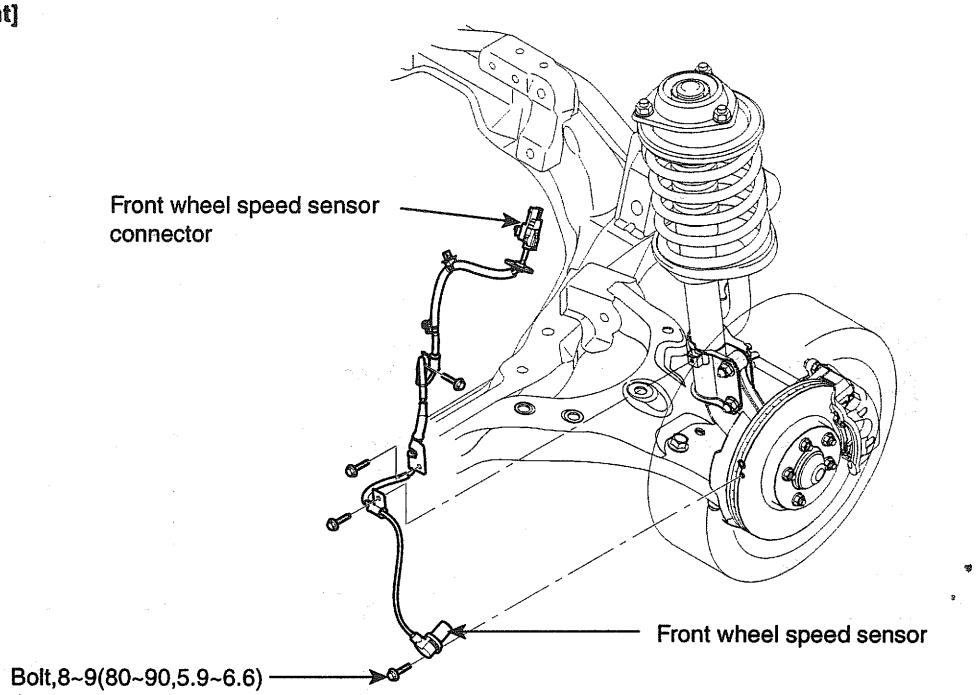
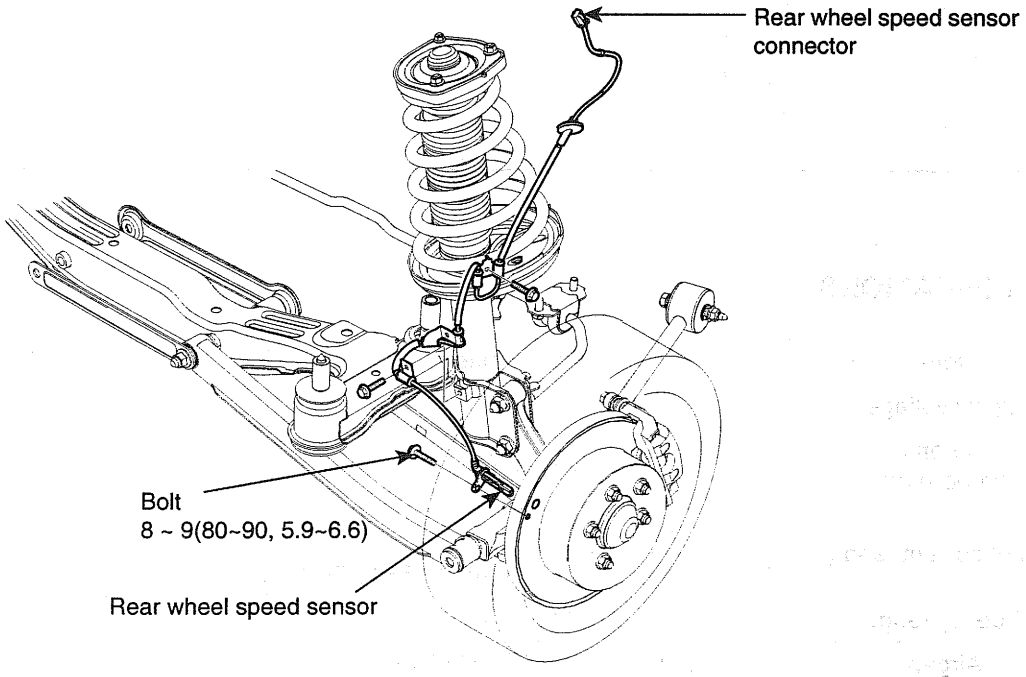
ANTI-LOCK BRAKING SYSTEM WHEEL SPEED SENSOR

COMPONENTS EBDAF3AE

[Front]



[Rear]



TORQUE : Nm(kgf·cm, lbf·ft)

EJQE210B

DTC C1503 TCS SWITCH ERROR

DESCRIPTION EEEA0F8B

The TCS(ESP) OFF switch is for ON/OFF of TCS(ESP) function.

When the TCS(ESP) OFF switch is pushed, the TCS(ESP) system stops and the TCS(ESP) OFF lamp is ON.

DTC DETECTING CONDITION E3E7E682

DTC No	Condition	Possible Cause
C1503	When the TCS/ESP switch is ON for 1 min.	- Open/short in TCS/ESP switch circuit. - Faulty TCS/ESP switch - Faulty HECU

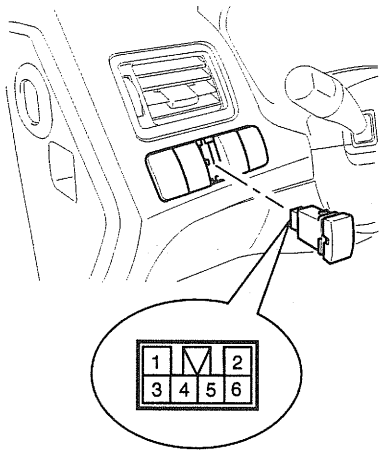
FAILSAFE FUNCTION

The TCS/ESP function is inhibited, while the ABS and EBD controls allowed.

The TCS/ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

INSPECTION PROCEDURE EACB53FF

1. CHECK TCS(ESP) OFF SWITCH
   1) Remove the TCS(ESP) OFF switch from the panel of the driver's side crashpad.
   2) Check for the continuity between the TCS(ESP) OFF switch terminals, when the TCS(ESP) OFF switch is ON.



KJQE900S

Is there continuity between terminals 3 and 4 of the TCS (ESP) switch connector?

Terminal / Function	3	4	5	2
ON	○	○	○	○
OFF				

EJQE900R

NO

▶ Replace with a new TCS(ESP) OFF switch.

YES

▶ Check short in circuit of TCS/ESP Switch

2. CHECK SHORT IN CIRCUIT OF TCS/ESP SWITCH

   1) Remove the TCS(ESP) OFF switch from the panel of the driver's side crashpad.

   2) After the ignition switch is ON, measure the voltage between terminal 3 of the TCS(ESP) OFF switch connector and the body ground.

Specification : Battery positive (B+)

Is the voltage within the specification?

NO

(1) Check and replace fuse(10A).
(2) Check and repair harness and connector.

YES

▶ Check open/short in circuit between TCS(ESP) OFF switch and the HECU.

3. CHECK OPEN/SHORT IN CIRCUIT BETWEEN TCS(ESP) OFF SWITCH AND THE HECU

Check an open or short in the circuit between terminal 3 of TCS(ESP) OFF switch connector and terminal 14 (ESP:27) of the HECU connector.

Is the circuit normal?

NO

▶ Check and repair the circuit between the switch and the HECU.

YES

▶ After clearing the DTC and driving the vehicle at 40Km/h speed or more, if the TCS(ESP) lamp is ON and the same DTC shows again, replace the HECU and recheck.

DTC C1605 CAN HARDWARE ERROR

DESCRIPTION E3D3DB24

The CAN is for sending and receiving the information for TCS(ESP) control, between the HECU and EMS/TCU.

DTC DESCRIPTION E863AF39

This code shows in case that there is an error on the CAN hardware. In this case, replace the HECU and check.

DTC DETECTING CONDITION ECDAED3A

DTC No	Condition	Possible Cause
C1605	In case that CAN has hardware failure.	- Faulty CAN bus

FAILSAFE FUNCTION

The TCS/ESP function is inhibited, while the ABS and EBD controls allowed.

The TCS/ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

DTC C1611 CAN TIME-OUT EMS

DESCRIPTION E70EFCC3

The CAN is for sending and receiving the information for TCS(ESP) control, between the HECU and EMS/TCU.

This code shows in case that there is no signal to the CAN from EMS.

DRC DETECTING CONDITION ED68F1D5

DTC No	Condition	Possible Cause
C1611	1. In case that EMS1 or EMS2 message was not received for more than 500ms within normal voltage condition. 2. The monitoring starts 2000 ms after power up.	- Open/short in CAN bus circuit. - Faulty CAN bus - Faulty EMS - Faulty HECU

FAILSAFE FUNCTION

The TCS/ESP function is inhibited, while the ABS and EBD controls allowed.

The TCS/ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

INSPECTION PROCEDURE EAE95850

1. CHECK DTC DETECTED IN HI-SCAN
   1) Clear the DTC related to the CAN, from the EMS or TCU by using the HI-SCAN.
   2) Check if any DTC related to the CAN is detected again, when the ignition switch ON.

   Is any DTC related to the CAN, detected again?

   NO

   ▶ Problem is intermittent and the HECU memory was not cleared.

   YES

   ▶ Check open/short in sircuit of the CAN
2. CHECK OPEN/SHORT IN CIRCUIT OF THE CAN
   1) Check an open or short in the circuit between terminal 10 of the HECU connector and terminal 4 of PCM connector.
   2) Check an open or short in the circuit between terminal 11 of the HECU connector and terminal 7 of PCM connector.

   Is the circuit normal?

   NO

   ▶ Check and repair harness and connector.

   YES

   ▶ Check the PCM (refer to EE or TR group).

DTC C1612 CAN TIME-OUT TCU

DESCRIPTION EBC946DE

The CAN is for sending and receiving the information for TCS(ESP) control, between the HECU and EMS/TCU.

This code shows in case that there is no signal to the CAN from TCU.

DRC DETECTING CONDITION EFABC46C

DTC No	Condition	Possible Cause
C1612	1. In case that TCU message was not received for more than 500ms within normal voltage condition.2. The monitoring starts 2000 ms after power up.	- Open/short in CAN bus circuit. - Faulty CAN bus - Faulty TCU - Faulty HECU

FAILSAFE FUNCTION

The TCS/ESP function is inhibited, while the ABS and EBD controls allowed.

The TCS/ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

INSPECTION PROCEDURE E3CE617B

1. CHECK DTC DETECTED IN HI-SCAN
   1) Clear the DTC related to the CAN, from the EMS or TCU by using the HI-SCAN.
   2) Check if any DTC related to the CAN is detected again, when the ignition switch ON.

   Is any DTC related to the CAN, detected again?

   NO

   ▶ Problem is intermittent and the HECU memory was not cleared.

   YES

   ▶ Check open/short in circuit of the CAN

2. CHECK OPEN/SHORT IN CIRCUIT OF THE CAN
   1) Check an open or short in the circuit between terminal 10 of the HECU connector and terminal 4 of PCM connector.
   2) Check an open or short in the circuit between terminal 11 of the HECU connector and terminal 7 of PCM connector.

   Is the circuit normal?

   NO

   ▶ Check and repair harness and connector.

   YES

   ▶ Check the PCM (refer to EE or TR group).

DTC C1613 CAN WRONG MESSAGE

DESCRIPTION E85EB9EE

The CAN is for sending and receiving the information for TCS(ESP) control, between the HECU and EMS/TCU.

This code shows in case that EMS misunderstands a vehicle with A/T to with M/T. In this case check if it is correct the information received from EMS by using the HI-SCAN.

DTC DETECTING CONDITION E454FDF8

DTC No	Condition	Possible Cause
C1613	1. In case that the information about transmission is different in the EMS2 and TCU within normal voltage condition.2. The monitoring starts 2000 ms after power up.	- Faulty CAN bus - Faulty EMS or TCM

FAILSAFE FUNCTION

The TCS/ESP function is inhibited, while the ABS and EBD controls allowed.

The TCS/ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

DTC C1616 CAN BUS OFF

DESCRIPTION E006C3B1

The CAN is for sending and receiving the information for TCS(ESP) control, between the HECU and ECM/TCM.

DTC DETECTING CONDITION EC3071B0

DTC No	Condition	Possible Cause
C1616	In case CAN BUS off state continued for more than 100ms.	- Open/short in CAN bus circuit. - Faulty CAN bus - Faulty HECU

FAILSAFE FUNCTION

The TCS/ESP function is inhibited, while the ABS and EBD controls allowed.

The TCS/ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

INSPECTION PROCEDURE EF4AB9B5

1. CHECK OPEN/SHORT IN CIRCUIT OF THE CAN
   1) Check an open or short in the circuit between terminal 10 of the HECU connector and terminal 4 of PCM connector.
   2) Check an open or short in the circuit between terminal 11 of the HECU connector and terminal 7 of PCM connector.

   Is the circuit normal?

   NO

   ▶ Check and repair harness and connector.

   YES

   ▶ Check the PCM (refer to EE or TR).

DTC C2227 EXCESSIVE TEMPERATURE OF BRAKE DISC

DESCRIPTION E8FC144F

The TCS controls the brake by using the motor pump.

When the TCS operates, The TCS detects overheating of the brake disk.

DTC DETECTING CONDITION E2AFC14E

DTC No	Condition	Possible Cause
C2227	1.When the calculated temperature of disc is higher than 500℃. 2.If the calculated temperature drops below 300℃, the controller recovers to normal state. 3.When IGN switched OFF, ECU calculate temperature of disc until calculated temperature drops below 80℃ by BATT1 power.	- Brake disc over working

FAILSAFE FUNCTION

The TCS/ESP function is inhibited, while the ABS and EBD controls allowed.

The TCS/ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

DTC C1112 SENSOR SOURCE VOLTAGE

DTC DETECTING CONDITION E54E9DCD

DTC No	Condition	Possible Cause
C1112	If the voltage of sensor power is out of the range of 5V±0.5V for 0.5sec, the failure is recognized.	- Faulty Sensor Power - Faulty HECU

FAILSAFE FUNCTION

The ESP function is inhibited, while the ABS and EBD controls allowed.

The ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

DTC C1235 PRESSURE SENSOR(PRIMARY)-ELECTRICAL

GENERAL DESCRIPTION E9C43F83

Master cylinder pressure sensor is used for detecting the pressure delivered to wheels when the brake system is working.

DTC DESCRIPTION EF021FEA

This code shows in case that there is an open or short in the circuit of the pressure sensor.

DTC DETECTING CONDITION EBD8367C

DTC No.	Detecting Condition	Possible Cause
C1235	1. When VMCP > 4.8V or VMCP < 0.2V continue 1second, 2. The Monitoring starts 1 sec after Power Up.	- Open/Short in the pressure sensor circuit - Faulty the pressure sensor - Faulty installing of the pressure sensor - Faulty HECU

FAILSAFE FUNCTION

The ESP function is inhibited, while the ABS and EBD controls allowed.

The ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

INSPECTION PROCEDURE EDE2DC8B

1. CHECK INSTALLING OF PRESSURE SENSOR
   1) Check if the pressure sensor is properly installed on the master cylinder.

      Is the pressure sensor installed properly?

      NO

      ▶ Reinstall the pressure sensor properly.

      YES

      ▶ Check power of pressure sensor
2. CHECK POWER OF PRESSURE SENSOR
   1) Disconnect the pressure sensor connector, and measure the voltage between terminals 1(-) and 3(+) of the pressure sensor connector.

      Specification : 4.8~5.2 V

      Is the voltage within the specification?

      NO

      ▶ Check harness and connector between the HECU and the pressure sensor.

      YES

      ▶ Check output voltage of pressure sensor

3. CHECK OUTPUT VOLTAGE OF PRESSURE SENSOR

1) Measure the voltage between terminal 2 of the pressure sensor connector and the body ground.

Specification : 0.5~4.5V

Is the output voltage within the specification?

NO

▶ Check harness and connector of the pressure sensor. If no error on the harness and the connector, replace the pressure sensor and recheck.

YES

▶ Check output voltage of HECU connector

4. CHECK OUTPUT VOLTAGE OF HECU CONNECTOR

1) Measure the voltage between terminal 12 of the HECU connector and the body ground.

Specification : 0.5~4.5V

Is the voltage within the specification?

NO

▶ Repair harness and connector between the HECU and the pressure sensor.

YES

▶ After clearing the DTC and driving the vehicle at 40Km/h speed or more, if the ESP lamp is ON and the same DTC shows again, replace the HECU and recheck.

DTC C1237 PRESSURE SENSOR-SIGNAL

GENERAL DESCRIPTION E3A85118

Master cylinder pressure sensor is used for detecting the pressure delivered to wheels when the brake system is working.

DTC DESCRIPTION E5E8D9BD

This code shows in case that there is an irregular or no signal of the pressure sensor.

DTC DETECTING CONDITION EBCB3621

DTC No.	Detecting Condition	Possible Cause
C1237	1. If input signal is noisy, which the gradient of the sensor signal is larger than predefined value, the failure is recognized. 2. Outside an ABS/BTCS control, correlation of the vehicle deceleration and the pressure sensor signal is evaluated, if it is not reasonable ECU detect the failure. 3. When the vehicle speed is higher than predefined value and pressure signal is higher than predefined value, if there is no variation of the pressure sensor signal for predefined time ECU detect the failure.	- Open/Short in the pressure sensor circuit - Faulty the pressure sensor - Faulty installing of the pressure sensor - Faulty HECU

FAILSAFE FUNCTION

The ESP function is inhibited, while the ABS and EBD controls allowed.

The ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

INSPECTION PROCEDURE E7EDE430

1. CHECK INSTALLING OF PRESSURE SENSOR

   Check if the pressure sensor is properly installed on the master cylinder.
   Is the installing proper ?

   NO

   ▶ Reinstall the pressure sensor properly.

   YES

   ▶ Check power of pressure sensor.

2. CHECK POWER OF PRESSURE SENSOR

   Disconnect the pressure sensor connector, and measure the voltage between terminals 1 and 3 of the pressure sensor connector.

Specification : 4.8~5.2 V

   Is the power voltage within the specification?

   NO

   ▶ Check harness and connector between the HECU and the pressure sensor.

   YES

   ▶ Check output voltage of pressure sensor

3. CHECK OUTPUT VOLTAGE OF PRESSURE SENSOR

   Measure the output voltage between terminal 2 of the pressure sensor connector and the body ground.

Specification : 0.5~4.5V

   Is the output voltage within the specification?

   NO

   ▶ Check harness and connector of the pressure sensor. If no error on the harness and the connector, replace the pressure sensor and recheck.

   YES

   ▶ After clearing the DTC and driving the vehicle at 40Km/h speed or more, if the ESP lamp is ON and the same DTC shows again, replace the HECU and recheck.

DTC C1259 STEERING ANGLE SENSOR-ELECTRICAL

GENERAL DESCRIPTION E28D21CD

Steering angle sensor is a plate between the photo-controller LED and the photo transistor. As the plate rotates with steering wheel rotation, electrical signal will be generated depending on whether the LED light passes through the plate to the photo-transistor or not. The signal is the steering wheel operation angular velocity and used to detect the steering wheel turning direction.

DTC DESCRIPTION E873FFCD

This code shows in case that there is an open or short in the circuit of the steering angle sensor.

DTC DETECTING CONDITION EAB0A7CF

DTC No.	Detecting Condition	Possible Cause
C1259	1.When Vsas > 4.4 or Vsas < 1.1 or 2.3V < Vsas < 2.7V continue 1sec, 2.The Monitoring starts 1 sec after Power Up.	- Faulty steering angle sensor - Faulty installing of steering angle sensor - Faulty HECU

FAILSAFE FUNCTION

The ESP function is inhibited, while the ABS and EBD controls allowed.

The ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

INSPECTION PROCEDURE EF8AA4DA

1. CHECK INSTALLING OF STEERING ANGLE SENSOR

   Check if the steering angle sensor is properly installed.
   Is the installing proper?

   NO

   ▶ Reinstall the steering angle sensor properly.

   YES

   ▶ Check power of steering angle sensor

2. CHECK POWER OF STEERING ANGLE SENSOR

   Disconnect the steering angle sensor connector, and measure the voltage between terminals 2 and 3 of the steering angle sensor connector.

Specification : 9~16 V

Is the voltage within the specification?

NO

▶ Check harness and connector between the HECU and the steering angle sensor.

YES

▶ Check output voltage of steering angle sensor

3. CHECK OUTPUT VOLTAGE OF STEERING ANGLE SENSOR

Measure the voltage between terminal 1,4, and 5 of the steering angle sensor connector and the body ground.

Specification : High : 3.0~4.1V
Low : 1.3~2.0V

Is the voltage within the specification?

NO

▶ Check harness and connector of the steering angle sensor. If no error on the harness and the connector, replace the steering angle sensor and recheck.

YES

▶ Check output of HECU connector

4. CHECK OUTPUT OF HECU CONNECTOR

Measure the voltage between terminal 8,40, and 39 of the HECU connector and the body ground.

Specification : High : 3.0~4.1V
Low : 1.3~2.0V

Is the voltage within the specification?

NO

▶ Repair harness and connector between the HECU and the steering angle sensor.

YES

▶ After clearing the DTC and driving the vehicle at 40Km/h speed or more, if the ESP lamp is ON and the same DTC shows again, replace the HECU and recheck.

DTC C1260 STEERING ANGLE SENSOR-SIGNAL

GENERAL DESCRIPTION ECFB6A6D

Steering angle sensor is a plate between the photo-controller LED and the photo transistor. As the plate rotates with steering wheel rotation, electrical signal will be generated depending on whether the LED light passes through the plate to the photo-transistor or not. The signal is the steering wheel operation angular velocity and used to detect the steering wheel turning direction.

DTC DESCRIPTION EDDBDF63

This code shows in case that there is an irregular or no signal of the steering angle sensor.

DTC DETECTING CONDITION E335CEEF

DTC No.	Detecting Condition	Possible Cause
C1260	1. When the steering wheel is turned more than 36 degrees, if neutral signal is maintained ECU detects the failure. 2. When the steering wheel is turned more than 364 degrees, if neutral signal is not detected, ECU detects the failure. 3.When the steering wheel angle is larger than 700 degrees ECU detects the failure. 4.During straight driving, if the steering wheel angle is larger than predefined degree ECU detects the failure. 5. When the vehicle speed is higher than 15km/H and reference steering wheel angle is larger than ±15 degrees, if there is no variation of the steering wheel angle for predefined time ECU detect the failure.	- Open/short in circuit of steering angle sensor - Faulty steering angle sensor - Faulty installing of steering angle sensor - Faulty HECU

FAILSAFE FUNCTION

The ESP function is inhibited, while the ABS and EBD controls allowed.

The ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

INSPECTION PROCEDURE EE69E4EF

1. CHECK INSTALLING OF STEERING ANGLE SENSOR

   Check if the steering angle sensor is properly installed.
   Is the installing proper?

   NO

   ▶ Reinstall the steering angle sensor properly.

   YES

   ▶ Check power of steering angle sensor

2. CHECK POWER OF STEERING ANGLE SENSOR

Disconnect the steering angle sensor connector, and measure the voltage between terminal 2 and 3 of the steering angle sensor connector.

Specification : 9~16 V

Is the voltage within the specification?

NO

▶ Check harness and connector between the HECU and the steering angle sensor.

YES

▶ Check output signal of steering angle sensor

3. CHECK OUTPUT SIGNAL OF STEERING ANGLE SENSOR

1) Check if both ST1 and ST2 alternate High and Low signal, rotating the wheel.
2) Check if STN has Low signal, rotating the wheel at 360 degree in one direction.

Is the signal of the steering angle sensor normal?

NO

▶ Check harness and connector of the steering angle sensor. If no error on the harness and the connector, replace the steering angle sensor and recheck.

YES

▶ After clearing the DTC and driving the vehicle at 40Km/h speed or more, if the ESP lamp is ON and the same DTC shows again, replace the HECU and recheck.

DTC C1282 YAW RATE & LATERAL G SENSOR-ELECTRICAL

GENERAL DESCRIPTION EBE9B1F3

The yaw-rate & Lateral G sensor is for the stability of a vehicle. The yaw-rate is to measure angular velocity while the Lateral G is to measure the force that makes a vehicle away from the center, when a vehicle cornering.

DTC DESCRIPTION E87EAFFC

This code shows in case that there is an open or short in the circuit of the yaw-rate & lateral G sensor.

DTC DETECTING CONDITION E1ACB797

DTC No.	Detecting Condition	Possible Cause
C1282	[Yaw Rate Sensor Open, short to GND, B+] 1) When Vyaw > 4.85V or Vyaw < 0.15V continue 1sec, 2) The Monitoring starts 1 s after Power Up [Lateral G Sensor Open, Short to GND, B+] 1) When Vlg > 4.85V or Vlg < 0.15V continue 1sec, 2) The Monitoring starts 1 s after Power Up	- Yaw Rate & Lateral G Sensor Open, short to GND - Faulty Yaw Rate & Lateral G Sensor - Faulty HECU

FAILSAFE FUNCTION

The ESP function is inhibited, while the ABS and EBD controls allowed.

The ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

INSPECTION PROCEDURE E5CE5406

1. CHECK POWER OF YAW-RATE & LATERAL G SENSOR

   Disconnect the connector from the yaw-rate& Lateral G sensor, and measure the voltage between terminals 3 and 4 of the yaw-rate& Lateral G sensor.

Specification : 4.75~5.25 V

Is the voltage within the specification?

NO

▶ Check harness and connector between the HECU and the yaw-rate & lateral G sensor.

YES

▶ Check output of yaw-rate & lateral G sensor

2. CHECK OUTPUT OF YAW-RATE & LATERAL G SENSOR

1) When the ignition switch is OFF, measure the voltage between terminal 1 of the yaw-rate sensor connector and the body ground.

2) When the ignition switch is OFF, measure the voltage between terminal 2 of the lateral G sensor connector and the body ground.

Specification : 2.25~2.75V

Is the voltage within the specification?

NO

▶ Check harness and connector of the yaw-rate & lateral G sensor. If no error on harness and connector, replace and recheck the yaw-rate & lateral G sensor.

YES

▶ Check output voltage of HECU connector for yaw-rate & lateral G sensor

3. CHECK OUTPUT VOLTAGE OF HECU CONNECTOR FOR YAW-RATE&LATERAL G SENSOR

1) When the ignition switch is OFF, measure the output voltage between terminal 41 of the HECU connector and the ground.

2) When the ignition switch is OFF, measure the output voltage between terminal 9 of the HECU connector and the ground.

Specification : 2.25~2.75V

Is the output voltage within the specification?

NO

▶ Repair harness and connector between the HECU and the yaw-rate & lateral G sensor.

YES

▶ After clearing the DTC and driving the vehicle at 40Km/h speed or more, if the ESP lamp is ON and the same DTC shows again, replace the HECU and recheck.

DTC C1283 YAW RATE & LATERNAL G SENSOR-SIGNAL

GENERAL DESCRIPTION E05E02A0

The yaw-rate & Lateral G sensor is for the stability of a vehicle. The yaw-rate is to measure angular velocity while the Lateral G is to measure the force that makes a vehicle away from the center, when a vehicle cornering.

DTC DESCRIPTION E6557F1A

This code shows in case that there is an irregular or no signal of the yaw-rate & lateral G sensor.

DTC DETECTING CONDITION EC2FDDBE

DTC No.	Detecting Condition	Possible Cause
C1283	[Yaw Rate Sensor offset error, noisy signal, stick] 1) During standstill if yaw rate value is larger than predefined value, the failure is recognized. 2)If input signal is noisy, which the gradient of the sensor signal is larger than predefined value, the failure is recognized. If the difference between estimated value and measured value of the sensor is larger than predefined value for predefined time, the failure is recognized. [Lateral G Sensor offset error, noisy signal, stick] 1)If input signal is noisy, which the gradient of the sensor signal is larger than predefined value, the failure is recognized. 2) If the difference between estimated value and measured value of the sensor is larger than predefined value for predefined time, the failure is recognized.	- Yaw Rate & Lateral G Sensor Open, short to GND - Faulty Yaw Rate & Lateral G Sensor - Faulty HECU

FAILSAFE FUNCTION

The ESP function is inhibited, while the ABS and EBD controls allowed.

The ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

INSPECTION PROCEDURE EE5B94BD

1. CHECK POWER OF YAW-RATE & LATERAL G SENSOR

   Disconnect the connector from the yaw-rate& Lateral G sensor, and measure the voltage between terminal 3 and 4 of the yaw-rate& Lateral G sensor.

Specification : 4.75~5.25 V

Is the voltage within the specification?

NO

▶ Check harness and connector between the HECU and the yaw-rate & lateral G sensor.

YES

▶ Check output of yaw-rate & lateral G sensor

2. CHECK OUTPUT OF YAW-RATE & LATERAL G SENSOR

1) When the ignition switch is OFF, measure the output voltage between terminal 1 of the yaw-rate sensor connector and the body ground.

2) When the ignition switch is OFF, measure the output voltage between terminal 2 of the lateral G sensor connector and the body ground.

Specification : 2.25~2.75V

Is the output voltage within the specification?

NO

▶ Check harness and connector of the yaw-rate & lateral G sensor. If no error on harness and connector, replace and recheck the yaw-rate & lateral G sensor.

YES

▶ Check output voltage of HECU connector for yaw-rate & lateral G sensor

3. CHECK OUTPUT VOLTAGE OF HECU CONNECTOR FOR YAW-RATE&LATERAL G SENSOR

1) When the ignition switch is OFF, measure the output voltage between terminal 41 of the HECU connector and the body ground.

2) When the ignition switch is OFF, measure the output voltage between terminal 9 of the HECU connector and the body ground.

Specification : 2.25~2.75V

Is the output voltage within the specification?

NO

▶ Repair harness and connector between the HECU and the yaw-rate & lateral G sensor.

YES

▶ Check output of yaw-rate & lateral G sensor when vehicle cornering

4. CHECK OUTPUT OF YAW-RATE&LATERAL G SENSOR WHEN VEHICLE CORNERING.

Check if any change of the voltage of the yaw-rate & lateral G sensor, when a vehicle is cornering.
Is there any change of the voltage of the sensor?

NO

▶ Replace and recheck the yaw-rate & lateral G sensor.
▶ After clearing the DTC and driving the vehicle at 40Km/h speed or more, if the ESP lamp is ON and the same DTC shows again, replace the HECU and recheck.

DTC C1513 BRAKE SWITCH ERROR

GENERAL DESCRIPTION EBE3CB3A

The brake lamp switch is a normal-open(NO) type, and the brake switch is a normal-close(NC) type.

DTC DESCRIPTION EFD01941

This code shows in case that there is an open or short in the circuit of the brake switch, or an error on the brake switch.

DTC DETECTING CONDITION E2072EDD

DTC No.	Detecting Condition	Possible Cause
C1513	If both brake lamp switch and brake switch have a same state for predetermined time, the failure is recognized.	- Brake switch Open, short to GND - Faulty brake switch - Faulty HECU

FAILSAFE FUNCTION

The ESP function is inhibited, while the ABS and EBD controls allowed.

The ESP warning lamp is ON, but the ABS and EBD warning lamps OFF.

INSPECTION PROCEDURE ED30545C

1. CHECK OPEN/SHORT IN CIRCUIT OF BRAKE SWITCH

   1) Disconnect the connector from the HECU, and measure the voltage between terminal 21 of the HECU connector and the body ground, not pushing the brake pedal.

   Specification : Battery (B+)

   2) Disconnect the connector from the HECU, and measure the voltage between terminal 21 of the HECU connector and the body ground, pushing the brake pedal.

   Specification : 0V

   Is the voltage within the specification?

   NO

   ▶ Repair harness and connector of the brake switch.

   YES

   ▶ Check open/short in circuit of brake lamp switch

2. CHECK OPEN/SHORT IN CIRCUIT OF BRAKE LAMP SWITCH

   1) Disconnect the connector from the HECU, and measure the voltage between terminal 5 of the HECU connector and the body ground, not pushing the brake pedal.

   Specification : 0V

   2) Disconnect the connector from the HECU, and measure the voltage between terminal 21 of the HECU connector and the body ground, pushing the brake pedal.

   Specification : Battery (B+)

   Is the voltage within the specification?

   NO

   ▶ Repair harness and connector of the brake lamp switch.

   YES

   ▶ After clearing the DTC and driving the vehicle at 40Km/h speed or more, if the ESP lamp is ON and the same DTC shows again, replace the HECU and recheck.

BLEEDING OF BRAKE SYSTEM E94DD4ED

This procedure should be followed to ensure adequate bleeding of air and filling of the ABS unit, brake lines and master cylinder with brake fluid.

1. Remove the reservoir cap (A) and fill the brake reservoir with brake fluid.

   CAUTION

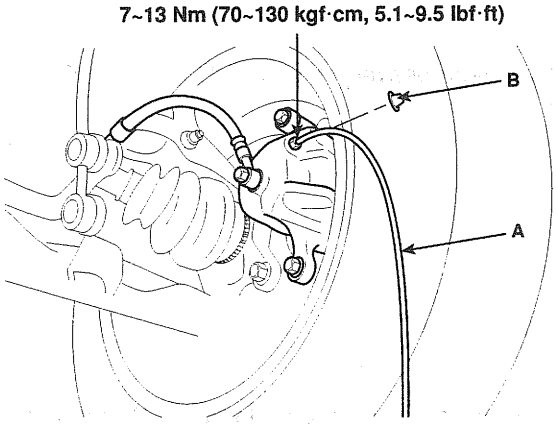
   If there is any brake fluid on any painted surface, wash it off immediately.

   NOTE

   When pressure bleeding, do not depress the brake pedal.

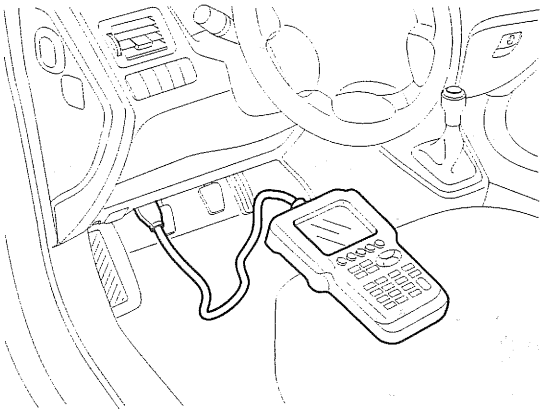
   Recommended fluid..... DOT3 or DOT4

2. Connect a clear plastic tube to the wheel cylinder bleeder plug (A) and insert the other end of the tube into a half filled clear plastic bottle.



EJQE620C

3. Connect the hi-scan (pro) to the data link connector located underneath the dash panel.



KRQE900A

4. Select and operate according to the instructions on the hi-scan (Pro) screen.

CAUTION

You must obey the maximum operating time of the ABS motor with the hi-scan (Pro) to prevent the motor pump from burning.

1) Select hyundai vehicle diagnosis.
2) Select vehicle name.
3) Select Anti-Lock Brake system.
4) Select air bleeding mode.
5) Press "YES" to operate motor pump and solenoid valve.

1.6 AIR BLEEDING MODE	
ABS AIR BLEEDING STATUS	
01. SOLENOID VALVE STATUS	CLOSE
02. MOTOR PUMP STATUS	OFF
DO YOU WANT TO START ?	
(PRESS [YES] KEY)	

EJDA014F

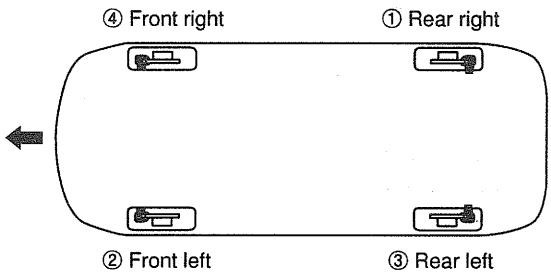
6) Wait 60 sec. before operating the air bleeding.

(If not, you may damage the motor.)

1.6 AIR BLEEDING MODE	
ABS AIR BLEEDING STATUS	
01. SOLENOID VALVE STATUS	OPEN
02. MOTOR PUMP STATUS	ON
TIME : AUTOMATIC COUNT (1-60 SEC.)	

EJDA014G

5. Pump the brake pedal several times, and then loosen the bleeder screw until fluid starts to run out without bubbles. Then close the bleeder screw.
6. Repeat step 5 until there are no more bubbles in the fluid for each wheel.



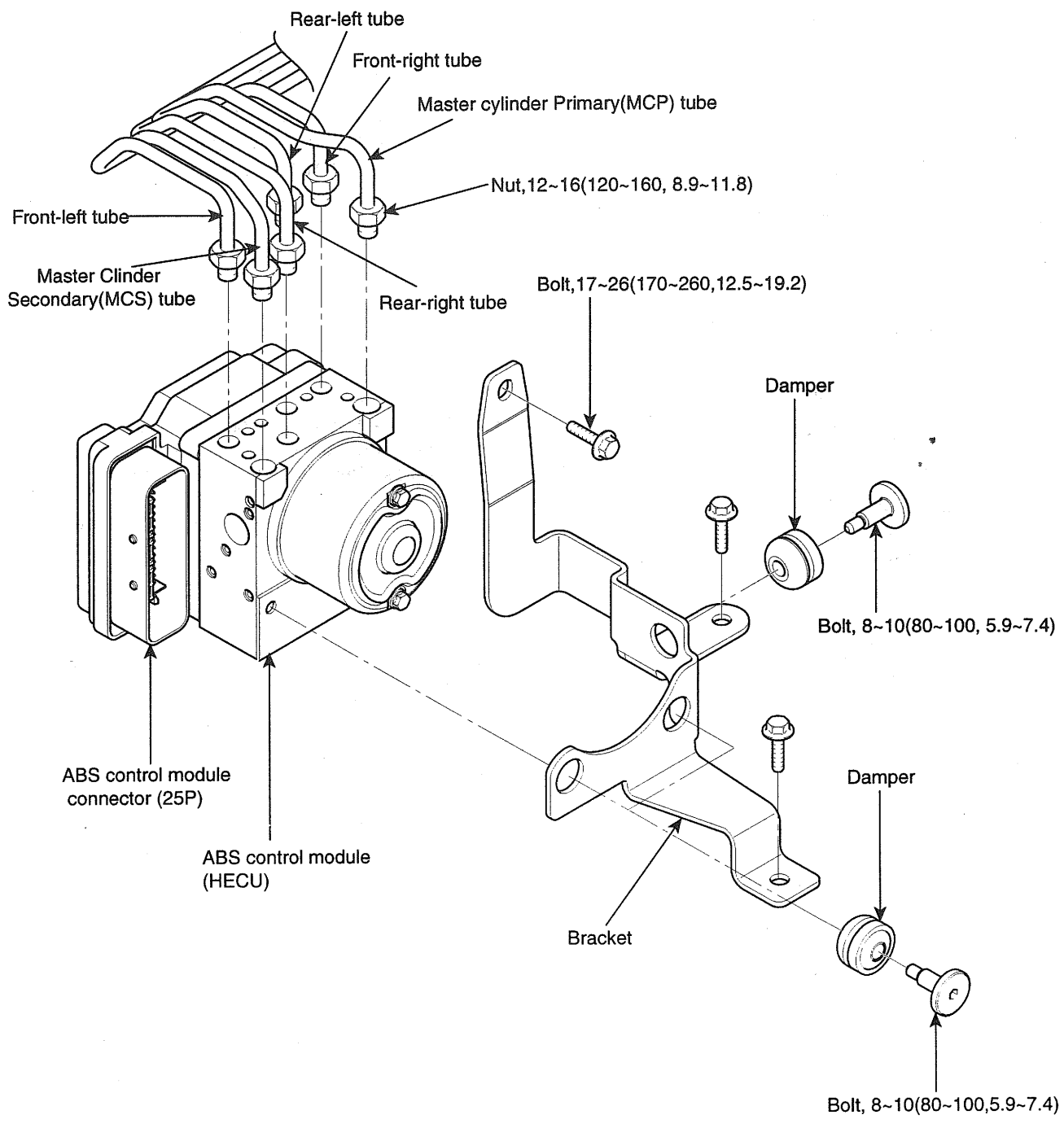
KJKE003B

7. Tighten the bleeder screw.

Bleed screw tightening torque:
7~13 Nm (70 ~130 kg·cm, 5.1 ~ 9.5 lb·ft)

ANTI-LOCK BRAKING SYSTEM CONTROL MODULE

COMPONENTS EEB94182

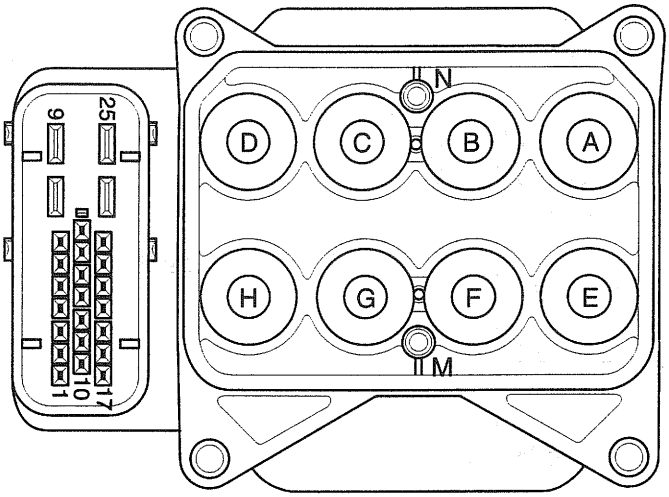


TORQUE : Nm(Kgf·cm,lbf·ft)

EJQE210A

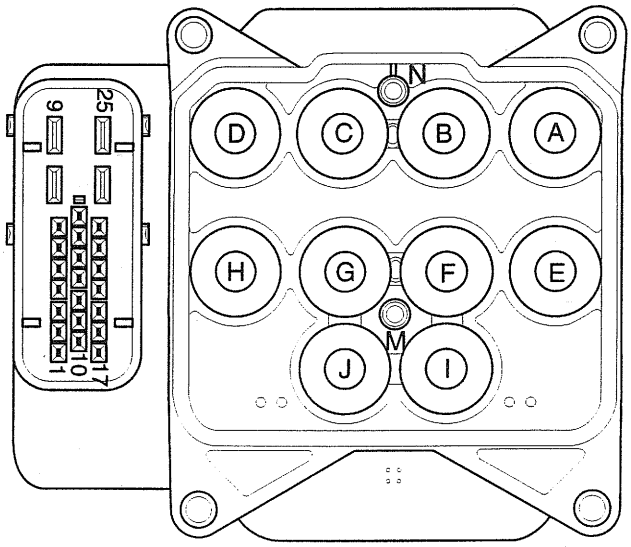
HECU EXTERNAL DIAGRAM EB66A90A

[ABS ECU]



A : INLET VALVE(FR)
B : INLET VALVE(RL)
C : INLET VALVE(RR)
D : INLET VALVE(FL)
E : OUTLET VALVE(FR)
F : OUTLET VALVE(RL)
G : OUTLET VALVE(RR)
H : OUTLET VALVE(FL)
M :MONITER(+)
N : MOTER(GND)

[TCS ECU]

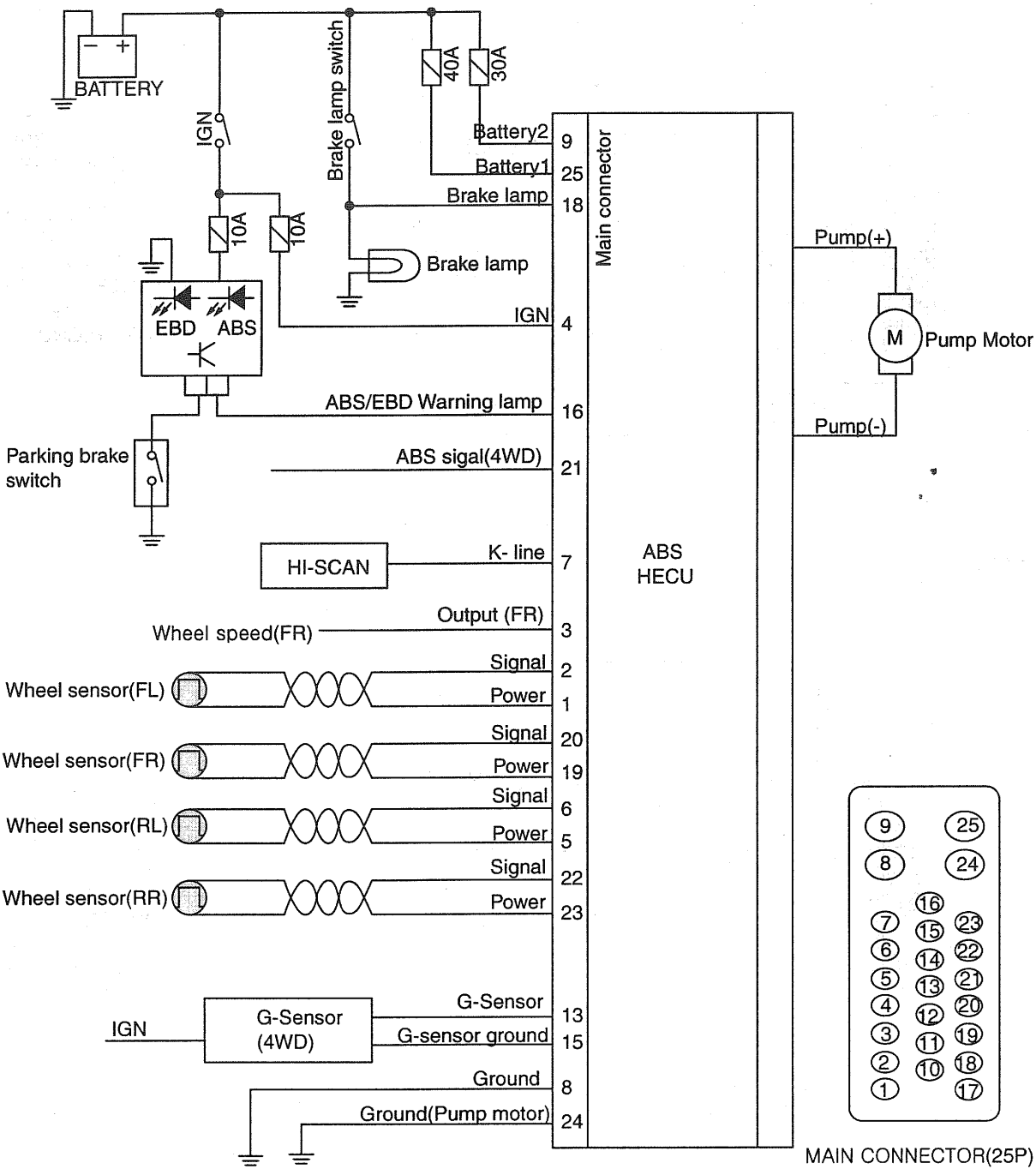


A : INLET VALVE(FR)
B : INLET VALVE(RL)
C : INLET VALVE(RR)
D : INLET VALVE(FL)
E : OUTLET VALVE(FR)
F : OUTLET VALVE(RL)
G : OUTLET VALVE(RR)
H : OUTLET VALVE(FL)
I : TRACTION VALVE(TCR)
J : TRACTION VALVE(TCL)
M : MOTER(+)
N : MOTER(GND)

EJQE220D

CIRCUIT DIAGRAM EAD2EF91

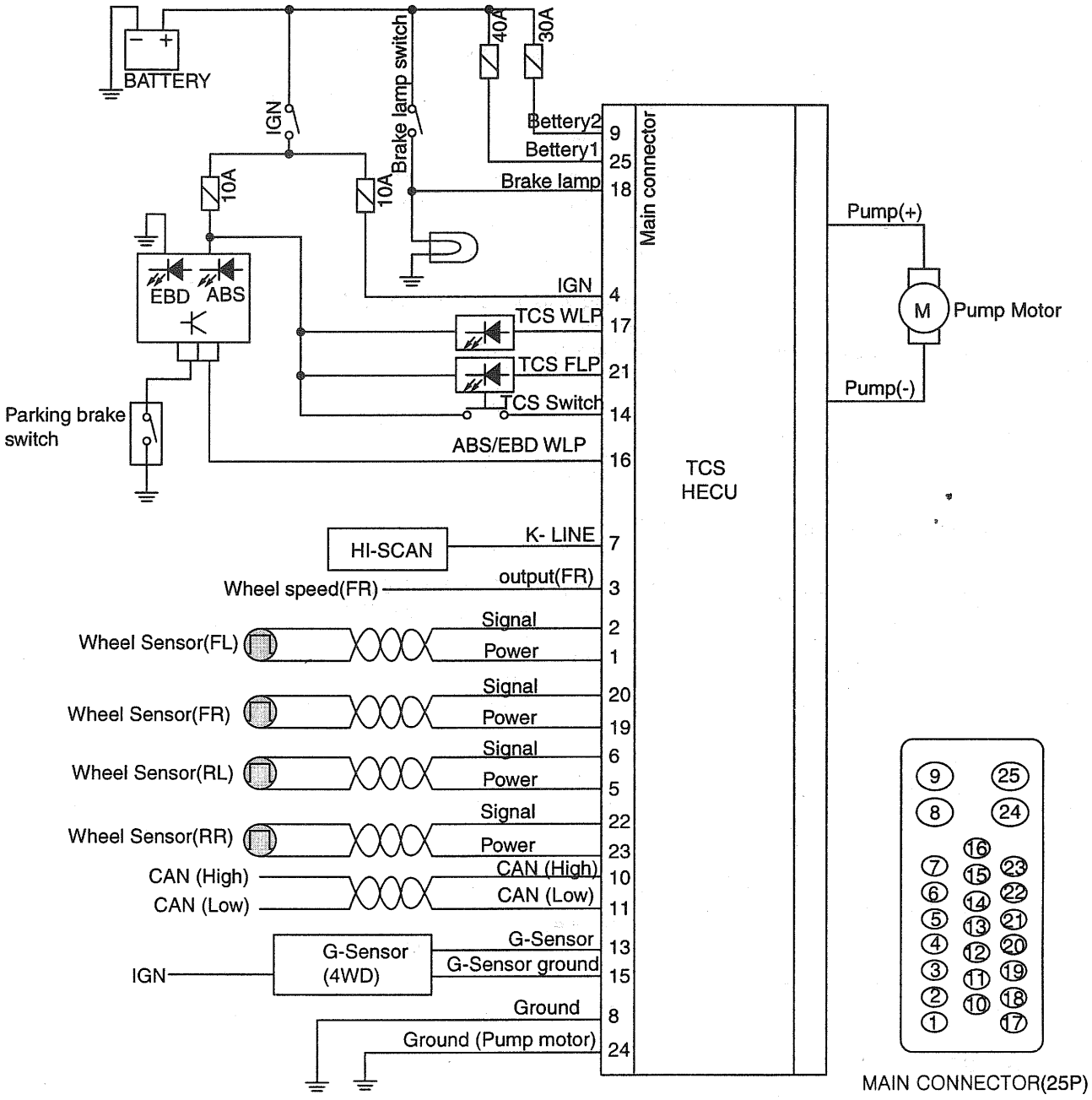
[ABS]



EJQE220A

[TCS]

WLP : Warning lamp
FLP : Function lamp



EJQE220B

ABS/TCS CONNECTOR INPUT/OUTPUT

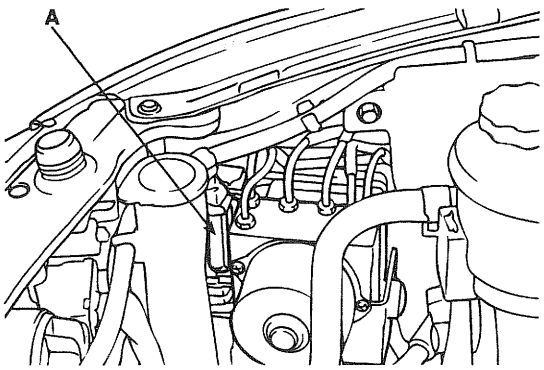
EC9BE439

Connector Terminal		Specification	Remark
No	Description		
4	IGNITION1(＋)	Over voltage range: 16.5±0.5V Operating voltage range: 9.5±0.5V < V < 16.5±0.5V Low voltage range: 7.0±0.5V < V < 9.5±0.5V Max. current: I < 300mA	
25	POS. BATTERY.(SOLENOID)	Max leakage current : I < 0.8mA Operating voltage range: 9.5±0.5V < V < 16.5±0.5V Max current : I < 30A	
9	POS, BATTERY.(MOTOR)	Operating voltage range: 9.5±0.5V < V < 16.5±0.5V Rush current : I < 100A Max current : I < 30A Max leakage current : I < 0.2mA	
8	GROUND	Rated current : I < 300mA Max. current: I < 30A	
24	PUMP MOTOR GROUND	Rush current : I < 100A Max current : I < 30A	
18	BRAKE LIGHT SWITCH	Input voltage low: 0V ≤ V ≤ 3.0V Input voltage High: 7.0V ≤ V ≤ 16.0V	
3	SENSOR FRONT RIGHT OUTPUT	Max current : I < 2mA External pull up resister : 10KW < R Output duty : 50 ±20%	
16	ABS/EBD W/LAMP DRIVE	Max. current: I < 200mA Max. output low voltage : V < 1.2V	
17	TCS W/LAMP DRIVE		with TCS
21	TCS F/LAMP DRIVE		with TCS
14	TCS ON/OFF SWITCH	- Input voltage low: 0V ≤ V ≤ 3.0V - Input voltage High: 7.0V ≤ V ≤ 16.0V - Max input current: I < 10mA	with TCS
11	CAN BUS LINE(LOW)	Max. current : I < 10mA	with TCS
10	CAN BUS LINE(HIGH)		
1	SENSOR FRONT LEFT POWER	- Output voltage : IGN[V] ± 1V - Output current : Max 30mA	
19	SENSOR FRONT RIGHT POWER		
5	SENSOR REAR LEFT POWER		
23	SENSOR REAR RIGHT POWER		

2	SENSOR FRONT LEFT SIGNAL	- Input current LOW : 5.9 ~8.4 mA - Input current HIGH : 11.8 ~ 16.8 mA - Frequency range : 1 ~ 2000 Hz - Input duty : 50 ±20%	
20	SENSOR FRONT RIGHT SIGNAL		
6	SENSOR REAR LEFT SIGNAL		
22	SENSOR REAR RIGHT SIGNAL		
21	ABS ACTIVE SIGNAL	Max. current : I < 200mA	with 4WD
13	G SENSOR SIGNAL	Input Voltage : 0≤V≤5.0V	with 4WD
15	G SENSOR GROUND	Rated current : I < 10mA	
7	DIAGNOSIS INPUT/OUTPUT	Input voltage : VIL < 0.3 IGN[V] VIH > 0.7 IGN[V] Output voltage : VOL < 0.2 IGN[V] VOH > 0.8 IGN[V]	

REMOVAL E5632DAD

1. Disconnect the double lock (A) from the Hecu.



KJQE710D

2. Disconnect the brake tube from the HECU by unlocking the nuts centerclockwise with a spanner.

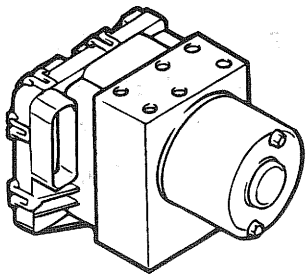
NOTE

- Do not spill brake fluild on vehicle; it may damage the pailt; if brake fluid gets on the paint, wash it off immediately with water.
- Take care not to damage or defrom the brake lines during remove and water.
- To prevent the brake fluid from flowing, plug and cover the hose ends and joints with a shop towel or equivalent material.

3. Remove the three HECU brake mounting bolts disassembly the HECU with the bracket.

CAUTION

1. Never attemlt to disassemble the HECU.
2. The HECU must be transported and stored in an upright podution and with the ports sealed.



EJDA008B

4. Remove the three HECU mounting bolts and disassembly the HECU from the bracket.

INSTALLATION EECBFB33

1. Installation is the reverse of removal.
2. Tighten the HECU mounting bolts and brake tube nuts to the specified torque.

Tighterning torque

HECU mounting bolt:

8~10Nm (80~100 kg·cm, 5.9~7.3 lbf·ft)

HECU braket mounting bolt:

17~26 Nm (170~260 kg·cm, 12.5~19.1 lbf·ft)

Brake tube nut:

13~17 Nm (130~170 kg·cm, 9.5~12.5 lbf·ft)