VEHICLE GENERAL

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VEHICLE GENERAL

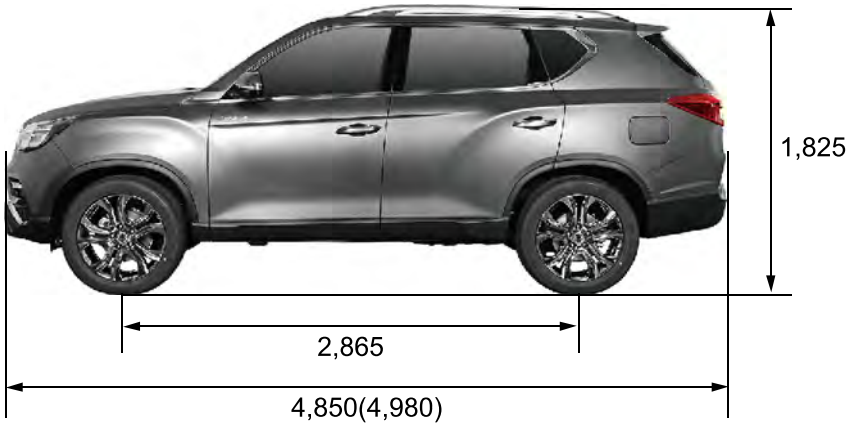
1. SPECIFICATIONS AND IDENTIFICATION

1) Exterior Dimensions

Unit: mm

Top view

Side view

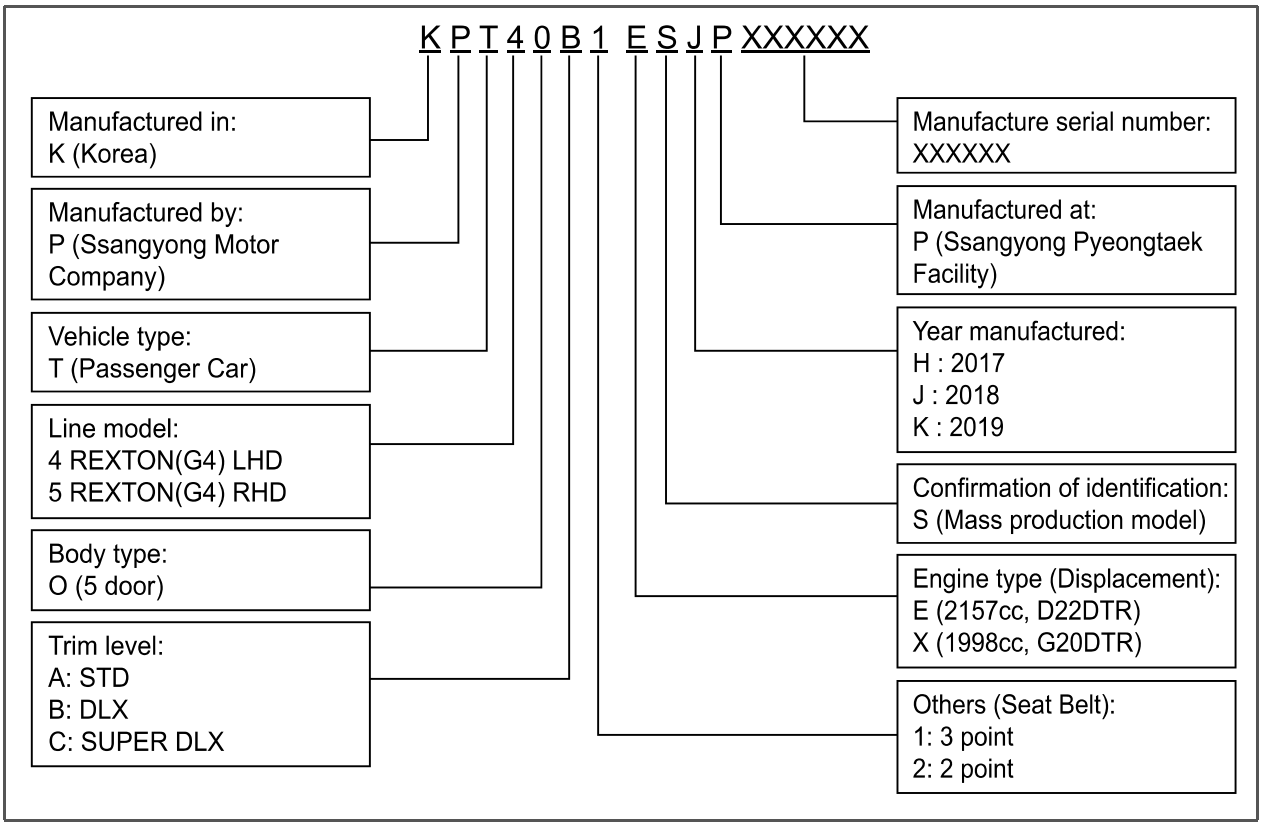


Front view

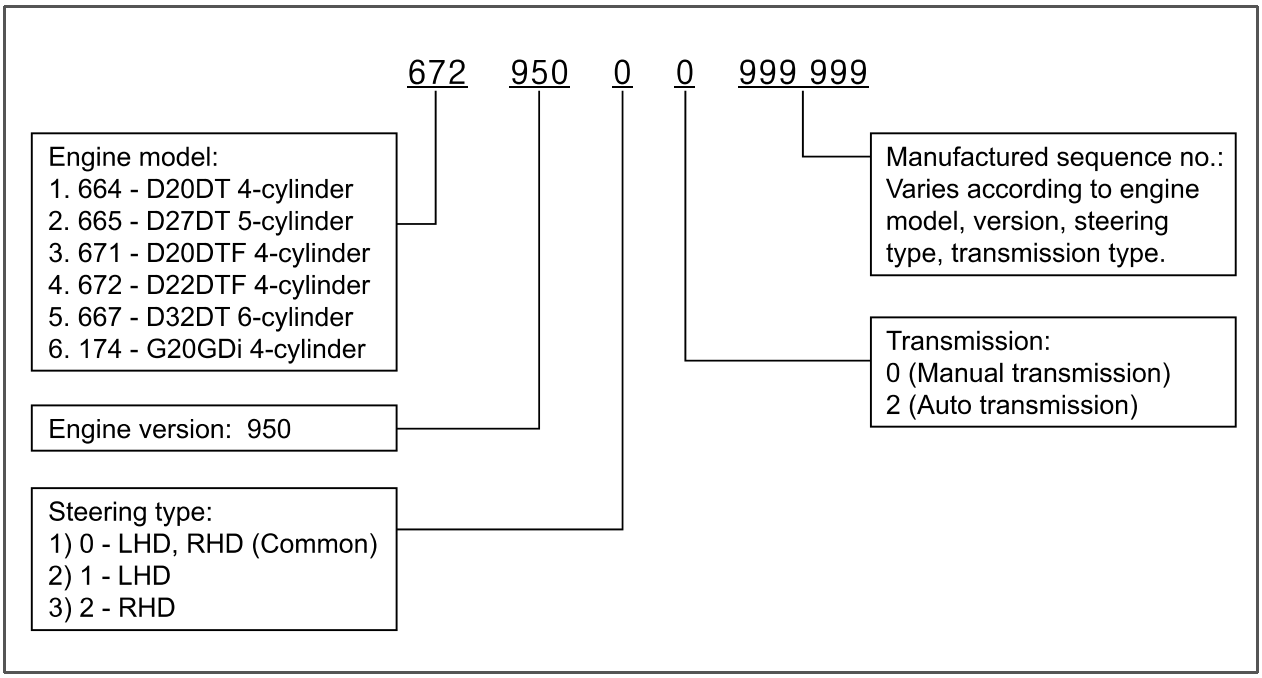
Rear view

Modification basis	
Application basis	
Affected VIN	

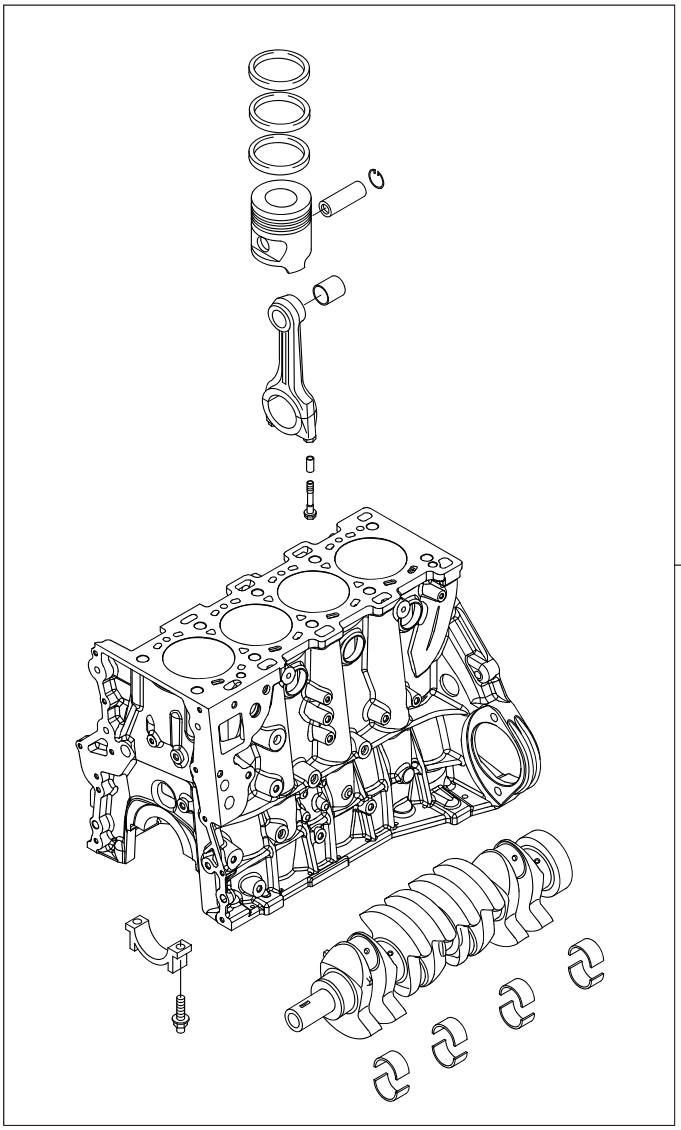
▶ Vehicle identification number



▶ Engine identification number



▶ 1120 SHORT BLOCK(DSL)

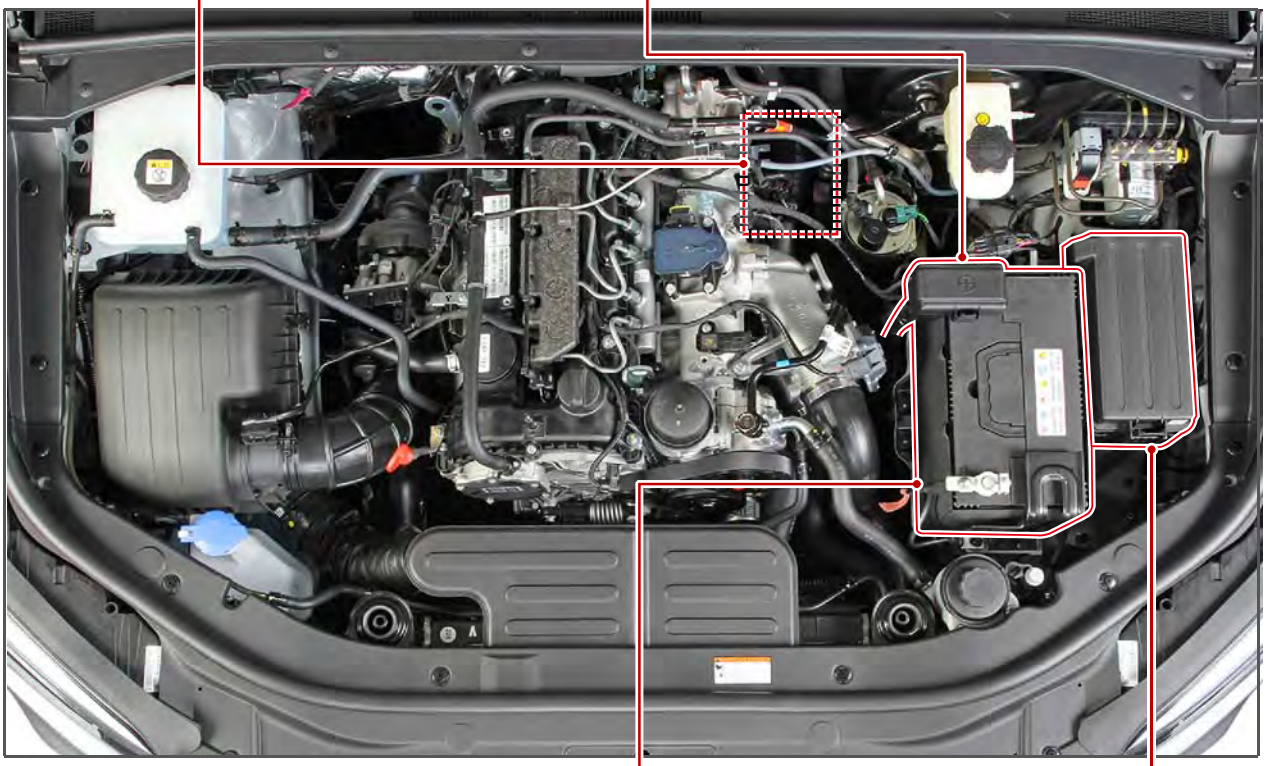


1. SHORT BLOCK

Modification basis	
Application basis	
Affected VIN	

2. COMPONENTS

Starting motor	Battery positive cable (starting motor power cable)	ECU
		



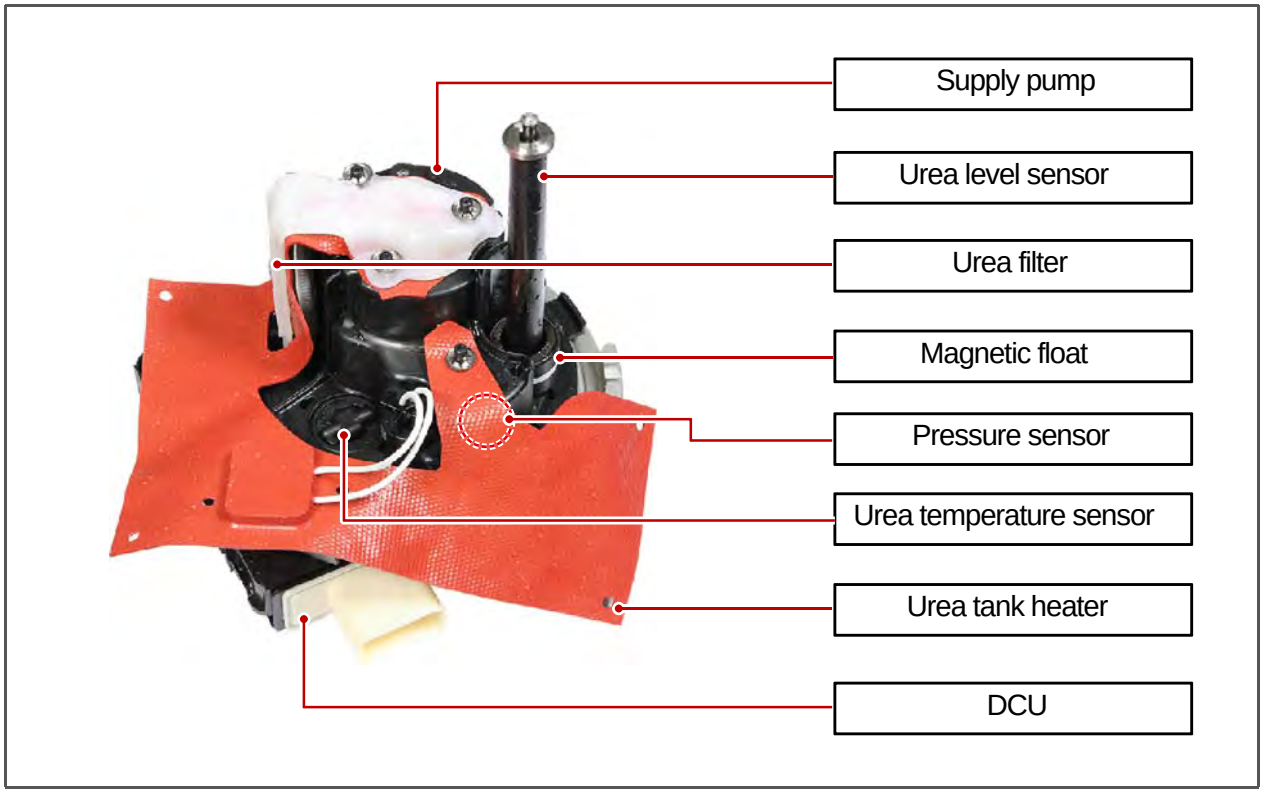
Battery	Start relay
	

4. DCU (DOSING CONTROL UNIT) & SUPPLY MODULE

1) Function

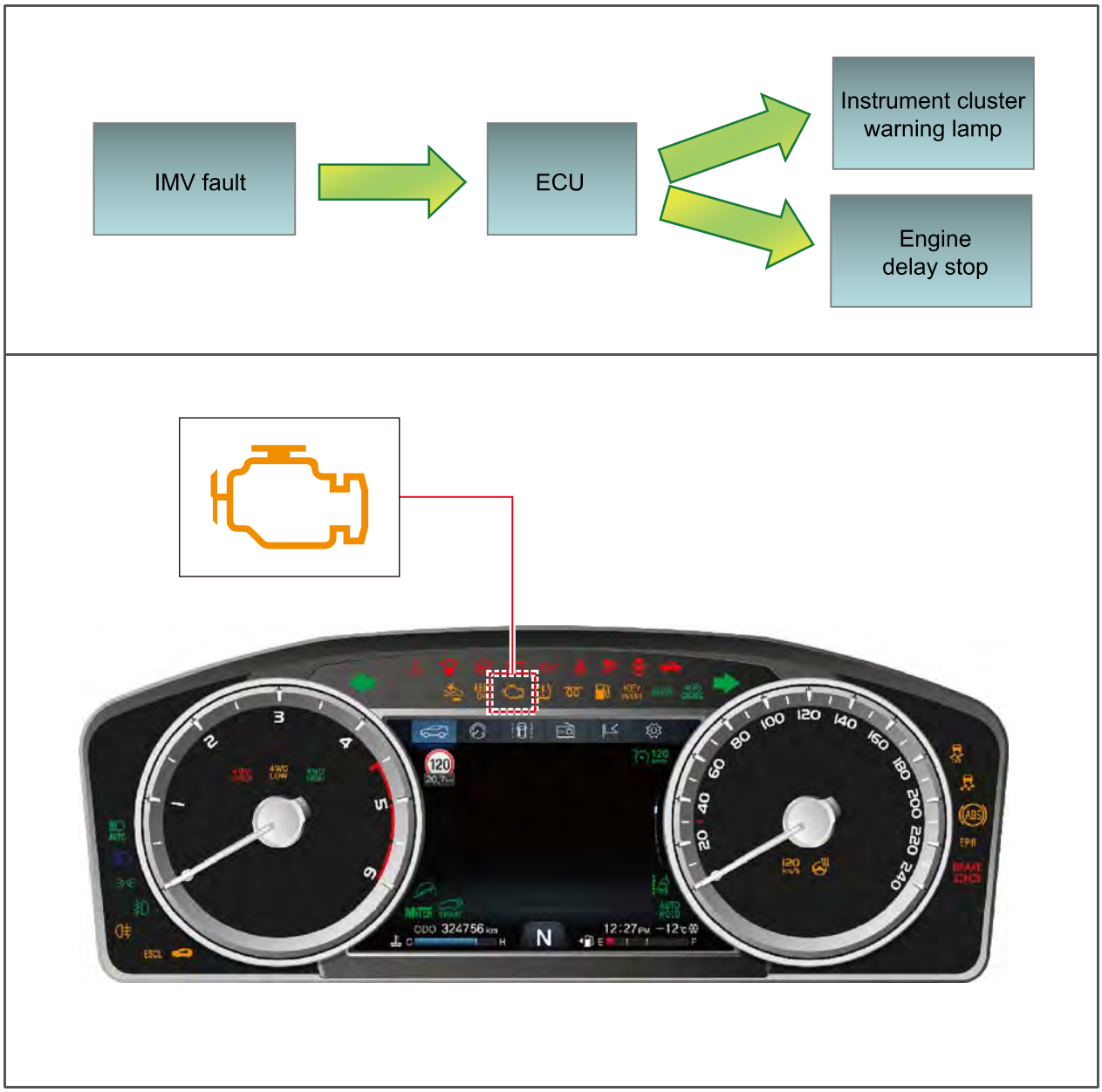
- Urea tank heater control
- Urea supply (heating) tube control
- Urea line pressure control and urea purge
- Urea level detection
- DCU initialization and diagnosis

▶ Description



Modification basis	
Application basis	
Affected VIN	

4) Engine delay stop function



- If IMV drive is defective during driving (IMV circuit is open)
- Engine CHECK warning lamp ON and changed to limp home mode
  (Limp home mode: Driving with minimum torque, engine rpm is restricted by 1,300 to 1,400 rpm)
- Emergency engine stop after 60 seconds

※ The engine can be started in 3 seconds after emergency stop, but running in limp home mode

1) Major Check Items and Service Interval

Check item	Daily check	Interval of regular inspection, adjustment and replacement	Remarks
Engine oil level check and replenishment	O	-	Check and replenish as necessary
Engine oil and filter replacement	-	Initial check : 7,500 km, Change every 15000 km or 12 months Check frequently and fill up if necessary	-
Coolant level check and replenishment, cooling system connection	O	-	Check and replenish as necessary
Coolant replacement	-	Change at every 5 years or 200,000 km of driving. (Long life antifreeze)	-
Drive belt	-	Check at every 15,000 km of driving Replace if necessary	-
Air cleaner element cleaning and replacement	-	Clean every 15,000 km Replace every 30,000km	-

The regular inspection interval should be shortened if the vehicle is used under following severe conditions:

1. Vehicle is traveled a short distance repeatedly
2. Frequent operating in sandy and dusty areas
3. Idling vehicle too long
4. Operating in a place with heavy traffic
5. High frequency of driving in rough roads such as sand, gravel road, snowy road and unpaved road
6. High frequency of driving in mountain roads, uphill/downhill, etc.
7. Used for patrol car, taxi, commercial vehicle, towing vehicle, etc.
8. Frequent driving at high speed (170 km/h)
9. Frequent stop-and-start driving
10. Driving on road with salt or corrosive substances or cold areas
11. Towing a trailer or off-road driving

Modification basis	
Application basis	
Affected VIN	

(4.6) Rear oxygen sensor: signal response rate check, lean to rich (P0140)

This signal validation is performed after the fuel cut-off. The rich mixture is supplied to the catalyst by a special air-fuel ratio control to reduce NOx emissions. The slope of line defined by the rear oxygen sensor signals in lean to rich condition is monitored. If the maximum value of the slope does not exceed the threshold, it will be determined to be a fault.

(4.7) Rear oxygen sensor: signal monitoring during fuel cut (P0140)

If the output voltage from the rear oxygen sensor exceeds the threshold, the signal will be considered as invalid. (voltage check in lean condition)

(4.8) Rear oxygen sensor: heating validation

This validation is to find a fault in the oxygen sensor heating. If there is a fault in the oxygen sensor heating, then the exhaust emission levels will increase beyond the permitted limits. The internal resistance is measured to determine the temperature of the oxygen sensor. Immediately after the engine starts, the internal resistance shows the greatest deviation from the reference value, because it is affected by the heating operation. Therefore, this validation is performed during the warm-up of the exhaust system and oxygen sensor after the engine starts.

a. Monitoring conditions

- **The engine is running**
- **The battery voltage is above the threshold**
- **The rear oxygen sensor heating is activated**
- **The rear oxygen sensor is operating**
- **The exhaust gas temperature is above the threshold (based on modeling)**

b. Method

If the resistance of the rear oxygen sensor measured after the predetermined monitoring cycles is below the threshold, the rear oxygen sensor heating will be determined to be malfunctioning.

(5) Engine cooling system monitoring

(5.1) Thermostat monitoring

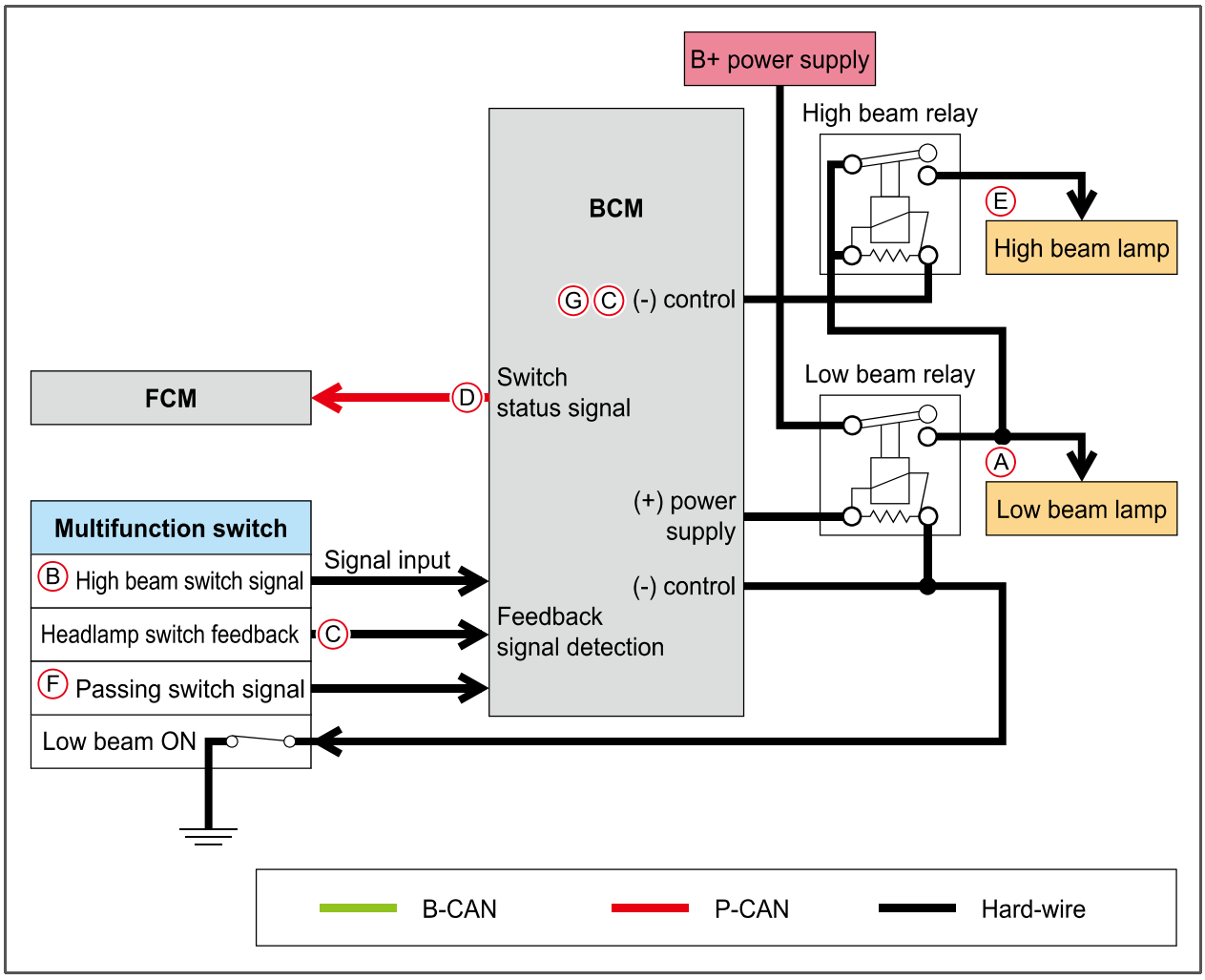
a. Basic principle

The thermostat control valve maintains a constant temperature value of the coolant and enables the engine to be warmed up in shorter time. Typically, the thermostat is closed at cold start. The monitoring is performed by comparing the measured coolant temperature with the simulated (modeling) coolant temperature. If the thermostat is stuck open, it will be easily detected because the coolant temperature will not increase during warm-up.

Modification basis	
Application basis	
Affected VIN	

2) High Beam Control

A. Headlamp low beam turned on
B. Multifunction high beam switch signal received
C. High beam ON control (maintains low beam output + high beam control)
D. BCM sends signal on high beam operation to FCM via P-CAN
E. High beam turned on
F. Multifunction passing switch signal received
G. High beam OFF control (maintains low beam output)
H. BCM sends signal on high beam operation to FCM via P-CAN



NOTE

For vehicles with FCM, turning ON the high beam with headlamp switch in AUTO light position activates the HBA system, and HBA system controls the headlamps (high beam, low beam).

2) Illumination Setup

(1) How to setup

Select Overall setting or Individual setting (LCD illumination, illumination other than LCD) under User settings menu of the instrument cluster.

▶ **Daytime/nighttime illumination**

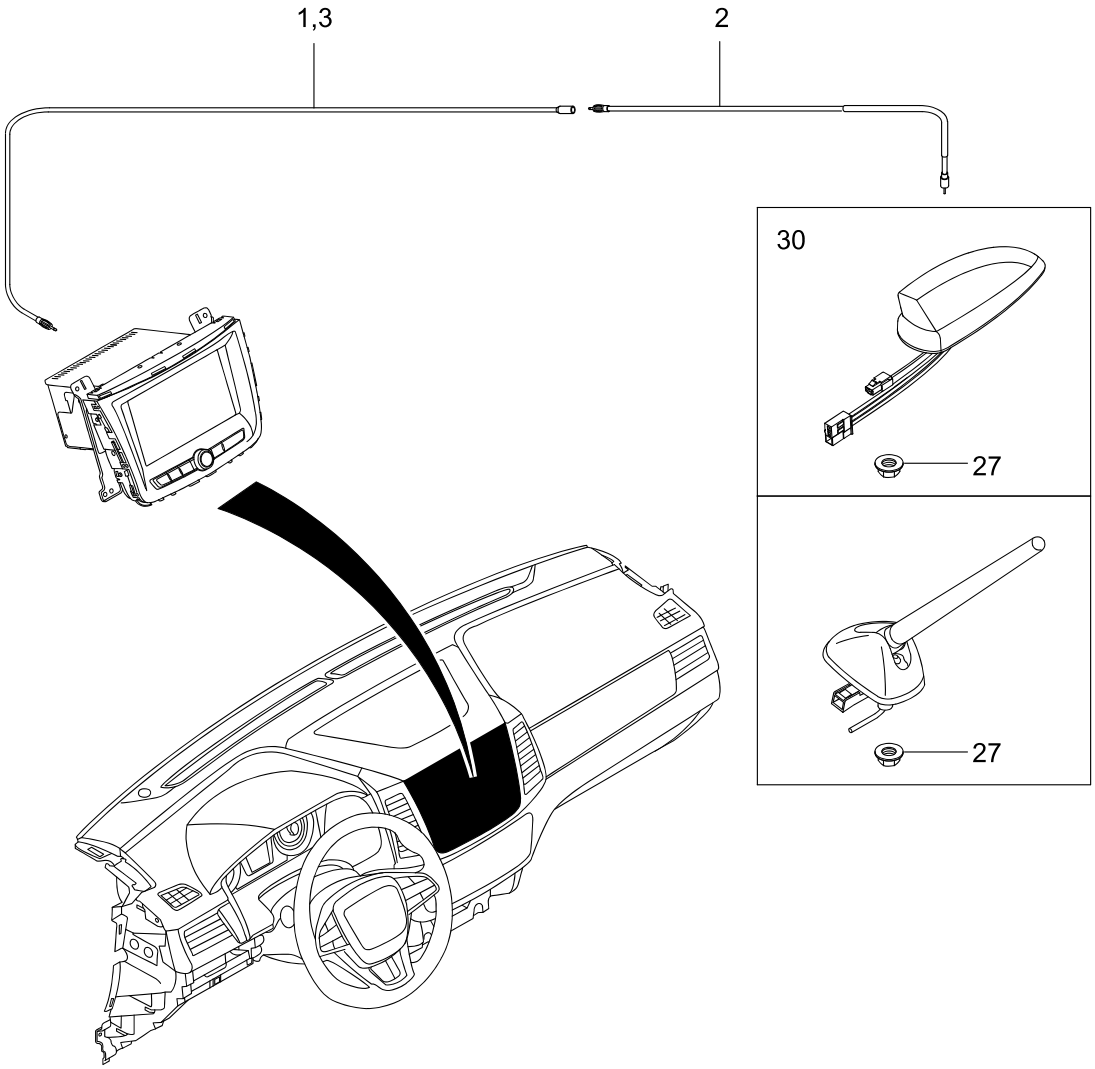
Illumination Level	Set value (PWM duty)					
	Standard instrument cluster			Supervision instrument cluster		
	Dial	Pointer	LCD	Dial	Pointer	LCD
Level 1	20 / 1.0	50 / 1.0	60 / 3.0	10 / 0.5	50 / 0.8	60 / 0.79
Level 2	22 / 1.2	52 / 1.2	61 / 3.4	11 / 0.6	52 / 1.0	62 / 0.9
Level 3	23 / 1.4	54 / 1.5	63 / 3.8	12 / 0.8	54 / 1.3	63 / 1.0
Level 4	25 / 1.7	56 / 1.9	64 / 4.3	14 / 0.9	56 / 1.7	65 / 1.3
Level 5	27 / 2.0	58 / 2.3	65 / 4.9	15 / 1.1	58 / 2.0	67 / 1.6
Level 6	30 / 2.4	60 / 2.8	67 / 5.5	17 / 1.4	60 / 2.5	69 / 1.9
Level 7	32 / 2.9	62 / 3.4	68 / 6.2	18 / 1.7	62 / 3.2	71 / 2.3
Level 8	35 / 3.5	65 / 4.2	70 / 7.0	20 / 2.0	65 / 3.9	72 / 2.8
Level 9	38 / 4.2	67 / 5.2	71 / 7.9	23 / 2.4	67 / 4.8	74 / 3.3
Level 10	41 / 5.0	69 / 6.4	73 / 8.9	25 / 3.0	69 / 6.0	76 / 4.0
Level 11	44 / 6.0	72 / 7.8	74 / 10	28 / 3.6	72 / 7.4	79 / 4.8
Level 12	48 / 7.0	75 / 9.6	76 / 11	31 / 4.3	75 / 9.1	81 / 5.7
Level 13	52 / 8.6	77 / 12	78 / 13	34 / 5.2	77 / 11	83 / 6.9
Level 14*	56 / 10	80 / 15	79 / 14	38 / 6.4	80 / 14	85 / 8.3
Level 15	61 / 12	83 / 18	81 / 16	42 / 7.7	83 / 17	87 / 10
Level 16	66 / 15	86 / 22	83 / 18	46 / 9.3	86 / 21	90 / 12
Level 17	71 / 18	90 / 27	84 / 21	51 / 11	90 / 26	92 / 14
Level 18	77 / 21	93 / 33	86 / 24	57 / 14	93 / 33	95 / 17
Level 19*	83 / 25	96 / 41	88 / 27	63 / 17	96 / 40	97 / 20
Level 20	90 / 30	100 / 50	90 / 30	70 / 20	100 / 50	100 / 25

* Default brightness when initializing instrument cluster settings
→ For individual settings (LCD illumination initialized to level 19 / other illuminations than LCD level 14)
→ For overall settings (all illuminations including LCD initialized to level 14)

** When ignition turned off, battery removed and ignition turned on, existing setting values remained

Modification basis	
Application basis	
Affected VIN	

▶ 8930 AUDIO & AVN SYSTEM - EXTERIOR



1. CABLE ASSY-COMBI ANT FRT
2. CABLE ASSY-RR
3. FEEDER CABLE-FRT
27.NUT-RADIO MICRO POLE MTG
30.ANTENNA ASSY-COMBINATION

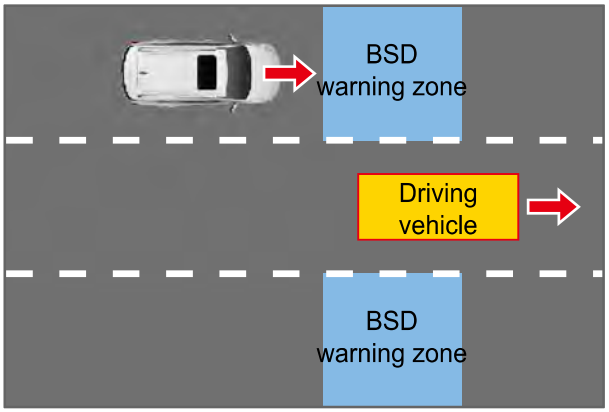
Modification basis	
Application basis	
Affected VIN	

OVERVIEW

1. OVERVIEW

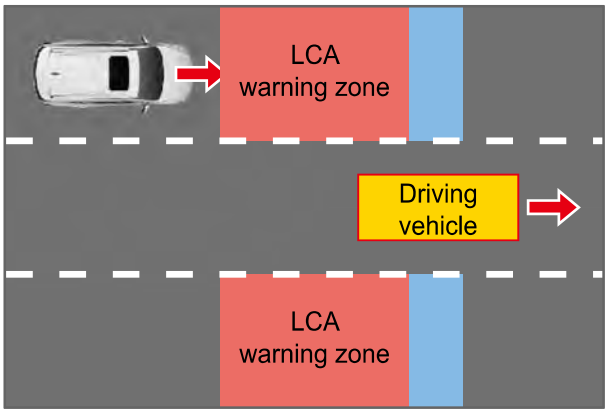
BSD (Blind Spot Detection) system uses the 2 radar sensors installed to both sides of the vehicle rear bumper inner side to measure the distance to the vehicle approaching from left or right rear side, approaching speed and angle. It also informs the driver of the vehicle rear situation through audible and visible signals for driver safety.
The BSD system has features such as:

▶ **BSD (Blind Spot Detection) system**



This system detects a vehicle which is in the area where the driver cannot view though the outside rearview mirror (1st warning). If the driver tries to change the lane in this state, the system warns the driver using a visible and audible warnings (2nd warning). This function is useful for acknowledging a vehicle in blind spot.

▶ **LCA (Lane Change Assist) system**



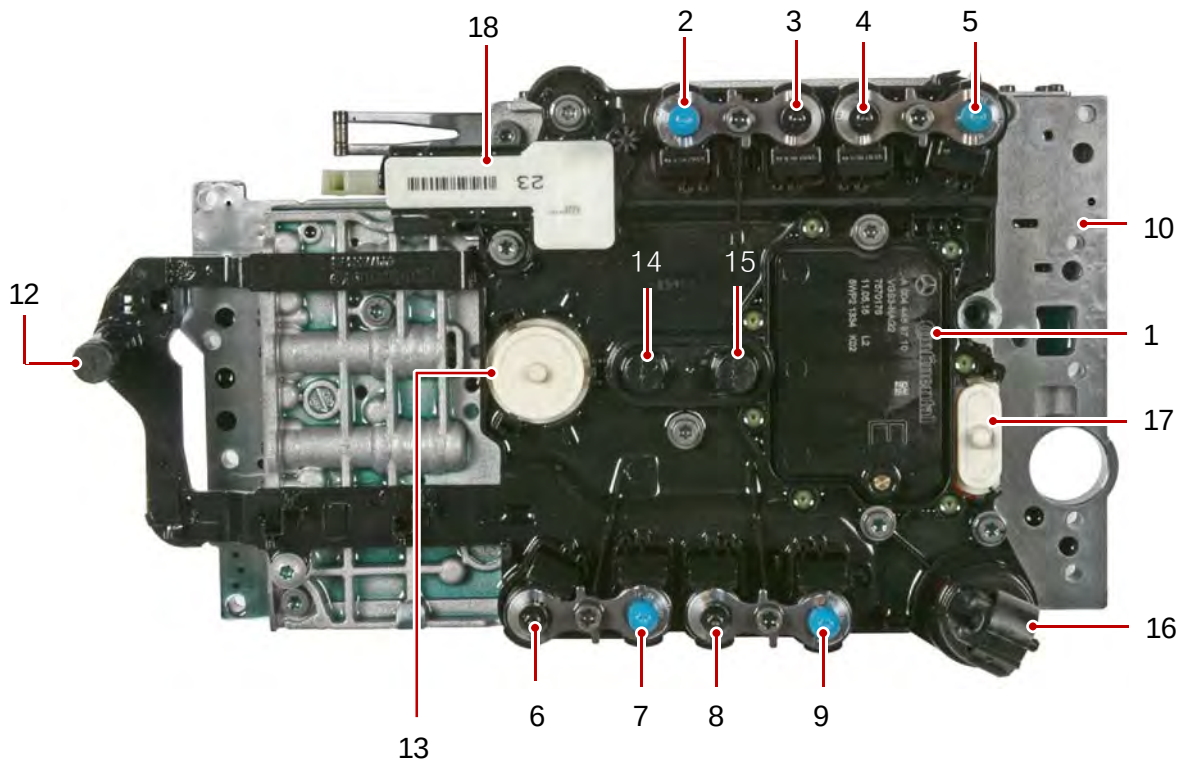
This system detects a vehicle which is approaching at high speed or about to collide from the left or right rear side of the vehicle (1st warning). If the driver tries to change the lane in this state, the system warns the driver using a visible and audible warnings (2nd warning). This function is useful for acknowledging a vehicle in foggy, dark night, rainy conditions.

Modification basis	
Application basis	
Affected VIN	

6) Speed sensor

The valve body and TCU integrated module measures the transmission internal speed using the following 3 sensors:

- Turbine speed sensor (15): measures rotational speed (rpm) of the ravigneaux gear set ring gear and sends it to TCU
- Internal speed sensor (14): measures rotational speed (rpm) of the simple planetary gear set ring gear and sends it to TCU
- Output speed sensor (12): measures rotational speed (rpm) of the parking pole gear and sends it to TCU



1. Integrated transmission control unit (TCU)
12. Output speed sensor
14. Internal speed sensor
15. Turbine speed sensor

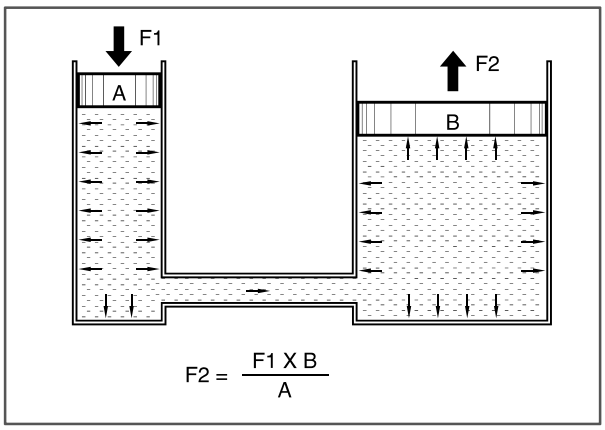
- The turbine speed sensor (15), internal speed sensor (14) and output speed sensor (12) are integrated (unified) with the integrated transmission control unit (TCU) (1). They cannot be replaced separately.

OVERVIEW

1. OVERVIEW

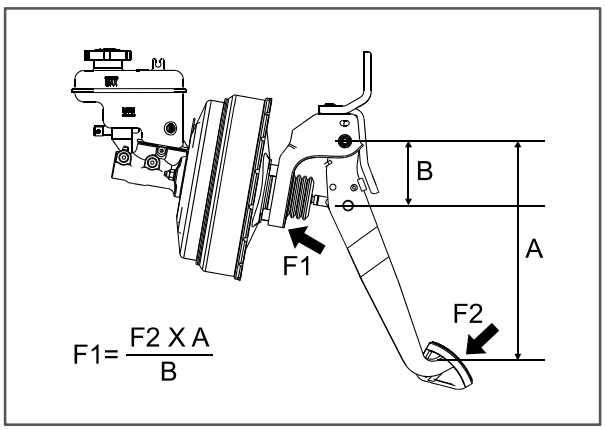
If the power is cut off while the vehicle is being driven, the vehicle will keep on moving for some distance without stopping because of inertia. Therefore, the brake system is very important to reduce the vehicle speed or stop the vehicle. The friction type brake system is typically used. This brake system converts the kinetic energy to the thermal energy and uses the friction force for braking.
The brake system primarily consists of the front disc brake, rear disc brake, MOC which is EPB (Electronic Parking Brake), master cylinder and brake booster for generating hydraulic pressure, brake pedal, brake hydraulic pipe (hose), etc.

▶ Hydraulic brake



It used the Pascal's principle to deliver the pedal effort, which increased by the brake booster, to the master cylinder which generates the hydraulic pressure when the driver depresses the brake pedal.
The hydraulic pressure travels to the caliper through the brake pipe or hose. Then, the pad is pressed against the disc by the pressure sent to the caliper pad to provide the braking force.

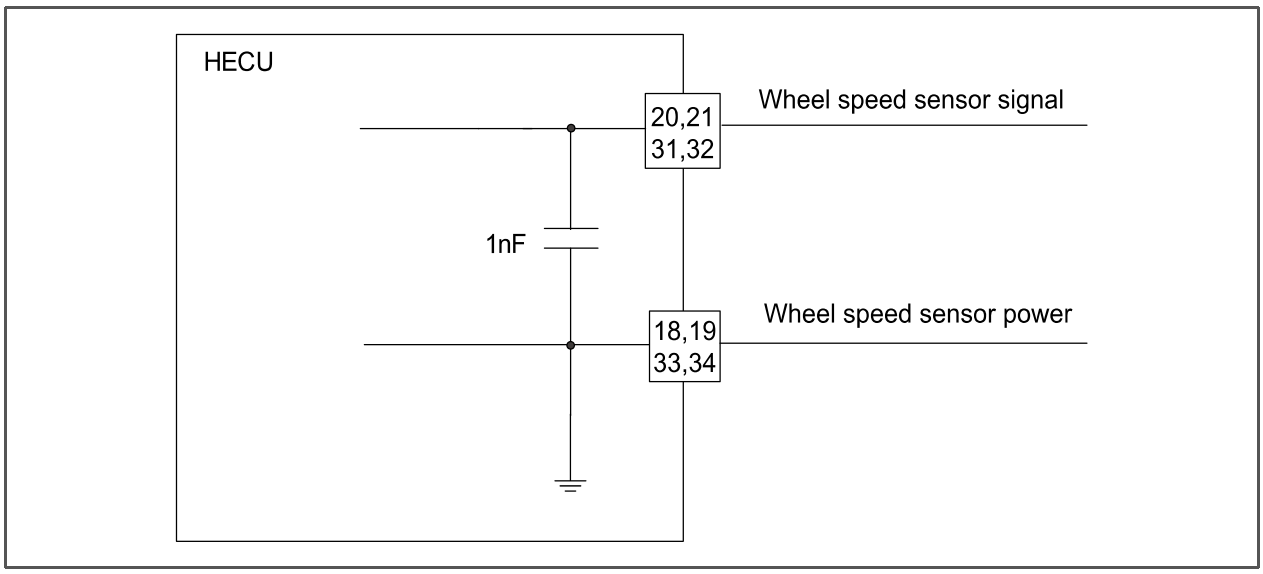
▶ Brake pedal



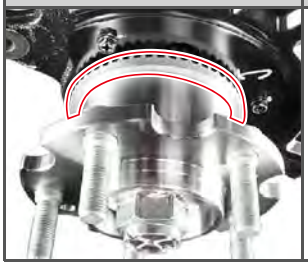
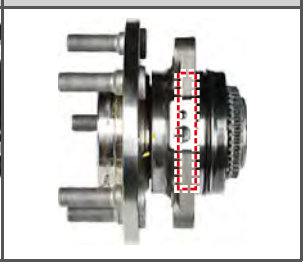
The brake pedal increases the force applied to the master cylinder in order to achieve the large braking force using the principle of the lever.

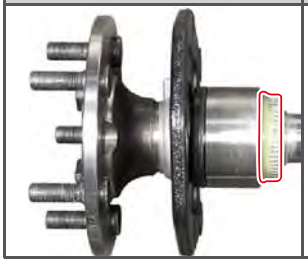
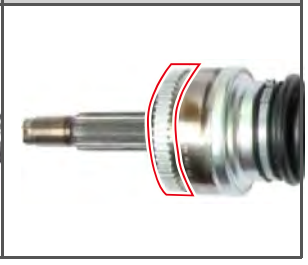
5. WHEEL SPEED SENSOR

▶ **HECU**



1) Function of Active Wheel Speed Sensor System

Front tone wheel(52EA)	
2WD	**4WD**
	

Rear tone wheel(52EA)	
Integrated axle type	**Multi-link type**
	

- sically, the tone wheel or the magnetized encoder wheel is required to activate the sensor. When the wheel rotates, the magnetic flux is changed as a sine wave form and this change is converted to voltage value by the hall elements. The voltage of sine wave form is amplified by the amplifier and finally converted to rectangular wave form by the comparator. This signal is transmitted to the ABS control unit to measure the speed.
- When the vehicle wheel rotates, the tone wheel rotates, and this rotation of the wheels changes the magnetic flux of the sensor and generates the induced electromotive force. The frequency of this duty waveform changes relative to the number of the rotation counts, and this frequency is controlled to detect the wheel speed.

Modification basis	
Application basis	
Affected VIN	