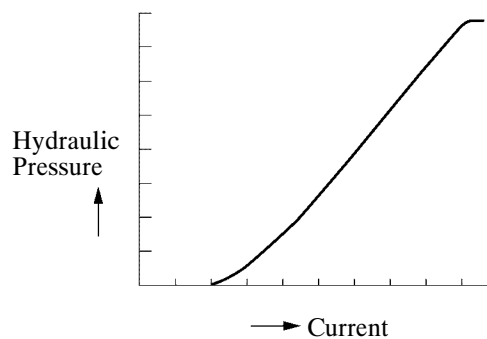
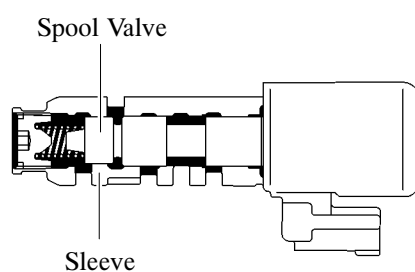
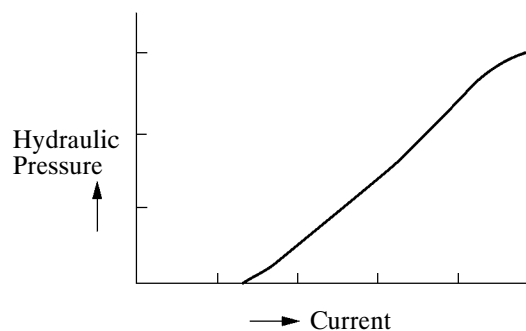
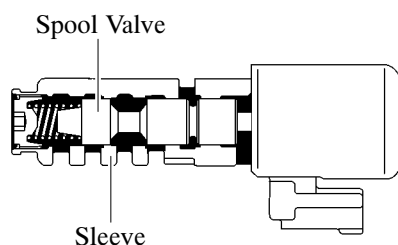
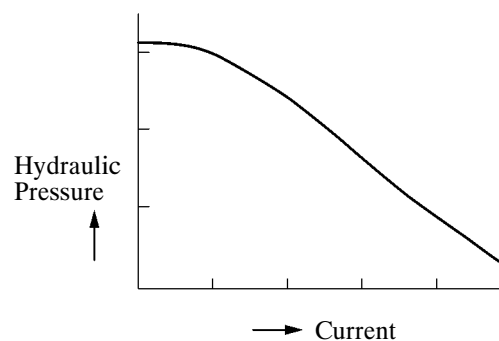
**Shift Solenoid Valve SL2**

036CH29TE

**Shift Solenoid Valve SLU**

036CH27TE

**Shift Solenoid Valve SLT**

036CH28TE

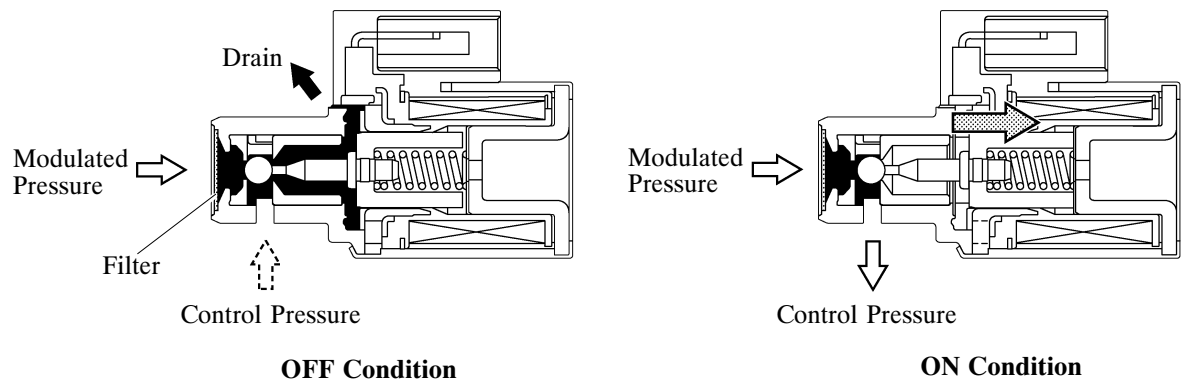
► Function of Shift Solenoid Valves ◀

Shift Solenoid Valve	Function
SL1	C ₁ clutch pressure control
SL2	C ₂ clutch pressure control
SL3	C ₃ clutch pressure control
SL4	C ₄ clutch pressure control
SL5	B ₁ brake pressure control
SLU	<ul style="list-style-type: none"> • Lock-up clutch pressure control • B₂ brake pressure control
SLT	Line pressure control

Shift Solenoid Valve SL and SR

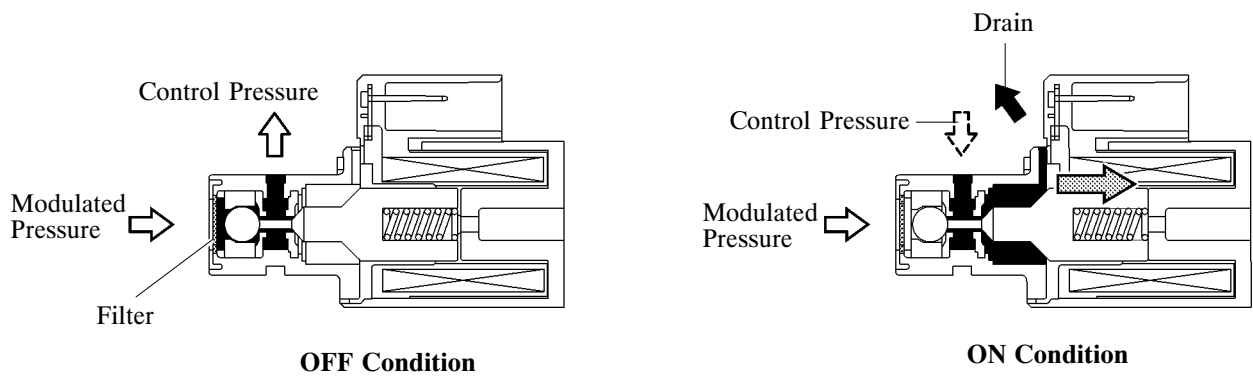
- Shift Solenoid valve SL and SR are 3-way solenoid valves.
- A filter is provided at the tip of the solenoid valve to further improve operational reliability.

► Shift Solenoid Valve SL ◀



036CH52TE

► Shift Solenoid Valve SR ◀



036CH31TE

► Function of Shift Solenoid Valve ◀

Shift Solenoid Valve	Type	Function
SL	3-way	<ul style="list-style-type: none">• Switches the lock-up relay valve.• Switches the reverse control valve.
SR	3-way	<ul style="list-style-type: none">• Switches the clutch apply control valve.• Switches the sequence control valve.

■ ELECTRONIC CONTROL SYSTEM

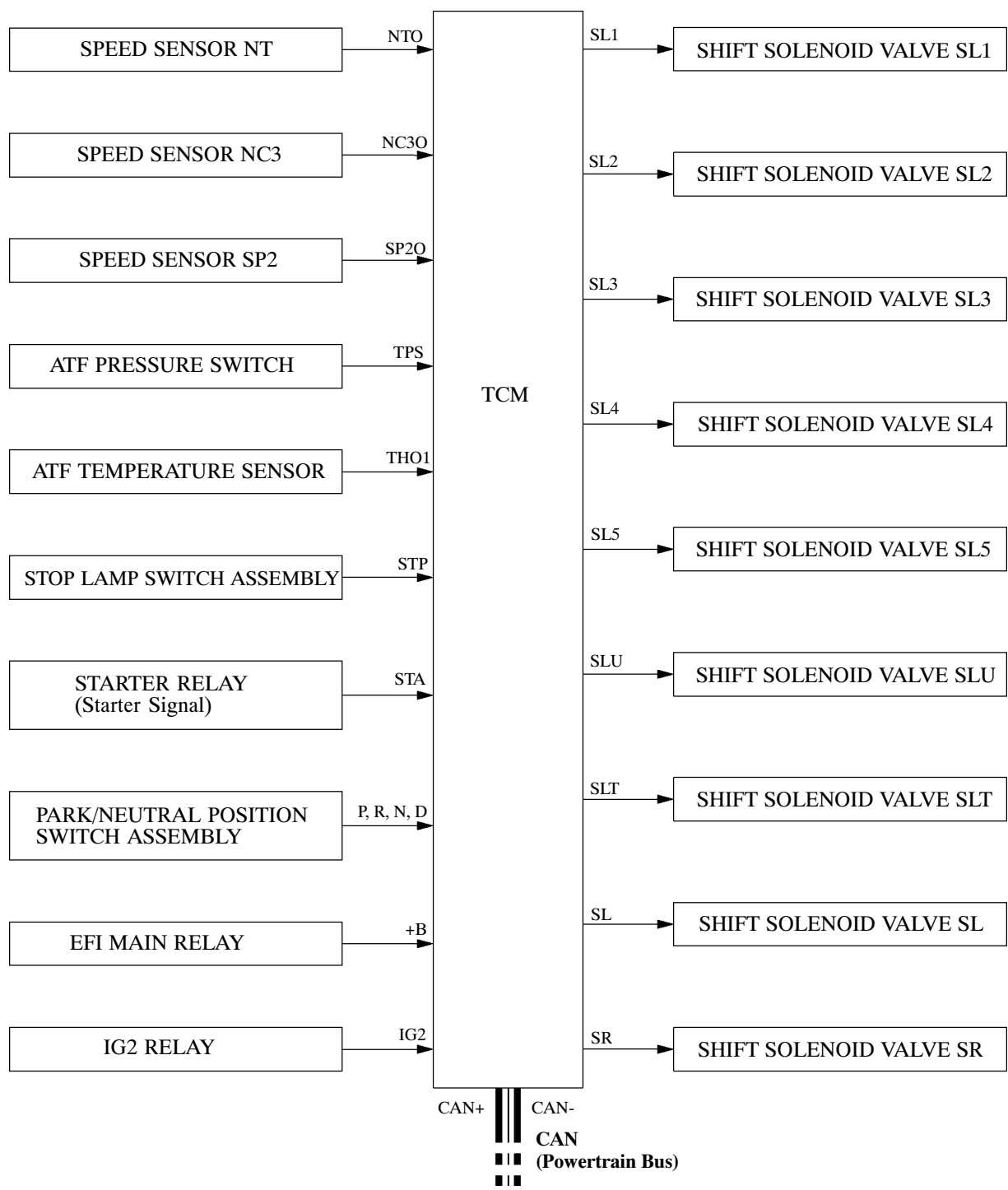
1. General

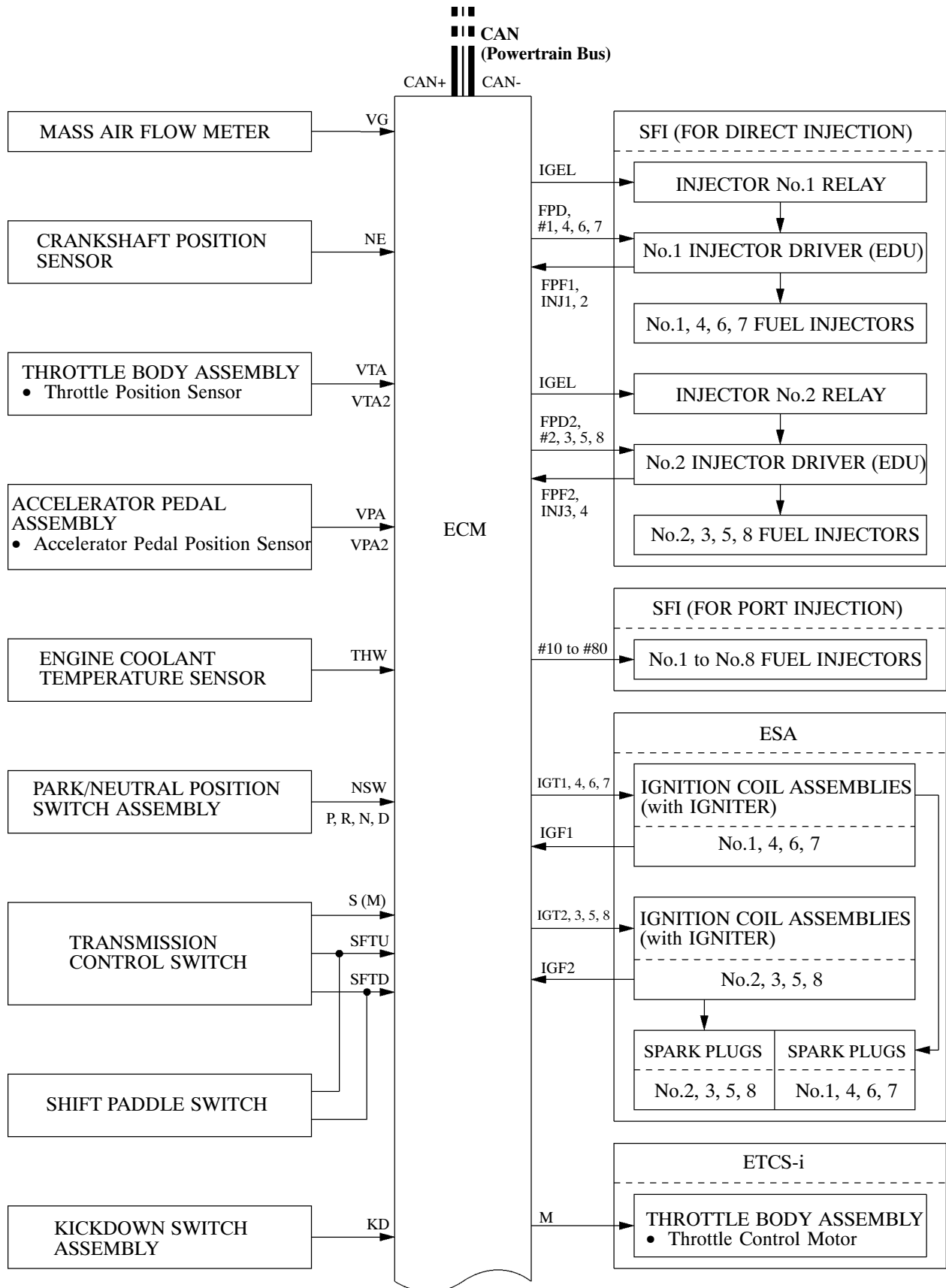
The electronic control system of the AA80E automatic transmission consists of the control functions listed below.

Controls	Outline
Shift Timing Control	The TCM sends current to shift solenoid valves SL1, SL2, SL3, SL4, SL5, SL and/or SLU based on signals from various sensors, in order to shift the gears.
Clutch Pressure Control (See page CH-36)	<ul style="list-style-type: none"> Controls the pressure that is applied directly to the C₁, C₂, C₃, C₄ clutches and B₁ brake by actuating the shift solenoid valves (SL1, SL2, SL3, SL4 and SL5) in accordance with TCM signals. Shift solenoid valves SLT, SLU, SL1, SL2, SL3, SL4 and SL5 minutely control clutch pressure in accordance with the engine output and driving conditions.
Line Pressure Optimal Control (See page CH-38)	Actuates shift solenoid valve SLT to control the line pressure in accordance with information from the TCM and the operating conditions of the transmission.
Lock-up Timing Control (See page CH-38)	The TCM sends current to shift solenoid valve SLU based on signals from various sensors to engage or disengage the lock-up clutch.
Flex Lock-up Clutch Control (See page CH-39)	Controls shift solenoid valve SLU, provides an intermediate mode for when the lock-up clutch is between on and off, increasing the operating range of the lock-up clutch to improve fuel economy.
Powertrain Integrated Control (See page CH-41)	Controls both the shift control and engine output control in an integrated way, achieving excellent shift characteristics and drivability.
Coast Downshift Control (See page CH-44)	To prevent engine speed from decreasing and thereby maintain fuel cut, the TCM performs downshifts before fuel cut ends.
2nd Gear Start-off and Stop Control (See page CH-45)	When the engine idling speed is high while the engine is warming up and the road surface is slippery, 2nd gear start-off and stop control for low-friction roads is automatically used in order to enhance control of driving force using the accelerator.
AI (Artificial Intelligence) -SHIFT Control (See page CH-46)	Based on the signals from various sensors, the TCM determines the road conditions and the intention of the driver. Thus, an appropriate shift pattern is automatically determined, thus improving drivability.
Multi-mode Transmission (See page CH-48)	<ul style="list-style-type: none"> When the shift lever is moved to the M position, 8-speed sport direct shift control is activated, enabling the driver to drive the vehicle in a gear selected using the shift lever or shift paddle switch. Gear hold control, complete lock-up control, super high response upshift control and blipping downshift control are adopted for 8-speed sport direct shift control to produce a direct feeling in response to accelerator and gear shift operation. Operating the shift paddle switch “-” (DOWN) with the shift lever in the D position enables D position (fixed range mode). D position (fixed range mode) enables the driver to drive the vehicle in a desired gear range.
Diagnosis (See page CH-57)	When the TCM detects a malfunction, the TCM records the malfunction and memorizes the information that relates to the fault.
Fail-safe (See page CH-58)	If a malfunction is detected in the sensors or solenoids, the TCM performs fail-safe control to prevent the vehicle's drivability from being affected significantly.

2. Construction

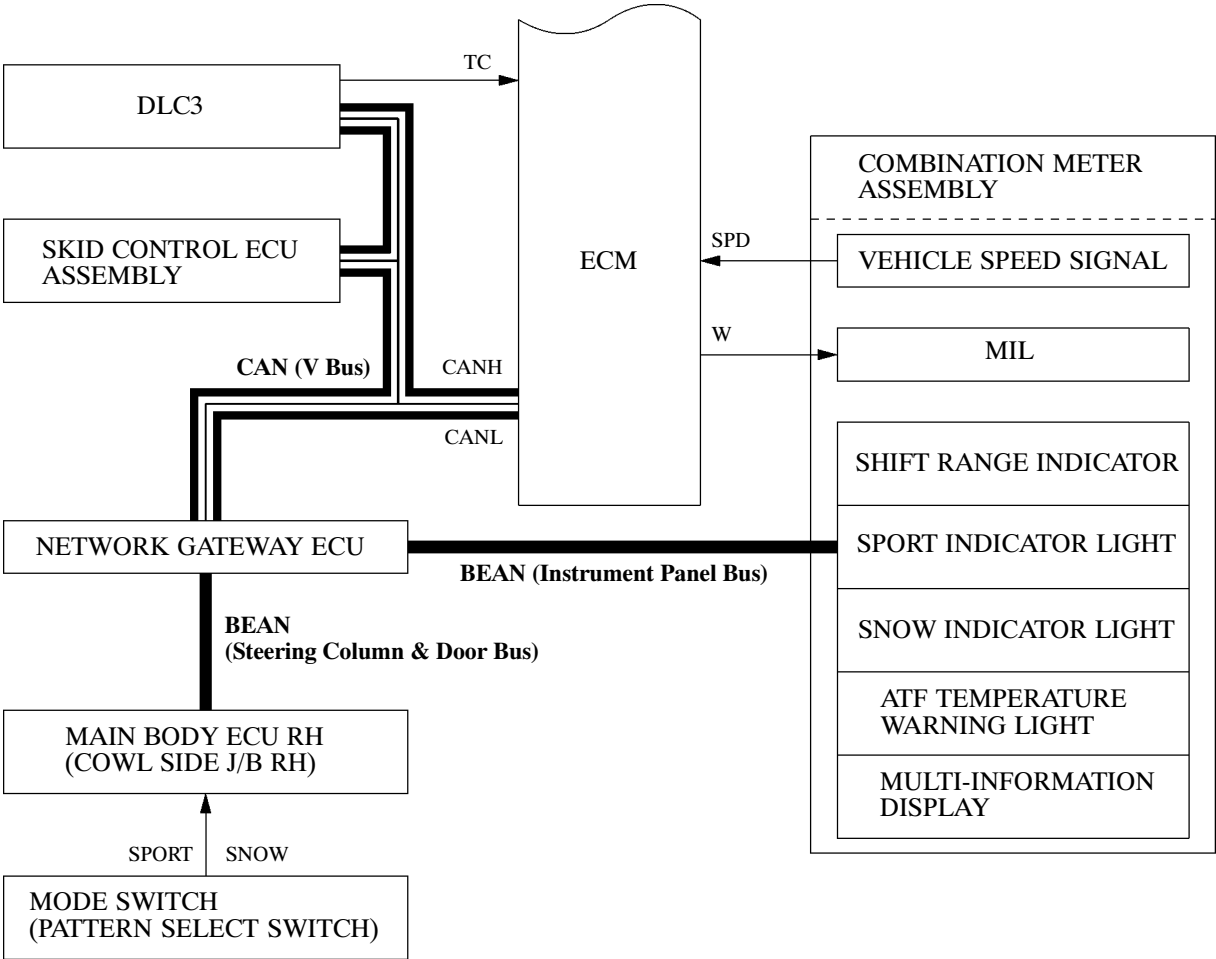
The configuration of the electronic control system in the AA80E automatic transmission is as shown in the following chart.



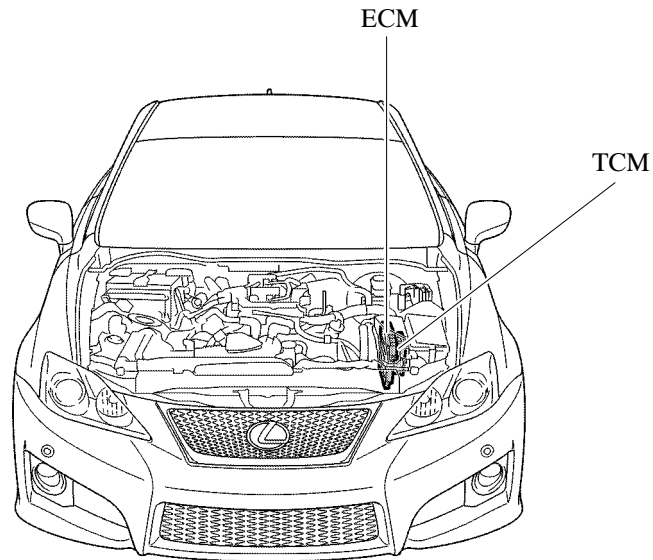


08D0CH61C

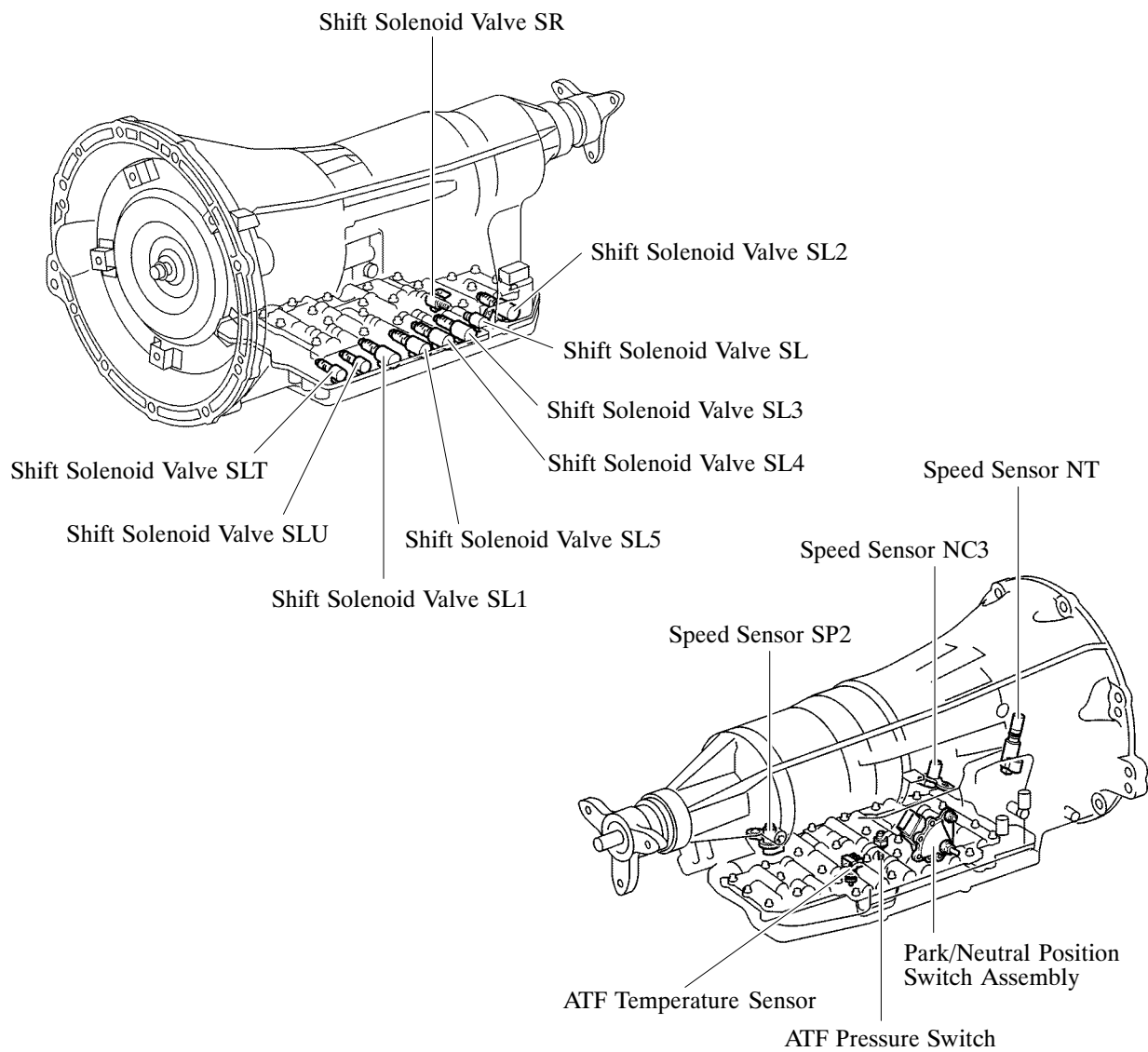
(Continued)



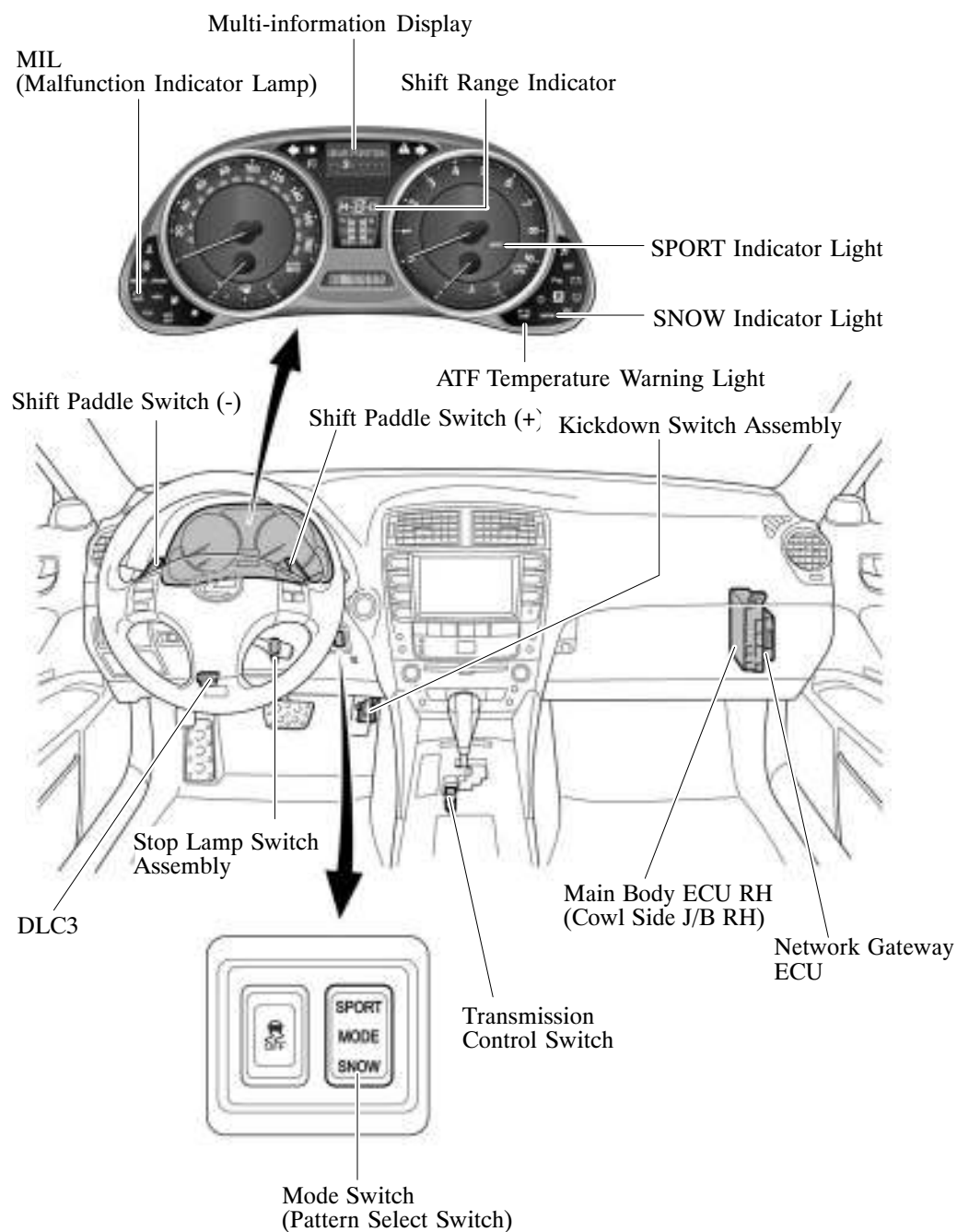
3. Layout of Main Components



08D0CH63Z



08D0CH64Z



4. Construction and Operation of Main Components

TCM

- The TCM has been isolated from the ECM. All the solenoid valves and sensors used for automatic transmission control are directly connected to the TCM through the connector located in side of the automatic transmission.
- The TCM maintains communication with the ECM through the CAN (Controller Area Network). Thus, engine control is effected in coordination with ECT control.

Mode Switch (Pattern Select Switch)

- The mode switch changes control for the engine, automatic transmission, VDIM and electric power steering in an integrated manner. The mode switch makes it possible to select SPORT, Normal or SNOW modes.
- When SPORT mode is selected, the SPORT indicator illuminates, VDIM enters SPORT mode, and the electric power steering, automatic transmission control and engine control all change to SPORT mode.
- When the mode switch is set to SPORT, D position gear shifts, AI-SHIFT selective gear shifts and throttle opening in response to the amount that the accelerator is depressed are changed to produce more sporty characteristics.

► Modes and Their Effect on Controls ◀

Control \ Mode		SPORT	NORMAL	SNOW
Engine-transmission Control	D Position (Normal)	SPORT* ¹	NORMAL	SNOW
	D Position (Fixed Range Mode)	SPORT* ¹ (Fixed Range Mode* ²)	NORMAL (Fixed Range Mode* ²)	SNOW (Fixed Range Mode* ²)
	M Position	Gear Hold Control	Gear Hold Control	Gear Hold Control
VDIM Control		SPORT	NORMAL	NORMAL
Power Steering Control		SPORT	NORMAL	NORMAL
Indicator Light		SPORT (Green)	-	SNOW (Yellow)

*¹: Equivalent to conventional ECT POWER control.

*²: If the speed of the vehicle drops below a designated point, a downshift will be automatically performed from the current gear.

ATF Temperature Warning Light

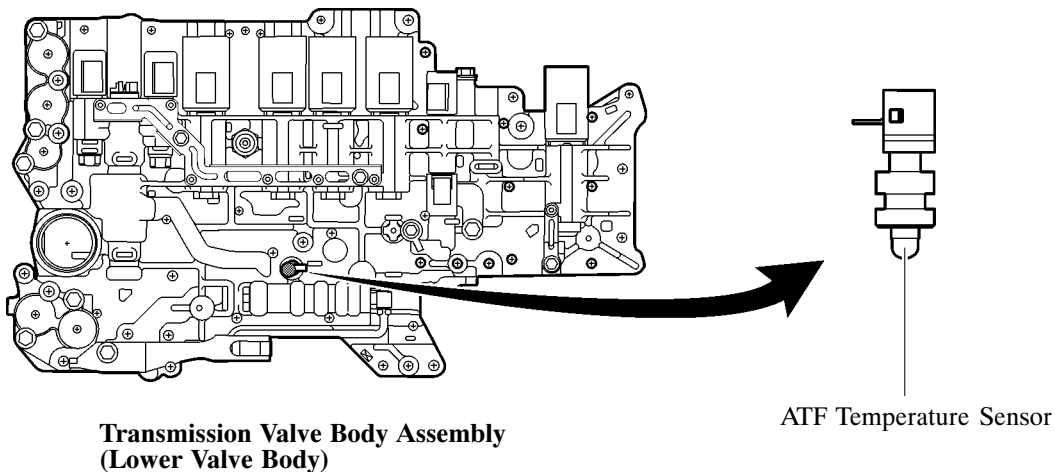
An ATF temperature warning light is adopted to inform the driver in the event that the ATF temperature becomes high. The warning light will go out when the temperature returns to normal.

► Warning Light Illumination ◀

ATF Temperature Warning Light	ATF Temperature
ON	140°C (284°F) or more
OFF	135°C (275°F) or less

ATF Temperature Sensor

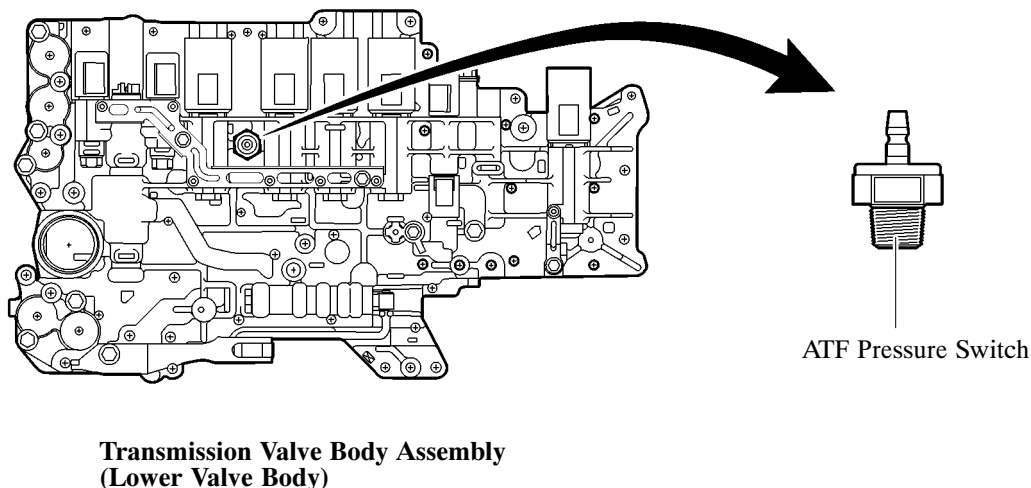
- The ATF temperature sensor is installed in the transmission valve body assembly for direct detection of the fluid temperature.
- The ATF temperature sensor is used for hydraulic pressure control. This sensor is used for fine-tuning the pressure that is used to apply clutches and brakes in the transmission. This helps to ensure smooth shift quality.
- The ATF temperature sensor also is used for the ATF temperature warning light.



08D0CH117C

ATF Pressure Switch

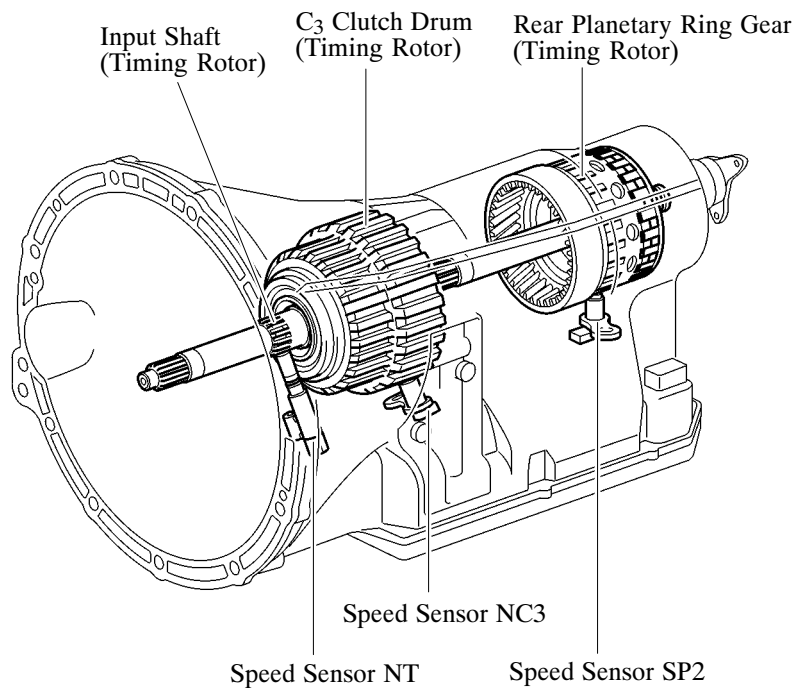
- The ATF pressure switch is located in the output fluid passage of shift solenoid valve SL1, it turns on and off in accordance with the shift solenoid valve SL1 output fluid pressure.
- If shift solenoid valve SL1 malfunctions, the TCM determines the appropriate fail-safe operation to be performed in accordance with the signal from the ATF pressure switch.



036CH35TE

Speed Sensors

- The AA80E automatic transmission uses speed sensor NT, speed sensor NC3 and speed sensor SP2. Thus, the TCM 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 Hall type.
- The speed sensor NT detects the input speed of the transmission. The input shaft is used as the timing rotor for this sensor.
- The speed sensor NC3 detects the speed of intermediate shaft. The C₃ clutch drum is used as the timing rotor for this sensor.
- The speed sensor SP2 detects the speed of the output shaft. The rear planetary ring gear is used as the timing rotor for this sensor.
- Hall type speed sensors consists of a magnet and a Hall IC. The Hall IC converts the changes in the magnetic flux density that occur through the rotation of the timing rotor into an electric signal, and outputs the signal to the TCM.

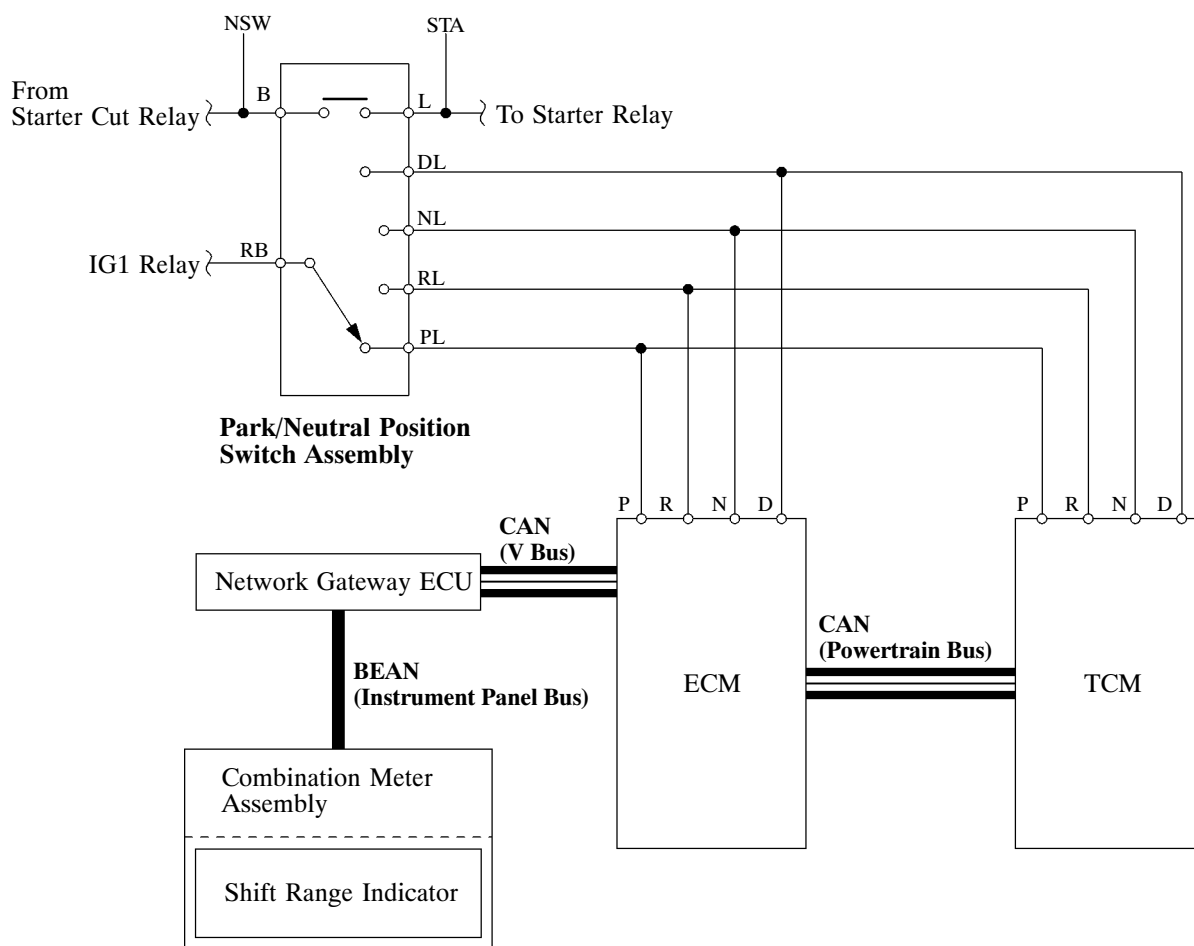


Park/Neutral Position Switch Assembly

The TCM and ECM use these switches to detect the shift lever position.

- The park/neutral position switch assembly detects the shift lever position (P, R, N or D) and transmits the signal to both the ECM and TCM. The ECM then transmits signals to the combination meter for the shift range indicator (P, R, N and D) in response to the signal it received from the switch.

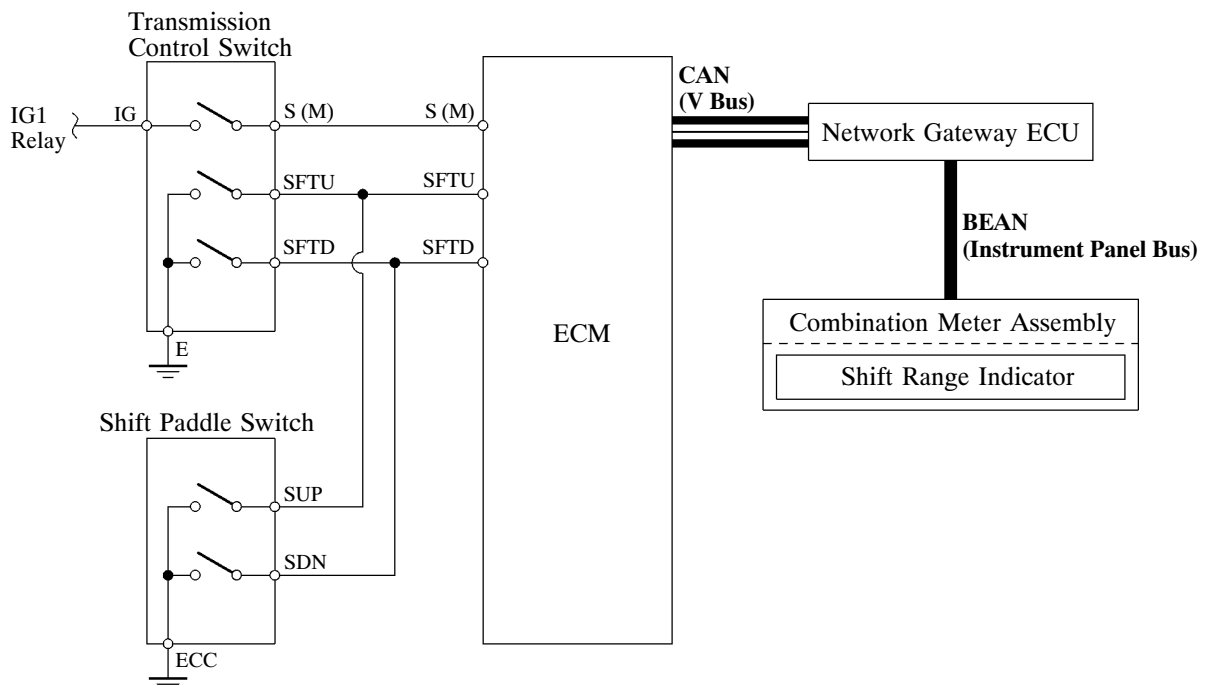
► Wiring Diagram ◀



Transmission Control Switch and Shift Paddle Switch

- The transmission control switch is installed inside the shift lever assembly to inform the ECM of the shift lever position. The ECM turns on the shift range indicator.
- The transmission control switch detects whether the shift lever is in the D position or in the M position. If the shift lever is in the M position, the switch detects the operating conditions of the shift lever (front [“+” position] or rear [“-” position]), and sends signals to the ECM. At this time, the ECM turns on the shift range indicator for the selected range.
- The shift paddle switches are installed in the steering wheel assembly. The ECM detects the operation of the shift paddle switches (right [“+” position] or left [“-” position]) when the shift lever is in the D position or M position. At this time, the ECM turns on the shift range indicator for the selected range or gear.

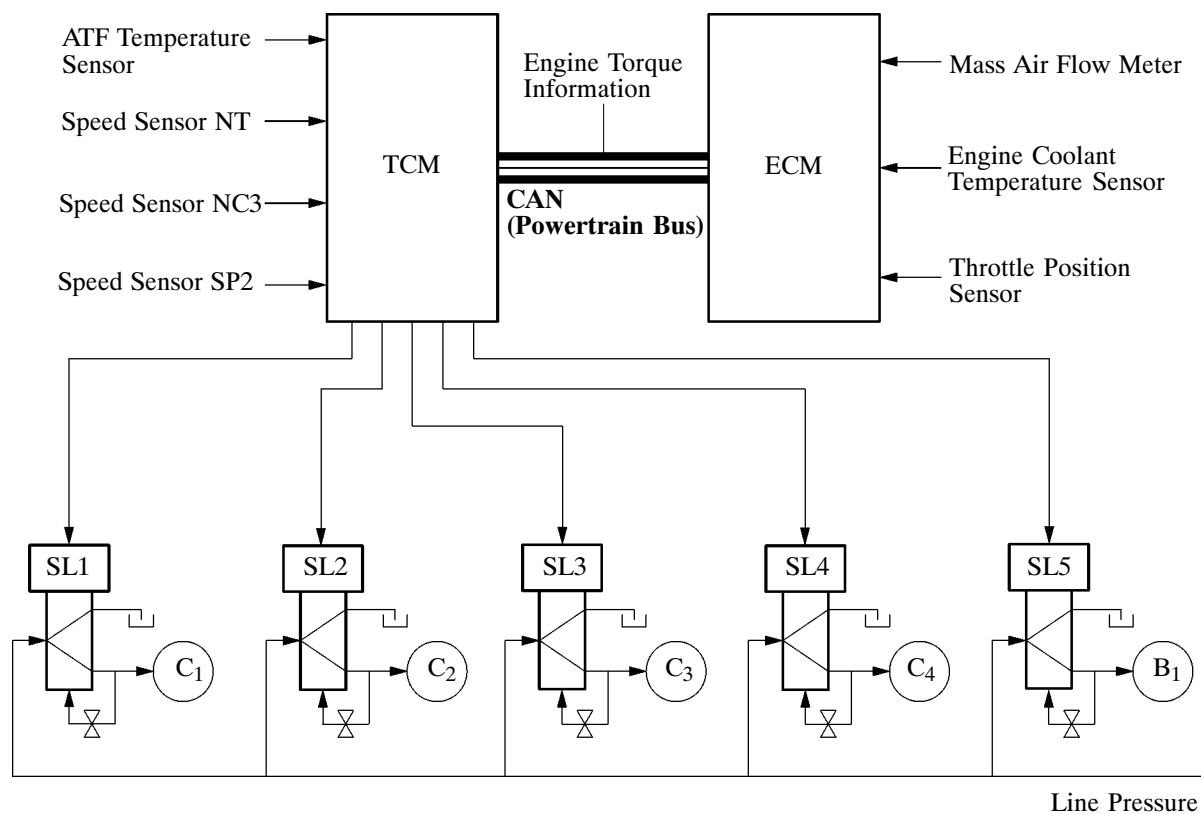
► Wiring Diagram ◀



5. Clutch Pressure Control

Clutch to Clutch Pressure Control

- Clutch to clutch pressure control is used for shift control. As a result, shift control in 2nd gear or above is possible without using a one-way clutch, making the automatic transmission lightweight and compact.
- Based on ECM instructions, the TCM controls each clutch and brake accordingly with the optimum fluid pressure and timing in accordance with the information transmitted by the sensors, in order to shift the gears. The TCM does this using fluid pressure circuits which enable the clutches and brakes (C₁, C₂, C₃, C₄ and B₁) to be controlled independently, and high flow SL1, SL2, SL3, SL4 and SL5 shift solenoid valves, which directly control the line pressure. As a result, highly responsive and excellent shift characteristics have been realized.



Clutch Pressure Optimal Control

The TCM monitors the signals from various types of sensors, such as the speed sensor NT and speed sensor NC3, allowing shift solenoid valves SLT, SL1, SL2, SL3, SL4, SL5 and SLU to minutely control the clutch pressure in accordance with engine output and driving conditions. As a result, smooth shift characteristics have been realized.

