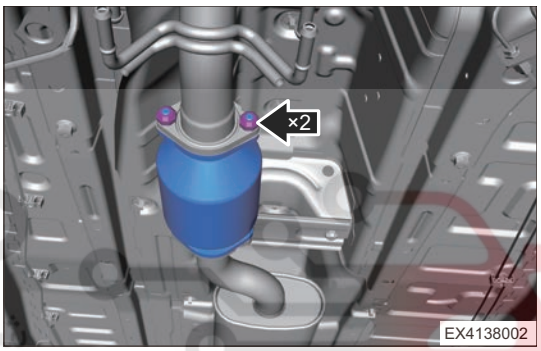
- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.

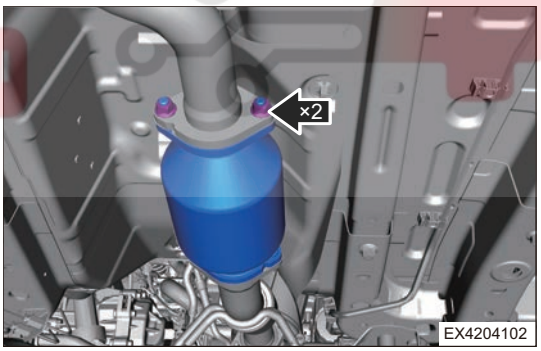
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Raise the vehicle to a proper position.
3. Remove the main catalytic converter and front muffler.
   a. Remove 2 coupling nuts (arrow), then disconnect connection between main catalytic converter assembly and front exhaust pipe.

      Tightening torque: 45 ± 5 N·m



   b. Remove 2 coupling nuts (arrow), then disconnect connection between main catalytic converter assembly and front muffler assembly.

      Tightening torque: 45 ± 5 N·m



   c. Carefully remove the main catalytic converter assembly.

Inspection

1. Check main catalytic converter assembly.
   a. Check if there are cracks or leakage on main catalytic converter assembly. If so, please replace main catalytic converter assembly.

Installation

Caution

- If gasket is damaged, replace it, and remove foreign matters on joints and threads.

1. Installation is in the reverse order of removal.

Front Muffler Assembly

Removal

⚠ Warning

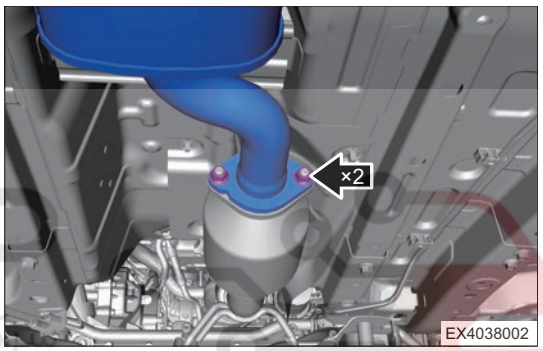
- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.

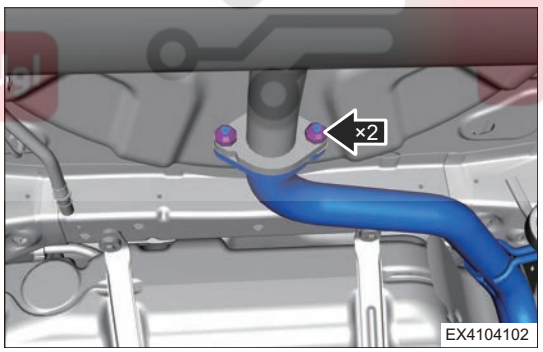
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Raise the vehicle to a proper position.
3. Remove the front muffler assembly.
   a. Remove 2 coupling nuts (arrow), then disconnect connection between main catalytic converter assembly and front muffler assembly.

      Tightening torque: 45 ± 5 N • m

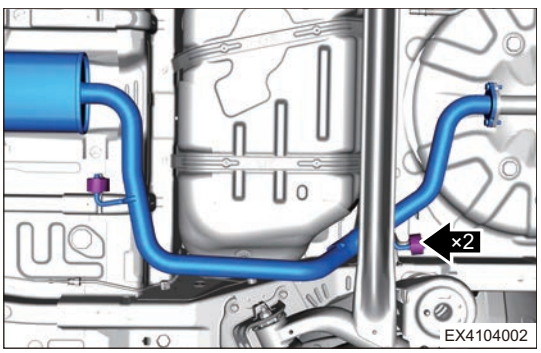


   b. Remove 2 coupling nuts (arrow), then disconnect connection between front muffler assembly and rear muffler assembly.

      Tightening torque: 45 ± 5 N • m



   c. Disengage 2 fixing hanger blocks (arrow) from front muffler assembly.



   d. Carefully remove the front muffler assembly.

Inspection

1. Inspect front muffler assembly.

a. Inspect if there are cracks or leakage on front muffler assembly surface. Replace the front muffler assembly if necessary.

Installation

⚠ Caution
• If gasket is damaged, replace it, and remove foreign matters on joints and threads.

1. Installation is in the reverse order of removal.

Rear Muffler Assembly

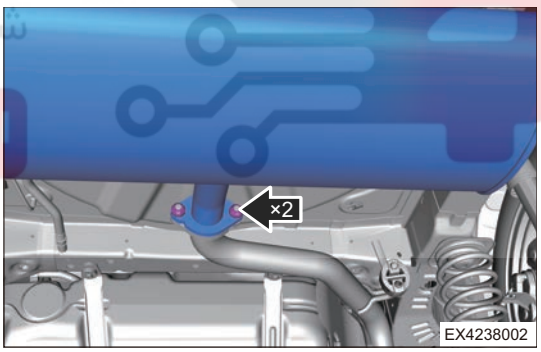
Removal

⚠ Warning
• Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

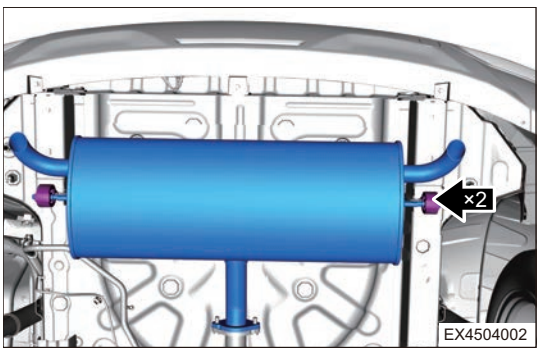
⚠ Caution
• Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Raise the vehicle to a proper position.
3. Remove the rear muffler assembly.
   a. Remove 2 coupling nuts (arrow), then disconnect connection between rear muffler assembly and front muffler assembly.

      Tightening torque: 45 ± 5 N·m



   b. Disengage 2 fixing hanger blocks (arrow) from rear muffler assembly.



   c. Carefully remove the rear muffler assembly.

Inspection

1. Inspect rear muffler assembly.
   a. Inspect if there are cracks or leakage on rear muffler assembly surface. Replace it if necessary.

Installation

⚠ Caution
• If gasket is damaged, replace it, and remove foreign matters on joints and threads.

1. Installation is in the reverse order of removal.

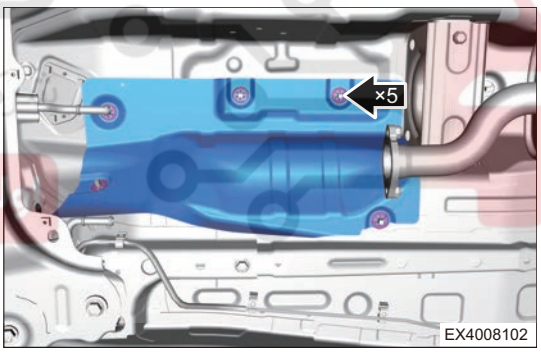
Muffler Heat Insulator II

Removal

⚠ Warning
• Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

⚠ Caution
• Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Raise vehicle to a proper height.
4. Remove the muffler heat insulator II.
   a. Remove 5 clamping washers (arrow) from muffler heat insulator II.



   b. Remove the muffler heat insulator II.

Inspection

1. Inspect the muffler heat insulator II.
   a. Inspect if there are cracks on muffler heat insulator II. If so, replace muffler heat insulator II.

Installation

1. Installation is in the reverse order of removal.

Front Muffler Heat Insulator

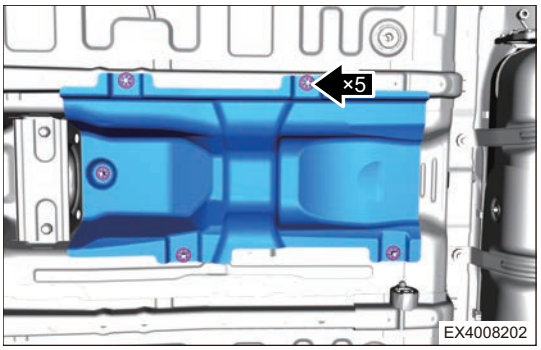
Removal

⚠ Warning
• Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and ENGINE START STOP switch
2. Disconnect the negative battery cable
3. Raise vehicle to a proper height.
4. Remove the front muffler heat insulator
   a. Remove 5 clamping washers (arrow) from front muffler heat insulator.



   b. Remove the front muffler heat insulator.

Inspection

1. Inspect the front muffler heat insulator
   a. Inspect if there are cracks on front muffler heat insulator. If so, replace front muffler heat insulator.

Installation

1. Installation is in the reverse order of removal.

Muffler Heat Insulator Ⅰ

Removal

⚠ Warning

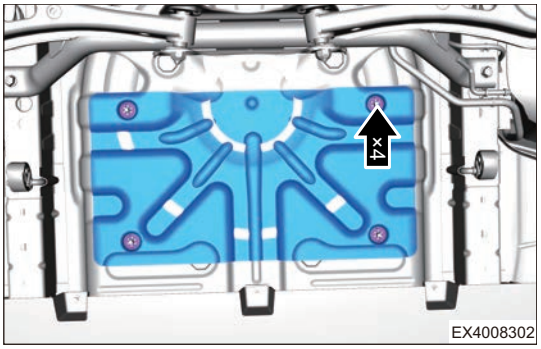
- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable
3. Raise vehicle to a proper height.
4. Remove the muffler heat insulator Ⅰ.

a. Remove 4 clamping washers (arrow) from muffler heat insulator Ⅰ.



b. Remove the muffler heat insulator Ⅰ.

Inspection

1. Inspect the muffler heat insulator Ⅰ.
   a. Inspect if there are cracks on muffler heat insulator Ⅰ. If so, replace muffler heat insulator Ⅰ.

Installation

1. Installation is in the reverse order of removal.

SQRE4T15C IGNITION SYSTEM

Warnings and Precautions

Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

1. It is prohibited to use short circuit spark test to test ignition function during repair, otherwise it may damage the module.
2. During using, do not remove ignition coil from spark plug with bare hands with power on, and do not contact the metal part and rubber guide rod directly, to avoid electric shock.
3. Make sure that ground wire of ignition coil assembly is short to the nearest GND separately from ECU and other electrical device to reduce signal interfere as possible.
4. Ensure that connector or wire harness has no damage; the wire harness connector is connected correctly. Ensure that wire harness and connector have no short circuit or poor contact.

Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

1. DO NOT remove the spark plugs when engine is hot; failure to do this may cause damage to the spark plug thread holes on cylinder head.
2. When installing spark plug and ignition coil, check if there is impurities in cylinder head mounting holes, and if the inner wall is smooth.
3. Do not make paint mark on spark plug assembly ceramic body. If there is paint or other organic mark, it is necessary to clean. Never apply grease such as lubricant and anti-rust oil etc. on spark plug assembly. If so, it is required to clean it.
4. Before removal, remove the dirt and foreign matter around ignition coil and ignition coil mounting hole to prevent them from dropping into cylinders.
5. After removing or when replacing ignition coil, do not place ignition coil on the ground or other dusty places, otherwise, dust or foreign matter may enter rubber guide and lead to ignition coil failure.
6. When replacing spark plug, remove and install ignition coil carefully. Do not rotate ignition coil (avoid scratching rubber guide).
7. Do not separate ignition coil rubber guide and ignition coil body. If so, it may cause the decrease of seal performance and fuel gas enter and corrode inner structure when reinstalling.

Symptom	Possible Cause
	Spark plug
	Intake camshaft phaser control valve
	Exhaust camshaft phaser control valve
	Wire harness
	ECU
Knock	Ignition coil assembly
	Knock sensor
	ECU
Difficult to start	Battery
	Ignition coil assembly
	Spark plug
	Engine speed sensor
Engine hesitation, power drop, unstable performance	Ignition coil assembly
	Engine speed sensor
	Intake camshaft phaser control valve
	Exhaust camshaft phaser control valve
	Spark plug
	Camshaft position sensor
	ECU
Rough, unstable idling or stall	Ignition coil assembly
	Camshaft position sensor
	Spark plug
	ECU

Repair Precautions

Visual inspection can reduce the unnecessary test and diagnostic time, so pay attention to the following inspection items:

1. Check the line and hose for obvious looseness, and if they are disconnected or routed improperly.
2. Make sure that the battery connections are clean and fixed firmly.
3. Check if the generator wire and belt are installed correctly and securely.
4. Check if the engine wire harness connectors are inserted fully.
5. Check if all electrical connectors are installed correctly and securely.
6. Check the following electrical connections:

a. Crankshaft position sensor.
b. Oxygen sensor.
c. Intake pressure/temperature sensor.
d. Ignition coil.
e. Oil pressure switch.
f. Charcoal canister solenoid valve.
g. Camshaft position sensor.
h. Electronic throttle.
i. Intake Variable Valve Timing (VVT) control valve.
j. Exhaust Variable Valve Timing (VVT) control valve.
k. Fuel injector.

7. Check the routing of all vacuum hoses.
8. Confirm that the following vacuum hoses are connected securely without any leakage.
   a. Charcoal canister solenoid valve.
   b. PCV valve.
   c. Brake booster.
9. Check electric fuel pump hose and wire connections to make sure that they are connected securely.

Spark Plug Common Problems

Inspection

OK

1. Spark plug porcelain small end is between white and yellowish, gray or brownish.
2. Air-fuel ratio and ignition time are normal, there is no misfire, and cold-start enriching function is normal.

Carbon Accumulation

A layer of velvety black charcoal smoke attaches on the insulator small end, electrode and spark plug body		
Cause	Result	Treatment
Mixture is excessively rich due to improper adjustment of air fuel mixture.	Poor starting ability	Check air filter and adjust air-fuel ratio and cold starting system.
Traveling distance of vehicle is too short, engine temperature is low, and combustion is incomplete.		
Fuel quality is poor or fuel deteriorates, fuel is abnormal.		
Spark plug type is incorrect.		

Oil Dirt

A layer of black oily charcoal smoke and dirt attach on the insulator small end, electrode and spark plug body		
Cause	Result	Treatment
Piston ring has bad elasticity or is worn excessively, and oil breaks into combustion chamber.	Difficult to start	Check and repair engine, or replace spark plug.

A layer of black oily charcoal smoke and dirt attach on the insulator small end, electrode and spark plug body		
Excessive matching clearance between piston skirt and cylinder wall causes oil breaking and air leakage.		
Air leakage occurs due to incorrect installation of piston ring in direction of inside and outside tangent angle, causing oil breaking into combustion chamber.		
Excessive clearance occurs between valve stem and valve guide due to excessive wear, or valve guide oil seal fails, causing oil leakage.		
Oil level is too high and oil breaks into combustion chamber.		

Lead Deposits

Brownish yellow enamels or greenish deposits exist on the insulator small end		
Cause	Result	Treatment
The fuel additive contains lead, when engine runs under high load conditions with throttle partially opened for a long time, enamel is formed.	Causing misfire	Replace spark plug.

Red Deposits

There are severe red brown deposits on insulator skirt and electrodes, and clear radial discharge traces can be seen on the surface of insulator small end		
Cause	Result	Treatment
In the unleaded gasoline, Mn-based anti-riot agent MMT is used instead of lead tetraethyl, the oxide of Mn after combustion adheres on the surface of insulator and electrode.	At high temperature, these deposits are easily conductive, resulting in flashover on insulator skirt surface, unstable combustion, high engine speed, and jitter under heavy load conditions.	Use qualified fuel, replace spark plug.

On-vehicle Service

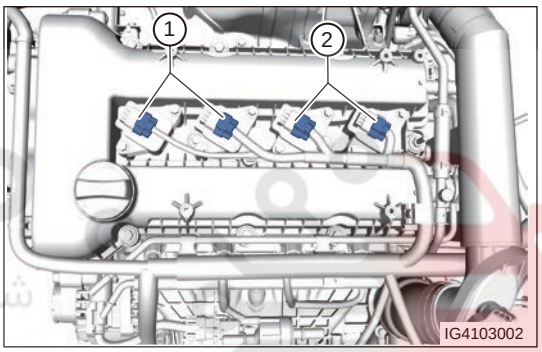
Ignition Coil Assembly

Removal

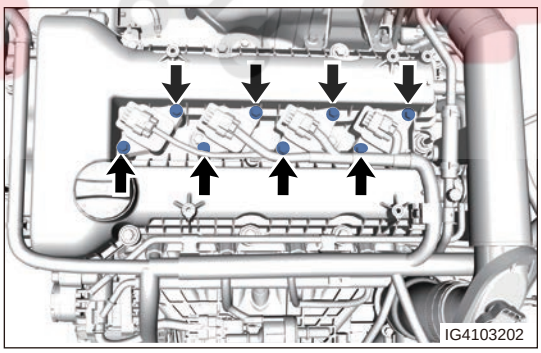
⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.
- It is prohibited to use short circuit spark test to test ignition function during repair, otherwise it may damage the module.
- During using, do not remove ignition coil from spark plug with bare hands with power on, and do not contact the metal part directly, to avoid electric shock.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the ignition coil assembly.
   a. Disconnect the ignition coil assembly connector (1), and move away the wire harness from ignition coil assembly.
   b. Disconnect the ignition coil assembly connector (2), and move away the wire harness from ignition coil assembly.



   c. Remove 8 fixing bolts (arrow) from ignition coil assembly.
      Tightening torque: 9 ± 1 N · m

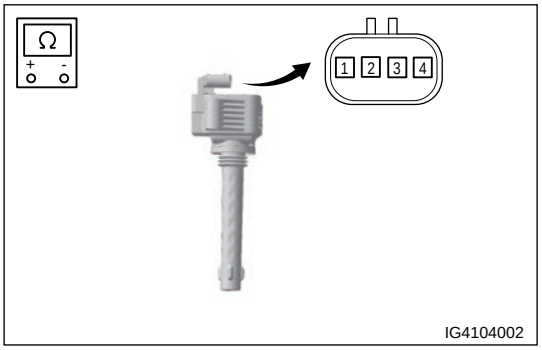


   d. Remove 4 ignition coil assemblies.

Inspection

1. Inspect the resistance of ignition coil.

a. Turn digital multimeter to ohm band, and check the resistance between terminals.



Terminal	Terminal Definition
1	Power supply
2	Ground
3	Ground
4	Control signal

Multimeter Connecti-on	Condition	Specification (Ω)	
		UAES	Wodeer
Terminal 1 - Terminal 2	Normal temperatu-re	1.27 MΩ ± 10%	12.77 KΩ ± 10%
Terminal 1 - Terminal 3		∞	∞
Terminal 1 - Terminal 4		1.27 MΩ ± 10%	13.72 KΩ ± 10%
Terminal 2 - Terminal 3		∞	∞
Terminal 2 - Terminal 4		1.1 KΩ ± 10%	0.95 KΩ ± 10%
Terminal 3 - Terminal 4		∞	∞

Hint:
Replace ignition coil if result difference is great.

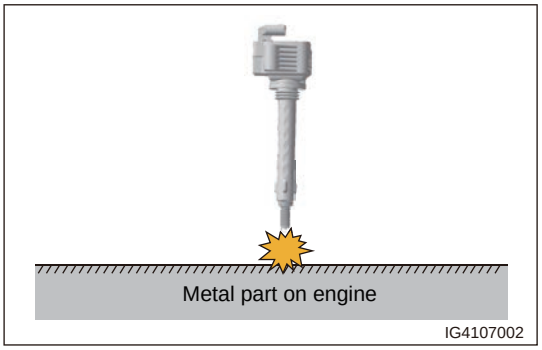
Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- Make sure that the connection of ignition coil high-voltage output terminal and spark plug is reliable, or it may cause high-voltage leakage, resulting in poor ignition.
- Before installation, check the mounting hole of cylinder head spark plug, and no impurities can be brought in during assembly.
- Install the ignition coil into cylinder head cover mounting hole and press it to close to mounting boss on cylinder head cover. Never turn ignition coil to left/right after pressing and do not tap ignition coil with a hammer etc.

a. If there is a thick spark with blue-white color and popping occurs between spark plug and engine body and also spark generated between center electrode and side electrode, that indicates ignition system is normal.
b. If there is a thick spark with blue-white color between spark plug and engine body and no spark between center electrode and side electrode, but spark is in inside of center electrode, that indicates inside of spark plug is damaged.
c. If the spark is red and short or there is no spark, check ignition coil or others.



Installation

⚠ Caution

- Check the spark plug type to confirm if it is suitable.
- Please install spark plug with a special spark plug socket, and never damage the normal spark plug gap.
- Avoid to install the spark plug from higher position from mounting hole during installation to prevent spark plug side electrode gap from damaging, resulting in poor ignition.
- Always tighten the spark plug according to specified torque using a torque wrench when installing and replacing it.

1. Install the spark plug.
   a. Install 4 spark plugs respectively into the cylinder head mounting holes for pre-tightening, and then retighten the spark plugs with a torque wrench.
      Tightening torque: 20 ± 3 N·m
2. Other installation procedures are in the reverse order of removal.

SQRE4T15C EMISSION SYSTEM

Warnings and Precautions

Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

1. Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.
2. Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

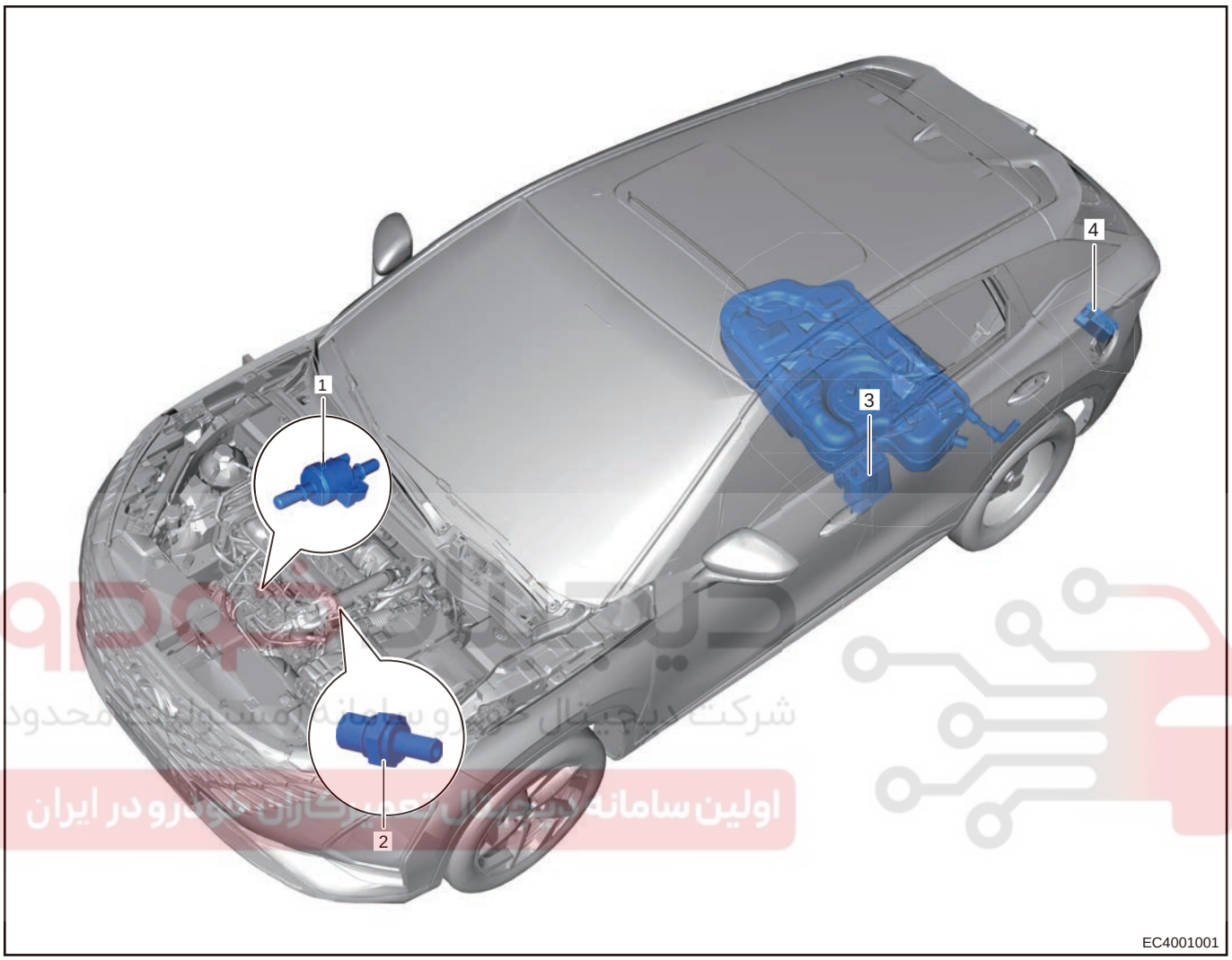
Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

1. Specified grease must be used and use of other grease will lead to oxygen sensor poisoning. New parts has been applied with grease and grease must be applied on mounting threads during reassembly.
2. Unneeded activated charcoal canister assembly should be handled by the specialized department according to local laws and regulations. Never discard it at will.
3. If the oxygen sensor falls, never pick it up to install and it needs to return to factory for testing.

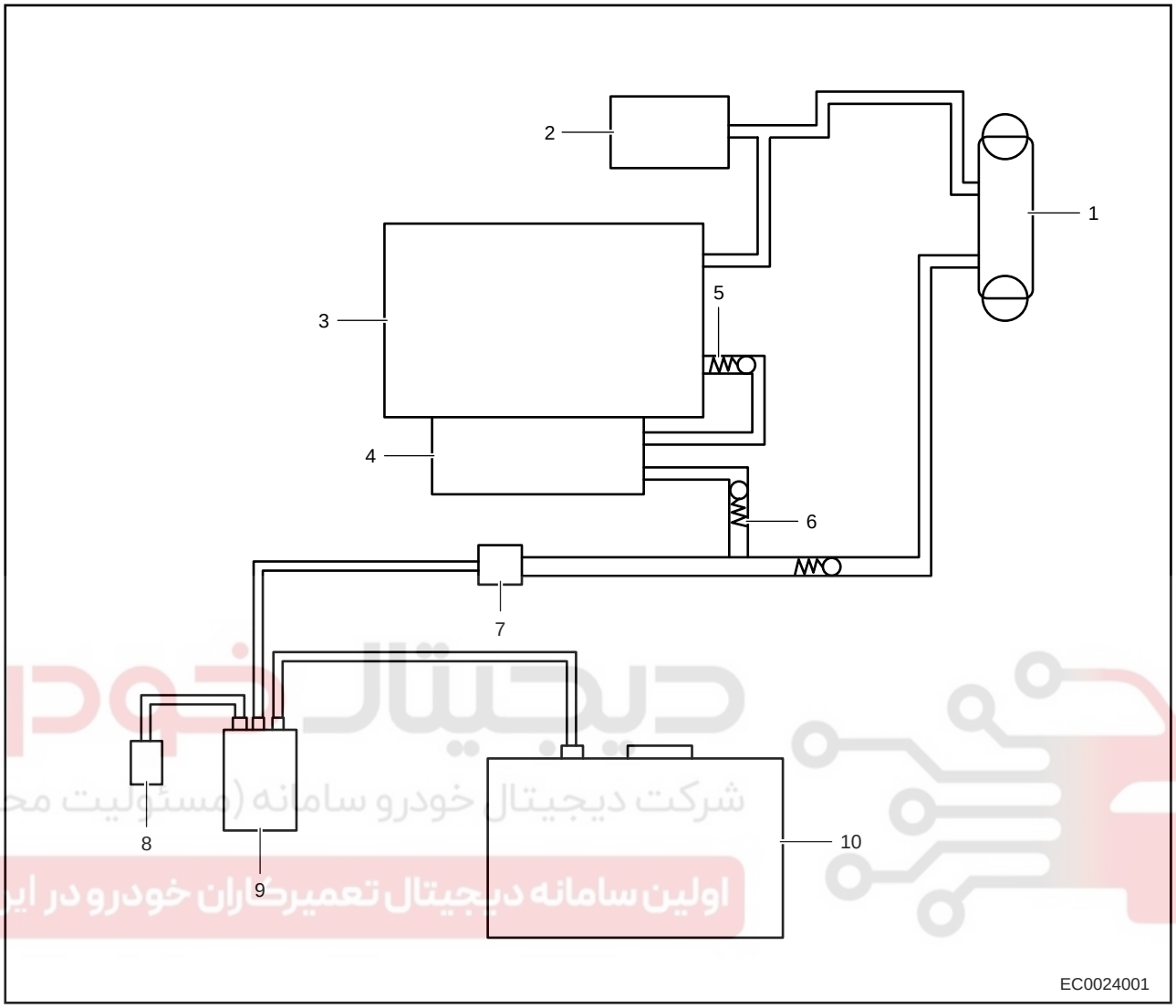
General Information

System Exploded Diagram



1	Activated Charcoal Canister Solenoid Valve	3	Activated Charcoal Canister Assembly
2	PCV Valve	4	Activated Charcoal Canister Filter

Emission Control System Schematic Diagram



1	Intake Hose	6	Turbocharger
2	Engine	7	Intake Manifold
3	PCV Valve	8	Check Valve
4	Charcoal Canister Solenoid Valve	9	Charcoal Canister Filter
5	Activated Charcoal Canister	10	Fuel Tank

Functional Principle

System Operation

- Emission control system recovers and burns fuel vapor to prevent the vapor in fuel tank from being discharged into the atmosphere. It monitors the oxygen content in exhaust gas, so as to guarantee the maximum efficiency of catalytic converter assembly in converting the HC, CO and NOx in exhaust gas. Activated charcoal canister assembly plays an important role in the emission control system. It is used to absorb and filter moisture and fuel vapor. Fresh air enters the top of activated charcoal canister assembly, meanwhile fuel vapor enters the bottom of activated charcoal canister through fuel vapor pipe. When engine stops operating, the fuel vapor and fresh air will be stored in activated charcoal

canister assembly. When engine runs and charcoal canister solenoid valve opens timely, the fuel vapor will enter intake manifold and burns in the cylinder.

- Oxygen sensor consists of upstream oxygen sensor and downstream oxygen sensor. Upstream oxygen sensor is installed on pre-catalytic converter assembly, and downstream oxygen sensor is installed on front exhaust pipe assembly. Oxygen sensor can detect the oxygen content in exhaust gas, and determine whether combustible air-fuel mixture is completely burnt out or not, so as to guarantee the maximum efficiency of catalytic converter assembly in converting the HC, CO and NOx in exhaust gas.
- Two desorption pipelines are equipped in this model. One desorption pipeline is connected to intake manifold through canister solenoid valve, which is low load desorption pipeline; The other desorption pipeline is connected to supercharger intake pipeline through canister solenoid valve, which is high load desorption pipeline.
- Low load desorption mode: When the pressure in intake manifold is lower than atmospheric pressure, after the canister solenoid valve operates, the fuel vapor in charcoal canister is desorbed directly by the pipeline connected to intake manifold.
- High load desorption mode: When the pressure in intake manifold is higher than atmospheric pressure, the fuel vapor in charcoal canister is desorbed by the pipeline connected to supercharger inlet pipe. In order to increase the effect of high load desorption, a venturi tube is installed in high load desorption pipeline to increase the desorption flow.

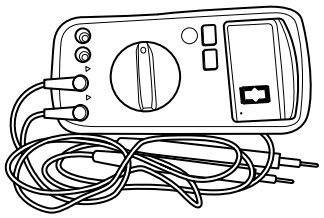
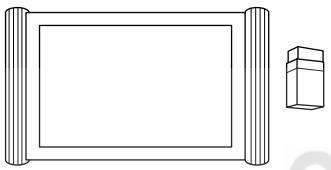
Specifications

Torque Specifications

Description	Torque (N·m)
Upstream Oxygen Sensor	45 ± 5
Downstream Oxygen Sensor	45 ± 5
Coupling Bolt Between Activated Charcoal Canister Filter and Body	7 ± 1
PCV Valve Tightening Torque	4 ± 1

Tools

General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006
X-431 PAD Diagnostic Tester	 RCH0001006

Diagnosis & Testing

Leakage Inspection

Visually check that hoses and connections have no leaks or damage.

⚠ Caution

- Removal of engine oil dipstick, filler cap, PCV hose and other components or other problems in them may cause the engine to run improperly. Air suction caused by disconnections, looseness or cracks in intake system pipes related to throttle assembly will result in engine failure or abnormal operation. Replace the parts as necessary.

Fuel Tank Cap Assembly Inspection

1. Visually check that fuel tank cap assembly is not deformed or damaged.
2. If result is not as specified, replace the fuel tank cap assembly.

On-vehicle Service

Charcoal Canister Solenoid Valve

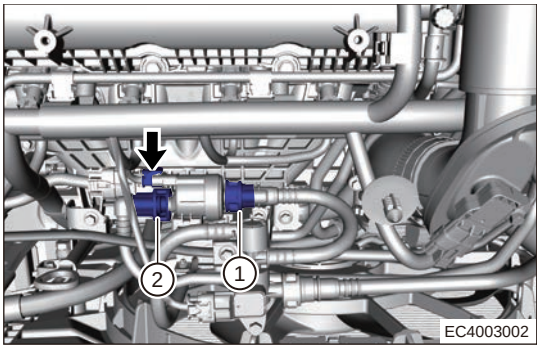
Removal

⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and ENGINE START STOP switch.

2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the canister solenoid valve.
   a. Disconnect the canister solenoid valve connector (arrow).
   b. Disconnect the connection between canister solenoid valve assembly and canister solenoid valve outlet pipe (1) and fuel vapor pipe (2).

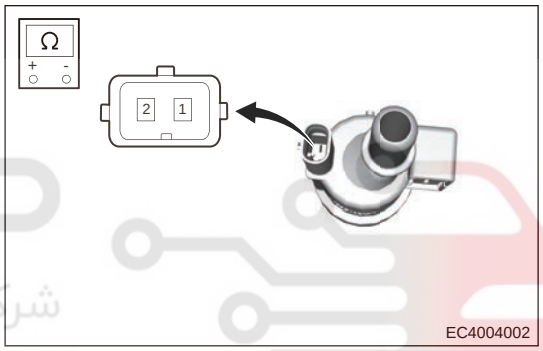


   c. Remove the canister solenoid valve.

Inspection

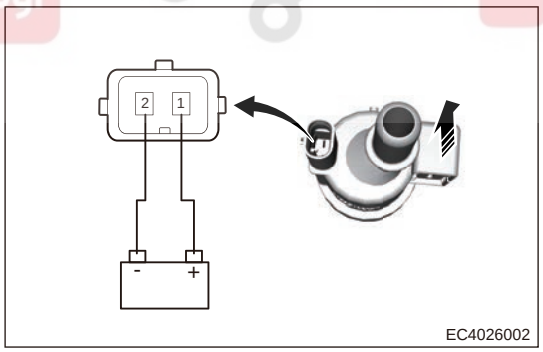
1. Check resistance of canister solenoid valve.
   a. Measure the resistance between 2 terminals of canister solenoid valve with a digital multimeter.

Multimeter Connection	Measurement Temperature	Specification (Ω)
Terminal 1 - Terminal 2	20°C	16 ± 2



Hint:
If resistance is not as specified, replace the canister solenoid valve assembly.

2. Check if the canister solenoid valve opens normally and is blocked.
   a. Connect the positive battery (+) to canister solenoid valve No. 1 pin and connect the negative battery (-) to canister solenoid valve No. 2 pin. Check if the canister solenoid valve can open. After it opened, bleed air to direction of canister solenoid valve (arrow), and air flows easily.



Installation

1. Installation is in the reverse order of removal.

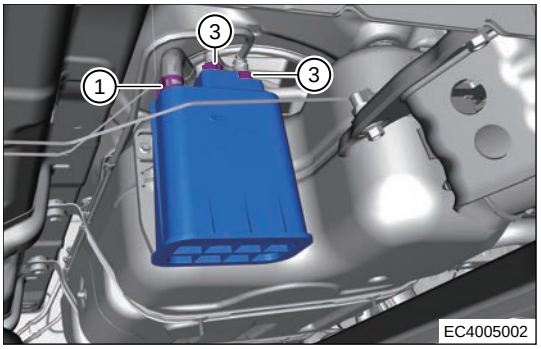
Activated Charcoal Canister Assembly

Removal

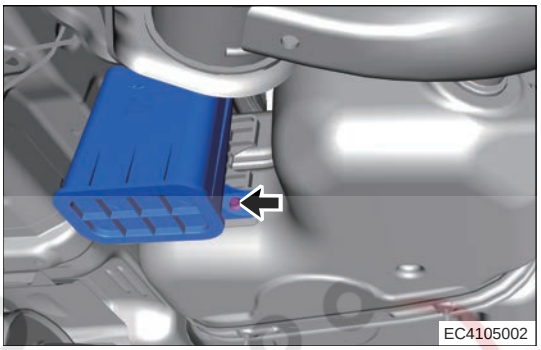
⚠ Caution
• Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and the ENGINE START STOP switch. Wait until engine cools down.
2. Disconnect the negative battery cable.

3. Raise the vehicle to a proper position.
4. Remove fuel tank fixing strap and lower fuel tank to a proper position.
5. Remove the activated charcoal canister assembly.
   a. Loosen elastic clamp (1), and disconnect connection of activated charcoal canister breather pipe.
   b. Disconnect connection between fuel vapor pipe Ⅰ (2) and activated charcoal canister assembly.
   c. Disconnect connection between fuel vapor pipe Ⅱ (3) and activated charcoal canister assembly.



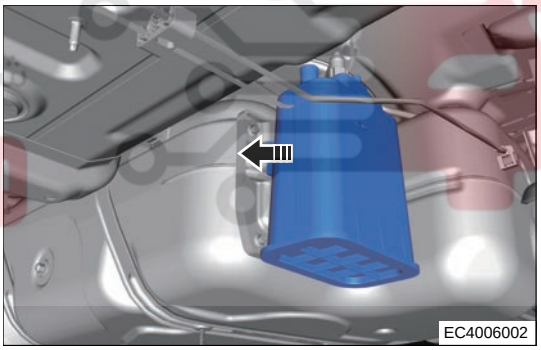
   d. Remove 1 fixing bolt (arrow) from activated charcoal canister assembly.



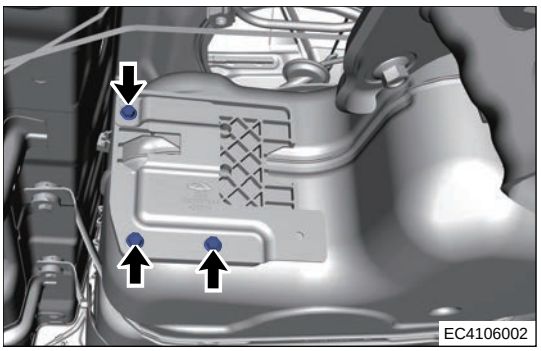
   e. Remove the activated charcoal canister assembly from bracket in direction of arrow.

      Hint:

      Unneeded activated charcoal canister assembly should be handled by the specialized department according to local laws and regulations. Never discard it at will.

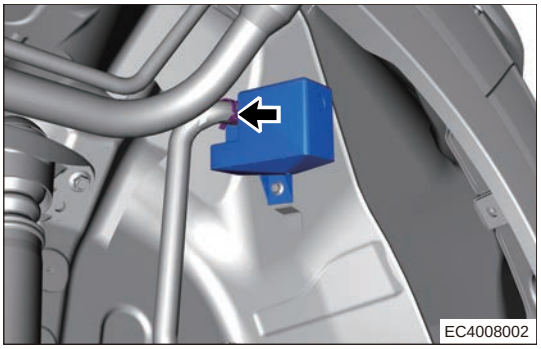


   f. Remove 3 fixing bolts (arrow), and remove activated charcoal canister mounting bracket.



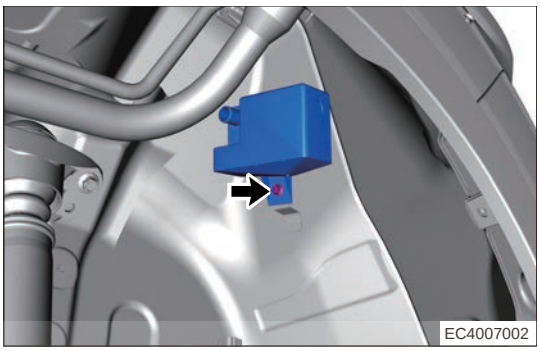
6. Remove the activated charcoal canister filter.
   a. Remove the rear left tire.
   b. Remove the rear left wheel house protector.

c. Loosen elastic clamp (arrow), and disconnect the connection between filter and breather hose.



d. Remove the fixing bolt (arrow) from activated charcoal canister filter.

Tightening torque: 7 + 1 N m



e. Remove the activated charcoal canister filter.

Installation

⚠ Caution
• Positioning distance from hose end to elastic clamp is 3 to 5 mm.

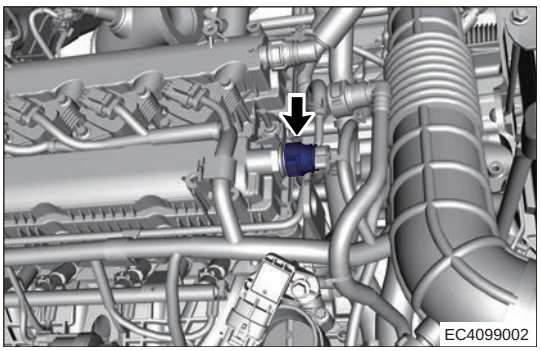
1. Installation is in the reverse order of removal.

PCV Valve

Removal

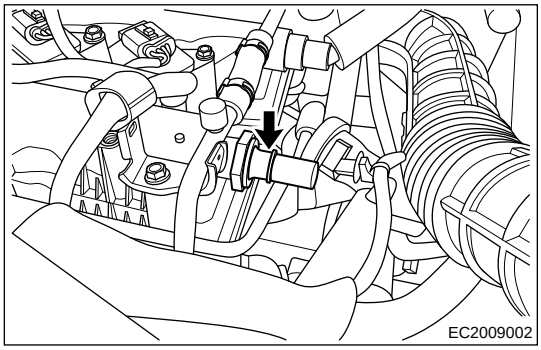
⚠ Caution
• Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Remove the engine trim cover.
3. Remove the PCV valve.
   a. Disconnect connection (arrow) between crankcase ventilation hose and PCV valve.



b. Loosen and remove the PCV valve (arrow) from cylinder head cover.

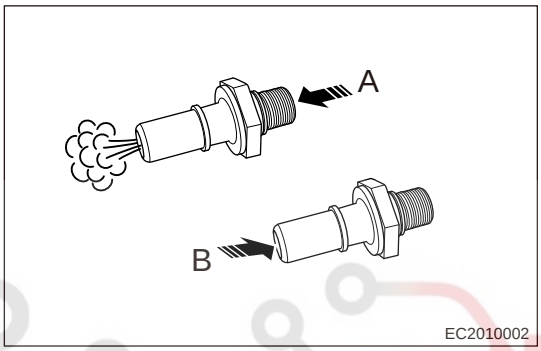
Tightening torque: 4 ± 1 N·m



Inspection

1. Install a clean hose to PCV valve.
2. Check the PCV valve operation.
   a. Bleed air into the cylinder head cover side, and check that air A flows easily.
   b. Blow air into the intake manifold side, and check that air B flows difficultly.

   Hint:
   If result is not as specified, replace PCV valve.



⚠ Caution

- DO NOT suck air through PCV valve. Petroleum substances inside the PCV valve are hazardous to your health.

3. Remove the clean hose from PCV valve.

Installation

1. Installation is in the reverse order of removal.

Upstream Oxygen Sensor

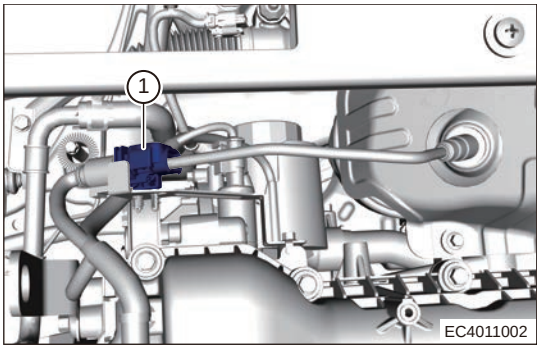
Removal

⚠ Caution

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the upstream oxygen sensor.

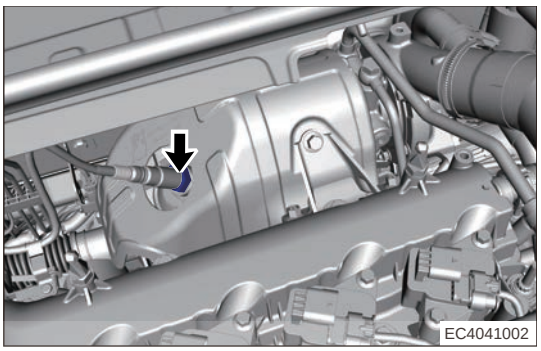
a. Take off and disconnect the upstream oxygen sensor connector (1) from bracket.



b. Remove the upstream oxygen sensor (arrow) from tip of precatalytic converter.

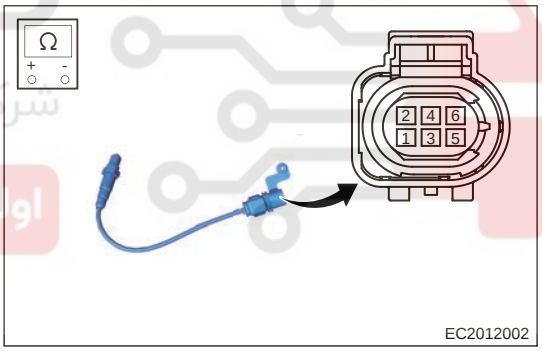
Tightening torque: 45 ± 5 N·m

Hint:
Remove it with special tool oxygen sensor socket.



Inspection

1. Check the upstream oxygen sensor.
   a. Measure the resistance of upstream oxygen sensor with a digital multimeter.



Multimeter Connection	Specified Condition
Terminal 1	Pump current
Terminal 2	Virtual ground
Terminal 3	Heater negative
Terminal 4	Heater positive
Terminal 5	Corrected resistance
Terminal 6	Nernst voltage

Multimeter Connection	Condition	Specified Condition
Terminal 3 - Terminal 4	Normal temperature	3 - 4 Ω
Terminal 1 - Terminal 5	Normal temperature	110 - 115 Ω

Hint:
If result is not as specified, replace the upstream oxygen sensor.

Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- Specified grease must be used and use of other grease will lead to oxygen sensor poisoning. New parts have been applied with grease and grease must be applied on mounting threads during reassembly.

Material number

5964080112 (120 g/pot) or 5964080145 (450 g/pot)

⚠ Warning

If the oxygen sensor falls, never pick it up to install and it needs to return to factory for testing.

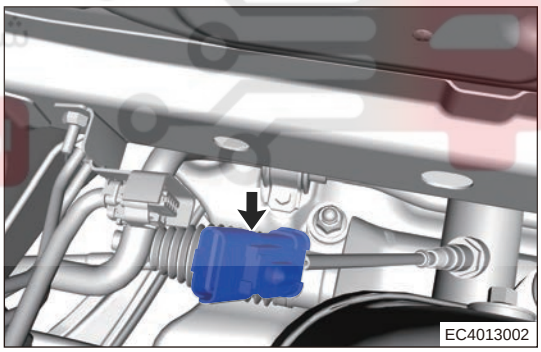
Downstream Oxygen Sensor

Removal

⚠ Caution

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.

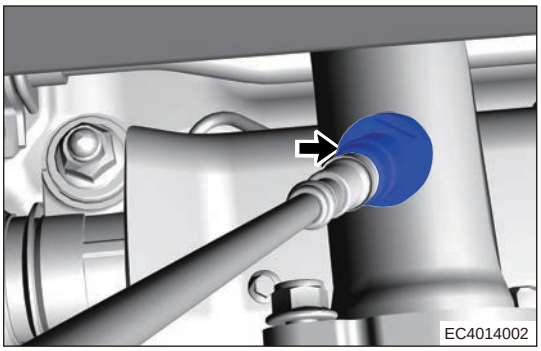
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the downstream oxygen sensor.
   a. Disconnect the downstream oxygen sensor connector (arrow).



   b. Raise the vehicle to a proper position.
   c. Remove downstream oxygen sensor (arrow) from main catalytic converter assembly.

      Tightening torque: 45 ± 5 N·m

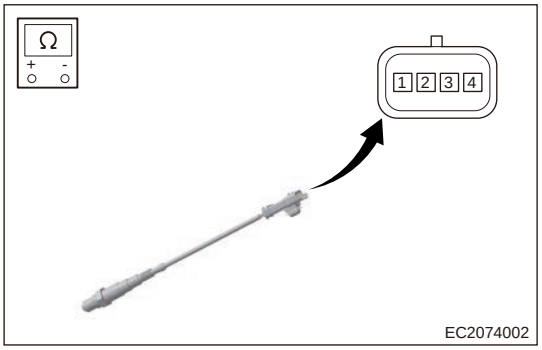
      Hint:
      Remove it with special tool oxygen sensor socket.



Inspection

1. Check the downstream oxygen sensor.

a. Measure the resistance of downstream oxygen sensor with a digital multimeter.



Multimeter Connection	Specified Condition
Terminal 1	Ground
Terminal 2	Signal
Terminal 3	Heating control
Terminal 4	Power supply

Multimeter Connection	Condition	Specified Condition
Terminal 3 - Terminal 4	20 ˚C	5 - 22 Ω
Terminal 1 - Terminal 2	Always	No continuity
Terminal 1 - Terminal 4		
Terminal 2 - Terminal 3		
Terminal 2 - Terminal 4		

Hint:
If result is not as specified, replace the downstream oxygen sensor.

Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- Specified grease must be used and use of other grease will lead to oxygen sensor poisoning. New parts have been applied with grease and grease must be applied on mounting threads during reassembly.

Material number

5964080112 (120 g/pot) or 5964080145 (450 g/pot)

⚠ Warning

If the oxygen sensor falls, never pick it up to install and it needs to return to factory for testing.

SQRE4T15C COOLING SYSTEM

Warnings and Precautions

Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

1. Temperature of cooling system is very high when engine is running. Before removal, make sure that engine has stopped running and cooling system has cooled down sufficiently, otherwise, there is a risk of scald injury.
2. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.
3. If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

Precautions

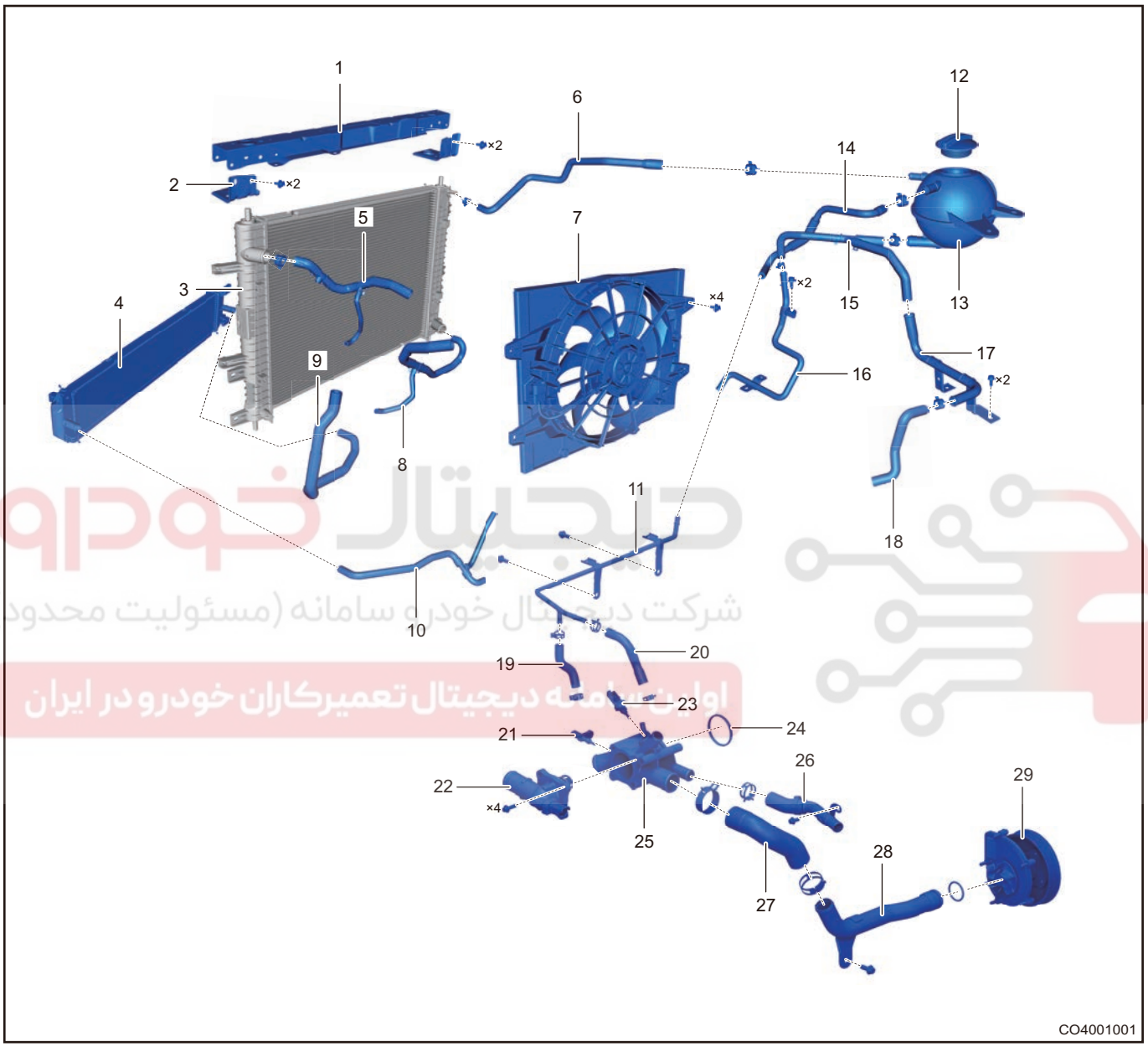
In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

1. When testing cooling system, please pressurize the system to specified pressure. Otherwise, system components may be damaged.
2. DO NOT mix different colors or types of coolant.
3. Please select coolant which is suitable for local climate in different areas.
4. Be sure to wear necessary safety equipment to prevent accidents when repairing.
5. Try to prevent body paint surface from being scratched during removal and installation.

System Overview

System Components Diagram

Engine Cooling System



1	Tank Upper Crossmember Body	16	Water Pipe 2 - Expansion Tank to Water Pump
2	Tank Mounting Bracket	17	Water Pipe - Expansion Tank to Water Pump II
3	Radiator Assembly	18	Water Pipe - Expansion Tank to Water Pump III
4	Low Temperature Radiator Assembly	19	Engine Discharge Hose III
5	Engine Outlet Pipe	20	Engine Discharge Hose I

6	Water Pipe - Radiator to Expansion Tank	21	Coolant Temperature Sensor Outlet
7	Cooling Fan Assembly	22	Electronic Thermostat
8	Engine Inlet Pipe	23	Coolant Temperature Sensor Inlet
9	Low Temperature Radiator Inlet Pipe	24	Seal Ring - Thermostat Seat
10	Low Temperature Radiator Outlet Pipe	25	Thermostat Seat Assembly
11	Discharge Steel Pipe	26	Heating Pipe Assembly
12	Expansion Tank Cap	27	Small Circulation Water Pipe
13	Expansion Tank Body	28	Cooling Pipe Assembly
14	Water Pipe - Engine to Expansion Tank	29	Water Pump
15	Water Pipe - Expansion Tank to Water Pump		

Functional Principle

System Operation

- Engine cooling system adjusts engine operating temperature by the flow of coolant and makes engine operate normally under various operating conditions.
- Engine cooling system is a forced circulation system, which supplies circulation pressure for cooling system by water pump and forces coolant to circulate in the engine cylinder block, and distributes excessive heat to radiator by the flow of coolant, and radiates it to the air by cooling fan. Also, engine cooling system provides heat to the heater core in cabin to improve driving comfort.

Specifications

Torque Specifications

Description	Torque (N·m)
Expansion Tank Fixing Bolt	5 ± 1
Electronic Thermostat Housing Fixing Bolt	8 + 3
Thermostat Seat Fixing Bolt	8 + 3
Coolant Temperature Sensor	15 ± 1
Cooling Fan Fixing Bolt	5 ± 1
Water Pump Fixing Bolt	8 + 3
Coupling Bolt Between Radiator and Condenser	7 ± 1
Water Pump Pulley Fixing Bolt	20 + 5
Discharge Steel Pipe Fixing Bolt	8 + 3

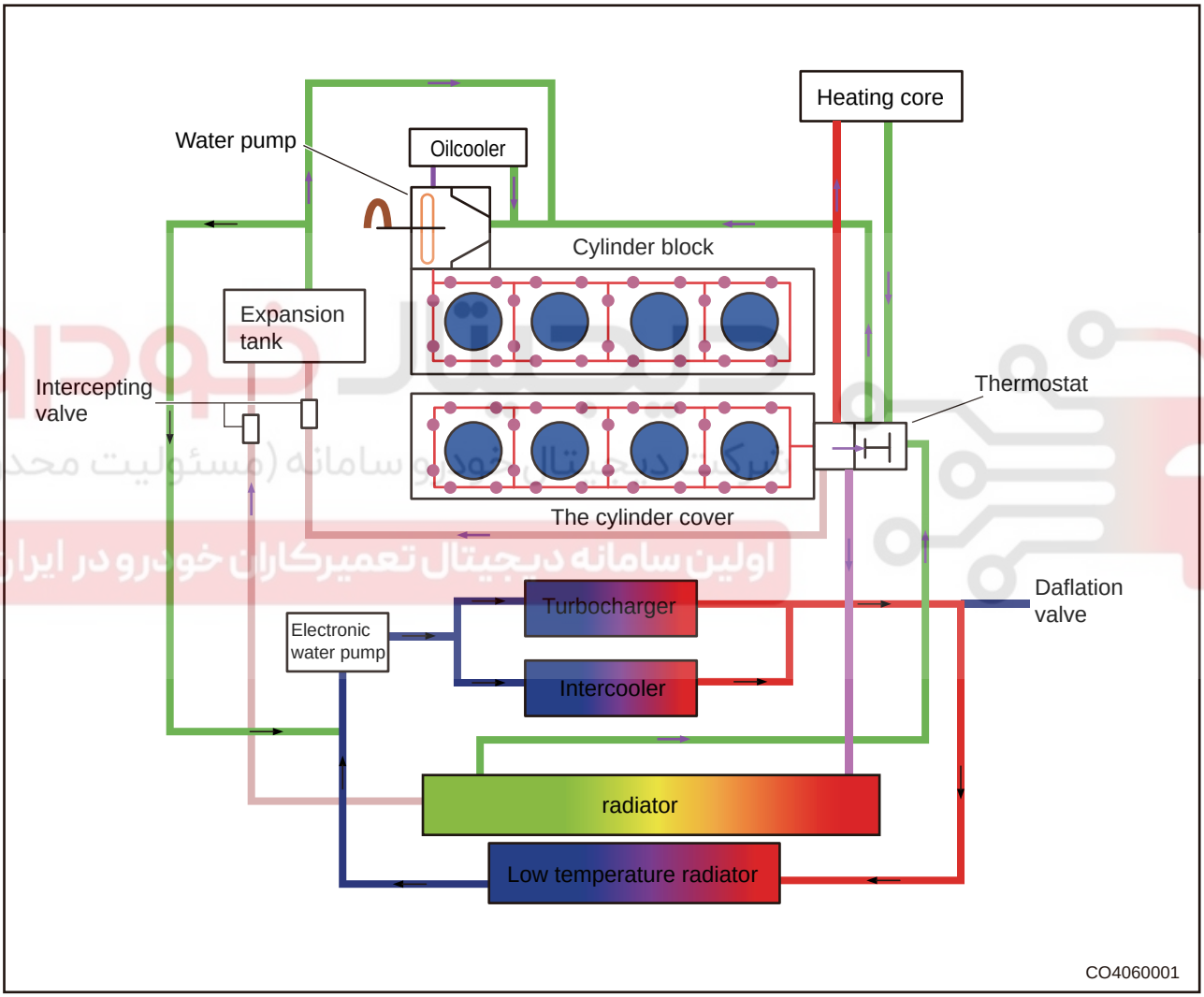
Coolant Capacity

Coolant	Capacity (L)
Full Organic Antifreeze (LEC-II)	9 ± 0.5 L

Coolant Freezing Point

Items	Freezing Point Value (℃)
Coolant	-40

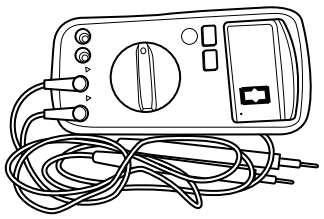
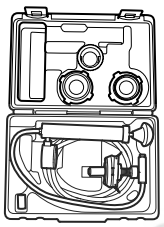
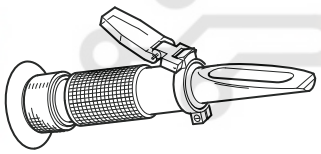
Cooling System Operation Flowchart



- Small circulation: When coolant temperature is below 82 ± 2 ℃, electronic thermostat assembly closes. Coolant only circulates inside the cylinder block and warms up other engine parts that need heat. Water pump assembly circulates engine coolant through cylinder block, oil cooler assembly, turbocharger and cylinder head. The coolant does not radiate heat through radiator.
- Large circulation: When coolant temperature is higher than 95 ℃, electronic thermostat assembly opens fully and all coolant flowing out of cylinder block enters radiator for radiating. It then returns to cylinder block for circulation by water pump. Due to radiating in radiator, engine coolant temperature decreases quickly to prevent engine from overheating.

Tools

General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006
Cooling System Pressure Tester	 RCH005506
Freezing Point Tester	 RCH000706

Diagnosis & Testing

Problem Symptoms Table

⚠ Caution

- Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Insufficient coolant	Coolant pipe (deteriorated and leaks)
	Expansion tank (leaks)
	Radiator (leaks)
	Heater core (leaks)

Symptom	Suspected Area
	Electronic thermostat assembly (improperly sealed)
	Thermostat seat assembly (cracked and damaged)
	Water pump (leaks)
	Engine cylinder head gasket (damaged)
	Engine cylinder head (cracked and leaks)
	Engine cylinder block (water jacket leaks and cylinder block cracked)
Engine overheating	Low coolant level
	Air resistance exists in pipe
	Expansion tank cap (damaged)
	Engine control module fault
	Cooling fan fault
	Radiator fault
	Electronic thermostat assembly fault
Engine overcooling	Electronic thermostat assembly fault
	Cooling fan fault
Unable to reach normal engine temperature	Cooling fan (constantly operating)
	Electronic thermostat assembly fault
Cooling fan does not operate or abnormal air speed	Cooling fan fault
	Wire harness
	Engine control module fault

Cooling System Leakage Test

⚠ Warning

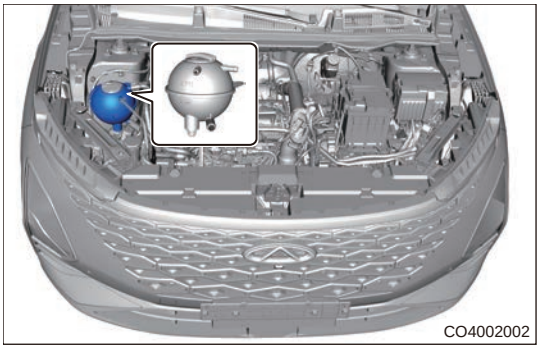
- Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.

⚠ Caution

- When testing cooling system, please pressurize the system to specified pressure. Otherwise, system components may be damaged.
- Before testing cooling system, do not perform operation until coolant temperature drops to normal level. Otherwise, it may cause scald.

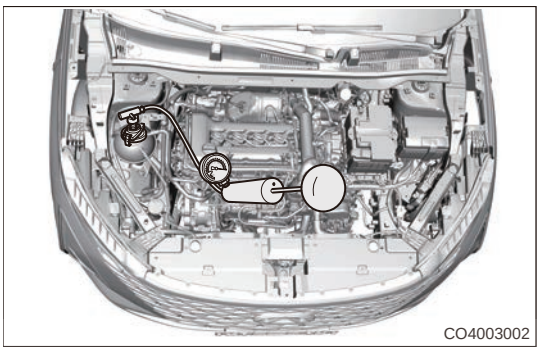
1. Turn off all electrical equipment and ENGINE START STOP switch.

2. Check if coolant level is between "MAX" and "MIN" lines. If coolant level is below "MIN" line, add coolant.


CO4002002

3. Connect cooling system pressure tester to coolant pressure release cap opening (expansion tank cap opening) and tighten it slowly.

   Hint:
   Make sure there is no leakage in connecting part of coolant system pressure tester, in order to avoid pressure leakage during test.


CO4003002

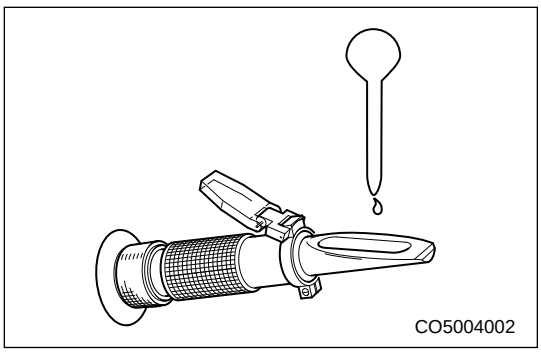
4. Pressurize cooling system to 1.2 bar with the cooling system pressure tester, and then observe the pressure changes. If system pressure does not drop within 2 minutes, it indicates there is no leakage in system. If pressure changes greatly, it indicates that there is a leakage in system; find the leaking area and perform troubleshooting.

Coolant Freezing Point Test

⚠ Caution

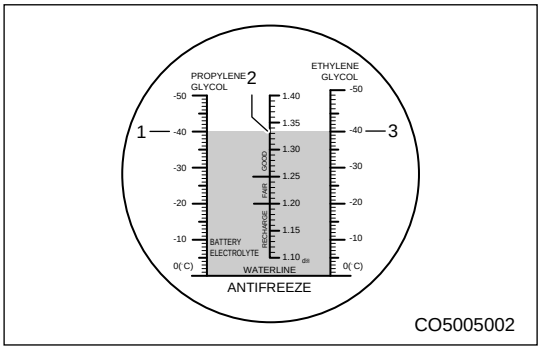
- DO NOT mix different colors or types of coolant.
- Please select coolant which is suitable for local climate in different areas.
- Please read measured value at the scale line. In order to distinguish the scale line more clearly, drip a drop of water on the glass of freezing point tester with a pipette, then the scale line can be clearly distinguished via a “waterline”.

5. As shown in illustration, drip a drop of coolant on the glass of freezing point tester with a pipette, and then observe freezing point value of coolant.


CO5004002

6. As shown in illustration, observe scale 3 of freezing point tester to read ethylene glycol coolant freezing point value. The freezing point value must be kept at -40 °C (value varies with geography, climate or freezing point).

   Hint:
   If freezing point is beyond the specified value, replace the coolant.
   Scale 1 is used to measure the freezing point value of propylene glycol coolant, and scale 2 is used to measure the battery electrolyte concentration.



On-vehicle Service

Coolant Replacement

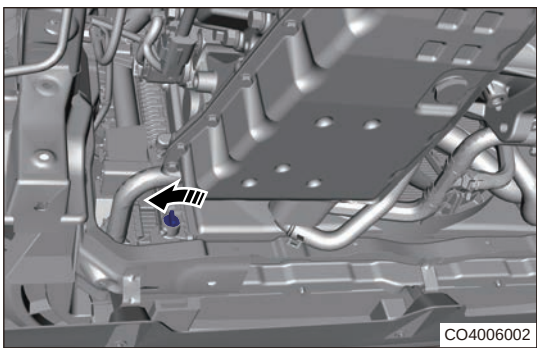
Engine System Coolant Draining

⚠ Warning

- Never remove expansion tank cap when engine is operating or temperature is higher. Otherwise, it may cause scald.
- Be careful when opening expansion tank cap, the high-pressurized hot engine coolant and steam may flow out and cause serious burns.
- Wait until the engine has cooled down, and then cover the expansion tank cap with a piece of damp cloth and turn it one turn slowly (counterclockwise). Step back when releasing cooling system pressure. After confirming that all pressure has been released, turn the expansion tank cap with cloth covered and remove it.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the expansion tank cap when engine temperature and radiator temperature are low.
4. Remove the engine lower protector assembly.
5. Drain the coolant.
   a. Put a coolant collector under the vehicle, loosen elastic clamp (arrow) and disconnect connection between engine inlet pipe and radiator assembly.

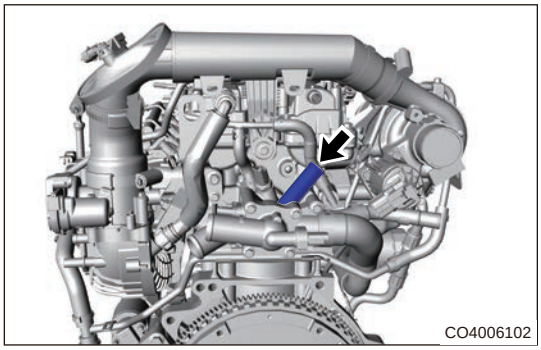
      Hint:
      Put a drainage device or similar tool at the radiator outlet, so that coolant can flow into the collector smoothly.



   b. After coolant stops flowing, connect engine inlet pipe and install elastic clamp.

      Hint:
      Tighten drain cock plug to prevent leakage.
      Wasted coolant should be handled by the specialized department according to local laws and regulations. Never discard it at will.

c. Remove the cooling water inlet and outlet pipe at the engine end and the heating pipe in the engine hood, use the compressed air to aim at the heating water outlet (arrow) and blow out the residual coolant in the engine block and cylinder head, and then use the compressed air to blow out the residual coolant in the heating core.


CO4006102

d. Successively connect the removed engine / heating pipes with clamps according to the state before removal.

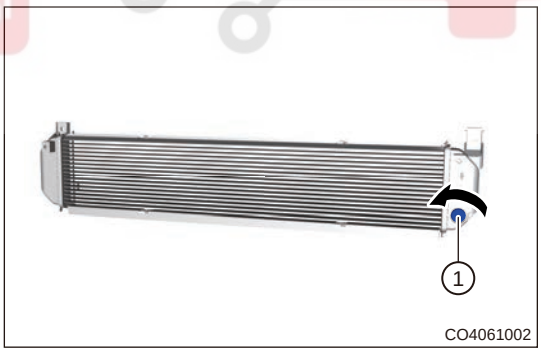
Low Temperature System Coolant Draining

⚠ Warning

- Never remove expansion tank cap when engine is operating or temperature is higher. Otherwise, it may cause scald.
- Be careful when opening expansion tank cap, the high-pressurized hot engine coolant and steam may flow out and cause serious burns.
- Wait until the engine has cooled down, and then cover the expansion tank cap with a piece of damp cloth and turn it one turn slowly (counterclockwise). Step back when releasing cooling system pressure. After confirming that all pressure has been released, turn the expansion tank cap with cloth covered and remove it.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Remove the expansion tank cap when engine temperature and radiator temperature are low.
3. Remove the front bumper assembly.
4. Drain the coolant.
   a. Put a coolant collector under the vehicle, disconnect the low temperature radiator inlet pipe and drain the coolant in low temperature radiator.

      Hint:
      Put a drainage device or similar tool at the low temperature radiator outlet, so that coolant can flow into the collector smoothly.



CO4061002

   b. After coolant stops flowing, connect low temperature radiator inlet pipe and install elastic clamp.

      Hint:
      Wasted coolant should be handled by the specialized department according to local laws and regulations. Never discard it at will.
      Carry out turbocharging inter-cooling system bleeding after filling coolant.

Coolant Adding

Description	Capacity (L)
Red Organic Coolant	8.5 ± 0.3

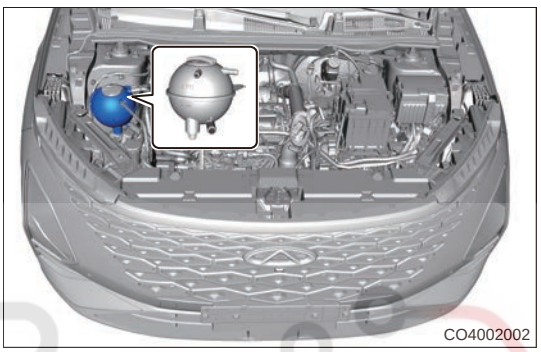
⚠ Warning

- Only use coolant that meets Chery specifications.
- If it is necessary to add coolant when engine is hot, loosen expansion tank cap slightly first to release internal pressure and loosen the cap completely after waiting for a while, and then add coolant.
- If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

⚠ Caution

- DO NOT use inferior coolant.
- DO NOT mix different colors or types of coolant.
- Be careful when adding coolant; avoid spilling coolant on any area of engine.

1. Open expansion tank cap and add coolant until coolant level reaches the “MAX” line.



2. Tighten expansion tank cap, start and run engine. Maintain engine speed between 2000 and 2500 rpm to warm up the engine until cooling fan operates.

⚠ Caution

If there is no coolant in expansion tank after engine just starts, perform the followings:

- Stop the engine;
- Wait until coolant cools down;
- Add coolant to "MAX" line on expansion tank.

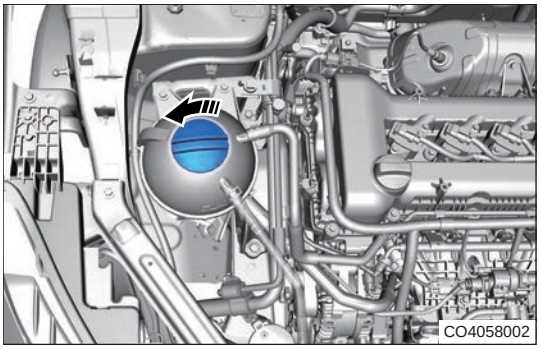
3. Stop engine and wait until coolant temperature drops to the ambient temperature. Check that coolant level is between “MAX” and “MIN” lines. If coolant level is below the “MIN” line, repeat all the above procedures. If coolant level is above the “MAX” line, drain coolant until the level is between “MAX” and “MIN” lines.

Turbocharging Inter-cooling System Bleeding

⚠ Caution

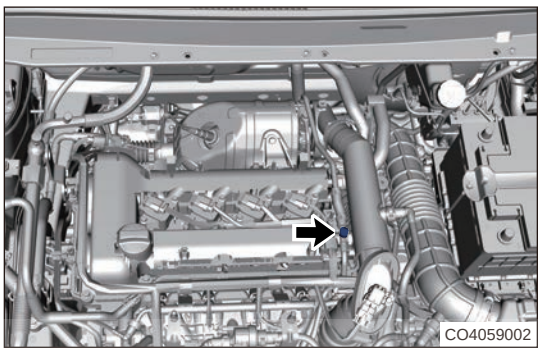
- Carry out turbocharging inter-cooling device cooling system bleeding after replacing coolant or removing and installing turbocharging inter-cooling system related components.
- Never loosen outlet pipe set upper pressure cap in warmed up engine, to prevent coolant from spilling out, causing burns.
- Please wear protection equipment and gloves.

1. Rotate expansion tank cap counterclockwise in cold engine.



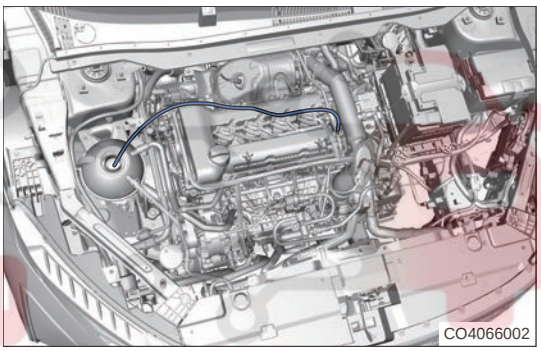
2. Unscrew the outlet pipe set upper pressure cap (arrow) counterclockwise.

   Hint:
   There is grommet inside the pressure cap, take care not to lose it after removing.



3. Connect one end of the proper pipe to exhaust port, and place other end to expansion tank.

   Hint:
   A thin pipe of about 1.5 meters or a gas pipe can be used for antifreeze bleeding.



4. Add the coolant.
5. Let the engine in an idling condition; Wait for electric water pump to operate.
6. When a large amount of coolant flows out (without gas), stop the engine, wait until the system is cooled, install and tighten the pressure cap.

   Hint:
   Clean up the spilled coolant, to prevent coolant from entering spark plug installation hole.
   Check if the pressure cap is properly sealed.
7. Add coolant to between MIN and MAX lines (if the coolant is less).
8. Tighten the expansion tank cap.
9. Start the and run engine. Maintain engine speed between 2000 and 2500 rpm to warm up the engine until cooling fan operates.
10. Check each pipe for leaks, lack of antifreeze, if so, handle it.

    Hint:
    Do not open the expansion tank cap at high engine temperature to prevent burns.
11. Use diagnostic tester, check for electronic injection system DTCs (especially electric water pump DTCs).

    Hint:
    If there is electric water pump idling DTC, such as Charge Air Cooler Coolant Pump Dry Run, it indicates that coolant is not sufficient in inter-cooling system, add coolant and perform bleeding.

Tank Upper Crossmember Assembly

Removal

⚠ Warning

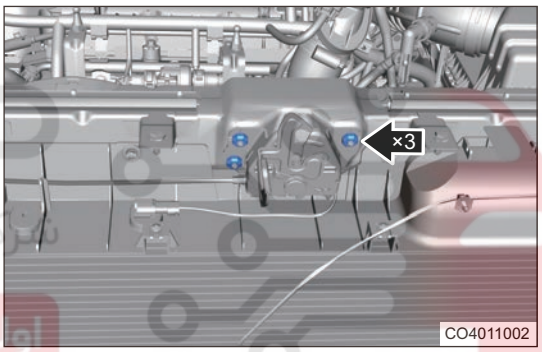
- Perform removal procedures with front compartment at low temperature after cooling fan stops completely, otherwise, rotating cooling fan or hot components of front compartment may cause serious injury.

⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.

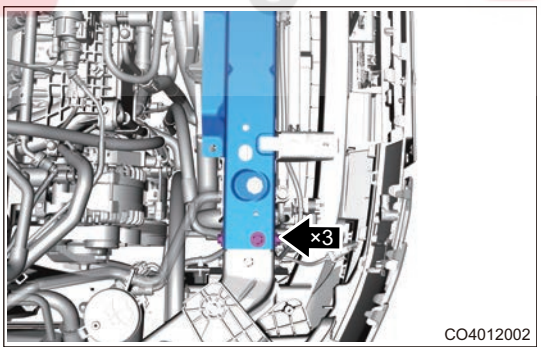
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the front bumper assembly.
4. Remove the upper air deflector.
5. Remove the air filter assembly.
6. Remove the tank upper crossmember assembly.
   a. Remove 3 fixing nuts (arrow) from engine hood lock assembly.

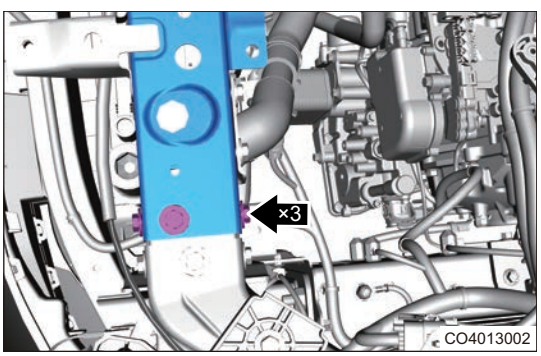
      Tightening torque: 9 ± 1 N·m



   b. Remove 6 fixing bolts (arrow) from tank upper crossmember.

      Tightening torque: 9 ± 1 N·m





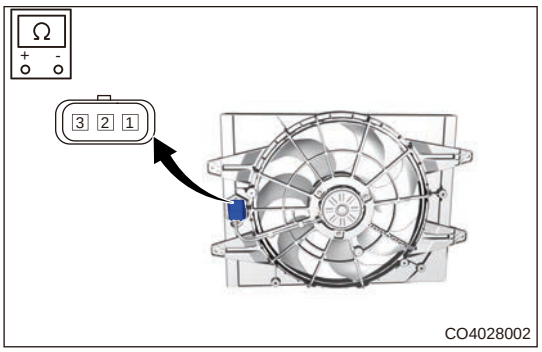
   c. Remove the tank upper crossmember assembly.

Cooling Fan Assembly

On-vehicle Inspection

1. Using a digital multimeter, measure resistance of cooling fan.
   a. Cooling fan

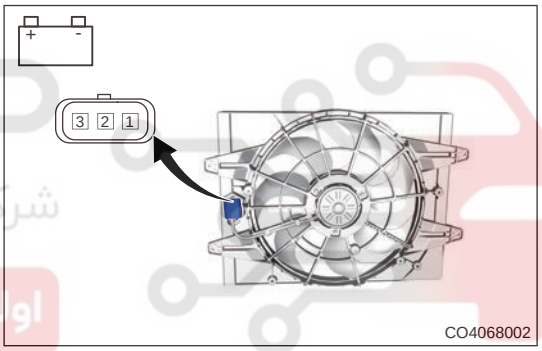
Measurement Condition	Condition	Specification (Ω)
Terminal 1 - Terminal 2	Normal temperature (20 ˚C)	0.8 ± 0.1
Terminal 1 - Terminal 3	Normal temperature (20 ˚C)	0.6 ± 0.1



Hint:
If inspection result is not as specified, replace cooling fan assembly.

2. Connect battery positive (+) and negative (-) to cooling fan connector terminal as shown in table below, to observe if cooling fan runs smoothly.
   a. Cooling fan

Measurement Condition	Condition	Specified Condition
Battery positive (+) - Terminal 2	Always	Runs at low speed
Battery negative (-) - Terminal 3		
Battery positive (+) - Terminal 3	Always	Runs at high speed
Battery negative (-) - Terminal 1		



Hint:
If inspection result is not as specified, replace cooling fan assembly.

Removal

⚠ Warning

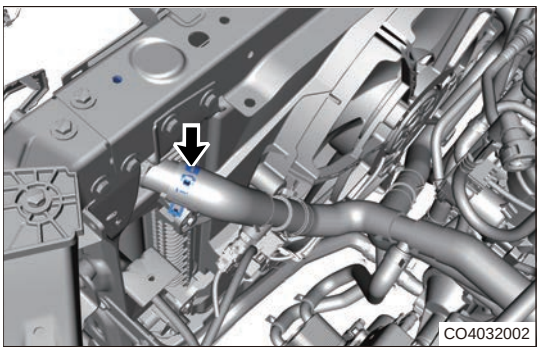
- Perform removal procedures with engine compartment at low temperature, after cooling fan stops completely, to prevent accidents.

⚠ Caution

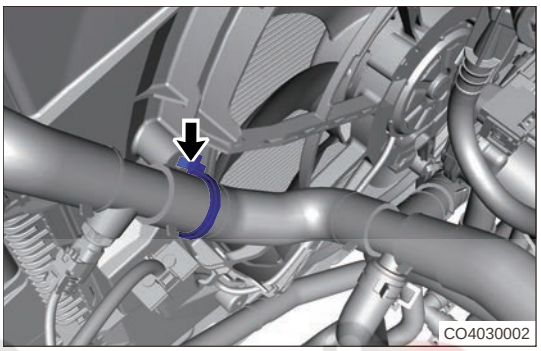
- Be sure to wear necessary safety equipment to prevent accidents when repairing.

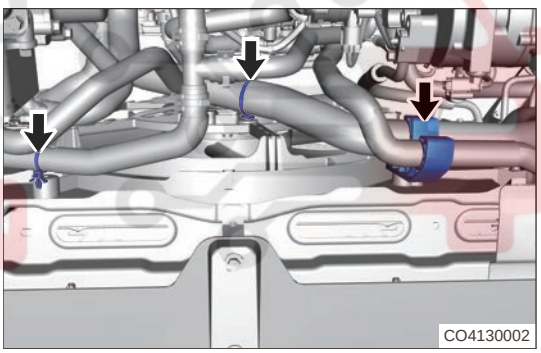
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.

3. Remove the air filter assembly.
4. Remove the cooling fan assembly.
   a. Loosen the elastic clamp (arrow) and disconnect water pipe.



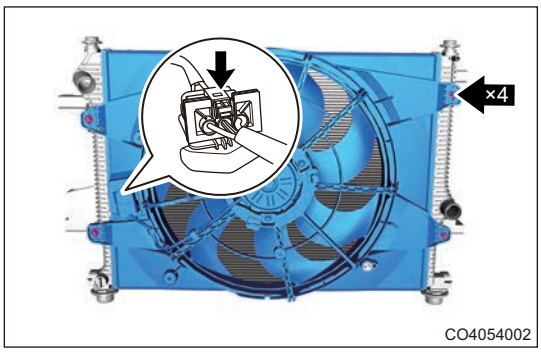
   b. Disengage fixing clip of water pipe from cooling fan assembly.





   c. Disconnect the cooling fan connector (arrow).
   d. Remove 4 fixing bolts (arrow) from cooling fan assembly.

      Tightening torque: 5 ± 1 N·m



   e. Remove the cooling fan assembly.

Inspection

1. Check cooling fan blade for dirt. If so, clean the cooling fan.
2. Check cooling fan blade for missing, cracks, etc. If so, replace cooling fan.

Installation

⚠ Caution

- Check that coolant has been added to the specified level after installation.

1. Installation is in the reverse order of removal.

Radiator Assembly

Removal

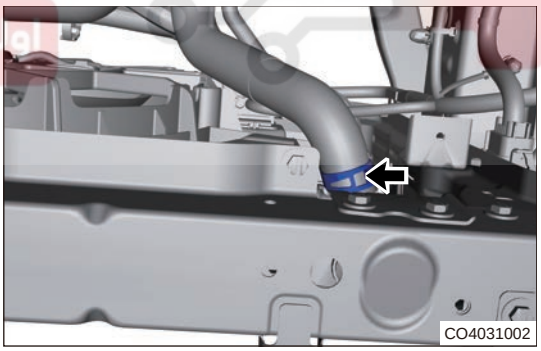
⚠ Warning

- Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.
- If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

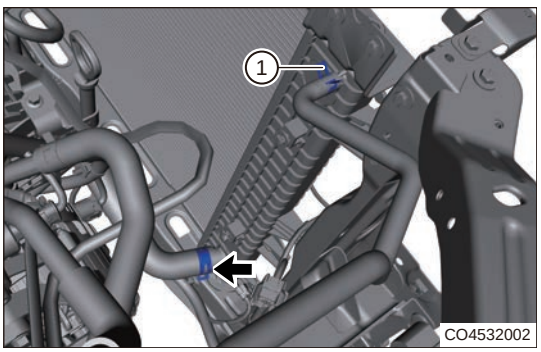
⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.

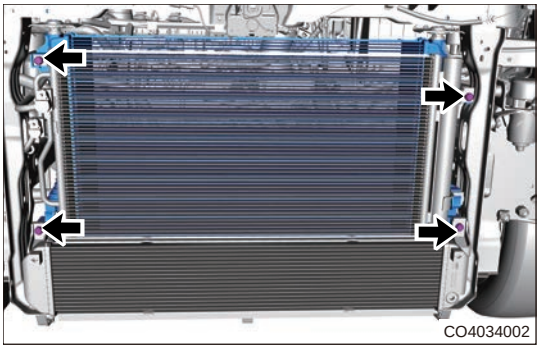
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Drain the coolant.
4. Remove the front bumper assembly.
5. Remove the cooling fan assembly.
6. Remove the radiator assembly.
   a. Loosen elastic clamp (arrow) and disconnect connection between engine outlet hose and radiator assembly.



   b. Loosen elastic clamp (1) and disconnect connection between radiator discharge hose and radiator assembly.
   c. Loosen elastic clamp (arrow) and disconnect connection between engine inlet pipe and radiator assembly.



d. Remove 4 fixing bolts (arrow) from radiator assembly.
Tightening torque: 5 ± 1 N·m


CO4034002

e. Carefully remove the radiator assembly.

Inspection

1. Check radiator surface for dirt. If occurs, clean radiator surface.

Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- When connecting engine outlet pipe and radiator, align the “工” mark on pipe port with boss, and align center position of elastic clamp tabs with “I” position of “工” mark, align the edge of elastic clamp with lower edge of “二” position of “工” mark.
- When connecting engine inlet pipe and radiator, align the “土” mark on pipe port with boss, and align center position of elastic clamp tabs with “I” position of “土” mark, align the edge of elastic clamp with lower edge of “二” position of “土” mark.
- Check that coolant has been added to specified level after installation, and check for leakage at the removal and installation position.

Water Pump Assembly

Removal

⚠ Warning

- Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.
- If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

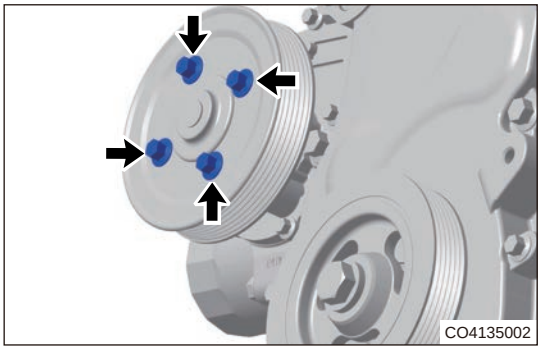
⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Drain the coolant.
4. Move away the accessory drive belt.
5. Remove the water pump assembly.

a. Remove 4 fixing bolts (arrow) from water pump pulley, and remove water pump pulley assembly.

Tightening torque: 20 + 5 N m



b. Remove 5 fixing bolts (arrow) from water pump assembly.

Tightening torque: 8 + 3 N m

c. Remove the water pump assembly.

Inspection

1. Check if water pump bearing is excessive looseness; If there is excessive looseness, replace water pump assembly.

Installation

⚠ Caution

- Clean installation surface of water pump assembly.
- If water pump is damaged, replace rather than attempt to repair it.
- Check that coolant has been added to the specified level after installation.
- Perform cooling system pressure test after adding coolant, to check cooling system for leakage.

Electric Water Pump Assembly

Removal

⚠ Warning

- Before operation, it is necessary to ensure that the engine cooling system is in a low temperature state. When the engine is hot, the high-pressure overheated coolant may flow out, causing serious personal injury.
- If your body accidentally comes into contact with coolant. Wash immediately with water. If it is serious, please go to the hospital.

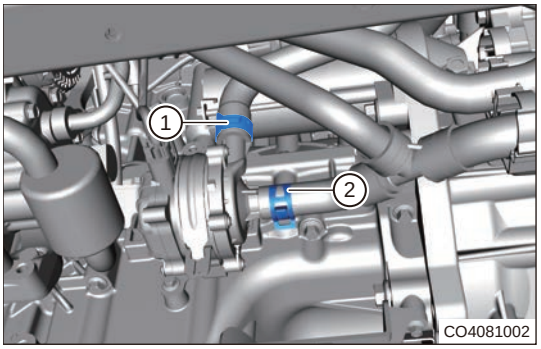
⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Drain the coolant.
4. Remove the electric water pump inlet and outlet pipes.

a. Loosen elastic clamp (1) and disconnect connection between electric water pump assembly and electric water pump outlet hose.

b. Loosen elastic clamp (2) and disconnect connection between electric water pump inlet hose and electric water pump assembly.

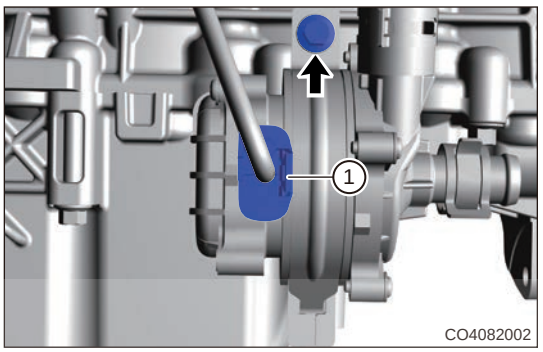


5. Remove the electric water pump assembly.

a. Disconnect the electric water pump assembly connector (1).

b. Remove 1 fixing bolt (arrow) from electric water pump assembly.

Tightening torque: 8 + 3 N m

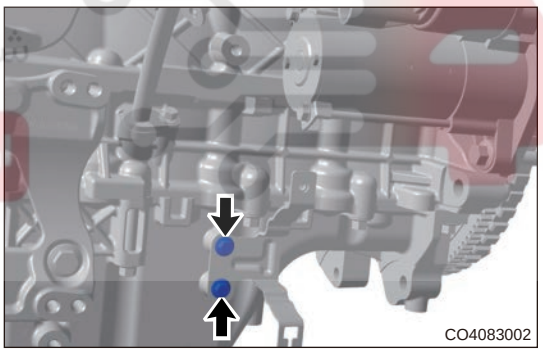


c. Remove the electric water pump assembly.

6. Remove the electric water pump assembly mounting bracket.

a. Remove 2 fixing bolts (arrow) from electric water pump assembly bracket.

Tightening torque: 8 + 3 N m



b. Remove the electric water pump assembly bracket.

Installation

1. Installation is in the reverse order of removal.

⚠ Caution
• After installation, check that coolant has been added to standard level, carry out turbocharging inter-cooling system bleeding and check for leakage at the removal and installation position.

Low Temperature Radiator Assembly

Removal

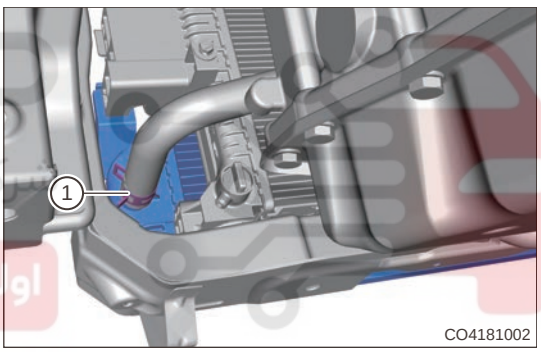
⚠ Warning

- Before operation, it is necessary to ensure that the engine cooling system is in a low temperature state. When the engine is hot, the high-pressure overheated coolant may flow out, causing serious personal injury.
- If your body accidentally comes into contact with coolant. Wash immediately with water. If it is serious, please go to the hospital.

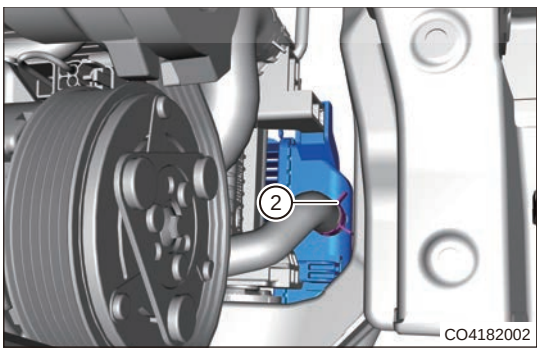
⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the front bumper assembly.
4. Drain the coolant.
5. Remove the low temperature radiator assembly.
   a. Loosen elastic clamp (1) and disconnect the low temperature radiator outlet pipe.



   b. Loosen elastic clamp (2) and disconnect the low temperature radiator inlet pipe.



   c. Remove 2 fixing bolts (arrow) from low temperature radiator assembly.
      Tightening torque: 5 ± 1 N·m
   d. Carefully remove the low temperature radiator assembly.

Installation

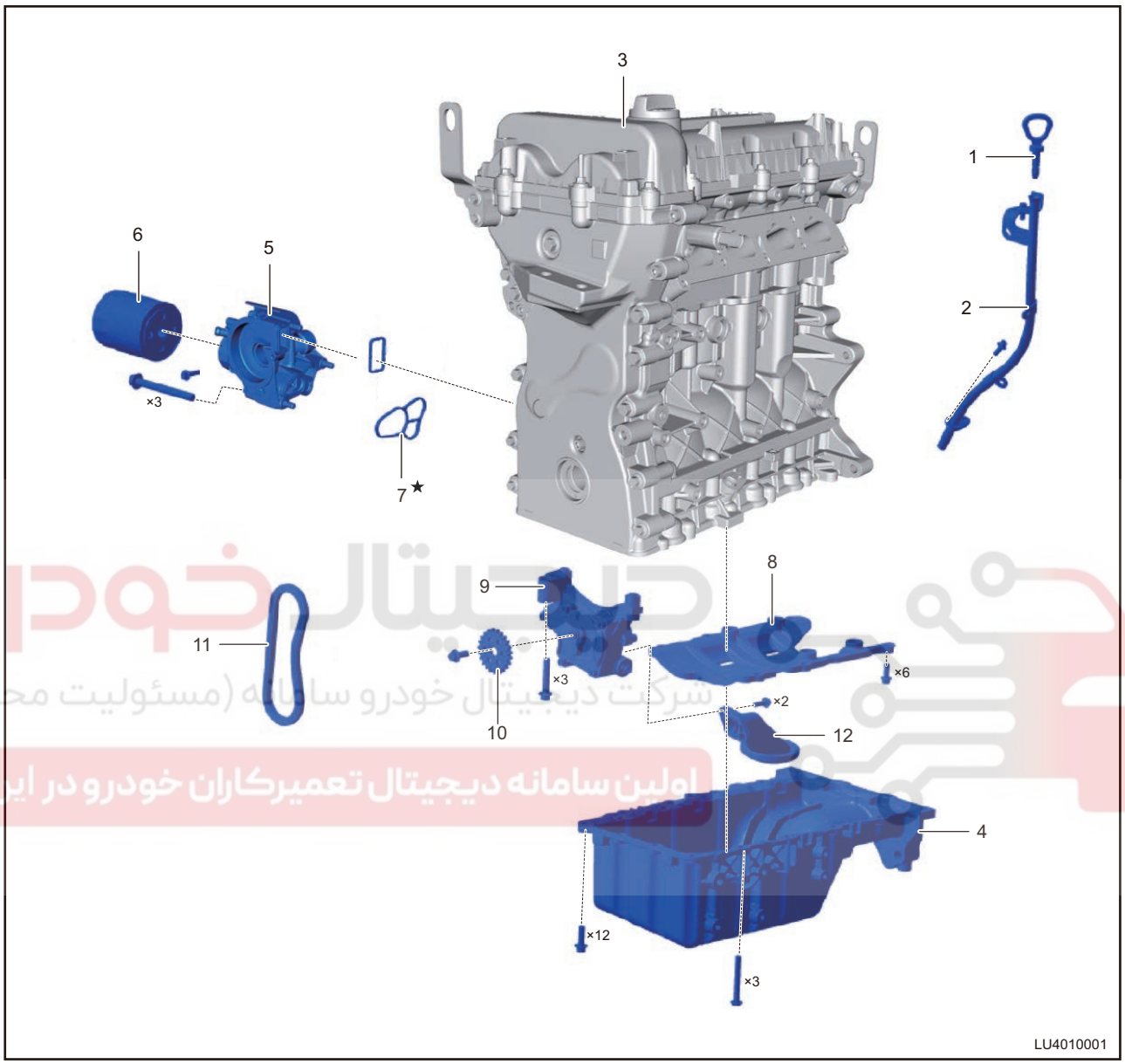
1. Installation is in the reverse order of removal.

⚠ Caution

- After installation, check that coolant has been added to standard level, carry out turbocharging inter-cooling system bleeding and check for leakage at the removal and installation position.

General Information

System Exploded Diagram



1	Oil Dipstick	8	Oil Deflector
2	Oil Dipstick Tube	9	Oil Pump Assembly
3	Fuel Filler Door	10	Oil Pump Sprocket
4	Oil Pan	11	Oil Pump Drive Chain
5	Oil Filter Module Assembly	12	Oil Strainer
6	Oil Filter Assembly	★	Non-reusable Part
7	Seal Ring		

Functional Principle

System Operation

When engine is operating, an oil pump driven by crankshaft, sucks oil from oil pan and pumps it at pressure through an oil filter. This filtered oil then flows through oil passages, to moving surfaces of all engine drive parts and forms oil films between moving surfaces to reduce friction and finally returns to the oil pan, thus reducing friction resistance between drive parts, power consumption and increasing reliability and durability of engine operation.

⚠ Warning
Prolonged and repeated contact with engine oil will result in the removal of natural oils from skin, leading to dryness, irritation and dermatitis. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Precautions should be followed when replacing engine oil to minimize the risk of your skin making contact with used engine oil:

- Wear protective clothing and gloves;
- Wash your skin thoroughly with soap and water, or use waterless hand cleaner to remove any used engine oil;
- Never use gasoline, thinners or solvents.

Specifications

Oil Specifications

Description	Specifications
Engine Type	SQRE4T15C
Oil Capacity (Replace Oil and Oil Filter Meanwhile)	4.2 ± 0.2 L
Oil Type	• Castrol SN 5W-30 • Castrol SP 5W-30 • Lukoil SN 5W-40 • Total SN+/SP 5W-30 • Royal Dutch Shell SN + 5W-30 • Royal Dutch Shell SN 5W-40 • Fuchs SN 5W-40

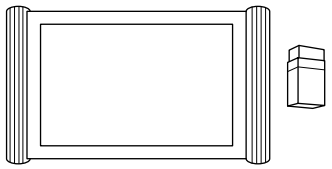
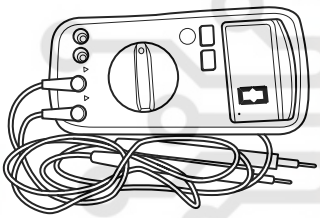
Torque Specifications

Description	Torque (N·m)
Drain Plug - Oil Pan	35 ± 3
Oil Filter	After it is 22 - 25 or seal ring is fitted to flange, rotate (3/4 - 1 lap)
Oil Pressure Switch	12 - 15
Oil Deflector Fixing Bolt	8 + 3
Oil Collector Fixing Bolt	8 + 3
Oil Pump Fixing Bolt	20 + 5

Description	Torque (N·m)
Oil Pan Fixing Bolt	20 + 5
Oil Filter Module	40 + 5
Oil Dipstick Tube	8 + 3

Tools

General Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006
Digital Multimeter	 RCH0002006

Diagnosis & Testing

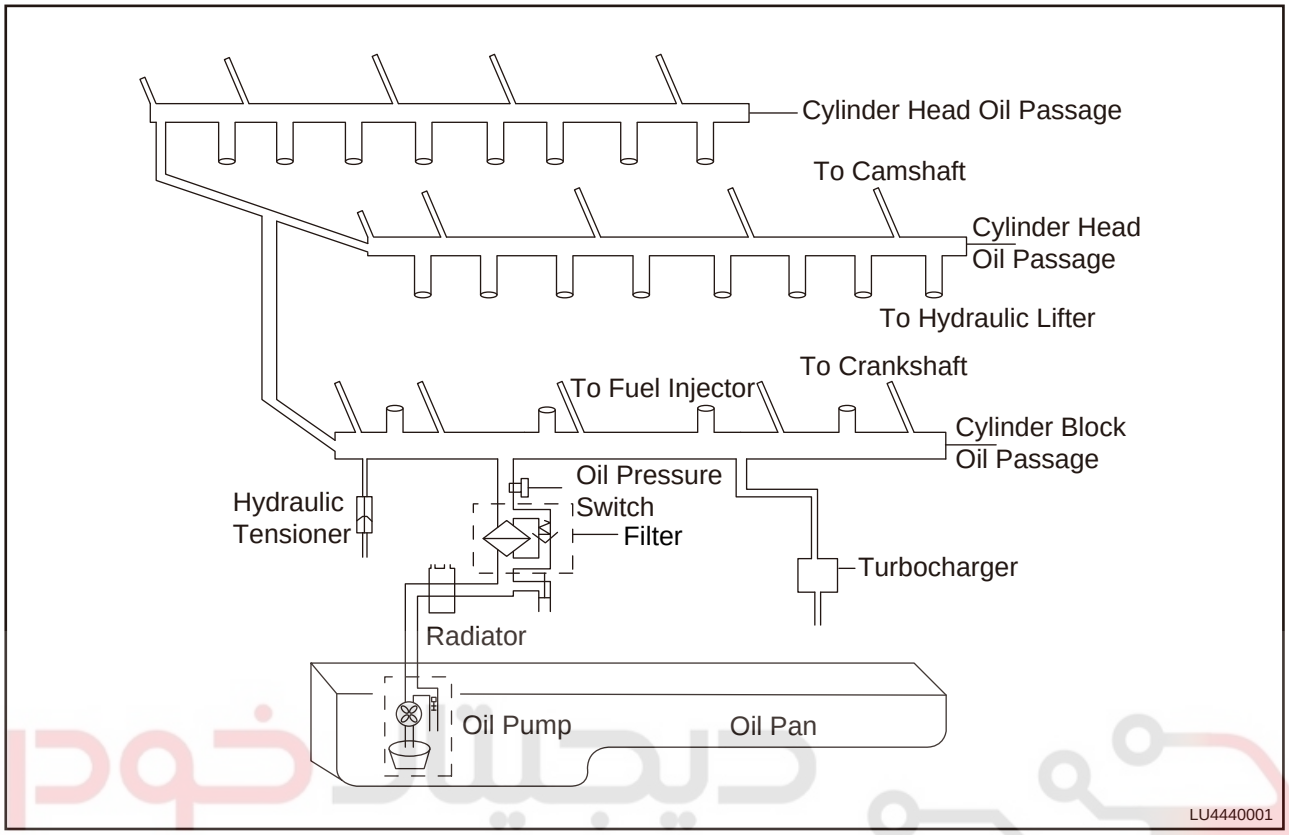
Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Possible Cause
Low pressure in lubrication system	Oil pan (dirty, leaky)
	Oil strainer (mesh dirty, blocked)
	Oil pump fault
	Line (blocked)
High oil consumption	Engine oil (excessive oil filling capacity)
	Oil filter module (leaked)
	Crankshaft front oil seal (damaged)

Symptom	Possible Cause
	Crankshaft rear oil seal (damaged)
	Oil pressure switch
	Oil drain plug (leaked)
	Oil pan (leaked)
	Engine oil leakage (cylinder head gasket damaged)
	Each engine seal surface leakage
Oil pressure warning light comes on	Engine oil (insufficient oil, low oil viscosity)
	Oil filter element (blocked)
	Oil strainer (blocked)
	Crankshaft front oil seal (damaged)
	Crankshaft rear oil seal (damaged)
	Oil pressure switch (damaged)
	Instrument cluster (oil pressure warning light)
	Cylinder block (cracks occur in water jacket, resulting in coolant leaking into oil pan, which will cause oil dilution)
	Line (blocked)

Schematic Diagram of Lubrication



Inspection of Engine Oil Level

⚠ Caution

- Check oil level indicated by oil dipstick, when engine is stopped after it reaches operating temperature.

2. Park vehicle on level ground, stop the engine after warming up and wait for 5 minutes.
3. Open the hood and pull out the oil dipstick and wipe it clean with a piece of cloth.

⚠ Caution

- Please put a piece of cloth under the oil dipstick end to prevent oil from splashing onto engine or body.

4. Reinsert the oil dipstick in place and leave it for 3 seconds to 5 seconds.
5. Pull out the oil dipstick again and check if oil level is proper.

Hint:
If engine oil level is too low, check for leakage and add oil up to the level mark.

7. Install the oil pressure switch.

   Hint:
   Apply a small amount of seal gum to threads when installing the oil pressure switch.
8. Connect the oil pressure switch connector and check engine oil for leakage.

On-vehicle Service

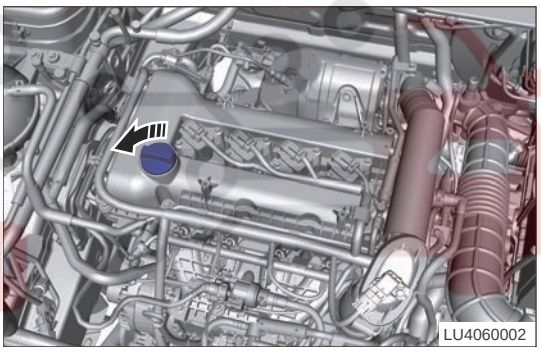
Engine Oil Replacement

Engine Oil Draining

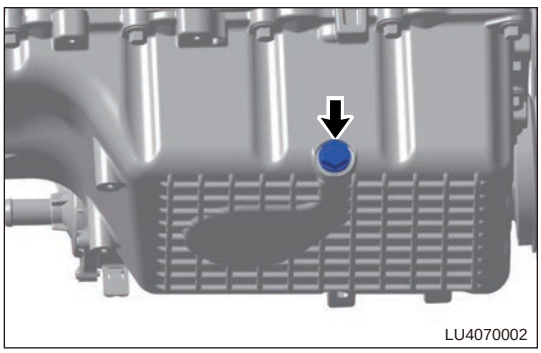
⚠ Warning

- Before operation. Wait for the engine to cool down completely.
- Prolonged and repeated contact with engine oil will result in the removal of natural oils from skin, leading to dryness, irritation and dermatitis. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Open the oil filler door.
   a. Turn the oil filler cap counterclockwise to open.



4. Raise the vehicle to a proper position.
   a. Remove drain plug (arrow) counterclockwise, and drain oil into a container.



⚠ Caution

- Apply a certain pushing force to drain plug while loosening the plug by hand, and have the drain plug attached to thread tightly to prevent oil from overflowing in advance. Move away your hand quickly to prevent burn by oil with a certain temperature.
- Wasted engine oil should be handled by specialized department according to local laws and regulations. Never discard it at will

b. Wipe off the drain plug and tighten it.
Tightening torque: 35 ± 3 N • m

⚠ Caution

- The drain plug gasket must be replaced each time the drain plug is removed.

Engine Oil Adding

1. Only use engine oil that meets Chery specifications.

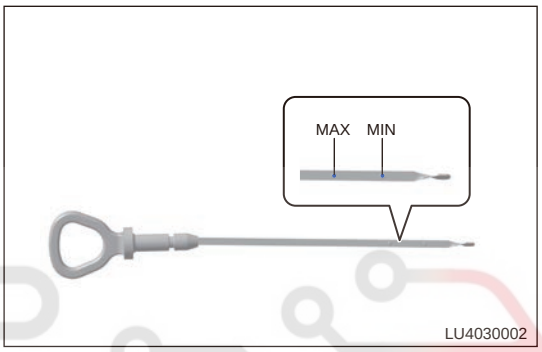
⚠ Caution

- DO NOT use inferior engine oil.
- DO NOT mix different types of engine oil.
- Be careful not to spill engine oil on any part of the engine when adding engine oil.

a. Add a proper amount of oil, and check that oil level is between "MIN" mark and "MAX" mark with oil dipstick.

b. Turn off the engine after running for 1 to 2 minutes, park vehicle on a level surface and wait for approximately 5 minutes. Check if oil level is between “MIN” mark and “MAX” mark. Refill oil if necessary.

c. Check the vehicle for leakage after replacing oil.



Oil Filter

Removal

⚠ Warning

- DO NOT remove oil filter element until engine cools down.
- Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.

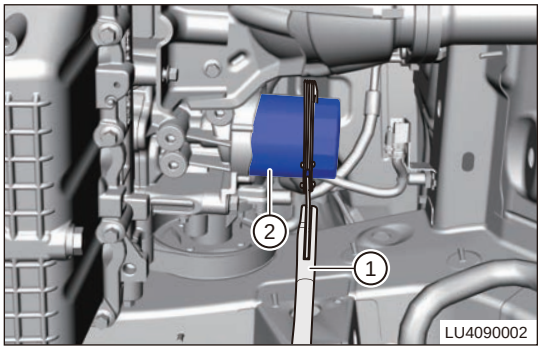
⚠ Caution

- Use oil filter installer when replacing oil filter to avoid deformation.
- Oil filter is close to exhaust pipe, avoid burns during installation and removal.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Raise the vehicle to a proper position.
3. Drain engine oil.
4. Remove the oil filter.

a. Use oil filter remover (1) to remove oil filter (2).

Tightening torque: 22 - 25 N m



b. Remove the oil filter assembly.

⚠ Caution

- The removed oil filter should be handled by specialized department according to local laws and regulations. Never discard it at will.

Installation

⚠ Caution

- Check and clean installation surface between oil filter and oil filter bracket.
- Apply a coat of clean engine oil to oil filter seal ring.
- Use a special tool to tighten oil filter.
- It is necessary to clean oil left on components after installing oil filter.

1. Installation is in the reverse order of removal.

Oil Pressure Switch

Removal

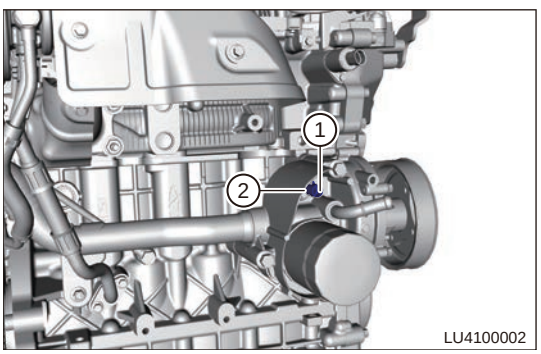
⚠ Caution

- DO NOT remove oil pressure switch until engine cools down.
- Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the oil pressure switch.

a. Disconnect the oil pressure switch connector (1) and remove oil pressure switch (2).

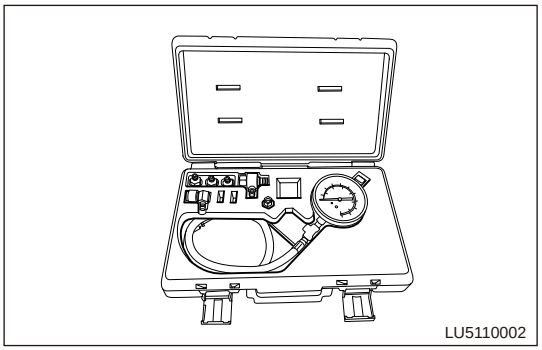
Tightening torque: 20 ± 2 N · m



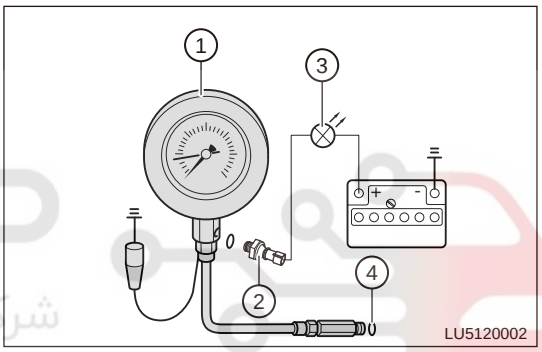
Inspection

> **⚠ Caution**
>
> - Before inspecting oil pressure switch, please make sure that oil level is proper and coolant temperature is above 90℃, and that oil filter is used within 5000 Km.

1. Inspect oil pressure switch.
   a. Use an oil pressure tester as shown in the illustration.


LU5110002

   b. Install the oil pressure tester into the threaded hole (4) of oil pressure switch as shown in the illustration.
   c. Install the oil pressure switch (2) onto the tester (1) and connect the LED lamp (3).
   d. LED (3) does not turn on when engine is not started. If it turns on, replace the oil pressure switch.
   e. After starting engine, observe the pressure reading on tester. LED (3) turns on when oil pressure reaches 94 Kpa, if it does not turn on, replace the oil pressure switch.

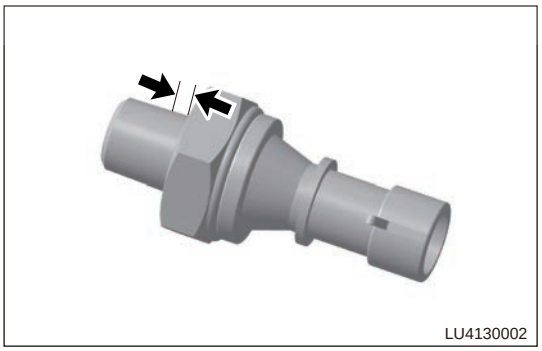


LU5120002

Installation

1. Remove the oil and impurities on the oil pressure switch and its threaded hole.
2. Apply a small amount of seal gum to threads when installing the oil pressure switch.
   a. Use a torque wrench to tighten it to specified torque, as shown in illustration, there is a gap (a) about 2 to 5 mm between oil pressure switch flange surface and oil filter module housing.

      Tightening torque: 20 ± 2 N · m


LU4130002

3. Other installation procedures are in the reverse order of removal.

> **⚠ Caution**
>
> - Apply seal gum on threads when assembling oil pressure switch.

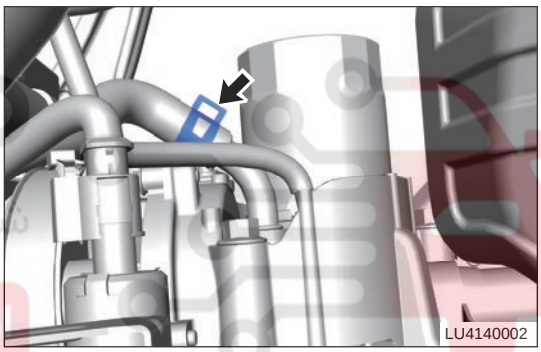
Oil Filter Module Assembly

Removal

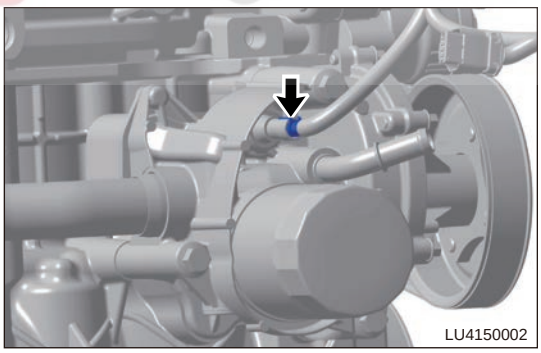
Warning

- DO NOT remove oil filter module assembly until engine cools down.
- There will be residual coolant inside engine during removal and installation, if your skin contacts coolant directly, clean it with water immediately. If it is serious, please go to hospital.
- Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.

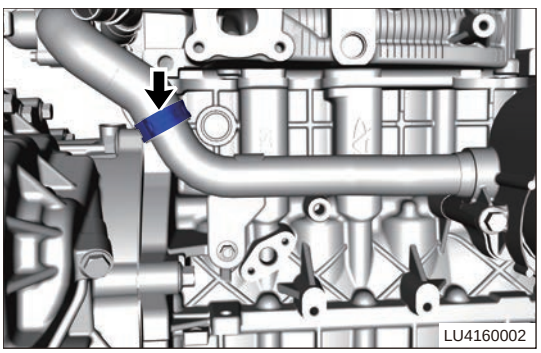
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the engine accessory belt.
4. Drain the oil.
5. Drain the coolant.
6. Remove the oil filter module assembly.
   a. Loosen elastic clamp (arrow), disconnect connection between water supply hose and oil filter module assembly.



   b. Disconnect the oil pressure switch connector.



   c. Loosen the elastic clamp (arrow) and disconnect connection between small circulation hose and cooling pipe I assembly.



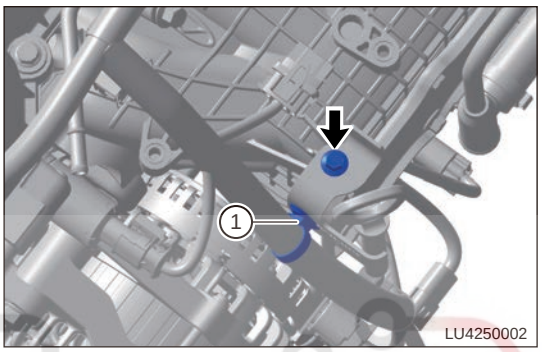
Oil Tube Assembly

Removal

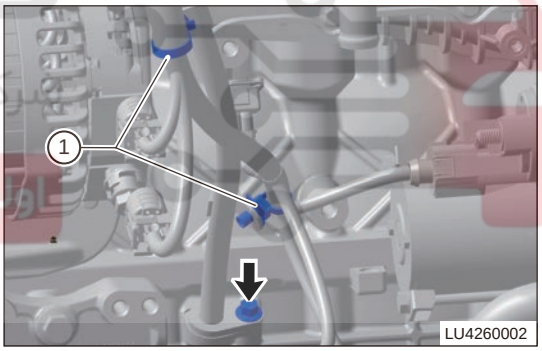
⚠ Warning

- Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the oil tube assembly.
   a. Disconnect the engine wire harness fixing clip (1).
   b. Remove coupling bolt (arrow) between oil tube and intake manifold assembly.



   c. Disconnect the engine wire harness fixing clip (1).
   d. Remove coupling bolt (arrow) between oil tube and engine frame assembly.



   e. Remove the oil tube assembly.

Installation

⚠ Caution

- Check O-ring before assembly to make sure it is not damaged, otherwise replace with a new one.
- Apply a small amount of lubricant to O-ring before assembly.
- When inserting dipstick tube into frame installing hole, insert lower end as far as possible along shaft line direction. If it tilts, it may be difficult to assemble O-ring, even damage O-ring.

1. Installation is in the reverse order of removal.

System Exploded Diagram

1	ENGINE START STOP Switch	3	Battery
2	Engine Compartment Fuse and Relay Box	4	Starter

Starting system consists of battery, ignition switch and starter, etc. Starting system converts electrical energy from battery into mechanical energy, allowing engine to crank initially, and disconnects power transmission between starter and engine when engine runs normally.

Operation

- Solenoid control mechanism: The driver operates the relay (solenoid switch) through the starting switch, while the relay operates the starter electromagnetic switch and driven gear.
- At starting, ensure that the starter power is transferred to the crankshaft through the flywheel; After starting, when the engine starts to work, immediately cut off the power transmission route, so that the engine can not reverse through the flywheel to drive starter high-speed rotation.
- DC motor: Converts electrical energy from battery into electromagnetic moment.
- Gear train: When the engine starts, the electromagnetic torque of motor is transferred to the flywheel of engine.When the engine is started, the starter is separated from the engine automatically.
- Solenoid switch: Controls engagement and disengagement between starter drive gear and engine flywheel gear and switches on/off the motor circuit; Also the solenoid switch has function of additional resistance of short circuit ignition coil when starting.

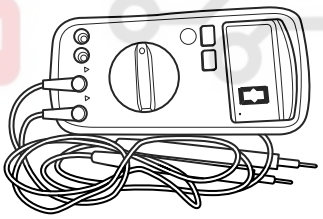
Specifications

Torque Specifications

Description	Torque (N·m)
Starter Fixing Bolt	45 ± 5

Tools

General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006

Diagnosis & Testing

Problem Symptoms Table

Hint:

- Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
When ignition switch is turned to START, solenoid switch makes a "clanking" sound and engine cannot start.	Battery (depleted)
	Starter (solenoid switch)
Starter does not run	Battery (depleted)
	Starter relay

Symptom	Suspected Area
	Starting system wire harness
	Starting switch
	Starter
	ECU
Starter runs weakly	Battery (depleted)
	Starter
Starter is racing	Starter (incorrect installation, internal fault)
	Flywheel ring gear (gear teeth broken)

On-vehicle Inspection

Starter Relay

1. Check the starter relay:
   a. Remove the starter relay from engine compartment fuse and relay box.
   b. Replace with a good relay for ignition, if ignition is successful, it means starter relay is damaged.

Ground Inspection

1. Power assembly ground and body ground inspection.
   a. Check the power and body ground wire fixing bolts for looseness, and the ground parts should be in good contact with no heat or burnt smell.

Precautions for Starting System

1. Before starting engine, shift transmission to P/N, and apply parking brake while depressing clutch pedal.
2. Make sure that battery is fully charged to reduce repeat operating time of starter.
3. Do not start engine for more than 5 seconds each time, repeated starting interval should not be less than 10 - 15 seconds, and consecutive starting is not allowed for more than 3 times.
4. If starter cannot stop, turn off ignition switch immediately, or remove the negative battery terminal cable to find the problem.
5. Check the starter circuit frequently to make sure that each wire of starting system is connected securely and in good insulation.
6. Generally, perform maintainable service for starter when servicing the vehicle. Also, maintenance interval can be shortened or extended depending on actual conditions.
7. Disconnect the negative battery terminal cable before removing starter.

On-vehicle Service

Starter Assembly

Removal

⚠ Caution

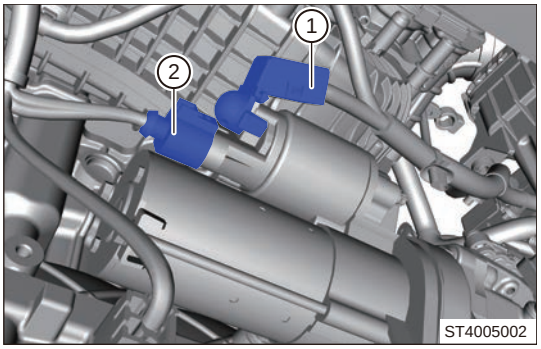
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and ENGINE START STOP switch.

2. Disconnect the negative battery cable.
3. Remove the air filter assembly.
4. Remove the starter assembly.
   a. Open positive cable fixing nut rubber protector (1) from starter. Remove the fixing bolt.

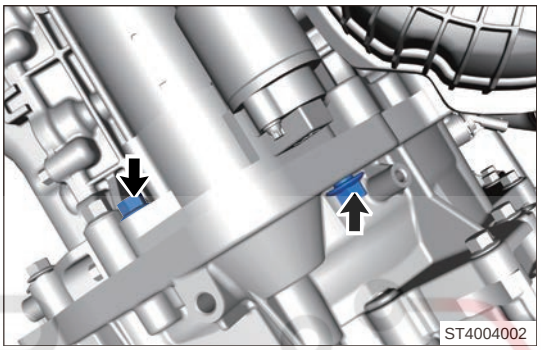
      Tightening torque: 13 ± 2 N · m

   b. Disconnect the starter assembly connector (2).



   c. Remove 2 fixing bolts (arrow) between starter assembly and transmission assembly.

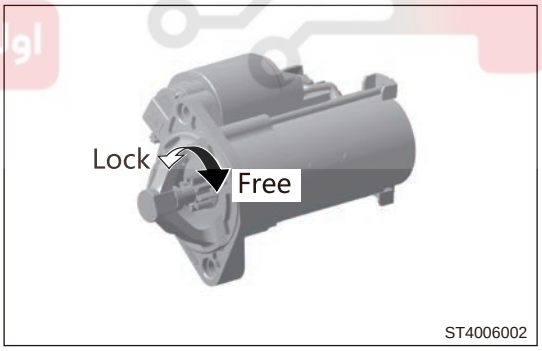
      Tightening torque: 45 ± 5 N m



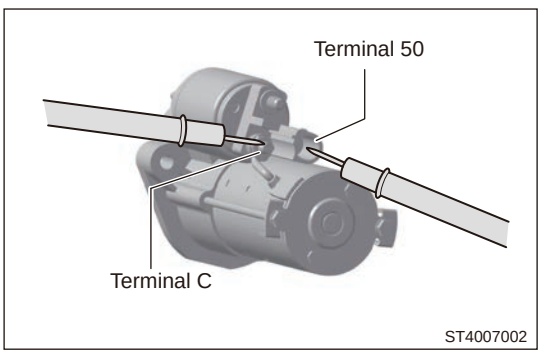
   d. Remove the starter assembly.

Inspection

1. Check the starter clutch.
   a. Rotate the clutch pinion gear clockwise to check that it can turn freely. Rotate the clutch pinion gear counterclockwise to check that it locks. If result is not as specified, replace the starter.

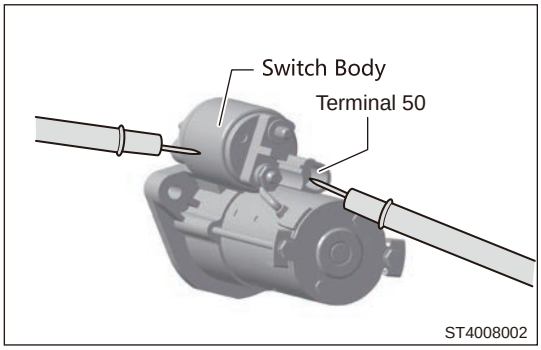


2. Check the starter solenoid switch.
   a. Check the pull-in coil.
      - Measure the resistance between terminal 50 and terminal C.
      - Standard resistance should be below 2Ω. If the resistance is abnormal, replace the starter assembly.



b. Check the hold-in coil.

- Measure the resistance between terminal 50 and starter solenoid switch body.
- Standard resistance should be below 2Ω. If the resistance is abnormal, replace the starter assembly.



3. Check the starter assembly

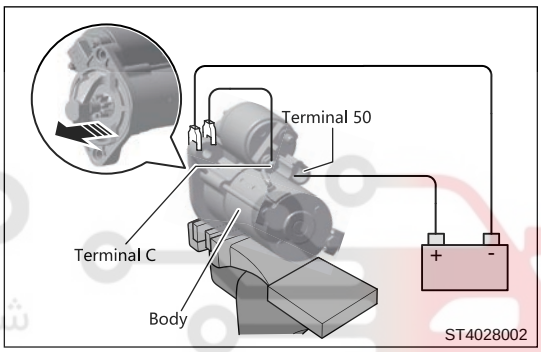
⚠ Caution

- These measurements must be performed within 3 to 5 seconds to avoid coil burnout.
- Place the starter assembly onto a vise. The jaws of vise should be covered by aluminum sheet or brass plate; otherwise, the starter assembly will be easily damaged when clamping it.

a. Perform pull-in test.

- Remove the nut and disconnect the field coil lead from terminal C.
- As shown in illustration, connect battery to solenoid switch, and check that starter clutch pinion sticks out normally.

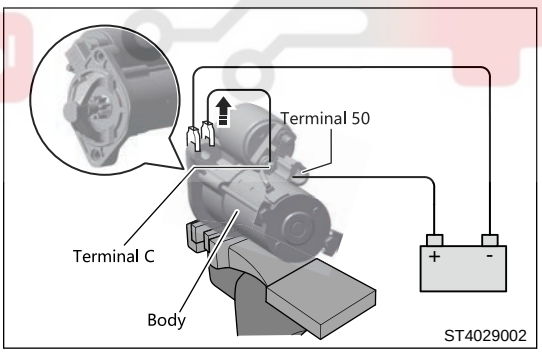
If starter clutch pinion does not move, replace the starter assembly.



b. Perform hold-in test.

- Keep the starter clutch pinion sticking out and the connection condition of battery mentioned above, and disconnect the negative battery cable from terminal C.
- Check if starter clutch pinion keeps sticking out.

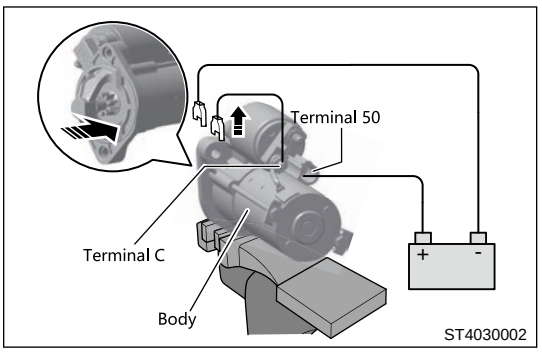
If starter clutch pinion moves inward, replace the starter assembly.



c. Check if starter clutch pinion returns back.

- Disconnect the negative battery cable from starter body. Check that starter clutch pinion returns back.

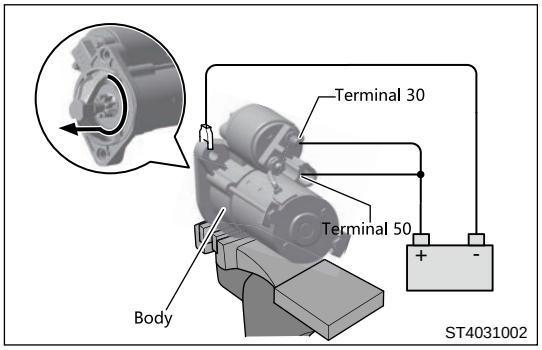
If starter clutch pinion does not return back, replace the starter assembly.



d. Check if starter rotates smoothly.

- Connect the field coil lead to terminal C, and tighten it with a nut.
- As shown in illustration, connect battery to starter. Check that starter rotates smoothly when the starter clutch pinion moves outward.

If result is not as specified, replace the starter assembly.



Installation

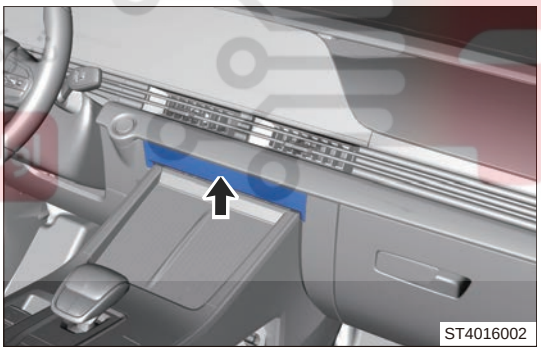
1. Installation is in the reverse order of removal.

ENGINE START STOP Switch

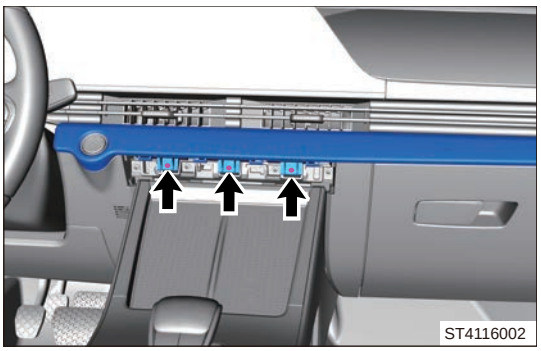
Removal

> **⚠ Caution**
>
> - Be sure to wear necessary safety equipment to prevent accidents when repairing.
> - Try to prevent interior from being scratched during removal and installation.

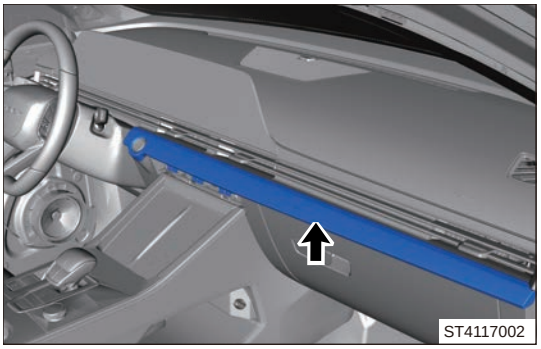
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the ENGINE START STOP switch
   a. Using an interior crow plate, remove auxiliary fascia console body bolt cover plate.



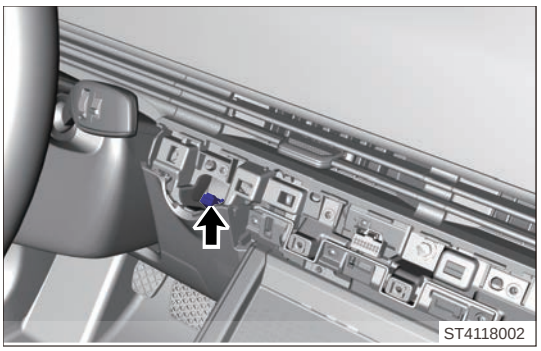
   b. Remove 3 fixing screws (arrow) from auto A/C control panel.



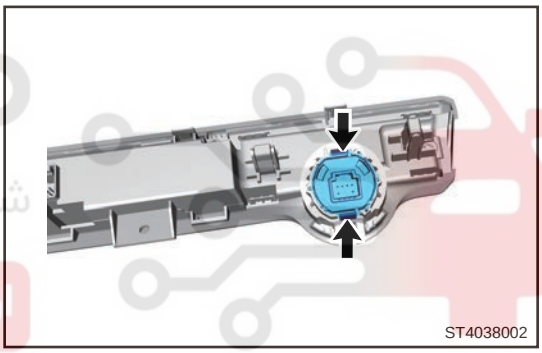
c. Using an interior crow plate, remove auto A/C control panel assembly.



d. Disconnect the ENGINE START STOP switch connector (arrow).



e. Push fixing clips on both sides of ENGINE START STOP switch and remove ENGINE START STOP switch.



Inspection

1. Check the continuity of ENGINE START STOP switch.
   a. Using a digital multimeter, check the continuity of ENGINE START STOP switch according to the table below.

Multimeter Connection	Switch Condition	Specified Condition
Terminal 1 - Terminal 2	Not pressed	No continuity
Terminal 3 - Terminal 2	Not pressed	No continuity
Terminal 1 - Terminal 2	Pressed	Continuity
Terminal 3 - Terminal 2	Pressed	Continuity

Hint:
If measure result is not as specified, replace the ENGINE START STOP switch.

2. Check the ENGINE START STOP switch indicator.
   a. Press ENGINE START STOP switch and observe if ENGINE START STOP switch lights is normal.

   Hint:
   If the positive (+) lead and negative (-) lead are incorrectly connected, ENGINE START STOP switch indicator will not illuminate.
   If the battery voltage is too low, ENGINE START STOP switch indicator will not illuminate.

Multimeter Connection	Specified Condition
Battery positive (+) → Terminal 4	White (not illuminate)
Battery negative (-) → Terminal 2	
Battery positive (+) → Terminal 5	Green
Battery negative (-) → Terminal 2	
Battery positive (+) → Terminal 8	Amber
Battery negative (-) → Terminal 2	

If measure result is not as specified, replace the ENGINE START STOP switch.

Installation

1. Installation is in the reverse order of removal.

SQRE4T15C CHARGING SYSTEM

Warnings and Precautions

Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

1. Battery acid is highly corrosive, so it is necessary to wear protective gloves and goggles when working.
2. Do not dump the battery, because acid may spill from vent hole.
3. Never throw the used battery into household garbage. There is risk of explosion.

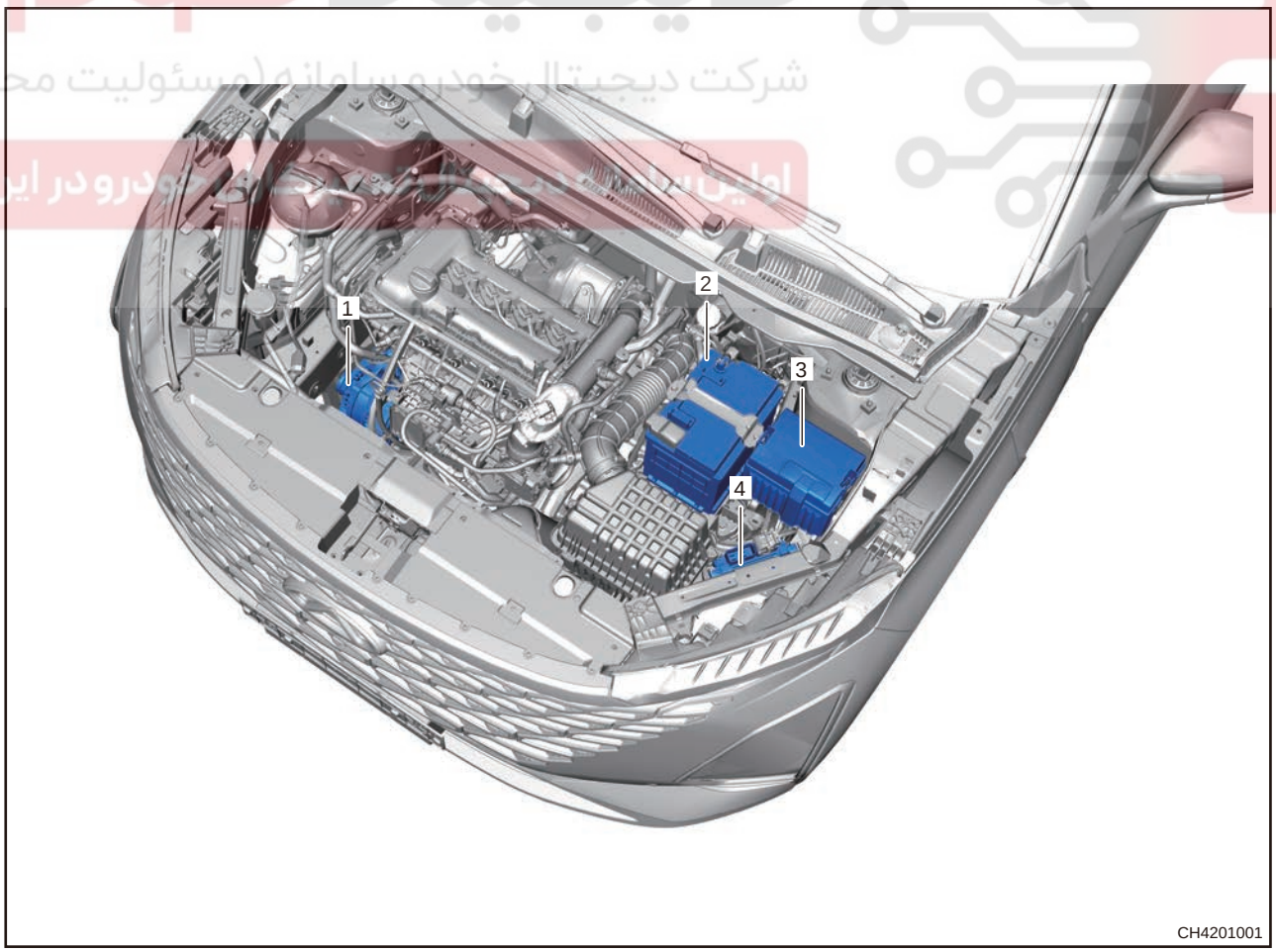
Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

1. Deliver the used battery to designated recycling site.
2. Never allow the children approaching acid and battery.

General Information

System Exploded Diagram



1	Alternator Assembly	3	Engine Compartment Fuse and Relay Box
2	Battery Assembly	4	ECU

Alternator is a key component of the charging system. It is a device that converts mechanical energy into electrical energy and generates DC voltage through a rectifying circuit, as one of main power sources of the vehicle. The alternator operates as a complete assembly. If alternator fails for any reason, the entire unit must be replaced.

Operation

- Alternator is a silicon rectifying alternator, which mainly consists of rotor, stator and rectifier.
- When direct current flows to rotor winding, rotor claws energize magnetic field to produce alternating induced electromotive force. The stator is installed on the outside of rotor, which is secured together with the front and rear end covers of alternator. When the rotor of the generator is rotated by the drive belt, the magnetic pole lines cut the stator winding, causing a change in the magnetic flux in the stator winding, and an alternating induced electromotive force is generated in the stator winding, thereby generating alternating current. Three-phase alternating current generated by alternator is converted to direct current from alternating current by rectifier, and direct current is transmitted to the vehicle electrical system and battery.

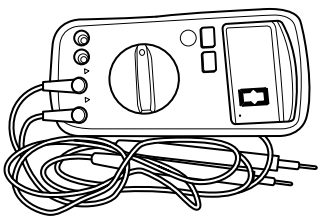
Specifications

Battery Specifications

Engine Type	Specifications
SQRE4T15C	12 V 60 Ah

Tools

General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH000206

Special Tools

Tool Name	Tool Drawing
Battery Tester	 RCH0090006

Diagnosis & Testing

Diagnosis Specification for Alternator Malfunction

⚠ Warning

- Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Operation Content	Operation Description
Appearance inspection: Confirm if there is any washer fluid, coolant, oil, sludge and other foreign matters adhered.	If the washer fluid, coolant, oil enters rotor slip ring, brush holder, it will cause oxidization to alternator rotor slip ring and poor contact to brush, resulting in charging light remaining on or flashing.
Turn over the center of alternator belt by hand and observe if the max. turning angle is over 90°.	Loose belt will cause low alternator speed, resulting in low electric energy production or failing to generate energy; if the angle is over 90°，adjust the belt tension.
Measure battery voltage with a multimeter.	Confirm if the battery is depleted (more than 12 V). If so, unplug the generator excitation coil connector and retest the battery voltage (more than 12 V). If such condition still exists, charge the battery.
Confirm if there is any looseness, short circuit, dirt on alternator B+, excitation end, battery pile line and ground line and also confirm if the connectors are connected firmly.	Confirm if the wire harness is connected normally. Poor contact will cause that the alternator voltage is high, the indicator light doesn’t come on, remains on or flashes. If there is any looseness, please tighten it firmly.

Charging indicator light remains on (do not generate electricity or power is low, vehicle cannot start, etc.)	
Operation Content	Operation Description
Unplug the alternator connector, start the engine and depress the accelerator (engine speed is above 1500rpm), turn off the vehicle load, measure B+ voltage to ground with multimeter and observe 2-3 minutes.	If B+ voltage is about 13.8V, the alternator operates normally. It may be LIN communication malfunction. Please check the LIN communication setting in ECU. If B+ voltage is the battery voltage, it indicates alternator malfunction. Replace the alternator.
If the alternator operates normally, reconnect the alternator connector, start the engine and keep it idling, turn on some electrical load on vehicle, such as A/C, headlight, etc. Meanwhile, depress the accelerator pedal or decelerate the vehicle. Measure B+ voltage to ground with multimeter and observe 2-3 minutes.	When vehicle load or speed changes, the alternator normal voltage should change within 10.6-16 V. If the charging indicator remains on, check if LIN communication is normal with an oscilloscope or other test software.

Charging indicator flashes (unstable electricity generation)	
Operation Content	Operation Description
Start the engine and keep it idling, remove alternator excitation coil and observe if the meter indicator flashes.	If the light flashes, it indicates that some excitation coil has outer leakage and intermittently ground. Check the circuit malfunction.

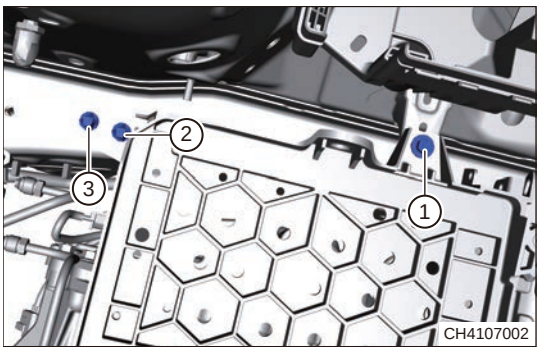
Indicator does not come on during self-check	
Operation Content	Operation Description
Turn ENGINE START STOP switch to “ON” position, remove the engine excitation coil and measure the alternator excitation coil terminal voltage to ground with multimeter.	If the voltage is 0, it indicates that the excitation coil circuit is open. Check the excitation coil circuit; if the voltage is equal to battery voltage, it indicates that excitation coil circuit is normal and there may be alternator malfunction. Replace the alternator.

Adjusting voltage is high (headlight and other electrical appliances used on vehicle are burnt out)	
Operation Content	Operation Description
Start the engine and keep it idling, measure B+ voltage to ground with multimeter and observe 2-3 minutes to check if the max. value exceeds 16 V.	If so, it indicates that the regulator in alternator is damaged which causes voltage out of control. Replace the alternator.

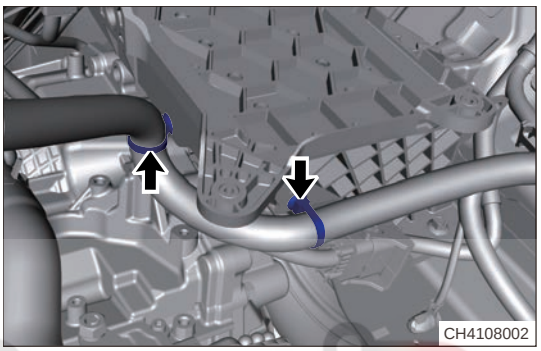
Charging System Charging Voltage Inspection

1. Leave vehicle under no load test condition and idle the engine. Measure battery voltage with a digital multimeter. Standard voltage: 13.5 V - 14.8 V; If result is not as specified, replace the alternator.

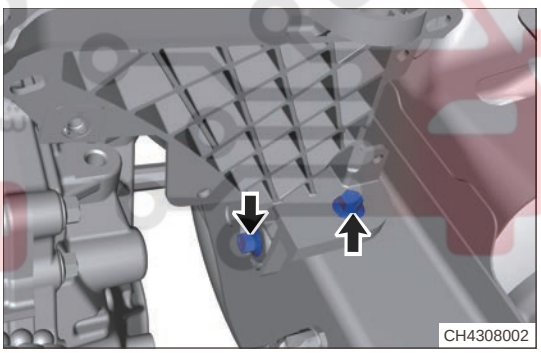
3. Remove the air filter assembly.
4. Remove the battery tray.
   a. Remove the battery tray fixing bolt (1).
      Tightening torque: 9 ± 1 N · m
   b. Remove the battery tray fixing bolt (2) and (3).
      Tightening torque: 25 ± 4 N · m



   c. Remove each wire harness fixing clips (arrow) from battery tray.



   d. Remove 2 fixing bolts (arrow) from battery tray.
      Tightening torque: 25 ± 4 N · m



   e. Remove the battery tray.

Installation

1. Installation is in the reverse order of removal.

Generator

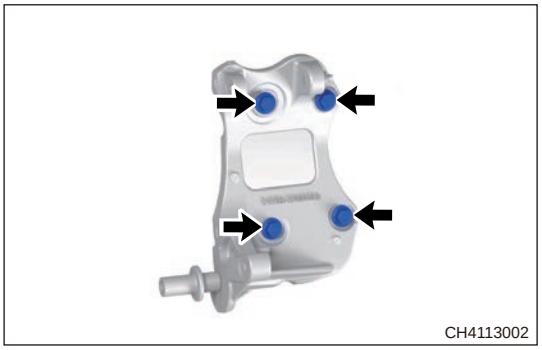
Removal

⚠ Caution
• Be sure to wear necessary safety equipment to prevent accidents when repairing.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Move away the accessory drive belt.
5. Remove the idler pulley assembly.
6. Remove the alternator mounting bracket.

a. Remove 4 fixing bolts (arrow) from alternator mounting bracket.

Tightening torque: 40 + 5 N m



b. Remove the alternator mounting bracket.

Installation

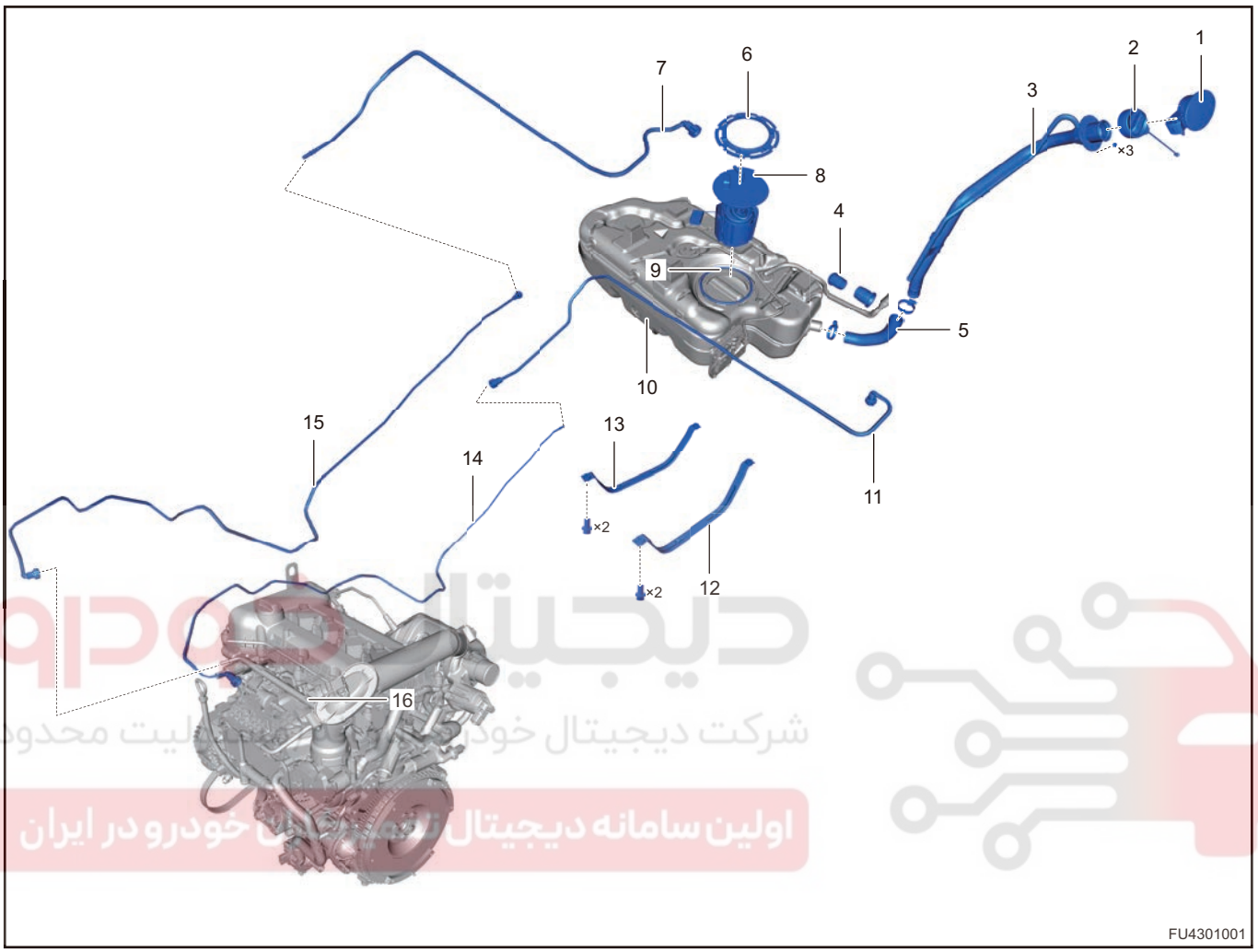
1. Installation is in the reverse order of removal.
2. Inspection.
   a. Start the engine.

      Hint:
      If battery warning light comes on, charging system may have a malfunction.

   b. When engine is running, use digital multimeter to check the output voltage of alternator and record it.
   c. If the voltage is between 13.5 - 14.8 V, the alternator is normal.

General Information

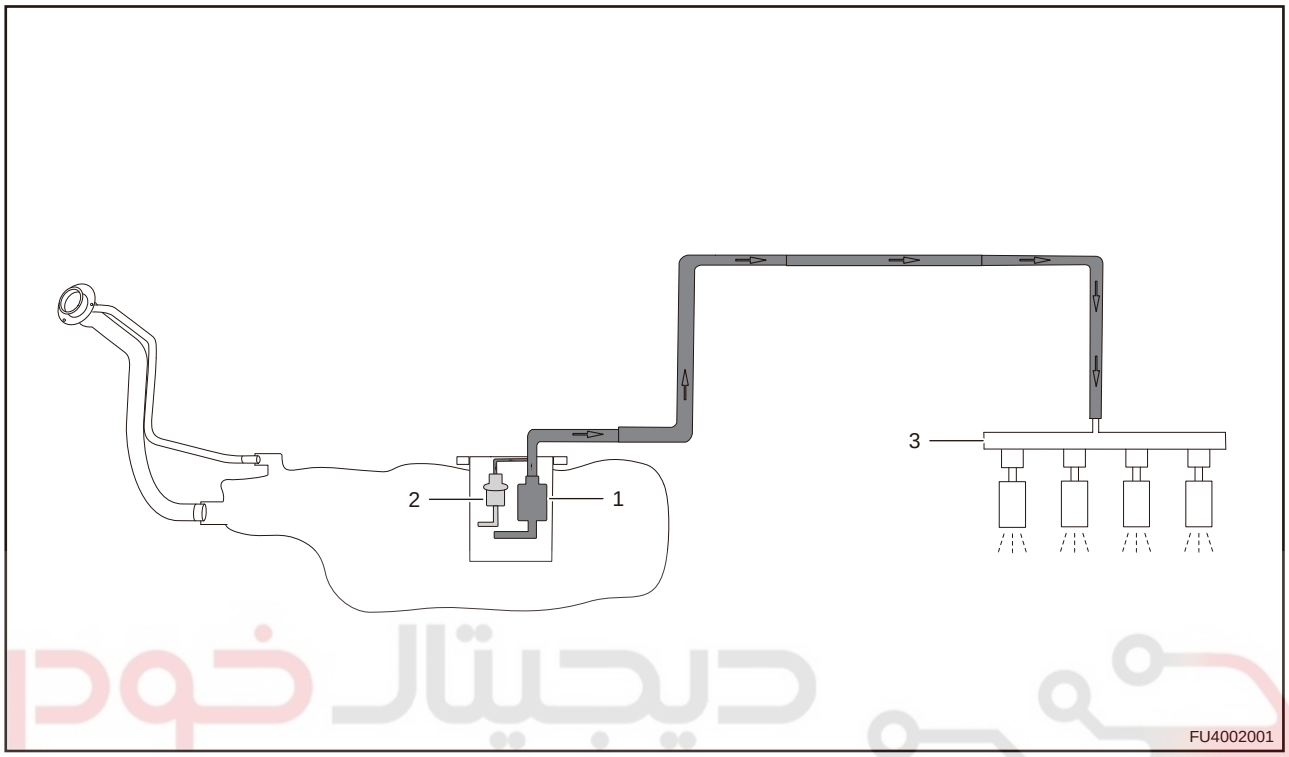
System Exploded Diagram



1	Fuel Filler Cap Assembly	9	Fuel Tank Seal Ring
2	Fuel Tank Cap Assembly	10	Fuel Tank Assembly
3	Filler Tube Assembly	11	Fuel Tank Vapor Pipe Ⅱ
4	Fuel Breather Hose Boot	12	Fuel Tank Fixing Strap Ⅱ
5	Fuel Filler Hose	13	Fuel Tank Fixing Strap Ⅰ
6	Fuel Tank Pressure Cap	14	Fuel Tank Vapor Pipe Ⅲ
7	Inlet Pipe Ⅰ Assembly	15	Inlet Pipe Ⅱ Assembly
8	Electric Fuel Pump Assembly	16	Fuel Rail Injector Assembly

Functional Principle

System Control Schematic Diagram



1	Electric Fuel Pump Assembly	3	Fuel Rail Injector Assembly
2	Electric Fuel Pump Assembly Pressure Regulator		

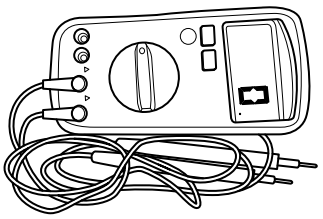
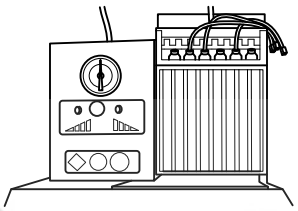
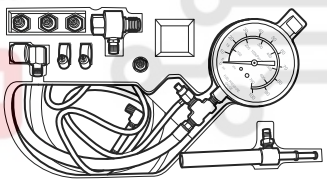
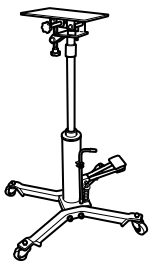
When engine operates properly, the electric fuel pump assembly (1) sucks fuel from fuel tank. Some fuel enters the fuel rail (3) and is supplied to injectors, some fuel flows back to the electric fuel pump assembly pressure regulator (2) directly. When fuel supply system pressure is high, the diaphragm spring in the regulator is jacked up by pressure, then the valve opens and fuel flows out from regulator. When pressure reaches normal value, the regulator shuts off and fuel stops flowing out. Finally, the system pressure reaches a steady state.

System Operation

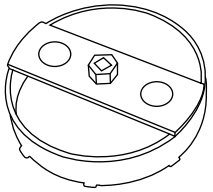
Fuel supply system consists of fuel tank, electric fuel pump assembly, delivery pipes, fuel rail and injectors, which is used for fuel storage, filtration, delivery and injection. The function of fuel supply system is to provide gasoline with sufficient pressure to fuel injectors by using electric fuel pump assembly, and the injector sprays a certain amount of gasoline which burnt mixed with gas to the top of intake valve in intake manifold in accordance with control signals from ECU.

Tools

General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006
Fuel System Pressure Tester	 RCH0062006
Injector Tester	 RCH004806
Transmission Carrier	 RCH0005006

Special Tools

Tool Name	Part No.	Tool Drawing
Fuel Pump Pressure Cap Remover	CH-30090	 RCH0004006

Diagnosis & Testing

Problem Symptoms Table

Warning

- Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Possible Cause
Fuel pressure in fuel supply system is too low	Electric fuel pump assembly (strainer blocked or fuel pressure regulator damaged)
	Low fuel level
Fuel pressure in fuel supply system is too high	Fuel injector (clogged)
	Electric fuel pump assembly (fuel pressure regulator damaged)
Electric fuel pump assembly has loud noise or a delay in operating	Low fuel level
	Electric fuel pump assembly relay
	Electric fuel pump assembly
Fuel tank flat	Charcoal canister solenoid valve operates all the time
	Activated charcoal canister (blocked)
	Charcoal canister filter ineffective
	Fuel tank ineffective
Fuel injector is clogged or leaked	Poor fuel quality
	Excessive impurities in fuel tank
	Fuel injector is damaged
Fuel injector does not work	Fuel supply system line (damaged)
	Fuel injector (short in coil)

Symptom	Possible Cause
	Electric fuel pump assembly (damaged)
	Wire harness

Fuel System Pressure Releasing

Operation Step

⚠ Warning

- When engine is not operating, the fuel pressure in fuel supply system is still high. Before repairing or disconnecting the fuel line or fuel supply system components, it is necessary to release the fuel supply system pressure to prevent fuel from spraying out accidentally. Failure to follow these instructions may result in serious personal injury.

1. Perform the following procedures to release the fuel pressure in fuel supply system:
   a. Recognize and remove the electric fuel pump assembly relay from engine compartment fuse and relay box.
   b. Start and run the engine until it stalls.
   c. Restart the engine until it does not run.
   d. Turn ENGINE START STOP switch to OFF.
   e. Disconnect the negative battery cable.
   f. Insert the electric fuel pump assembly relay into the original place.

Fuel System Pressure Test

Fuel Pressure Specifications

SQRE4T15C	Pressure (kPa)
Fuel Rail Fuel Pressure - Key (ON)	When power is on, pressure of fuel supply system is kept at 400 kPa - key (ON). For the new vehicle, after it is added with a certain fuel, make sure that measured fuel pressure on fuel rail at 13 seconds can reach 90% or higher of rated pressure.
Fuel Rail Fuel Pressure - Engine Idling	Make sure that supply fuel under normal system pressure (at least 400 kPa).
Fuel Rail Fuel Pressure - Key (OFF)	Turn off oil pump after it runs for 5 minutes, test changes of pressure in oil outlet of oil pump within 48 hours, the pressure should be not less than 1 KPa; When system pressure is 80%, turn power and oil outlet off, the maximum pressure will not drop more than 10% in 1min.

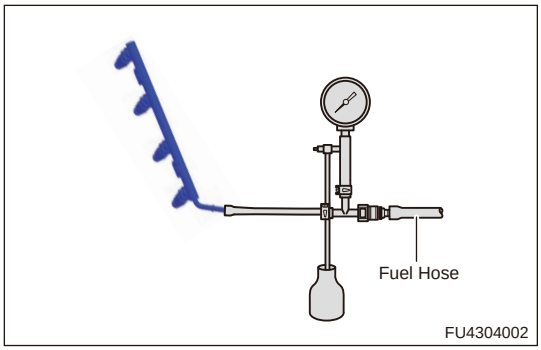
⚠ Warning

- When operating the fuel supply system, work area should be in good ventilation and keep fire sources or open flames away from the work area, in which fire extinguisher should be equipped.
- Before operating the fuel supply system, please touch the vehicle body to discharge static electricity; failure to do so will cause a fire, even result in an explosion.
- Before removing and installing fuel pipes, release the fuel supply system pressure.

⚠ Caution

- Make sure that battery voltage is not less than 12V.
- There is sufficient fuel in fuel tank for test.
- Make sure that fuel supply system lines are securely connected, preventing the fuel supply system from leaking.

1. Detect the fuel system pressure.
2. Disconnect the oil inlet pipe connector and connect the fuel supply system pressure tester between oil inlet pipe and fuel rail.



3. Start engine and run it at idle, and then read the value on pressure tester.
   a. Standard pressure at idle should be 400 kPa.
   b. If measured pressure value is lower than 380 kPa or higher than 420 kpa, check vehicle fuel supply line for leakage or kink, injector for blockage, function of electric fuel pump for abnormality.

   Hint:
   Replace injector or electric fuel pump assembly if necessary.

Fuel Flow Test

⚠ Caution

- When fuel pressure is normal during idling, the test of fuel flow can be performed.

1. Test method:
   a. Disconnect the inlet pipe Ⅱ connector and connect the fuel supply system pressure tester between inlet pipe Ⅱ and fuel rail.
   b. Start engine, increase engine speed (such as throttle fully opens), if the pressure of pressure gauge is lower than 0.1 Mpa (100 kPa) of system pressure, flow is insufficient.
   c. If flow is insufficient, line blockage or bend, fuel pump wear or mesh blockage may be the problem cause.

   Hint:
   Replace the electric fuel pump first if necessary. If line is blocked or bent, check, repair or replace it and retest flow, if it is eligible, the problem is eliminated. If it is ineligible, replace fuel pump and wash impurities in fuel tank.

On-vehicle Service

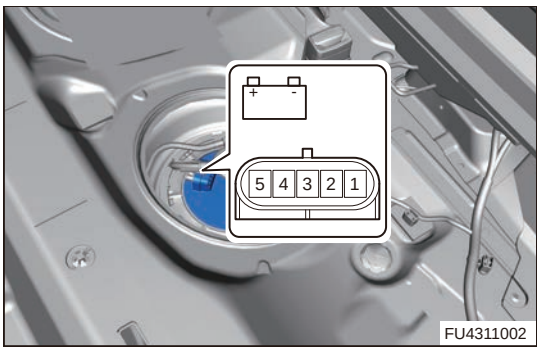
Electric Fuel Pump Assembly

On-vehicle Inspection

1. Check the electric fuel pump assembly operation.
   a. Remove electric fuel pump assembly protective cap and disconnect electric fuel pump assembly connector.

b. Apply battery voltage to terminals 1 and 5, and check if electric fuel pump operates within 10 seconds.

Battery Connection	Status
Battery positive (+) to Terminal 5	Operating current
Battery negative (-) to Terminal 1	



Hint:

- These tests must be finished within 10 seconds to prevent the coils from being burnt.
- Leave the electric fuel pump assembly as far as possible from the battery.
- Always switch voltage on and off on the battery side, rather than the electric fuel pump assembly side.
- If the electric fuel pump assembly does not operate, replace it.

Removal

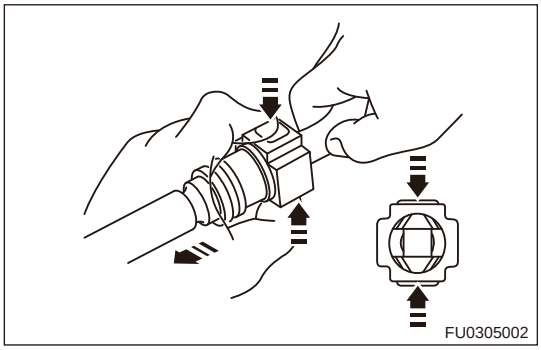
⚠ Warning

- Before operating the fuel supply system, please touch the vehicle body to discharge static electricity; failure to do so will cause a fire, even result in an explosion.
- When operating the fuel supply system, work area should be in good ventilation and keep fire sources or open flames away from the work area, in which fire extinguisher should be equipped.
- After performing the procedures for fuel system pressure release, there still remains some fuel in fuel line. When disconnecting fuel line, cover the joint with a piece of cloth or equivalent to prevent fuel from spraying out.
- If fuel leakage occurs when operating the fuel supply system, please handle the leaked fuel in time.

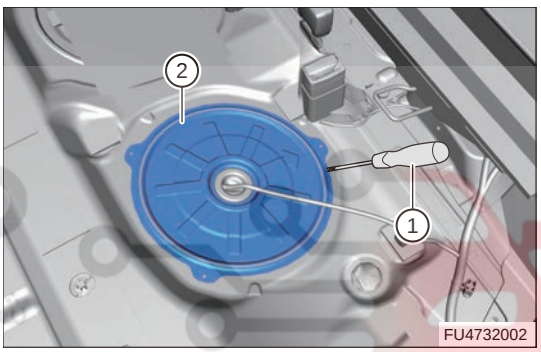
⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Operation staff should wear protective glasses and rubber gloves during repair and avoid inhaling much fuel gas.
- Only use parts approved by Chery Automobile Co., Ltd. to replace the electric fuel pump assembly.
- As electric fuel pump assembly radiates through fuel, low fuel level in fuel tank will directly shorten the service life of electric fuel pump assembly.
- Keep electric fuel pump assembly and work area clean when replacing electric fuel pump assembly; otherwise the electric fuel pump assembly element will be clogged.
- DO NOT damage the disconnected fuel system line or connectors. Cover the line joints or connectors with plastic bags or equivalent, preventing foreign matter from entering.
- Keep fuel tank and line clean.

Disconnection way for all fuel pipe coupling joints in following procedures is shown in the illustration:

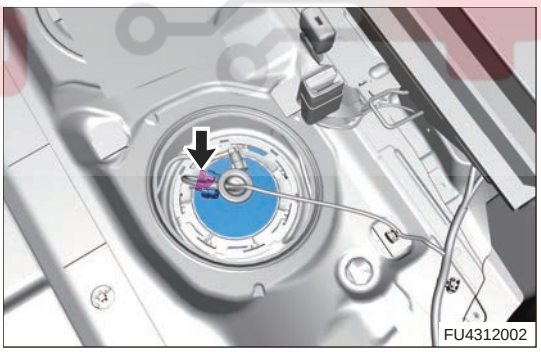

FU0305002

1. Release the fuel system pressure.
2. Turn off all electrical equipment and ENGINE START STOP switch.
3. Disconnect the negative battery cable.
4. Open the fuel tank cap assembly and discharge the fuel vapor in fuel tank.
5. Remove the second row seat assembly.
6. Remove the electric fuel pump assembly.
   a. Using a screwdriver (1) wrapped with protective tape, pry off electric fuel pump assembly protective cap (2).

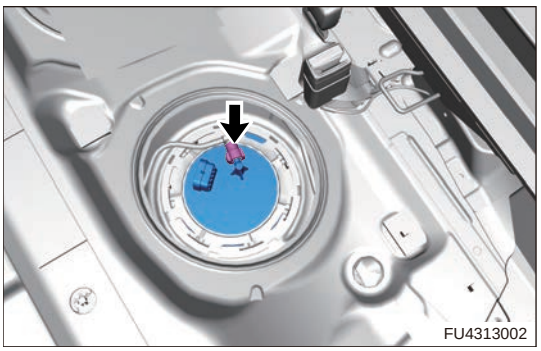


FU4732002

   b. Disconnect the electric fuel pump assembly connector (arrow).


FU4312002

   c. Disconnect connection between inlet pipe (arrow) and electric fuel pump assembly.

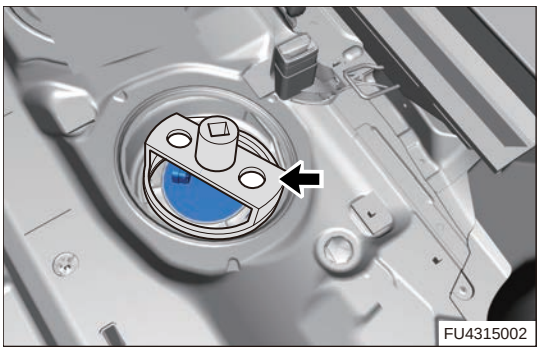

FU4313002

⚠ Caution

- Before disconnecting the joints, remove all dirt from electric fuel pump assembly pressure cap.
- DO NOT forcefully bend or twist fuel line.

d. Using fuel pump pressure cap remover, remove pressure cap as shown in illustration.

e. Remove electric fuel pump assembly and dispose of fuel in electric fuel pump assembly.



⚠ Caution

- Operate carefully when taking the electric fuel pump assembly out of fuel tank, preventing damaging lines.
- Cover the electric fuel pump assembly completely with a plastic bag or equivalent to prevent foreign matter from entering.
- Electric fuel pump assembly can be put into a container and taken out of the cabin, thus preventing fuel in the pump from dropping into the cabin.
- It is not allowed to perform running test for electric fuel pump assembly under dry state or in water. Otherwise service life will be reduced. In addition, do not inversely connect electric fuel pump assembly positive and negative poles.

Installation

⚠ Warning

- DO NOT connect the power during installation. Work area should be in good ventilation and keep fire sources or open flames away.
- Replace fuel tank seal ring with a new one when installing electric fuel pump assembly, align it with installation position of fuel tank and do not run the electric fuel pump assembly with no fuel in fuel tank, preventing damaging electric fuel pump assembly.
- Before connecting the hose, check if there is any damage or foreign matter on the hose or joint.
- During installation, push in fuel pipe connector until a click sound is heard, then check that fuel pipe joint clip is on the collar of fuel pipe joint. After installing the pipe joint clip, check that fuel pipe joint cannot be pulled out. Be careful not to damage joint. If clip is damaged, replace it.
- Turn ignition switch to ON (without starting engine) to apply fuel pressure to fuel system, and then check connections for leakage.

1. Install fuel pump and fuel pump seal ring to fuel tank.
2. Using a fuel tank pressure cap special tool, tighten fuel tank pressure cap in clockwise direction.

   Tightening torque: 400 N·m

⚠ Caution

- When installing electric fuel pump assembly into fuel tank, it is necessary to install float rod assembly into fuel tank carefully at first to avoid deformation as collision.

Filler Tube Assembly

Removal

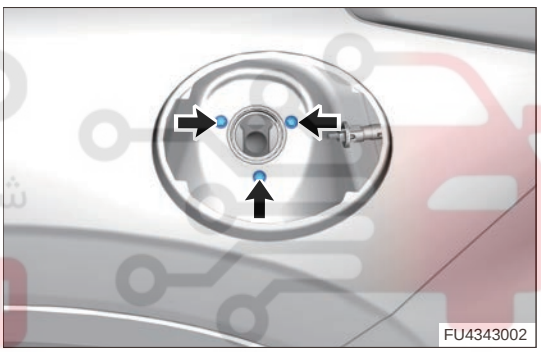
Warning

- Before operating the fuel supply system, please touch the vehicle body to discharge static electricity; failure to do so will cause a fire, even result in an explosion.
- When operating the fuel supply system, work area should be in good ventilation and keep fire sources or open flames away from the work area, in which fire extinguisher should be equipped.
- If fuel leakage occurs when operating the fuel supply system, please handle the leaked fuel in time.

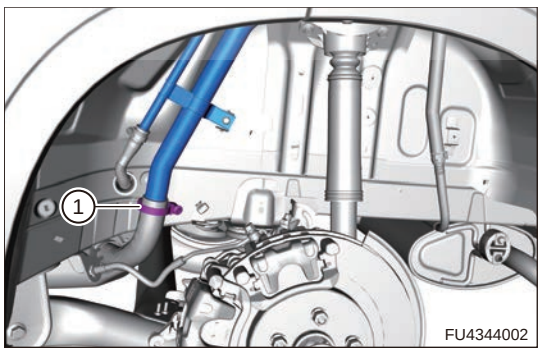
Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.

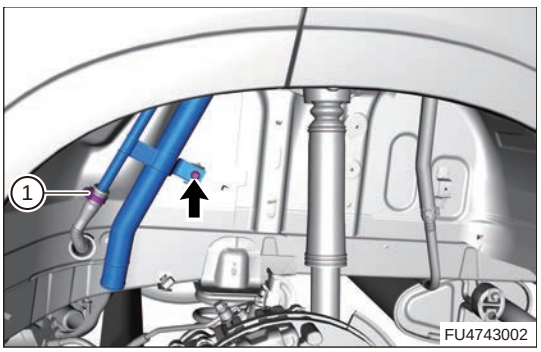
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Remove the rear left tire assembly.
3. Remove the rear left wheel house protector assembly.
4. Open fuel filler cap, and rotate fuel tank cap assembly counterclockwise to remove it.
5. Remove the filler tube assembly.
   a. Remove 3 fixing bolts (arrow) from upper part of filler tube assembly.



   b. Loosen worm clamp (1) and disconnect the connection of fuel filler hose.



   c. Loosen worm clamp (1) and disconnect the connection between fuel vapor pipe and filler tube assembly.
   d. Removal 1 fixing bolt (arrow) between fuel filler pipe assembly and lower part of body.



e. Remove the filler tube assembly.

⚠ Caution

Cover the joints with plastic bags after disconnecting the fuel filler hose and fuel breather hose, in order to prevent foreign matter from entering the fuel tank and fuel from evaporating or leaking.

Installation

1. Install the filler tube assembly.
2. Install 1 fixing bolt between lower part of filler tube assembly and body.

   Tightening torque: 7 ± 1 N·m

3. Connect fuel vapor pipe.
4. Connect filler hose assembly, and tighten worm clamp.

   Tightening torque: 3 ± 0.5 N·m

5. Install 3 fixing bolts between upper part of filler tube assembly and body.

   Tightening torque: 7 ± 1 N·m

6. Install the fuel tank cap assembly.
7. Install the rear left wheel house protector.
8. Install the rear left tire.

⚠ Caution

- When assembling hose, make sure that hose is not twisted and kinked.
- Note that when you hear a sound of “click” during disconnecting and connecting quick connector, it indicates that it is installed in place.

Fuel Tank

Removal

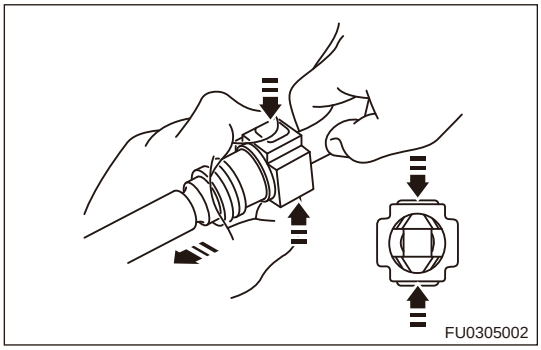
⚠ Warning

- Before operating the fuel supply system, please touch the vehicle body to discharge static electricity; failure to do so will cause a fire, even result in an explosion.
- When operating the fuel supply system, work area should be in good ventilation and keep fire sources or open flames away from the work area, in which fire extinguisher should be equipped.
- After performing the procedures for fuel system pressure release, there still remains some fuel in fuel line. When disconnecting fuel line, cover the joint with a piece of cloth or equivalent to prevent fuel from spraying out.
- If fuel leakage occurs when operating the fuel supply system, please handle the leaked fuel in time.

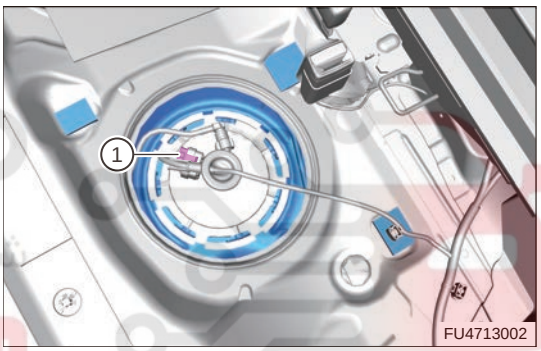
⚠ Caution

- DO NOT damage the disconnected fuel system line or connectors. Cover the line joints or connectors with plastic bags or equivalent, preventing foreign matter from entering.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.

Disconnection way for all fuel pipe coupling joints in following procedures is shown in the illustration.


FU0305002

1. Release the fuel system pressure.
2. Turn off all electrical equipment and ENGINE START STOP switch.
3. Disconnect the negative battery cable.
4. Remove the rear seat cushion.
5. Open fuel tank cap to discharge fuel vapor.
6. Disconnect the electric fuel pump connector.
   a. Remove the electric fuel pump assembly protective cap.
   b. Disconnect the electric fuel pump assembly connector (1).

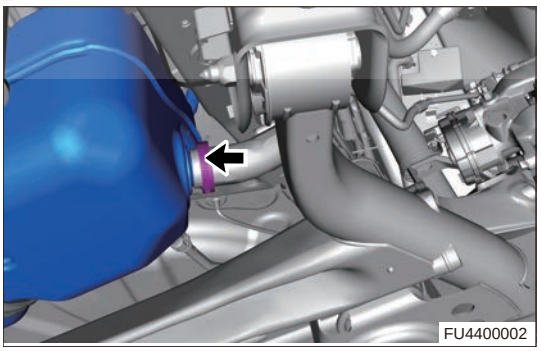


FU4713002

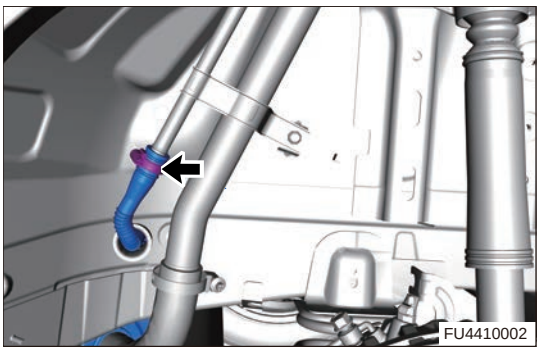
7. Remove the fuel tank assembly.
   a. Loosen worm clamp (arrow) and disconnect connection between fuel filler hose and fuel tank assembly.

      Hint:

      - Before disconnecting the joints, remove all dirt from electric fuel pump assembly pressure cap.
      - DO NOT forcefully bend or twist fuel line.


FU4400002

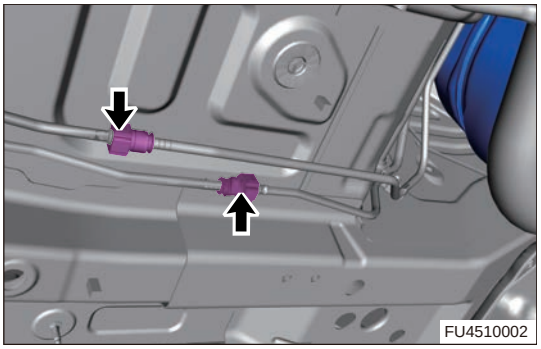
   b. Disconnect connection between fuel vapor pipe (- arrow) and filler tube assembly.


FU4410002

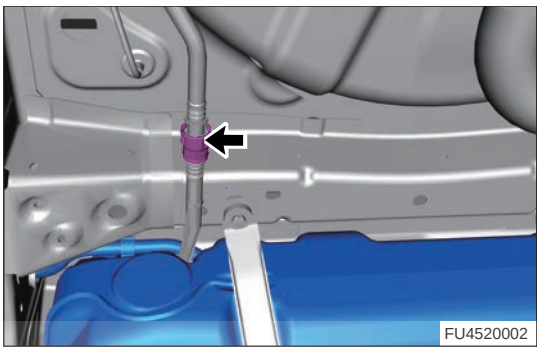
=

c. Disconnect connection (arrow) between fuel vapor pipe Ⅱ and fuel vapor pipe Ⅲ.

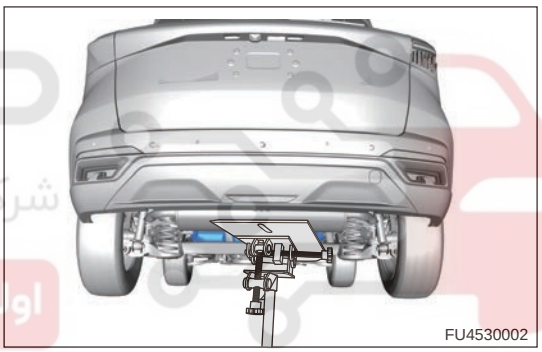
d. Disconnect connection (arrow) between inlet pipe Ⅰ and inlet pipe Ⅱ.



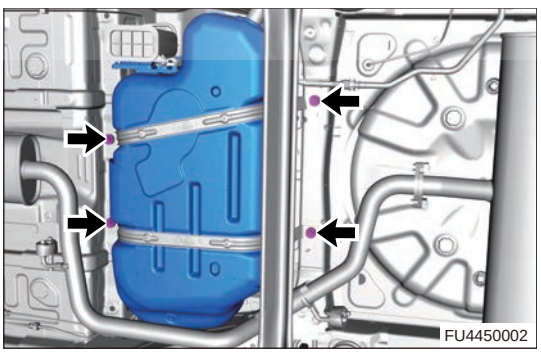
e. Disconnect connection (arrow) of activated charcoal canister breather pipe assembly.



8. Support fuel tank assembly with a transmission carrier.



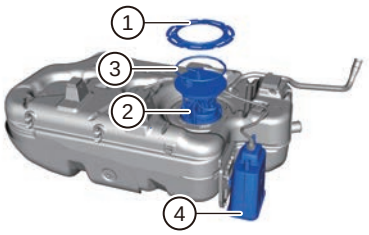
9. Remove 4 fixing bolts (arrow) between fuel tank left and right fixing straps and body.



10. Slowly lower transmission carrier to remove fuel tank assembly.

a. Remove fuel pump pressure cap (1), electric fuel pump assembly (2) and fuel tank seal ring (3) from fuel tank assembly.

b. Remove the activated charcoal canister assembly (4).



FU4570002

Installation

⚠ Caution

- Return fuel lines and vent lines on fuel tank to their original positions, or the fuel lines will be damaged due to friction generated by vehicle body shock, causing fuel leak.
- Before connecting the hose, check if there is any damage or foreign matter on the hose or joint.
- During installation, push in fuel pipe connector until a click sound is heard, then check that fuel pipe joint clip is on the collar of fuel pipe joint. After installing the pipe joint clip, check that fuel pipe joint cannot be pulled out. Be careful not to damage joint. If clip is damaged, replace it.
- Turn ignition switch to ON (without starting engine) to apply fuel pressure to fuel system, and then check connections for leakage.

1. Installation is in the reverse order of removal.

Fuel Rail Injector Assembly

Removal

⚠ Warning

- Before operating the fuel supply system, please touch the vehicle body to discharge static electricity; failure to do so will cause a fire, even result in an explosion.
- When operating the fuel supply system, work area should be in good ventilation and keep fire sources or open flames away from the work area, in which fire extinguisher should be equipped.
- After performing the procedures for fuel system pressure release, there still remains some fuel in fuel line. When disconnecting fuel line, cover the joint with a piece of cloth or equivalent to prevent fuel from spraying out.
- If fuel leakage occurs when operating the fuel supply system, please handle the leaked fuel in time.

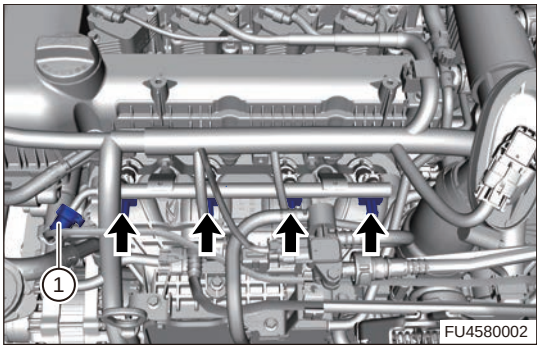
⚠ Caution

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- DO NOT damage the disconnected fuel system line or connectors. Cover the line joints or connectors with plastic bags or equivalent, preventing foreign matter from entering.
- Injector is a part of high accuracy, featuring good anti-clogging, anti-pollution and atomization, so be careful not to damage the injector during removal of fuel rail.

1. Release the fuel supply system pressure.
2. Turn off all electrical equipment and ENGINE START STOP switch.
3. Disconnect the negative battery cable.
4. Remove the engine trim cover.
5. Remove the fuel rail injector assembly.

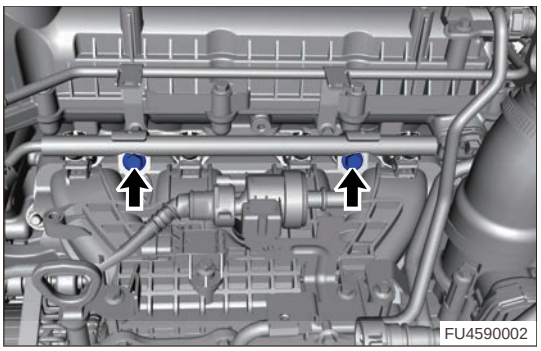
a. Disconnect connection (1) between inlet pipe II assembly and fuel rail injector assembly.

b. Disconnect connectors (arrow) from each cylinder injector assembly.



c. Remove 2 fixing bolts (arrow) from fuel rail injector assembly.

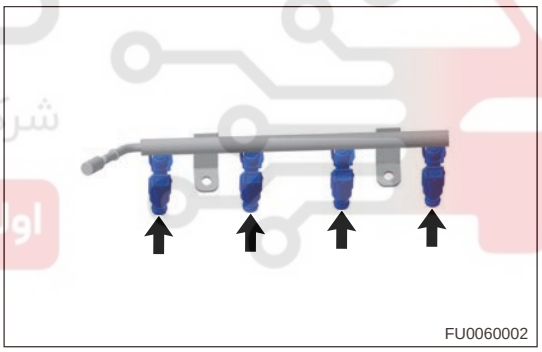
Tightening torque: 20 + 5 N · m



d. Remove the fuel rail injector assembly.

6. Separate the injector and fuel rail.

a. Remove injector fixing clips and remove injectors (-arrow) from fuel rail.



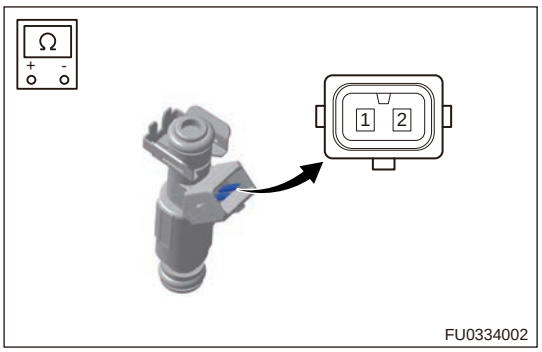
Inspection

1. Check the resistance of injector.

a. Disconnect the injector connector.

b. Measure resistance between 2 terminals (injector side) of injector with a digital multimeter.

Multimeter Connection	Measurement Temperature	Specification (Ω)
Terminal 1 - Terminal 2	20°C	12



2. Check leakage test and injection test of injector.

a. Remove injector and then install the injector to injector cleaning analyzer, adjust the pressure to operation pressure, and observe the injector for leakage, if so, sealing is poor.

b. If there is no cleaning analyzer, a free-unpick cleaning device also can be used, adjust pressure to 4 bar, and place a white paper under injector. Observe the injector for leakage.

⚠ Caution

- When assembling injector, grease will be applied to sealing ring to install injector easily, if the part is in high temperature for a long time, grease will melt, and adsorb around injector, so it may be wrong when judging injector for leakage. It is recommend to clean around injector to check injector for leakage.

c. If the color of one injector nozzle is different from the color of other injector nozzles, the injector may be leaked or have a poor atomization.

d. Fuel injection angle.

- Poor atomization: Fuel injected by injector is radial, and injection angle from injection nozzle is irregular.
- Good atomization: Fuel injected from injector is fuel mist, and injection angle from injection nozzle is cone.

Installation

⚠ Caution

- Install a new O-ring sealing on injector.
- Before installing the injector, apply clean grease or oil to the O-ring sealing surface for easy installation, preventing damage to the O-ring.
- When applying grease or oil, do not contaminate the injector internal and injection holes.
- It is not allowed to use any tool (hammer, etc.) to strike the injector when installing it.

1. Installation is in the reverse order of removal.

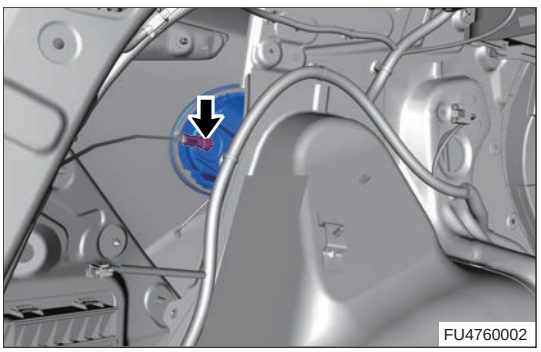
Fuel Filler Cap Assembly

Removal

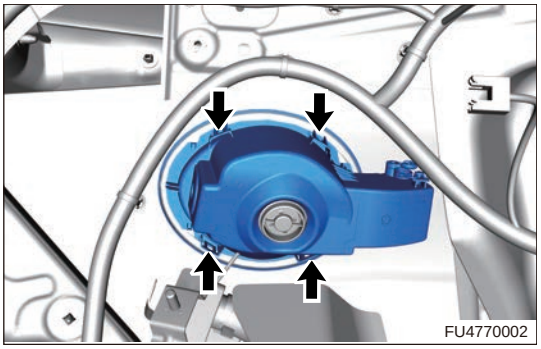
⚠ Caution

- Try to prevent body interior from being scratched when removing fuel filler cap assembly.

1. Release the fuel supply system pressure.
2. Turn off all electrical equipment and ENGINE START STOP switch.
3. Disconnect the negative battery cable.
4. Remove the filler tube assembly.
5. Remove the left C-pillar lower protector assembly.
6. Remove the fuel filler cap assembly.
   a. Disengage fuel filler cap cable (arrow) from the fuel filler cap assembly.



b. Disengage 4 fixing clips of fuel filler cap assembly from vehicle sheet metal.



Installation

1. Installation is in the reverse order of removal.