

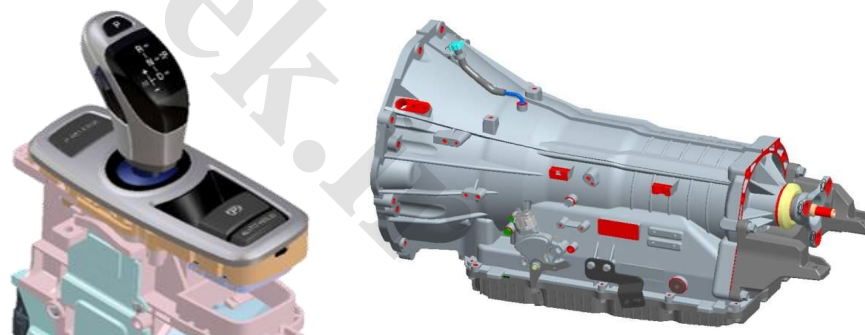
8 Speed AT (A8LR1) with SBW



Spec Comparison

Category	New Opirus (GH)	KH	Remarks
Automatic Transmission	Front Wheel Drive 6 Speed	Rear-Wheel 8-Speed AT + SBW	Manual Transmission N/A

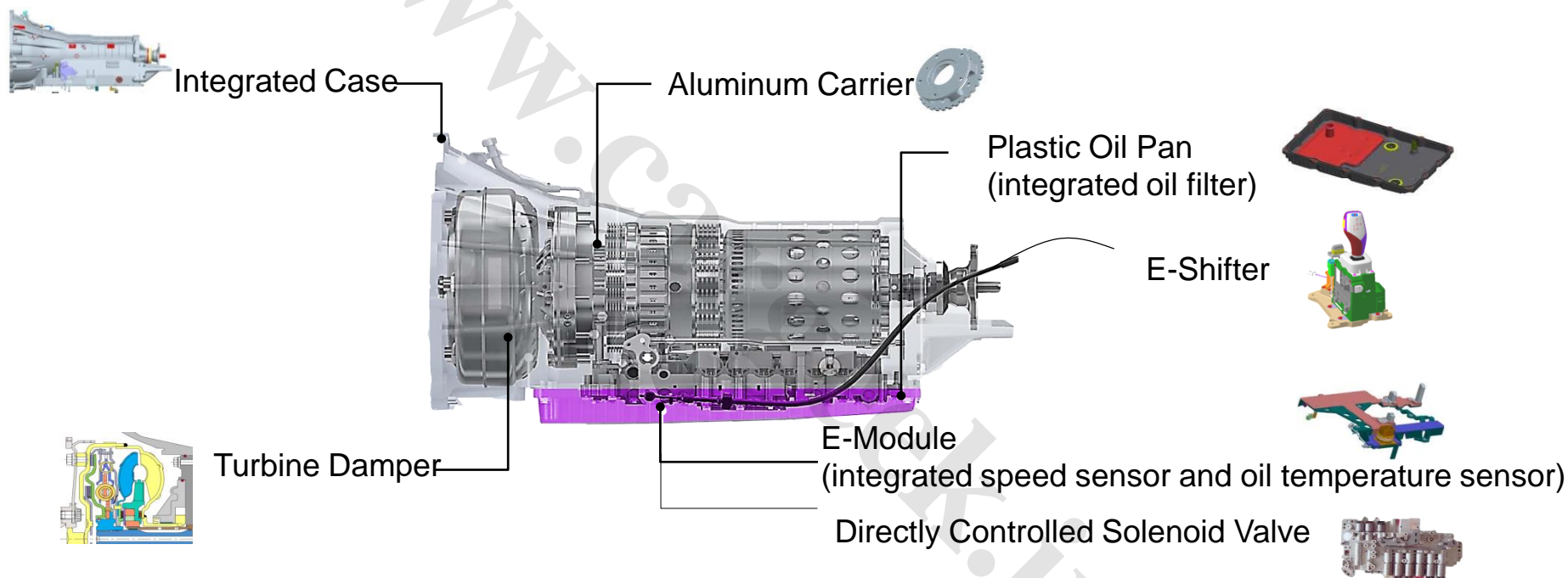
- 2011 Mohave is applied with the 8-Speed AT (only the model with SBC option)
- KH is applied with the SBW so there is H/W and S/W difference with the 8-Speed AT equipped in Mohave.



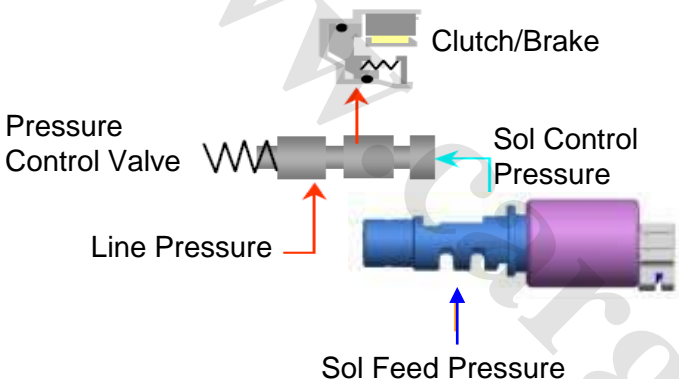
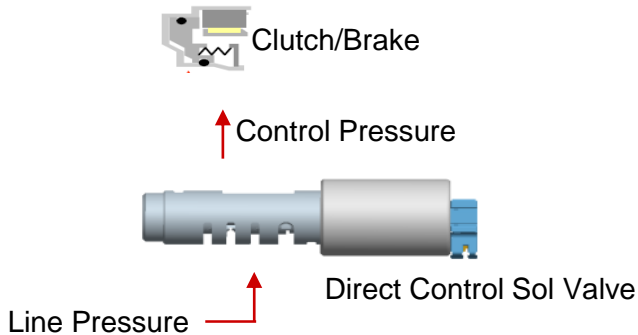
Main Specifications

Category		Tau FR 8-Speed + SBC (A8TR1)	Lambda II FF 8-Speed + SBW (A8LR1)
Applied Model		Mohave S- II 3.0	KH 3.3/3.8 GDI
Torque (kgf.m)		55	44
Weight (including oil, kg)		95.7	85.7
Length(mm)		676	684
SBW		None	Applied
Composition Factor	Planetary Gear Type	Simple 2 + Complex 1	←
	Operating Factors	Clutch: 4 Brakes: 2 One-way Clutch: 1	←
	No. of Solenoid Valves	VFS: 8 ON/OFF : 1	VFS: 8 ON/OFF : 3
Gear Ratio	1/2/3/4 5/6/7/8	3.795/2.473/1.613/1.177 1.000/0.831/0.652/0.571	3.665/2.396/1.610/1.190 1.000/0.826/0.643/0.556
	Reverse	2.467	2.273

Main Features

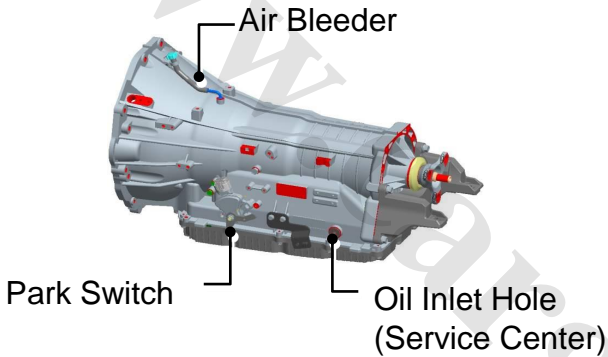
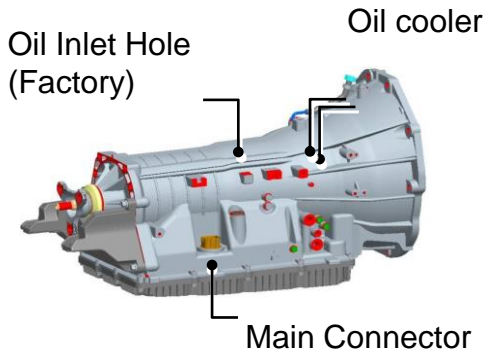


Directly Controlled Solenoid Valve

Category	Previous Model: Indirect control type	KH: Direct control type
Image	 <p>Clutch/Brake</p> <p>Pressure Control Valve</p> <p>Line Pressure</p> <p>Sol Feed Pressure</p> <p>Sol Control Pressure</p>	 <p>Clutch/Brake</p> <p>Control Pressure</p> <p>Line Pressure</p> <p>Direct Control Sol Valve</p>

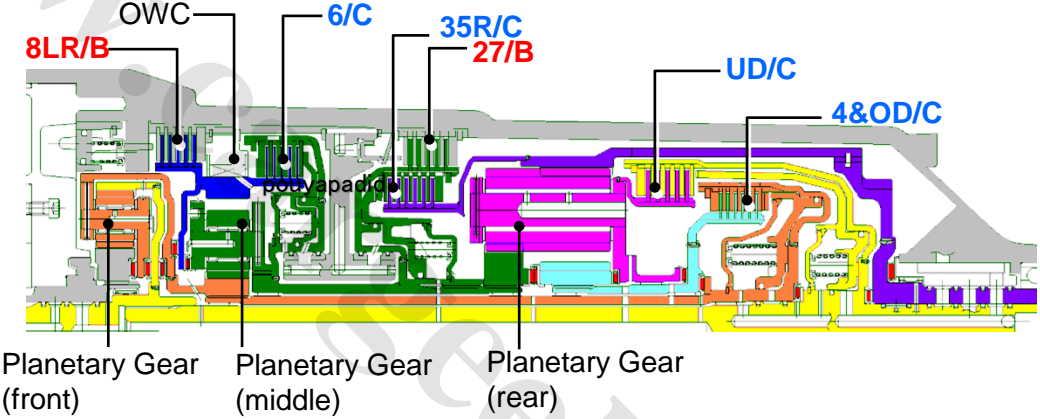
- Improved oil pressure response / reduced weight by simplifying the valve body system

External Structure

Category	Right Side	Left Side
Image	 <p>Air Bleeder</p> <p>Park Switch</p> <p>Oil Inlet Hole (Service Center)</p>	 <p>Oil Inlet Hole (Factory)</p> <p>Oil cooler</p> <p>Main Connector</p>

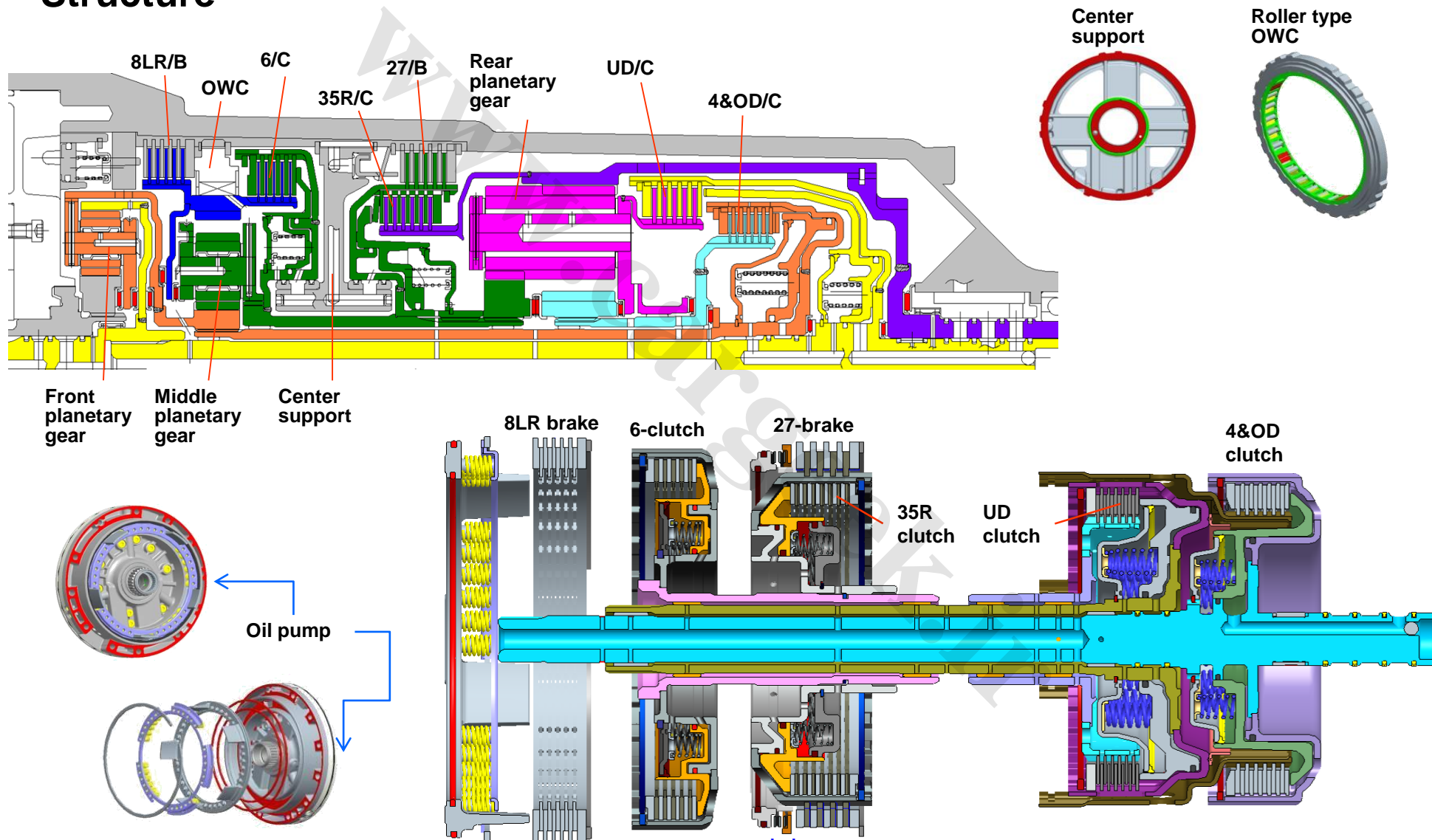
- Oil Used: SP-IV RR (red color)
- Oil Exchange Period: No Exchange (100,000Km in harsh condition)

Internal Structure

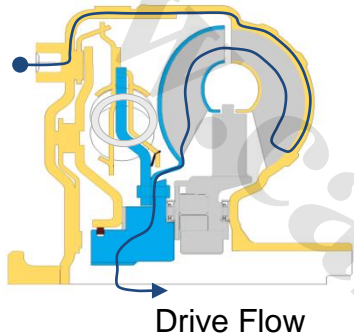
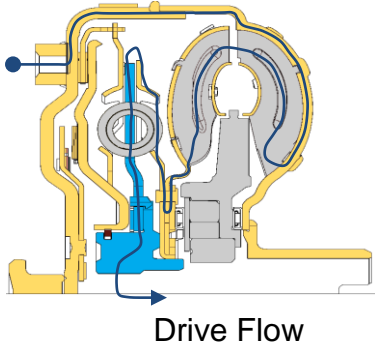
Category	Interior Side
Image	 <p>OWC</p> <p>8LR/B</p> <p>6/C</p> <p>35R/C</p> <p>27/B</p> <p>UD/C</p> <p>4&OD/C</p> <p>Planetary Gear (front)</p> <p>Planetary Gear (middle)</p> <p>Planetary Gear (rear)</p>

- Composed of 4 clutches and 2 brakes
- 2 simple and 1 complex planetary gear system

Structure



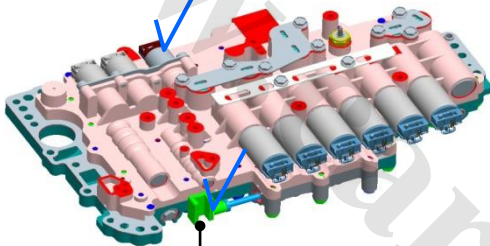
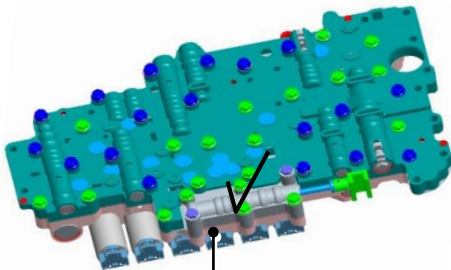
Torque Converter

Category	Conventional Damper	Turbine Damper
Image	 <p>Drive Flow</p>	 <p>Drive Flow</p>

- Enhanced damper clutch operation range for improved fuel efficiency also absorbs damper's internal vibration.

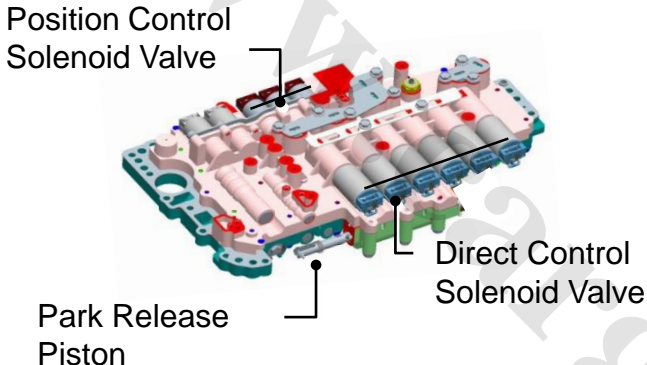
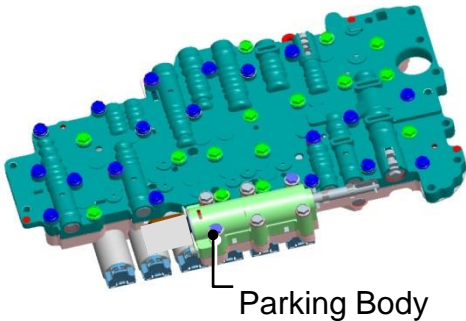
✂ Damper Operation Range (full direct): Vehicle speed above 20km/h, engine RPM above 1300 RPM, oil temperature above 20°C

Valve Body (SBC)

Category	Upper	Lower
Image	<p>8LR F/S Valve ON/OFF SOL</p>  <p>Manual Valve</p>	 <p>Manual Body</p>

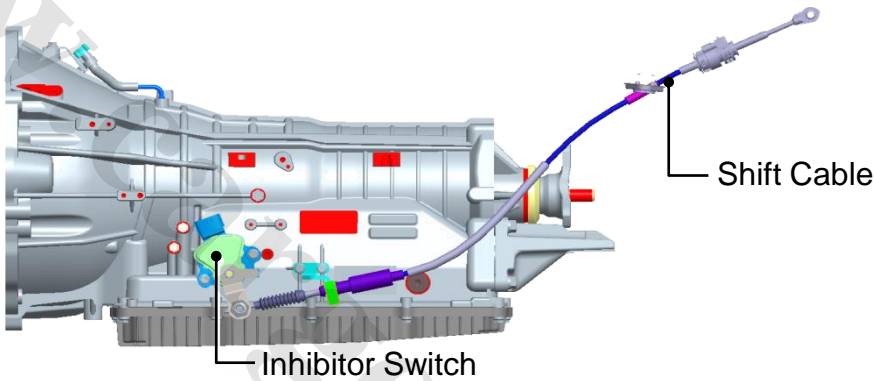
- 2 solenoid valves and park body is additional installed and hydraulic circuit is changed compared to Mohave 8-Speed AT

Valve Body (SBW)

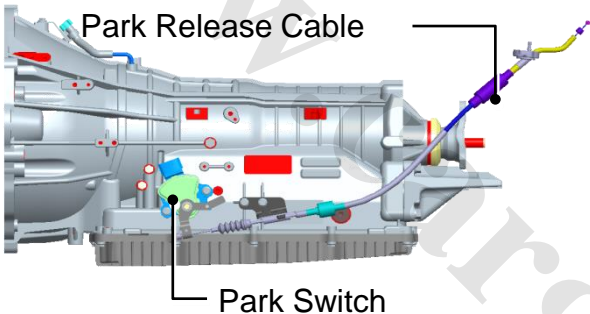
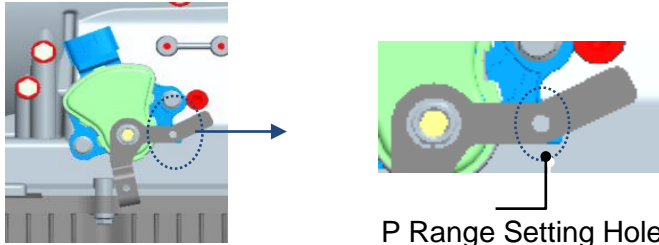
Category	Upper	Lower
Image		

- 2 solenoid valves and park body is additional installed and hydraulic circuit is changed compared to Mohave 8-Speed AT

Inhibitor Switch (SBC)

Category	Inhibitor Switch
Image	 <p>The diagram illustrates the Inhibitor Switch (SBC) assembly on a transmission. A purple shift cable is connected to the transmission housing. The Inhibitor Switch is a green component with a blue lever, mounted on the transmission. A label 'Shift Cable' points to the cable, and a label 'Inhibitor Switch' points to the green component. The assembly is shown in a cutaway view of the transmission housing.</p>

Park Switch (SBW)

Category	Park Switch	P Range Setting Procedure
Image	 <p>Diagram showing the Park Switch assembly. Labels include: Park Release Cable and Park Switch.</p>	 <p>Diagram showing the P Range Setting Hole and the shift lever.</p> <ul style="list-style-type: none"> - Shift Lever at P Range (N in previous model) - Assemble Park Switch - P Range Setting Hole Alignment (important) - Tighten Park Switch Mounting Bolt - Tighten Lever Nut

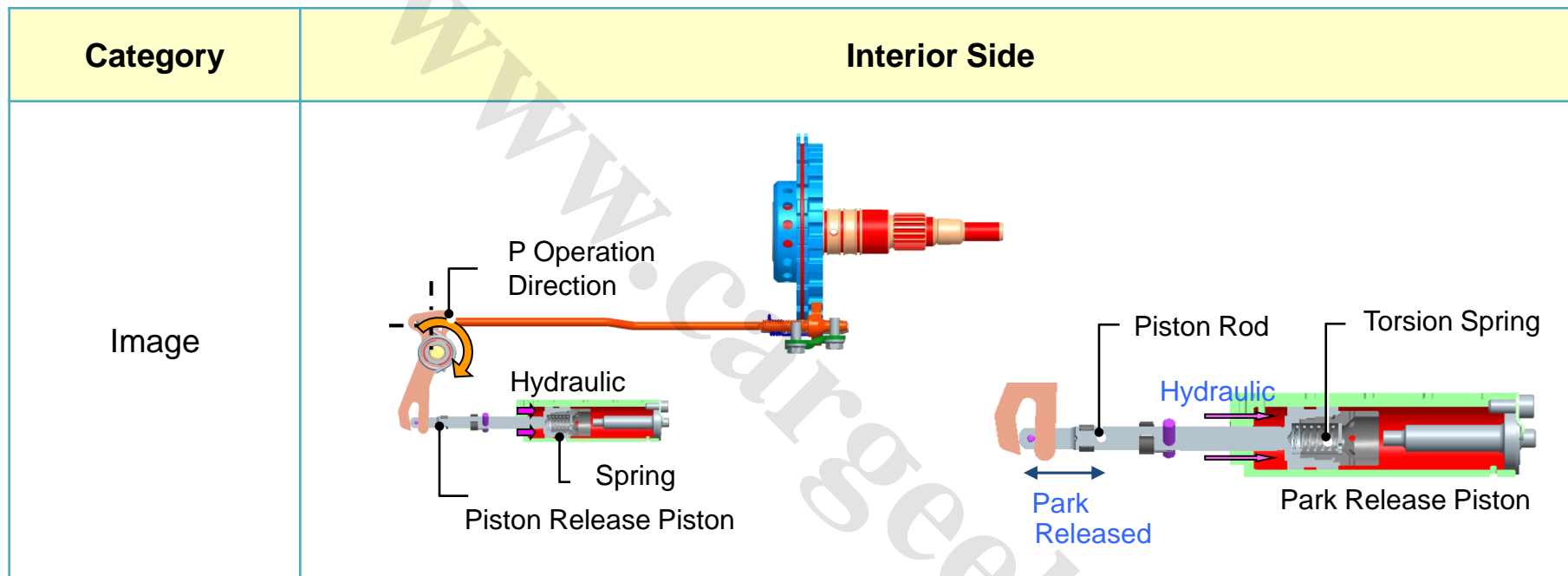
- Detect whether or not Park is engaged
- It is very important to set the P range after servicing relevant components (similar to N range setting in previous model)

Parking Mechanism (SBC)

Category	Interior Side
Image	

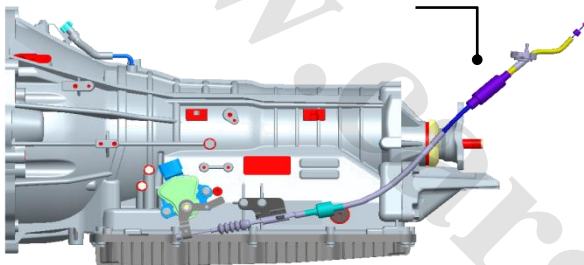
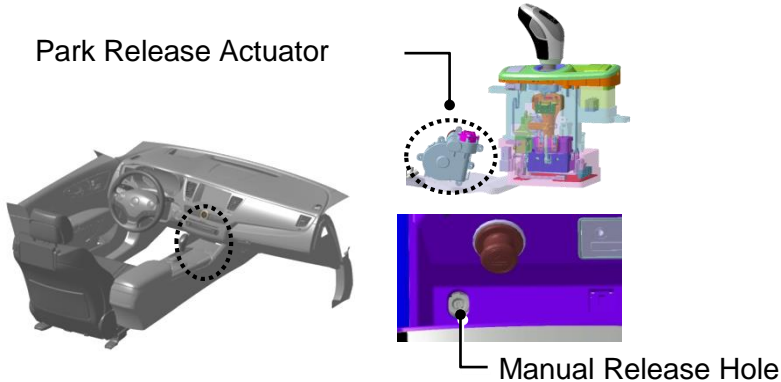
- Cam Type

Parking Mechanism (SBW)



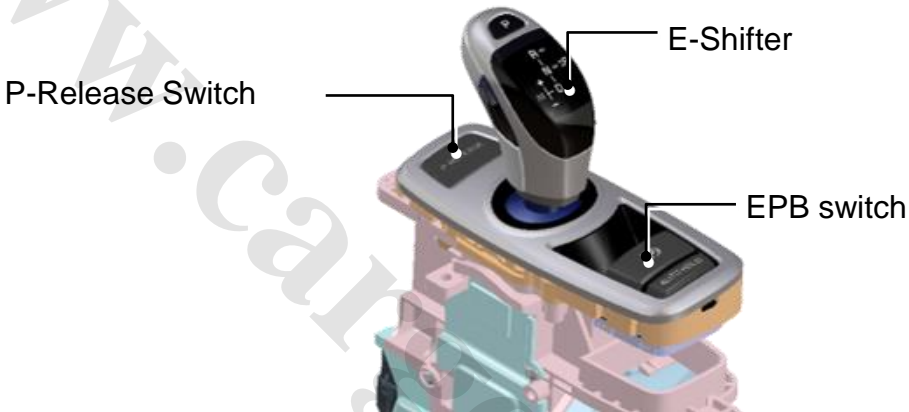
- IGN OFF: The piston rod is pushed to left by the torsion spring and Park is engaged
- IGN ON and Shift Lever other than P: The hydraulic pressure supplied by the P-Range Control Solenoid moves the piston rod to the right and releases Park.

Parking release Actuator

Category	Park Release Cable	Manual Release Procedure
Image	 <p>Park Release Cable</p>	 <p>Park Release Actuator</p> <p>Manual Release Hole</p>

- Prevent parking when an engine off : Neutral parking, manual release when a battery flat
- Engage manual release only in a special condition (when battery discharge). When performing manual release, park the car on a flat surface to ensure the vehicle from moving, and then insert and turn (-) driver clockwise direction (10 turns by hand).
- System is internally designed to prevent manual release while in KEY ON Mode.

P-Release Switch (Neutral Parking)

Category	P-Release Switch
Image	 <p>The diagram shows the P-Release Switch assembly. It includes the E-Shifter (Electronic Shifter), the P-Release Switch, and the EPB switch (Electronic Parking Brake switch).</p>



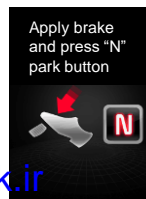
Engine OFF

Within
3 min.



“N” Parking

for parking lot or car wash



Without
B/pedal

www.bargeek.ir

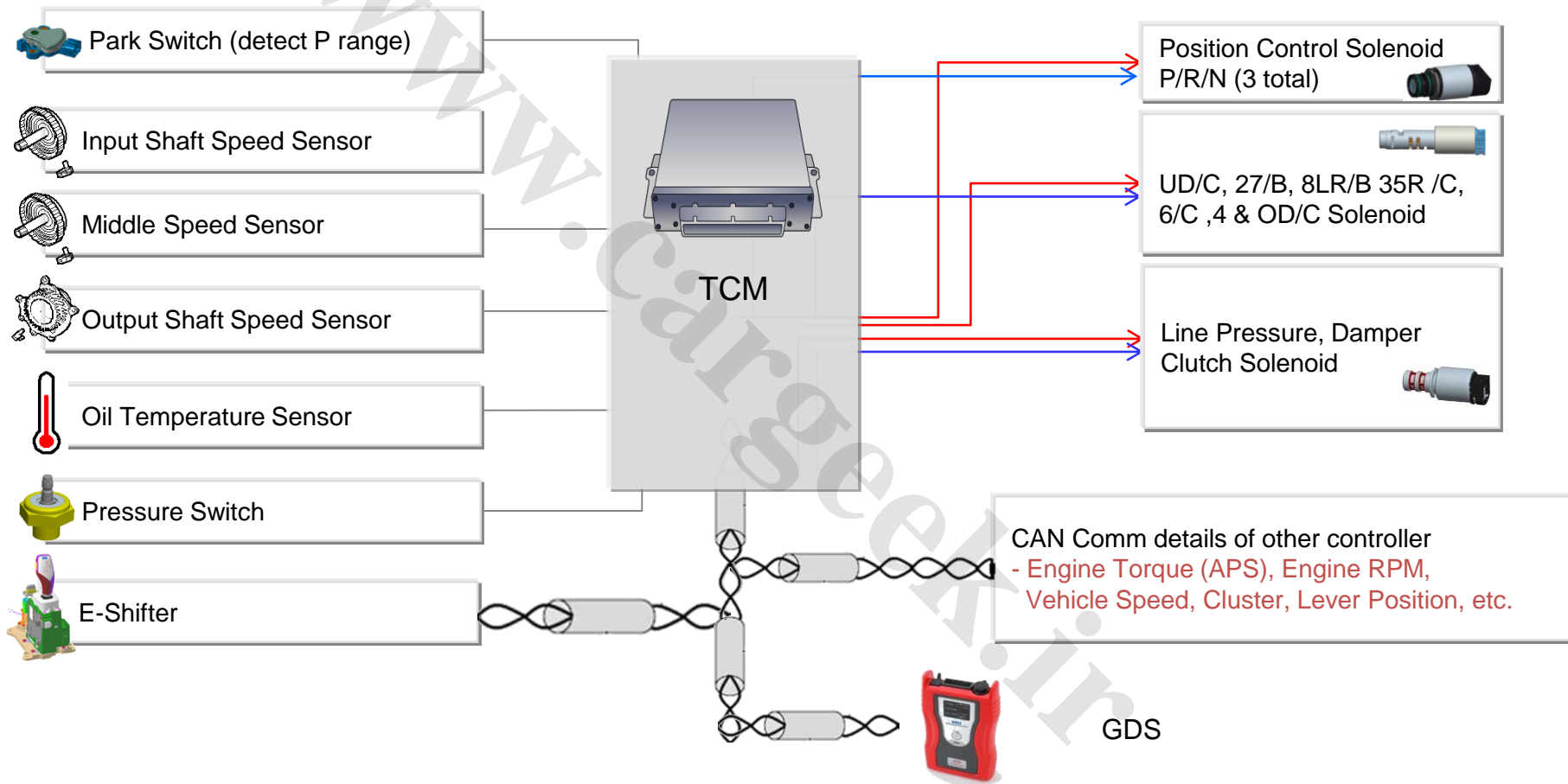


Clutch & Brake Operation Table

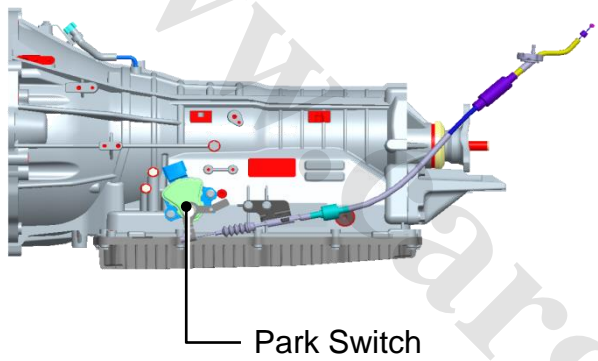
Gear	Gear ratio		Clutch				Brake		OWC
	A8LR1	A8TR1	UD/C	6/C	4&OD/C	35R/C	8LR/B	27/B	
P	-	-				●		●	
R	2.273	2.467				●	●		
N	-	-					●		
1 st	3.665	3.795	●				○		●
2 nd	2.396	2.473	●					●	
3 rd	1.610	1.613	●			●			
4 th	1.190	1.177	●		●				
5 th	1.000	1.000			●	●			
6 th	0.826	0.831		●	●				
7 th	0.643	0.652			●			●	
8 th	0.556	0.571			●		●		

○ : operates at low speed only

In/Output Factors

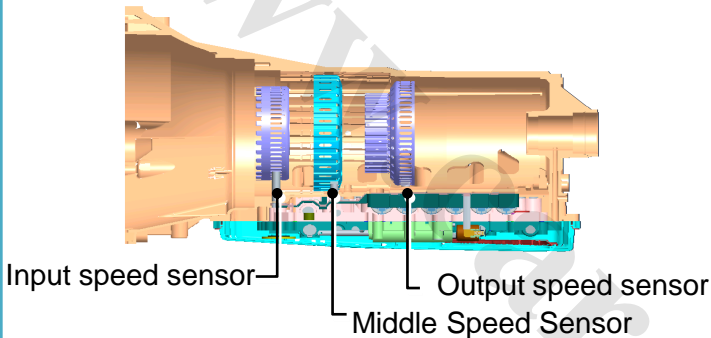
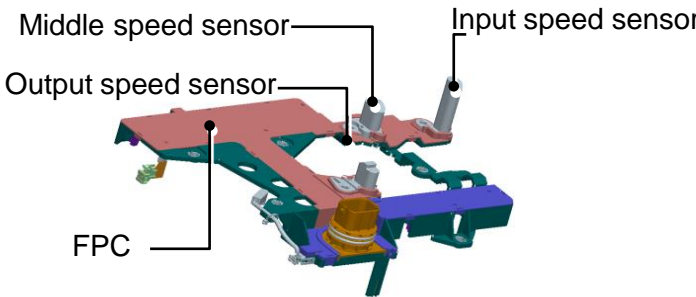


Park Switch

Category	Park Switch	Output Signal									
Image		<table> <tr> <th>Category</th><th>Signal1</th><th>Signal2</th></tr> <tr> <td>P</td><td>1</td><td>0</td></tr> <tr> <td>Not P</td><td>0</td><td>1</td></tr> </table>	Category	Signal1	Signal2	P	1	0	Not P	0	1
Category	Signal1	Signal2									
P	1	0									
Not P	0	1									

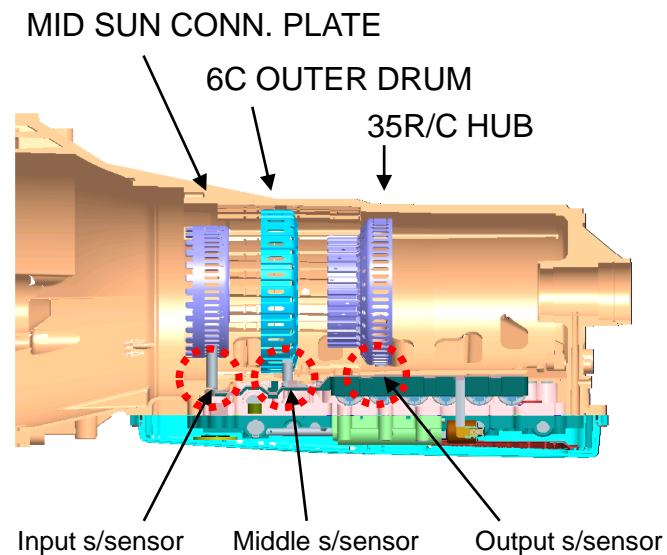
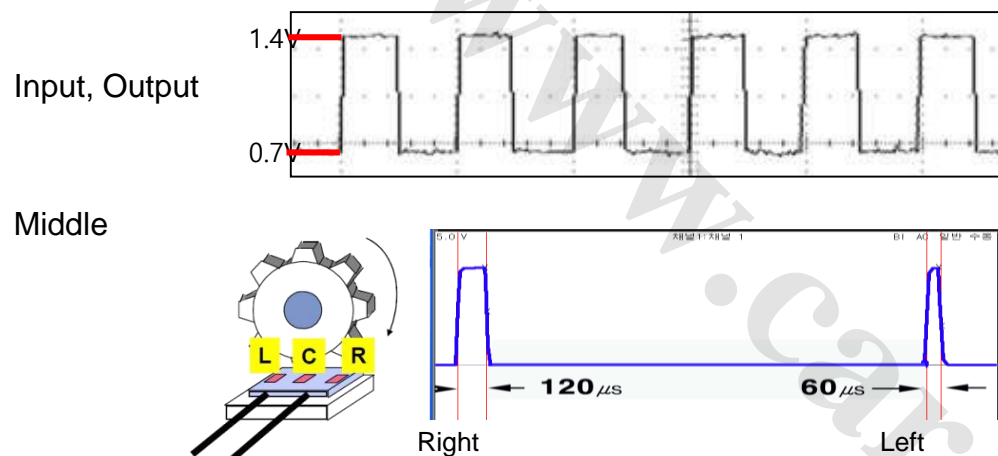
- Detect only whether or not Park is engaged (different from inhibitor S/W) / composed of 3 Pins
- It is very important to set the P range after servicing relevant components
- Only forward driving is possible in case of switch malfunction / Reverse is disabled

Speed Sensor

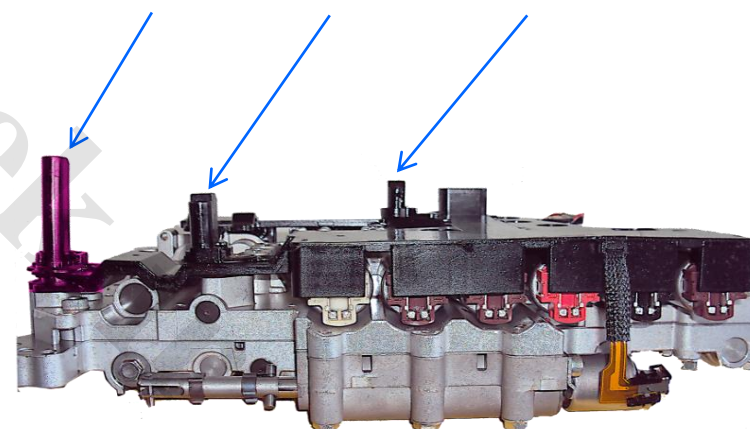
Category	Mounting Location-1	Mounting Location-2
Image	 <p>Input speed sensor</p> <p>Output speed sensor</p> <p>Middle Speed Sensor</p>	 <p>Middle speed sensor</p> <p>Output speed sensor</p> <p>Input speed sensor</p> <p>FPC</p>

- Integrated into the E-Module
- 2 Pin Type Hall IC
- Gear is fixed at D Range 5-Speed in case of In/Output Speed Sensor failure / Sports Mode 2~5 Speed enabled / Reverse enabled

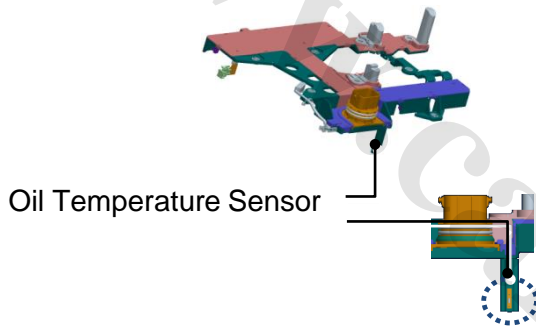
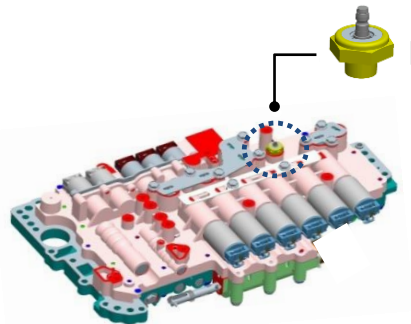
Speed sensors



Category		Input speed sensor	Middle speed sensor	Output speed sensor
Target wheel		MID SUN CONN. PLATE	6C OUTER DRUM	35R/C HUB
Air gap		1.3 (0.7~2)	1.3 (0.7~2)	1.3 (0.7~2)
Length	A8TR1	62.3	32	37.5
	A8LR1	65.4	28.8	39.5
Color	A8TR1	Gray	Gray	Gray
	A8LR1	Black	Black	Black



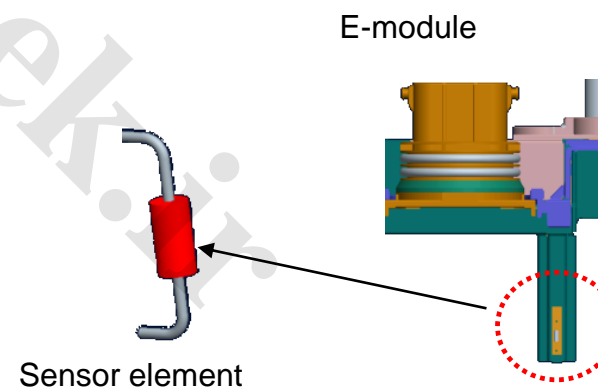
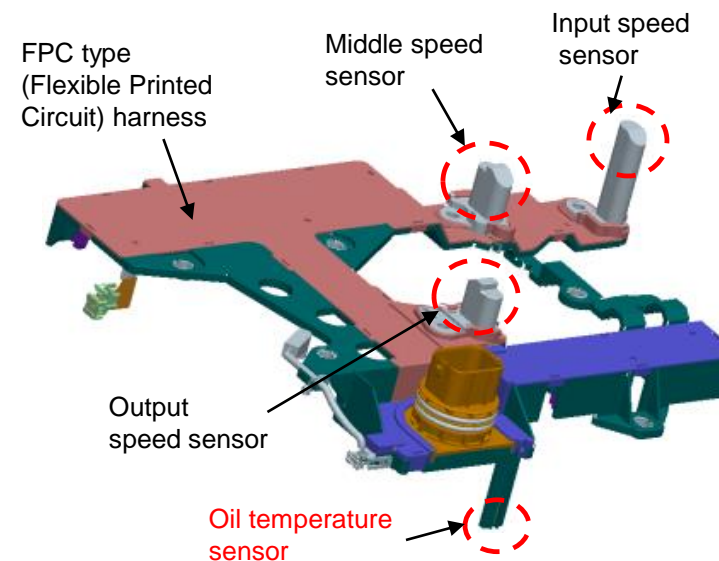
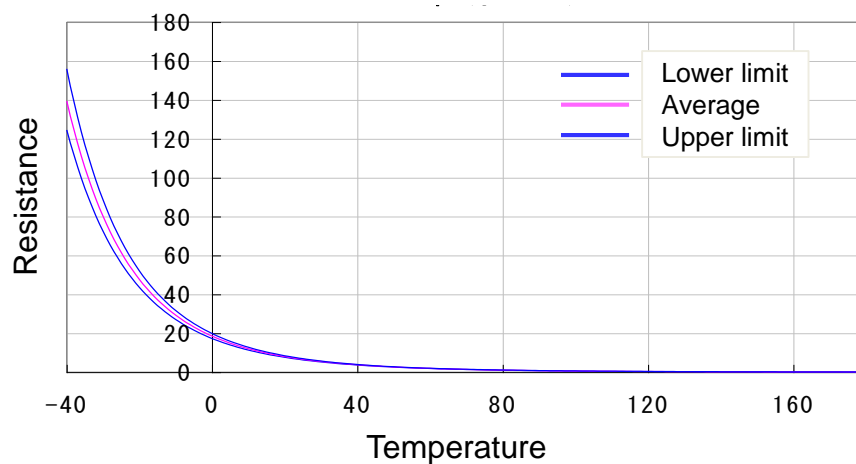
Oil Temp Sensor / Pressure Switch

Category	Oil Temperature Sensor	pressure switch
Image	 <p>Oil Temperature Sensor</p>	 <p>pressure switch</p>

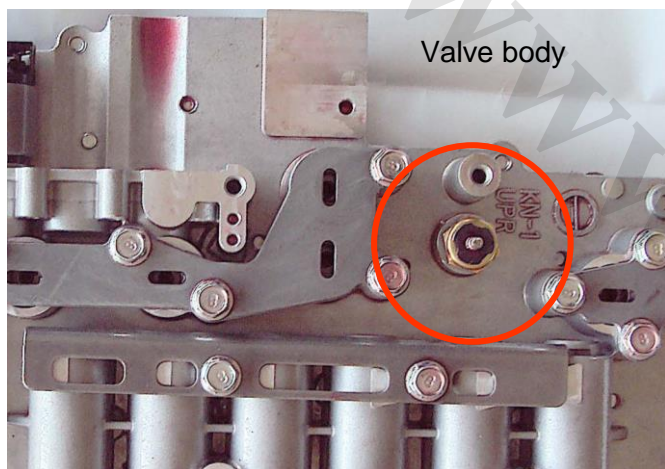
- Oil Temperature Sensor: Temperature is limited to 80°C in case of failure
- Pressure Switch: Check if abnormal oil pressure is supplied to 35R Clutch while in N range
8LR oil pressure duty is controlled to 0% in N range in case of pressure switch failure

Oil temperature sensor

Temperature (°C)	Resistance (kΩ)
-40	139.5
0	18.6
40	3.8
80	1.08
120	0.38
160	0.16

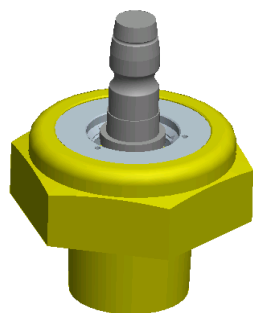


Pressure switch

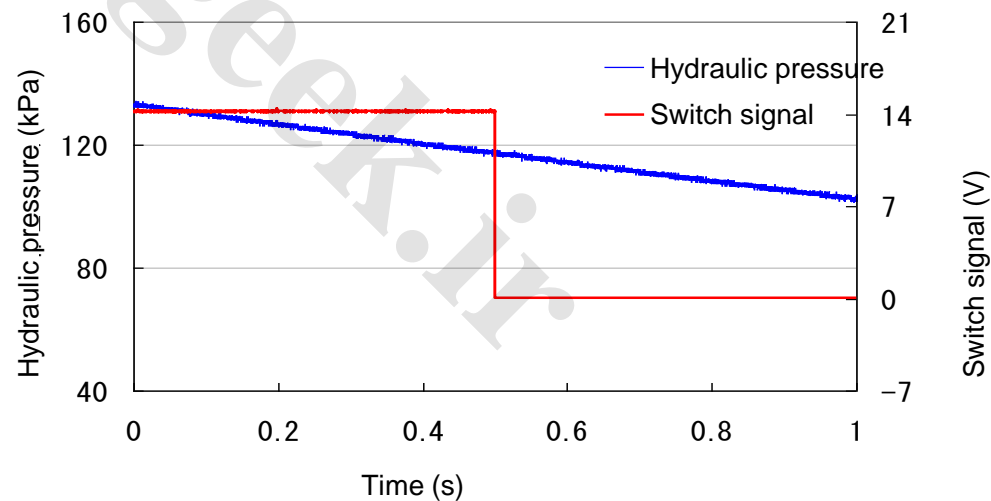


Function:
it detects the abnormal hydraulic pressure
in 35R clutch.

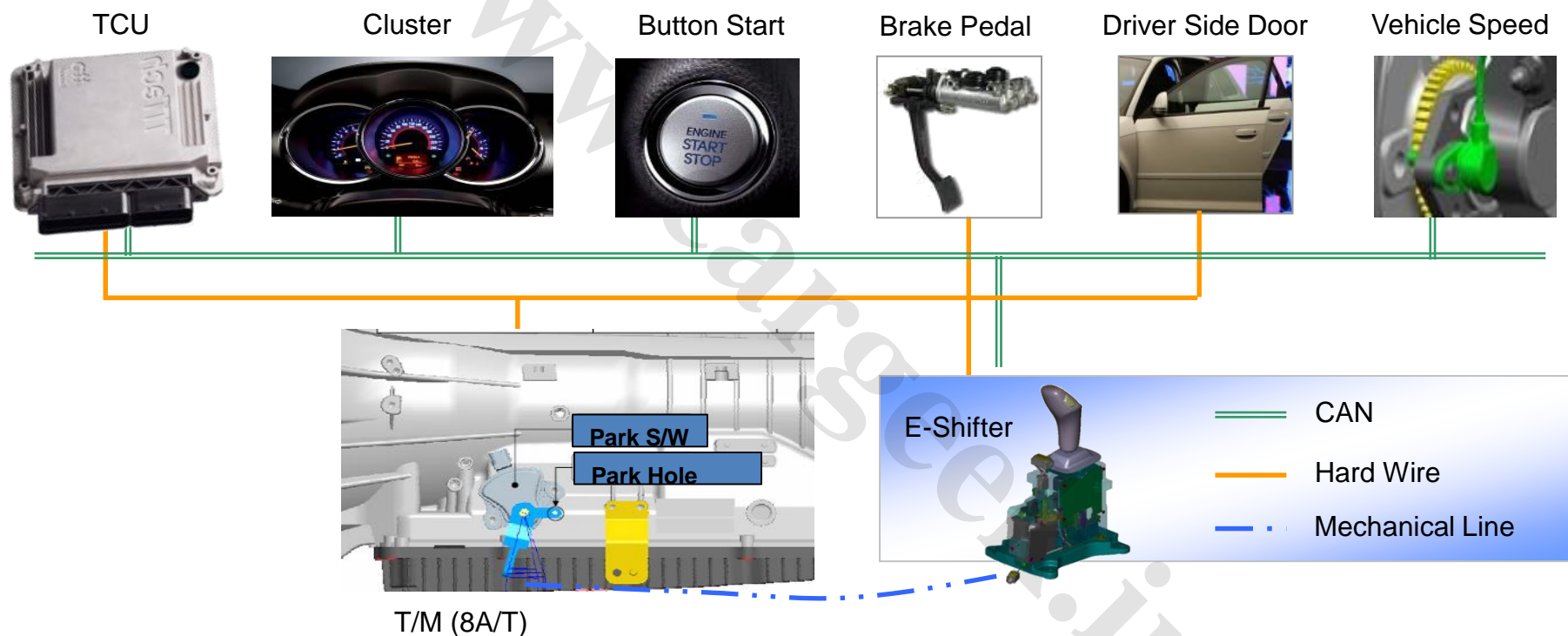
Signal shift	Specification (20°C)
OFF → ON	146±40kPa
ON → OFF	50 kPa



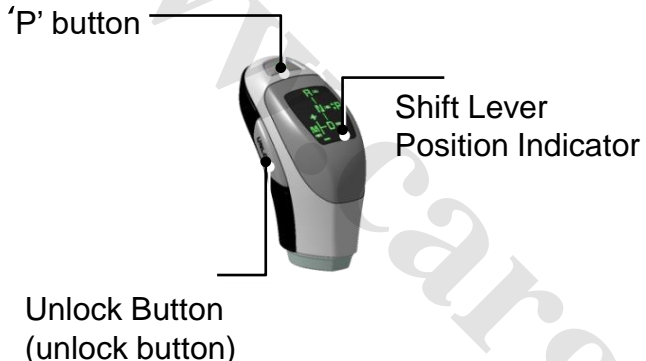
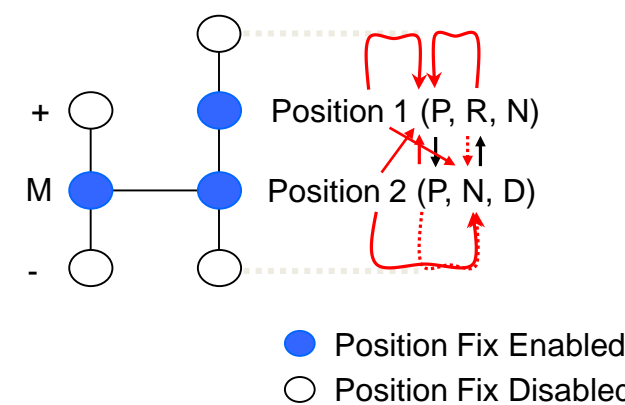
Pressure switch



E-Shifter Layout



E-Shifter

Category	E-Shifter	Transmission pattern
Image		 <p>Position 1 (P, R, N)</p> <p>Position 2 (P, N, D)</p> <p>● Position Fix Enabled ○ Position Fix Disabled</p>

A. Gear shift convenience:

Achieve fast gear shift with little operation and movement (patented by Hyundai & KIA Motors)

B. Safety: Automatically engages P range when engine is turned OFF.

C. Improved Shift Range Visibility: Shift range is displayed on the knob for quick visibility (remains ON for 30 seconds after IGN OFF and when the door is opened)

* E-Shifter communicates with TCU via CAN communication / has addition of hard wire connection in case of CAN communication line failure

E-Shifter Operation

- Operation Procedure (operates only when the Engine is ON)

A. P→R, P→D

- KEY ON and holding the Brake ON, press the Unlock button and move the shift lever
- Cluster will display “Hold brake to change gear” message if attempting to move the shifter without hold down the brake

B. N→D : Shift lever can be moved but the gear shift is limited by TCU based on below conditions

- If vehicle speed is over 2km/h: Gear shift is engaged when shift lever is moved
- If vehicle speed is less than 2km/h: Gear shift is engaged only if engine RPM is less than 3000 RPM, and brake is ON

C. R→N, D→N : Gear shift is engaged when shift lever is moved



E-Shifter Operation

D. Shift to P Range: If the P button on the upper section of the knob is pressed in any of the R/N/D/M range, the P range is engaged and the Shift Lever returns. However, P range is not engaged if the vehicle speed is over 1km/h

E. R→D: Move back 2 slots

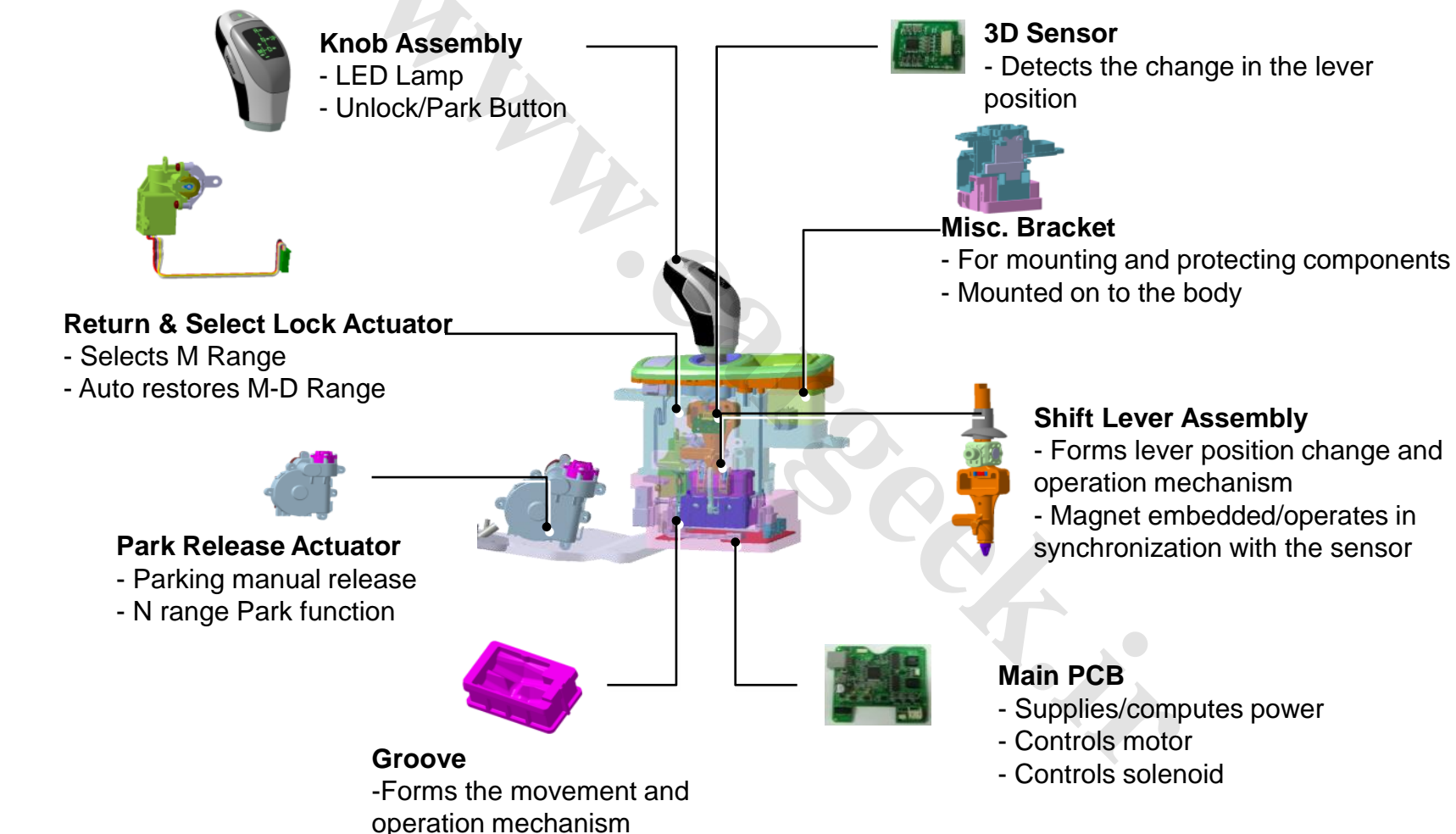
F. P range is automatically engaged: If the conditions: in any of D/R/M range seat belt OFF, accel & brake pedal OFF, door opened, vehicle speed less than 2km/h are satisfied.

G. N→R

- Gear shifts to R range if the shift is attempted while the brake is engaged, unlock button is pressed, and the vehicle speed is less than 2km/h
- Gear shifts to R range if the shift is attempted while unlock button is pressed and the vehicle speed is between 2~8km/h
- If the attempt is made to shift the gear to R range while the vehicle speed is over 8km/h, Cluster will display "Invalid gear shift condition." message.

※ The Shift Lock is engaged by the TCU with consideration to the status of the Unlock button, Brake Switch, and the Key Mode → **There is no separate Shift Lock device**

E-Shifter Configuration



- Shift Knob cannot be changed separately

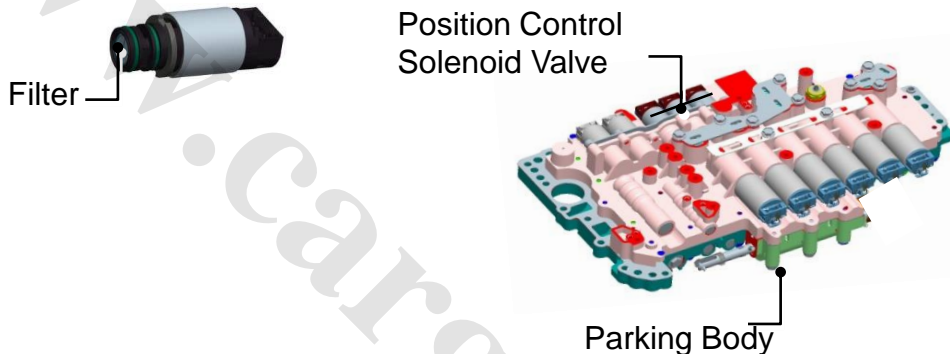
Sensor Output-SBW

Category	Sensor Output
Image	<p>The screenshot shows the KIA diagnostic tool interface. On the left, the 'Data Analysis' menu is selected. The 'Current Data' window is open, displaying a list of sensors. A red box highlights the 'ON/OFF Solenoid B(Reverse) (SBW)' sensor, which shows a value of 'OFF'. Other sensors listed include 'ON/OFF Solenoid C(Parking)', 'ON/OFF Solenoid A(Drive)', 'Shift Control Solenoid Valve A(UD/C)', 'Shift Control Solenoid Valve D(4&OD/C)', 'Shift Control Solenoid Valve E(27/B)', 'Shift Control Solenoid Valve C(35R/C)', 'Shift Control Solenoid Valve B(6/C)', 'Shift Control Solenoid Valve F(8LR/B)', 'Pressure Control Solenoid Valve(VFS) "A"', 'Malfunction Indicator Lamp On', 'Torque Converter Clutch Solenoid Valve', 'Kick Down Switch', 'OD Switch(O/D)', 'Brake Switch', 'Auto Cruise Switch', '4L Switch (4WD Only)', 'Sports Mode Select', 'Sports Mode Up Switch', 'Sports Mode Down Switch', 'Reverse Lamp Relay Output', 'Shift Lock Solenoid', 'P&N Relay', 'Pressure Switch', 'Number of DTC', and 'ON/OFF Solenoid (SBC)'.</p>

Actuation Test - SBW


Category	Actuation Test																																													
Image	<p>The screenshot displays the KIA diagnostic tool interface. On the left is a navigation menu with options: Diagnosis, Basic Inspection, DTC Analysis, Data Analysis (highlighted), Symptom Analysis, Flight Record, Oscilloscope, and CARB OBD-II. The main area is titled 'Actuation Test' and contains two sections: 'Current Data' and 'Actuation Test'.</p> <p>Current Data Section:</p> <table border="1"> <thead> <tr> <th>Sensor Name</th> <th>Value</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/> ON/OFF Solenoid C(Parking)</td> <td>OFF</td> <td>-</td> </tr> <tr> <td><input checked="" type="checkbox"/> ON/OFF Solenoid A(Drive)</td> <td>ON</td> <td>-</td> </tr> <tr> <td><input checked="" type="checkbox"/> ON/OFF Solenoid B(Reverse) (SBW)</td> <td>OFF</td> <td>-</td> </tr> <tr> <td><input checked="" type="checkbox"/> Shift Control Solenoid Valve A(UD/C)</td> <td>0</td> <td>mA</td> </tr> <tr> <td><input checked="" type="checkbox"/> Shift Control Solenoid Valve D(4&OD/C)</td> <td>0</td> <td>mA</td> </tr> <tr> <td><input checked="" type="checkbox"/> Shift Control Solenoid Valve E(27/B)</td> <td>0</td> <td>mA</td> </tr> <tr> <td><input type="checkbox"/> Kick Down Switch</td> <td>Not Supported</td> <td>-</td> </tr> <tr> <td><input type="checkbox"/> OD Switch(O/D)</td> <td>Not Supported</td> <td>-</td> </tr> <tr> <td><input type="checkbox"/> Brake Switch</td> <td>OFF</td> <td>-</td> </tr> <tr> <td><input type="checkbox"/> Auto Cruise Switch</td> <td>OFF</td> <td>-</td> </tr> </tbody> </table> <p>Actuation Test Section:</p> <table border="1"> <thead> <tr> <th>Test Items</th> </tr> </thead> <tbody> <tr><td>3rd Gear Lamp</td></tr> <tr><td>4th Gear Lamp</td></tr> <tr><td>5th Gear Lamp</td></tr> <tr><td>6th Gear Lamp</td></tr> <tr><td>7th Gear Lamp</td></tr> <tr><td>8th Gear Lamp</td></tr> <tr><td>ON/OFF Solenoid A(Drive)</td></tr> <tr><td>ON/OFF Solenoid B(Reverse) (SBW)</td></tr> <tr><td>ON/OFF Solenoid (SBC)</td></tr> <tr><td>ON/OFF Solenoid A(Parking)</td></tr> <tr><td>ON/OFF Solenoid A(DRH)</td></tr> </tbody> </table> <p>On the right side of the Actuation Test section, there are input fields for:</p> <ul style="list-style-type: none"> Duration: 3 Sec Conditions: IG. ON, ENG OFF, 'P' RANGE, NO DTC Result: Activation <p>At the bottom of the interface is a status bar with buttons: Setup, Manual, TSB, Case Analysis, DTC, Current Data, Actuation Test (highlighted), Flight Record, DVOM, Oscilloscope, Fault Code Searching, and Internet Update.</p>	Sensor Name	Value	Unit	<input checked="" type="checkbox"/> ON/OFF Solenoid C(Parking)	OFF	-	<input checked="" type="checkbox"/> ON/OFF Solenoid A(Drive)	ON	-	<input checked="" type="checkbox"/> ON/OFF Solenoid B(Reverse) (SBW)	OFF	-	<input checked="" type="checkbox"/> Shift Control Solenoid Valve A(UD/C)	0	mA	<input checked="" type="checkbox"/> Shift Control Solenoid Valve D(4&OD/C)	0	mA	<input checked="" type="checkbox"/> Shift Control Solenoid Valve E(27/B)	0	mA	<input type="checkbox"/> Kick Down Switch	Not Supported	-	<input type="checkbox"/> OD Switch(O/D)	Not Supported	-	<input type="checkbox"/> Brake Switch	OFF	-	<input type="checkbox"/> Auto Cruise Switch	OFF	-	Test Items	3rd Gear Lamp	4th Gear Lamp	5th Gear Lamp	6th Gear Lamp	7th Gear Lamp	8th Gear Lamp	ON/OFF Solenoid A(Drive)	ON/OFF Solenoid B(Reverse) (SBW)	ON/OFF Solenoid (SBC)	ON/OFF Solenoid A(Parking)	ON/OFF Solenoid A(DRH)
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P/R/D Position Control Sol Valve (ON/OFF Type)

Category	Valve Body
Image	 <p>The diagram illustrates the components of the P/R/D Position Control Sol Valve (ON/OFF Type). It includes a Filter (a small cylindrical component), the Position Control Solenoid Valve (a red component), and the Parking Body (a larger, complex assembly with multiple ports and a green base).</p>


- Role of the **manual valve** in conventional shifter: 3
- Resistance: 10.5Ω (based on 25°C)
- D range shift is enabled but reverse is disabled in case of solenoid valve malfunction

Direct Control Sol Valve (VFS Type)

Category	Valve body
Image	 <p>The diagram illustrates the Direct Control Solenoid Valve (VFS Type) installed in the valve body. The valve body is a complex assembly with multiple ports and internal passages. The solenoid valve is a cylindrical component with a blue top and a silver body, featuring a filter. A label 'Direct Control Solenoid Valve' points to the main assembly, and another label 'Filter * 2' points to the filter on the solenoid valve.</p>

- Used when shifting: 6
- Resistance: 5.3Ω (based on 25°C)
- Gear is fixed at 5-Speed but reverse is disabled in case of solenoid valve malfunction

Indirect Control Sol Valve (VFS Type)

Category	Valve body
Image	

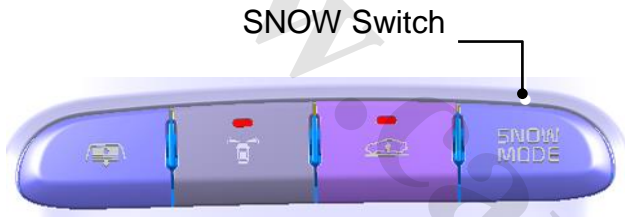

- Used for line pressure and damper clutch control: 2
- Resistance: 5.1Ω (based on 25°C)
- Gear is fixed at 5-Speed but reverse is disabled in case of solenoid valve malfunction

D-Mode Control

Category	Switch Image	Cluster Indication Lamp
Image		

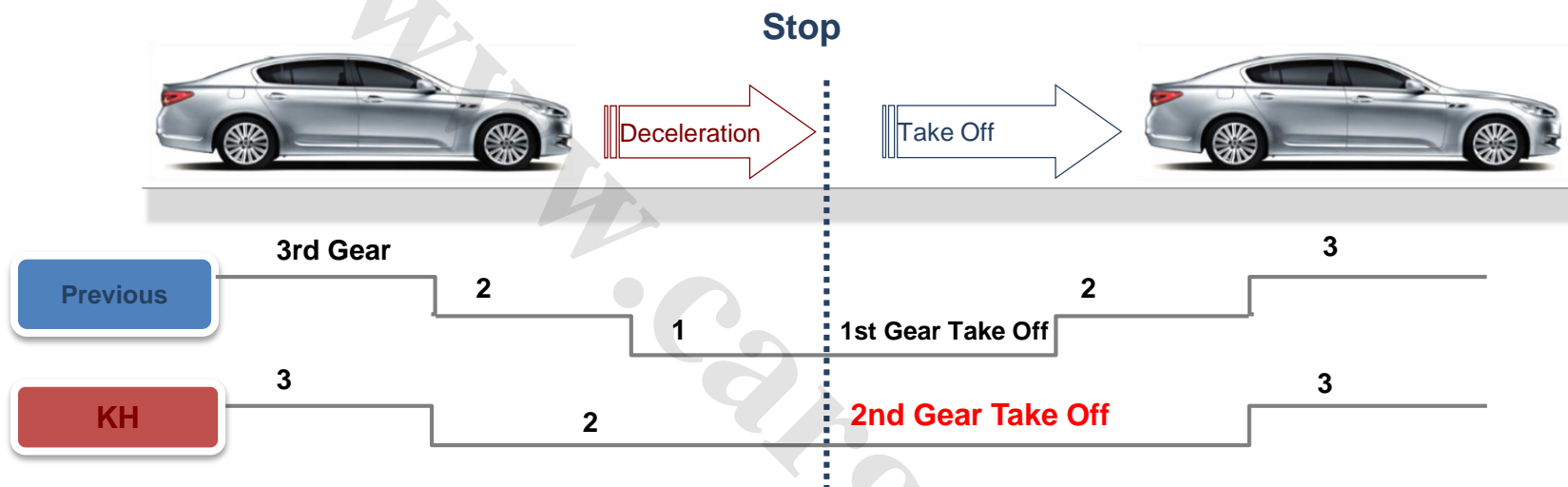
- **Normal:** General gear shift pattern
- **Sport:** Controls the gear shift pattern with expanded low range and increased engine torque
- **ECO:** Prevents down-shift during acceleration and reduces engine torque
 - ➔ Returns to the Normal Mode when the engine is turned OFF and restarted
- Each mode is indicated on the AVN monitor

SNOW-Mode Control

Category	Switch Image	Cluster Indication Lamp
Image	 <p>SNOW Switch</p> <p>Installed on the Arm Rest</p>	

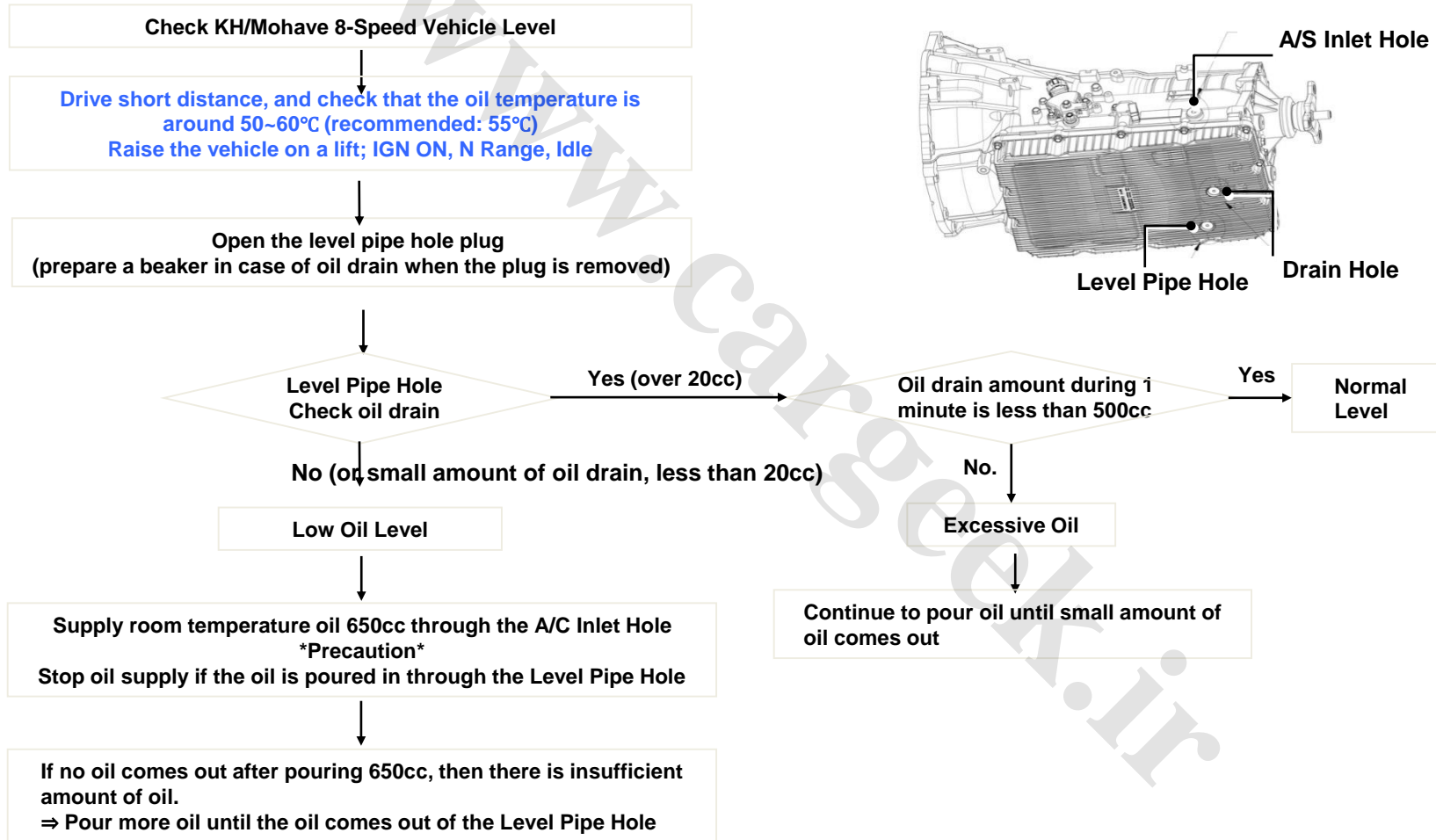
- Used on the snow or icy road driving
- **2nd gear take off and 2nd gear stop**, improves drive traction by reducing the torque
- SNOW Mode is engaged when selected, regardless of current drive mode

2nd Gear Take Off



- ① **Normal ECO Mode:** The first take off after shifting P/R/N→D is in the 1st gear. If the gear goes into 2nd gear at least once, and comes to stop, the transmission stops at the 2nd gear, and then any take off after starts in the 2nd gear.
 - ➔ However, in case of APS 70% or higher, or on a certain degree or higher incline road, the gear is down shifted from 2nd to 1st gear and then take off starts to improve acceleration.
- ② **Sport Mode:** Takes off and stops on the 1st gear to provide sporty drive feeling
- ③ **Snow Mode:** Takes off and stops on the 2nd gear to prevent slippage on snow and icy road.

Oil Level Check Procedure

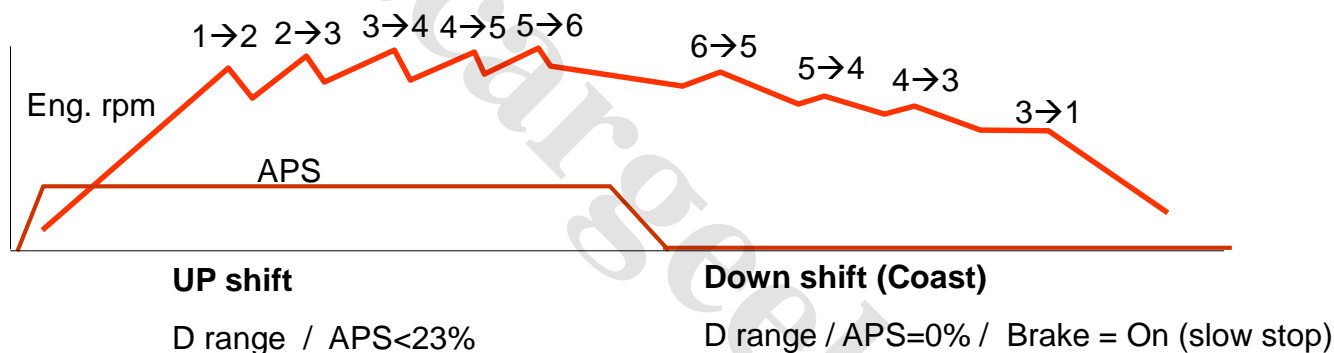


TCM learning

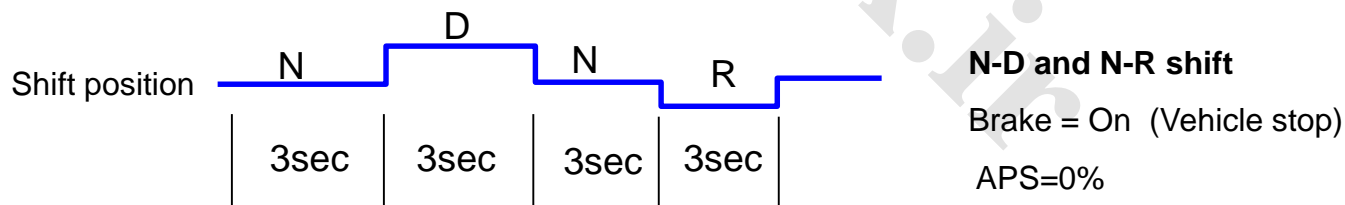


- 1) ATF temperature: 60 ~ 95°C
- 2) APS must be constant while up-shift (10% ~ 25%)
- 3) Repeat following driving pattern 3 times at least until the shift becomes stable.

Driving



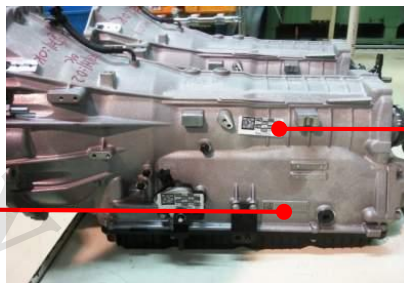
Static



How to input hydraulic pressure parameter

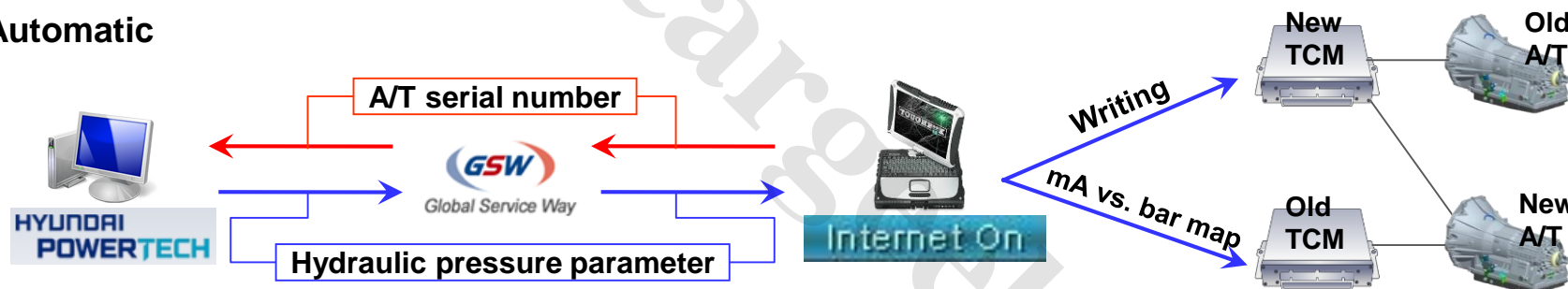


A/T Serial number
(12 digits)

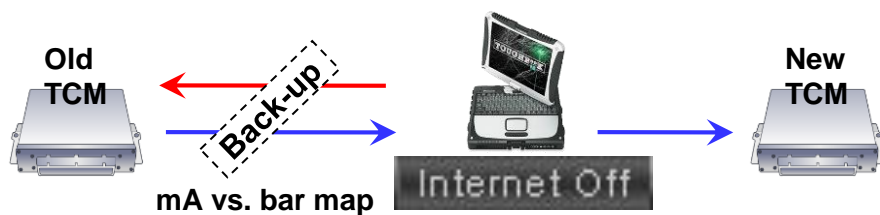


Bar-code sticker
(68 digits)

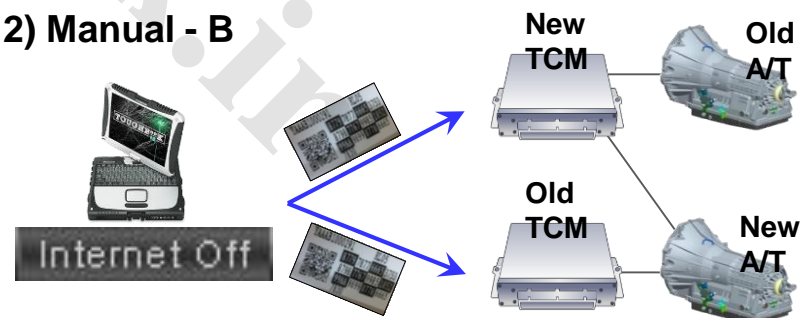
1) Automatic



2) Manual - A

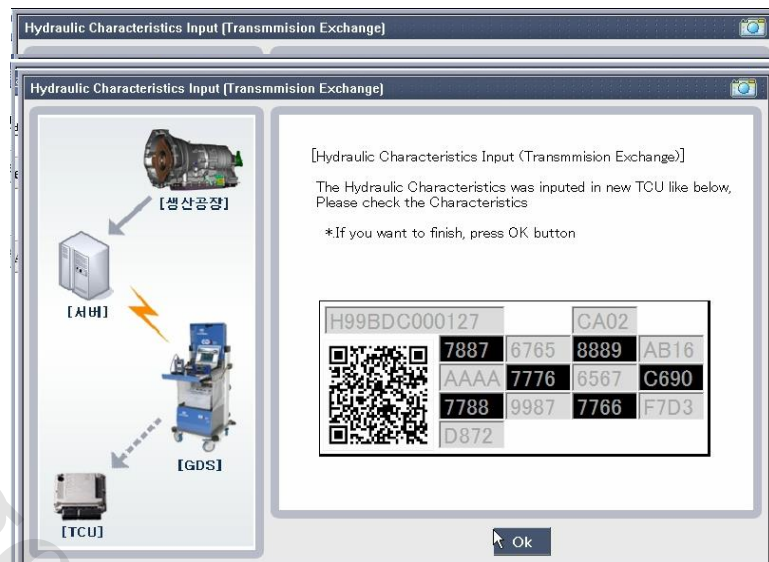
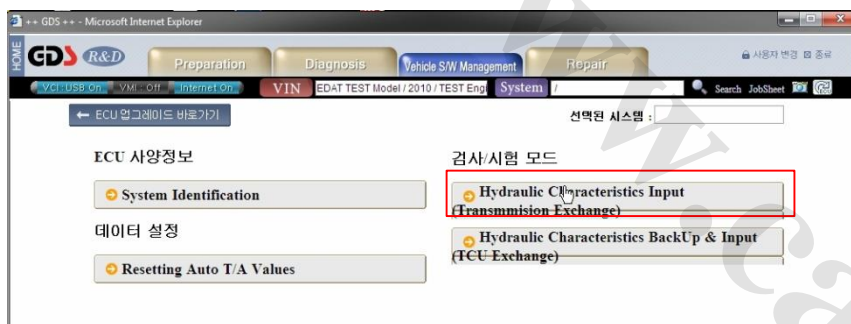


2) Manual - B

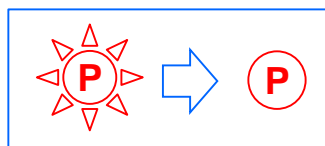
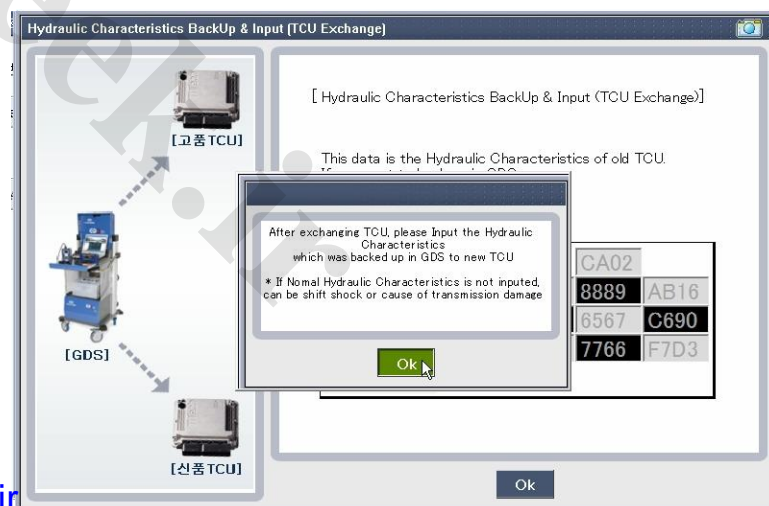
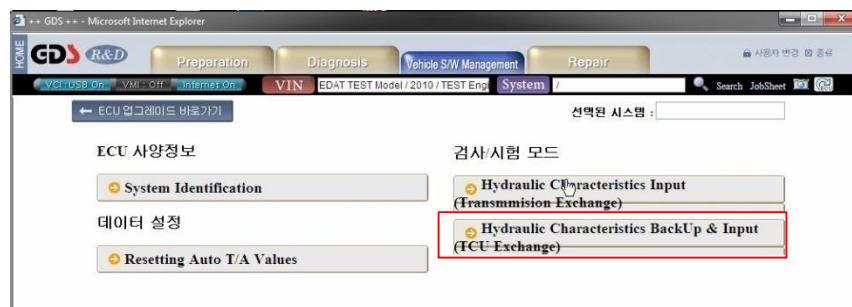


How to input hydraulic pressure parameter

1) After replacing new A/T assembly



2) After replacing new TCM

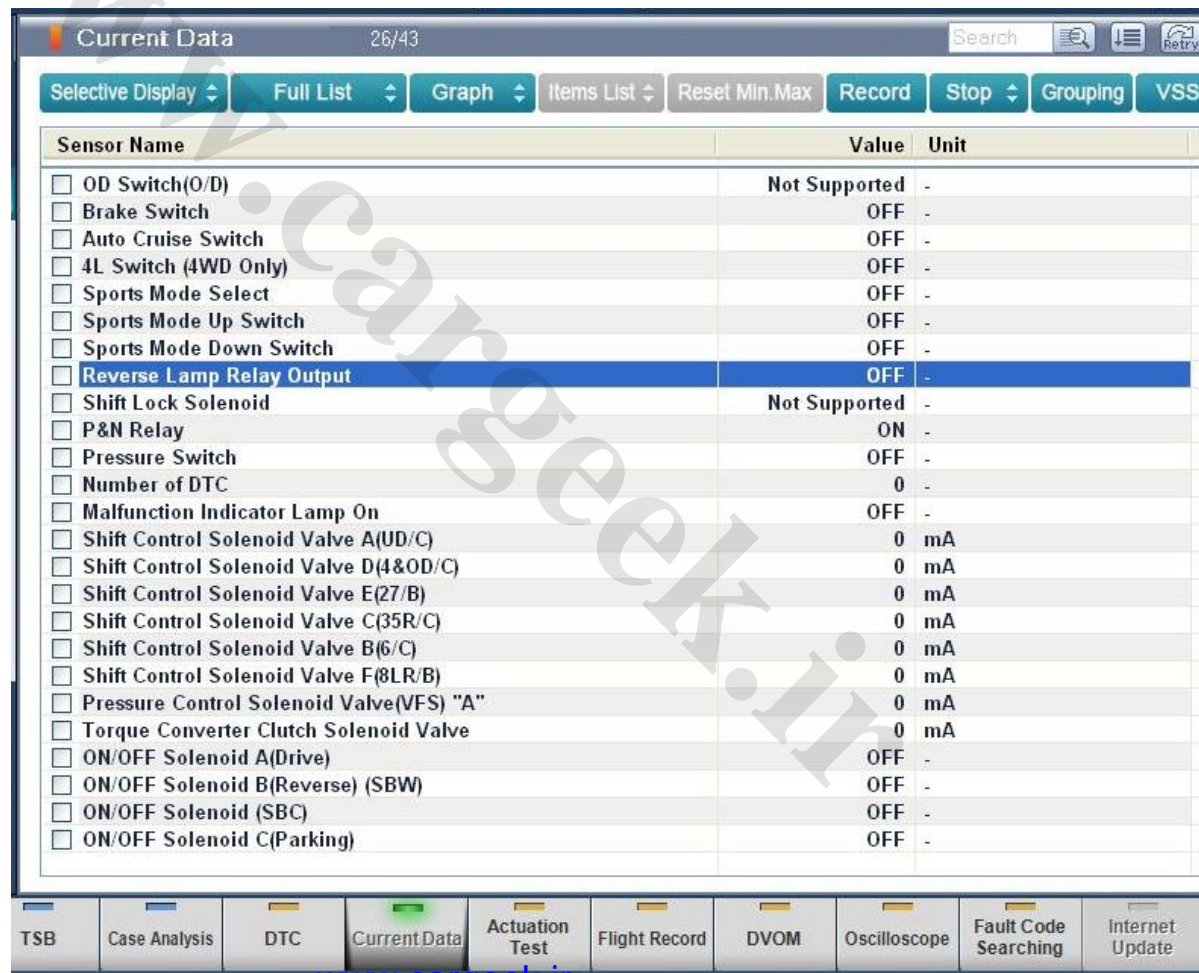


Sensor Output - Transmission

Category

Sensor output

Image



Sensor Name	Value	Unit
<input type="checkbox"/> OD Switch(O/D)	Not Supported	-
<input type="checkbox"/> Brake Switch	OFF	-
<input type="checkbox"/> Auto Cruise Switch	OFF	-
<input type="checkbox"/> 4L Switch (4WD Only)	OFF	-
<input type="checkbox"/> Sports Mode Select	OFF	-
<input type="checkbox"/> Sports Mode Up Switch	OFF	-
<input type="checkbox"/> Sports Mode Down Switch	OFF	-
<input type="checkbox"/> Reverse Lamp Relay Output	OFF	-
<input type="checkbox"/> Shift Lock Solenoid	Not Supported	-
<input type="checkbox"/> P&N Relay	ON	-
<input type="checkbox"/> Pressure Switch	OFF	-
<input type="checkbox"/> Number of DTC	0	-
<input type="checkbox"/> Malfunction Indicator Lamp On	OFF	-
<input type="checkbox"/> Shift Control Solenoid Valve A(UD/C)	0	mA
<input type="checkbox"/> Shift Control Solenoid Valve D(4&OD/C)	0	mA
<input type="checkbox"/> Shift Control Solenoid Valve E(27/B)	0	mA
<input type="checkbox"/> Shift Control Solenoid Valve C(35R/C)	0	mA
<input type="checkbox"/> Shift Control Solenoid Valve B(6/C)	0	mA
<input type="checkbox"/> Shift Control Solenoid Valve F(8LR/B)	0	mA
<input type="checkbox"/> Pressure Control Solenoid Valve(VFS) "A"	0	mA
<input type="checkbox"/> Torque Converter Clutch Solenoid Valve	0	mA
<input type="checkbox"/> ON/OFF Solenoid A(Drive)	OFF	-
<input type="checkbox"/> ON/OFF Solenoid B(Reverse) (SBW)	OFF	-
<input type="checkbox"/> ON/OFF Solenoid (SBC)	OFF	-
<input type="checkbox"/> ON/OFF Solenoid C(Parking)	OFF	-