10. Electronic Control System

General

The electronic control system of A761E automatic transmission on the new LS430 and the A650E automatic transmission on the previous LS430 are compared below.

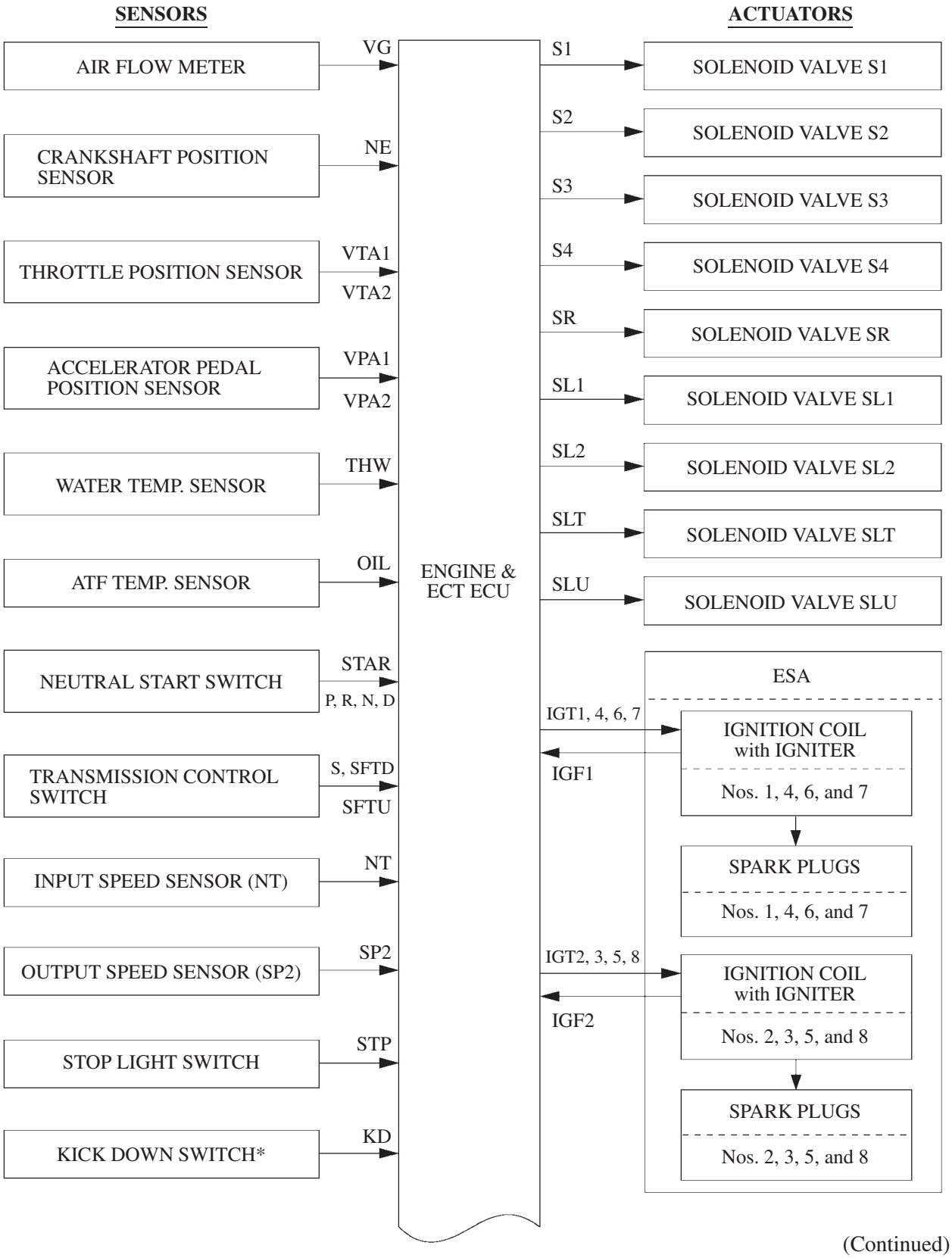
System	Function	New	Previous
		A761E	A650E
Shift Timing Control	The engine & ECT ECU sends current to the solenoid valve S1, S2, S3, S4 and/or SR based on signals from each sensor and shifts the gear.	○	—
	The engine & ECT ECU sends current to the solenoid valve S1, S2, S3 and/or S4 based on signals from each sensor and shifts the gear.	—	○
Clutch Pressure Control (See page 44)	● Controls the pressure that is applied directly to B_2 brake and C_3 clutch by actuating the linear solenoid valves SL1 and SL2 in accordance with the engine & ECT ECU signals. ● The solenoid valve SLT and SL1 minutely controls the clutch pressure in accordance with the engine output and driving conditions.	○	—
	● To achieve smooth shifting, the solenoid valve SLN controls the accumulator back pressure in order to finely regulate the hydraulic pressure that is applied to the clutch. ● Uses the solenoid valve SLU to directly control the hydraulic pressure that is applied to the clutch.	—	○
Line Pressure Control (See page 45)	Based on the throttle opening angle and various signals, the engine & ECT ECU sends a signal to solenoid valve SLT to generate line pressure according to the engine output and to effect a smooth gear shift change.	○	○
Engine Torque Control	Retards the engine ignition timing temporarily to improve shift feeling while up or down shifting.	○	○
High Response Shift Control	Though the cooperative control with the ETCS-i (Electronic Throttle Control System-intelligent), and the electronic control of supply and discharge speed of the clutch and brake hydraulic pressure, excellent response has been realized.	○	○
Lock-up Timing Control (See page 45)	While in the top gear when the shift lever is in the D position or 4 range, the engine & ECT ECU sends current to the shift solenoid valve SLU based on the signals from the sensors and engages or disengages the lock-up clutch.	—	○
	While in the 5th or 6th gear when the shift lever is in the D position or S6 range and in the 5th gear when the shift lever is in the S5 range and in the 4th gear when the shift lever is in the S4 range, the ECM sends current to the shift solenoid valve SLU based on the signals from the sensors and engages or disengages the lock-up clutch.	○	—
Flex Lock-up Clutch Control (See page 46)	Controls the solenoid valve SLU, provides an intermediate mode between the ON/OFF operation of the lock-up clutch, and increase the operating range of the lock-up clutch to improve fuel economy.	○	○
	The flex lock-up clutch control operates in the 3rd, 4th and 5th gears in the D position.	—	○
	The flex lock-up clutch control operates in the 3rd, 4th, 5th and 6th gears in both D position and S6 range, 3rd, 4th and 5th gears in the S5 range and 3rd and 4th gears in the S4 range.	○	—

(Continued)

System	Function	New	Previous
		A761E	A650E
AI (Artificial Intelligence) -SHIFT (See page 47)	Based on the signals from various sensors, the engine & ECT ECU determines the road conditions and the intention of the driver. Thus, the shift pattern is automatically regulated to an optimal level, thus improving driveability.	○	○
Orifice Switching Control (See page 49)	The orifice switching control prevents the oil pump from drawing air during extremely low temperatures.	○	—
Multi-Mode Automatic Transmission (See page 50)	The engine & ECT ECU appropriately controls the automatic transmission in accordance with the range position selected while the shift lever is in the S mode position.	○	—
Vehicle lift Control	To restrain the upward movement of the vehicle when the shift lever is moved from the D position to N, the clutch release speed has been optimized.	○	○
Shift Down Control	In order to ensure a smooth shift feel during downshifting to accelerate the vehicle, the hydraulic passages and control have been optimized.	○	○
Diagnosis (See page 52)	When the engine & ECT ECU detects a malfunction, the engine & ECT ECU makes a diagnosis and memorizes the failed section.	○	○
Fail-safe (See page 52)	Even if a malfunction is detected in the sensors or solenoids, the engine & ECT ECU effects fail-safe control to prevent the vehicle's driveability from being affected significantly.	○	○

Construction

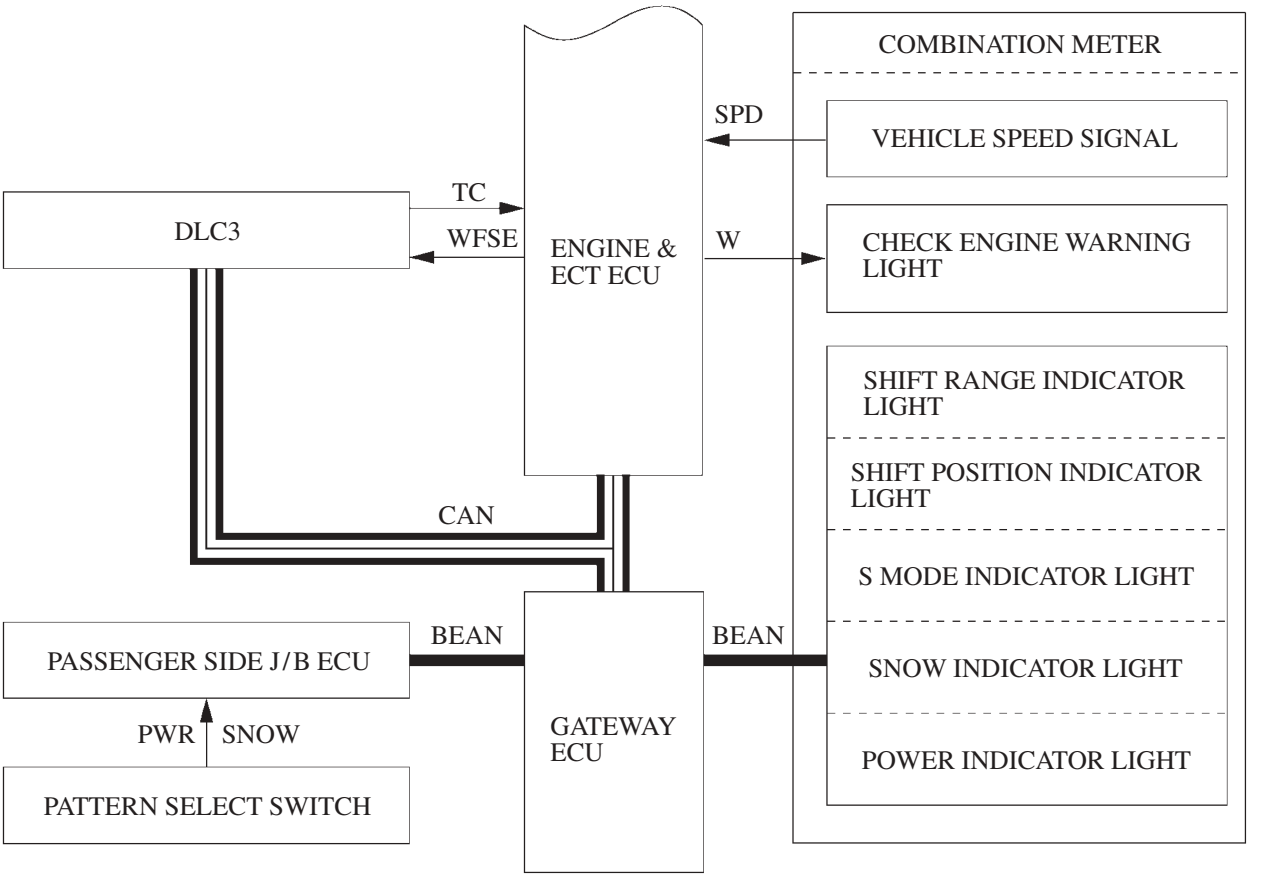
The configuration of the electronic control system in the A761E is as shown in the following chart.



(Continued)

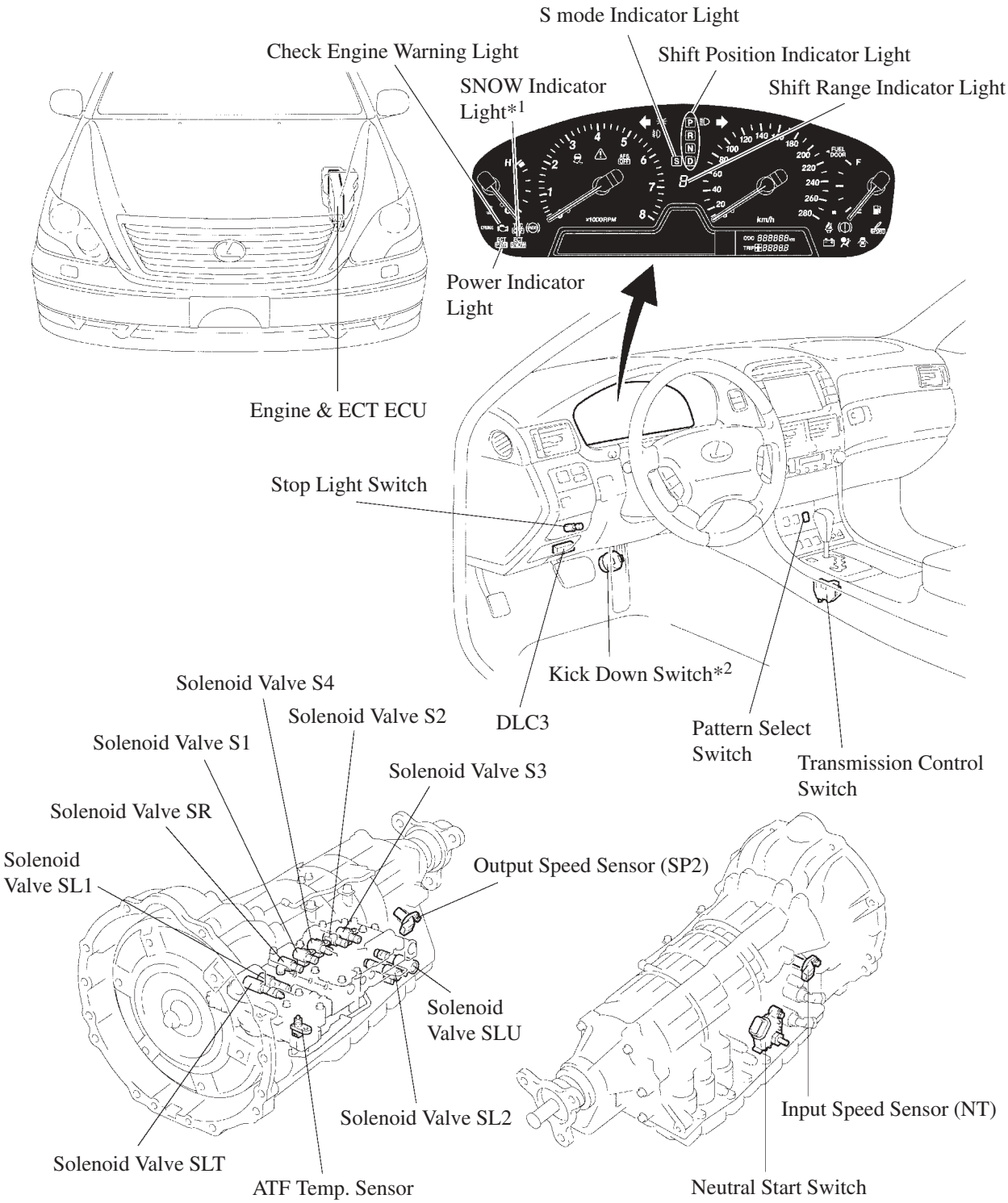
* : Only for Europe Model

260LSK02


COMBINATION METER
SPD
VEHICLE SPEED SIGNAL
TC
DLC3
WFSE
ENGINE &
ECT ECU
W
CHECK ENGINE WARNING
LIGHT
SHIFT RANGE INDICATOR
LIGHT
SHIFT POSITION INDICATOR
LIGHT
CAN
S MODE INDICATOR LIGHT
BEAN
BEAN
PASSENGER SIDE J/B ECU
SNOW INDICATOR LIGHT
PWR
SNOW
GATEWAY
ECU
POWER INDICATOR LIGHT
PATTERN SELECT SWITCH

259LSK18

Layout of Main Component



260LSK01

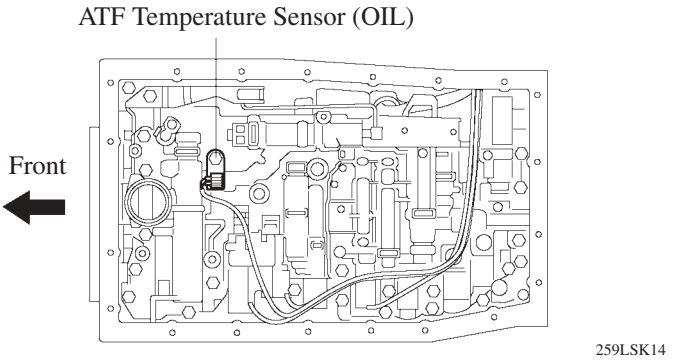
*1: G.C.C. Countries model is ETCS Indicator Light

*2: Only for Europe Model

Construction and Operation of Main Component

1) ATF Temperature Sensor

ATF temperature sensor (OIL) is used for hydraulic pressure control. This sensor is used for revision of clutches and brakes pressure to keep smooth shift quality.

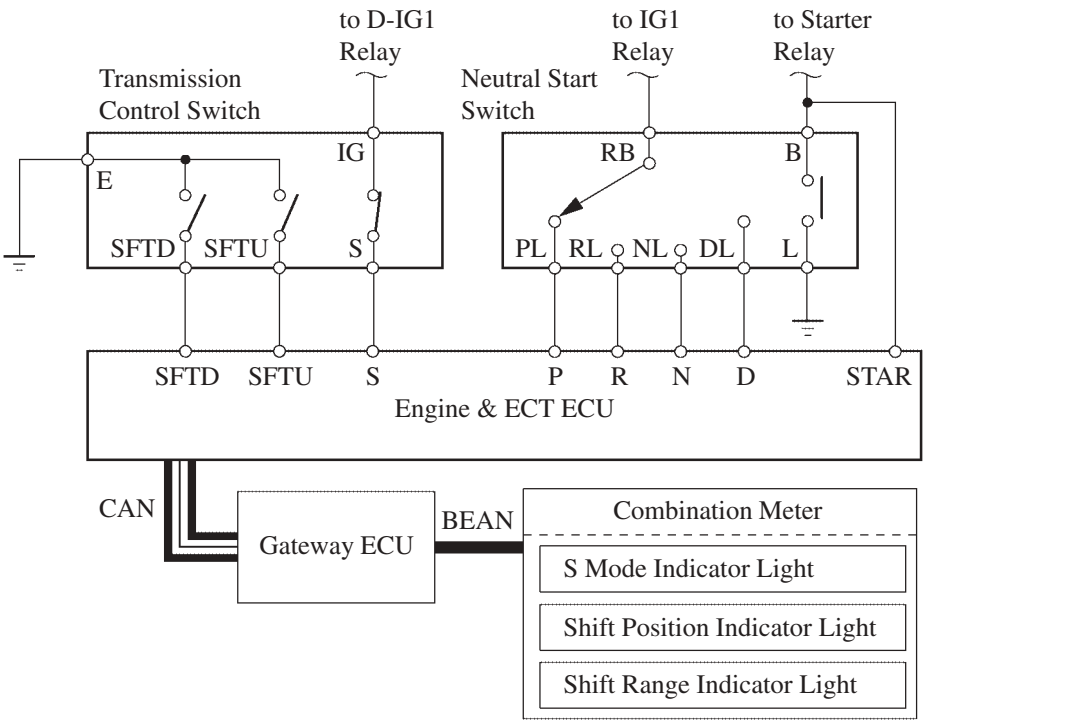


2) Transmission Control Switch and Neutral Start Switch

The engine & ECT ECU uses these switches to detect the shift position.

- The neutral start switch sends the P, R, N, D and STAR position signals to the engine & ECT ECU. It also sends signals for the shift indicator light (P, R, N, and D) in the combination meter.
- The transmission control switch is installed inside shift lever assembly to detect the shift lever position and to inform engine & ECT ECU. The engine & ECT ECU turns on the shift position indicator light in the combination meter.
- The transmission control switch detects whether the shift lever is in the D position or in the S mode position, and detects the operating conditions of the shift lever (front [+ position] or rear [– position]) if the S mode is selected, and sends signals to the engine & ECT ECU.

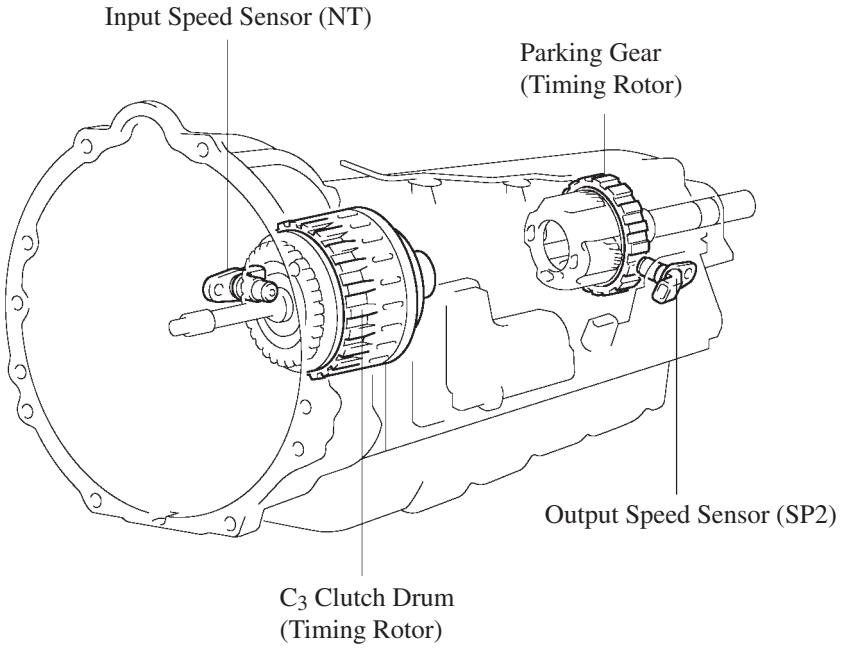
▶ Wiring Diagram ◀



3) Input Speed Sensor and Output Speed Sensor

The A761E automatic transmission uses an input speed sensor (for NT signal) and output speed sensor (for SP2 signal). Thus, the engine & ECT ECU can detect the timing of the shifting of the gears and appropriately control the engine torque and hydraulic pressure in response to the various conditions. These speed sensors are the pick-up coil type.

- The input speed sensor detects the input speed of the transmission. The C_3 clutch drum is used as the timing rotor for this sensor.
- The output speed sensor detects the speed of the output shaft. The parking gear on the rear planetary gear is used as the timing rotor for this sensor.



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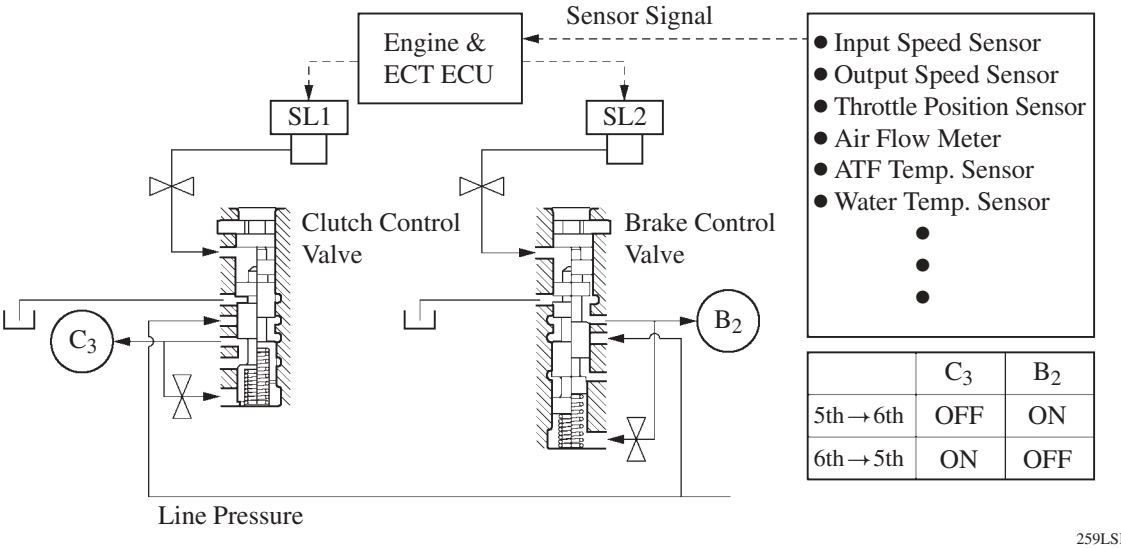
Clutch Pressure Control

1) Clutch to Clutch Pressure Control

This control has been adopted for shifting from the 5th to 6th gear and from the 6th to 5th gear.
Solenoid valves SL1 and SL2 are actuated in accordance with the signals from the engine & ECT ECU, and guides this output pressure directly to the control valves B_2 and C_3 in order to regulate the line pressure that acts on the B_2 brake and C_3 clutches.
As a result, high response and excellent shift characteristics have been realized.

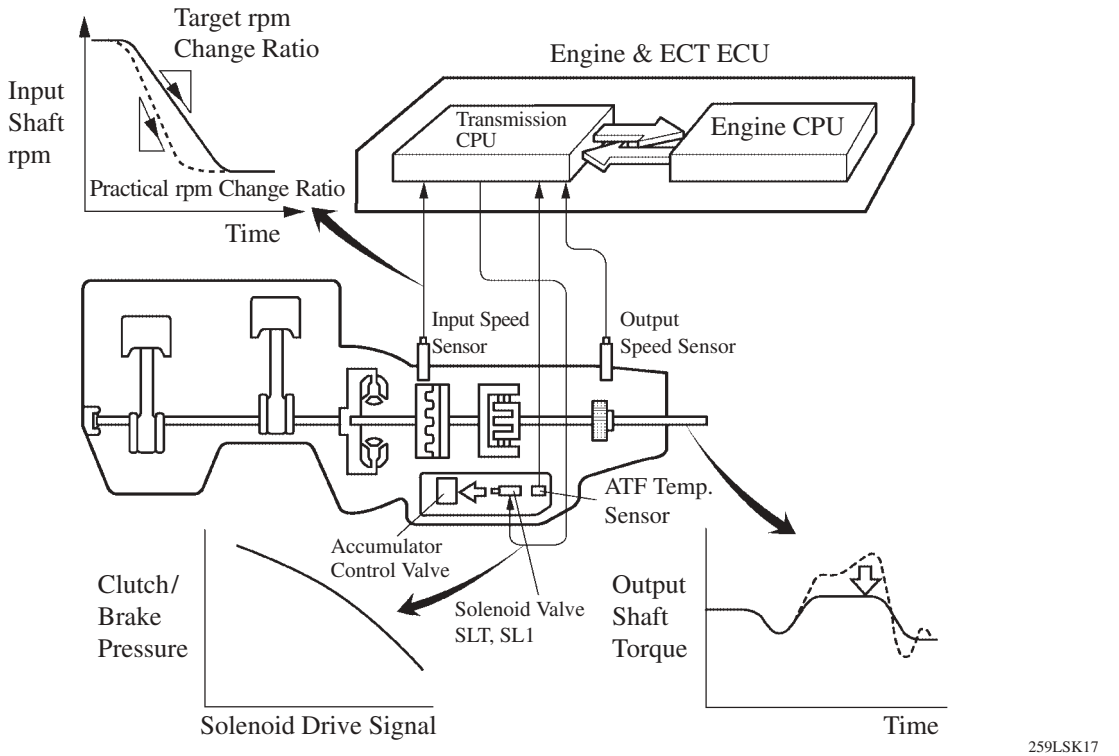


	C_3	B_2
5th → 6th	OFF	ON
6th → 5th	ON	OFF

259LSK69

2) Clutch Pressure Optimal Control

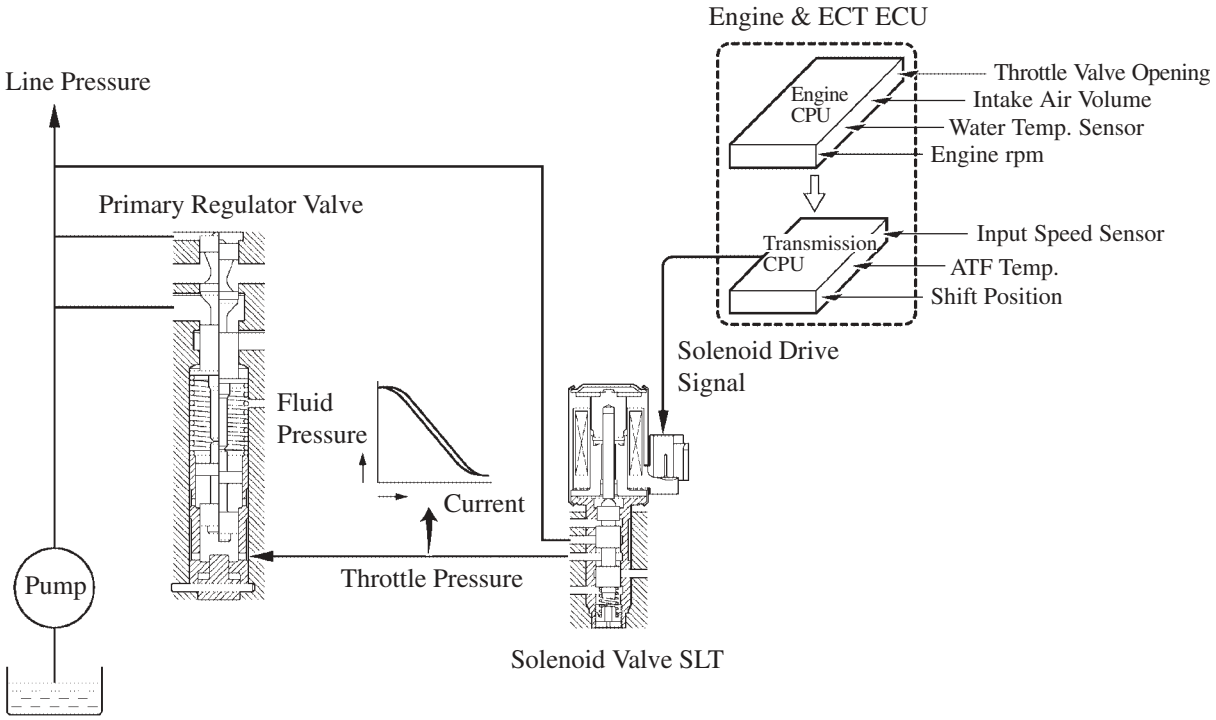
The engine & ECT ECU monitors the signals from various types of sensors, such as the input turbine speed sensor, allowing shift solenoid valves SLT and SL1 to minutely control the clutch pressure in accordance with engine output and driving conditions.
As a result, smooth shift characteristics have been realized.



259LSK17

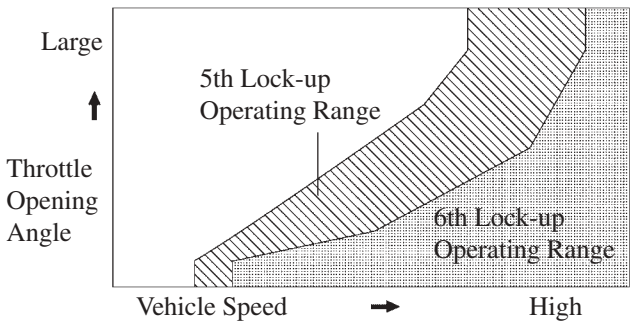
Line Pressure Optimal Control

Through the use of the solenoid valve SLT, the line pressure is optimally controlled in accordance with the engine torque information, as well as with the internal operating conditions of the torque converter and the transmission.
Accordingly, the line pressure can be controlled minutely in accordance with the engine output, traveling condition, and the ATF temperature, thus realizing smooth shift characteristics and optimizing the workload in the oil pump.



Lock-up Timing Control

The ECM operates the lock-up timing control in order to improve the proper fuel consumption performance while in the top gear with the shift lever in the S4 or S5 range, and in 5th or 6th gear with the shift lever in the S6 range or D position.



Lock-Up Timing in D position or S6 Range

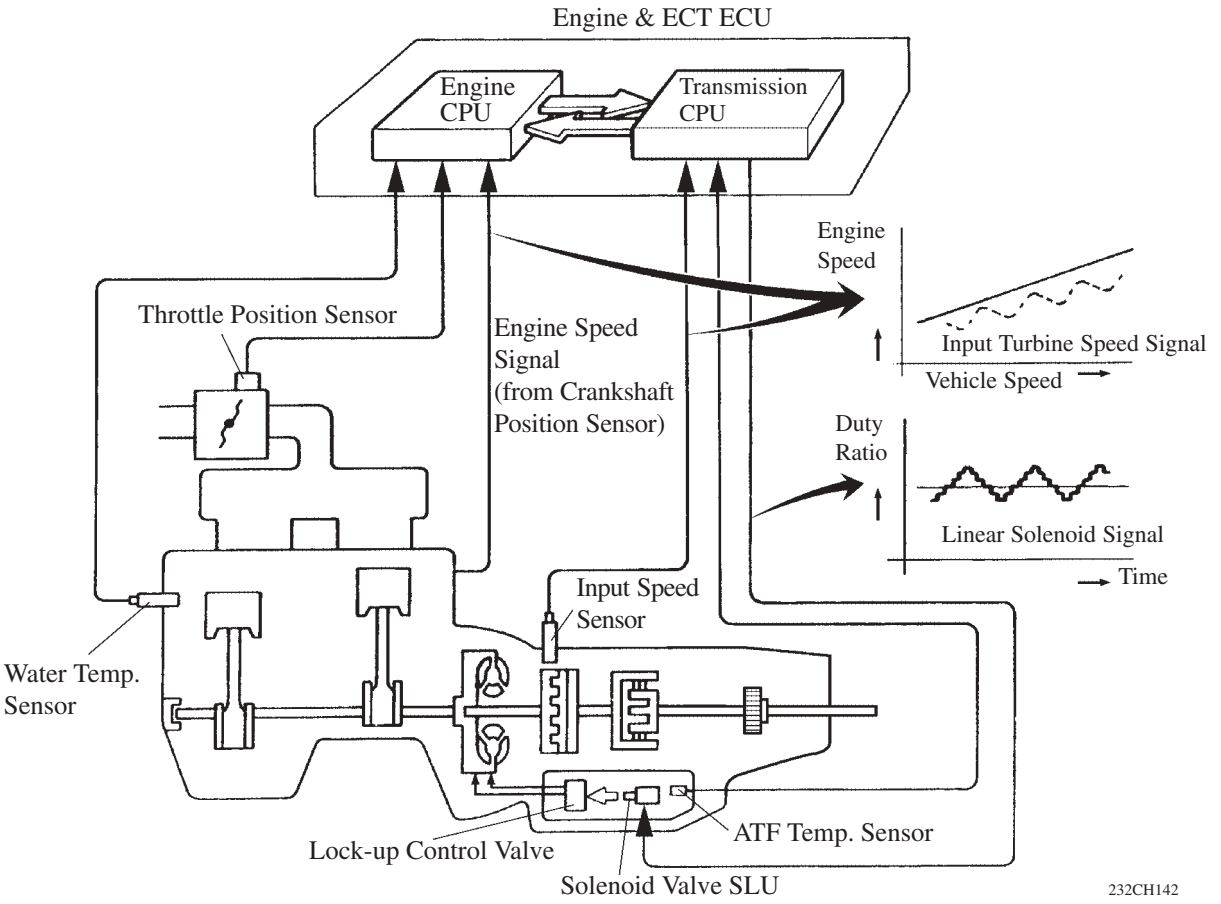
Lock-up Operation Gears in Each Range

Gear \ Position or Range	D, S6	S5	S4
1st	x	x	x
2nd	x	x	x
3rd	x	x	x
4th	x*	x*	○
5th	○	○	—
6th	○	—	—

*: Lock-up operation is performed when the 4th gear is hold during the AI-SHIFT control.

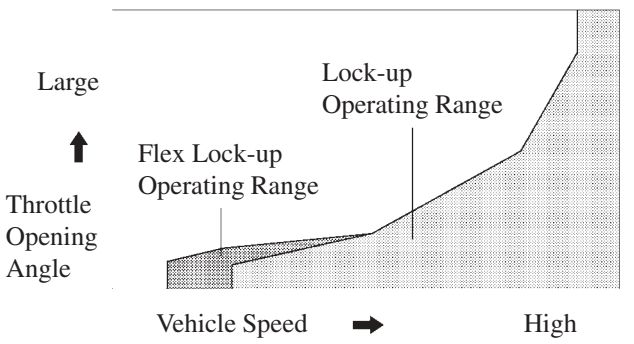
Flex Lock-up Clutch Control

In addition to the conventional lock-up timing control, a flex lock-up clutch control is used.
In the low-to-mid-speed range, this flex lock-up clutch control regulates the solenoid valve SLU to provide an intermediate mode between the ON/OFF operation of the lock-up clutch in order to improve the energy transmitting efficiency in this range.
As a result, the operating range of the lock-up clutch has been increased and fuel economy has been improved. The flex lock-up clutch control operates in the 3rd, 4th, 5th and 6th gears in both D position and S6 range, 3rd, 4th and 5th gears in the S5 range and 3rd and 4th gears in the S4 range.



Flex Lock-up Operation Gears in Each Range

Position or Range / Gear	D, S6	S5	S4
1st	x	x	x
2nd	x	x	x
3rd	x	x	x
4th	x	x	○
5th	○	○	—
6th	○	—	—



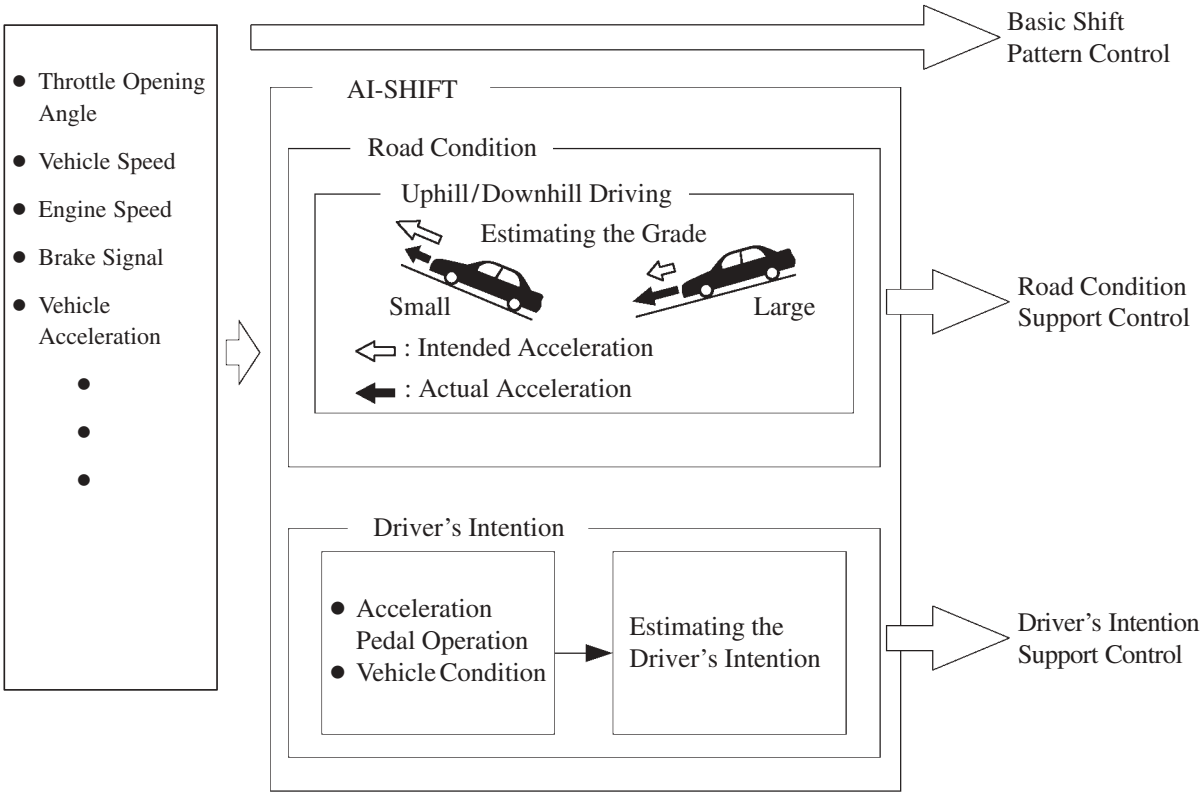
Flex Lock-up Timing in 6th Gear

259LSK21

AI (Artificial Intelligence)-SHIFT Control

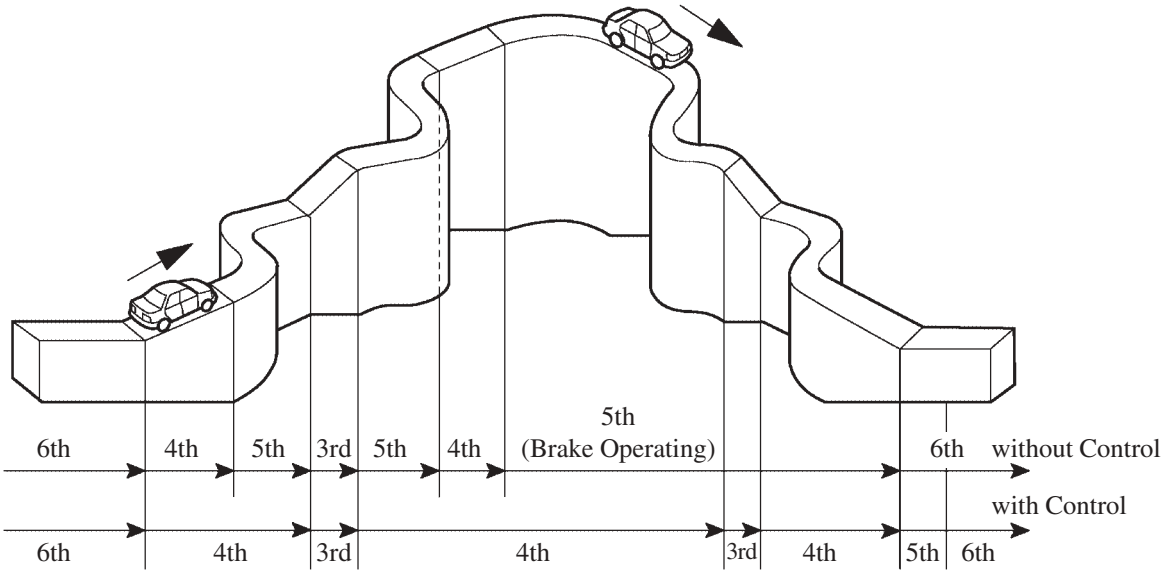
1) General

In addition to the switching of the shift pattern through the pattern select switch, the AI-SHIFT control enables the engine & ECT ECU to estimate the road conditions and the driver's intention in order to automatically select the optimal shift pattern. As a result, a comfortable ride has been realized.



2) Road Condition Support Control

Under road condition support control, the engine & ECT ECU determines throttle valve opening angle and the vehicle speed whether the vehicle is being driven uphill or downhill.
To achieve an optimal drive force while driving uphill, this control prevents the transmission from up-shifting to the 4th or 5th or 6th gear. To achieve an optimal engine brake effect while driving downhill, this control automatically downshifts the transmission to the 5th or 4th or 3rd gear.



259LSK70

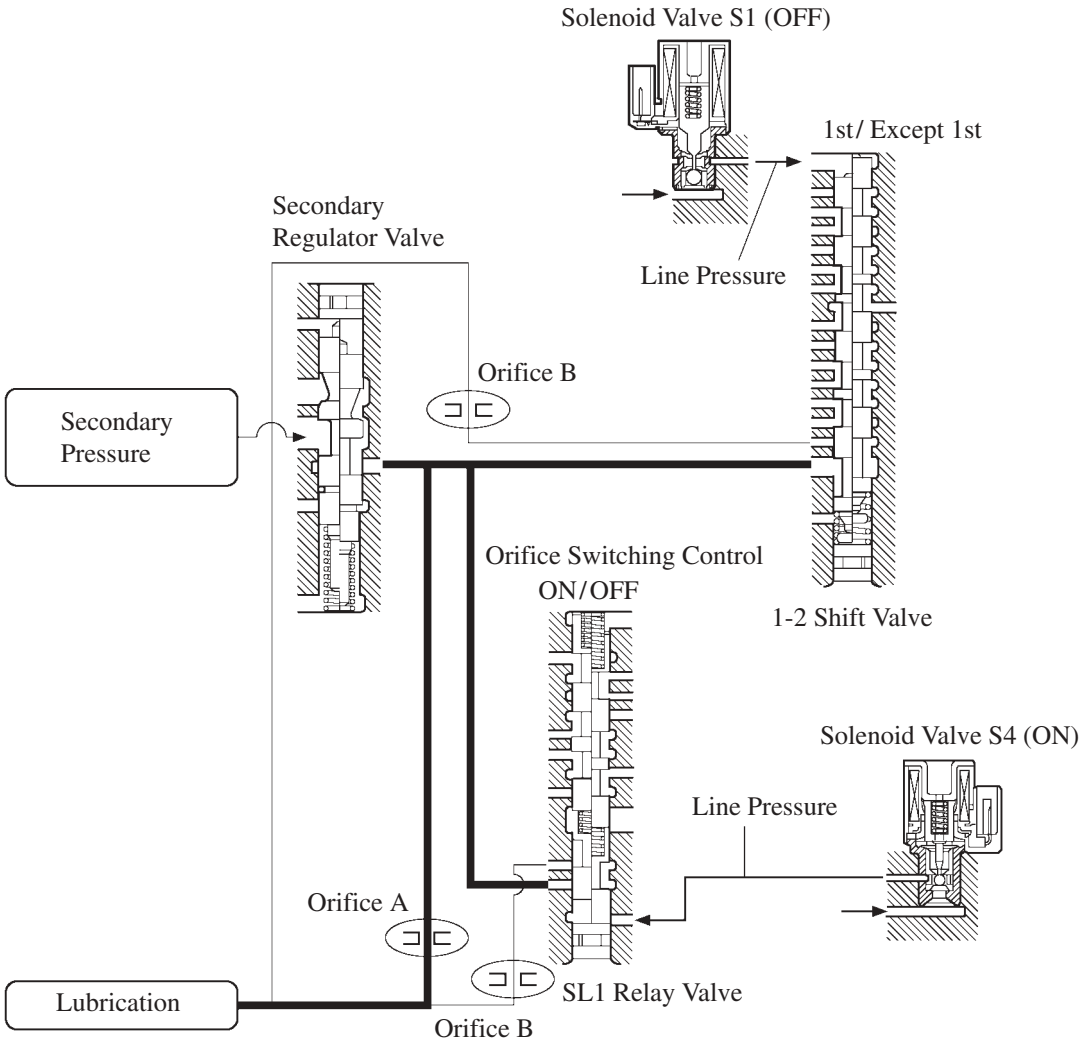
3) Driver's Intention Support Control

Estimates the driver's intention based on the accelerator operation and vehicle condition to switch to a shift pattern that is well-suited to each driver, without the need to operate the shift pattern select switch.

Orifice Switching Control

At extremely low temperatures, the ATF becomes thick, making the oil pump susceptible to drawing air. For this reason, the orifice switching control reduces the volume of the oil in the transmission and increases the volume of oil drawn by the oil pump, in order to prevent the oil pump from drawing air.

- While stopped in 1st, the engine & ECT ECU turns OFF the solenoid valve S1 and turns ON the solenoid valve S4 in order to apply the line pressure to the 1-2 shift valve and the SL1 relay valve. The 1-2 shift valve and the SL1 relay valve close the oil passage for the secondary pressure from the secondary regulator valve, thus causing the secondary pressure to pass through orifice "A". As a result, the volume of oil in the transmission decreases.
- While stopped in a gear other than 1st, the secondary pressure from the secondary regulator valve travels through either or both of the 1-2 shift valve and SL1 relay valve, and passes through orifice "B", in order to lubricate the inside of the transmission. As a result, the volume of the oil in the transmission does not decrease.



259LSK68

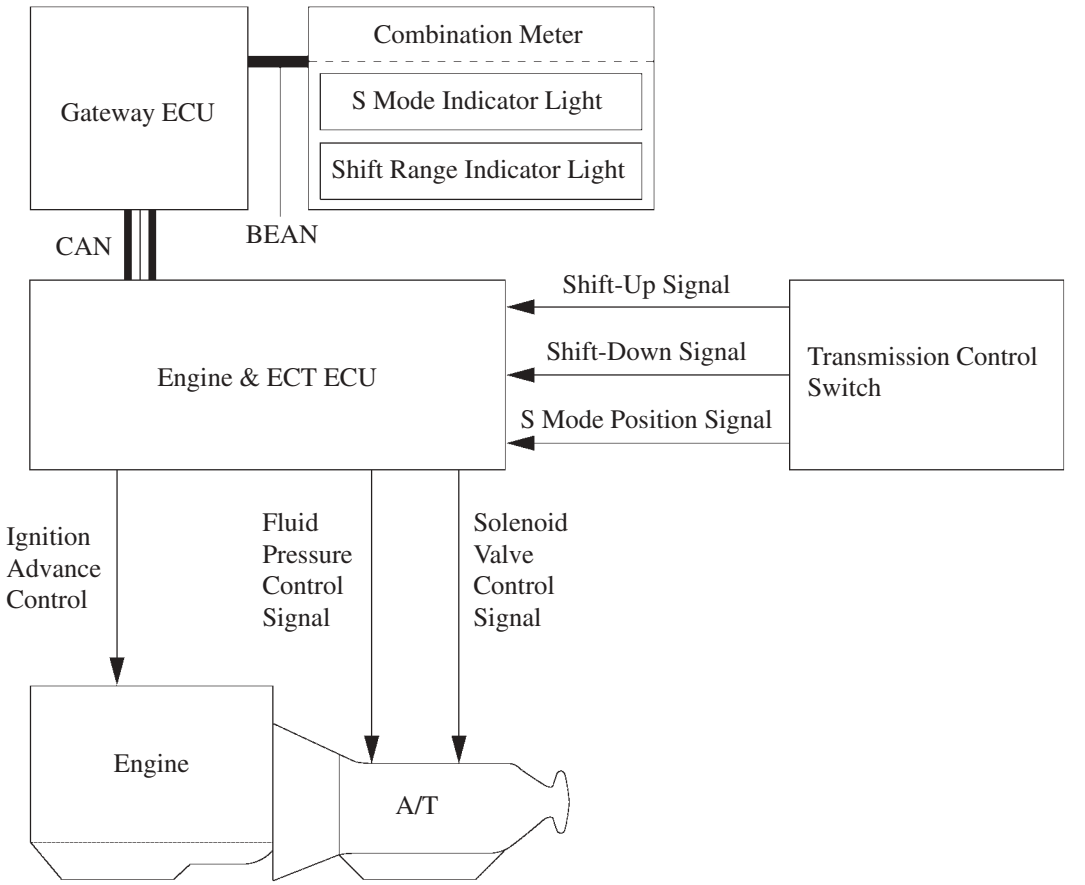
Multi-Mode Automatic Transmission

1) General

By moving the shift lever to the front ("+" position) or to the rear ("–" position), the driver can select the desired shift range position. Thus, the driver is able to shift gears with a manual-like feel.

- Multi-mode automatic transmission is designed for switching the gear range; not for fixing in one gear.
- An S mode indicator light which illuminates when the S mode position is selected and a shift range indicator light, which indicates the range position, have been provided in the combination meter.

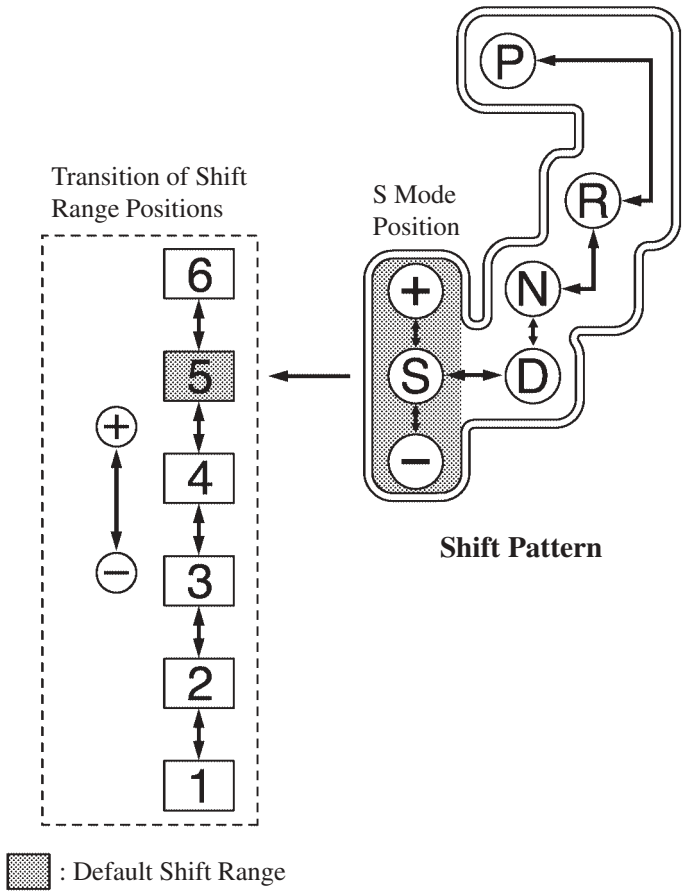
▶ System Diagram ◀



259LSK23

2) Operation

- The driver selects the S mode position by engaging the shift lever. At this time, the shift range position selects the 5 range. Then, the shift range positions change one at a time, as the driver moves the shift lever to the front ("+" position) or to the rear ("–" position). However, the shift lever is in 4th range or 3rd range in the AI-SHIFT control, the range is selected.
- Under this control, the engine & ECT ECU effects optimal shift control within the usable gear range that the driver has selected. As with the ordinary automatic transmission, it shifts to the 1st gear when the vehicle is stopped.
- When the shift lever is in the S mode position, the S mode indicator in the combination meter illuminates. The shift range indicator indicates the state of the shift range position that the driver has selected.



▶ Shift Program ◀

The usable gears are shown in the chart below.

Shift Range Indicator Light Indication	Shift Range	Usable Gear
6	6	6th ↔ 5th ↔ 4th ↔ 3rd ↔ 2nd ↔ 1st
5	5	5th ↔ 4th ↔ 3rd ↔ 2nd ↔ 1st
4	4	4th ↔ 3rd ↔ 2nd ↔ 1st
3	3	3rd ↔ 2nd ↔ 1st
2	2	2nd ↔ 1st
1	1	1st

Diagnosis

- When the engine & ECT ECU detects a malfunction, the engine & ECT ECU makes a diagnosis and memorizes the failed section. Furthermore, the check engine warning light in the combination meter illuminates or blinks to inform the driver.
- At the same time, the DTC (Diagnosis Trouble Codes) are stored in memory. The DTC can be read by connecting a hand-held tester to DLC3.

Service Tip

Because the engine & ECT ECU of the new LS430 effects diagnosis communication through CAN protocol, an Intelligent Tester II is required in order to obtain diagnostic information. For details, see the LEXUS LS430 Repair Manual Supplement (Pub. No. RM1049E).

Fail Safe

This function minimizes the loss of operability when any abnormality occurs in each sensor or solenoid.

▶ Fail-Safe Control List ◀

Malfunction Part	Function
Input Speed Sensor (NT)	During an input speed sensor malfunction, shift control is effected through the output speed sensor signal (SP2). During an input speed sensor malfunction, up-shift to the 5th and 6th, AI-SHIFT and flex lock-up clutch control are prohibited.
Output Speed Sensor (SP2)	During an output speed sensor malfunction, shift control is effected through the input speed sensor signal (NT). During an output speed sensor malfunction, up-shift to the 5th and 6th, AI-SHIFT and flex lock-up clutch control are prohibited.
ATF Temp. Sensor	During an ATF temperature sensor malfunction, up-shift to the 5th and 6th and flex lock-up clutch control are prohibited.
Solenoid Valve S1, S2, S2, S4 and SR	The current to the failed solenoid valve is cut off and control is effected by operating the other solenoid valves. Shift control is effected depending on the failed solenoid as described in the table on the next page.
Solenoid Valve SL1 and SL2	During a solenoid valve SL1 or SL2 malfunction, up-shift to the 5th and 6th and flex lock-up clutch control are prohibited.
Solenoid Valve SLU	During a solenoid valve SLU malfunction, the current to the solenoid valve is stopped. Because this stops lock-up control and flex lock-up control, fuel economy decreases.
Solenoid Valve SLT	During a solenoid valve SLT malfunction, the current to the solenoid valve is stopped. Because this stops line pressure optimal control, the shift shock increases. However, shifting is effected through normal clutch pressure control.

Position	Normal								Shift Solenoid Valve S1 Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	OFF	ON	ON	OFF	ON	OFF	ON	1st	x	ON	ON	OFF	ON	OFF	ON	1st
	ON	ON	ON	OFF	ON	OFF	ON	2nd	x	ON→OFF	ON→OFF	OFF	ON	OFF	ON	1st→4th
	ON	OFF	ON	OFF	ON	OFF	ON	3rd	x	OFF	ON→OFF	OFF	ON	OFF	ON	3rd→4th
	ON	OFF	OFF	OFF	ON	OFF	ON	4th	x	OFF	OFF	OFF	ON	OFF	ON	4th
	ON	OFF	OFF	ON	OFF	ON	OFF	5th	x	OFF	OFF	ON	OFF	ON	OFF	5th
	ON	ON	OFF	ON	OFF	ON	OFF	6th	x	ON→OFF	OFF	ON	OFF	ON	OFF	N→5th
S5	OFF	ON	ON	OFF	ON	OFF	ON	1st	x	ON	ON	OFF	ON	OFF	ON	1st
	ON	ON	ON	OFF	ON	OFF	ON	2nd	x	ON→OFF	ON→OFF	OFF	ON	OFF	ON	1st→4th
	ON	OFF	ON	OFF	ON	OFF	ON	3rd	x	OFF	ON→OFF	OFF	ON	OFF	ON	3rd→4th
	ON	OFF	OFF	OFF	ON	OFF	ON	4th	x	OFF	OFF	OFF	ON	OFF	ON	4th
	ON	OFF	OFF	ON	OFF	ON	OFF	5th	x	ON→OFF	OFF	ON	OFF	ON	OFF	5th
S4	OFF	ON	ON	OFF	ON	OFF	ON	1st	x	ON	ON	OFF	ON	OFF	ON	1st
	ON	ON	ON	OFF	ON	OFF	ON	2nd	x	ON→OFF	ON→OFF	OFF	ON	OFF	ON	1st→4th
	ON	OFF	ON	OFF	ON	OFF	ON	3rd	x	OFF	ON→OFF	OFF	ON	OFF	ON	3rd→4th
	ON	OFF	OFF	OFF	ON	OFF	ON	4th	x	OFF	OFF	OFF	ON	OFF	ON	4th
S3	OFF	ON	ON	OFF	ON	OFF	ON	1st	x	ON	ON	OFF	ON	OFF	ON	1st
	ON	ON	ON	OFF	ON	OFF	ON	2nd	x	ON→OFF	ON→OFF	OFF	ON	OFF	ON	1st→4th
	ON	OFF	ON	OFF	ON	OFF	OFF	3rd (E/B)	x	OFF	ON→OFF	OFF	ON	OFF	OFF→ON	3rd (E/B)→4th
S2	OFF	ON	ON	OFF	ON	OFF	ON	1st	x	ON	ON	OFF	ON	OFF	ON	1st
	ON	ON	ON	ON	ON	OFF	OFF	2nd (E/B)	x	ON→OFF	ON→OFF	OFF	ON	OFF	OFF→ON	1st (E/B)→4th
S1	OFF	ON	ON	OFF	ON	OFF	OFF	1st (E/B)	x	ON	ON	OFF	ON	OFF	OFF	1st (E/B)

Position	Shift Solenoid Valve S2 Malfunction								Shift Solenoid Valve S3 Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	OFF→ON	x	ON	OFF	ON	OFF	ON	3rd	OFF→ON	ON→OFF	x	OFF	ON	OFF	ON	3rd→4th
	ON	x	ON	OFF	ON	OFF	ON	3rd	ON	ON→OFF	x	OFF	ON	OFF	ON	4th
	ON	x	ON	OFF	ON	OFF	ON	3rd	ON	OFF	x	OFF	ON	OFF	ON	4th
	ON	x	OFF	OFF	ON	OFF	ON	4th	ON	OFF	x	OFF	ON	OFF	ON	4th
	ON	x	OFF	ON	OFF	ON	OFF	5th	ON	OFF	x	ON	OFF	ON	OFF	5th
	ON	x	OFF	ON	OFF	ON	OFF	5th	ON	ON	x	ON	OFF	ON	OFF	6th
S5	OFF→ON	x	ON	OFF	ON	OFF	ON	3rd	OFF→ON	ON→OFF	x	OFF	ON	OFF	ON	3rd→4th
	ON	x	ON	OFF	ON	OFF	ON	3rd	ON	ON→OFF	x	OFF	ON	OFF	ON	4th
	ON	x	ON	OFF	ON	OFF	ON	3rd	ON	OFF	x	OFF	ON	OFF	ON	4th
	ON	x	OFF	OFF	ON	OFF	ON	4th	ON	OFF	x	OFF	ON	OFF	ON	4th
	ON	x	OFF	ON	OFF	ON	OFF	5th	ON	OFF	x	ON	OFF	ON	OFF	5th
S4	OFF→ON	x	ON	OFF	ON	OFF	ON	3rd	OFF→ON	ON→OFF	x	OFF	ON	OFF	ON	3rd→4th
	ON	x	ON	OFF	ON	OFF	ON	3rd	ON	ON→OFF	x	OFF	ON	OFF	ON	4th
	ON	x	ON	OFF	ON	OFF	ON	3rd	ON	OFF	x	OFF	ON	OFF	ON	4th
	ON	x	OFF	OFF	ON	OFF	ON	4th	ON	OFF	x	OFF	ON	OFF	ON	4th
S3	OFF→ON	x	ON	OFF	ON	OFF	ON→OFF	3rd→3rd (E/B)	OFF→ON	ON→OFF	x	OFF	ON	OFF	ON	3rd→4th
	ON	x	ON	OFF	ON	OFF	ON→OFF	3rd→3rd (E/B)	ON	ON→OFF	x	OFF	ON	OFF	ON	4th
	ON	x	ON	OFF	ON	OFF	OFF	3rd (E/B)	ON	OFF	x	OFF	ON	OFF	OFF→ON	4th
S2	OFF→ON	x	ON	OFF	ON	OFF	ON→OFF	3rd→3rd (E/B)	OFF→ON	ON→OFF	x	OFF	ON	OFF	ON	3rd→4th
	ON	x	ON	OFF	ON	OFF	OFF	3rd (E/B)	ON	ON→OFF	x	OFF	ON	OFF	OFF→ON	6th→4th
S1	OFF→ON	x	ON	OFF	ON	OFF	OFF	3rd (E/B)	OFF→ON	ON→OFF	x	OFF	ON	OFF	OFF→ON	1st (E/B)→4th

Position	Shift Solenoid Valve S4 Malfunction								Shift Solenoid Valve SR Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	OFF	ON	ON	x	ON	OFF	ON	1st	OFF	ON	ON	OFF	x	OFF	ON	1st
	ON	ON	ON	x	ON	OFF	ON	2nd	ON	ON	ON	OFF	x	OFF	ON	2nd
	ON	OFF	ON	x	ON	OFF	ON	3rd	ON	OFF	ON	OFF	x	OFF	ON	3rd
	ON	OFF	OFF	x	ON	OFF	ON	4th	ON	OFF	OFF	OFF	x	OFF	ON	4th
	ON	OFF	OFF	x	OFF→ ON	ON→ OFF	OFF→ ON	4th	ON	OFF	OFF	ON	x	ON	OFF	5th
	ON	ON→ OFF	OFF	x	OFF→ ON	ON→ OFF	OFF→ ON	4th	ON	ON	OFF	ON	x	ON	OFF	6th
S5	OFF	ON	ON	x	ON	OFF	ON	1st	OFF	ON	ON	OFF	x	OFF	ON	1st
	ON	ON	ON	x	ON	OFF	ON	2nd	ON	ON	ON	OFF	x	OFF	ON	2nd
	ON	OFF	ON	x	ON	OFF	ON	3rd	ON	OFF	ON	OFF	x	OFF	ON	3rd
	ON	OFF	OFF	x	ON	OFF	ON	4th	ON	OFF	OFF	OFF	x	OFF	ON	4th
	ON	OFF	OFF	x	OFF→ ON	ON→ OFF	OFF→ ON	4th	ON	OFF	OFF	ON	x	ON	OFF	5th
S4	OFF	ON	ON	x	ON	OFF	ON	1st	OFF	ON	ON	OFF	x	OFF	ON	1st
	ON	ON	ON	x	ON	OFF	ON	2nd	ON	ON	ON	OFF	x	OFF	ON	2nd
	ON	OFF	ON	x	ON	OFF	ON	3rd	ON	OFF	ON	OFF	x	OFF	ON	3rd
	ON	OFF	OFF	x	ON	OFF	ON	4th	ON	OFF	OFF	OFF	x	OFF	ON	4th
S3	OFF	ON	ON	x	ON	OFF	ON	1st	OFF	ON	ON	OFF	x	OFF	ON	1st
	ON	ON	ON	x	ON	OFF	ON	2nd	ON	ON	ON	OFF	x	OFF	ON	2nd
	ON	OFF	ON	x	ON	OFF	OFF	3rd (E/B)	ON	OFF	ON	OFF	x	OFF	OFF	3rd
S2	OFF	ON	ON	x	ON	OFF	ON	1st	OFF	ON	ON	OFF	x	OFF	ON	1st
	ON	ON	ON	x	ON	OFF	OFF	2nd	ON	ON	ON	OFF	x	OFF	OFF	2nd
S1	OFF	ON	ON	x	ON	OFF	OFF	1st (E/B)	OFF	ON	ON	OFF	x	OFF	OFF	1st

Position	Shift Solenoid Valve S1 and S2 Malfunction								Shift Solenoid Valve S1 and S3 Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	x	x	ON→ OFF	OFF	ON	OFF	ON	3rd→ 4th	x	ON	x	OFF	ON	OFF	ON	3rd
	x	x	ON→ OFF	OFF	ON	OFF	ON	3rd→ 4th	x	ON→ OFF	x	OFF	ON	OFF	ON	3rd→ 4th
	x	x	ON→ OFF	OFF	ON	OFF	ON	3rd→ 4th	x	OFF	x	OFF	ON	OFF	ON	4th
	x	x	OFF	OFF	ON	OFF	ON	4th	x	OFF	x	OFF	ON	OFF	ON	4th
	x	x	OFF	ON	OFF	ON	OFF	5th	x	OFF	x	ON	OFF	ON	OFF	5th
	x	x	OFF	ON	OFF	ON	OFF	5th	x	OFF	x	ON	OFF	ON	OFF	5th
S5	x	x	ON→ OFF	OFF	ON	OFF	ON	3rd→ 4th	x	ON	x	OFF	ON	OFF	ON	3rd
	x	x	ON→ OFF	OFF	ON	OFF	ON	3rd→ 4th	x	ON→ OFF	x	OFF	ON	OFF	ON	3rd→ 4th
	x	x	ON→ OFF	OFF	ON	OFF	ON	3rd→ 4th	x	OFF	x	OFF	ON	OFF	ON	4th
	x	x	OFF	OFF	ON	OFF	ON	4th	x	OFF	x	OFF	ON	OFF	ON	4th
	x	x	OFF	ON	OFF	ON	OFF	5th	x	OFF	x	ON	OFF	ON	OFF	5th
S4	x	x	ON→ OFF	OFF	ON	OFF	ON	3rd→ 4th	x	ON	x	OFF	ON	OFF	ON	3rd
	x	x	ON→ OFF	OFF	ON	OFF	ON	3rd→ 4th	x	ON→ OFF	x	OFF	ON	OFF	ON	3rd→ 4th
	x	x	ON→ OFF	OFF	ON	OFF	ON	3rd→ 4th	x	OFF	x	OFF	ON	OFF	ON	4th
	x	x	OFF	OFF	ON	OFF	ON	4th	x	OFF	x	OFF	ON	OFF	ON	4th
S3	x	x	ON→ OFF	OFF	ON	OFF	ON	3rd→ 4th	x	ON	x	OFF	ON	OFF	ON	3rd
	x	x	ON→ OFF	OFF	ON	OFF	ON	3rd→ 4th	x	ON→ OFF	x	OFF	ON	OFF	ON	3rd→ 4th
	x	x	ON→ OFF	OFF	ON	OFF	OFF→ ON	3rd (E/B) →4th	x	OFF	x	OFF	ON	OFF	OFF→ ON	4th
S2	x	x	ON→ OFF	OFF	ON	OFF	ON	3rd→ 4th	x	ON	x	OFF	ON	OFF	ON	3rd
	x	x	ON→ OFF	ON→ OFF	ON	OFF	OFF→ ON	3rd (E/B) →4th	x	ON→ OFF	x	OFF	ON	OFF	OFF→ ON	1st→ 4th
S1	x	x	ON→ OFF	OFF	ON	OFF	OFF→ ON	3rd (E/B) →4th	x	ON	x	OFF	ON	OFF	OFF	1st

Position	Shift Solenoid Valve S1 and S4 Malfunction								Shift Solenoid Valve S1 and SR Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	x	ON	ON	x	ON	OFF	ON	1st	x	ON	ON	OFF	x	OFF	ON	1st
	x	ON→OFF	ON→OFF	x	ON	OFF	ON	1st→4th	x	ON→OFF	ON→OFF	OFF	x	OFF	ON	1st→4th
	x	OFF	ON→OFF	x	ON	OFF	ON	3rd→4th	x	OFF	ON→OFF	OFF	x	OFF	ON	3rd→4th
	x	OFF	OFF	x	ON	OFF	ON	4th	x	OFF	OFF	OFF	x	OFF	ON	4th
	x	OFF	OFF	x	OFF	ON	OFF	5th	x	OFF	OFF	ON	x	ON	OFF	5th
	x	ON→OFF	OFF	x	OFF	ON	OFF	4th→5th	x	OFF	OFF	ON	x	ON	OFF	5th
S5	x	ON	ON	x	ON	OFF	ON	1st	x	ON	ON	OFF	x	OFF	ON	1st
	x	ON→OFF	ON→OFF	x	ON	OFF	ON	1st→4th	x	ON→OFF	ON→OFF	OFF	x	OFF	ON	1st→4th
	x	OFF	ON→OFF	x	ON	OFF	ON	3rd→4th	x	OFF	ON→OFF	OFF	x	OFF	ON	3rd→4th
	x	OFF	OFF	x	ON	OFF	ON	4th	x	OFF	OFF	OFF	x	OFF	ON	4th
	x	OFF	OFF	x	OFF	ON	OFF	5th	x	OFF	OFF	ON	x	ON	OFF	5th
S4	x	ON	ON	x	ON	OFF	ON	1st	x	ON	ON	OFF	x	OFF	ON	1st
	x	ON→OFF	ON→OFF	x	ON	OFF	ON	1st→4th	x	ON→OFF	ON→OFF	OFF	x	OFF	ON	1st→4th
	x	OFF	ON→OFF	x	ON	OFF	ON	3rd→4th	x	OFF	ON→OFF	OFF	x	OFF	ON	3rd→4th
	x	OFF	OFF	x	ON	OFF	ON	4th	x	OFF	OFF	OFF	x	OFF	ON	4th
S3	x	ON	ON	x	ON	OFF	ON	1st	x	ON	ON	OFF	x	OFF	ON	1st
	x	ON→OFF	ON→OFF	x	ON	OFF	ON	1st→4th	x	ON→OFF	ON→OFF	OFF	x	OFF	ON	1st→4th
	x	OFF	ON→OFF	x	ON	OFF	OFF→ON	3rd (E/B) →4th	x	OFF	ON→OFF	OFF	x	OFF	OFF→ON	3rd (E/B) →4th
S2	x	ON	ON	x	ON	OFF	ON	1st	x	ON	ON	OFF	x	OFF	ON	1st
	x	ON→OFF	ON→OFF	x	ON	OFF	OFF→ON	1st (E/B) →4th	x	ON→OFF	ON→OFF	OFF	x	OFF	OFF→ON	1st (E/B) →4th
S1	x	ON	ON	x	ON	OFF	OFF	1st (E/B)	x	ON	ON	OFF	x	OFF	OFF	1st (E/B)

Position	Shift Solenoid Valve S2 and S3 Malfunction								Shift Solenoid Valve S2 and S4 Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	OFF→ON	x	x	OFF	ON	OFF	ON	4th	OFF→ON	x	ON	x	ON	OFF	ON	3rd
	ON	x	x	OFF	ON	OFF	ON	4th	ON	x	ON	x	ON	OFF	ON	3rd
	ON	x	x	OFF	ON	OFF	ON	4th	ON	x	ON	x	ON	OFF	ON	3rd
	ON	x	x	OFF	ON	OFF	ON	4th	ON	x	OFF	x	ON	OFF	ON	4th
	ON	x	x	ON	OFF	ON	OFF	5th	ON	x	OFF	x	OFF→ON	ON→OFF	OFF→ON	4th
	ON	x	x	ON	OFF	ON	OFF	5th	ON	x	OFF	x	OFF→ON	ON→OFF	OFF→ON	4th
S5	OFF→ON	x	x	OFF	ON	OFF	ON	4th	OFF→ON	x	ON	x	ON	OFF	ON	3rd
	ON	x	x	OFF	ON	OFF	ON	4th	ON	x	ON	x	ON	OFF	ON	3rd
	ON	x	x	OFF	ON	OFF	ON	4th	ON	x	ON	x	ON	OFF	ON	3rd
	ON	x	x	OFF	ON	OFF	ON	4th	ON	x	OFF	x	ON	OFF	ON	4th
	ON	x	x	ON	OFF	ON	OFF	5th	ON	x	OFF	x	OFF→ON	ON→OFF	OFF→ON	4th
S4	OFF→ON	x	x	OFF	ON	OFF	ON	4th	OFF→ON	x	ON	x	ON	OFF	ON	3rd
	ON	x	x	OFF	ON	OFF	ON	4th	ON	x	ON	x	ON	OFF	ON	3rd
	ON	x	x	OFF	ON	OFF	ON	4th	ON	x	ON	x	ON	OFF	ON	3rd
	ON	x	x	OFF	ON	OFF	ON	4th	ON	x	OFF	x	ON	OFF	ON	4th
S3	OFF→ON	x	x	OFF	ON	OFF	ON	4th	OFF→ON	x	ON	x	ON	OFF	ON→OFF	3rd→3rd (E/B)
	ON	x	x	OFF	ON	OFF	ON	4th	ON	x	ON	x	ON	OFF	ON→OFF	3rd→3rd (E/B)
	ON	x	x	OFF	ON	OFF	OFF→ON	4th	ON	x	ON	x	ON	OFF	OFF	3rd→3rd (E/B)
S2	OFF→ON	x	x	OFF	ON	OFF	ON	4th	OFF→ON	x	ON	x	ON	OFF	ON→OFF	3rd→3rd (E/B)
	ON	x	x	OFF	ON	OFF	OFF→ON	4th	ON	x	ON	x	ON	OFF	OFF	3rd (E/B)
S1	OFF→ON	x	x	OFF	ON	OFF	OFF→ON	4th	OFF→ON	x	ON	x	ON	OFF	OFF	3rd (E/B)

Position	Shift Solenoid Valve S2 and SR Malfunction								Shift Solenoid Valve S3 and S4 Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	OFF→ON	x	ON	OFF	x	OFF	ON	3rd	OFF	ON	x	x	ON	OFF	ON	3rd
	ON	x	ON	OFF	x	OFF	ON	3rd	ON	ON→OFF	x	x	ON	OFF	ON	4th
	ON	x	ON	OFF	x	OFF	ON	3rd	ON	OFF	x	x	ON	OFF	ON	4th
	ON	x	OFF	OFF	x	OFF	ON	4th	ON	OFF	x	x	ON	OFF	ON	4th
	ON	x	OFF	ON	x	ON	OFF	5th	ON	OFF	x	x	OFF→ON	ON→OFF	OFF→ON	4th
	ON	x	OFF	ON	x	ON	OFF	5th	ON	ON→OFF	x	x	OFF→ON	ON→OFF	OFF→ON	4th
S5	OFF→ON	x	ON	OFF	x	OFF	ON	3rd	OFF	ON	x	x	ON	OFF	ON	3rd
	ON	x	ON	OFF	x	OFF	ON	3rd	ON	ON→OFF	x	x	ON	OFF	ON	4th
	ON	x	ON	OFF	x	OFF	ON	3rd	ON	OFF	x	x	ON	OFF	ON	4th
	ON	x	OFF	OFF	x	OFF	ON	4th	ON	OFF	x	x	ON	OFF	ON	4th
	ON	x	OFF	ON	x	ON	OFF	5th	ON	OFF	x	x	OFF→ON	ON→OFF	OFF→ON	4th
S4	OFF→ON	x	ON	OFF	x	OFF	ON	3rd	OFF	ON	x	x	ON	OFF	ON	3rd
	ON	x	ON	OFF	x	OFF	ON	3rd	ON	ON→OFF	x	x	ON	OFF	ON	4th
	ON	x	ON	OFF	x	OFF	ON	3rd	ON	OFF	x	x	ON	OFF	ON	4th
	ON	x	OFF	OFF	x	OFF	ON	4th	ON	OFF	x	x	ON	OFF	ON	4th
S3	OFF→ON	x	ON	OFF	x	OFF	ON→OFF	3rd→3rd (E/B)	OFF	ON	x	x	ON	OFF	ON	3rd
	ON	x	ON	OFF	x	OFF	ON→OFF	3rd→3rd (E/B)	ON	ON→OFF	x	x	ON	OFF	ON	4th
	ON	x	ON	OFF	x	OFF	OFF	3rd (E/B)	ON	OFF	x	x	ON	OFF	OFF→ON	4th
S2	OFF→ON	x	ON	OFF	x	OFF	ON→OFF	3rd→3rd (E/B)	OFF	ON	x	x	ON	OFF	ON	3rd
	ON	x	ON	OFF	x	OFF	OFF	3rd (E/B)	ON	ON→OFF	x	x	ON	OFF	OFF→ON	4th
S1	OFF→ON	x	ON	OFF	x	OFF	OFF	3rd (E/B)	OFF	ON	x	x	ON	OFF	OFF	1st

Position	Shift Solenoid Valve S3 and SR Malfunction								Shift Solenoid Valve S4 and SR Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	OFF→ON	ON→OFF	x	OFF	x	OFF	ON	1st→4th	OFF	ON	ON	x	x	OFF	ON	1st
	ON	ON→OFF	x	OFF	x	OFF	ON	4th	ON	ON	ON	x	x	OFF	ON	2nd
	ON	OFF	x	OFF	x	OFF	ON	4th	ON	OFF	ON	x	x	OFF	ON	3rd
	ON	OFF	x	OFF	x	OFF	ON	4th	ON	OFF	OFF	x	x	OFF	ON	4th
	ON	OFF	x	ON	x	ON	OFF	5th	ON	OFF	OFF	x	x	ON→OFF	OFF→ON	4th
	ON	ON	x	ON	x	ON	OFF	6th	ON	ON→OFF	OFF	x	x	ON→OFF	OFF→ON	4th
S5	OFF→ON	ON→OFF	x	OFF	x	OFF	ON	1st→4th	OFF	ON	ON	x	x	OFF	ON	1st
	ON	ON→OFF	x	OFF	x	OFF	ON	4th	ON	ON	ON	x	x	OFF	ON	2nd
	ON	OFF	x	OFF	x	OFF	ON	4th	ON	OFF	ON	x	x	OFF	ON	3rd
	ON	OFF	x	OFF	x	OFF	ON	4th	ON	OFF	OFF	x	x	OFF	ON	4th
	ON	OFF	x	ON	x	ON	OFF	5th	ON	OFF	OFF	x	x	ON→OFF	OFF→ON	4th
S4	OFF→ON	ON→OFF	x	OFF	x	OFF	ON	1st→4th	OFF	ON	ON	x	x	OFF	ON	1st
	ON	ON→OFF	x	OFF	x	OFF	ON	4th	ON	ON	ON	x	x	OFF	ON	2nd
	ON	OFF	x	OFF	x	OFF	ON	4th	ON	OFF	ON	x	x	OFF	ON	3rd
	ON	OFF	x	OFF	x	OFF	ON	4th	ON	OFF	OFF	x	x	OFF	ON	4th
S3	OFF→ON	ON→OFF	x	OFF	x	OFF	ON→OFF	1st→4th	OFF	ON	ON	x	x	OFF	ON	1st
	ON	ON→OFF	x	OFF	x	OFF	ON	4th	ON	ON	ON	x	x	OFF	ON	2nd
	ON	OFF	x	OFF	x	OFF	OFF→ON	4th	ON	OFF	ON	x	x	OFF	OFF	3rd (E/B)
S2	OFF→ON	ON→OFF	x	OFF	x	OFF	ON→OFF	1st→4th	OFF	ON	ON	x	x	OFF	ON	1st
	ON	ON→OFF	x	OFF	x	OFF	OFF→ON	4th	ON	ON	ON	x	x	OFF	OFF	2nd
S1	OFF→ON	ON→OFF	x	OFF	x	OFF	OFF	1st→4th	OFF	ON	ON	x	x	OFF	OFF	1st (E/B)

Position	Shift Solenoid Valve S1, S2 and S3 Malfunction								Shift Solenoid Valve S1, S2 and S4 Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	x	x	x	OFF	ON	OFF	ON	4th	x	x	ON→ OFF	x	ON	OFF	ON	3rd→ 4th
	x	x	x	OFF	ON	OFF	ON	4th	x	x	ON→ OFF	x	ON	OFF	ON	3rd→ 4th
	x	x	x	OFF	ON	OFF	ON	4th	x	x	ON→ OFF	x	ON	OFF	ON	3rd→ 4th
	x	x	x	OFF	ON	OFF	ON	4th	x	x	OFF	x	ON	OFF	ON	4th
	x	x	x	ON	OFF	ON	OFF	5th	x	x	OFF	x	OFF→ ON	ON→ OFF	OFF→ ON	4th
	x	x	x	ON	OFF	ON	OFF	5th	x	x	OFF	x	OFF→ ON	ON→ OFF	OFF→ ON	4th
S5	x	x	x	OFF	ON	OFF	ON	4th	x	x	ON→ OFF	x	ON	OFF	ON	3rd→ 4th
	x	x	x	OFF	ON	OFF	ON	4th	x	x	ON→ OFF	x	ON	OFF	ON	3rd→ 4th
	x	x	x	OFF	ON	OFF	ON	4th	x	x	ON→ OFF	x	ON	OFF	ON	3rd→ 4th
	x	x	x	OFF	ON	OFF	ON	4th	x	x	OFF	x	ON	OFF	ON	4th
	x	x	x	ON	OFF	ON	OFF	5th	x	x	OFF	x	OFF→ ON	ON→ OFF	OFF→ ON	4th
S4	x	x	x	OFF	ON	OFF	ON	4th	x	x	ON→ OFF	x	ON	OFF	ON	3rd→ 4th
	x	x	x	OFF	ON	OFF	ON	4th	x	x	ON→ OFF	x	ON	OFF	ON	3rd→ 4th
	x	x	x	OFF	ON	OFF	ON	4th	x	x	ON→ OFF	x	ON	OFF	ON	3rd→ 4th
	x	x	x	OFF	ON	OFF	ON	4th	x	x	OFF	x	ON	OFF	ON	4th
S3	x	x	x	OFF	ON	OFF	ON	4th	x	x	ON→ OFF	x	ON	OFF	ON	3rd→ 4th
	x	x	x	OFF	ON	OFF	ON	4th	x	x	ON→ OFF	x	ON	OFF	ON	3rd→ 4th
	x	x	x	OFF	ON	OFF	OFF→ ON	4th	x	x	ON→ OFF	x	ON	OFF	OFF→ ON	3rd (E/B) →4th
S2	x	x	x	OFF	ON	OFF	ON	4th	x	x	ON→ OFF	x	ON	OFF	ON	3rd→ 4th
	x	x	x	OFF	ON	OFF	OFF→ ON	4th	x	x	ON→ OFF	x	ON	OFF	OFF→ ON	3rd (E/B) →4th
S1	x	x	x	OFF	ON	OFF	OFF→ ON	4th	x	x	ON→ OFF	x	ON	OFF	OFF→ ON	3rd (E/B) →4th

Position	Shift Solenoid Valve S1, S2 and SR Malfunction								Shift Solenoid Valve S1, S3 and S4 Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	x	x	ON→ OFF	OFF	x	OFF	ON	3rd→ 4th	x	ON	x	x	ON	OFF	ON	3rd
	x	x	ON→ OFF	OFF	x	OFF	ON	3rd→ 4th	x	ON	x	x	ON	OFF	ON	3rd
	x	x	ON→ OFF	OFF	x	OFF	ON	3rd→ 4th	x	OFF	x	x	ON	OFF	ON	4th
	x	x	OFF	OFF	x	OFF	ON	4th	x	OFF	x	x	ON	OFF	ON	4th
	x	x	OFF	ON	x	ON	OFF	5th	x	OFF	x	x	OFF→ ON	ON→ OFF	OFF→ ON	5th→ 4th
	x	x	OFF	ON	x	ON	OFF	5th	x	ON→ OFF	x	x	OFF→ ON	ON→ OFF	OFF→ ON	4th
S5	x	x	ON→ OFF	OFF	x	OFF	ON	3rd→ 4th	x	ON	x	x	ON	OFF	ON	3rd
	x	x	ON→ OFF	OFF	x	OFF	ON	3rd→ 4th	x	ON	x	x	ON	OFF	ON	3rd
	x	x	ON→ OFF	OFF	x	OFF	ON	3rd→ 4th	x	OFF	x	x	ON	OFF	ON	4th
	x	x	OFF	OFF	x	OFF	ON	4th	x	OFF	x	x	ON	OFF	ON	4th
	x	x	OFF	ON	x	ON	OFF	5th	x	OFF	x	x	OFF→ ON	ON→ OFF	OFF→ ON	5th→ 4th
S4	x	x	ON→ OFF	OFF	x	OFF	ON	3rd→ 4th	x	ON	x	x	ON	OFF	ON	3rd
	x	x	ON→ OFF	OFF	x	OFF	ON	3rd→ 4th	x	ON	x	x	ON	OFF	ON	3rd
	x	x	ON→ OFF	OFF	x	OFF	ON	3rd→ 4th	x	OFF	x	x	ON	OFF	ON	4th
	x	x	OFF	OFF	x	OFF	ON	4th	x	OFF	x	x	ON	OFF	ON	4th
S3	x	x	ON→ OFF	OFF	x	OFF	ON	3rd→ 4th	x	ON	x	x	ON	OFF	ON	3rd
	x	x	ON→ OFF	OFF	x	OFF	ON	3rd→ 4th	x	ON	x	x	ON	OFF	ON	3rd
	x	x	ON→ OFF	OFF	x	OFF	OFF→ ON	3rd (E/B) →4th	x	OFF	x	x	ON	OFF	OFF→ ON	4th
S2	x	x	ON→ OFF	OFF	x	OFF	ON	3rd→ 4th	x	ON	x	x	ON	OFF	ON	3rd
	x	x	ON→ OFF	OFF	x	OFF	OFF→ ON	3rd (E/B) →4th	x	ON	x	x	ON	OFF	OFF	1st
S1	x	x	ON→ OFF	OFF	x	OFF	OFF→ ON	3rd (E/B) →4th	x	ON	x	x	ON	OFF	OFF	1st

Position	Shift Solenoid Valve S1, S3 and SR Malfunction								Shift Solenoid Valve S1, S4 and SR Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	x	ON→OFF	x	OFF	x	OFF	ON	4th	x	ON	ON	x	x	OFF	ON	1st
	x	ON→OFF	x	OFF	x	OFF	ON	4th	x	ON→OFF	ON→OFF	x	x	OFF	ON	1st→4th
	x	OFF	x	OFF	x	OFF	ON	4th	x	OFF	ON→OFF	x	x	OFF	ON	3rd→4th
	x	OFF	x	OFF	x	OFF	ON	4th	x	OFF	OFF	x	x	OFF	ON	4th
	x	OFF	x	ON	x	ON	OFF	5th	x	OFF	OFF	x	x	ON→OFF	OFF→ON	5th→4th
	x	ON→OFF	x	ON	x	ON	OFF	N→5th	x	ON→OFF	OFF	x	x	ON→OFF	OFF→ON	4th
S5	x	ON→OFF	x	OFF	x	OFF	ON	4th	x	ON	ON	x	x	OFF	ON	1st
	x	ON→OFF	x	OFF	x	OFF	ON	4th	x	ON→OFF	ON→OFF	x	x	OFF	ON	1st→4th
	x	OFF	x	OFF	x	OFF	ON	4th	x	OFF	ON→OFF	x	x	OFF	ON	3rd→4th
	x	OFF	x	OFF	x	OFF	ON	4th	x	OFF	OFF	x	x	OFF	ON	4th
	x	OFF	x	ON	x	ON	OFF	5th	x	OFF	OFF	x	x	ON→OFF	OFF→ON	5th→4th
S4	x	ON→OFF	x	OFF	x	OFF	ON	4th	x	ON	ON	x	x	OFF	ON	1st
	x	ON→OFF	x	OFF	x	OFF	ON	4th	x	ON→OFF	ON→OFF	x	x	OFF	ON	1st→4th
	x	OFF	x	OFF	x	OFF	ON	4th	x	OFF	ON→OFF	x	x	OFF	ON	3rd→4th
	x	OFF	x	OFF	x	OFF	ON	4th	x	OFF	OFF	x	x	OFF	ON	4th
S3	x	ON→OFF	x	OFF	x	OFF	ON	4th	x	ON	ON	x	x	OFF	ON	1st
	x	ON→OFF	x	OFF	x	OFF	ON	4th	x	ON→OFF	ON→OFF	x	x	OFF	ON	1st→4th
	x	OFF	x	OFF	x	OFF	OFF→ON	4th	x	OFF	ON→OFF	x	x	OFF	OFF→ON	3rd (E/B)→4th
S2	x	ON→OFF	x	OFF	x	OFF	ON	4th	x	ON	ON	x	x	OFF	ON	1st
	x	ON→OFF	x	OFF	x	OFF	OFF→ON	4th	x	ON→OFF	ON→OFF	x	x	OFF	OFF→ON	1st (E/B)→4th
S1	x	ON→OFF	x	OFF	x	OFF	OFF→ON	4th	x	ON	ON	x	x	OFF	OFF	1st (E/B)

Position	Shift Solenoid Valve S2, S3 and S4 Malfunction								Shift Solenoid Valve S2, S4 and SR Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	OFF→ON	x	x	x	ON	OFF	ON	4th	OFF→ON	x	ON	x	x	OFF	ON	3rd
	ON	x	x	x	ON	OFF	ON	4th	ON	x	ON	x	x	OFF	ON	3rd
	ON	x	x	x	ON	OFF	ON	4th	ON	x	ON	x	x	OFF	ON	3rd
	ON	x	x	x	ON	OFF	ON	4th	ON	x	OFF	x	x	OFF	ON	4th
	ON	x	x	x	OFF→ON	ON→OFF	OFF→ON	2nd→4th	ON	x	OFF	x	x	ON→OFF	OFF→ON	4th
	ON	x	x	x	OFF→ON	ON→OFF	OFF→ON	2nd→4th	ON	x	OFF	x	x	ON→OFF	OFF→ON	4th
S5	OFF→ON	x	x	x	ON	OFF	ON	4th	OFF→ON	x	ON	x	x	OFF	ON	3rd
	ON	x	x	x	ON	OFF	ON	4th	ON	x	ON	x	x	OFF	ON	3rd
	ON	x	x	x	ON	OFF	ON	4th	ON	x	ON	x	x	OFF	ON	3rd
	ON	x	x	x	ON	OFF	ON	4th	ON	x	OFF	x	x	OFF	ON	4th
	ON	x	x	x	OFF→ON	ON→OFF	OFF→ON	2nd→4th	ON	x	OFF	x	x	ON→OFF	OFF→ON	4th
S4	OFF→ON	x	x	x	ON	OFF	ON	4th	OFF→ON	x	ON	x	x	OFF	ON	3rd
	ON	x	x	x	ON	OFF	ON	4th	ON	x	ON	x	x	OFF	ON	3rd
	ON	x	x	x	ON	OFF	ON	4th	ON	x	ON	x	x	OFF	ON	3rd
	ON	x	x	x	ON	OFF	ON	4th	ON	x	OFF	x	x	OFF	ON	4th
S3	OFF→ON	x	x	x	ON	OFF	ON	4th	OFF→ON	x	ON	x	x	OFF	ON→OFF	3rd (E/B)
	ON	x	x	x	ON	OFF	ON	4th	ON	x	ON	x	x	OFF	ON→OFF	3rd→3rd (E/B)
	ON	x	x	x	ON	OFF	OFF→ON	4th	ON	x	ON	x	x	OFF	OFF	3rd (E/B)
S2	OFF→ON	x	x	x	ON	OFF	ON	4th	OFF→ON	x	ON	x	x	OFF	ON→OFF	3rd (E/B)
	ON	x	x	x	ON	OFF	OFF→ON	4th	ON	x	ON	x	x	OFF	OFF	3rd (E/B)
S1	OFF→ON	x	x	x	ON	OFF	OFF→ON	4th	OFF→ON	x	ON	x	x	OFF	OFF	3rd (E/B)

Position	Shift Solenoid Valve S3, S4 and SR Malfunction								Shift Solenoid Valve S1, S2, S3 and S4 Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	OFF→ ON	ON→ OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	ON→ OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	OFF	x	x	x	ON→ OFF	OFF→ ON	4th	x	x	x	x	OFF→ ON	ON→ OFF	OFF→ ON	5th→ 4th
	ON	ON→ OFF	x	x	x	ON→ OFF	OFF→ ON	4th	x	x	x	x	OFF→ ON	ON→ OFF	OFF→ ON	5th→ 4th
S5	OFF→ ON	ON→ OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	ON→ OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	OFF	x	x	x	ON→ OFF	OFF→ ON	4th	x	x	x	x	OFF→ ON	ON→ OFF	OFF→ ON	5th→ 4th
S4	OFF→ ON	ON→ OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	ON→ OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
S3	OFF→ ON	ON→ OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	ON→ OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	OFF	x	x	x	OFF	OFF→ ON	4th	x	x	x	x	ON	OFF	OFF→ ON	4th
S2	OFF→ ON	ON→ OFF	x	x	x	OFF	ON	4th	x	x	x	x	ON	OFF	ON	4th
	ON	ON→ OFF	x	x	x	OFF	OFF→ ON	4th	x	x	x	x	ON	OFF	OFF→ ON	4th
S1	OFF→ ON	ON→ OFF	x	x	x	OFF	OFF→ ON	4th	x	x	x	x	ON	OFF	OFF→ ON	4th

Position	Shift Solenoid Valve S1, S2, S3 and SR Malfunction								Shift Solenoid Valve S2, S3, S4 and SR Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	x	x	x	OFF	x	OFF	ON	4th	OFF→ ON	x	x	x	x	OFF	ON	4th
	x	x	x	OFF	x	OFF	ON	4th	ON	x	x	x	x	OFF	ON	4th
	x	x	x	OFF	x	OFF	ON	4th	ON	x	x	x	x	OFF	ON	4th
	x	x	x	OFF	x	OFF	ON	4th	ON	x	x	x	x	OFF	ON	4th
	x	x	x	ON	x	ON	OFF	5th	ON	x	x	x	x	ON→ OFF	OFF→ ON	2nd→ 4th
	x	x	x	ON	x	ON	OFF	5th	ON	x	x	x	x	ON→ OFF	OFF→ ON	2nd→ 4th
S5	x	x	x	OFF	x	OFF	ON	4th	OFF→ ON	x	x	x	x	OFF	ON	4th
	x	x	x	OFF	x	OFF	ON	4th	ON	x	x	x	x	OFF	ON	4th
	x	x	x	OFF	x	OFF	ON	4th	ON	x	x	x	x	OFF	ON	4th
	x	x	x	OFF	x	OFF	ON	4th	ON	x	x	x	x	OFF	ON	4th
	x	x	x	ON	x	ON	OFF	5th	ON	x	x	x	x	ON→ OFF	OFF→ ON	2nd→ 4th
S4	x	x	x	OFF	x	OFF	ON	4th	OFF→ ON	x	x	x	x	OFF	ON	4th
	x	x	x	OFF	x	OFF	ON	4th	ON	x	x	x	x	OFF	ON	4th
	x	x	x	OFF	x	OFF	ON	4th	ON	x	x	x	x	OFF	ON	4th
	x	x	x	OFF	x	OFF	ON	4th	ON	x	x	x	x	OFF	ON	4th
S3	x	x	x	OFF	x	OFF	ON	4th	OFF→ ON	x	x	x	x	OFF	ON	4th
	x	x	x	OFF	x	OFF	ON	4th	ON	x	x	x	x	OFF	ON	4th
	x	x	x	OFF	x	OFF	OFF→ ON	4th	ON	x	x	x	x	OFF	OFF→ ON	4th
S2	x	x	x	OFF	x	OFF	ON	4th	OFF→ ON	x	x	x	x	OFF	ON	4th
	x	x	x	OFF	x	OFF	OFF→ ON	4th	ON	x	x	x	x	OFF	OFF→ ON	4th
S1	x	x	x	OFF	x	OFF	OFF→ ON	4th	OFF→ ON	x	x	x	x	OFF	OFF→ ON	4th

Position	Shift Solenoid Valve S1, S3, S4 and SR Malfunction								Shift Solenoid Valve S1, S2, S4 and SR Malfunction							
	Shift Solenoid							Gear	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2		S1	S2	S3	S4	SR	SL1	SL2	
D, S6	x	ON→OFF	x	x	x	OFF	ON	1st→4th	x	x	ON→OFF	x	x	OFF	ON	3rd→4th
	x	ON→OFF	x	x	x	OFF	ON	1st→4th	x	x	ON→OFF	x	x	OFF	ON	3rd→4th
	x	OFF	x	x	x	OFF	ON	4th	x	x	ON→OFF	x	x	OFF	ON	3rd→4th
	x	OFF	x	x	x	OFF	ON	4th	x	x	OFF	x	x	OFF	ON	4th
	x	OFF	x	x	x	ON→OFF	OFF→ON	5th→4th	x	x	OFF	x	x	ON→OFF	OFF→ON	5th→4th
	x	ON→OFF	x	x	x	ON→OFF	OFF→ON	4th	x	x	OFF	x	x	ON→OFF	OFF→ON	5th→4th
S5	x	ON→OFF	x	x	x	OFF	ON	1st→4th	x	x	ON→OFF	x	x	OFF	ON	3rd→4th
	x	ON→OFF	x	x	x	OFF	ON	1st→4th	x	x	ON→OFF	x	x	OFF	ON	3rd→4th
	x	OFF	x	x	x	OFF	ON	4th	x	x	ON→OFF	x	x	OFF	ON	3rd→4th
	x	OFF	x	x	x	OFF	ON	4th	x	x	OFF	x	x	OFF	ON	4th
	x	OFF	x	x	x	ON→OFF	OFF→ON	5th→4th	x	x	OFF	x	x	ON→OFF	OFF→ON	5th→4th
S4	x	ON→OFF	x	x	x	OFF	ON	1st→4th	x	x	ON→OFF	x	x	OFF	ON	3rd→4th
	x	ON→OFF	x	x	x	OFF	ON	1st→4th	x	x	ON→OFF	x	x	OFF	ON	3rd→4th
	x	OFF	x	x	x	OFF	ON	4th	x	x	ON→OFF	x	x	OFF	ON	3rd→4th
	x	OFF	x	x	x	OFF	ON	4th	x	x	OFF	x	x	OFF	ON	4th
S3	x	ON→OFF	x	x	x	OFF	ON	1st→4th	x	x	ON→OFF	x	x	OFF	ON	3rd→4th
	x	ON→OFF	x	x	x	OFF	ON	1st→4th	x	x	ON→OFF	x	x	OFF	ON	3rd→4th
	x	OFF	x	x	x	OFF	OFF→ON	4th	x	x	ON→OFF	x	x	OFF	OFF→ON	3rd (E/B)→4th
S2	x	ON→OFF	x	x	x	OFF	ON	1st→4th	x	x	ON→OFF	x	x	OFF	ON	3rd→4th
	x	ON→OFF	x	x	x	OFF	OFF→ON	1st→4th	x	x	ON→OFF	x	x	OFF	OFF→ON	3rd (E/B)→4th
S1	x	ON→OFF	x	x	x	OFF	OFF→ON	1st→4th	x	x	ON→OFF	x	x	OFF	OFF→ON	3rd (E/B)→4th

Position	Shift Solenoid Valve S1, S2, S3, S4 and SR Malfunction							
	Shift Solenoid							Gear
	S1	S2	S3	S4	SR	SL1	SL2	
D, S6	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	ON→OFF	OFF→ON	5th→4th
	x	x	x	x	x	ON→OFF	OFF→ON	5th→4th
S5	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	ON→OFF	OFF→ON	5th→4th
S4	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	OFF	ON	4th
S3	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	OFF	OFF→ON	4th
S2	x	x	x	x	x	OFF	ON	4th
	x	x	x	x	x	OFF	OFF→ON	4th
S1	x	x	x	x	x	OFF	OFF→ON	4th