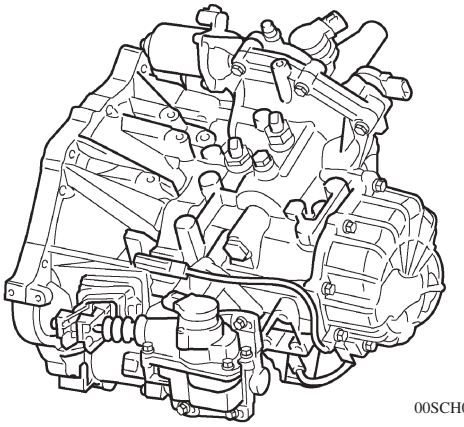
MULTI-MODE MANUAL TRANSMISSION

■C53A AND C551A MULTI-MODE MANUAL TRANSMISSION SYSTEMS

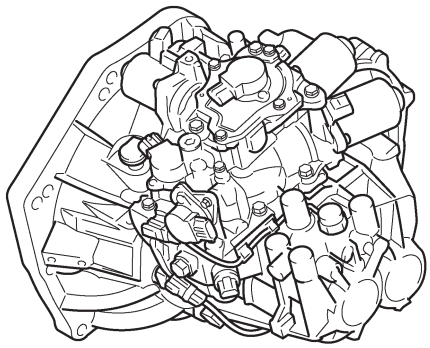
1. General

- C53A multi-mode manual transmission is used on the 1ND-TV engine model.
- C551A multi-mode manual transmission is used on the 1KR-FE and 2SZ-FE engine models.
- The multi-mode manual transmission system consists of two types of shift mode: the E-mode that shifts automatically to suit the driving conditions, and the M-mode that allows the driver to manually operate the shift lever to shift gears without applying the clutch. As a result, good fuel efficiency, ease of driving (in the E-mode) and a sporty drive (in the M-mode) have been realized.
- In the E-mode, the driver can select two shift patterns: the normal [E] pattern and sporty [Es] pattern.
- This system consists of C53A and C551A multi-mode manual transmissions, engine ECU, M-MT (Multi-mode Manual Transmission) ECU, LCC (Load Controlled Clutch cover), and shift lever. The C53A and C551A multi-mode manual transmissions are based on the C53 and C551 manual transaxles, to which clutch actuator, shift & select actuator, transmission revolution sensor, and neutral start switch have been added.
- The basic constructions and main operations of the multi-mode manual transmission system for the new model are same as those on the previous model (Pub. No. NCF244E).



00SCH02Y

C53A (1ND-TV)



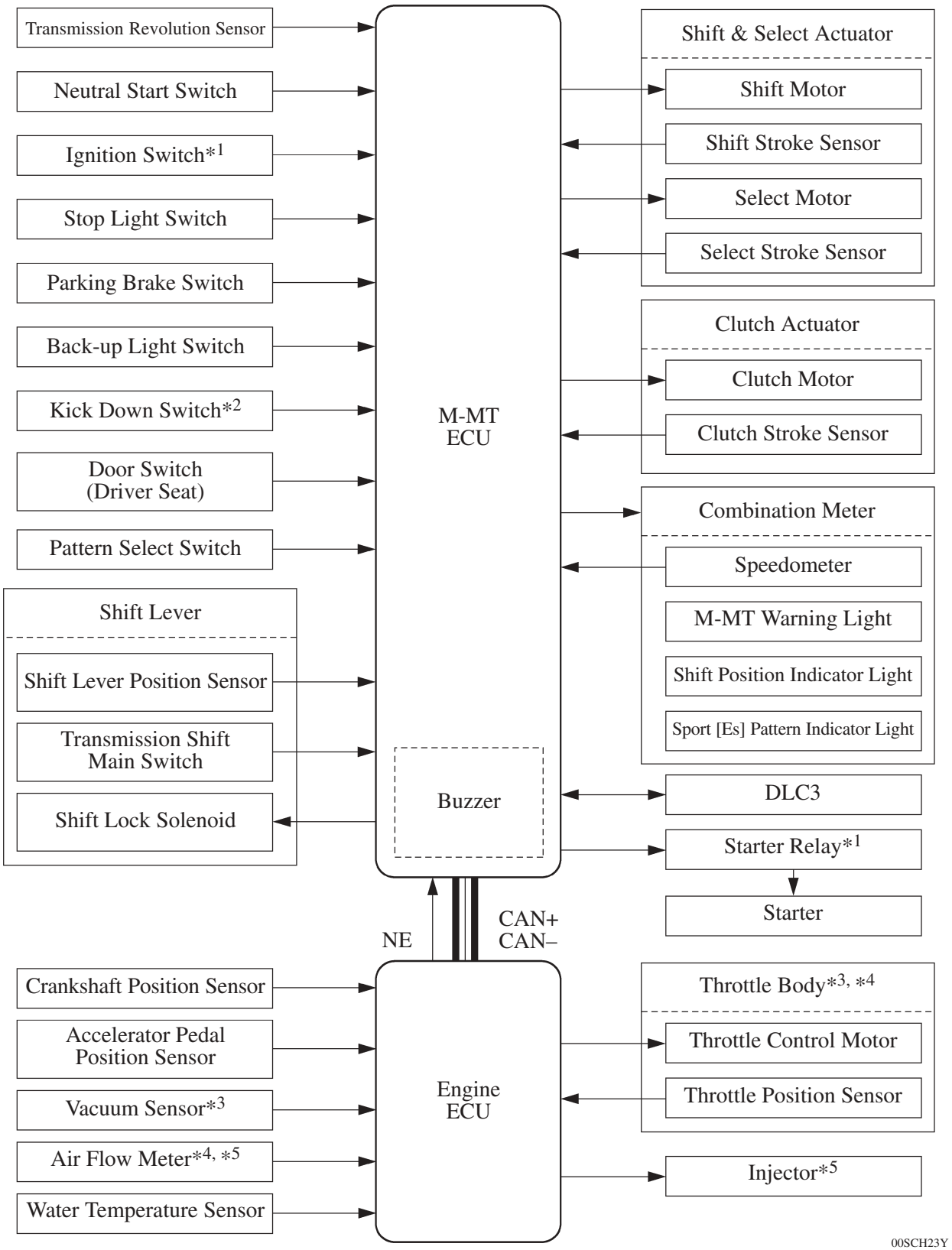
00SCH04Y

C551A (1KR-FE, 2SZ-FE)

▶ Specifications ◀

Transaxle Type		C53A	C551A	
Engine Type		1ND-TV	1KR-FE	2SZ-FE
Gear Ratio	1st	3.545	←	←
	2nd	1.904	1.913	←
	3rd	1.310	←	←
	4th	0.969	1.027	←
	5th	0.725	0.850	←
	Reverse	3.250	3.214	←
Differential Gear Ratio		3.526	4.411	4.055
Oil Capacity	Liters (US qts, Imp. qts)	1.9 (2.0, 1.7)	1.7 (1.8, 1.5)	←
Oil Viscosity		SAE 75W	←	←
Oil Grade		API GL-4	←	←

2. System Diagram

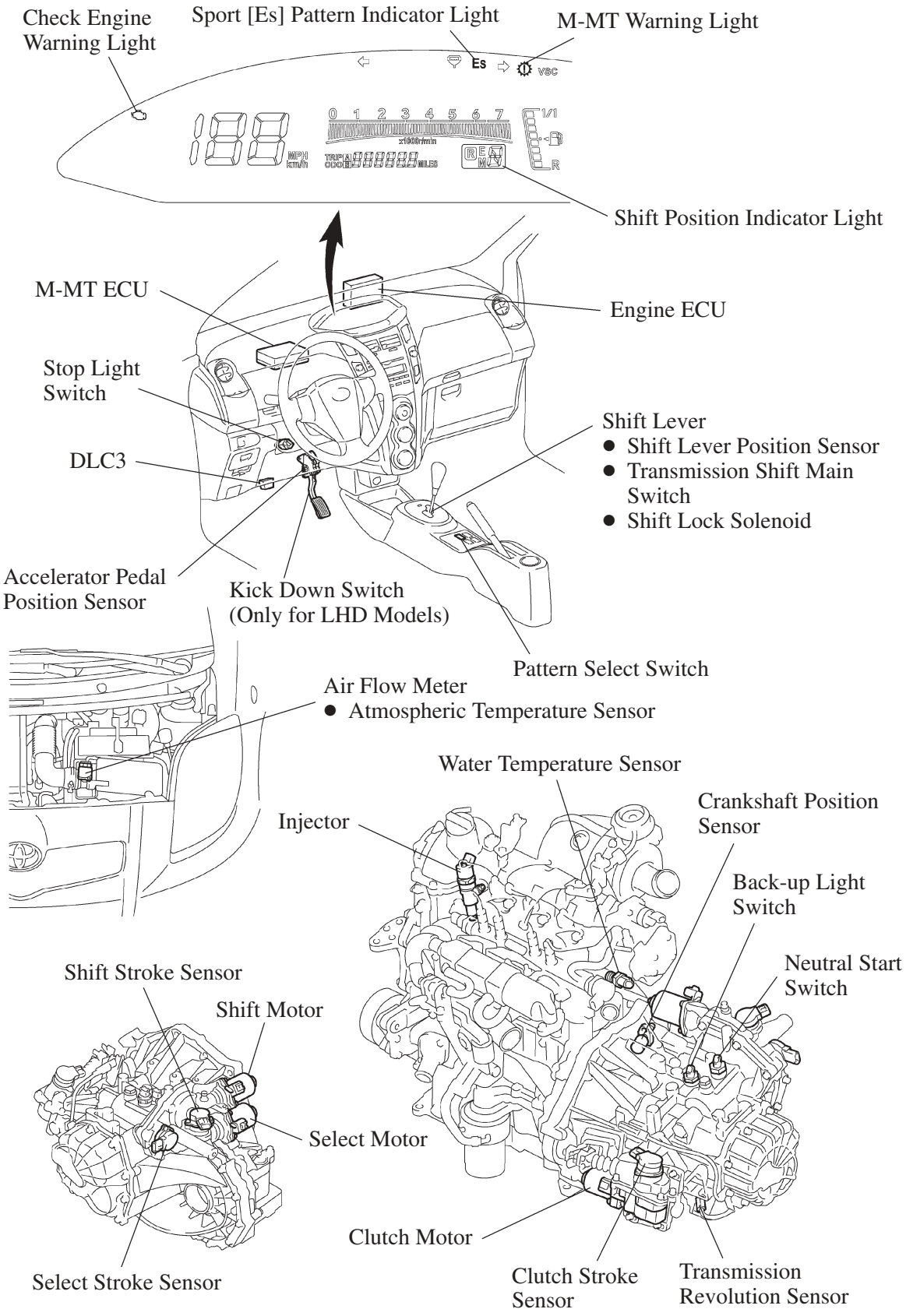


*1: See page BE-60 for vehicles equipped with the smart entry & start system.
*2: Only for LHD Models *3: 1KR-FE Engine Models *4: 2SZ-FE Engine Models
*5: 1ND-TV Engine Models

CH

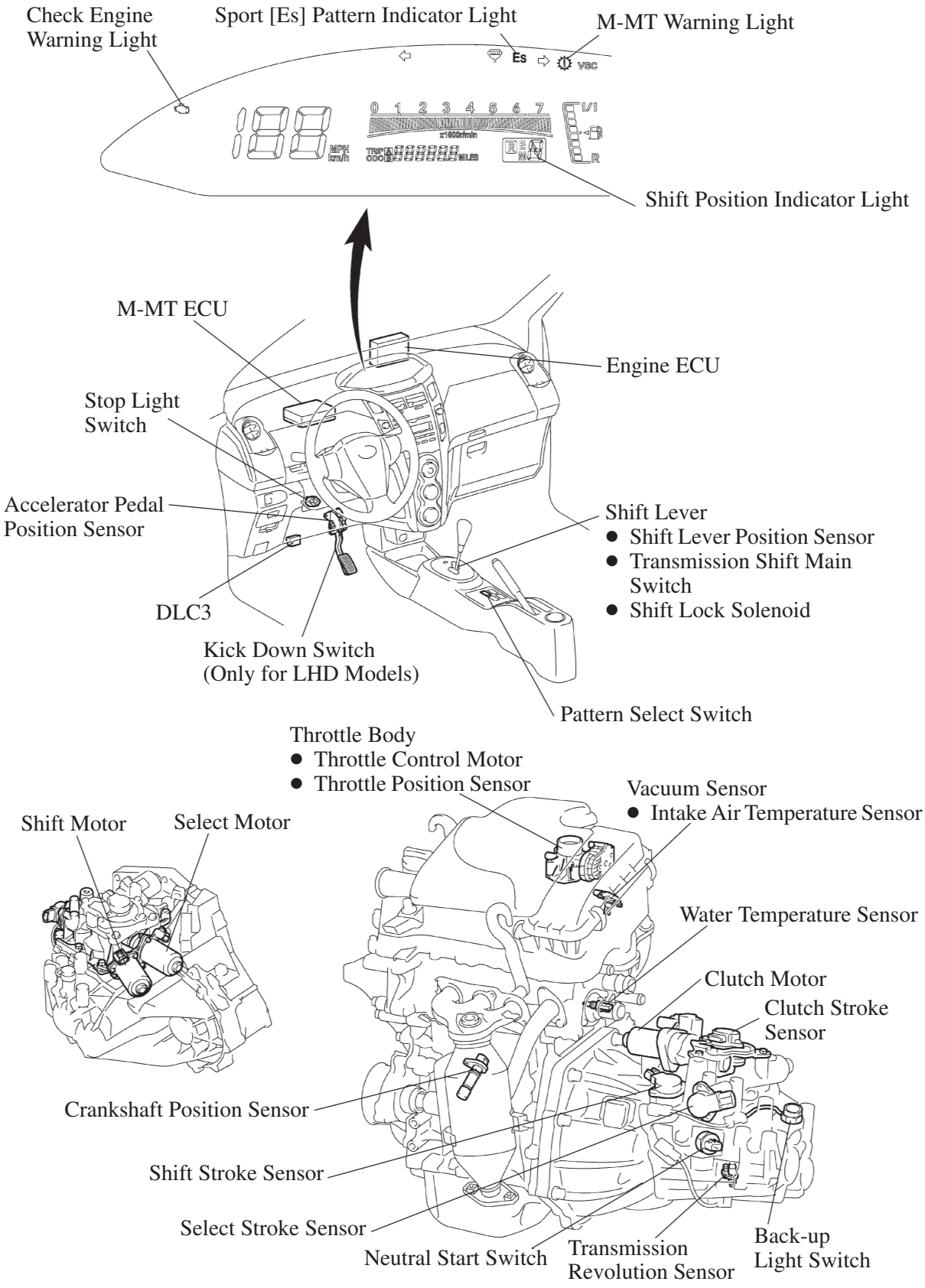
3. Layout of Main Components

▶ C53A Multi-mode Manual Transmission (For 1ND-TV Engine Model) ◀



00SCH73Y

▶ C551A Multi-mode Manual Transmission (For 1KR-FE Engine Model) ◀



00SCH47Y

CH

4. Function of Main Components

Component		Outline
Clutch Actuator	Clutch Motor	Actuated by the M-MT ECU, the clutch motor engages and disengages the clutch via the reduction gear with the assist spring.
	Clutch Stroke Sensor	Detects the amount of the clutch stroke from the rotational angle of the worm wheel and relays this information to the M-MT ECU in the form of feedback signals.
Shift & Select Actuator	Shift Motor	Actuated by the M-MT ECU, the shift motor effects the shift operation of the shift & select lever shaft via the reduction gear.
	Shift Stroke Sensor	Detects the length of the shift stroke of the gear shift fork from the rotational angle of the shift & select lever shaft and relays this information to the M-MT ECU in the form of feedback signals.
	Select Motor	Actuated by the M-MT ECU, the select motor effects the select operation of the shift & select lever shaft via the rack & pinion gear.
	Select Stroke Sensor	Detects the length of the select stroke of the gear shift fork from the rotational angle of the shift & select lever shaft and relays this information to the M-MT ECU in the form of feedback signals.
Shift Lever	Shift Lever Position Sensor	The M-MT ECU determines the shift lever position from the ON/OFF combination of the 8-position switch that is built in.
	Transmission Shift Main Switch	The M-MT ECU determines the shift mode (M-mode or E-mode) through the condition of this switch.
	Shift Lock Solenoid	Actuated by the M-MT ECU, the shift lock solenoid restricts the movement of the shift lever.
Clutch Cover	LCC Mechanism	Actuated by the M-MT ECU and the clutch actuator, the pressure plate height of the LCC is mechanically adjusted to a predetermined position, in order to apply a constant load to the clutch motor.
Throttle Body*1, *2	Throttle Control Motor	Actuated by the ETCS-i (Electronic Throttle Control System-intelligent) in the engine ECU, the throttle motor controls the throttle valve position at the torque requested by the M-MT ECU. For details of the ETCS-i control, see page EG-44.
	Throttle Position Sensor	Detects the throttle valve position and outputs it to the engine ECU.
Injector*3		Receives signals from the engine ECU and performs fuel volume control. For details of the fuel volume control, see page EG-178.
Combination Meter	Meter ECU	● Controls the operation of the indicator lights and warning lights. ● Outputs the vehicle speed signal from the skid control ECU to the M-MT ECU.
	M-MT Warning Light	Lights up to alert the driver when a malfunction occurs in the multi-mode manual transmission system.
	Shift Position Indicator Light	Indicates the present gear position. In addition, this indicator light flashes if the actual gear position and the shift lever position do not match.
	Sport [Es] Pattern Indicator Light	Illuminates by pressing the pattern select switch and informs the driver of driving in the sport pattern.
Vacuum Sensor*1	Intake Air Temperature Sensor	This sensor detects the external air temperature and outputs it to the M-MT ECU via the engine ECU. (For shift protection control)
Air Flow Meter	Intake Air Temperature Sensor*2	
	Atmospheric Temperature Sensor*3	

*1: 1KR-FE Engine Models *2: 2SZ-FE Engine Models *3: 1ND-TV Engine Models

(Continued)

Component		Outline
Transmission Revolution Sensor		Detects the input shaft speed of the transaxle and outputs it to the M-MT ECU.
Accelerator Pedal Position Sensor		Detects the accelerator pedal position and outputs it to the engine ECU.
Crankshaft Position Sensor		Detects the engine speed and outputs it to the M-MT ECU via the engine ECU.
Water Temperature Sensor		Detects the water temperature and outputs it to the M-MT ECU via the engine ECU. (for shift protection control)
Kick Down Switch (Only for LHD Models)		Detects beyond the full-throttle opening and outputs it to the M-MT ECU.
Neutral Start Switch		Detects the neutral position of the transaxle and outputs it to the M-MT ECU.
Back-up Light Switch		Detects the reverse position of the transaxle, outputs it to the M-MT ECU, and controls the operation of the back-up lights.
Stop Light Switch		Detects that the brake pedal is applied and outputs this information to the M-MT ECU.
Pattern Select Switch		Switches the driving pattern ([E] or [Es]) in the E-mode.
Starter Relay		The M-MT ECU restricts the operation of the starter relay in accordance with the gear position and the braking conditions, in order to control the operation of the starter.
M-MT ECU		● Controls the multi-mode manual transmission system; in addition, requests the engine ECU to effect ETCS-i control during upshift or downshift via CAN (Controller Area Network) communication. ● When the transmission control ECU detects a malfunction, the transmission control ECU makes a diagnosis and memorizes the failed section. Furthermore, the M-MT warning light and check engine warning light illuminate or blink to inform the driver.
	Buzzer	● Sounds a built-in buzzer during system warning. ● Sounds if the driver door is opened while the engine is idling and the shift lever is in the E, M, or R position.
Engine ECU		Effects engine output control per request from the M-MT ECU.