



TRAINING MANUAL

Mazda6 Facelift

ZOOM-ZOOM



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Training Services

ZOOM-ZOOM

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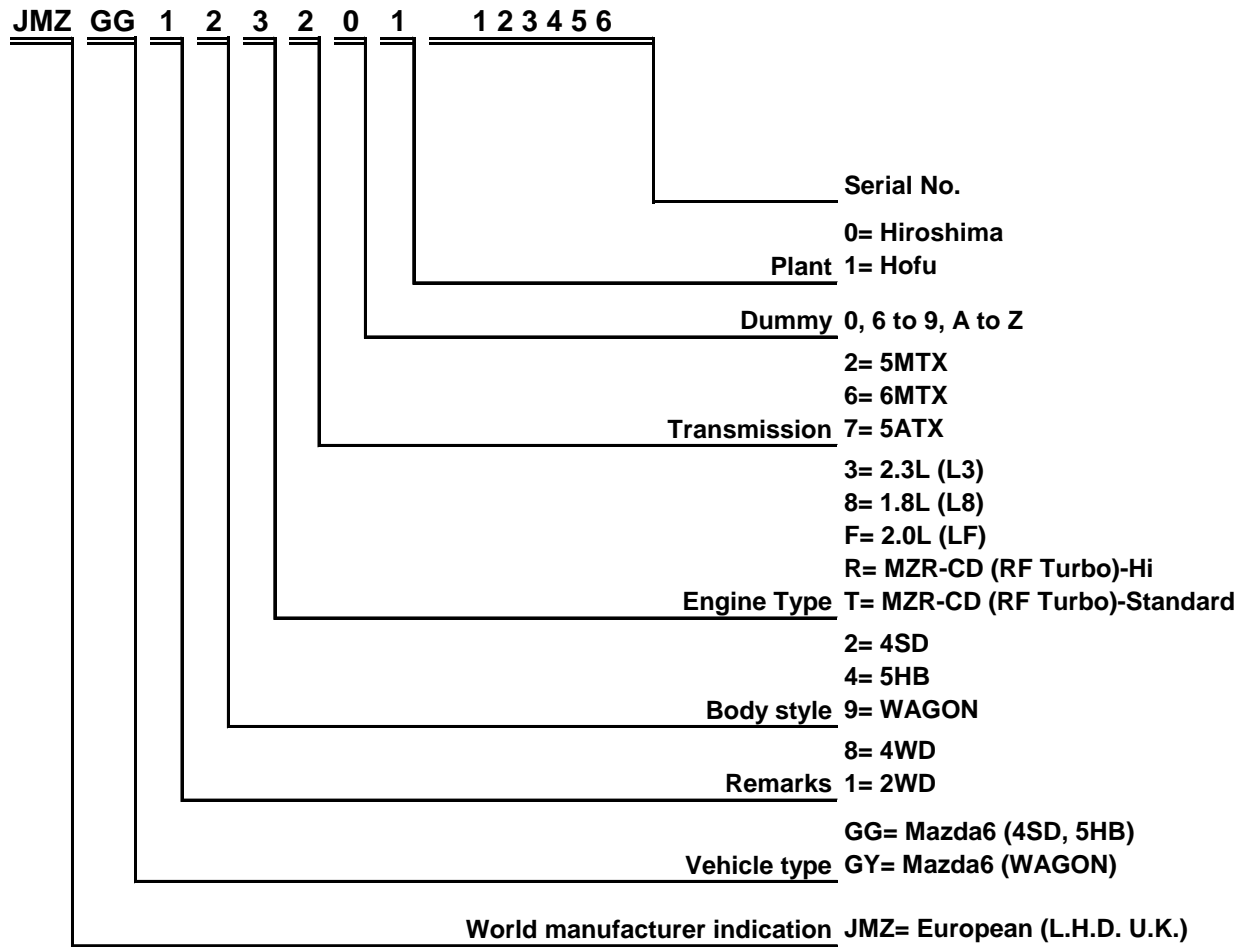
General Information

00 General Information

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General Information

Vehicle Identification Number (VIN) Code



M6FL_00T001

Applicable VIN

- | | | |
|----------------------|----------------------|----------------------|
| JMZ GG1236*# 600001— | JMZ GG14360# 600001— | JMZ GY19820# 400001— |
| JMZ GG12360# 600001— | JMZ GG1482*# 600001— | JMZ GY19F6*# 400001— |
| JMZ GG1282*# 600001— | JMZ GG14820# 600001— | JMZ GY19F60# 400001— |
| JMZ GG12820# 600001— | JMZ GG14F6*# 600001— | JMZ GY19R6*# 400001— |
| JMZ GG12F6*# 600001— | JMZ GG14F60# 600001— | JMZ GY19R60# 400001— |
| JMZ GG12F60# 600001— | JMZ GG14R6*# 600001— | JMZ GY19T6*# 400001— |
| JMZ GG12R6*# 600001— | JMZ GG14R60# 600001— | JMZ GY19T60# 400001— |
| JMZ GG12R60# 600001— | JMZ GG14T6*# 600001— | JMZ GY8937*# 400001— |
| JMZ GG12T6*# 600001— | JMZ GG14T60# 600001— | JMZ GY89370# 400001— |
| JMZ GG12T60# 600001— | JMZ GY1936*# 400001— | |
| JMZ GG1436*# 600001— | JMZ GY1982*# 400001— | |

Engine / Transaxle Combinations

- All engines have been revised. New transaxles have been added to the range. The following engine/transaxle combinations are available:

	G35M-R 5-speed manual transaxle	G66M-R 6-speed manual transaxle	A26M-R 6-speed manual transaxle	FS5A-EL 5-speed automatic transaxle (front wheel drive)	JA5AX-EL 5-speed automatic transaxle (All Wheel Drive (AWD))
L8 1.8L 88 KW (120 HP) at 5,500 rpm 165 Nm at 4,300 rpm	X				
LF 2.0L 108 KW (147 HP) at 6,500 rpm 184 Nm at 4,000 rpm		X		X	
L3 2.3L 122 KW (166 HP) at 6,500 rpm 207 Nm at 4,000 rpm		X		X	X
RF Turbo STD 2.0L 89 KW (121 HP) at 3,500 rpm 320 Nm at 2,000 rpm			X		
RF Turbo HI 2.0L 105 KW (143 HP) at 3,500 rpm 360 Nm at 2,000 rpm			X		

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General Information

Scheduled Maintenance

Europe

Maintenance items	Maintenance interval (number of months or km (miles) which ever comes first)									
	Months	12	24	36	48	60	72	84	96	108
	X1000 km	20	40	60	80	100	120	140	160	180
	X1000 miles	12,5	25	37,5	50	62,5	75	87,5	100	112,5
PETROL ENGINE										
Engine valve clearance	Audible inspect every 120,000km (75,000 miles), if noisy adjust									
Spark plugs	Replace every 100,000km (62,500miles)									
Air cleaner element			R				R			R
Evaporation system(if installed)			I				I			I
DIESEL ENGINE										
Engine valve clearance	I						I			
Engine timing belt *2	Replace every 120,000 km (75,000 miles)									
Fuel filter			R				R			R
Fuel injection system	I		I				I			I
Fuel system (Drain water)	D	D	D	D	D	D	D	D	D	D
Air cleaner element*1	C	C	R	C	C	R	C	C	R	
PETROL AND DIESEL ENGINE										
Engine oil*3	R	R	R	R	R	R	R	R	R	R
Engine oil filter *3	R	R	R	R	R	R	R	R	R	R
Drive belt *4			I				I			I
Cooling system (including coolant level adjustment)		I		I			I		I	
Engine coolant	FL 22 type *5	Replace every 200,000 km (125,000 miles) Or 11 years								
	Others	Replace at first 100,000 km (62,500 miles) or 4 years; after that, every 2years								
Fuel lines and hoses		I		I			I		I	
Battery electrolyte level and specific gravity	I	I	I	I	I	I	I	I	I	I
Brakes lines hoses and connections	I	I	I	I	I	I	I	I	I	I
Brake fluid *6		R		R			R		R	
Parking brake	I	I	I	I	I	I	I	I	I	I
Disc brakes	I	I	I	I	I	I	I	I	I	I
Steering operation and linkages	I	I	I	I	I	I	I	I	I	I
Manual transaxle oil						R				
Automatic transaxle fluid level			I				I			I
Rear differential oil (for 4 WD)	*7 *8									
Transfer oil (for 4 WD)	*8									
Front and rear suspension and ball joints		I		I			I		I	
Drive shaft dus boots		I		I			I		I	
Exhaust system and heat shields	Inspect every 80,000 km (50,000 miles) or 5 years									
Body condtion (for rust, corrosion and perforation)	Inspect annually									
Cabin air filter (if installed)		R		R			R		R	
Tires (including spare tire) (with inflation pressure adjustment)	I	I	I	I	I	I	I	I	I	I

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- I:** Inspect: Inspect and clean, repair, adjust, or replace if necessary.
R: Replace
C: Clean
D: Drain

Remarks:

*1 If the vehicle is operated in very dusty or sandy areas, clean and if necessary, replace the air filter more often than the recommended intervals.

*2 Replacement of the timing belt is required at every 120,000 km (75,000 miles). Failure to replace the timing belt may result in damage to the engine.

*3 If the vehicle is operated under any of the following conditions, change the engine oil and oil filter every 10,000 km (6,250 miles) or shorter.

- a) Driving in dusty conditions
- b) Extended periods of idling or low speed operation
- c) Driving for long period in cold temperatures or driving regularly at short distance only

*4 Also inspect and adjust the power steering and air conditioner drive belts, if installed.

*5 Use FL22 type coolant in vehicles with the inscription "FL22" on the radiator cap itself or the surrounding area. Use FL22 when replacing the coolant.

*6 If the brakes are used extensively (for example, continuous hard driving or mountain driving) or if the vehicle is operated in extremely humid climates, change the brake fluid annually.

*7 If the vehicle is operated under any of the following conditions, change the rear differential oil every 45,000 km (28,100 miles).

- a) Towing a trailer or using a car-top carrier
- b) Driving in dusty, sandy or wet condition
- c) Extended periods of idling or low speed operation
- d) Repeated short trips of less than 16 km (10 miles)

*8 If this component has been submerged in water, the oil should be changed.

01

Engines

01 Engine

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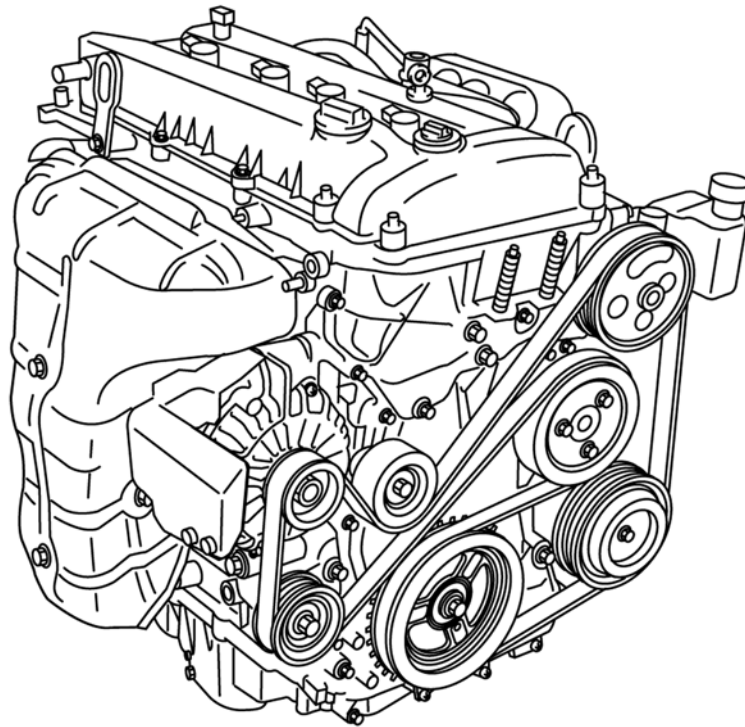
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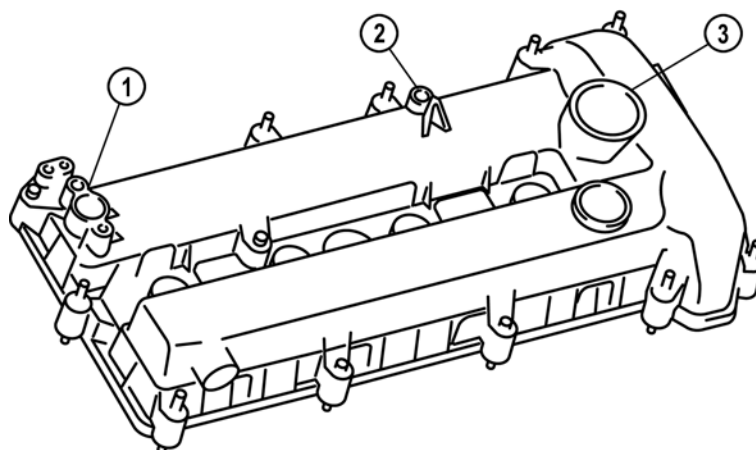
Mechanics



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Cylinder Head Cover

- The cylinder head cover is made of plastic. On LF and L3 engines a hole is provided for installation of the **OCV (Oil Control Valve)**.
- A dipstick insertion hole has been equipped to the cylinder head cover.



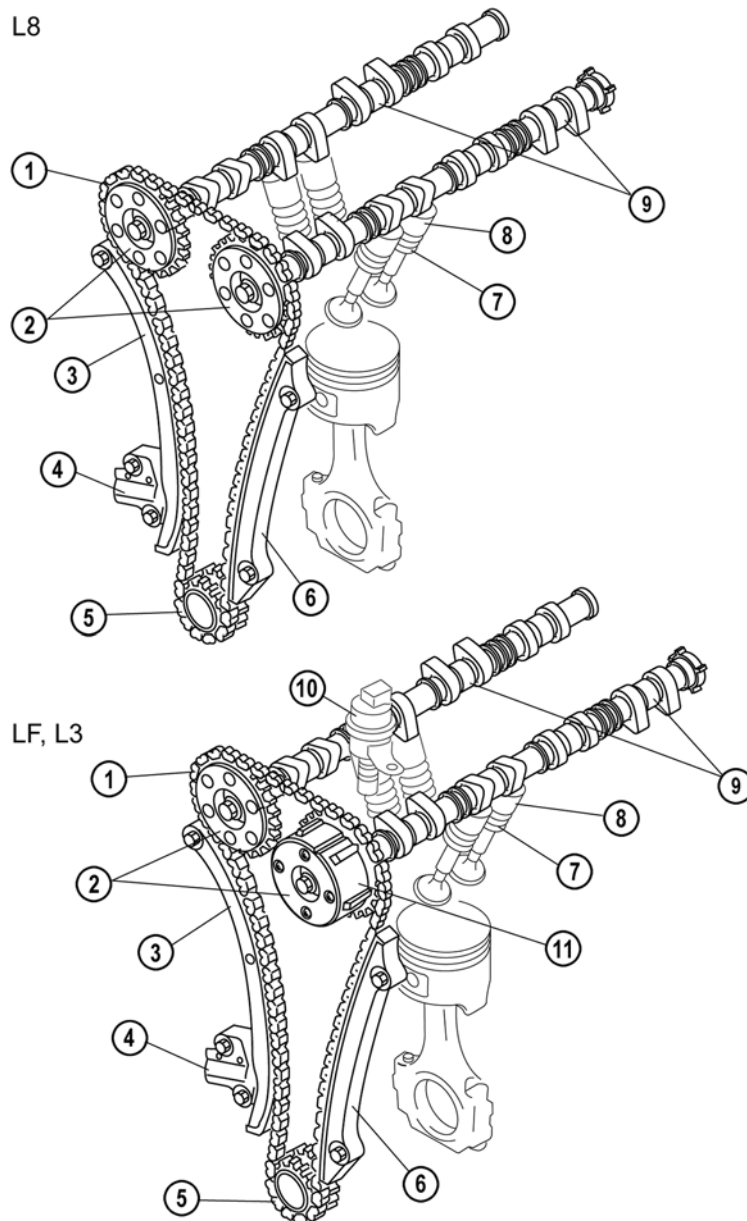
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- 1 **CMP (Camshaft Position)** sensor attachment part
- 2 Dipstick insertion hole

- 3 OCV attachment hole (LF, L3)

Valve Mechanism

- For the LF engine the variable valve timing system has been carried over from the L3 engine.
- All engines use a sensor ring with 6 reference cams for the CMP Sensor on the intake camshaft.

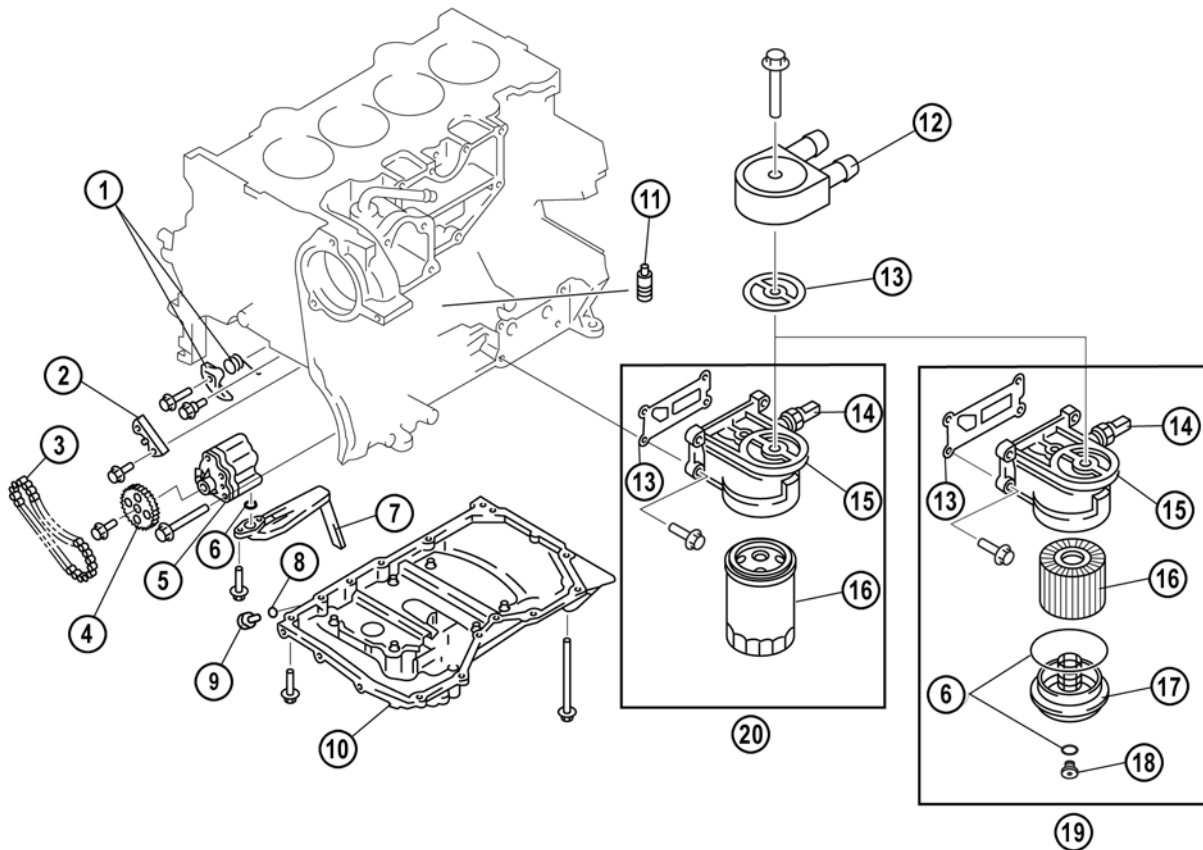


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- | | | | |
|---|---------------------|----|--------------------------------|
| 1 | Timing chain | 7 | Valve assembly |
| 2 | Camshaft sprocket | 8 | Tappet |
| 3 | Tensioner arm | 9 | Camshafts |
| 4 | Chain tensioner | 10 | OCV |
| 5 | Crankshaft sprocket | 11 | Variable valve timing actuator |
| 6 | Chain guide | | |

Lubrication

- The lubrication system has been carried over from the previous engines. Depending on specification, both spin-on and cartridge type oil filters are available.
- The oil cooler is now installed on both the L3 and the LF engine.

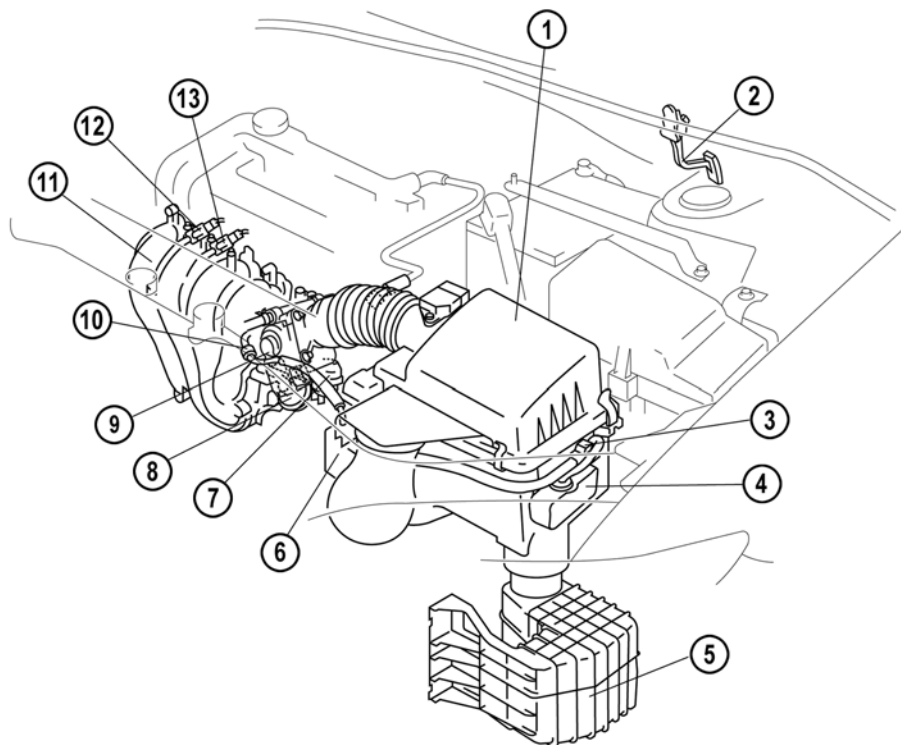


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- | | | | |
|----|--------------------------|----|---------------------------|
| 1 | Oil pump chain tensioner | 11 | Oil jet valve |
| 2 | Oil pump chain guide | 12 | Oil cooler (LF, L3) |
| 3 | Oil pump chain | 13 | Gasket |
| 4 | Oil pump sprocket | 14 | Oil pressure switch |
| 5 | Oil pump | 15 | Oil filter adapter |
| 6 | O-ring | 16 | Oil filter |
| 7 | Oil strainer | 17 | Oil filter cover |
| 8 | Washer | 18 | Oil filter drain plug |
| 9 | Oil pan drain plug | 19 | Cartridge type oil filter |
| 10 | Oil pan | 20 | Spin-on type oil filter |

Intake-Air System

- The intake-air system has been basically carried over from the previous engines. It comprises:
 - **VTCS (Variable Tumble Control System)** (L8, LF, L3)
 - **VIS (Variable Intake-air System)** (LF, L3)
 - **VAD (Variable Air Duct)** (L3)
- All petrol engines now use an electronic throttle control.
- For the LF engine the VIS has been carried over from the L3 engine.

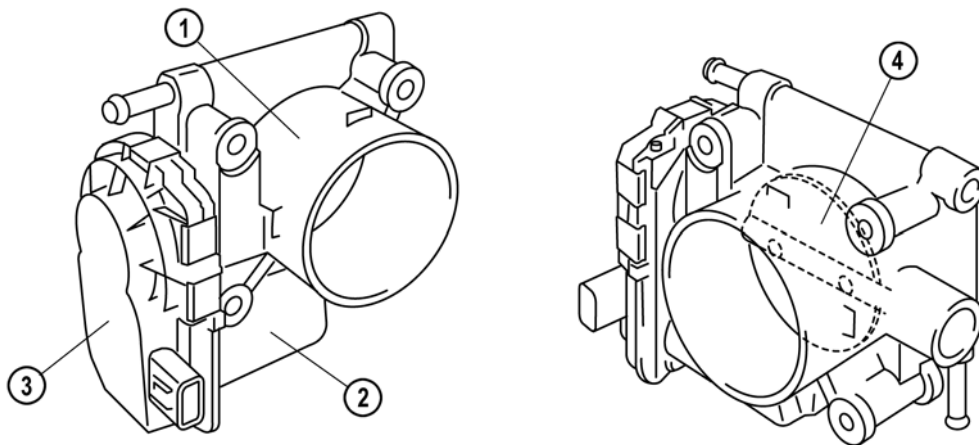


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|---|-----------------------------|----|-------------------------------------|
| 1 | Air cleaner | 8 | VIS shutter valve actuator (LF, L3) |
| 2 | Accelerator pedal | 9 | Throttle body |
| 3 | VAD solenoid valve (L3) | 10 | VAD check valve (one-way) (L3) |
| 4 | VAD shutter valve (L3) | 11 | Intake manifold |
| 5 | Resonance chamber | 12 | VIS solenoid valve (LF, L3) |
| 6 | VAD vacuum chamber (L3) | 13 | VTCS solenoid valve |
| 7 | VTCS shutter valve actuator | | |

Electronic Throttle Control

- All engines are using an electronically controlled throttle body, which is quite similar to the one on RX-8. This supersedes the **IAC (Idle Air Control)** valve.
- To keep moisture from freezing inside the throttle body, and thus to prevent the throttle valve from getting stuck, engine coolant is circulated through the throttle body.
- The throttle body cannot be disassembled.
- When the throttle actuator is not energized, the throttle valve is maintained slightly open by the force of the return spring. This allows limited operation of the engine in case of a malfunction.



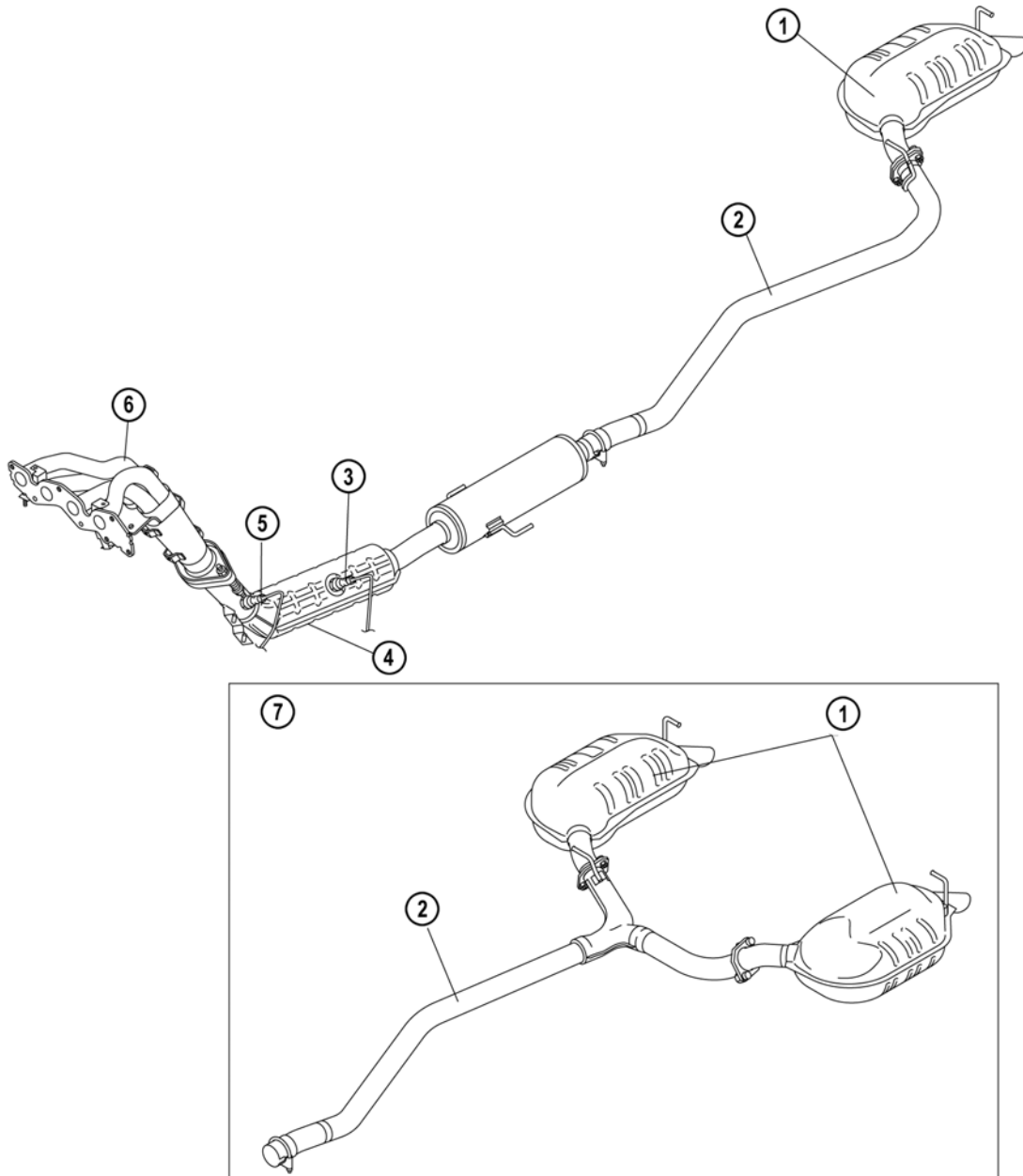
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- 1 Throttle body
- 2 Throttle actuator

- 3 **TP (Throttle Position)** sensor
- 4 Throttle valve

Exhaust System

- The exhaust system has been carried over from the previous Mazda6.
- Vehicles specified with LF engine are now using the exhaust system with two main silencers (previously used on L3 engines only).



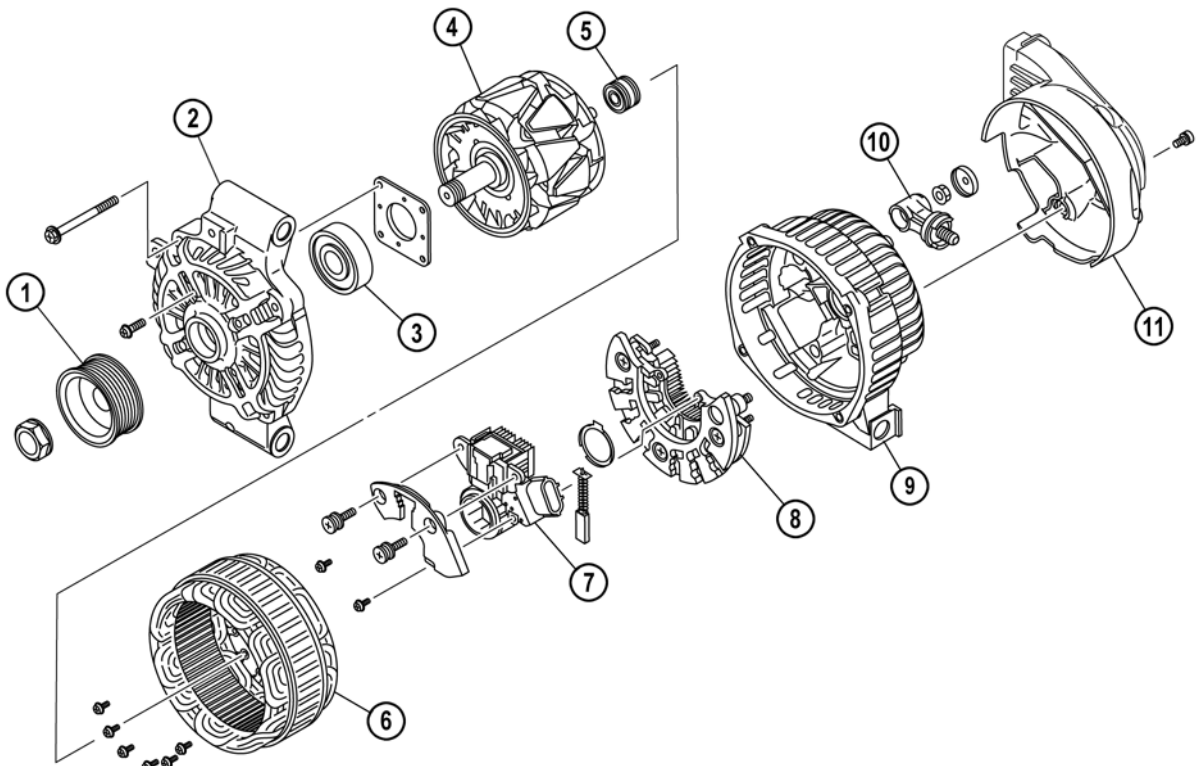
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- | | | | |
|---|---|---|------------------|
| 1 | Main silencer | 5 | HO2S (front) |
| 2 | Middle pipe | 6 | Exhaust manifold |
| 3 | HO2S (H eated O xxygen S ensor) (rear) | 7 | LF, L3 |
| 4 | TWC (T hree- W ay C atalyst) | | |

Charging System

Generator Design

- Generator control is carried out by the **PCM (Powertrain Control Module)**. Excitation current in the field coil is increased or decreased by the power transistor built into the generator. The power transistor is controlled by a duty signal from the PCM.
- A generator duct made of plastic, and a generator heat insulator made of iron have been adopted to protect the generator from the exhaust manifold heat.

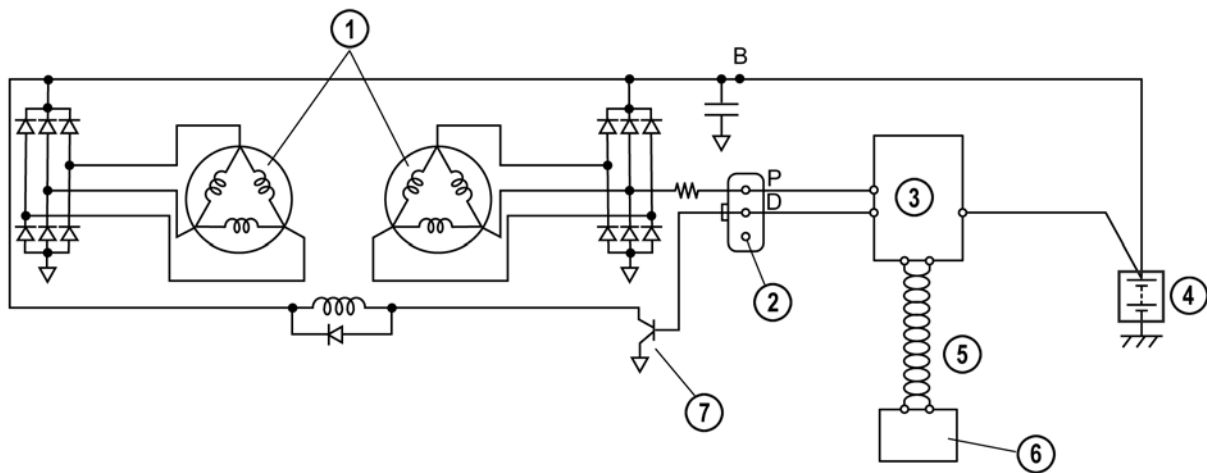


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- | | | | |
|---|---------------|----|---|
| 1 | Pulley | 7 | Regulator component (built-in power transistor) |
| 2 | Front cover | 8 | Rectifier |
| 3 | Front bearing | 9 | Rear cover |
| 4 | Rotor | 10 | Terminal B connector |
| 5 | Rear bearing | 11 | Heat insulator |
| 6 | Stator coil | | |

Generator Electrical Diagram

- Two delta connection type stator coils have been introduced. Due to this, the generator operation noise (electrical noise) is reduced and pulsation occurring through voltage rectifying in the stator coil is minimized, as a result, stable voltage output is supplied.
- The generator warning light in the instrument cluster illuminates under the following conditions:
 - Charging system voltage low input
 - Charging system voltage high input
 - IAT sensor circuit low input
 - IAT sensor circuit high input

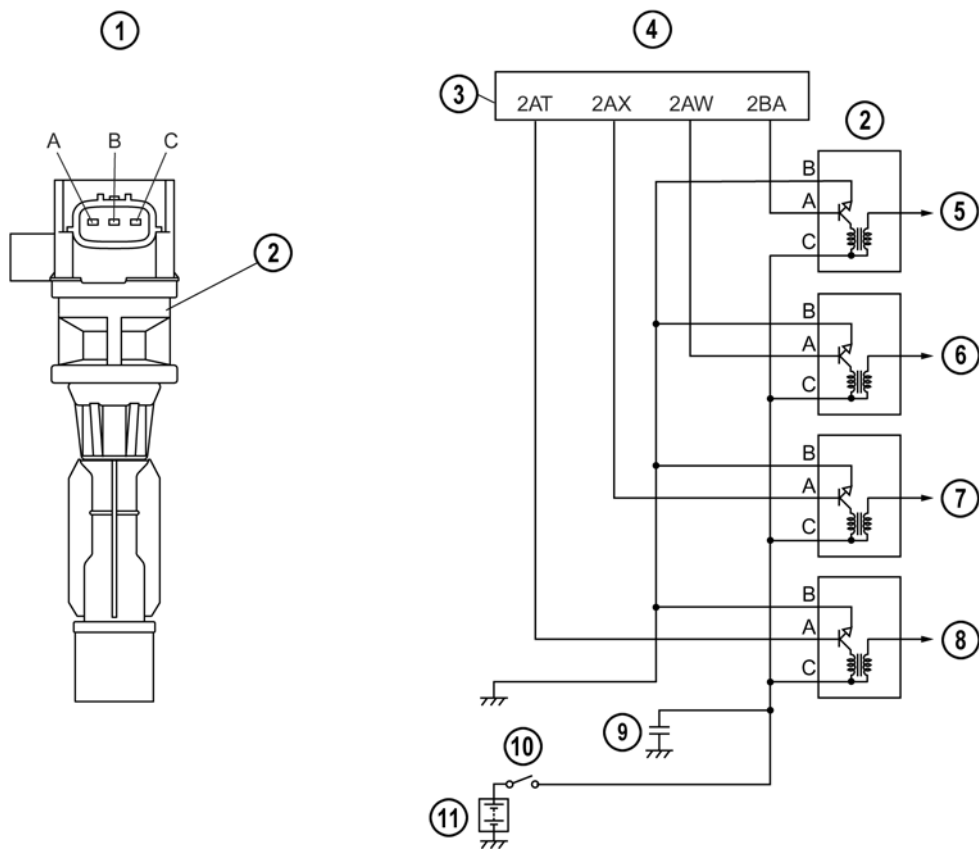


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- | | | | |
|---|-------------------|---|--------------------------------------|
| 1 | Stator coil | 5 | CAN (Controller Area Network) |
| 2 | Terminal not used | 6 | Instrument cluster (warning light) |
| 3 | PCM | 7 | Power transistor |
| 4 | Battery | | |

Ignition System

- The petrol engines use direct ignition coils which are installed directly to each spark plug. By adopting direct ignition coils, high-tension leads have been eliminated in order to simplify the parts of the ignition system, preventing voltage reduction, and improving the firing efficiency.
- In addition to that, the use of direct ignition coils allows independent firing control.
- The direct ignition coil consists of an ignition coil, ignition coil connector, and boot area, which has the same function as the current high-tension lead.
- The igniter has been integrated into each ignition coil.
- The firing timing of the coil is controlled by the PCM for optimum ignition timing control.

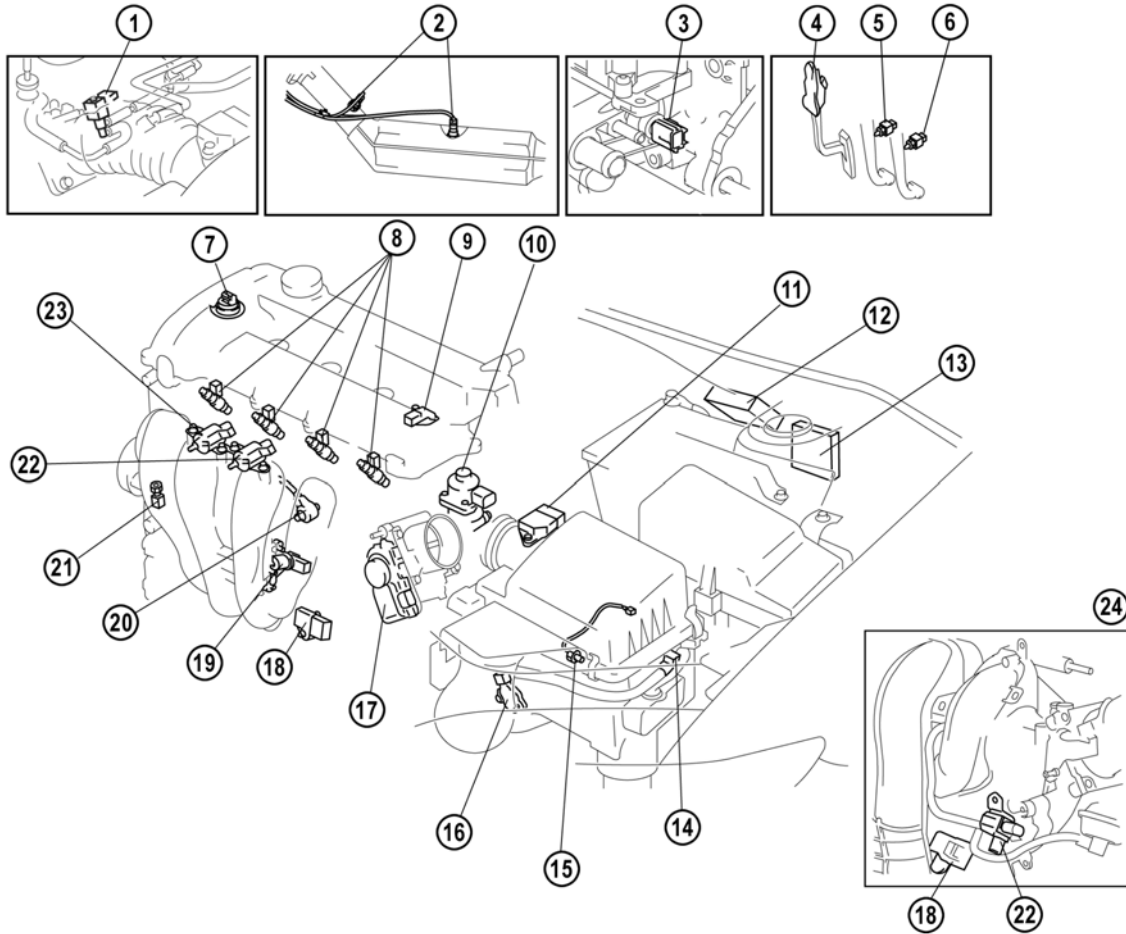


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- | | | | |
|---|--|----|-----------------------|
| 1 | Ignition coil external view | 7 | Cylinder number No. 3 |
| 2 | Ignition coil | 8 | Cylinder number No. 4 |
| 3 | PCM | 9 | Condenser |
| 4 | Ignition coil electrical system wiring diagram | 10 | Ignition switch |
| 5 | Cylinder number No. 1 | 11 | Battery |
| 6 | Cylinder number No. 2 | | |

Engine Control System

Structural View

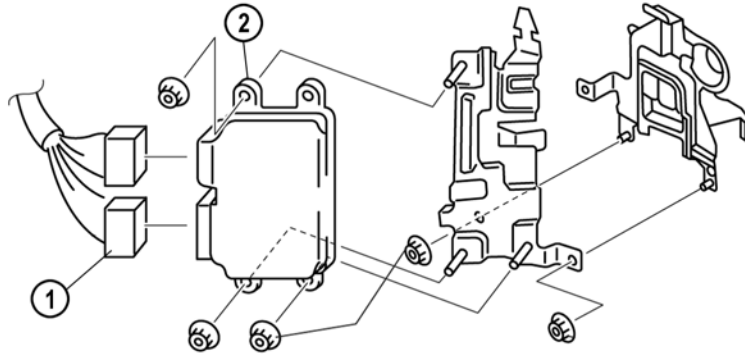


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- | | | | |
|----|---|----|---|
| 1 | Purge valve | 13 | PCM (LHD) |
| 2 | HO2S (front, rear) | 14 | VAD solenoid valve (L3) |
| 3 | ECT (Engine C oolant T emperature) sensor | 15 | Neutral switch (MTX (Manual Transaxle)) |
| 4 | APP (Accelerator P edal P osition) sensor | 16 | TR (Transmission R ange) switch (ATX (Automatic Transaxle)) |
| 5 | Brake switch | 17 | TP sensor, throttle actuator |
| 6 | Clutch switch (MTX) | 18 | MAP (Manifold A bsolute P ressure) sensor |
| 7 | OCV (LF,L3) | 19 | CKP (Crankshaft P osition) sensor |
| 8 | Fuel injectors | 20 | KS (Knock S ensor) |
| 9 | CMP sensor | 21 | P/S (Power S teering) pressure switch |
| 10 | EGR (Exhaust G as R ecirculation) valve | 22 | VTCS solenoid valve |
| 11 | MAF (Mass A ir F low) / IAT (Intake A ir T emperature) sensor | 23 | VIS solenoid valve (LF, L3) |
| 12 | PCM (RHD) | 24 | L8 engine |

Powertrain Control Module (PCM)

- A PCM with integral **BARO** (Barometric Pressure) sensor has been introduced. It is installed on the left-hand side under the dashboard.
- Right-hand-drive vehicles have two additional PCM covers secured with set bolts.



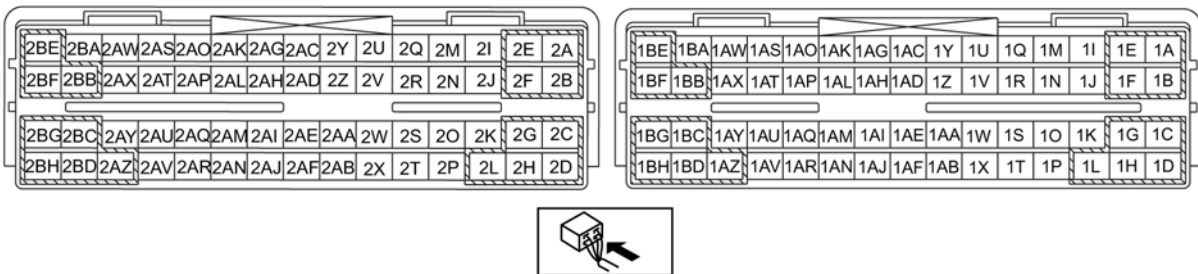
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1 PCM connectors

2 PCM

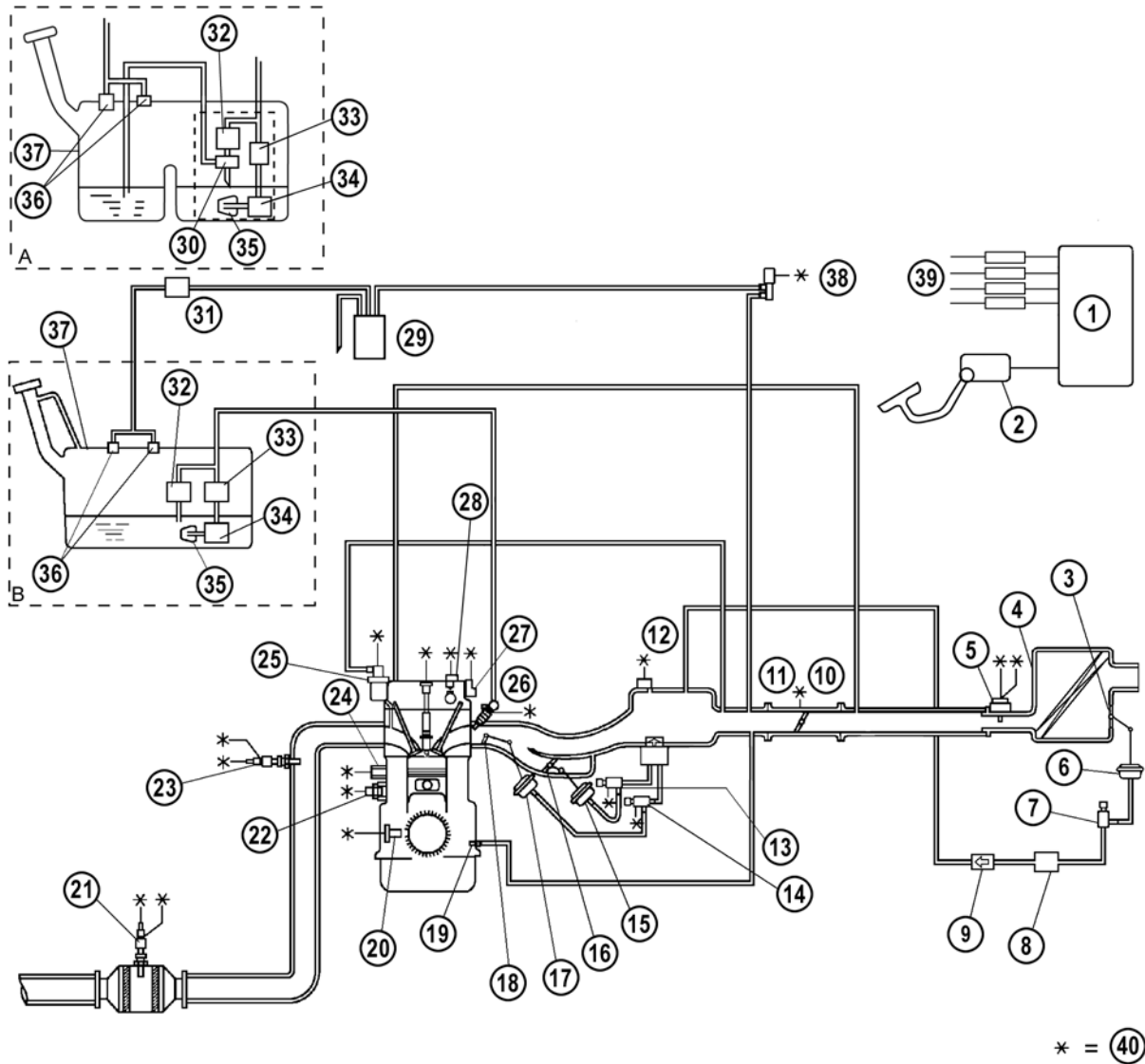
PCM Connector (Harness Side Shown)

- The PCM has two connectors with 60 pins each.



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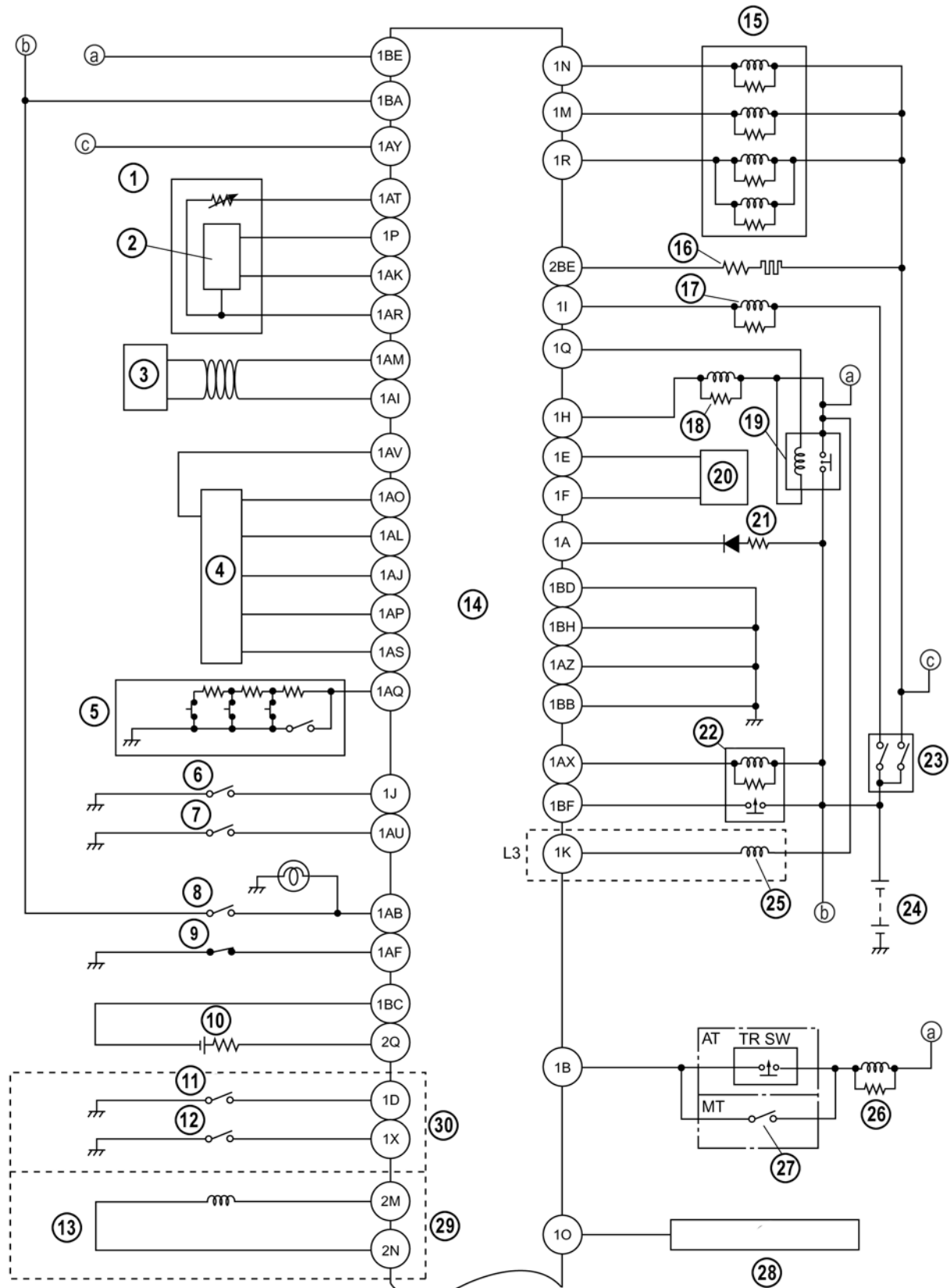
Overview



M6FL_01013

1	PCM	22	ECT sensor
2	APP sensor	23	HO2S (front)
3	VAD shutter valve (L3)	24	Knock sensor
4	Air cleaner	25	EGR valve
5	MAF sensor	26	Fuel injector
6	VAD shutter valve actuator (L3)	27	OCV (LF, L3)
7	VAD solenoid valve (L3)	28	CMP sensor
8	Vacuum chamber	29	Charcoal canister
9	VAD check valve (one-way) (L3)	30	Fuel pump (transfer)
10	TP sensor	31	Check valve (two-way)
11	Throttle actuator	32	Pressure regulator
12	MAP (Manifold Absolute Pressure) sensor	33	Fuel filter (high pressure)
13	VIS control solenoid valve (LF, L3)	34	Fuel pump
14	VTCS solenoid valve	35	Fuel filter (low pressure)
15	VIS shutter valve actuator (LF, L3)	36	Rollover valve
16	VIS shutter valve (LF, L3)	37	Fuel tank
17	VTCS shutter valve actuator	38	Purge solenoid valve
18	VTCS shutter valve	39	Ignition coils
19	PCV (Positive Crankcase Ventilation) valve	40	To PCM
20	CKP sensor	A	4WD (4-Wheel Drive)
21	HO2S (rear)	B	2WD (2-Wheel Drive)

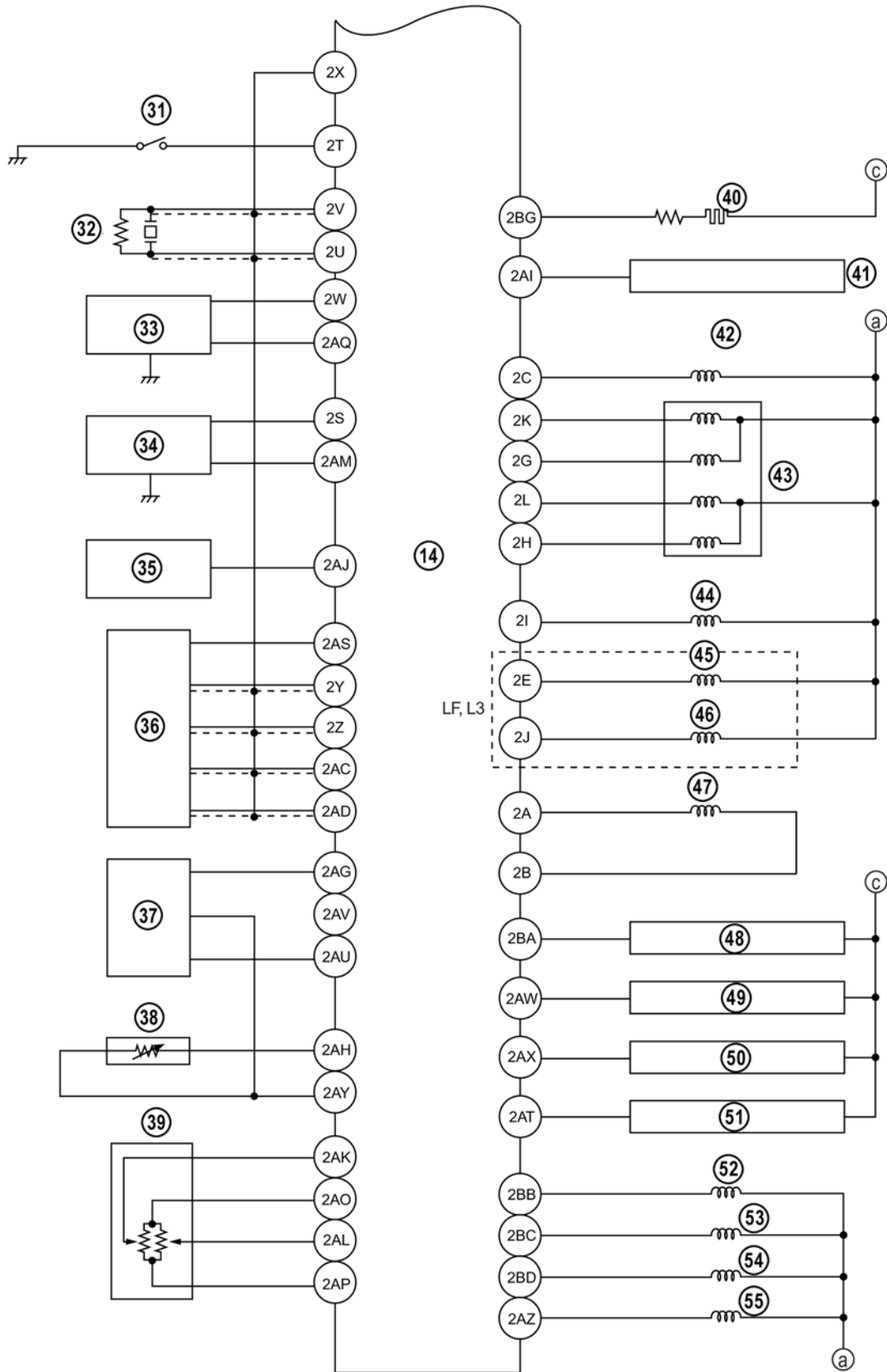
Wiring Diagram



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1	IAT sensor	16	Rear HO2S heater
2	MAF sensor	17	A/C (Air Conditioning) relay
3	CAN	18	Fuel pump
4	APP sensor	19	Main relay
5	Cruise control switch	20	Coil antenna
6	Refrigerant pressure switch (medium)	21	Security light
7	Refrigerant pressure switch (high and low)	22	Drive-by-wire relay
8	Brake switch No.1	23	Ignition switch
9	Brake switch No.2	24	Battery
10	Rear HO2S	25	VAD solenoid valve
11	Clutch pedal position switch	26	Starter relay
12	Neutral switch	27	Starter interlock switch
13	VSS (Vehicle Speed Sensor)	28	VSS output signal
14	PCM	29	MTX without ABS/DSC
15	FAN relay	30	MTX

Wiring Diagram (Continued)

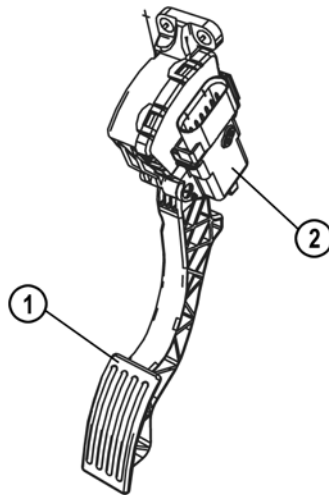


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14	PCM	43	EGR valve
31	PSP (Power S teering P ressure) switch	44	VTCS solenoid valve
32	KS	45	OCV
33	CKP sensor	46	VIS solenoid valve
34	CMP sensor	47	Throttle actuator
35	Generator	48	Ignition coil No.1
36	Front HO2S	49	Ignition coil No.2
37	MAP sensor	50	Ignition coil No.3
38	ECT sensor	51	Ignition coil No.4
39	TP sensor	52	Fuel injector No.1
40	Front HO2S heater	53	Fuel injector No.2
41	Generator	54	Fuel injector No.3
42	Purge solenoid valve	55	Fuel injector No.4

Accelerator Pedal Position (APP) Sensor

- The APP sensor uses Hall elements to detect accelerator pedal movement. This non-contact sensor type improves durability.
- The APP sensor is composed of a main sensor and a sub sensor, and detects the accelerator actuating angle with these two sensors (main and sub).

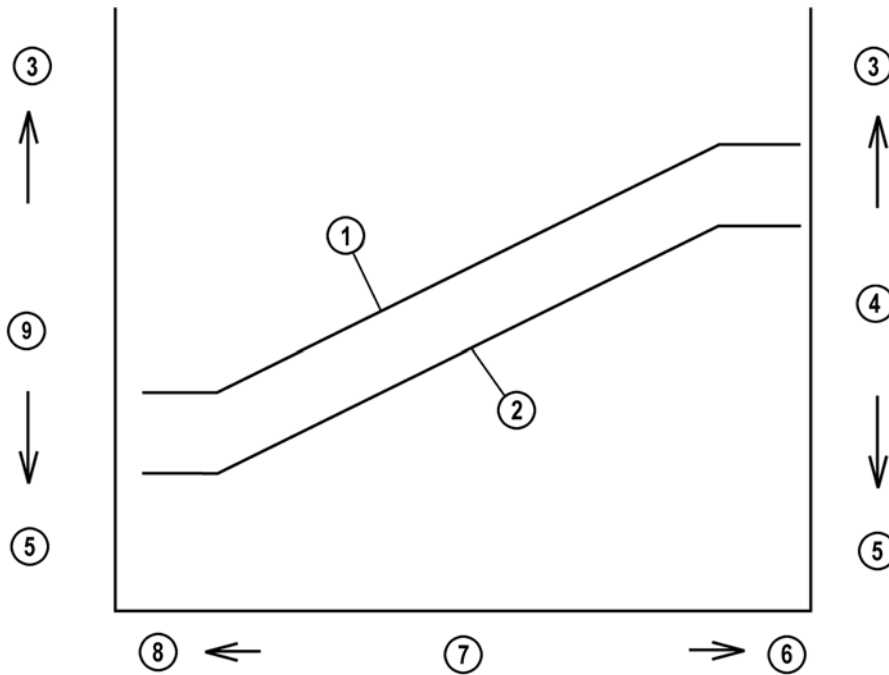


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1 Accelerator pedal

2 APP Sensor

- The main sensor outputs a duty signal, and the sub sensor outputs a voltage signal.
- Even if a malfunction occurs in either one of the sensors, the detection is performed and drive-by-wire control is maintained.
- If both the main and the sub sensor for the APP sensor fail, the signals necessary for the drive-by-wire control are not input to the PCM and the drive-by-wire control is disabled.
- However, even though the drive-by-wire control is disabled, the throttle valve opening angle necessary for minimum driving is maintained.



M6FL_01017

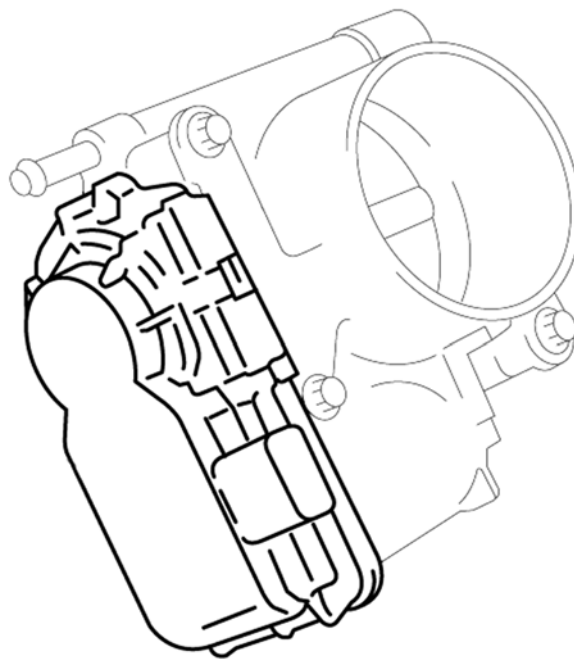
- | | | | |
|---|----------------------|---|-------------------------------------|
| 1 | Main sensor (duty) | 6 | Large |
| 2 | Sub sensor (voltage) | 7 | Accelerator pedal depression amount |
| 3 | High | 8 | Small |
| 4 | Duty cycle | 9 | Output voltage |
| 5 | Low | | |

Throttle Valve Actuator

- By controlling the throttle actuator, the PCM sets an optimal throttle valve opening angle according to the engine conditions.
- The PCM calculates a target throttle valve opening angle based on the accelerator pedal depression amount.
- The PCM calculates the target throttle valve opening angle based on signals from APP sensors No.1 and No.2. In order to change the actual throttle valve opening angle to the calculated target opening angle, the PCM controls the direction and size of the current sent to the throttle actuator. TP sensors No.1 and No.2 detect the actual throttle valve opening angle.
- The PCM sends electrical current to the throttle actuator to achieve the target opening angle.
- The engine idling speed can be controlled through PCM control of the throttle valve. Due to this, the previous IAC valve has been eliminated.
- After the ignition switch is turned off, the PCM opens and closes the throttle valve. At this time, the input voltage of the TP sensor at the fully closed position and the fully open position is stored. This learned voltage measurement at the fully closed and open position is used when correcting the throttle opening angle.
- If the PCM detects any of the following malfunctions, it limits the throttle valve opening angle, performs fuel cut and other control measures to limit engine output, as well as stopping the flow of electricity to the throttle actuator. When this flow of electricity is stopped, the throttle valve is limited to the minimum opening angle possible for driving:
 - TP sensor No.1 malfunction
 - TP sensor No.2 malfunction
 - APP sensor No.1 malfunction
 - APP sensor No.2 malfunction
 - Throttle actuator malfunction
 - PCM internal circuit (for electronic throttle control) malfunction
 - Throttle body (throttle valve and return spring) malfunction

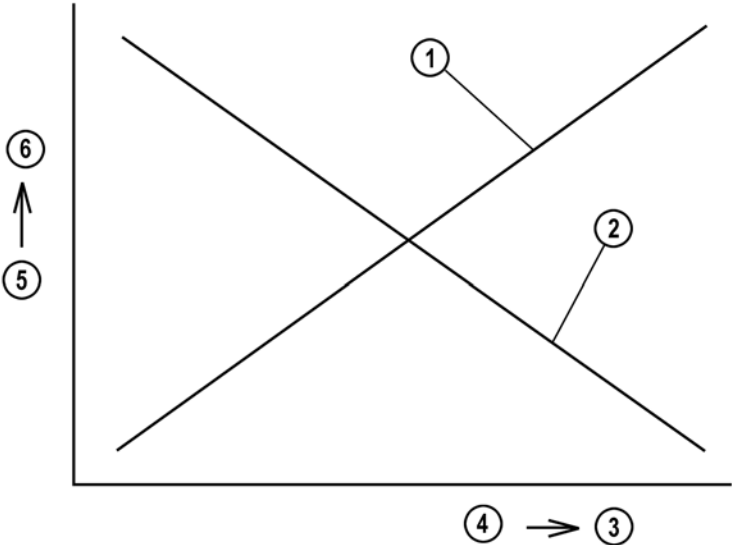
Throttle Position (TP) Sensor

- The TP sensor is built into the throttle body and detects the throttle valve opening angle.
- The TP sensor uses Hall elements to detect throttle valve movement. This non-contact sensor type improves durability.
- The TP sensor is composed of a main sensor and a sub sensor, and detects the throttle valve opening angle with these two sensors (main and sub).
- Even if a malfunction occurs in either one of the sensors, the detection is performed and drive-by-wire control is maintained.
- If both the main and the sub sensor for the TP sensor fail, the signals necessary for the drive-by-wire control are not input to the PCM and the drive-by-wire control is disabled.
- However, even though the drive-by-wire control is disabled, the throttle valve opening angle necessary for minimum driving is maintained mechanically.



M6FL_01018

TP Sensor Voltage Characteristics

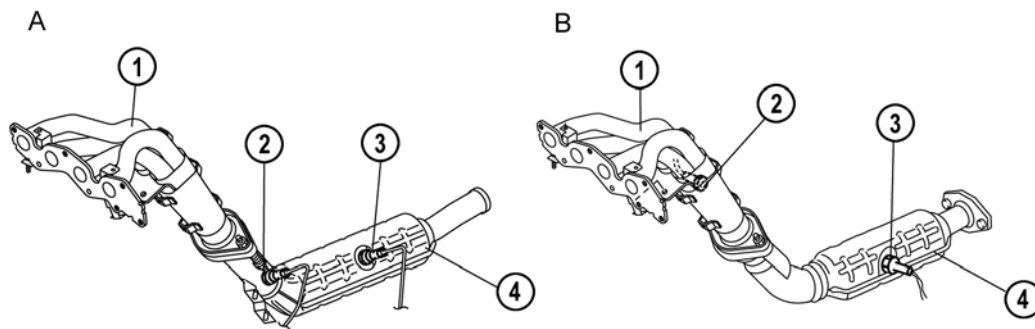


M6FL_01019

- 1 TP sensor No.1
- 2 TP sensor No.2
- 3 Large
- 4 Throttle opening angle
- 5 Output voltage
- 6 High

Heated Oxygen Sensors (HO2S)

- Heated oxygen sensors are installed on the front and back of the **TWC (Three-Way Catalyst)**.
- The front HO2S is a wide-range air/fuel ratio sensor, which can linearly detect the oxygen concentration in the exhaust gas in all ranges, from lean to rich (air/fuel mixture).
- The rear HO2S detects the oxygen concentration in the exhaust gas behind the TWC.
- Integral heating elements allow stable detection of the oxygen concentration even when the exhaust gas temperature is low.



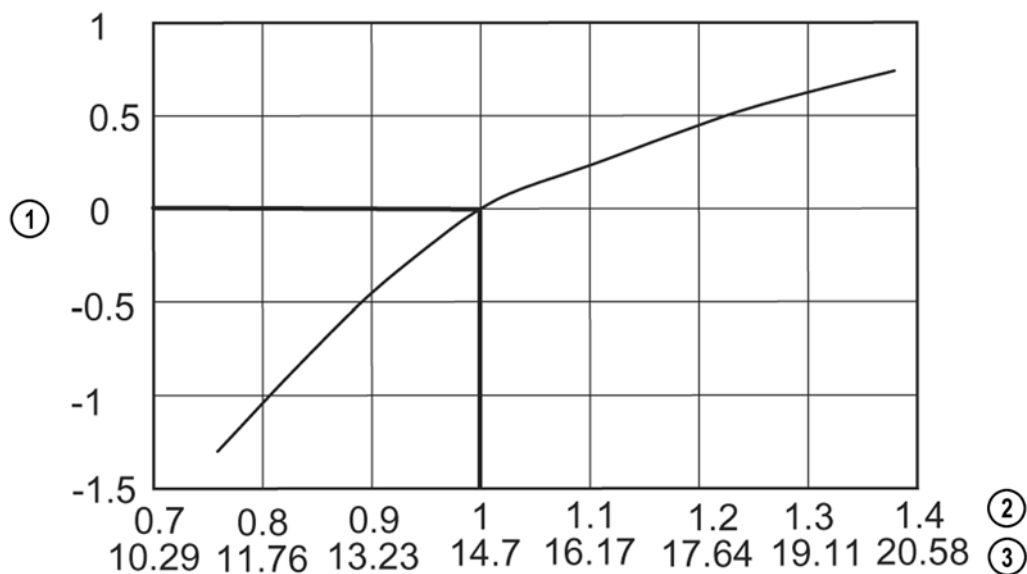
M6FL_01020

A 2WD
1 Exhaust manifold
2 HO2S (front)

B 4WD
3 HO2S (rear)
4 TWC

Front HO2S

- The front HO2S is a wide-range oxygen sensor, and can detect the oxygen concentration in the exhaust gas in all ranges, from lean to rich (air/fuel mixture).
- A heater is built into the sensor to facilitate the activation of the HO2S at engine startup (when the exhaust gas temperature is low).
- The wide-range oxygen sensor converts the oxygen concentration in the exhaust gas into a current value, and sends the value to the PCM.
- The PCM calculates the λ (lambda) value of the air/fuel mixture based on the received current value.



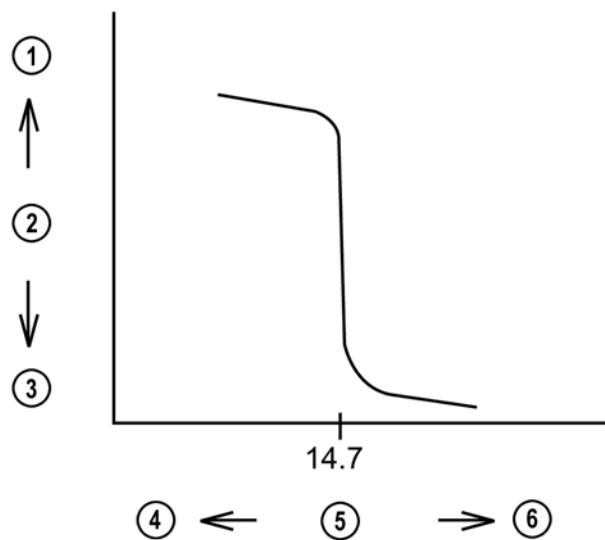
M6FL_01021

1 Current (mA)
2 λ (Lambda)

3 Air/fuel ratio

Rear HO2S

- A zirconium element is used on the sensor. When there is a difference between the oxygen concentration inside and outside the element, electromotive force is generated by the movement of oxygen ions (inside of the zirconium element: atmosphere, outside: exhaust gas). The electromotive force changes significantly at the boundary of the stoichiometric air/fuel ratio (= 14.7). The PCM receives the voltage generated from the HO2S directly, and increases or decreases the fuel injection amount by the fuel injection control so that it is close to the stoichiometric air/fuel ratio.
- When the temperature of the zirconium element is low, electromotive force is not generated. Therefore the HO2S is heated by a built-in heater, facilitating the oxygen sensor activation. Due to this, the sensor is efficiently activated even immediately after cold-engine startup, and a stable sensor output can be obtained.



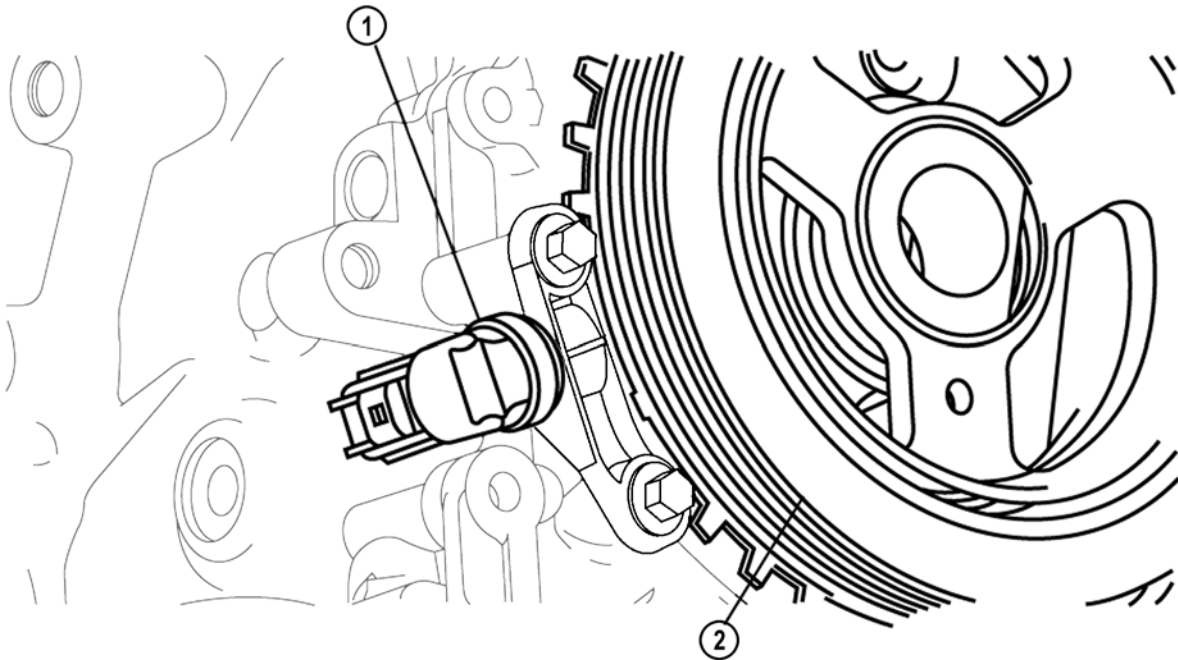
1 High
2 Output voltage
3 Low

4 Rich
5 Air/fuel ratio
6 Lean

M6FL_01022

Crankshaft Position (CKP) Sensor

- The CKP sensor is installed near the crankshaft pulley.
- The crankshaft position sensor pulse wheel has 30 projections with 10° of crank angle between the rising edge of each projection.



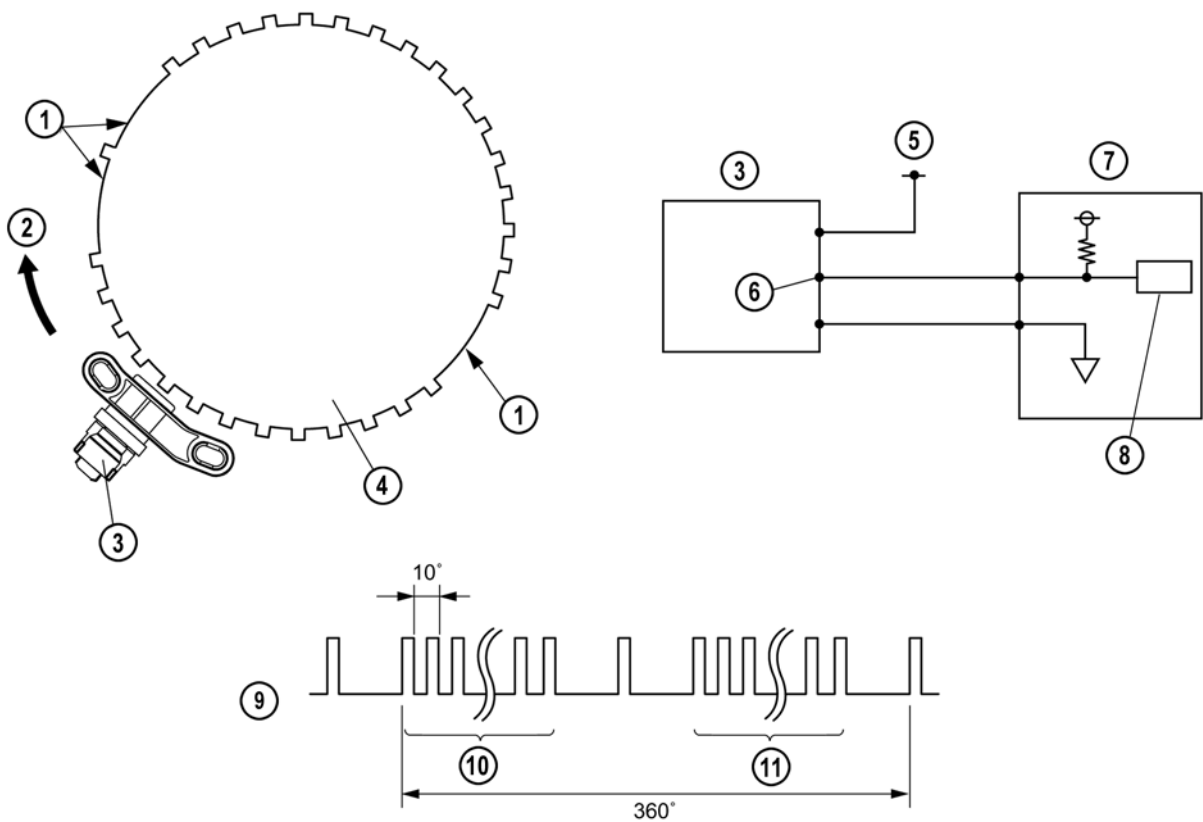
M6FL_01023

1 CKP Sensor

2 Crankshaft Pulley

- The CKP sensor consists of an **IC (Integrated Circuit)** with a **GMR (Giant Magneto Resistive)** element and an integrated signal processing circuit, and a magnet. Signal reliability has been improved with the adoption of the GMR element resulting in the signal amplitude being wider compared to the Hall element.
- Signal detection uses the special characteristics of GMR to change the electrical resistance corresponding to the magnetic field.
- The size of the magnetic field detected by the GMR element is changed into square waves at the signal processing circuit, and then sent to the PCM.

NOTE: If the crankshaft position sensor is removed/installed or replaced, magnetized objects such as metal shavings adhering to the sensor could cause fluctuation in the magnetic flux, causing abnormal sensor output which could adversely affect engine control.

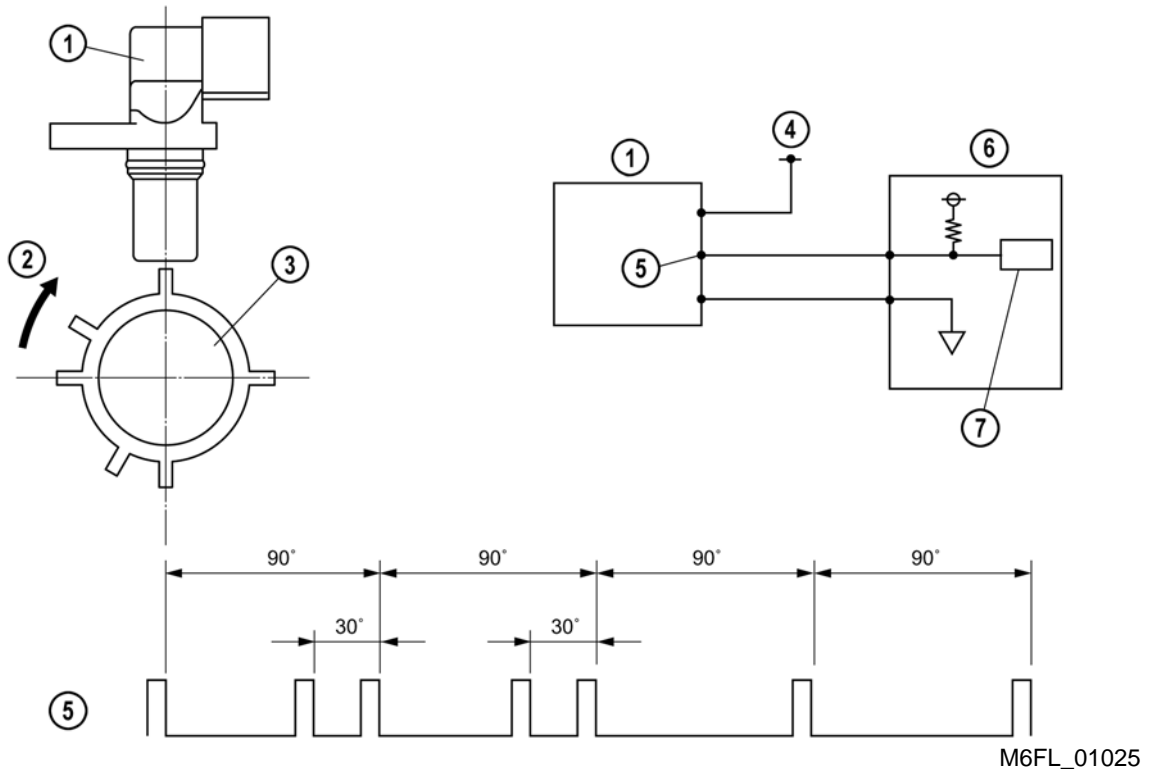


M6FL_01024

- | | | | |
|---|-------------------|----|--------------------------------------|
| 1 | Large gaps | 7 | PCM |
| 2 | Rotation | 8 | CPU (Central Processing Unit) |
| 3 | CKP sensor | 9 | CKP output signal |
| 4 | Pulse wheel | 10 | 16 tooth |
| 5 | From main relay | 11 | 13 tooth |
| 6 | CKP output signal | | |

Camshaft Position (CMP) Sensor

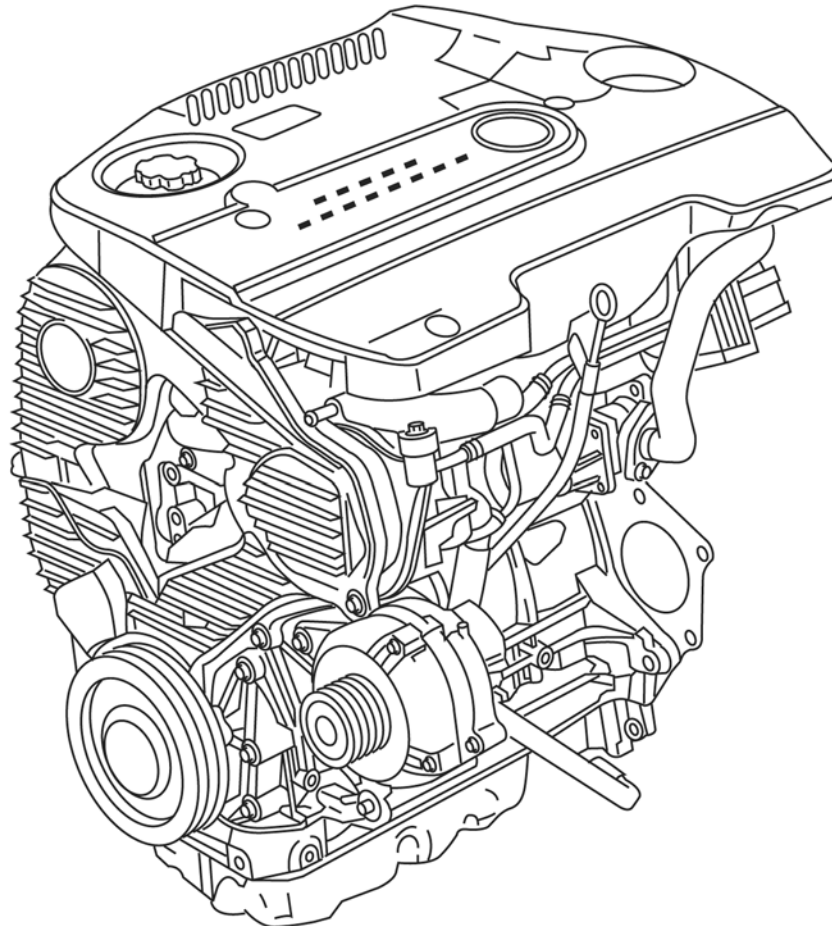
- The CMP sensor is installed on the cylinder head cover.
- Six pulses per one camshaft rotation are detected.
- The CMP sensor uses the same operating principle like the CKP sensor.



- | | | | |
|---|-----------------|---|-------------------|
| 1 | CMP sensor | 5 | CMP output signal |
| 2 | Rotation | 6 | PCM |
| 3 | Camshaft | 7 | CPU |
| 4 | From main relay | | |

Mechanics

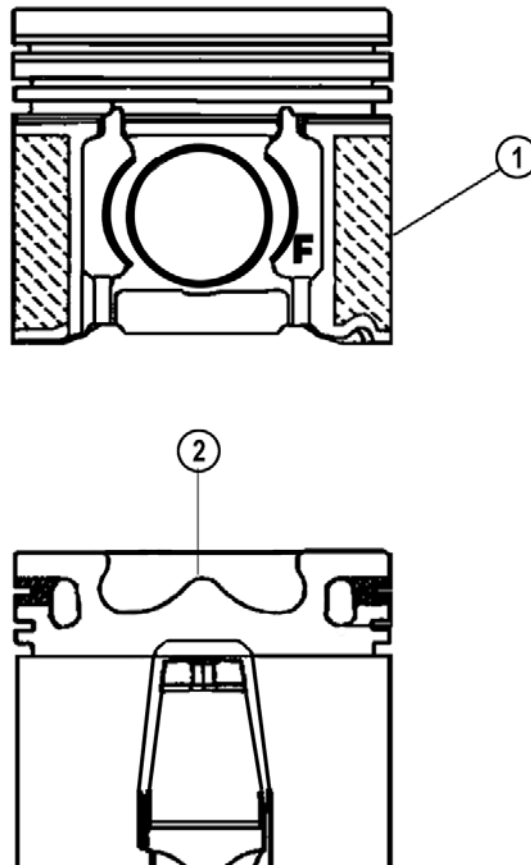
- The mechanical system of the 2.0 MZR-CD engine basically has been carried over from previous model ranges.



M6FL_01030

Pistons

- Pistons with a modified combustion chamber have been introduced to achieve a lower compression ratio of 16.7. This leads to lower pumping losses and optimized thermal efficiency at middle and high engine load, improving the fuel consumption.



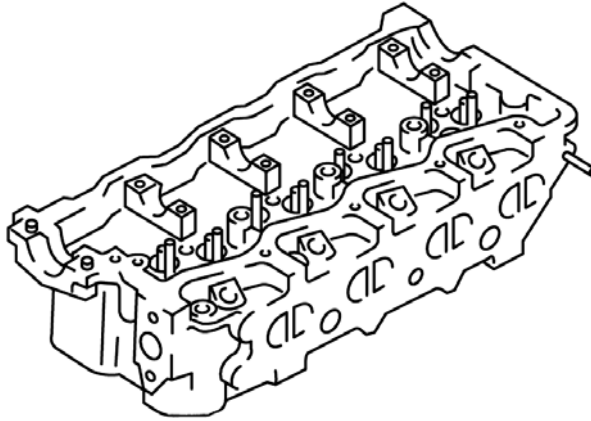
1 Coating

2 Combustion chamber

M6FL_01052

Cylinder Head

- A cylinder head with integrated leak-off lines for the injectors has been introduced.



M6FL_01058

Lubrication

Specifications

Item		Specification
Type		Force-fed type
Oil pressure (reference value) [oil temperature: 100 °C (212 °F)]		147 (1.5, 21) min. [1,000] 343 (3.5, 50) min. [3,000]
Oil pump	Type	Trochoid gear type
	Relief valve opening pressure (reference value)	kPa (kgf/cm ² , psi)[rpm] 580-700 (5.9-7.1, 84.1-101.5) [3,000]
Oil cooler	Type	Water-cooled
Oil filter	Type	Full-flow, paper element
	Bypass pressure	kPa (kgf/cm ² , psi) 78-118 (0.8-1.2, 11.3-17.1)
Oil capacity (approx. quantity)	Total (dry engine)	L (US qt, Imp qt) 5.5 (5.8, 4.8)
	Oil replacement	L (US qt, Imp qt) 4.9 (5.2, 4.3)
	Oil and oil filter replacement	L (US qt, Imp qt) 5.1 (5.4, 4.5)

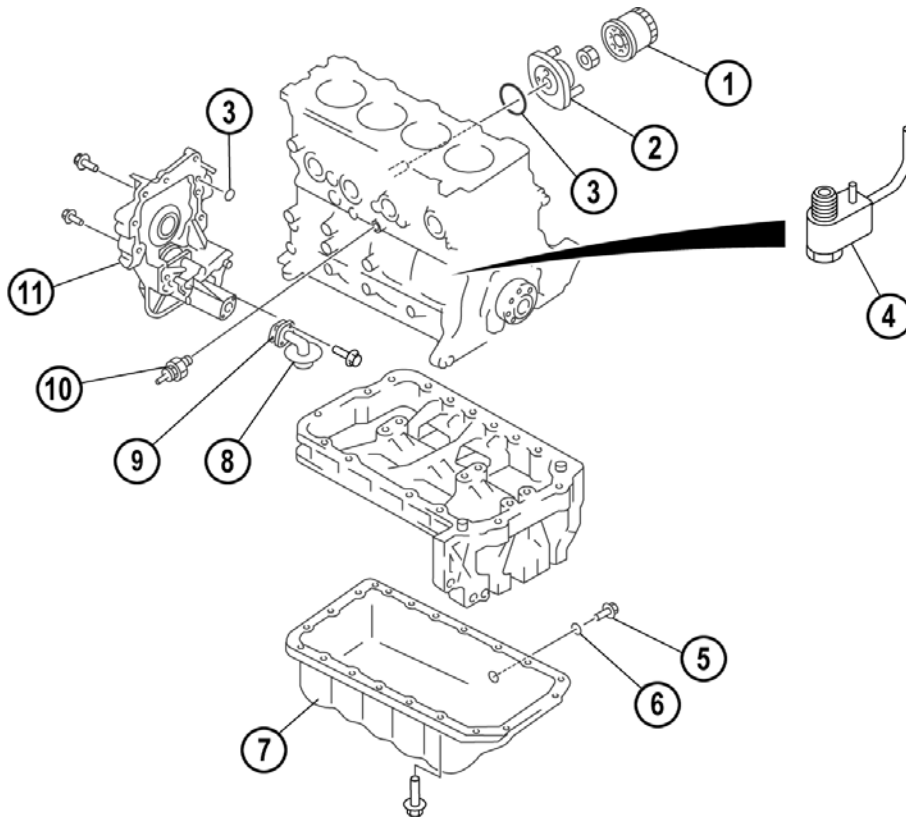
M6FL_01T009

Engine Oil

Item	Specification
Grade	ACEA C1 or JASO DL-1
Viscosity	SAE 5W-30
Recommended oil	e.g. Mazda genuine Dexelia DPF

M6FL_01T010

Parts Location



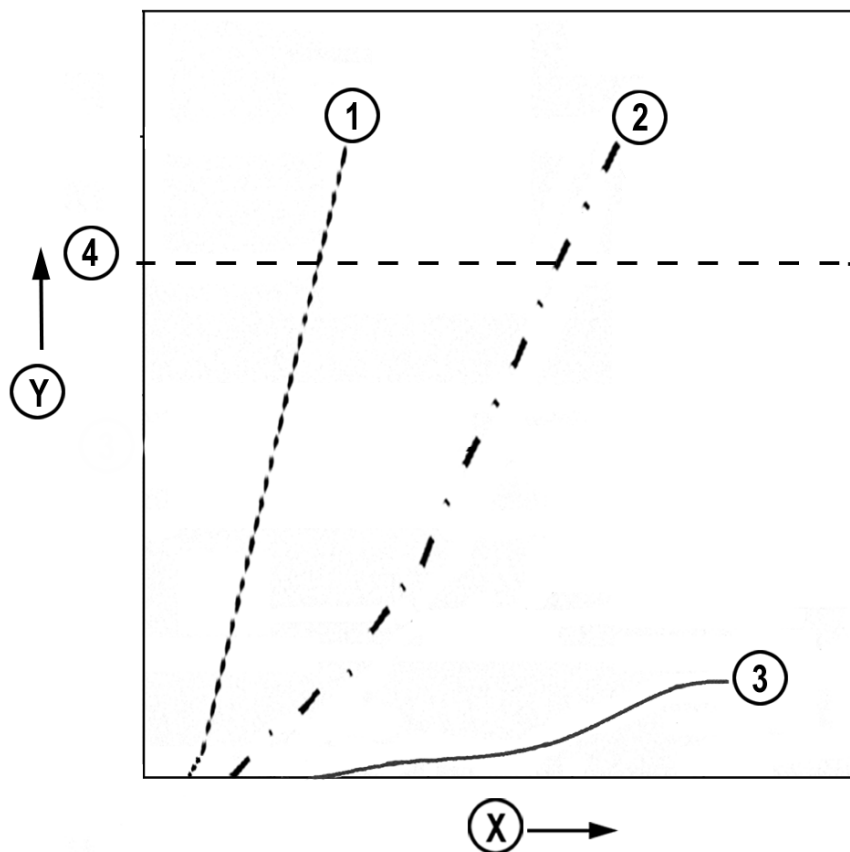
M6FL_01031

- | | | | |
|---|----------------|----|---------------------|
| 1 | Oil filter | 7 | Oil pan |
| 2 | Oil cooler | 8 | Oil strainer |
| 3 | O-ring | 9 | Gasket |
| 4 | Oil jet valve | 10 | Oil pressure switch |
| 5 | Oil drain plug | 11 | Oil pump |
| 6 | Sealing washer | | |

Engine Oil

- In order to limit the ash amount accumulated in the diesel particulate filter, an engine oil with reduced ash formation is required. This oil must meet the specification ACEA C1 (equivalent to the Japanese specification JASO DL-1) and is also termed as low **SAPS** (**Sulphate Ash, Phosphor, Sulphur**) oil, since it has a reduced proportion of these components.

NOTE: The use of engine oil with a higher ash formation is strictly forbidden as this can lead to blockage of the **DPF (Diesel Particulate Filter)**. The usable filter volume would be reduced significantly due to the higher ash amount deposited in the DPF. As a result, the regeneration intervals are shortened, so that the fuel consumption and hence the oil dilution are increased.



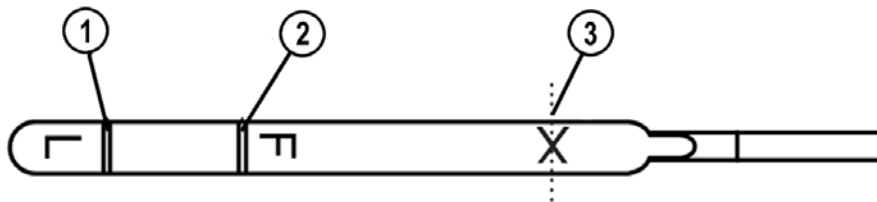
M5_01058

X	Service life of DPF	Y	Ash amount in the DPF
1	Normal engine oil (ACEA A3/B3/B4)	3	Mazda low SAPS oil (ACEA C1)
2	Conventional low SAPS oil (ACEA C2/C3)	4	DPF blocked with ash

Oil Dipstick

- Since the fuel post-injections required to regenerate the DPF can lead to an excessively high engine oil dilution, an “X” mark has been added to the oil dipstick to make the customer aware of this condition. If the oil level is close to or exceeds the “X” mark, the engine oil must be replaced.

NOTE: Every time the engine oil is replaced, the parameter “Calculated oil dilution” in the PCM must be reset (refer to the section “Control System, Service and Repair”).



M6FL_01060

- 1 L mark (Low)
- 2 F mark (Full)

- 3 X mark (Excessive)

Oil Dilution Calculation

- The PCM calculates the oil dilution amount based on the duration of the regeneration process and the regeneration intervals.
- If the engine oil level reaches a certain limit due to oil dilution, DTC P252F is stored in the PCM but no warning light is illuminated. This **DTC (Diagnostic Trouble Code)** comes up when the regeneration of the DPF has been started multiple times but could never be completed due to the driving method (such as frequent short distance driving with low engine speed etc.). In this case, check the engine oil level. If the oil level is lower than the “X” mark on the dipstick, delete the DTC. In addition, the customer must be informed to change the driving method (such as driving the vehicle at middle or high engine speeds for a longer distance), so that regeneration of the DPF is enabled.
- If the engine oil performance and engine oil level is approaching the limit due to oil dilution, the DPF indicator light flashes and DTC P253F is stored in the PCM. In addition, the PCM reduces the fuel injection amount to protect the engine. However, the engine could be damaged if the vehicle continues to be driven. In this case, replace the engine oil even if the engine oil level is lower than the “X” mark on the dipstick. In addition, the customer must be informed to change the driving method (such as driving the vehicle at middle or high engine speeds for a longer distance), so that regeneration of the DPF is enabled.

- The different conditions of the oil dilution are shown in the following table.

Item	Engine oil dilution		
Engine oil level			
DPF indicator light	—	—	Flashes every 0.4 s
MIL	—	—	—
Output restriction	—	—	Max. 150 km/h (93 mph)
DTC stored in PCM	P252F		P253F
Customer action	—	—	Bring the vehicle to a dealer
DPF automatic regeneration	Enabled		Disabled
Dealer action	—	—	<p>If DTC 253F is stored in the PCM, replace the engine oil even if the engine oil level is lower than the "X" mark on the oil dipstick.</p> <p>After inspecting engine oil level replace the engine oil.</p>

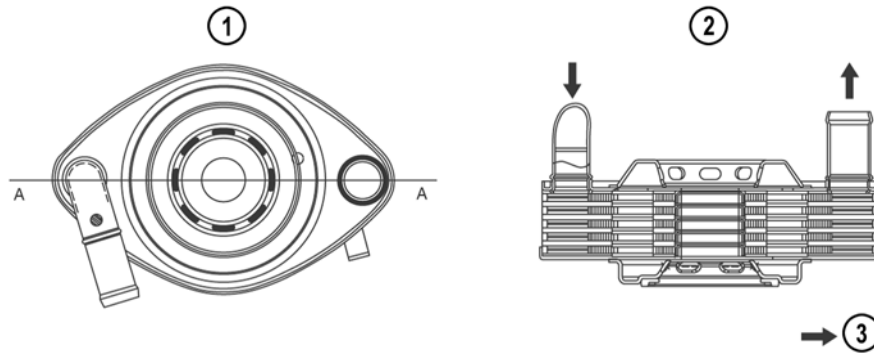
M6FL_01T011

- 1 F mark
- 2 X mark
- 3 Oil dipstick

- 4 Oil level okay
- 5 Oil level excessive

Oil Cooler and Oil Filter

- The oil cooler and the oil filter are now located at the rear of the engine.



M6FL_01032

- 1 External view
- 2 Cut-view A-A

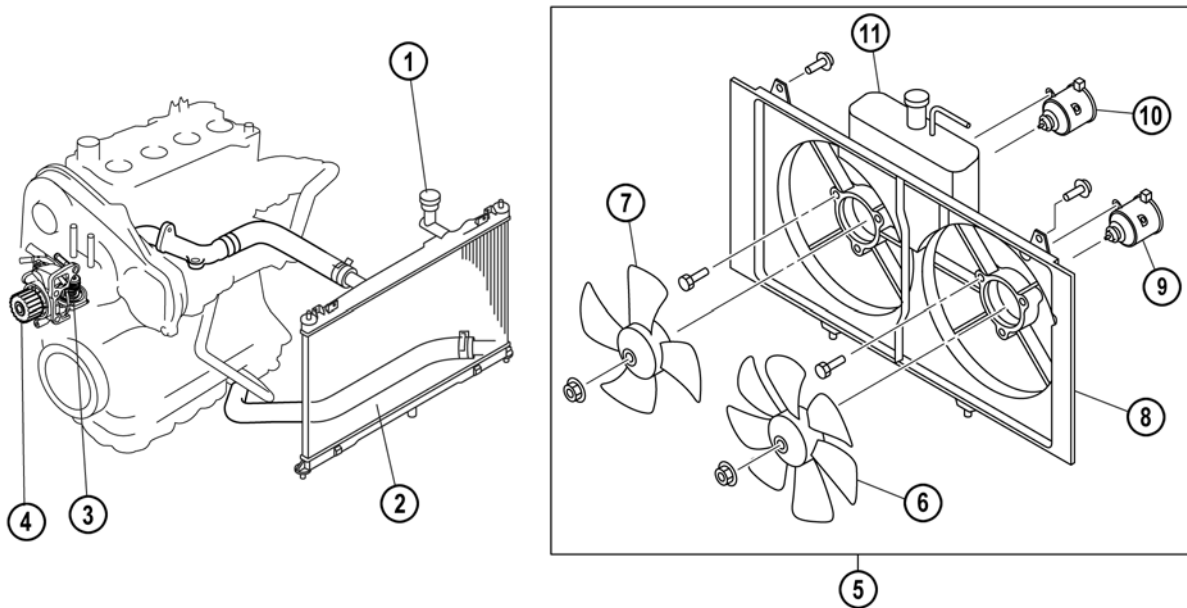
- 3 Engine coolant flow direction

Cooling System**Specifications**

Item			Specification
Type			Water-cooled
Coolant capacity (approx. quantity) (L)			9.0
Water pump	Type		Centrifugal, Timing belt-driven
Thermostat	Type		Wax, bottom-bypass
	Opening temperature	°C (°F)	80-84 (176-183)
	Full-open temperature	°C (°F)	95 (203)
	Full-open lift	mm (in)	8.5 (0.33) or more
Radiator	Type		Corrugated fin
Cooling system cap	Cap valve opening pressure	kPa (kgf/cm ² , psi)	93.2-122.6 (0.95-1.25, 13.5-17.8)
Cooling fan	Type		Electric

M6_01T012

Parts Location



M6FL_01061

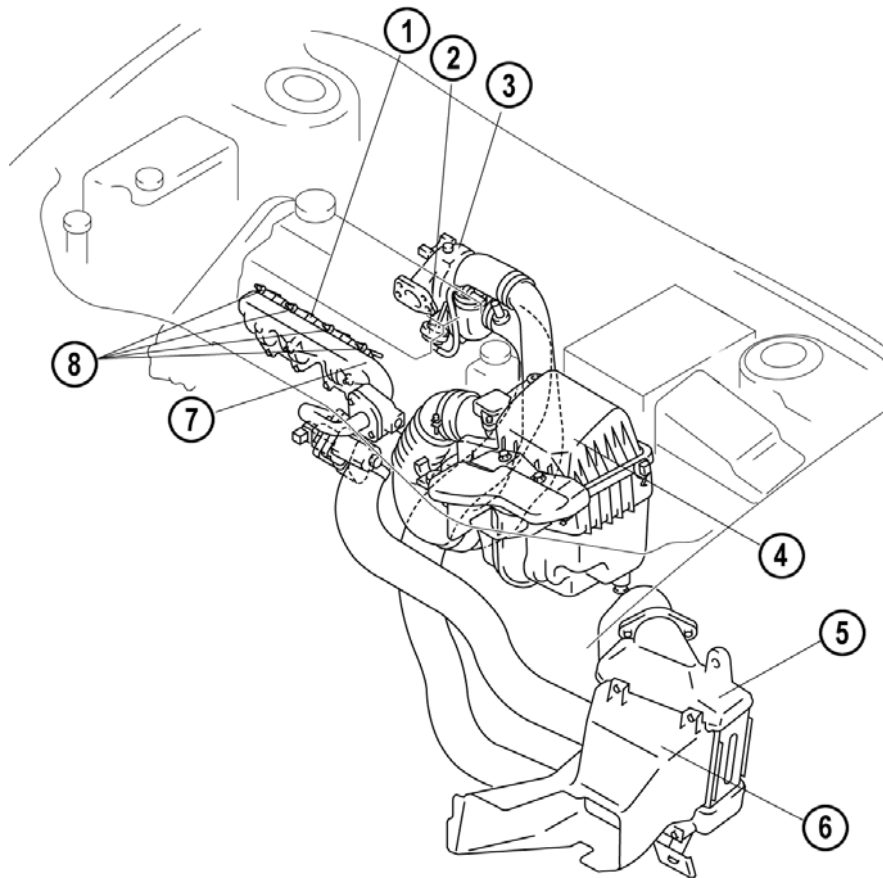
- 1 Cooling system cap
- 2 Radiator
- 3 Thermostat
- 4 Water pump
- 5 Cooling fan component
- 6 Cooling fan No.1

- 7 Cooling fan No.2
- 8 Radiator cowl
- 9 Cooling fan motor No.1
- 10 Cooling fan motor No.2
- 11 Coolant reserve tank

Intake-air System

- The intake-air system of the vehicles with 2.0 MZR-CD engine has the following features:
 - MAF learning function has been cancelled.
 - Turbocharger with variable geometry turbine and reduced turbine diameter has been introduced.
 - Manifold absolute pressure sensor located above the intake manifold has been introduced.
 - Variable swirl control valves have been cancelled.

Parts Location

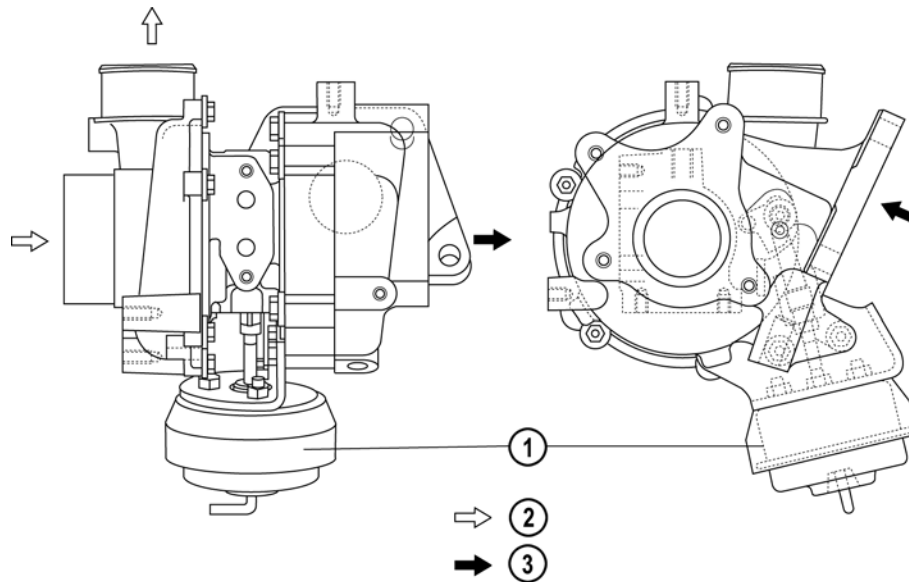


M6FL_01063

- | | | | |
|---|---|---|------------------------|
| 1 | Glow plug lead | 5 | Charge-air cooler |
| 2 | VBC (Variable Boost Control) vacuum actuator | 6 | Charge-air cooler duct |
| 3 | Turbocharger | 7 | Intake manifold |
| 4 | Air cleaner | 8 | Glow plugs |

Turbocharger

- A turbocharger with variable geometry turbine and reduced turbine diameter has been introduced. This leads to a lower inertia moment of the turbine, improving the response of the engine during acceleration.



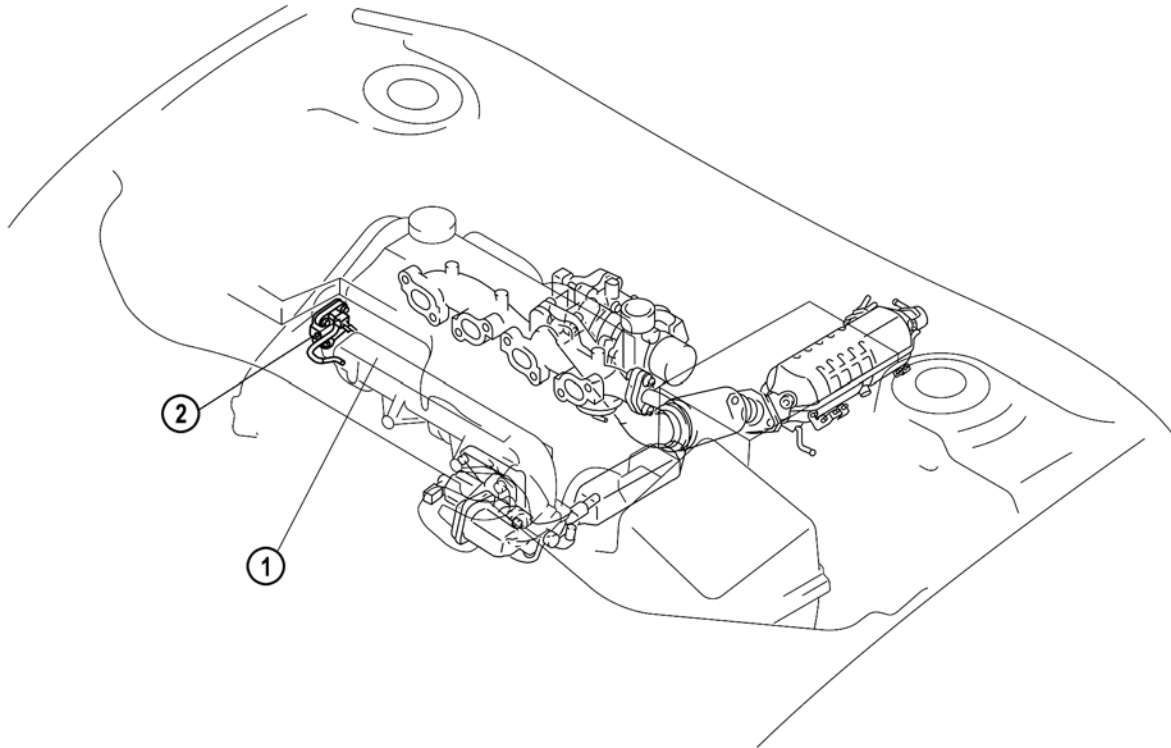
M6FL_01064

- 1 VBC vacuum actuator
- 2 Intake air flow

- 3 Exhaust gas flow

Manifold Absolute Pressure Sensor

- A MAP sensor located above the intake manifold has been introduced.



M6FL_01065

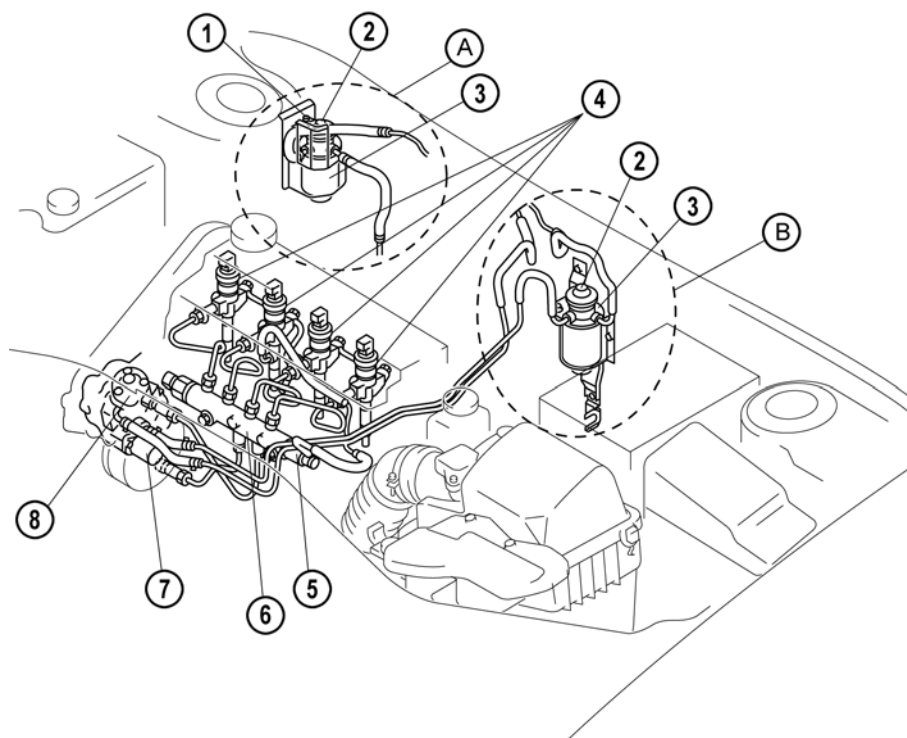
1 Intake manifold

2 MAP sensor

Fuel System

- The fuel system of the vehicles with 2.0 MZR-CD engine has the following features:
 - Common rail located above the intake manifold has been introduced.
 - Solenoid valve-type injectors with injector correction factors have been introduced.
 - Injector driver module has been cancelled.
 - Injection amount learning function has been modified.

Parts Location



M6FL_01066

A **LHD (Left Hand Drive)**

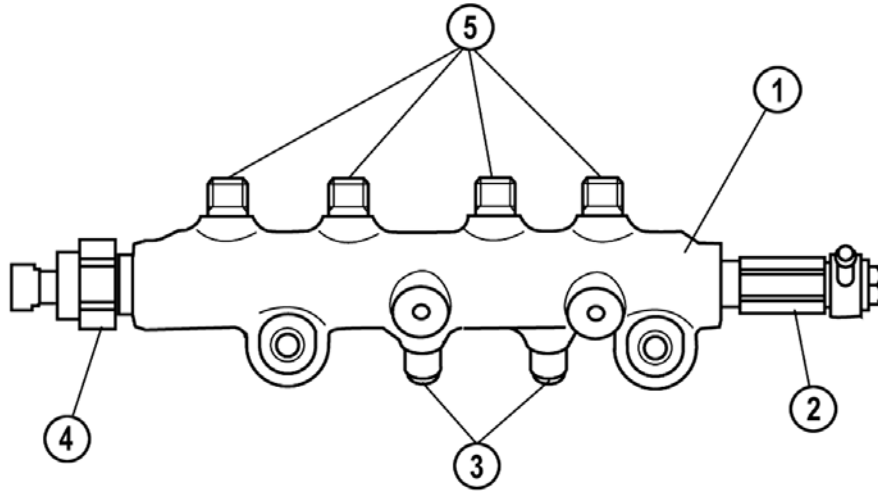
- 1 Fuel warmer
- 2 Priming pump
- 3 Fuel filter
- 4 Fuel injectors

B **RHD (Right Hand Drive)**

- 5 Pressure limiter valve
- 6 Common rail
- 7 Fuel metering valve
- 8 High-pressure pump

Common Rail

- A common rail located above the intake manifold has been introduced.

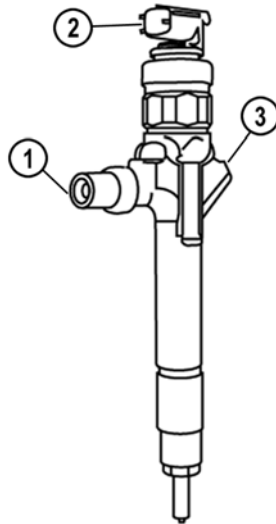


M6FL_01067

- | | | | |
|---|---------------------------------------|---|----------------------------------|
| 1 | Common rail | 4 | Fuel pressure sensor |
| 2 | Pressure limiter valve | 5 | Connections (fuel injector-side) |
| 3 | Connections (high-pressure pump-side) | | |

Injectors

- Solenoid valve-type injectors with lower power consumption and better response have been introduced.



M6FL_01068

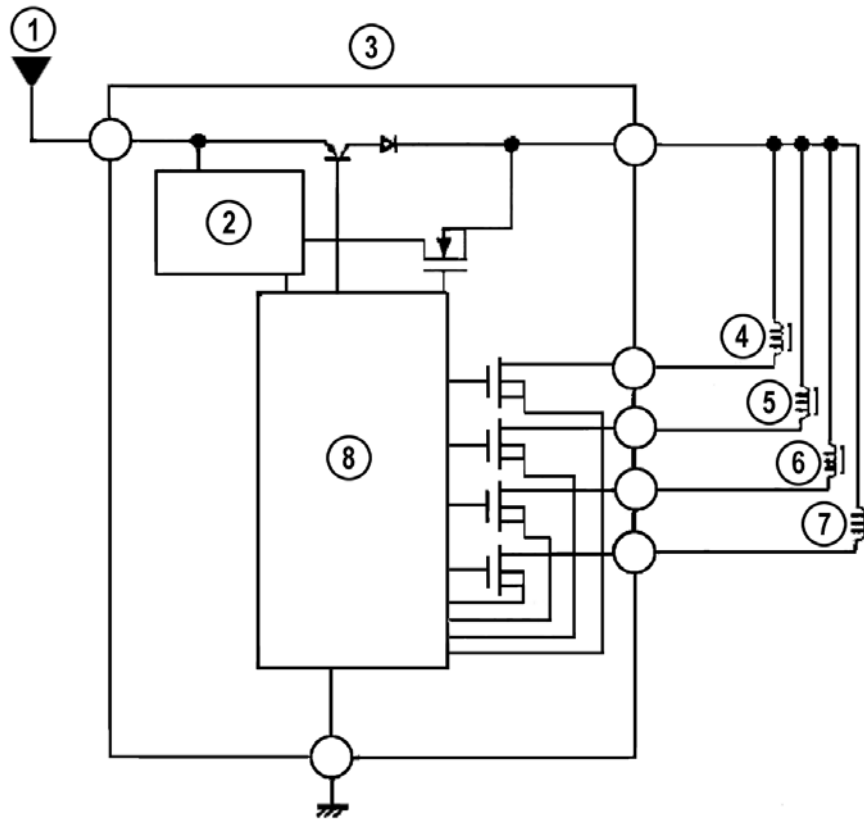
- | | | | |
|---|------------------|---|--------------|
| 1 | From common rail | 3 | To fuel tank |
| 2 | Connector | | |

NOTE: Since the size of the injector connector is relatively big compared to the diameter of the injector head, there might be an interference between the connector and the injector seal during removal and installation of the cylinder head cover. In order to prevent any damage to the seal, wrap vinyl tape around the injector connector covering the connector edges.

- In addition, the leak-off lines of the injectors are located under the cylinder head cover. As a result, the total leak-off amount of the injectors must be measured and compared to the values of a known good vehicle in order to detect a leaking solenoid valve.

NOTE: Always replace the gaskets of the injector leak-off lines when removing them. As the leak-off lines are located under the cylinder head cover, fuel leaking from the lines can contaminate the engine oil. This results in engine oil dilution and hence in engine damage.

- The injectors are directly driven by the PCM. The module has a high-voltage generator inside, which amplifies the battery voltage into a high voltage of approx. 90 V and stores it in a capacitor. A control circuit outputs the high voltage to the injectors as a drive signal.



M6FL_01069

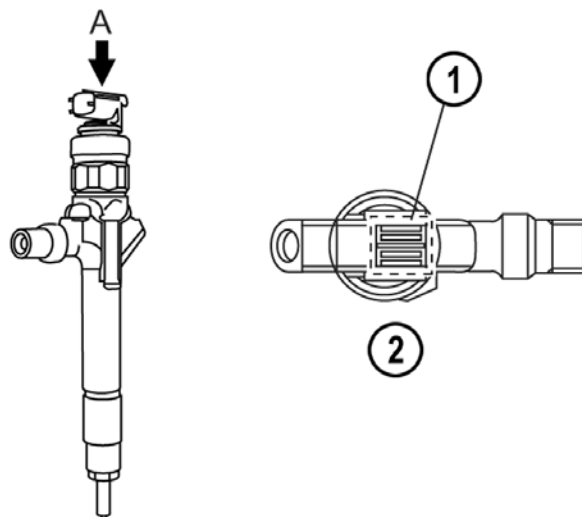
- | | | | |
|---|------------------------|---|-----------------|
| 1 | From PCM control relay | 5 | Injector No 2 |
| 2 | High voltage generator | 6 | Injector No 3 |
| 3 | PCM | 7 | Injector No.4 |
| 4 | Injector No.1 | 8 | Control circuit |

- All injectors are connected in parallel, i.e. they feature the same PCM terminal for the positive voltage supply. In case of an open circuit on one injector the PCM cuts off the power supply for this injector, so that the engine still runs on three cylinders.

- When the required injection amount is small, the PCM outputs a short drive signal to the injectors. As a result, the opening time of the injectors is short, resulting in a small injection amount.
- When the required injection amount is large, the PCM outputs a long drive signal to the injectors. As a result, the opening time of the injectors is long, resulting in a large injection amount.

Injector Correction Factors

- The manufacturing tolerances of the injectors are taken into account by injector correction factors. The correction factors are determined during injector production and are labeled as hexadecimal numbers (seven four-digit blocks and one two-digit block) on top of the injector connector.
- At the end of the vehicle production line the injector correction factors of the installed injectors are programmed into the PCM. Hereby the PCM equalizes the injection amount of the individual injectors in order to improve engine running, combustion noise and exhaust emissions.



M6FL_01070

1 Injector correction factor

2 View from A

NOTE: After replacing one or more injectors, several steps must be performed to ensure their proper function (refer to the section “Control System, Service and Repair”).

NOTE: When re-installing the injectors after a repair, they must be matched to the cylinders they were removed from. Therefore make a note of the injector correction factors and the allocated cylinders before removing the injectors. Failure to follow this instruction may cause irregular idling, increased combustion noise and/or increased black smoke emissions.

Injection Amount Learning Function

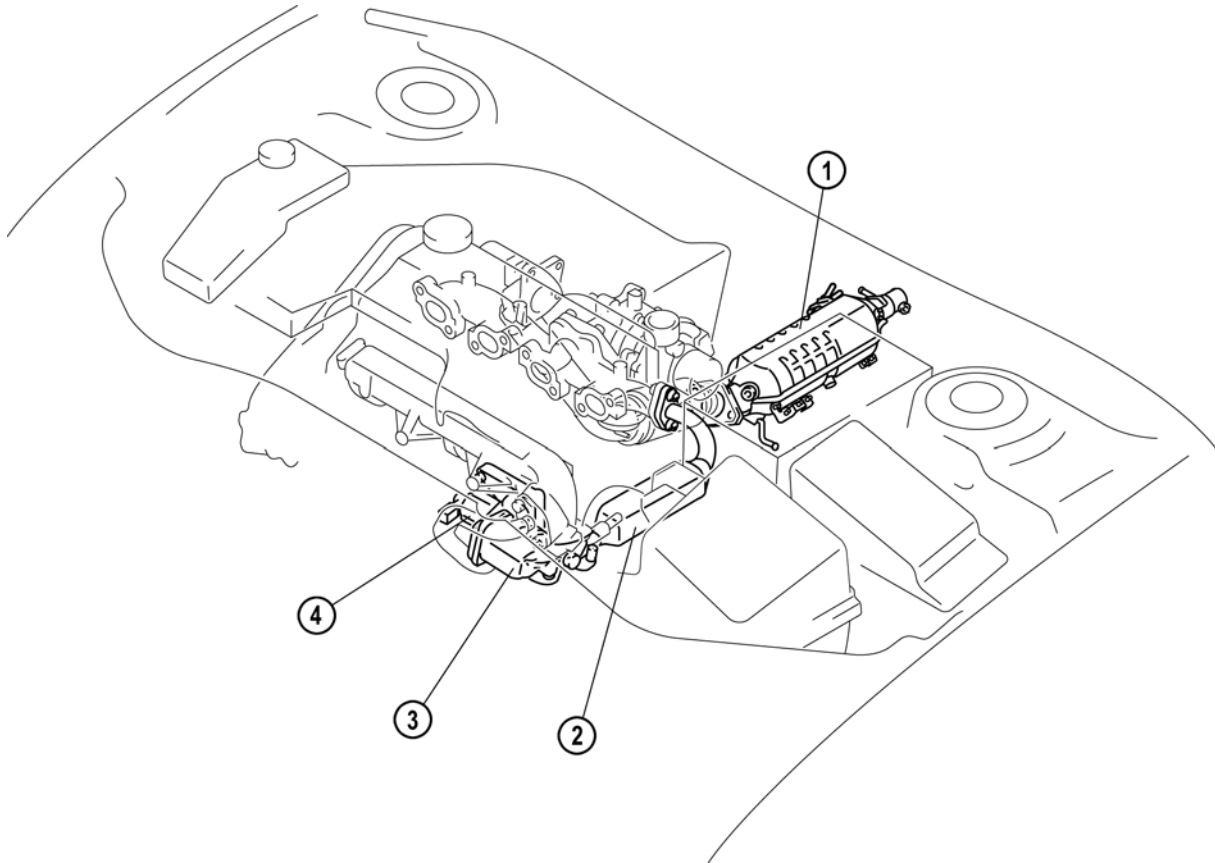
- The injection amount learning function has been modified. As a result, the PCM carries out the injection amount learning function every 150 km within the first 1,500 km and after that every 3,000 km, when all of the following conditions are met:
 - Engine is idling
 - Shift lever is in Neutral position
 - Vehicle speed is 0 km/h
 - Engine coolant temperature is between 65...95 °C
 - A/C is not operating
 - Accelerator pedal is not depressed
 - DPF regeneration is not performed
- If any of these conditions change while carrying out the injection amount learning function, the process will be suspended until the conditions are once again met. In addition, the injection amount learning function has to be carried out at specified service intervals (refer to the workshop manual).

NOTE: The injection amount learning function is performed several times at a pressure of 35 MPa, 65 MPa, 100 MPa and 140 MPa. As a result, slight changes in engine sound are normal.

NOTE: The injection amount learning function will be aborted, if the idle fluctuation of the engine is too high (e.g. due to a faulty injector). In this case the **WDS (Worldwide Diagnostic System)** indicates a communication fault, although the communication between WDS and PCM is okay.

Emission System

Parts Location



M6FL_01071

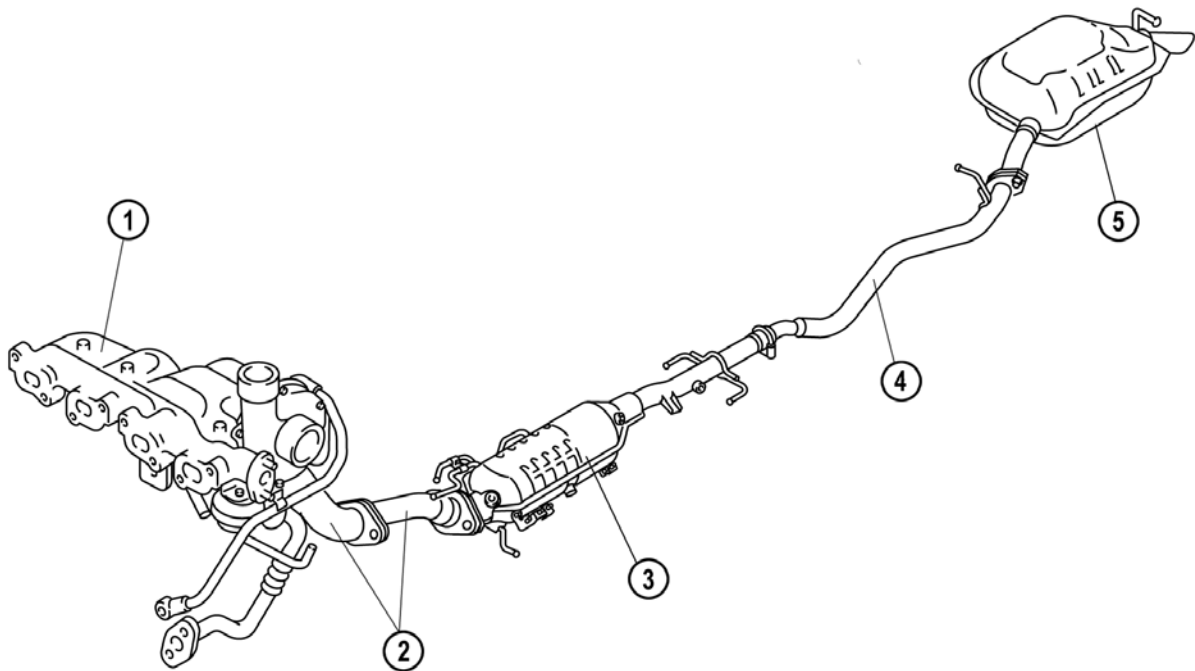
- 1 Oxidation catalytic converter and diesel particulate filter
- 2 EGR cooler

- 3 Intake shutter valve
- 4 EGR valve

Exhaust System

- The exhaust system of the vehicles with 2.0 MZR-CD engine has the following features:
 - Warm-up oxidation catalytic converter has been cancelled.
 - Diesel particulate filter integrated in the housing of the oxidation catalytic converter has been introduced.

Parts Location



M6FL_01040

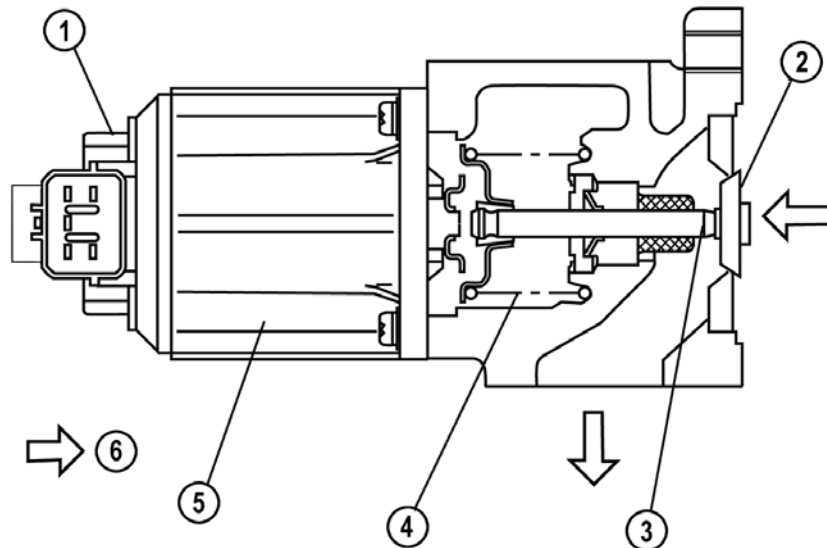
- | | | | |
|---|---|---|---------------|
| 1 | Exhaust manifold | 4 | Middle pipe |
| 2 | Front pipe | 5 | Main silencer |
| 3 | Oxidation catalytic converter and diesel particulate filter | | |

Exhaust Gas Recirculation System

- The exhaust gas recirculation system of the vehicles with 2.0 MZR-CD engine has the following features:
 - EGR valve with direct current motor and position sensor has been introduced.
 - EGR cooler located at the transmission-side of the engine has been introduced.
 - Intake shutter valve with direct current motor and position sensor has been introduced.

EGR Valve

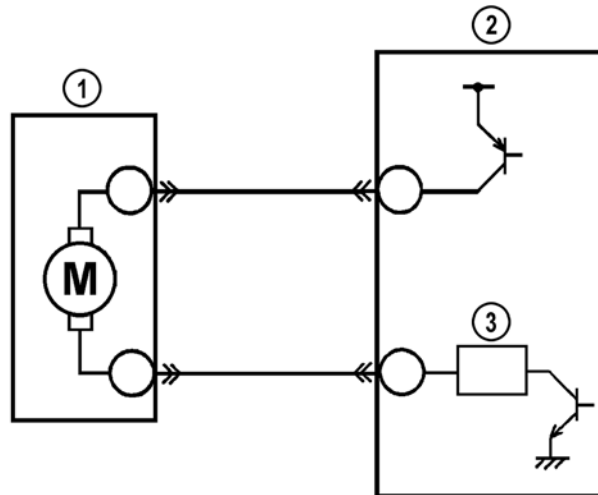
- An EGR valve with **DC (Direct Current)** motor and position sensor has been introduced. A threaded spindle transforms the rotational movement of the motor into an axial movement of the EGR valve.



M6FL_01027

- | | | | |
|---|---------------------------|---|------------------|
| 1 | EGR valve position sensor | 4 | Return spring |
| 2 | Valve | 5 | DC motor |
| 3 | Push rod | 6 | Exhaust gas flow |

- The position of the EGR valve is controlled by the PCM, which activates the DC motor via a duty signal.



M6FL_01080

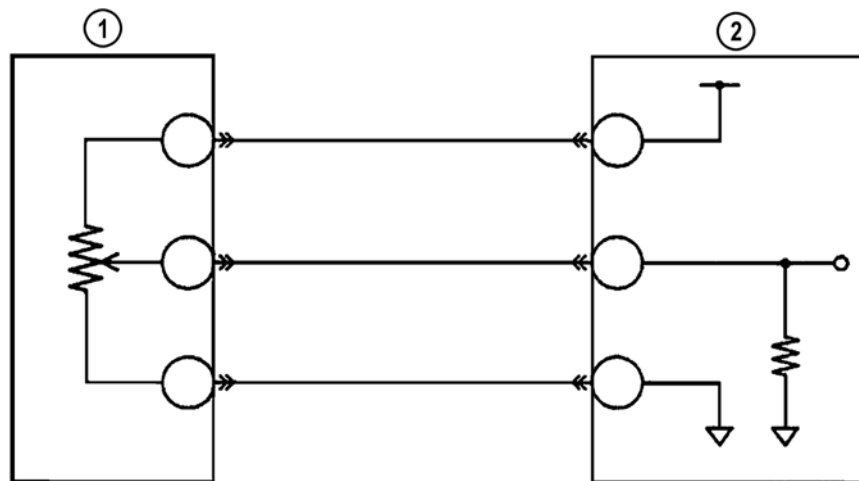
- 1 DC motor
- 2 PCM
- 3 Current detection circuit

- At low engine speeds the PCM controls the DC motor with a large duty cycle, so that the EGR valve opens and exhaust gas is recirculated.
- At high engine speeds the PCM controls the DC motor with a small duty cycle, so that the EGR valve closes and no exhaust gas is recirculated.
- In order to remove any carbon deposits from the EGR valve seat a cleaning mode is activated each time the engine is shut off. Therefore, the PCM actuates the EGR valve so that it is moved from the fully open to the fully closed position several times. This process takes approx. 10 s.
- The PCM controls the DC motor by a duty signal 0 V/12 V.

NOTE: If the EGR system fails, the EGR valve stays in the closed position in which no exhaust gas is recirculated.

- The **EGRVP (EGR Valve Position)** sensor is integrated in the DC motor and detects its position by a sliding contact potentiometer. When the EGR valve opens the resistance of the potentiometer rises. The sensor supplies the PCM with an analogue voltage signal between 0...5 V.

NOTE: After the EGR valve is replaced, its adaptation values in the PCM must be reset and the EGRVP sensor initialized (refer to the section “Control System, Service and Repair”).



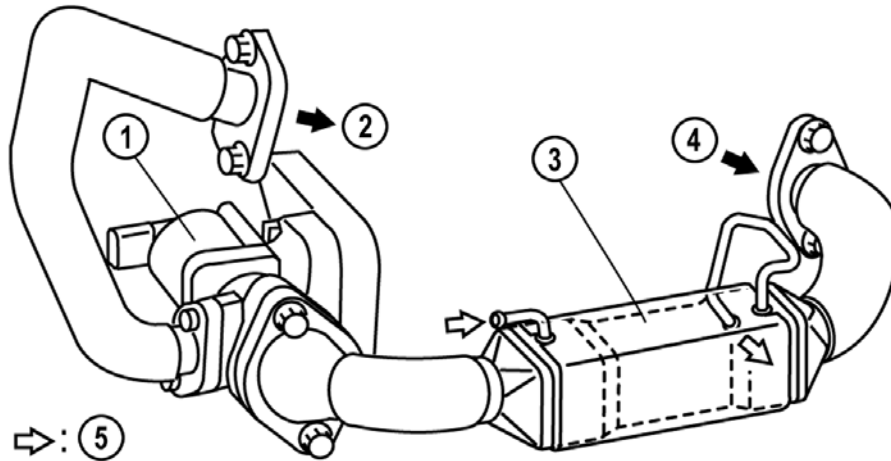
M6FL_01081

1 EGRVP sensor

2 PCM

EGR Cooler

- An EGR cooler located at the transmission-side of the engine has been introduced.

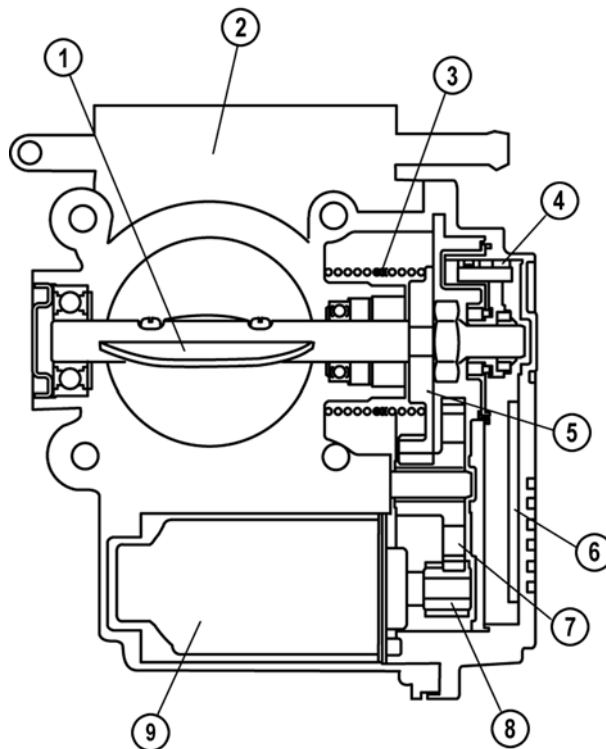


M6FL_01072

- | | | | |
|---|--------------------|---|-----------------------|
| 1 | EGR valve | 4 | From exhaust manifold |
| 2 | To intake manifold | 5 | Engine coolant flow |
| 3 | EGR cooler | | |

Intake Shutter Valve

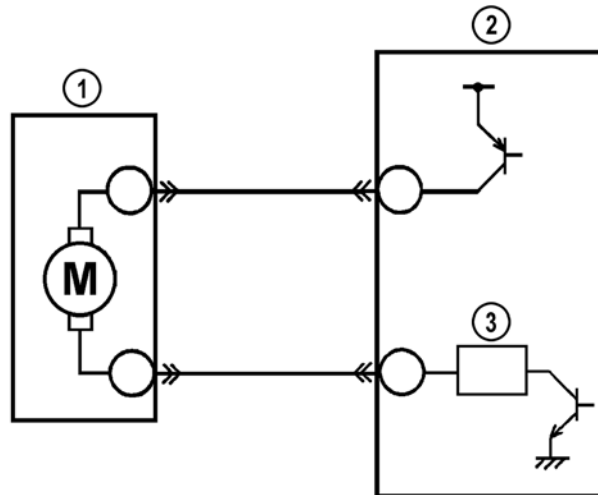
- An **ISV** (Intake **S**hutter **V**alve) with DC motor and position sensor has been introduced. A reduction gear ensures, that a large rotation angle of the motor results in a small rotation angle of the valve.
- The valve body is connected to the engine coolant circuit to prevent icing of the ISV at low ambient temperatures.



M5_01035

- | | | | |
|---|---------------------------------|---|-------------------|
| 1 | Valve | 6 | Drive circuit |
| 2 | ISV | 7 | Intermediate gear |
| 3 | Return spring | 8 | Drive gear |
| 4 | Stator with Hall element | 9 | DC motor |
| 5 | Driven gear with magnetic rotor | | |

- The position of the ISV is controlled by the PCM, which activates the DC motor via a duty signal.



M6FL_01080

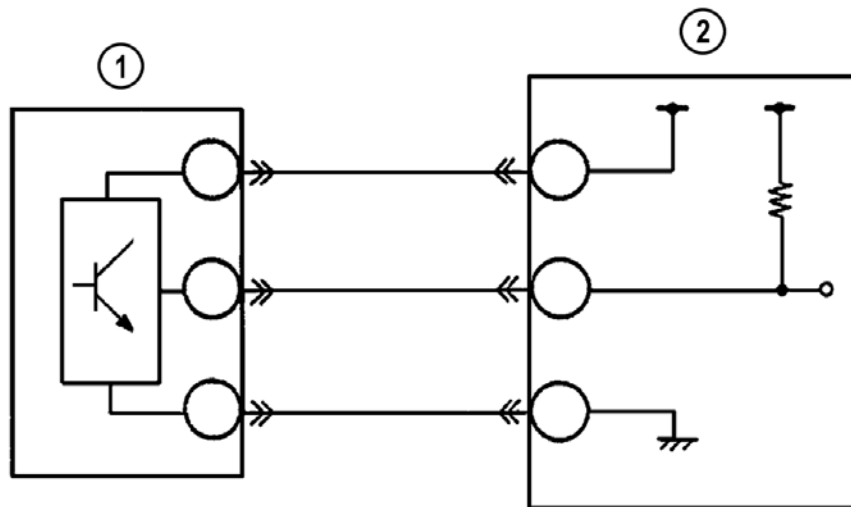
- 1 DC motor
- 2 PCM
- 3 Current detection circuit

- When the required EGR rate is high the PCM controls the DC motor with a large duty cycle. As a result, the ISV closes halfway, reducing the cross-section of the intake pipe. Thus a vacuum is generated in the intake manifold and a large amount of exhaust gas can be recirculated.
- When the required EGR rate is low the PCM controls the DC motor with a small duty cycle. As a result, the ISV opens, making the complete cross-section of the intake pipe available. Thus atmosphere or boost pressure is generated in the intake manifold (depending on the operating conditions) and only a small amount of exhaust gas can be recirculated.
- When the engine is switched off the PCM controls the DC motor with maximum duty cycle. As a result, the ISV closes fully and no air is induced into the engine, preventing bucking movements during shut-off.

- In order to remove any deposits from the ISV a cleaning mode is activated each time the engine is shut off. Therefore, the PCM actuates the ISV so that it is moved from the fully open position to the fully closed position several times. This process takes approx. 10 s.
- The PCM controls the DC motor by a duty signal 0 V/12 V.

NOTE: If the ISV system fails, the ISV stays in the open position in which no vacuum is produced.

- The ISV position sensor is integrated in the cover of the valve body and detects the ISV position by a Hall-type sensor. The sensor consists of a stator with Hall element and a magnetic rotor joint to the driven gear.



M6FL_01082

1 ISV position sensor

2 PCM

- When the magnetic rotor rotates, a voltage is generated in the Hall element. As the Hall voltage is very low, it is amplified in the sensor and input to the PCM.

NOTE: After the ISV is replaced, its adaptation values in the PCM must be reset and the ISV position sensor initialized (refer to the section “Control System, Service and Repair”).

Diesel Particulate Filter System

- The diesel particulate filter system of the vehicles with 2.0 MZR-CD engine has the following features:
 - Diesel particulate filter with differential pressure sensor and three exhaust gas temperature sensors (upper/middle/lower) has been introduced.
 - Heated oxygen sensor located behind the diesel particulate filter has been introduced.

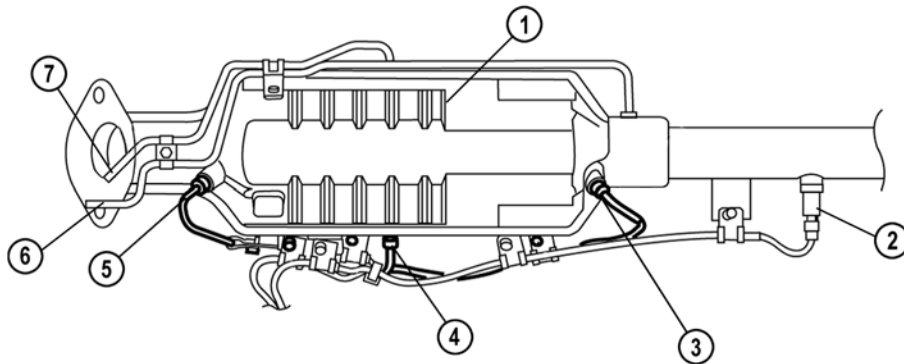
Diesel Particulates

- Under engine operating conditions such as cold start, acceleration and high engine load the combustion process of the diesel engine is incomplete, resulting in an increased formation of soot particles. These microscopically small particles have a diameter of only about 0.05 μm .
- Soot itself has no harmful effect on the human organism. Hydrocarbons originating from the fuel and lubricants, as well as water and sulphates, attach themselves to these granulates, increasing their size to 0.09 μm . In this way the harmful soot particles are formed.
- The human nose and bronchial tubes are not able to filter out particles smaller than 2.5 μm (for comparison: a hair is about 70 μm thick). As a result, the particles can then penetrate through the airways deep into the lungs and pose a health threat especially to children and adults with certain medical conditions. Soot particles are suspected of triggering allergies and even cancer. This is especially true of the smallest particles measuring between 0.1...1.0 μm .
- The European Union is introducing progressively stricter emissions legislation to achieve a long-lasting reduction in air pollution from vehicle emissions. As part of this legislation, all new Diesel passenger vehicles requiring type approval from January 1st 2005 must comply with the Euro 4 emission standard. In addition, all Diesel passenger vehicles first registered from January 1st 2006 must meet the Euro 4 standard.

- In comparison to the particulate matter limit for Euro 3 vehicles (0.05 g/km), the limit for Euro 4 vehicles (0.025 g/km) has been lowered by 50 %. In order to comply with the strict Euro 4 emission legislation, the Mazda6 with 2.0 MZR-CD engine is equipped with a diesel particulate filter system.
- The following sample calculation shows the benefit of a diesel particulate filter: A modern Common Rail diesel engine without diesel particulate filter has emitted on average about 3 kg of soot after 80.000 km. With a filter it would have emitted less than 100 g over the same distance, which is a reduction of 95 %.

Diesel Particulate Filter

- The oxidation catalytic converter and the DPF are located one behind another in a combined housing.



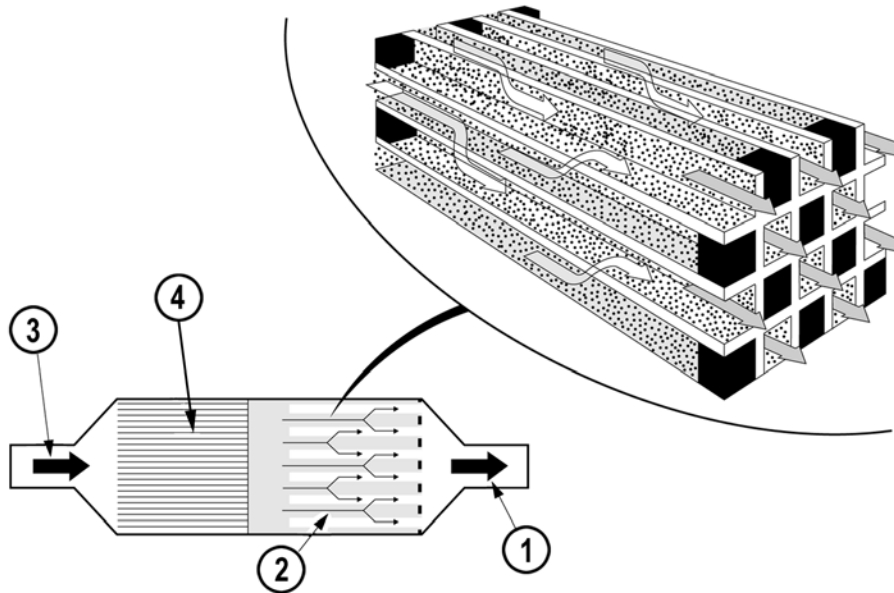
M5_01037

- | | | | |
|---|---|---|--|
| 1 | Oxidation catalytic converter and DPF | 5 | Exhaust gas temperature sensor (upper) |
| 2 | Heated oxygen sensor | 6 | Connection for reference pressure |
| 3 | Exhaust gas temperature sensor (lower) | 7 | Connection for high pressure |
| 4 | Exhaust gas temperature sensor (middle) | | |

NOTE: To ensure proper function of the DPF system only mineral diesel fuel with a maximum sulphur proportion of 350 ppm according to DIN EN 590 must be used. The use of fuel with a higher sulphur proportion is strictly forbidden as this can lead to blockage of the DPF.

NOTE: Mixing of any additives with metallic compounds to the diesel fuel (e.g. valve cleaner, coldstart accelerator) is strictly forbidden since this leads to an increased ash formation, resulting in a blocked DPF.

- The DPF is a monolith made of silicon carbide ceramics, which features a high resistance against temperature fluctuations. The individual channels of the filter have porous dividing walls and are closed at alternative ends. As a result, the exhaust gas is forced to flow through the dividing walls, which retain the soot particles and allow gaseous components to pass. The accumulation of particles in the filter increases the filtration effect still further.



M5_01038

- | | | | |
|---|---------------------|---|-------------------------------|
| 1 | Cleaned exhaust gas | 3 | Exhaust gas from engine |
| 2 | DPF | 4 | Oxidation catalytic converter |

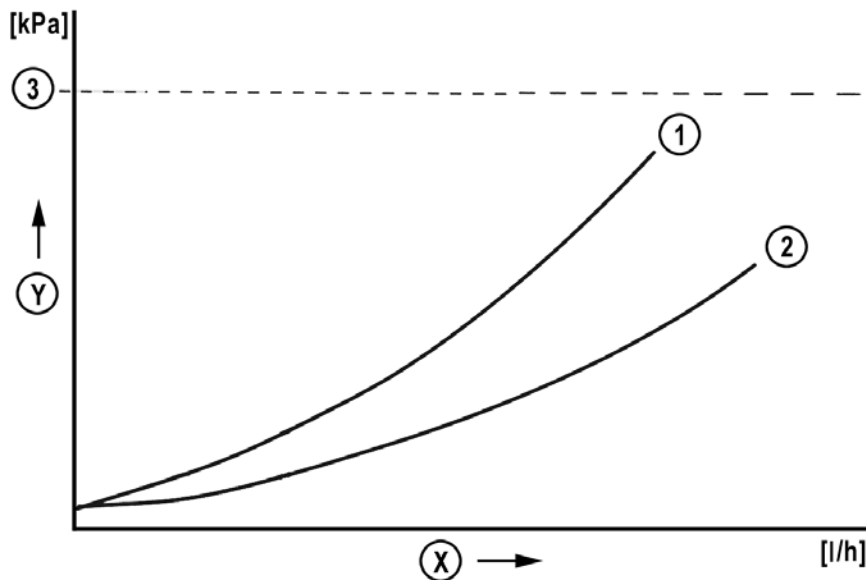
- To avoid the DPF from becoming blocked with soot particles it must be regenerated at regular intervals, i.e. the soot particles collected in the filter are burnt off. In addition, the regeneration process reduces the exhaust gas back-pressure caused by the soot amount accumulated, preventing an increase in fuel consumption.

NOTE: On vehicles with a higher mileage soot residues can often form on the exhaust tailpipe. This is an inherent by-product of the regeneration process and should not be considered a concern.

NOTE: Under certain conditions it is possible for white smoke to be emitted from the exhaust tailpipe during regeneration. This is also a by-product of the regeneration process and should not be considered a concern.

- The channels of the DPF are coated with platinum. This catalytic coating facilitates the regeneration of the filter by significantly lowering the light-off temperature of the soot and by accelerating the combustion of the particles. Without coating the burn-off of the particles takes place above a temperature of approx. 600 °C. Due to the effect of the platinum coating the light-off temperature of the soot is lowered to 500 °C.
- After regeneration ash residues that have formed from the engine oil and diesel fuel remain in the DPF and cannot be further converted. These residues reduce the usable filter volume, shortening the regeneration intervals. Since the filter pores are clogged by the ash residues, the exhaust gas back-pressure and hence the fuel consumption are increased. Due to the use of engine oil with low ash formation, these effects can be reduced to a minimum. For this reason, there is no replacement interval given for the filter.
- However, depending on the operating conditions the usable filter volume may reach the limit within the lifetime of the vehicle. In this case, the DPF must be replaced.

NOTE: After replacing the DPF, several steps must be performed to ensure its proper function (refer to the section “Control System, Service and Repair”).

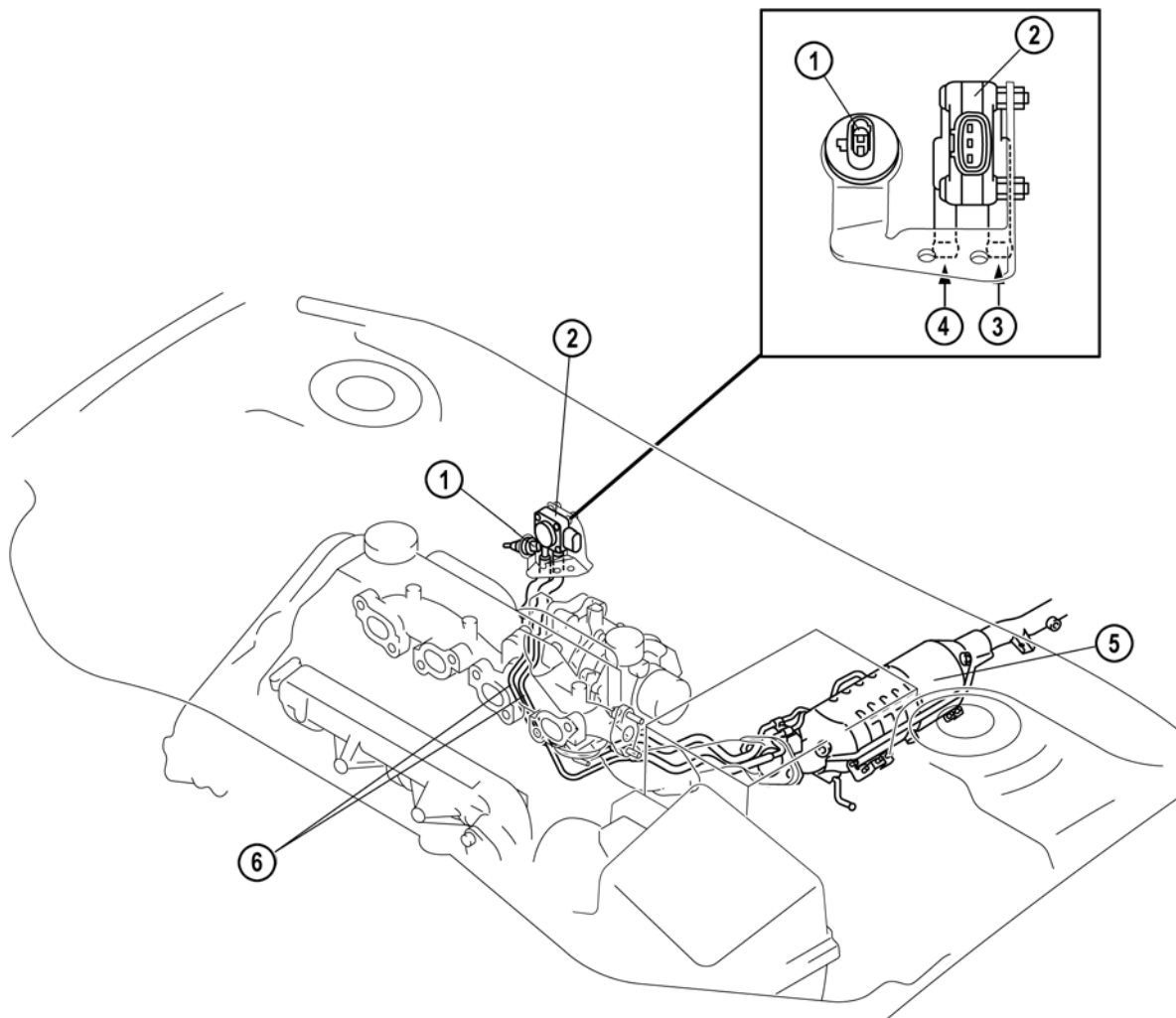


M5_01039

- | | | | |
|---|-------------------------|---|-----------------------------|
| X | Exhaust-gas volume flow | Y | Differential pressure |
| 1 | Used filter | 3 | Differential pressure limit |
| 2 | New filter | | |

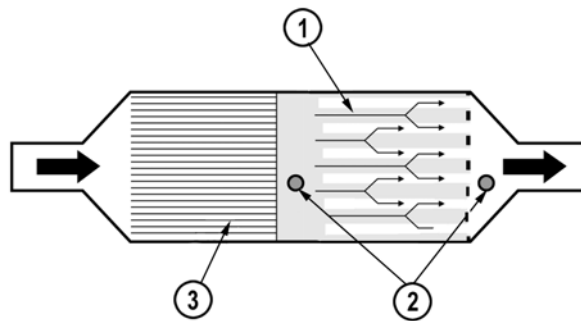
DPF Differential Pressure Sensor

- The DPF differential pressure sensor detects the pressure difference in the exhaust gas flow upstream and downstream of the DPF. The pressure difference is a measure for the soot amount accumulated in the filter (i.e. the higher the pressure difference, the higher the soot amount). The sensor is located in the engine compartment at the bulkhead and is connected to the upstream and downstream measuring point of the DPF by means of pressure lines.
- The differential pressure sensor consists of a pressure chamber with integrated semi-conductor element. The electrical resistance of the element varies, when its shape changes due to exposure to pressure.



M6FL_01047

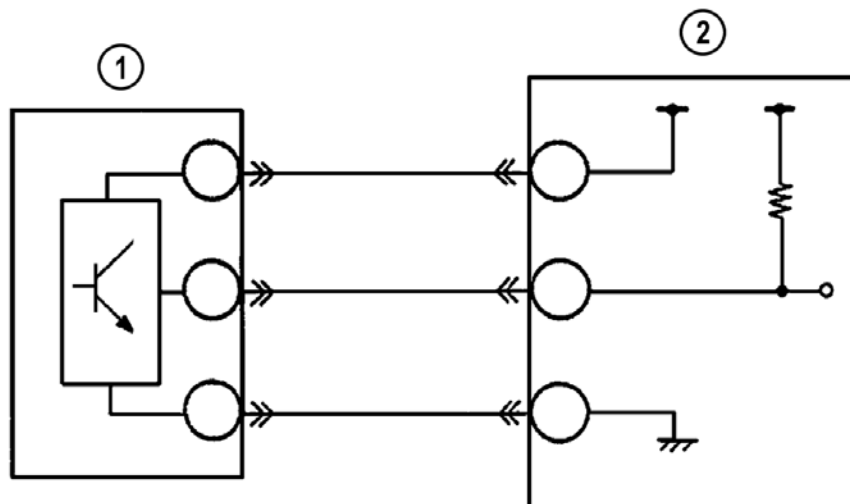
- | | | | |
|---|-----------------------------------|---|---------------------------------------|
| 1 | Temperature correction sensor | 4 | Connection for high pressure |
| 2 | DPF differential pressure sensor | 5 | Oxidation catalytic converter and DPF |
| 3 | Connection for reference pressure | 6 | Pressure lines |



M5_01041

- 1 DPF
- 2 Pipe connections for differential pressure sensor
- 3 Oxidation catalytic converter

- The signal of the DPF differential pressure sensor is used to determine, whether the soot amount requires regeneration of the filter. In addition, the signal serves to monitor the regeneration process.
- The DPF differential pressure sensor supplies the PCM with an analogue voltage signal between 0...5 V.



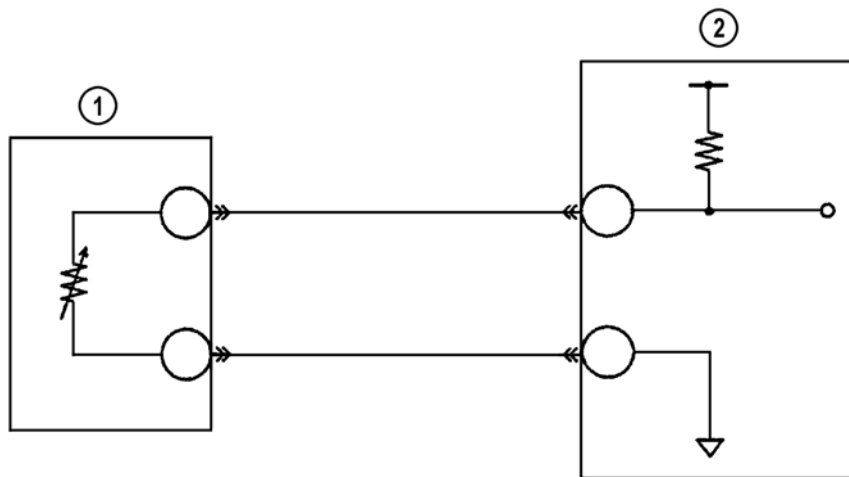
M6FL_01082

- 1 DPF differential pressure sensor
- 2 PCM

- In addition, the DPF differential pressure sensor features a temperature correction sensor, which is located on the bracket of the differential pressure sensor and detects the temperature in the engine compartment. The sensor is a temperature-resistive resistor with **NTC (Negative Temperature Coefficient)**, i.e. its resistance becomes smaller when the temperature rises. The temperature correction sensor supplies the PCM with an analogue voltage signal between 0...5 V.
- The signal of the temperature correction sensor is used to compensate the thermal characteristics of the DPF differential pressure sensor.

NOTE: Since the output characteristics of the DPF differential pressure sensor is adjusted while it is installed to the bracket, always replace the sensor and the bracket as a unit.

NOTE: After replacing the DPF differential pressure sensor, several steps must be performed to ensure its proper function (refer to the section “Control System, Service and Repair”).



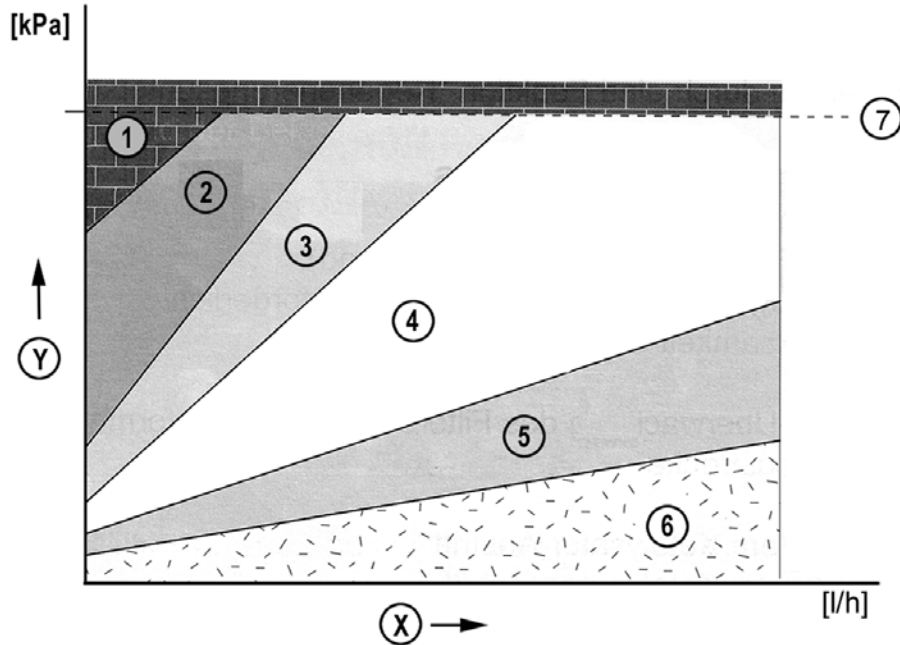
M6FL_01084

1 Temperature correction sensor

2 PCM

Diagnostics

- Since the filter itself creates a certain resistance in the exhaust gas flow, the signal of the DPF differential pressure sensor is also used to determine the filter condition.



M6FL_01062

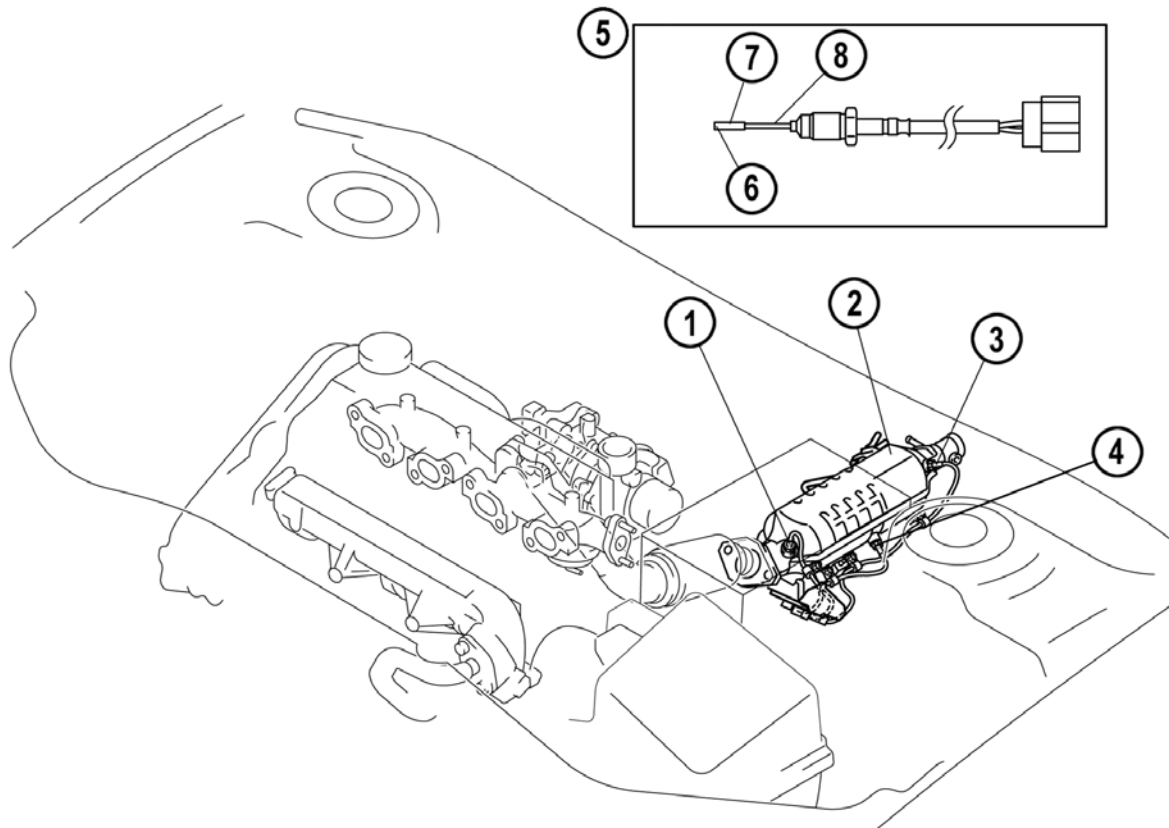
X	Exhaust-gas volume flow	Y	Differential pressure
1	Blocked condition of filter	5	Regenerated condition of filter
2	Overloaded condition of filter	6	Damaged condition of filter
3	Loaded condition of filter	7	Differential pressure limit
4	Intermediate condition of filter		

- If the value measured by the DPF differential pressure sensor is above a certain limit, the DPF is recognized as being blocked. Then the PCM stores a corresponding DTC, illuminates the **MIL** (**M**alfunction **I**ndicator **L**ight) and activates the limp home mode.
- The blocking of the DPF is often as a result of excessive soot emission by the engine (e.g. due to EGR valve stuck open, leak in the intake-air system etc.) or can be attributed to multiple failed regeneration processes. To rectify this concern, a manual regeneration should be carried out using WDS (refer to the section "Control System, Service and Repair").

- If the value measured by the DPF differential pressure sensor is below a certain limit, the DPF is recognized as being damaged. Then the PCM stores a corresponding DTC, illuminates the MIL and activates the limp home mode.
- In this case, the DPF differential pressure sensor should be checked first. Call up the Datalogger of the PCM and select the PID **EXHPRESS_DIF** (Press). Then connect a hand-operated pressure/vacuum pump to the upstream pressure line at the DPF, apply a pressure of 30 kPa and monitor the **PID** (**P**arameter **I**dentification). If the PID indicates 30 kPa, replace the DPF. Otherwise check the upstream pressure line and the DPF differential pressure sensor.

Exhaust Gas Temperature Sensors

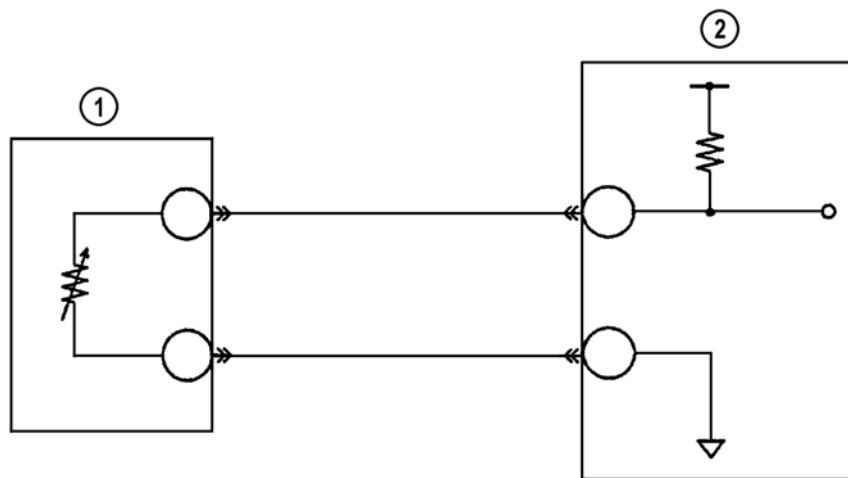
- The three exhaust gas temperature sensors (upper/middle/lower) are located in the combined housing of the oxidation catalytic converter/DPF and detect the temperature of the exhaust gas upstream of the oxidation catalytic converter, as well as upstream and downstream of the DPF. Each sensor is a temperature-resistive resistor with NTC, i.e. its resistance becomes smaller when the temperature rises. The exhaust gas temperature sensor supplies the PCM with an analogue voltage signal between 0...5 V.



M6FL_01045

- | | | | |
|---|---|---|--------------------------------|
| 1 | Exhaust gas temperature sensor (upper) | 5 | Exhaust gas temperature sensor |
| 2 | Oxidation catalytic converter and DPF | 6 | Thermistor element |
| 3 | Exhaust gas temperature sensor (lower) | 7 | Cover |
| 4 | Exhaust gas temperature sensor (middle) | 8 | Sheath pin |

- The signal of the upper exhaust gas temperature sensor allows checking, whether the exhaust gas temperature required for operation of the oxidation catalytic converter is reached.
- The signal of the middle exhaust gas temperature sensor is used to determine, whether the exhaust gas temperature required for regeneration of the filter is reached.
- The signal of the lower exhaust gas temperature sensor serves to monitor the exhaust gas temperature during the regeneration process.
- In addition, the information from the exhaust gas temperature sensors is used for the calculation of the soot amount burnt off in the DPF.



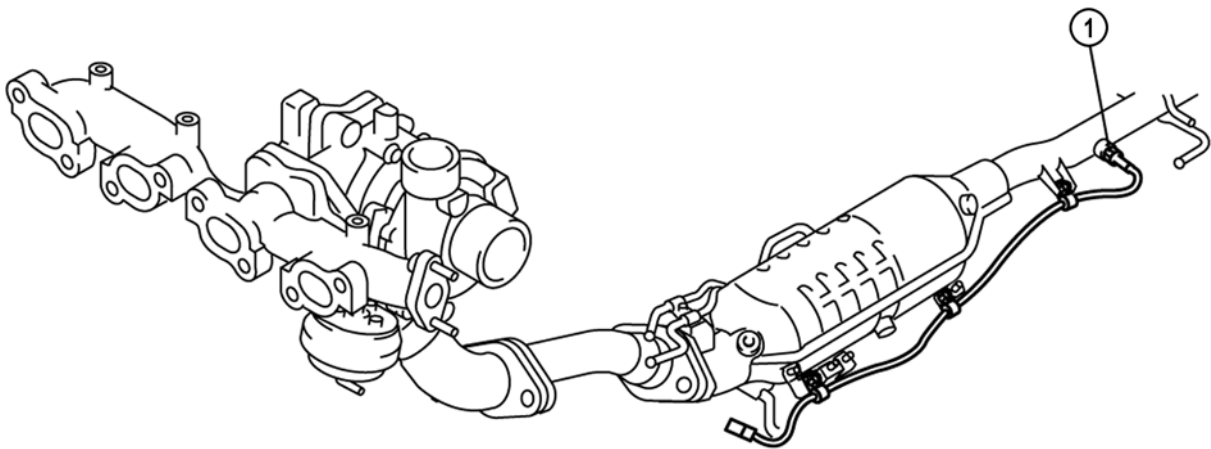
M6FL_01084

1 Exhaust gas temperature sensor

2 PCM

Heated Oxygen Sensor

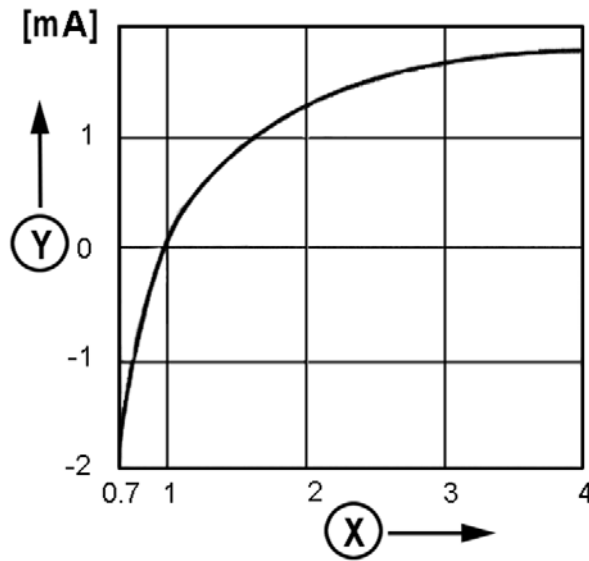
- The HO2S is located behind the DPF and detects the oxygen concentration in the exhaust gas. The HO2S is a wide range type oxygen sensor and uses the same operating principle as the wide range oxygen sensors on petrol engines. It generates a clear electrical signal in a wide range from $\lambda = 0.7 \dots \infty$ ($\infty =$ air with 21 % oxygen). As a result, the sensor is also capable of detecting the oxygen concentration in the exhaust gas of a diesel engine, which generally works with an excess-air factor of $\lambda \sim 1.4$ (at full load) to $\lambda \sim 3.4$ (at idle).
- The information of the HO2S is used for the calculation of the soot amount burnt off in the DPF.



M6FL_01055

1 HO2S

- The HO2S supplies the PCM with a current between -1.8...+1.8 mA.

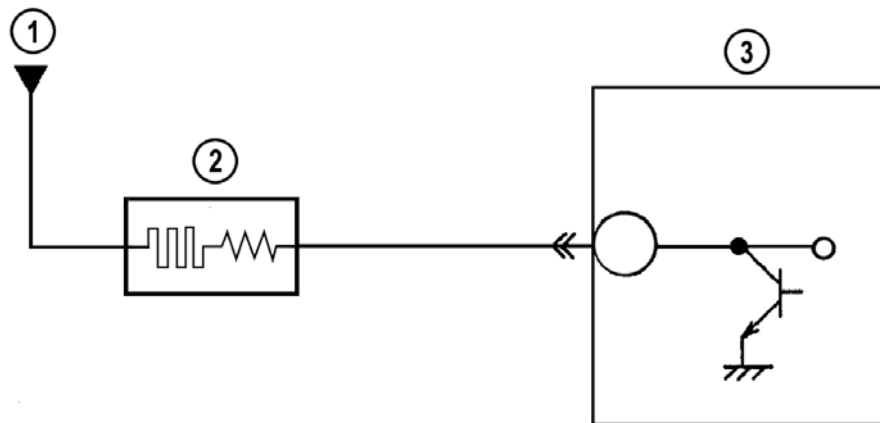


M6FL_01086

X Excess-air factor λ

Y Current

- Since the HO2S only generates a usable signal above a certain temperature, it features an integral heater element. The temperature of the HO2S is controlled by the PCM, which activates the heater element via a duty signal.



M6FL_01085

1 From PCM control relay
2 Heater element

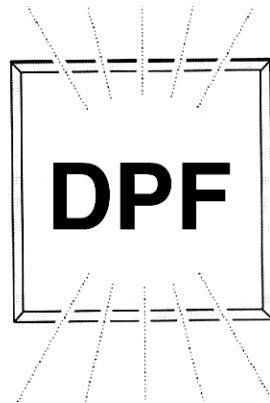
3 PCM

- At low exhaust gas temperatures the PCM controls the heater element by a large duty cycle, so that the required operating temperature is reached quickly.
- At high exhaust gas temperatures the PCM controls the heater element by a small duty cycle, so that no heating takes place.
- The PCM controls the heater element by a duty signal 0 V/12 V.

NOTE: After replacing the HO2S, its adaptation values in the PCM must be reset (refer to the section “Control System, Service and Repair”).

DPF Indicator Light

- The DPF indicator light is located in the instrument cluster and serves to alert the driver to a malfunction in the DPF system. During normal operation the DPF indicator light illuminates when the ignition is on and is extinguished after a few seconds. If the DPF indicator light illuminates or flashes during driving, then a fault has been detected.



M6FL_01087

Regeneration Control

- The regeneration control determines the soot amount accumulated in the DPF and subsequently starts the regeneration process. The regeneration control is integrated in the PCM.

Soot Amount Calculation

- The PCM receives information about the soot amount accumulated in the filter from the DPF differential pressure sensor. In order to establish the soot emission of the engine, the PCM evaluates the customer's driving method by monitoring the engine load, engine speed and vehicle speed. In addition, the PCM calculates the soot amount burnt off in the DPF using the signals from the HO₂S and the exhaust gas temperature sensors.
- Depending on the signal from the DPF differential pressure sensor, the calculated soot emission, the burnt-off soot amount and the distance travelled, the PCM decides whether and when a regeneration should be carried out. In this way, the filter does neither become blocked nor damaged by a violent regeneration following an over-accumulation of soot. As a result, it is possible to maintain the long-term integrity of the DPF while achieving minimum fuel consumption, minimum oil dilution and optimum engine performance.
- If the soot accumulation rate in the DPF is 80 % or more, the DPF indicator light illuminates. In this case an automatic regeneration of the DPF must be performed by driving the vehicle at an engine speed of 2000 min⁻¹ or more and a vehicle speed of 40 km/h or more for approx. 10...15 min. As soon as the automatic regeneration process starts, the DPF indicator light turns off.

NOTE: Although the DPF indicator light turns off when the automatic regeneration is started, the regeneration process is continued until the soot accumulation rate decreases to 60 % or less.

NOTE: If the customer complains that the DPF indicator light illuminates frequently, he must be informed to change the driving method (they should drive the vehicle at middle or high engine speeds for a longer distance), so that regeneration of the DPF is enabled.

- If the soot accumulation rate in the DPF reaches 100 % or more, the DPF indicator light flashes and DTC P2458 is stored in the PCM. In addition, the PCM reduces the fuel injection amount to lower the exhaust gas temperature, preventing the filter from overheating. Due to the reduced injection amount the soot emission of the engine and hence the soot amount accumulated in the filter is also reduced. In this case a manual regeneration of the DPF must be performed.

NOTE: Do NOT perform automatic regeneration when the soot accumulation rate in the DPF is 100 % or more, since this may cause damage to the filter or the engine.

- If the soot accumulation rate in the DPF reaches 140 % or more, the MIL also illuminates and DTC P242F is stored in the PCM. In addition, the PCM further reduces the fuel injection amount and hence the soot emission of the engine, resulting in a lower soot amount accumulated in the filter. Here, a manual regeneration of the DPF must also be performed.
- If the soot accumulation rate in the DPF reaches 200 %, the filter cannot be regenerated anymore and must therefore be replaced.
- The different conditions of the soot accumulation in the DPF are shown in the following table:

Item	Soot accumulation in the DPF					
	60%	80%	100%	125%	140%	200%
Soot accumulation rate						
DPF indicator light	—	—	Illuminates	Flashes every 0.4 s		
MIL	—	—	—	—	—	Illuminates
Output restriction	—	—	—	Max. 150 km/h (93 mph)		Max. 70 km/h (43 mph)
DTC stored in PCM	—	—	—	P2458		P242F
Customer action	—	—	Perform auto regeneration by driving the vehicle at an engine speed of 2,000 rpm or more and a vehicle speed of 40 km/h (22 mph) or more for 10...15 min	Bring the vehicle to a dealer		
DPF automatic regeneration	—	Enabled		Disabled		
Dealer action	—	—		Perform manual regeneration (normal mode)	Perform manual regeneration (long mode)	Replace the DPF

M6FL_01T013

Regeneration Process

- Due to the effect of the catalytic coating the diesel particles are burnt off above a temperature of 500 °C. Since the exhaust gas temperature during normal driving is between 150...400 °C (depending on the engine operating conditions), it must be increased artificially by external intervention from the engine management system to start the regeneration process.
- If regeneration of the DPF is required, the PCM checks whether the engine operating conditions are suitable to start the regeneration process. If the requirements for regeneration are met, the PCM performs the following measures to artificially increase the exhaust gas temperature:
 - Closing the EGR valve to increase the combustion temperature by increasing the oxygen proportion of the cylinder charge
 - Closing the ISV partially to increase the intake air temperature by throttling
 - Performing an early post-injection to increase the combustion temperature by burning an additional fuel amount
 - Performing two late post-injections to increase the exhaust gas temperature by burning fuel in the oxidation catalytic converter
- By these measures the minimum exhaust gas temperature of 150 °C (at low engine load and engine speed) is increased to 500 °C and regeneration starts. Then the PCM monitors the regeneration process using the signals from the DPF differential pressure sensor and from the exhaust gas temperature sensors. Control over the regeneration process is critically important since the DPF is damaged when its temperature exceeds 1000 °C.
- The regeneration process takes up to 15 min. When regeneration has started it will be completed regardless of the engine operating conditions. It is only stopped when the engine is shut off. In this case, the regeneration process is started again once the required operating conditions are met.

Regeneration Intervals

- Depending on the operating conditions of the vehicle the DPF is regenerated every 100...300 km. Due to the ash residues that have formed from the engine oil and diesel fuel the usable filter volume is reduced. Since the ash amount accumulated in the DPF increases with every regeneration process, the regeneration intervals become shorter with rising mileage.

NOTE: High fuel consumption, low fuel quality (high sulphur content) and high engine oil consumption accelerate the accumulation of ash in the DPF, shortening the regeneration intervals more quickly.

Charging System

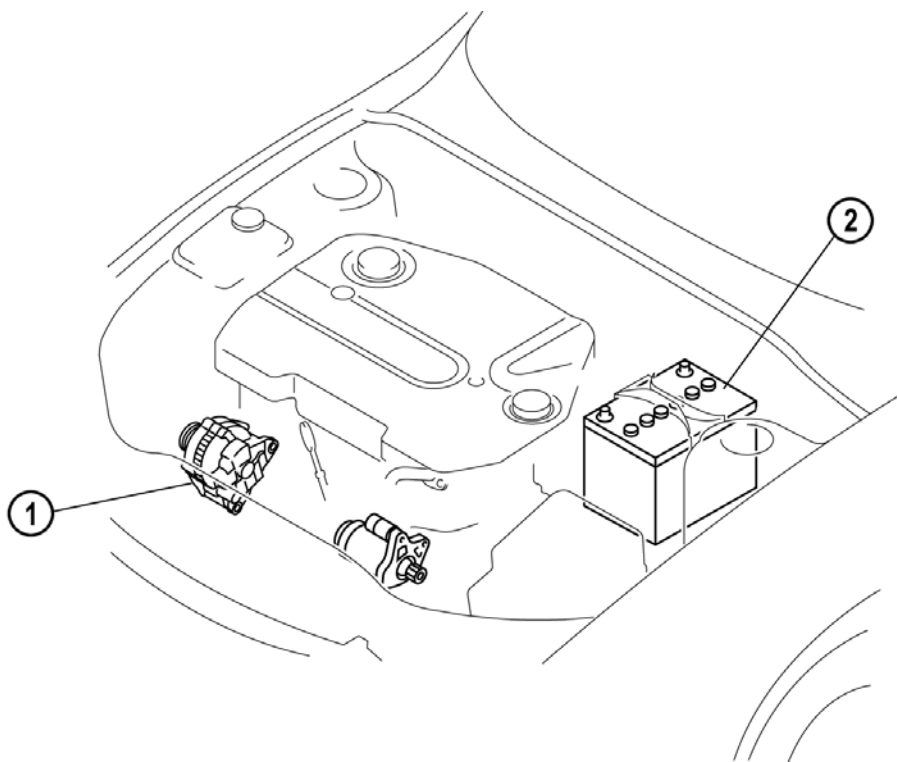
- The charging system of the vehicles with 2.0 MZR-CD engine has the following feature:
 - Smart charging system has been introduced.

Specifications

Item		Specification
Battery	Voltage (V)	12
	Type and capacity (5-hour rate) (Ah)	95D31L (64), 115D31L (70)
Generator	Output (V-A)	12-90
	Regulated voltage	Controlled by PCM
	Self diagnosis function	

M6FL_01T014

Parts Location



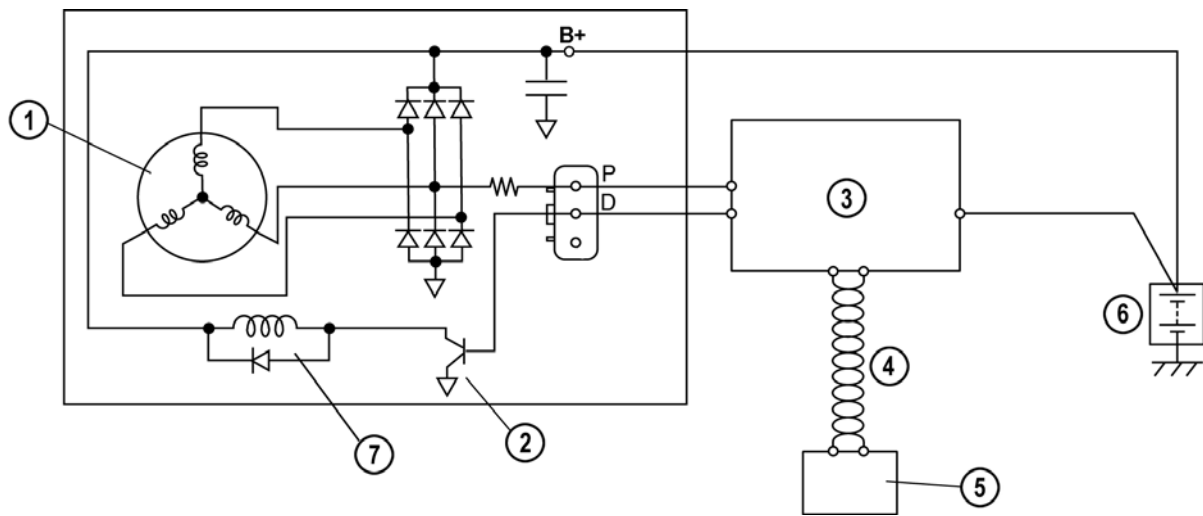
M5_01050

1 Generator

2 Battery

Smart Charging System

- A so-called "Smart Charging System" has been introduced to improve battery charging and durability. The exciting current of the field coil and hence the charging voltage is controlled by the PCM, which actuates the generator by a duty signal. In addition, the generator sends a feedback signal to the PCM, which hereby monitors the generator load.
- The PCM determines the duty ratio output to the generator according to the battery voltage, battery electrolyte temperature (derived from the intake air temperature, engine coolant temperature and vehicle speed signal) and generator load. In addition, the PCM transmits information about the generator warning light status via the high-speed CAN bus to the instrument cluster, which activates the generator warning light accordingly.



M5_01051

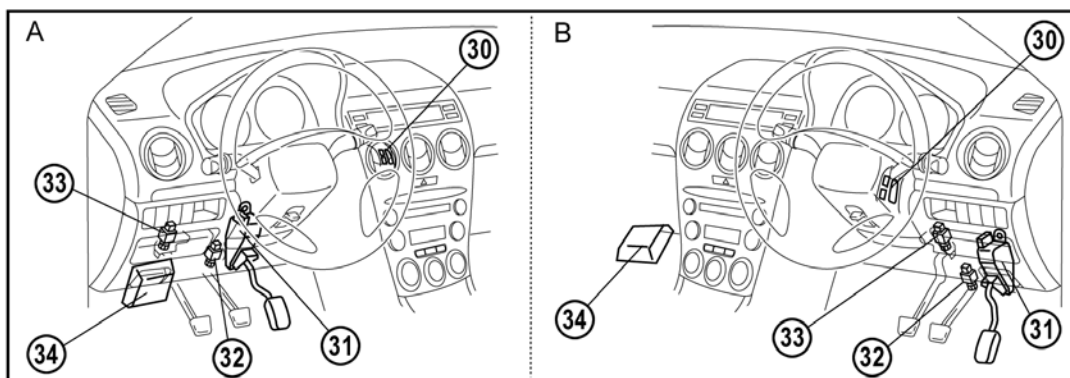
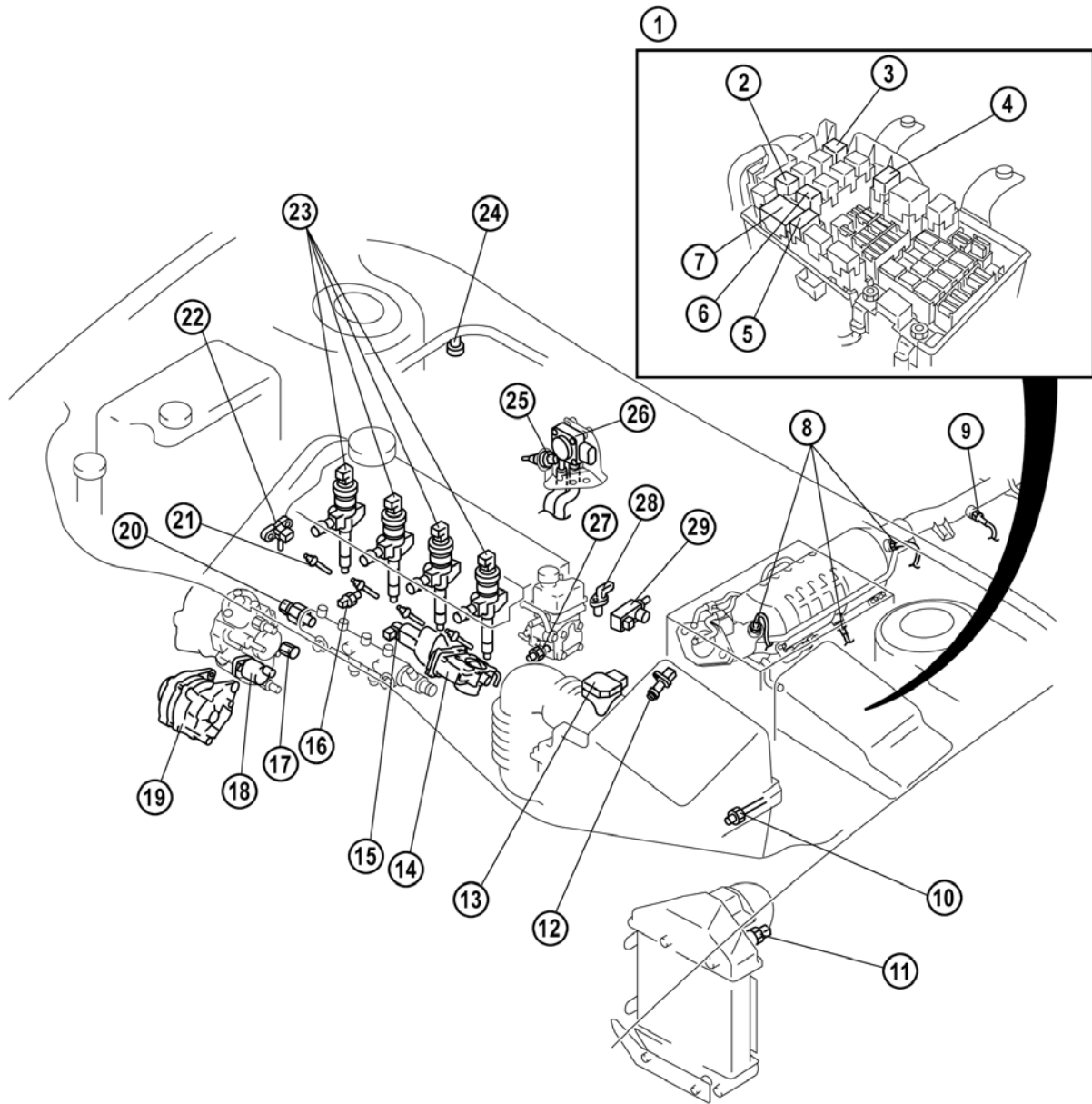
- | | | | |
|---|--------------------|---|--------------------|
| 1 | Stator coil | 5 | Instrument cluster |
| 2 | Power transistor | 6 | Battery |
| 3 | PCM | 7 | Field coil |
| 4 | High-speed CAN bus | | |

- When the battery voltage/battery electrolyte temperature is high and/or the generator load is low, the PCM controls the generator with a small duty cycle. As a result, a low exciting current flows through the field coil and the generator outputs a low charging voltage.
- When the battery voltage/battery electrolyte temperature is low and/or the generator load is high, the PCM controls the generator with a large duty cycle. As a result, a high exciting current flows through the field coil and the generator outputs a high charging voltage.

Control System

- The control system of the vehicles with 2.0 MZR-CD engine has the following features:
 - Powertrain control module with **FEEPROM (Flash Electronically Erasable Programmable Read Only Memory)** has been introduced.
 - Magneto resistive-type crankshaft and camshaft position sensor have been introduced.
 - Hall-type accelerator pedal position sensor has been introduced.
 - Idle switch has been cancelled.
 - Power steering pressure switch has been introduced.

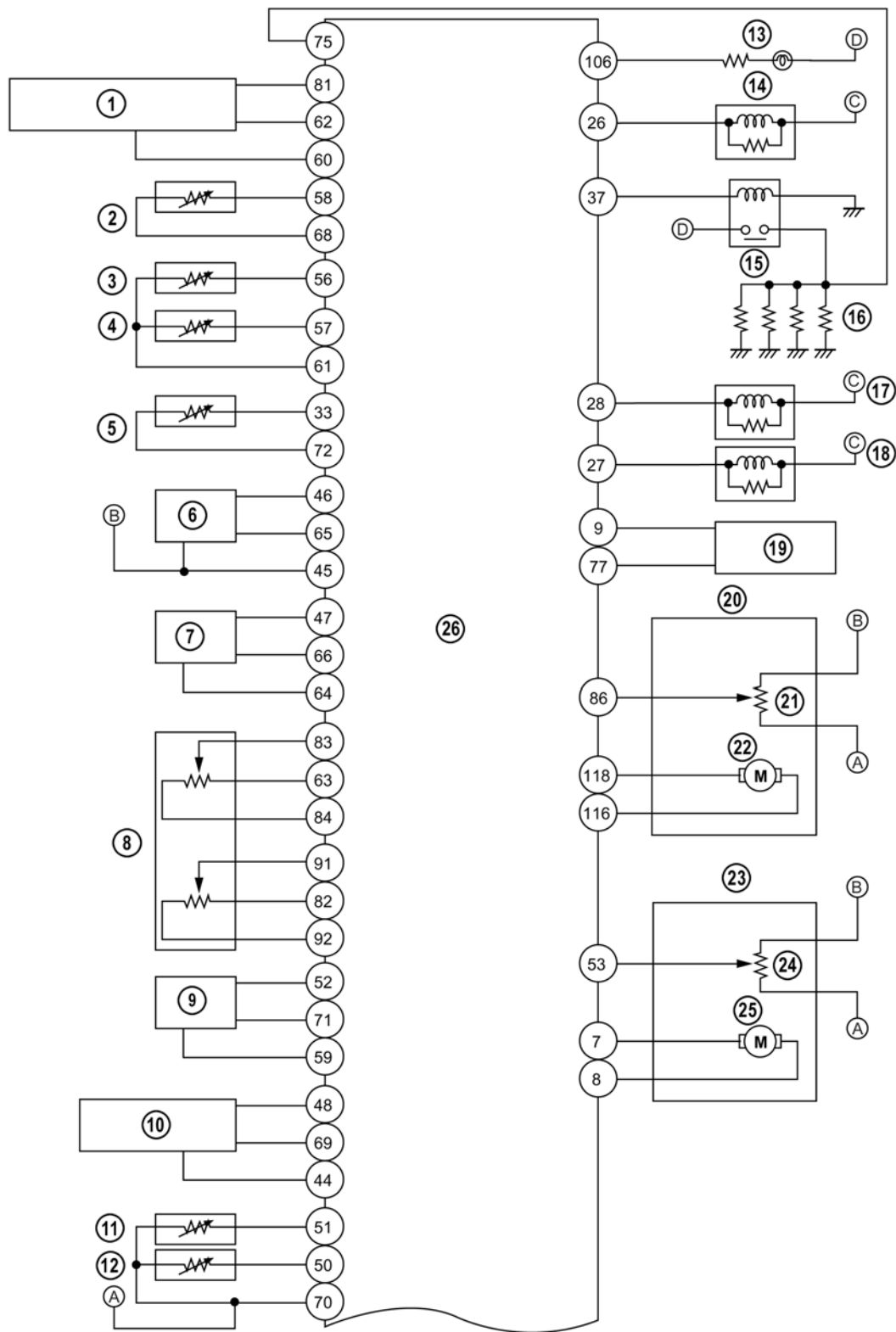
Parts Location



M6FL_01079

1	Main fuse block	19	Generator
2	Starter relay	20	Fuel pressure sensor
3	Cooling fan relay No.1	21	Glow plug
4	PCM control relay (main relay)	22	MAP sensor
5	Cooling fan relay No.2	23	Fuel injectors
6	A/C relay	24	Refrigerant pressure switch
7	Glow plug relay	25	Temperature correction sensor
8	Exhaust gas temperature sensors	26	DPF differential pressure sensor
9	HO2S	27	PSP switch
10	Neutral switch	28	CMP sensor
11	IAT No.2 sensor	29	VBC solenoid valve
12	CKP sensor	30	Cruise control switch
13	MAF/IAT sensor	31	APP sensor
14	Intake shutter valve position sensor	32	Brake switch
15	EGR valve position sensor	33	Clutch switch
16	ECT sensor	34	PCM (with built-in BARO sensor)
17	Fuel temperature sensor	A	LHD
18	Suction control valve	B	RHD

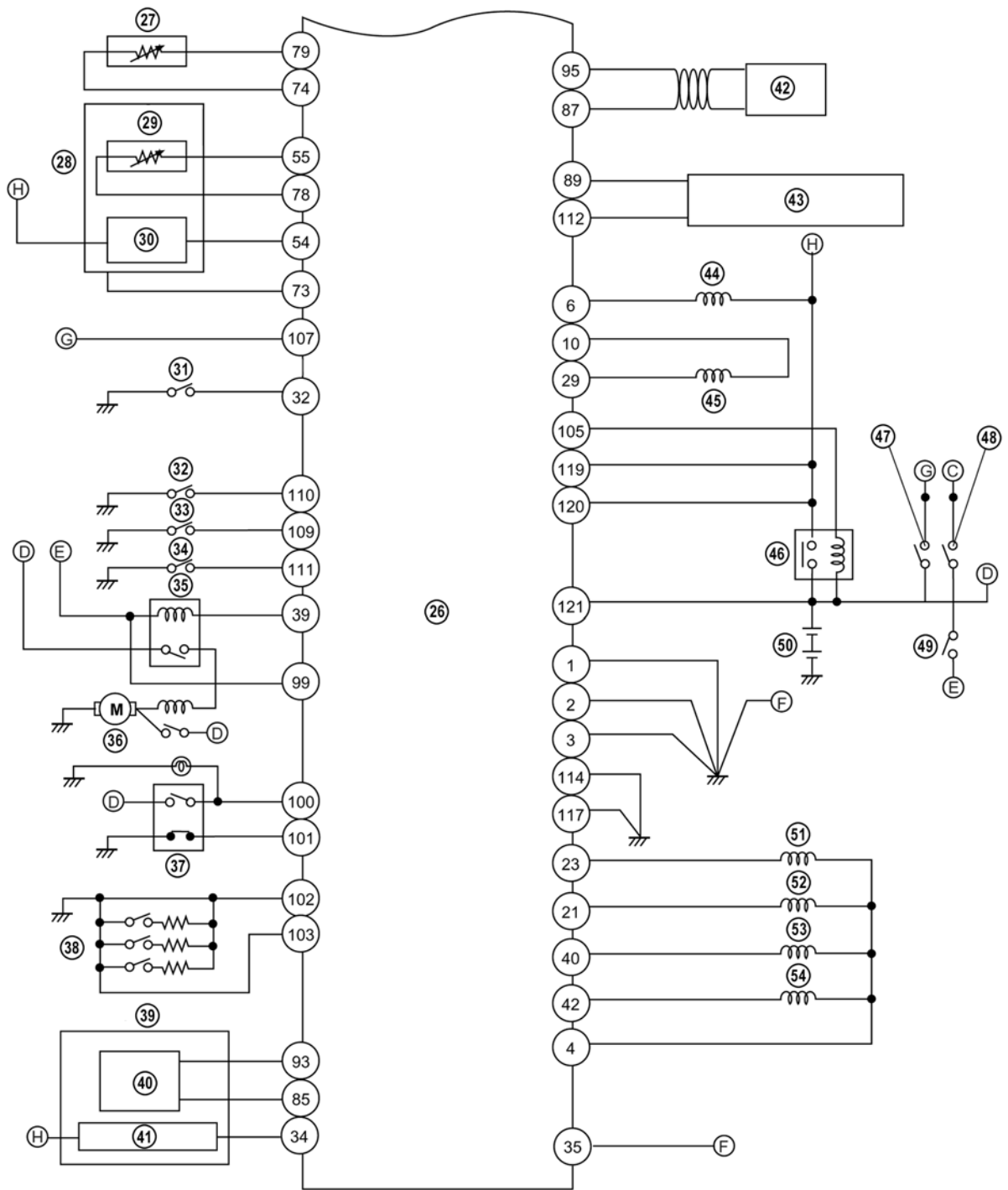
Wiring Diagram



M6FL_01076

1	DPF differential pressure sensor	14	A/C relay
2	Temperature correction sensor	15	Glow plug relay
3	Exhaust gas temperature sensor (upper)	16	Glow plugs
4	Exhaust gas temperature sensor (middle)	17	Cooling fan relay No.2
5	Exhaust gas temperature sensor (lower)	18	Cooling fan relay No.1
6	CKP sensor	19	Generator
7	CMP sensor	20	Intake shutter valve
8	APP sensor	21	Intake shutter valve position sensor
9	MAP sensor	22	Intake shutter valve actuator
10	Fuel pressure sensor	23	EGR valve
11	ECT sensor	24	EGR valve position sensor
12	Fuel temperature sensor	25	DC motor
13	Security light	26	PCM

Wiring Diagram (Continued)



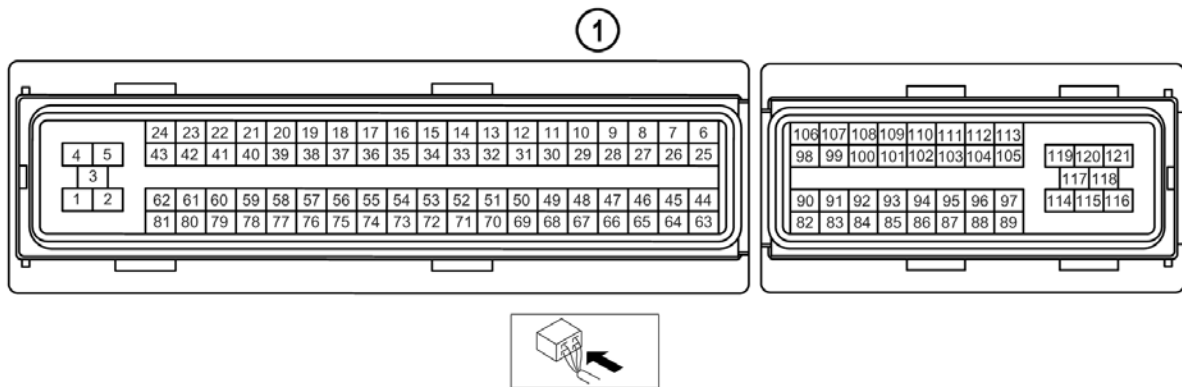
M6FL_01077

26	PCM	41	Oxygen sensor heater
27	IAT sensor No.2	42	DLC
28	MAF/IAT sensor	43	Immobilizer-related information
29	IAT sensor	44	VBC solenoid valve
30	MAF sensor	45	Suction control valve
31	Refrigerant pressure switch	46	PCM control relay (main relay)
32	Neutral switch	47	Engine switch (IG1)
33	Clutch switch	48	Engine switch (IG2)
34	PSP switch	49	Engine switch (START)
35	Starter relay	50	Battery
36	Starter	51	Fuel injector No.3
37	Brake switch	52	Fuel injector No.2
38	Cruise control switch	53	Fuel injector No.4
39	HO2S	54	Fuel injector No.1
40	Oxygen sensor		

Powertrain Control Module

- The PCM is located behind a cover in the left-hand-side footwell and features a 121-pin (two-block) connector.

NOTE: When replacing the PCM, several steps must be performed to ensure its proper function (refer to the section “Control System, Service and Repair”).



M6FL_01075

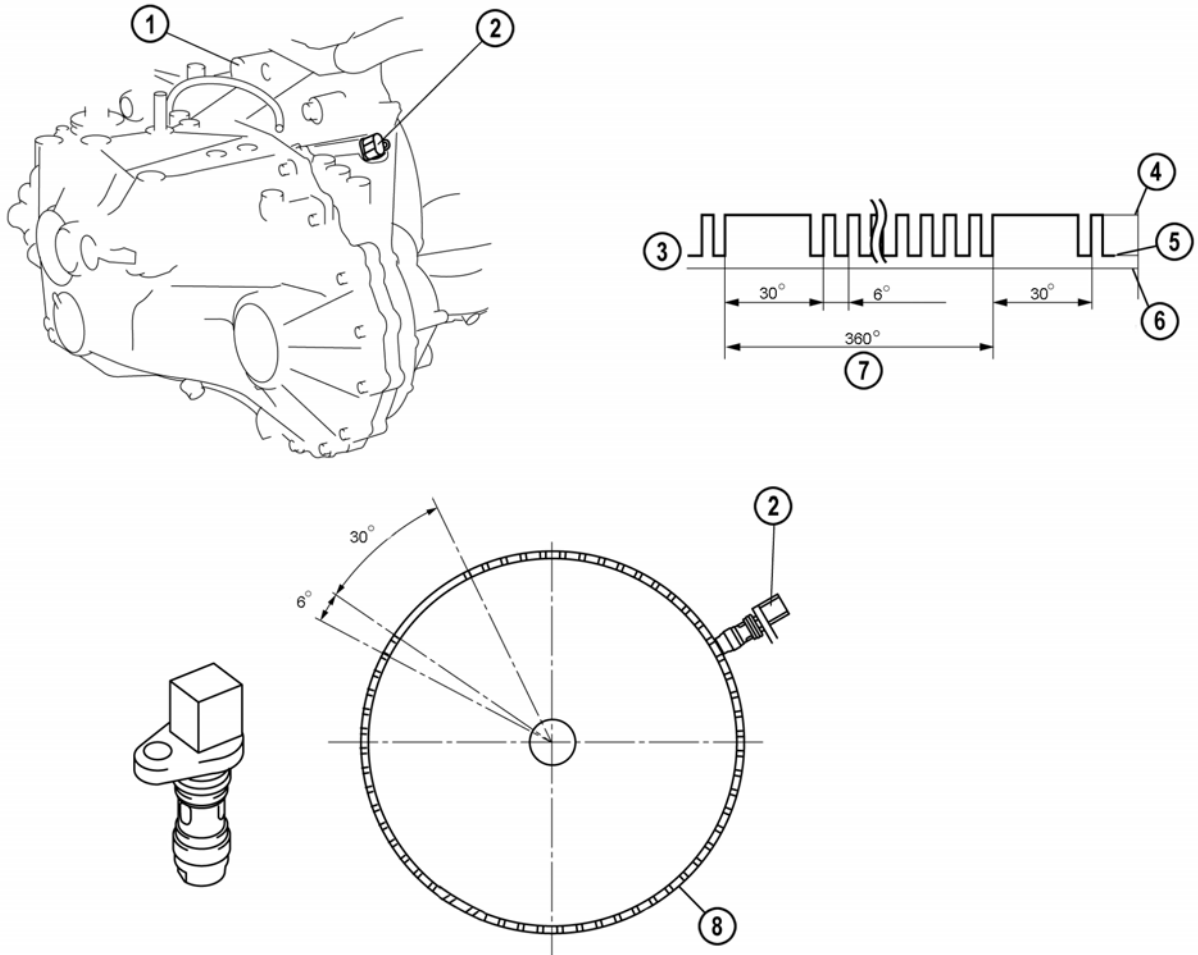
1 Wiring harness side-connector of the PCM

- The PCM features an EEPROM, which can be erased electronically by a flash voltage and reprogrammed with updated calibration data. As a result, the strategy program and the calibration data logged in the EEPROM can be updated without replacing the PCM.
- If the PCM should be updated with a later software calibration, the module has to be reprogrammed with the aid of the WDS. Therefore, select the option **Toolbox→Module Programming→Module Reprogramming→PCM** and follow the instructions of the WDS.

NOTE: As later software calibrations are usually released to resolve specific customer concerns, module reprogramming should only be carried out when recommended e.g. by a Service Information or by the Technical Hotline/Technical Service Department.

Crankshaft Position Sensor

- A GMR-type CKP sensor has been introduced, which is located at the rear side of the clutch housing. The sensor consists of two GMR elements and a magnet, which scan a rotor with 56 teeth, missing five teeth in one location. The rotor is integrated in the flywheel.



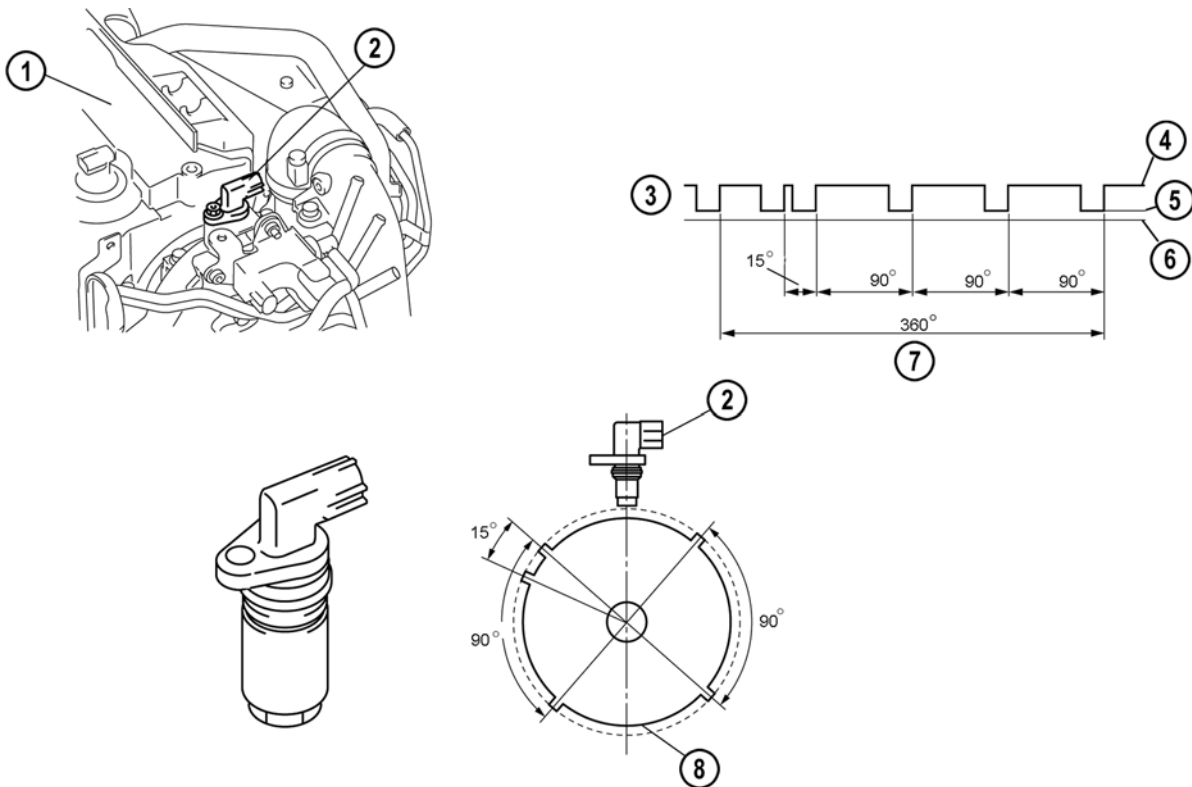
M6FL_01074

- | | | | |
|---|----------------|---|---------------|
| 1 | Clutch housing | 5 | 0.5 V |
| 2 | CKP sensor | 6 | Ground |
| 3 | Output signal | 7 | Crank angle |
| 4 | 5 V | 8 | Toothed rotor |

Camshaft Position Sensor

- A GMR-type CMP sensor has been introduced, which is located at the vacuum pump. The sensor consists of two GMR elements and a magnet, which scan a rotor with five teeth. The rotor is attached to the drive gear of the power steering oil pump.

NOTE: When the CMP sensor is faulty, this can be recognized by the increased engine noise (Diesel knocking). In order to identify cylinder No.1 during engine start the PCM injects metered quantities of fuel into the individual cylinders and monitors the engine speed via the CKP sensor. The cylinder in question is the one where the engine speed increases after fuel has been injected. As a result, the starting process takes longer than normal.



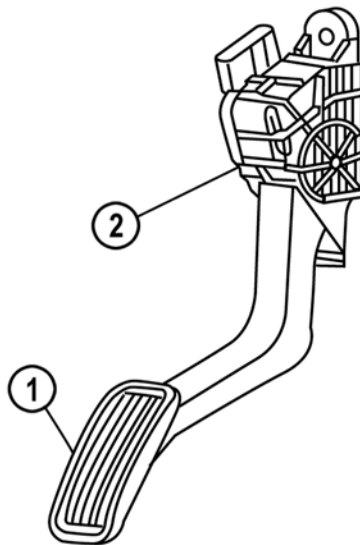
M6FL_01073

- | | | | |
|---|---------------|---|---------------|
| 1 | Cylinder head | 5 | 0.5 V |
| 2 | CMP sensor | 6 | Ground |
| 3 | Output signal | 7 | Cam angle |
| 4 | 5 V | 8 | Toothed rotor |

Accelerator Pedal Position Sensor

- A Hall-type APP sensor has been introduced. For safety reasons the APP sensor consists of two Hall elements integrated in the stator and a magnetic rotor joint to the accelerator pedal.

NOTE: If one Hall-type sensor fails, the PCM uses the signal from the other sensor to detect the driver's acceleration demand. As a result, the engine speed is limited to approx. 2500 min⁻¹. If the APP sensor fails completely, the engine speed is limited to 1500 min⁻¹.

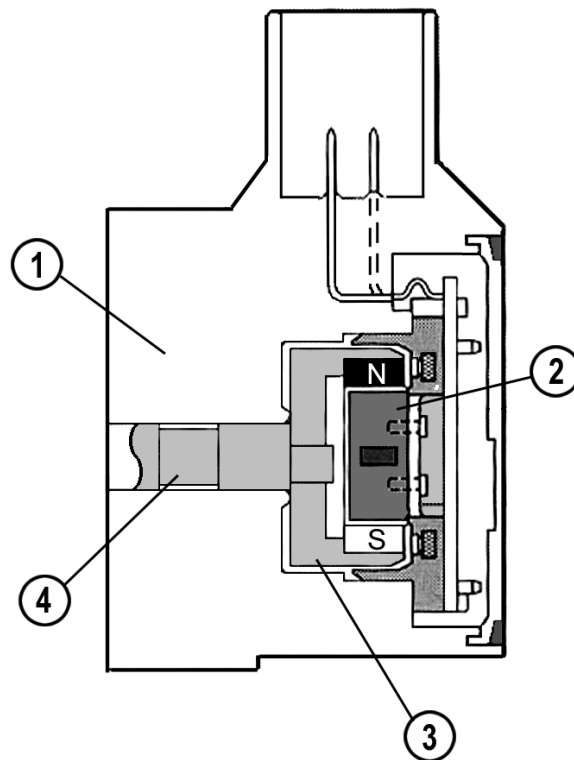


M5_01056

1 Accelerator pedal

2 APP sensor

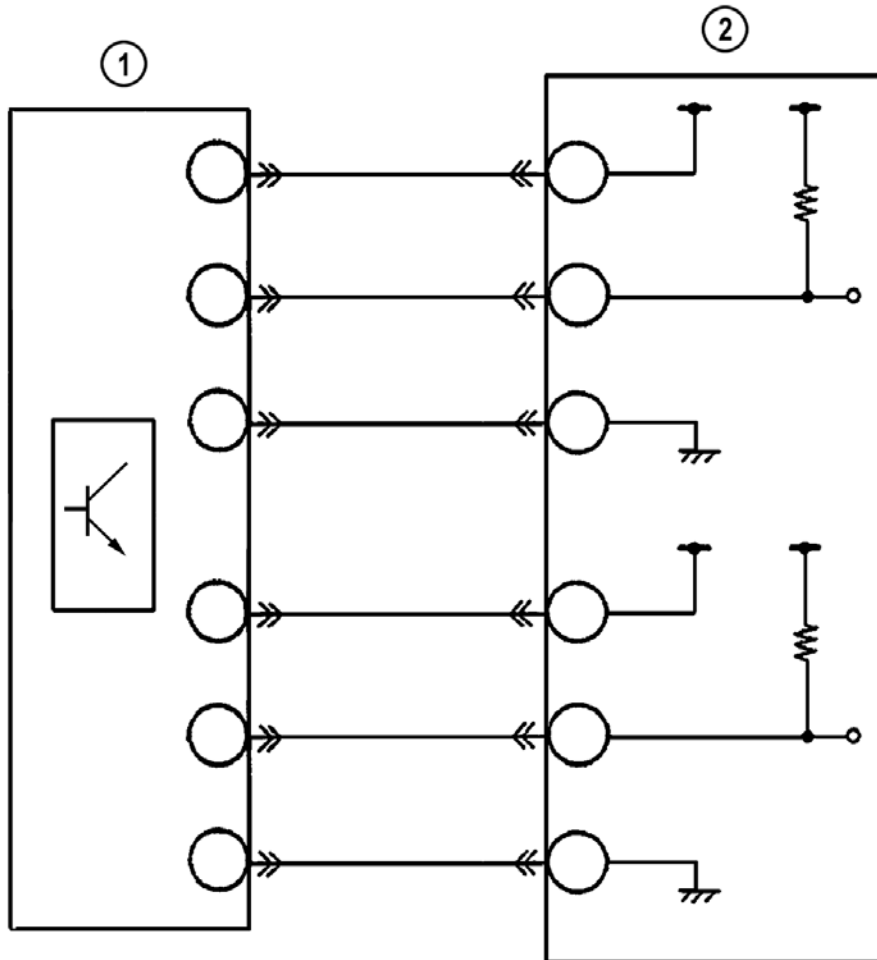
- When the magnetic rotor rotates, a voltage is generated in the Hall elements. As the Hall voltage is very low, it is amplified in the sensor and input to the PCM.



M5_01057

- | | | | |
|---|---------------------------|---|----------------|
| 1 | Sensor body | 3 | Magnetic rotor |
| 2 | Stator with Hall elements | 4 | Shaft |

- Each Hall-type sensor supplies the PCM with an analogue voltage signal between 0...5 V. In order to facilitate failure detection there is a voltage offset of 0.5 V between both signals.



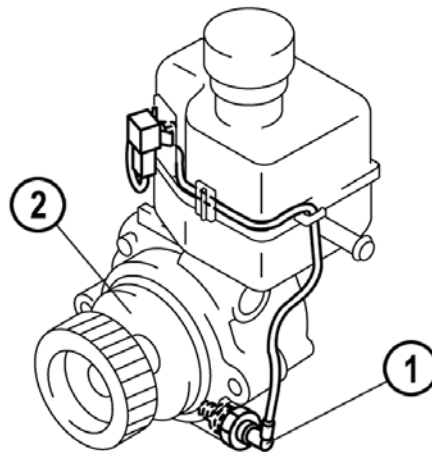
M6FL_01088

1 APP sensor

2 PCM

Power Steering Pressure Switch

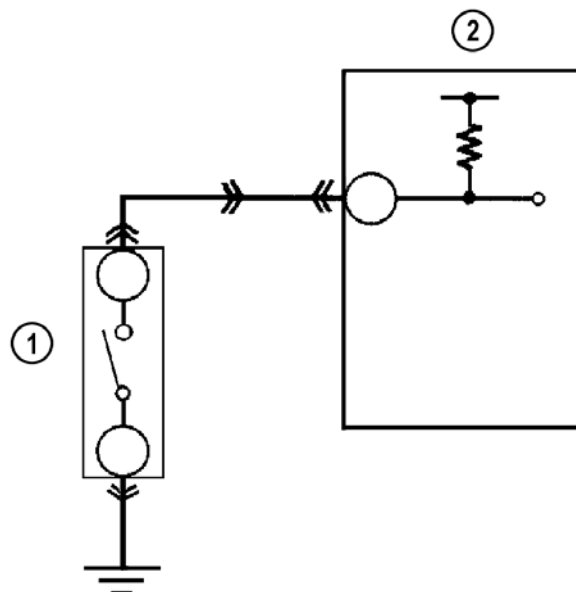
- A PSP switch located at the power steering oil pump has been introduced to detect the load condition of the power steering. If the power steering oil pressure exceeds a given value, the switch closes and supplies the PCM with a voltage signal of 0 V.



M5_01065

1 PSP switch

2 Power steering oil pump



M6FL_01050

1 PSP switch

2 PCM

Service and Repair

Replacing the Engine Oil

- Every time the engine oil is replaced, the parameter “Calculated oil dilution” in the PCM must be reset with the aid of WDS. Therefore, select the option **Toolbox→Powertrain→Data Reset→Engine Oil**.

Manual Regeneration

- If the DPF is blocked due to an excessive soot amount accumulated, it must be regenerated manually with the aid of WDS. Therefore, select the option **Toolbox→Powertrain→DPF→DPF Regeneration**.
- Depending on the amount of soot accumulated in the DPF the PCM automatically selects normal regeneration mode (34 min) or long regeneration mode (60 min). Long regeneration mode is performed when the soot amount in the filter exceeds 125 %. Due to the longer duration the manual regeneration can be performed at a lower exhaust gas temperature. As a result, damage of the DPF by a violent regeneration following an over-accumulation of soot is prevented.
- In order to cancel the manual regeneration process perform the following procedure:
 1. Depress the clutch pedal, shift to 1st gear and verify that the engine speed decreases to idle speed (manual regeneration is cancelled).
 2. Shift to Neutral and increase the engine speed to 3000 min⁻¹ for 1 min (DPF is cooled).
 3. If the manual regeneration must be performed again, wait for approx. 5 min before re-starting the regeneration process.

NOTE: Always perform the manual regeneration in a well-ventilated place and use an appropriate exhaust-gas extraction system. The vehicle should also not be parked in front of any flammable or low heat resistant material, since high temperature exhaust gas is emitted during this process. In addition, the hood should be opened to prevent the engine from overheating. Do NOT apply electrical load (such as turning on the headlights or rear window defroster) during manual regeneration, since the post injection amount is changed and regeneration may not be performed correctly.

NOTE: If the exhaust gas temperature during manual regeneration exceeds a certain limit, the PCM stops the regeneration process and increases the engine speed to 2500 min⁻¹ to cool the DPF.

NOTE: Depending on the amount of soot accumulated the PCM performs normal and long regeneration mode one after another, i.e. the regeneration process may take up to 94 min. If the DPF indicator light does not extinguish after the manual regeneration is finished, perform the regeneration process again.

Replacing the MAF Sensor

- After replacing the MAF sensor, its adaptation values in the PCM must be reset with the aid of the WDS. Therefore, select the option **Toolbox→Powertrain→Data Reset→MAF Sensor**.

Replacing the High-Pressure Pump

- After replacing the high-pressure pump, its adaptation values in the PCM must be reset with the aid of the WDS. Therefore, select the option **Toolbox→Powertrain→Data Reset→Fuel Pump**.

Replacing Injectors

- After replacing one or more injectors, the following steps must be performed:
 1. The injector adaptation values in the PCM must be reset using the option **Toolbox→Powertrain→Data Reset→Injector**.
 2. The injector correction factors must be programmed into the PCM via the option **Toolbox→Module Programming→Programmable Parameters→Injector Correction Factors**.
 3. The injection amount learning function must be performed using the option **Toolbox→Powertrain→Engine Checks→Learning→Correction after Parts Installation**.

Replacing the EGR Valve Or The ISV

- After replacing the EGR valve or the ISV, its adaptation values in the PCM must be reset with the aid of the WDS. Therefore, select the option **Toolbox→Powertrain→Data Reset→ETB/EGR**. Then the EGRVP sensor or the ISV position sensor must be initialized using the option **Toolbox→Powertrain→ETB/EGR Initialization**.

Replacing the DPF

- After replacing the DPF, the following steps must be performed:
 1. The DPF adaptation values in the PCM must be reset using the option **Toolbox→Powertrain→Data Reset→DPF**.
 2. The regeneration control in the PCM must be reset via the option **Toolbox→Powertrain→DPF→DPF Reset**.
 3. The injection amount learning function must be performed using the option **Toolbox→Powertrain→Engine Checks→Learning→Injection Amount Correction**.
 4. The DPF must be regenerated manually via the option **Toolbox→Powertrain→DPF→DPF Regeneration**.
 5. The pressure difference of the DPF must be assessed using the option **Toolbox→Powertrain→DPF→DPF Assessment**.

Replacing the DPF Differential Pressure Sensor

- After replacing the DPF differential pressure sensor, the following steps must be performed:
 1. The DPF differential pressure sensor adaptation values in the PCM must be reset using the option **Toolbox→Powertrain→Data Reset→DPF Pressure Sensor**.
 2. The regeneration control in the PCM must be reset via the option **Toolbox→Powertrain→DPF→DPF Reset**.
 3. The pressure difference of the DPF must be assessed using the option **Toolbox→Powertrain→DPF→DPF Assessment**.

Replacing the HO2S

- After replacing the HO2S, its adaptation values in the PCM must be reset with the aid of the WDS. Therefore, select the option **Toolbox→Powertrain→Data Reset→O2 Sensor**.

Replacing the PCM

- After replacing the PCM, the following steps must be performed:
 1. The PCM must be configured using the option **Toolbox→Module Programming→Programmable Module Installation→PCM**.
 2. The keys must be programmed via the option **Toolbox→Body→Security→PATS Functions**.
 3. All the adaptation values in the PCM must be reset using the option **Toolbox→Powertrain→Data Reset→PCM**.
 4. The EGRVP sensor and the ISV position sensor must be initialized via the option **Toolbox→Powertrain→ETB/EGR Initialization**.
 5. The regeneration control in the PCM must be reset using the option **Toolbox→Powertrain→DPF→DPF Reset**.
 6. The injection amount learning function must be performed via the options **Toolbox→Powertrain→Engine Checks→Learning→Correction after Parts Installation/Injection Amount Correction**.
 7. The DPF must be regenerated manually via the option **Toolbox→Powertrain→DPF→DPF Regeneration**.
 8. The pressure difference of the DPF must be assessed using the option **Toolbox→Powertrain→DPF→DPF Assessment**.
 9. Since the parameter “Calculated oil dilution” has also been reset, the engine oil level must be checked. If the oil level is close to or exceeds the “X” mark on the dipstick, replace the engine oil.

On-board Diagnostic System

- The On-board diagnostic system consists of the following functions:
 - Self-test function
 - PID monitor function
 - Simulation test function

Self Test

- The self-test function allows to read out the **CMDTCs (Continuous Mode DTC)** of the PCM with the aid of WDS. Therefore, select the option **Toolbox→Self Test→Modules→PCM→Retrieve CMDTCs**.
- In addition, the KOEO self-test can be performed using the option **Toolbox→Self Test→Modules→PCM→KOEO On-demand Self Test**.
- In order to conduct the KOER self-test select the option **Toolbox→Self Test→Modules→PCM→KOER On-demand Self Test**.

PID Monitor

- The PID monitor function allows to monitor the PIDs of the PCM with the aid of WDS. Therefore, select the option **Toolbox→Datalogger→Modules→PCM**.

Item	Definition	Unit/Condition
AC_REQ	A/C ON request	On/Off
ACCS	A/C compressor cycling switch	On/Off
ALTF	Generator field current control duty cycle	%
ALTF V	Generator output voltage	V
APP	Accelerator pedal position	%
APP_LRN	APP learning value - closed	V
APP1	APP sensor no.1	%
		V
APP2	APP sensor no.2	%
		V
ARPMDES	Target idle speed	RPM
BARO	Barometric pressure sensor	Pa
		V
BOO	Brake switch	On/Off
BOOST_DSD	Boost pressure desired	Pa
CATT11_DSD	Catalyst temperature desired (upper)	°C
CATT12_DSD	Catalyst temperature desired (middle)	°C
CATT21_DSD	Catalyst temperature desired (lower)	°C
CHRGLP	Generator warning light	On/Off
CPP	CPP switch	On/Off
DEC_CMP	Fuel correction for deceleration	No unit
DSC_ACT	DSC control	Enabled/ Disabled
DTCCNT	DTC count	No unit
ECT	ECT sensor	°C
		V
EGR_LRN	EGR valve learning value - closed	mm
EGRP	EGRVP sensor	V
		mm
		%
EQ_RAT11	Equivalence ratio (lambda)	No unit
ETC_ACT	ISV position actual	°
ETC_DSD	ISV position desired	%
		°C
EXHPRESS_DIF	DPF differential pressure sensor	Pa
EXHPRESS_LRN	DPF differential pressure sensor learning value	Pa
EXHPRESS2	DPF differential pressure sensor (middle)	Pa
EXHTEMP1	Exhaust gas temperature sensor (upper)	°C
EXHTEMP2	Exhaust gas temperature sensor (middle)	°C
EXHTEMP3	Exhaust gas temperature sensor (lower)	°C

M6FL_01T016

Item	Definition	Unit/Condition
FAN1	Cooling fan No. 1 control signal	On/Off
FAN3	Cooling fan No. 2 control signal	On/Off
FI_LRN_01	Fuel injection learning value (injector 1 at 35 MPa)	ms
FI_LRN_02	Fuel injection learning value (injector 2 at 35 MPa)	ms
FI_LRN_03	Fuel injection learning value (injector 3 at 35 MPa)	ms
FI_LRN_04	Fuel injection learning value (injector 4 at 35 MPa)	ms
FI_LRN_11	Fuel injection learning value (injector 1 at 65 MPa)	ms
FI_LRN_12	Fuel injection learning value (injector 2 at 65 MPa)	ms
FI_LRN_13	Fuel injection learning value (injector 3 at 65 MPa)	ms
FI_LRN_14	Fuel injection learning value (injector 4 at 65 MPa)	ms
FI_LRN_21	Fuel injection learning value (injector 1 at 100 MPa)	ms
FI_LRN_22	Fuel injection learning value (injector 2 at 100 MPa)	ms
FI_LRN_23	Fuel injection learning value (injector 3 at 100 MPa)	ms
FI_LRN_24	Fuel injection learning value (injector 4 at 100 MPa)	ms
FI_LRN_31	Fuel injection learning value (injector 1 at 140 MPa)	ms
FI_LRN_32	Fuel injection learning value (injector 2 at 140 MPa)	ms
FI_LRN_33	Fuel injection learning value (injector 3 at 140 MPa)	ms
FI_LRN_34	Fuel injection learning value (injector 4 at 140 MPa)	ms
FIA_DSD	Fuel injection amount desired [mm ³ /stroke]	No unit
FIP_FL	High-pressure pump flow	A
FIP_FL_DSD	High-pressure pump flow desired	No unit
FIP_SCV	Fuel metering valve	A
FLT	Fuel temperature sensor	°C
FP	Fuel metering valve duty cycle	%
FRP	Fuel pressure sensor	V Pa
FRP_A	Fuel pressure after fuel injection	Pa
GENVDSD	Generator voltage desired	V
GLWPG V	Glow plug voltage	V
GP_LMP	Glow plug indicator light	On/Off
GPC	Glow plug relay	On/Off
HTR11	HO2S (heater element)	% Ohms
HTR11_OFF	HO2S voltage - off	V
HTR11_ON	HO2S voltage - on	V
IAT	IAT sensor	V °C
IAT2	IAT sensor no.2	V °C
ICP	Injector control pressure	Pa
ICP_DSD	Injector control pressure desired	Pa
INGEAR	Load/No load condition	On/Off
ISV_LRNC	ISV learning value - closed	%
ISV_LRNO	ISV learning value - open	%
IVS	Idle validation switch	Idle/Off Idle
LOAD	Engine load	%

M6FL_01T016A

PID Monitor (Continued)

Item	Definition	Unit/Condition
MAF	MAF sensor	g/s
		V
MAF_C	Mass air flow per cylinder	g
MAF_C_DSD	Mass air flow per cylinder desired	g
MAP	MAP sensor	Pa
		V
MIL	Malfunction indicator light	On/Off
MIL_DIS	Travelled distance since MIL illuminated	km
O2	Oxygen concentration in exhaust gas	%
O2S11	HO2S (sensor)	Current
O2S11_CAL	HO2S calibration value	No unit
PM_ACC	Soot accumulation amount	g/L
PM_ACC_DSD	Soot accumulation amount desired	g/L
PM_GEN	Soot generation amount	g/L
PSP	PSP switch	Low/High
REG_AUTO	Automatic regeneration	On/Off
REG_MAN	Manual regeneration	On/Off
RPM	Engine speed	RPM
SC_CANCEL	Cruise control cancel switch	Active/Inactive
SC_COAST	Cruise control coast switch	Active/Inactive
SC_MAIN	Cruise control main switch	Active/Inactive
SC_MODE	Cruise control operation mode	Off/Standby/ Active/Tap-up/ Set/Tap-down/ Coast
SC_ON	Cruise control actuator switch on	On/Off
SC_RES	Cruise control resume switch	Active/Inactive
SC_SET	Cruise control set indicator light	On/Off
SC_SET/ACC	Cruise control set/acceleration switch	Active/Inactive
SCCS	Cruise control command switch	V
TC_CMP	Fuel correction for torque-down control [mm ³ /stroke]	No unit
TIRE SIZE	Tire revolution per mile	rev/mile
TP1	ISV position sensor	%
		V
VBCV	VBC solenoid valve duty cycle	%
VPWR	Battery positive voltage	V
VSS	Vehicle speed	km/h

M6FL_01T016B

Simulation Test

- The simulation test function allows to activate certain PIDs of the PCM with the aid of WDS. Therefore, select the option **Toolbox→Datalogger→Modules→PCM**.

x: Applicable
—: Not applicable

Item	Definition	Unit/Condition	Test condition	
			KOEO	KOER
ACCS	A/C compressor cycling switch	On/Off	X	X
EGRP	EGR valve position sensor	%	X	X
GENVDS	Generator voltage desired	V	—	X
GP_LMP	Glow plug indicator light	On/Off	X	X
GPC	Glow plug relay	On/Off	X	X
INJ_1	Fuel injector no.1	On/Off	—	X
INJ_2	Fuel injector no.2	On/Off	—	X
INJ_3	Fuel injector no.3	On/Off	—	X
INJ_4	Fuel injector no.4	On/Off	—	X
VBCV	VBC solenoid valve duty cycle	%	X	X
FAN1	Cooling fan relay No.1	On/Off	X	X
FAN3	Cooling fan relay No.2	On/Off	X	X

M6FL_01T017

NOTES:

02

Suspension

02 Suspension

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Suspension

Features

- The suspension system of the Mazda6 Facelift has been basically carried over from the previous Mazda6. All improvements and changes to the previous Mazda6 suspension system (such as reinforced bushings and improved top strut mounts) have been carried over to the Mazda6 Facelift.
- New wheel and tire dimensions (18 inch wheel) have been added.

Tire Dimensions

Item		Specifications			
Tire	Size	195/65R 15 91V	205/55R16 91V	215/45R17 87W 215/45R17 91W	215/45R18 89W

M6FL_02T001

Wheel Dimensions

Item		Specification			
Wheel	Size	15 X 6J	16 X 7J	17 X 7J	18 x 7J
	Material	Steel	Alluminium alloy		
	Offset [mm (in)]	50 (1.97)	55 (2.17)		
	Pitch circle diameter [mm (in)]	114.3 (4.50)			

M6FL_02T002

Temporary Spare Tire

Item		Specifications		
Tire	Size	T115/70D15	2WD: T115/70D15 4WD: T135/90D15	T125/70D17
Wheel	Size	15 x 4T		17 X 4 T
	Material	Steel		
	Offset [mm(in)]	40 (1.57)		
	Pitch circle diameter [mm(in)]	114.3 (4.50)		

M6FL_02T003

Winter Tires

Saloon /Hatchback	Wagon (except L3 engine)	Wagon (L3 2WD)	Wagon (L3 4WD)
195/65R15 91 ^{*1} M+S	195/65R15 91 ^{*1} M+S	195/65R15 91 ^{*1} M+S	195/65R15 91 ^{*1} M+S
205/55R16 91 ^{*1} M+S	205/55R16 91 ^{*1} M+S	205/55R16 91 ^{*1} M+S	205/55R16 91 ^{*1} M+S
215/45R17 87 ^{*1} M+S		215/45R17 87 ^{*2} M+S	215/45R17 91 ^{*1} M+S (REINFORCED)
215/45R18 89 ^{*1} M+S		215/45R18 89 ^{*1} M+S	

M6FL_02T004

*1 Speed Symbol (The speed symbols for winter tires are Q, T, and H only.)

*2 Speed Symbol (The speed symbol for winter tires is Q only.)

Tire Chains

- Mazda recommends hexagon type steel ring chains for the following tire sizes:
 - 195/65R15
 - 215/45R17
 - 215/45R18
- Although Mazda recommends hexagon type steel ring chains, all chains within the installation specifications may be used.
- Use of tire chains on a vehicle equipped with 205/55R16 specification tires could cause interference with the vehicle body and scratching. If tire chains are to be used, replace both front and rear tires with 195/65R15 or 215/45R17 tires, and use genuine Mazda tire chains.
- Use only genuine Mazda tire chains on a vehicle equipped with 215/45 R17 or 215/45R18 specification tires.

04

Brakes

04 Brakes

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Brakes

Features

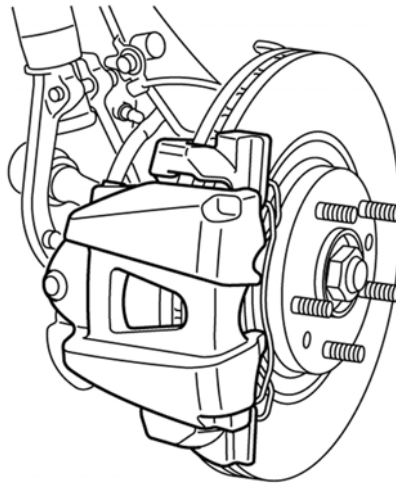
- The brake system of the Mazda6 Facelift has been basically carried over from the previous Mazda6.
- New brake disc dimensions (for 18 inch wheels) have been added.

Item		Specification
Brake pedal	Type	Suspended
	Pedal lever ratio	2.7
	Max. Stroke [mm (in)]	128.5 (5.06)
Master cylinder	Type	Tandem (with level sensor)
	Cylinder diameter [mm (in)]	20.64 (0.813)
Front disc brake	Type	Ventilated disc
	Cylinder bore [mm (in)]	L8, LF, L3 (except 18 inch wheel), MZR-CD (RF Turbo): 57.15 (2.250) L3 (18 inch wheel): 57 (2.2)
	Pad dimensions (area × thickness) [mm ² (in ²) × mm (in)]	L8 (4SD, 5HB): 4,220 (6.75) × 10.0 (0.39) L8 (WGN), LF, L3 (except 18 inch wheel), MZR-CD (RF Turbo): 4,010 (6.42) × 12.0 (0.47) L3 (18 inch wheel): 3,918 (6.27) × 12.5 (0.49)
	Disc plate dimensions (outer diameter × thickness) [(mm (in) × mm (in)]	L8 (4SD, 5HB): 274 (10.8) × 24.0 (0.945) L8 (WGN), LF, L3 (except 18 inch wheel), MZR-CD (RF Turbo): 283 (11.1) × 25.0 (0.984) L3 (18 inch wheel): 320 (12.6) × 25.0 (0.984)
Rear brake (disc)	Type	Solid disc
	Cylinder bore [mm (in)]	L8, LF, L3 (except 18 inch wheel), MZR-CD (RF Turbo): 34.93 (1.375) L3 (18 inch wheel): 33.96 (1.337)
	Pad dimensions (area × thickness) [mm ² (in ²) × mm (in)]	L8, LF, L3 (except 18 inch wheel), MZR-CD (RF Turbo): 2,820 (4.51) × 8.0 (0.31) L3 (18 inch wheel): 2,195 (3.51) × 9.0 (0.35)
	Disc plate dimensions (outer diameter × thickness) [mm (in)]	L8, LF, L3 (except 18 inch wheel), MZR-CD (RF Turbo): 280 (11.0) × 10.0 (0.39) L3 (18 inch wheel): 314 (12.4) × 11.0 (0.43)
Power brake unit	Type	Vacuum multiplier, single diaphragm
	Diameter [mm (in)]	276.1 (10.87)
Braking force control device	Type	EBD (Electronic Brakeforce Distribution)
Parking brake	Type	Mechanical two-rear-wheel control
	Operation system	Center lever type
Brake fluid	Type	SAE J1703, FMVSS 116 DOT-3 or DOT-4

M6FL_04T001

Front Disc Brakes

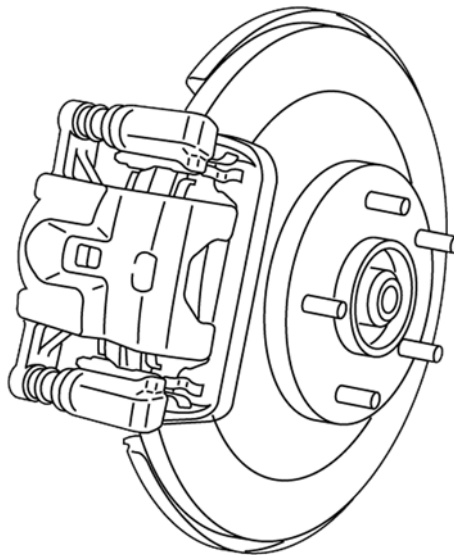
- Vehicles with L3 engine and 18 inch wheels are equipped with front brake discs of 320 mm diameter and 25 mm thickness.



M6FL_04001

Rear Disc Brakes

- Vehicles with L3 engine and 18 inch wheels are equipped with rear brake discs of 314 mm diameter and 11 mm thickness.



M6FL_04002

05

**Transmission/
Transaxle**

05 Transmission/Transaxle

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G35M-R

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G66M-R

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FS5A-EL

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05 Transmission/Transaxle

Transmission/Transaxle

Transaxle

Features

- The manual transaxles have the following features:
 - Cable operated shift mechanism
 - Hydraulically operated clutch
 - 5-speed G35M-R manual transaxle carried over for 1.8L (L8) petrol engine models
 - 6-speed G66M-R manual transaxle for 2.0L (LF) and 2.3L (L3) petrol engine models (new)
 - 6-speed A26M-R manual transaxle for diesel engine models (new)
 - Dual-mass flywheel (A26M-R)
 - Self-adjusting clutch cover (A26M-R)
- The automatic transaxles have the following features:
 - 5-speed JA5AX-EL automatic transaxle for AWD carried over from previous Mazda6
 - 5-speed FS5A-EL automatic transaxle for 2.0L (LF) and 2.3L (L3) petrol engine models (new)

Notes:

G35M-R

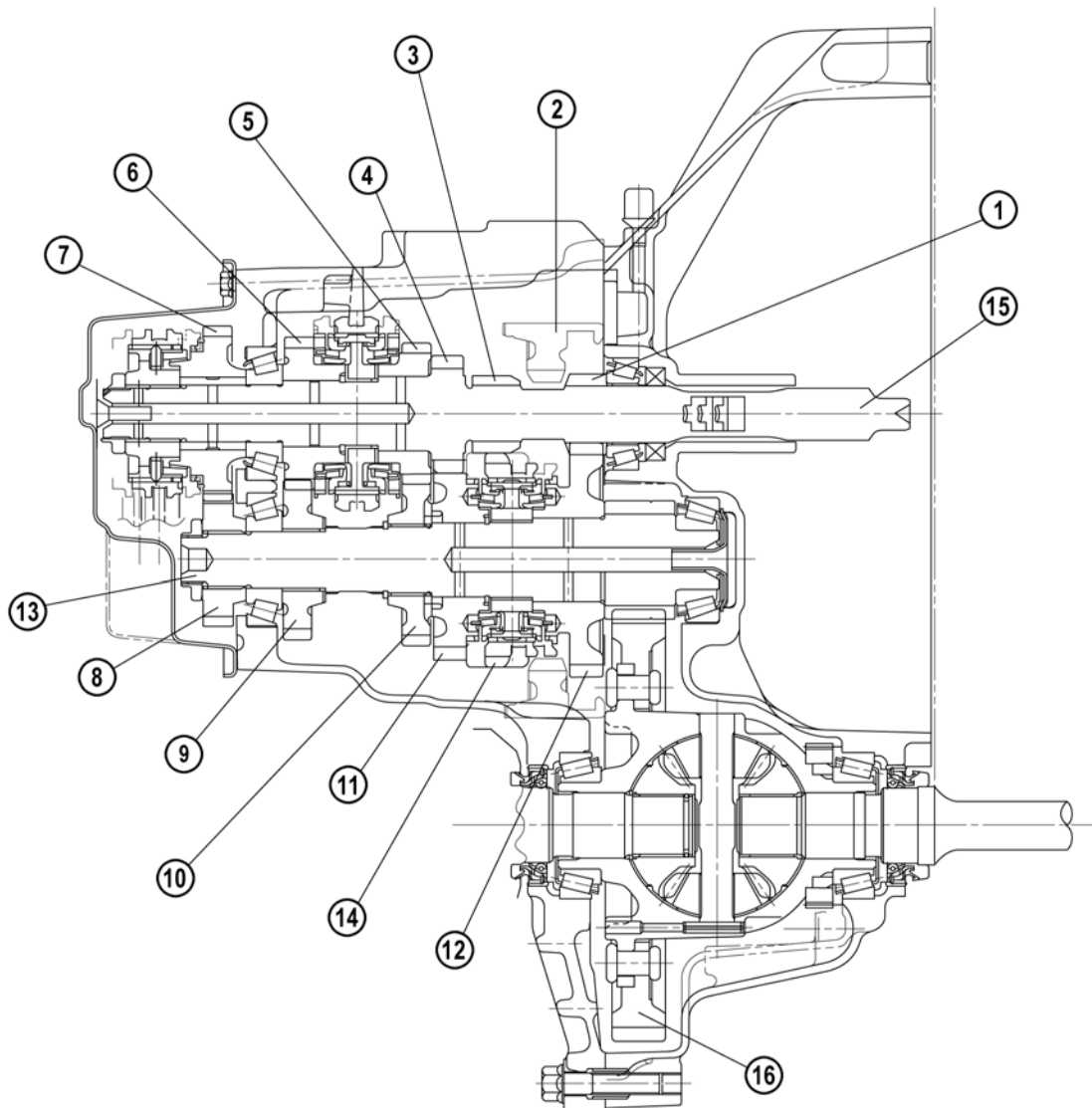
- The G35M-R manual transaxle is essentially the same as that used on the previous Mazda6, except for the following:
 - Triple-cone synchronizers are used for first and second gears.

Specifications

Item		Specifications	
Engine type		L8	
Manual transaxle type		G35M-R	
Operation system		Cable	
Transaxle control		Floor-shift	
Shift assist	Forward	Synchromesh	
	Reverse	Selective sliding and synchromesh	
Gear ratio	1GR	3.666	
	2GR	2.059	
	3GR	1.392	
	4GR	0.970	
	5GR	0.755	
	Reverse	3.166	
Final gear ratio		4.388	
Oil	Grade	API service GL-4 or GL-5	
	Viscosity	All season	SAE 75W-90
		Above 10 ° C (50 ° F)	SAE 80W-90
Capacity (approx. quantity)	L (US qt, Imp qt)	2.87 (3.03, 2.53)	

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Cross-Sectional View



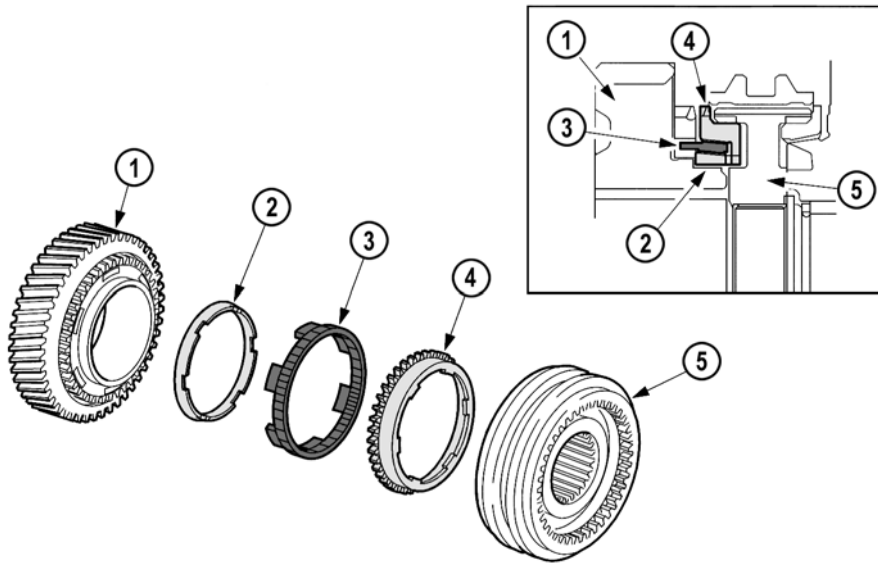
M6FL_05001

- | | | | |
|---|----------------------|----|----------------------------------|
| 1 | First gear | 9 | Secondary fourth gear |
| 2 | Reverse idler gear | 10 | Secondary third gear |
| 3 | Reverse gear | 11 | Secondary second gear |
| 4 | Second gear | 12 | Secondary first gear |
| 5 | Third gear | 13 | Secondary shaft |
| 6 | Fourth gear | 14 | Clutch hub sleeve (reverse gear) |
| 7 | Fifth gear | 15 | Primary shaft |
| 8 | Secondary fifth gear | 16 | Differential gear |

Triple Cone Synchronizer

- A triple cone synchronizer mechanism is used for the first and second gears.
- The construction of the triple cone synchronizer is essentially the same as a double cone synchronizer, except that the inner surface of the inner ring is used as a friction surface on the triple cone synchronizer.

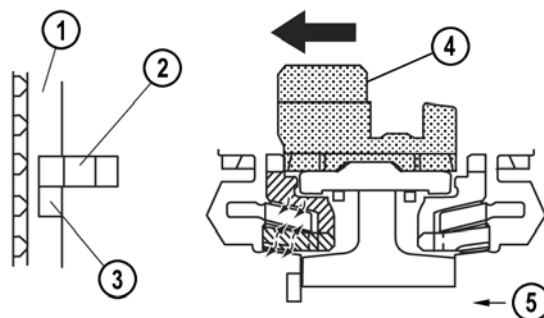
Structural View



M6FL_05016

- | | |
|---------------------------|---------------------------|
| 1 Gear | 4 Outer synchronizer ring |
| 2 Inner synchronizer ring | 5 Synchronizer assembly |
| 3 Synchronizer cone | |

Operation

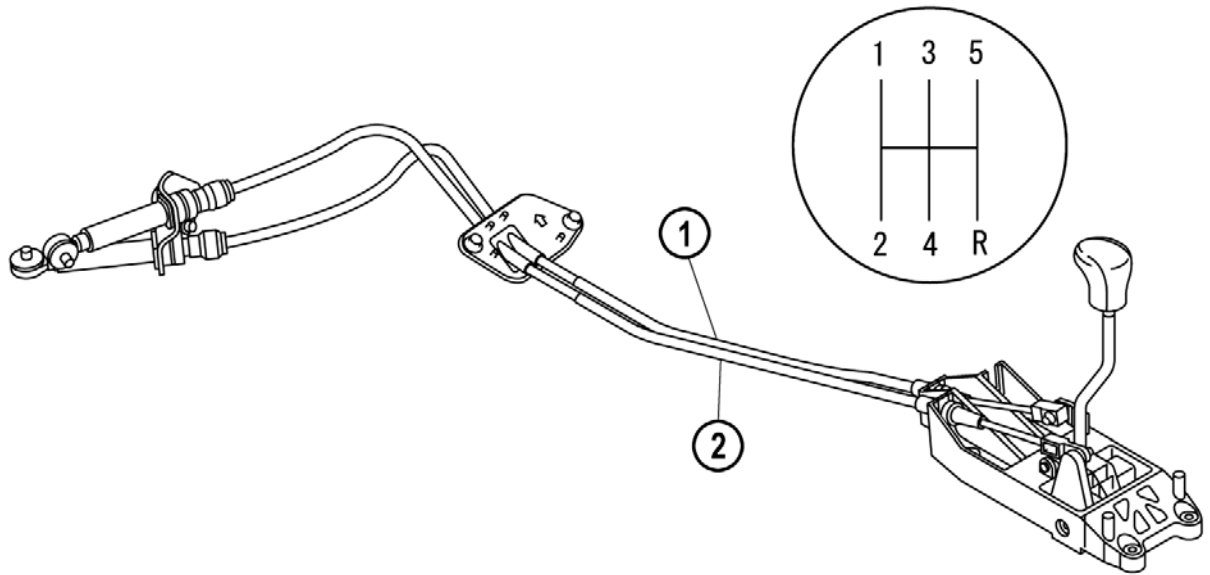


M6FL_05017

- | | |
|---------------------|---------------------------|
| 1 Synchronizer ring | 4 Synchronizer hub sleeve |
| 2 Synchronizer key | 5 Friction surface |
| 3 Key groove | |

Shift Mechanism

- A cable operated shift mechanism similar to that on the previous Mazda6 is used.
- The selector cable is adjusted the same way as on the previous Mazda6.



M6FL_05002

1 Shift cable

2 Select cable

G66M-R

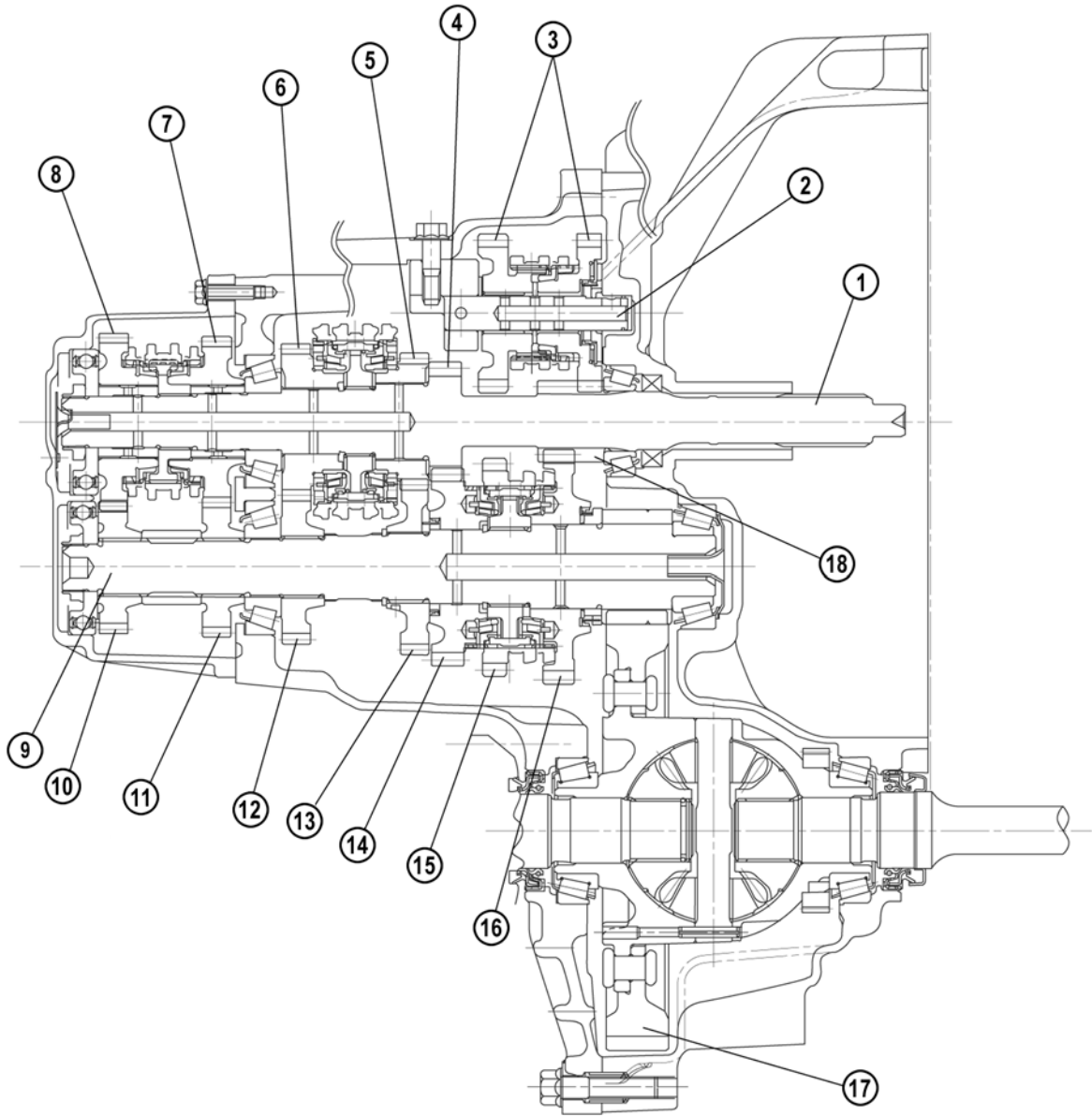
- The G66M-R 6-speed manual transaxle is generally based on the G35M-R 5-speed manual transaxle.
- The G66M-R 6-speed manual transaxle uses triple cone synchronizers for first and second gears and double cone synchronizers for third and fourth gears.
- The triple cone synchronizer mechanism of the G66M-R manual transaxle has been carried over from the G35M-R manual transaxle.

Specifications

Item		Specifications	
Engine type		LF	L3
Manual transaxle type		G66M-R	
Operation system		Cable	
Transaxle control		Floor-shift	
Shift assist	Forward	Synchromesh	
	Reverse		
Gear ratio	1GR	3.454	
	2GR	2.059	1.842
	3GR	1.310	
	4GR	0.970	1.030
	5GR	0.795	0.837
	6GR	0.680	0.755
	Reverse	3.166	
Final gear ratio		4.388	
Oil	Grade		API service GL-4 or GL-5
	Viscosity	All season	SAE 75W-90
		Above 10 °C (50 °F)	SAE 80W-90
	Capacity (approx. quantity)	L (US qt, Imp qt)	2.95 (3.12, 2.60)

M6FL_05T002

Cross-Sectional View

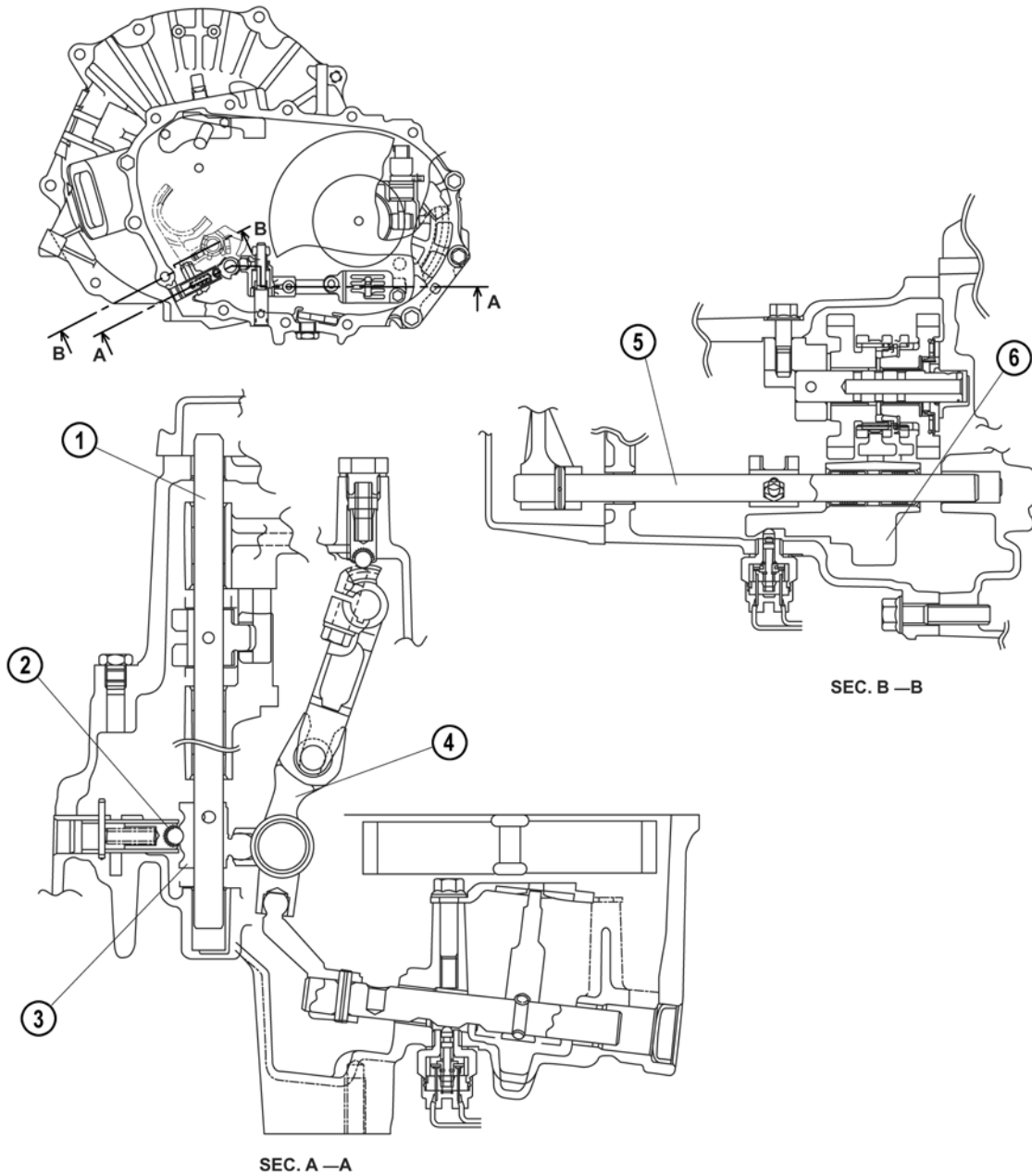


M6FL_05003

- | | | | |
|---|--------------------------|----|----------------------------------|
| 1 | Primary shaft | 10 | Secondary Sixth gear |
| 2 | Reverse idler gear shaft | 11 | Secondary fifth gear |
| 3 | Reverse idler gear | 12 | Secondary fourth gear |
| 4 | Second gear | 13 | Secondary third gear |
| 5 | Third gear | 14 | Secondary second gear |
| 6 | Fourth gear | 15 | Clutch hub sleeve (reverse gear) |
| 7 | Fifth gear | 16 | First gear |
| 8 | Sixth gear | 17 | Differential gear |
| 9 | Secondary shaft | 18 | Reverse gear |

Internal Shift Mechanism

- The control rod design of the G66M-R manual transaxle has been carried over from the G35M-R manual transaxle.

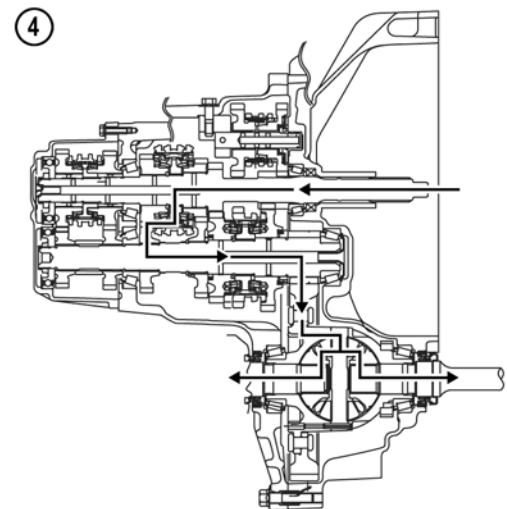
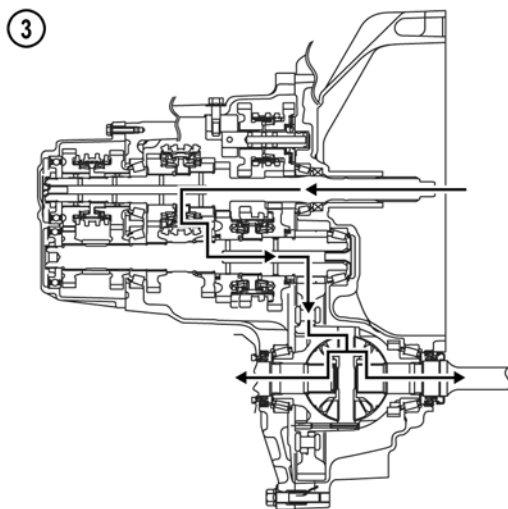
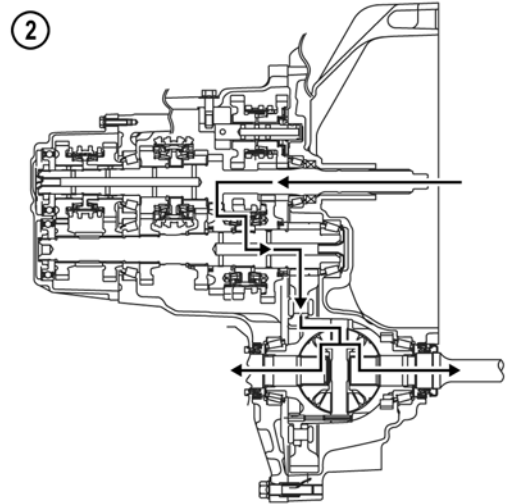
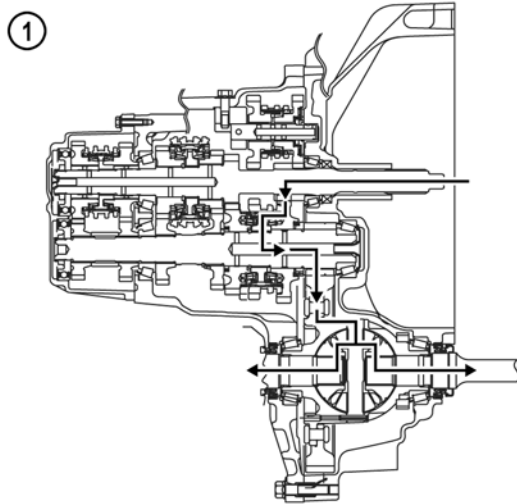


M6FL_05004

- | | | | |
|---|-----------------|---|--------------------|
| 1 | Control rod | 4 | Crank lever |
| 2 | Detent ball | 5 | Shift rod |
| 3 | Control rod end | 6 | Reverse shift fork |

Power Flow

First to Fourth Gear

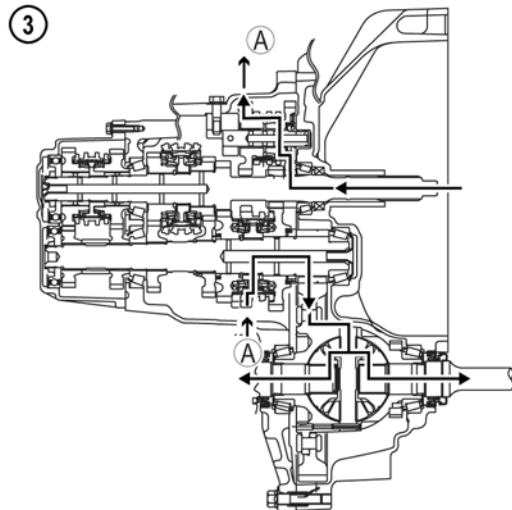
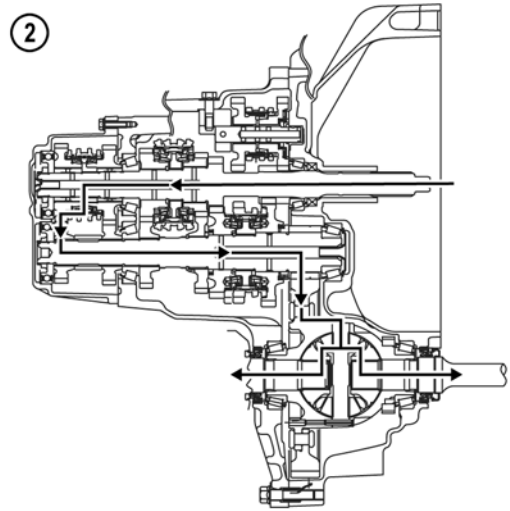
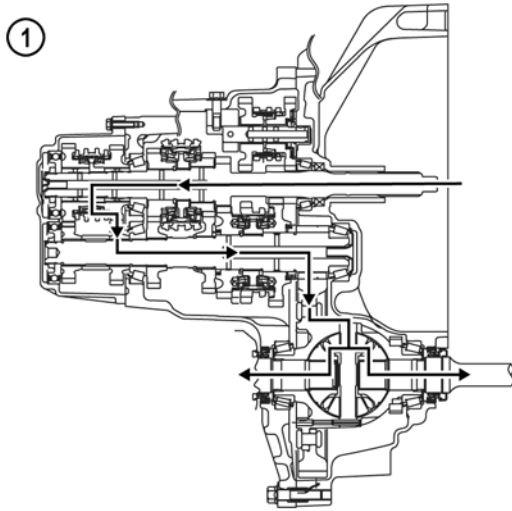


M6FL_05005

- 1 First gear
- 2 Second gear

- 3 Third gear
- 4 Fourth gear

Fifth, Sixth and Reverse Gear



M6FL_05006

- 1 Fifth gear
- 2 Sixth gear

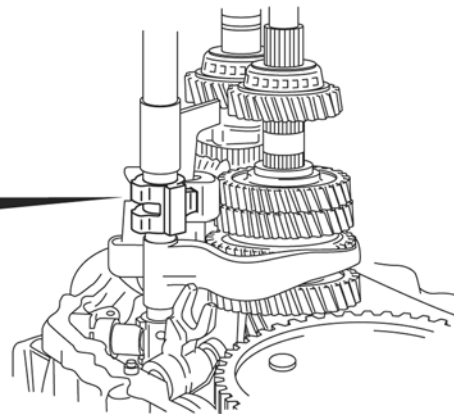
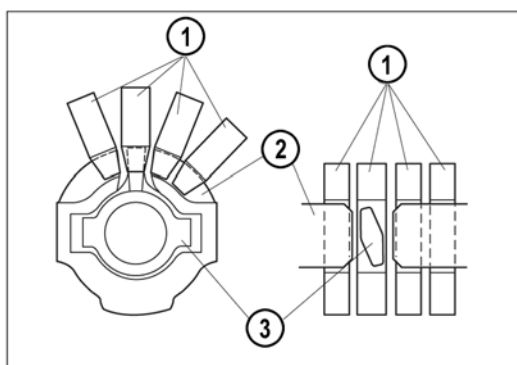
- 3 Reverse gear

Shift Interlock Mechanism

- The shift interlock mechanism provides reliable double-engagement prevention.
- During shifting, the shift rods, except for the one in operation, are locked in the neutral position by the interlock sleeve.

Neutral Condition

- The interlock sleeve fits into the notches of the 1st/2nd, 5th/6th and reverse shift forks.
- The control lever fits into the notch of the 3rd/4th shift fork.



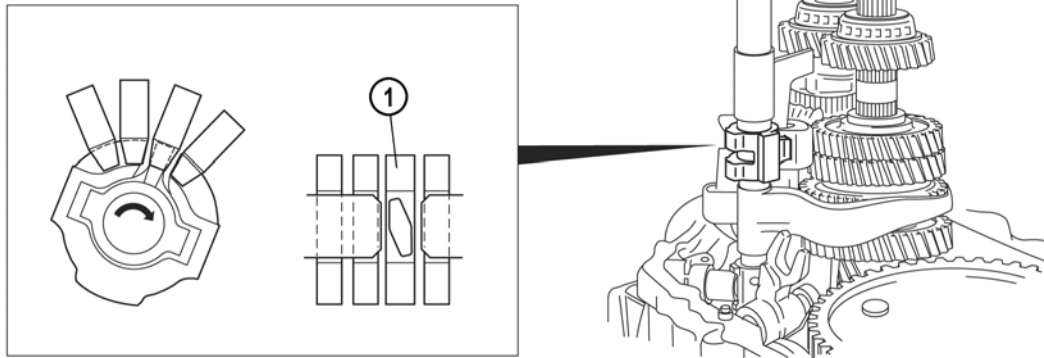
M6FL_05007

- 1 Shift fork
- 2 Interlock sleeve

- 3 Control lever

Select Condition

- The shift lever is moved laterally to the 1st/2nd position.
- Both the control lever and the interlock sleeve turn in the direction shown by the arrow.
- The control lever fits into the notch of the 1st/2nd shift fork.
- The interlock sleeve fits into the notches of the 3rd/4th, 5th/6th and reverse shift forks.

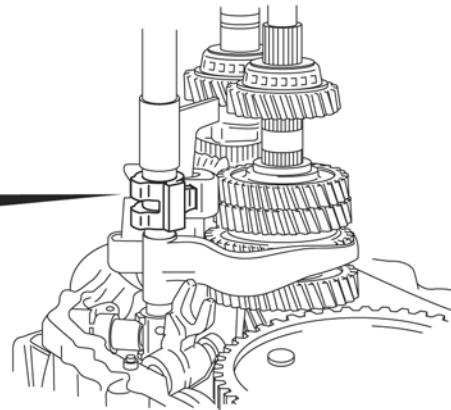
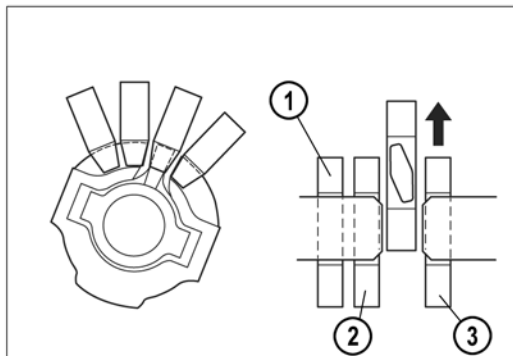


M6FL_05008

1 1 Shift fork (1st/2nd)

Shift Condition

- The shift lever is moved vertically to the 2nd position.
- The control lever moves up the 1st/2nd shift fork and the change to 2nd gear is complete.
- The interlock sleeve holds the 3rd/4th, 5th/6th and reverse shift forks at the neutral position, preventing double engagement of gears.
- The operation procedure is the same for other gear positions.



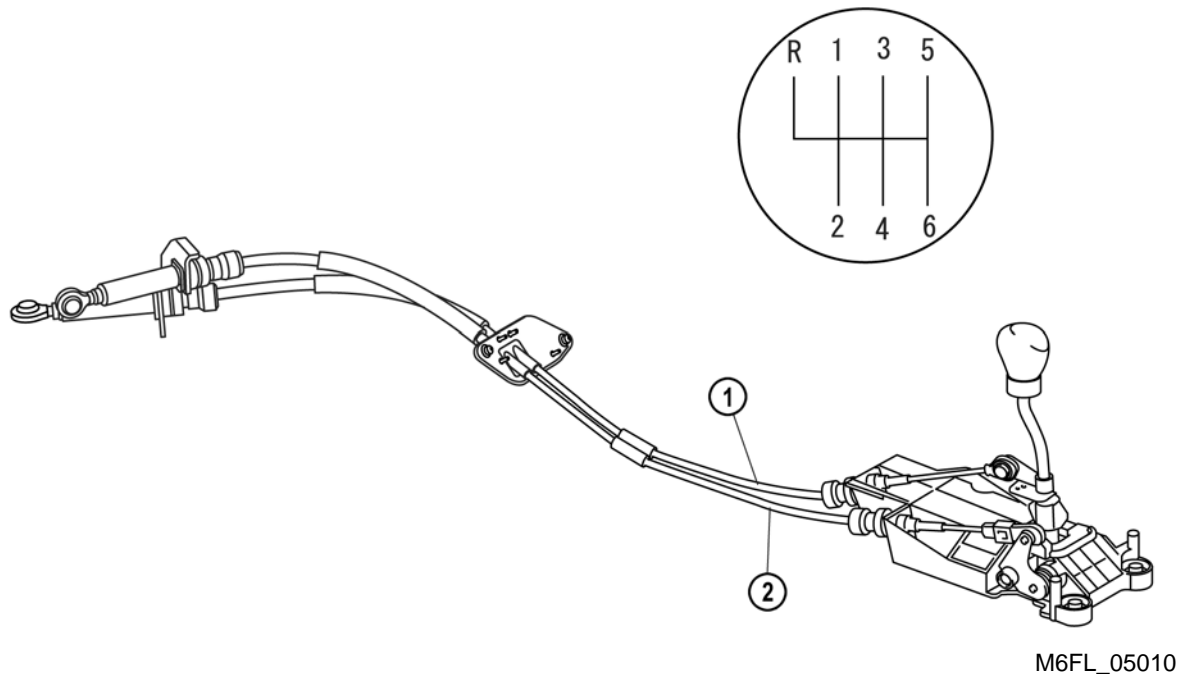
M6FL_05009

- 1 Shift fork (5th/6th)
2 Shift fork (3rd/4th)

- 3 Shift fork (reverse)

Shift Mechanism

- A cable operated shift mechanism similar to that on the previous Mazda6 is used.
- Note the new shift position for the reverse gear.
- The selector cable is adjusted the same way as on the previous Mazda6.

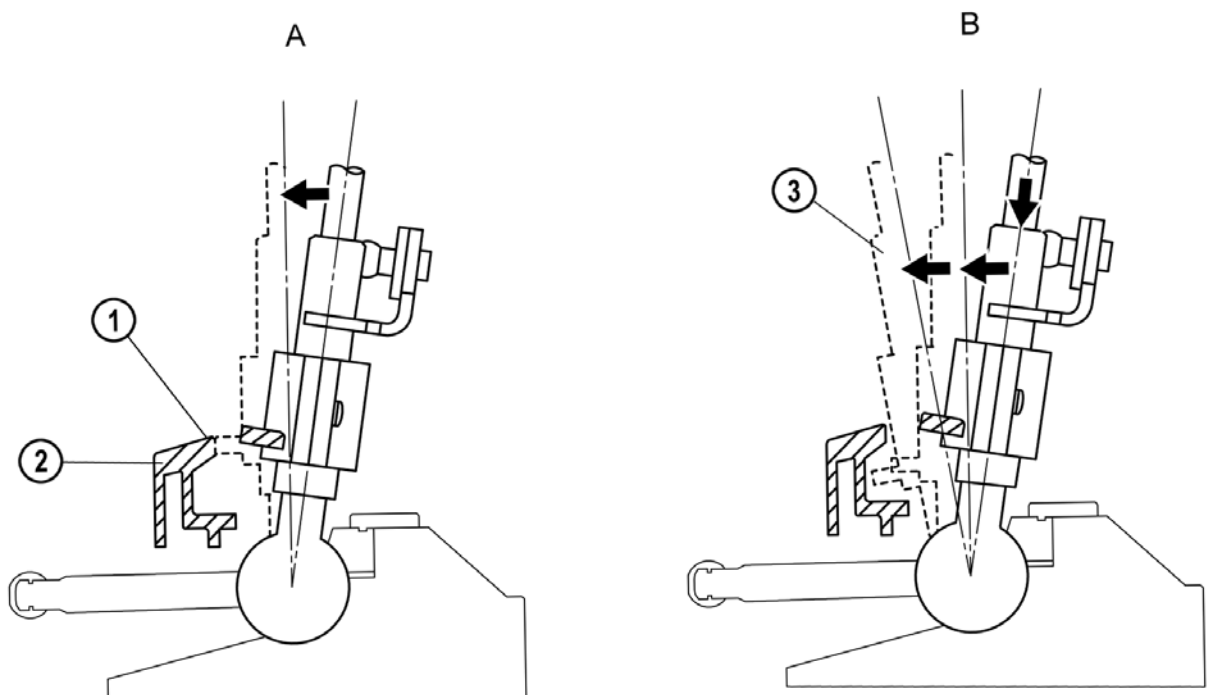


1 Shift cable

2 Select cable

Reverse Lockout Mechanism

- The reverse lockout mechanism prevents the driver from accidentally shifting into reverse gear when shifting into 1st gear.
- A guide plate, attached to the shift lever assembly, prevents accidental shifting into reverse when shifting into 1st gear by restricting the movement of the shift lever.
- When shifting into reverse, once the shift lever is pressed down and moved towards the reverse position, the projection on the lever goes under the guide plate, releasing the reverse shift restriction and allowing for shifting into reverse.



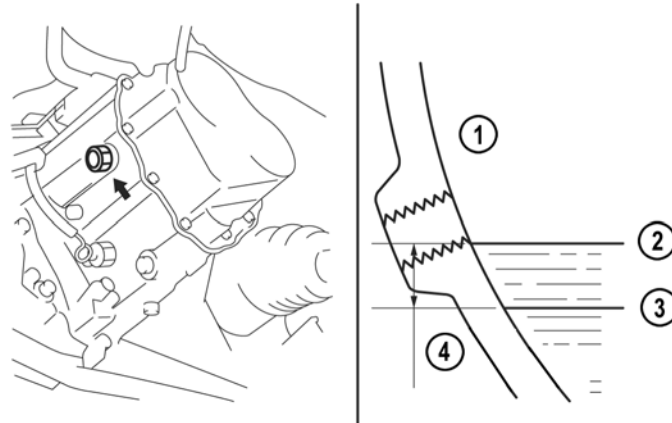
M6FL_05011

Guide plate function

- | | | | |
|---|---|---|---|
| A | Shifting when the shift lever is not pressed down | B | Shifting when the shift lever is pressed down |
| 1 | Movement restricted | 3 | Reverse position |
| 2 | Guide plate | | |

Transaxle Oil

- The G66M-R manual transaxle is filled with 2.95 litres of manual transaxle oil which complies with the specification API Service GL-4 or GL-5 (grade) and SAE 75W-90 (viscosity) for all season use and SAE 80W-90 above 10° C.
- To check the transaxle oil level, verify that the oil level is near the brim of the plug port.

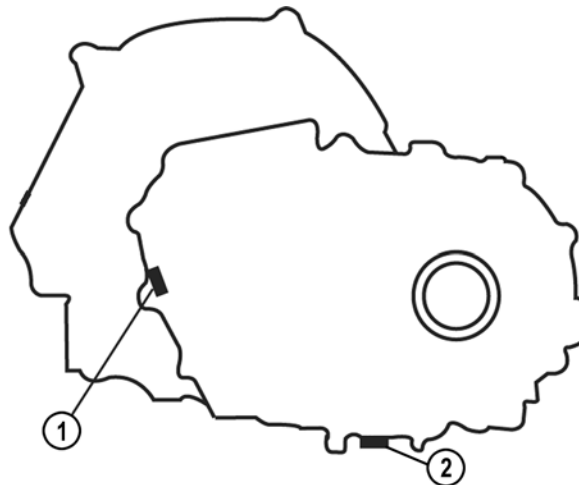


M6FL_05012

- 1 Oil level
- 2 High level

- 3 Low level
- 4 About 10 mm

Drain Plug and Oil Level Plug Location



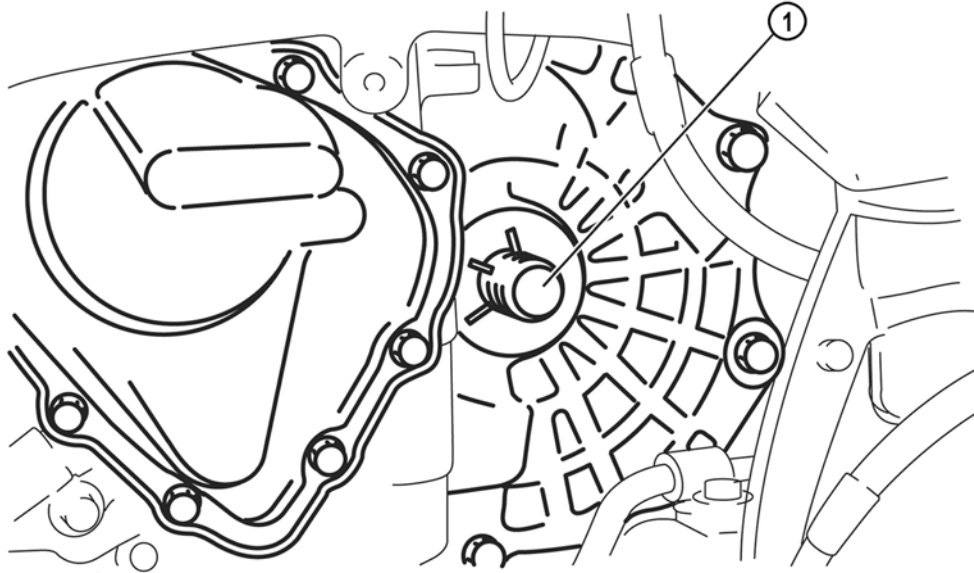
M6FL_05013

- 1 Oil level plug

- 2 Drain plug

Drive Shaft Removal Note

- Install the **SST (Special Service Tool) 49 G030 455** into the transaxle to hold the side gears after the joint shaft is removed. (This also applies to the G35M-R transaxle.)

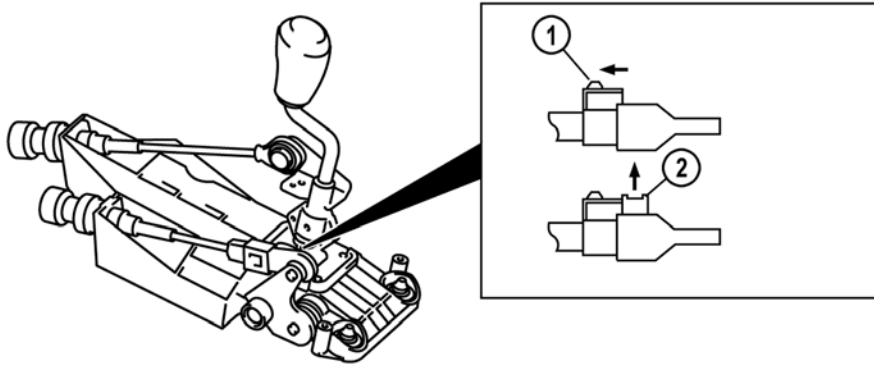


M6FL_05029

1 SST 49 G030 455

Select Cable Adjustment

1. Make sure that the shift lever (transaxle side) is in neutral.
2. Unlock the lock piece of the select cable (shift lever side) in the order as shown in the figure.

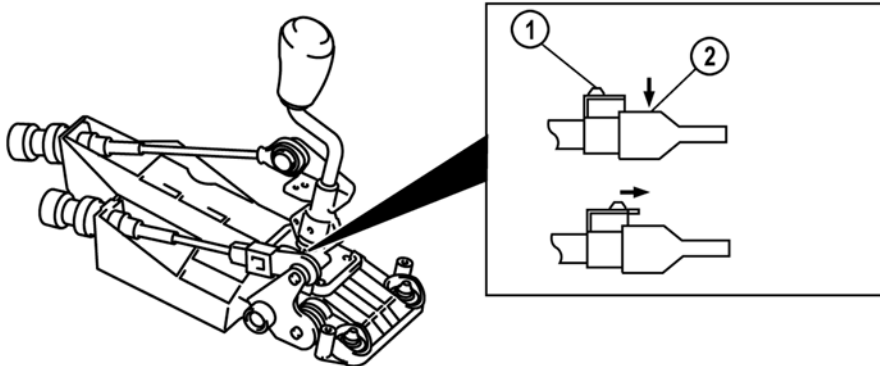


M6FL_05027

1 Safety lock

2 Lock piece

3. Shift the shift lever to neutral.
4. Lock the lock piece of the selector cable (shift cable side) in the order as shown in the figure.



M6FL_05028

1 Safety lock

2 Lock piece

5. Shift the shift lever from neutral to other position, and make sure that there are no other components in that area to interfere with the lever.

Notes:

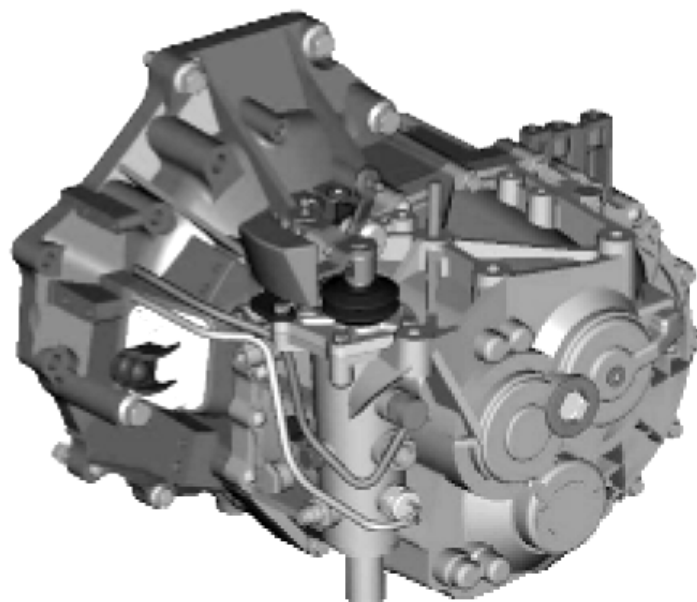
A26M-R

- The A26M-R 6-speed manual transaxle is designed for front-wheel-drive vehicles with a transversely mounted powertrain.

Specifications

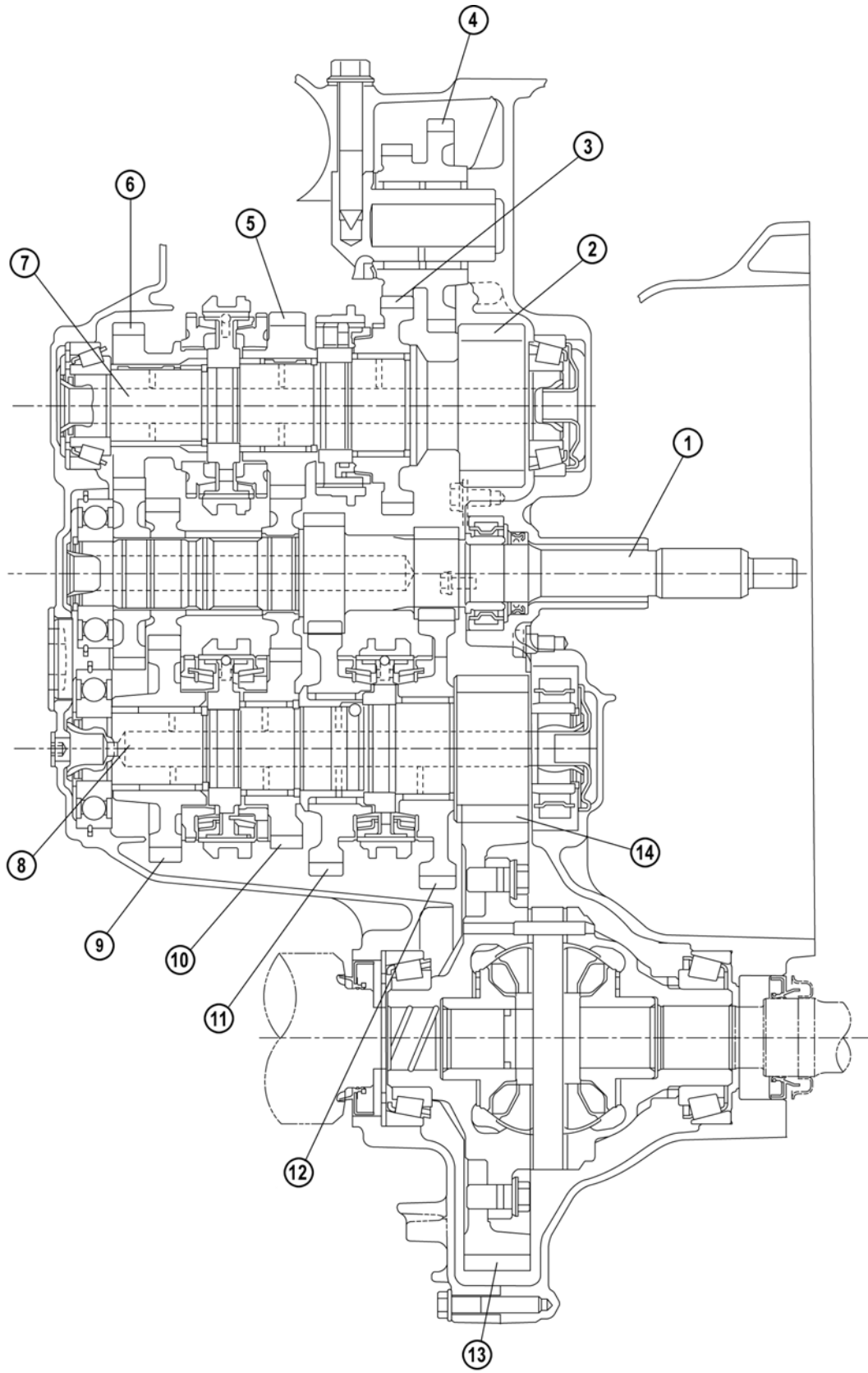
Item		Specifications	
Engine type		MZR-CD (RF Turbo)	
Manual transaxle type		A26M-R	
Shift assist	Forward	Synchromesh	
	Reverse	Synchromesh (Lever type)	
Gear ratio	1GR	3.538	
	2GR	1.913	
	3GR	1.218	
	4GR	0.880	
	5GR	0.809	
	6GR	0.673	
	Reverse	3.831	
Final gear ratio	1GR—4GR	3.611	
	5GR, 6GR, Reverse	3.095	
Oil	Grade		API service GL-4 or GL-5
	Viscosity	All season	SAE 75W-90
		Above 10 °C (50 °F)	SAE 75W-90
	Capacity (approx. quantity)	L (US qt, Imp qt)	2.55 (2.69, 2.24)

M6FL_05T003



M6FL_05018

Cross-Sectional View

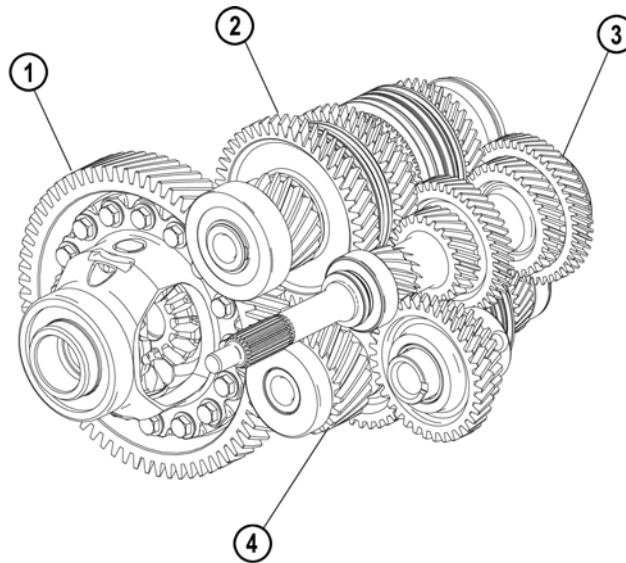


M6FL_05020

1	Primary shaft	8	Secondary shaft No. 1
2	Final gear No. 2	9	Third gear
3	Reverse gear	10	Fourth gear
4	Reverse idler gear	11	Second gear
5	Fifth gear	12	First gear
6	Sixth gear	13	Differential ring gear
7	Secondary shaft No. 2	14	Final Gear No. 1

Construction

- The A26M-R manual transaxle is a three-shaft design; one primary (input) shaft and two secondary (output) shafts.
- The three-shaft design allows for a more compact construction due to the fact that each output shaft needs only to carry three or four gears, so can thus be made shorter.
- As a result of the three shaft construction there are two different final gear ratios possible; one for the first to fourth gears and another one for the fifth, sixth and reverse gears.
- A triple synchronizer mechanism has been used for first, second, and third gears. The fourth gear has a double synchronizer mechanism.



M6FL_05019

1 Differential

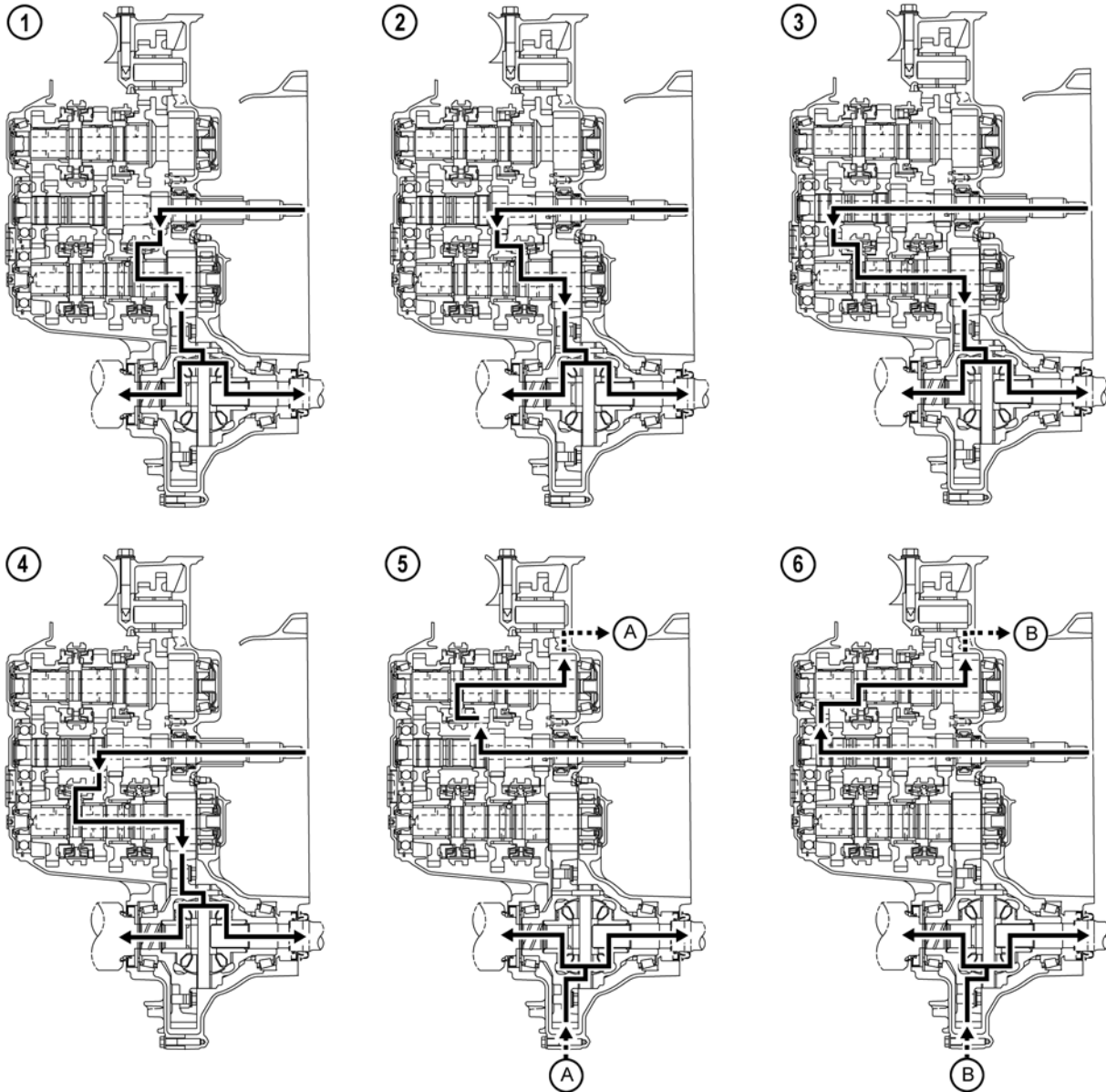
2 Secondary shaft No. 1

3 Primary shaft

4 Secondary shaft No. 2

Power Flow

First to Sixth Gear

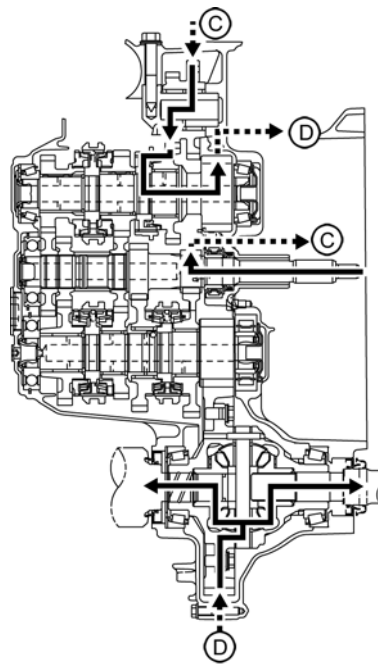


M6FL_05021

- 1 First gear
- 2 Second gear
- 3 Third gear

- 4 Fourth gear
- 5 Fifth gear
- 6 Sixth gear

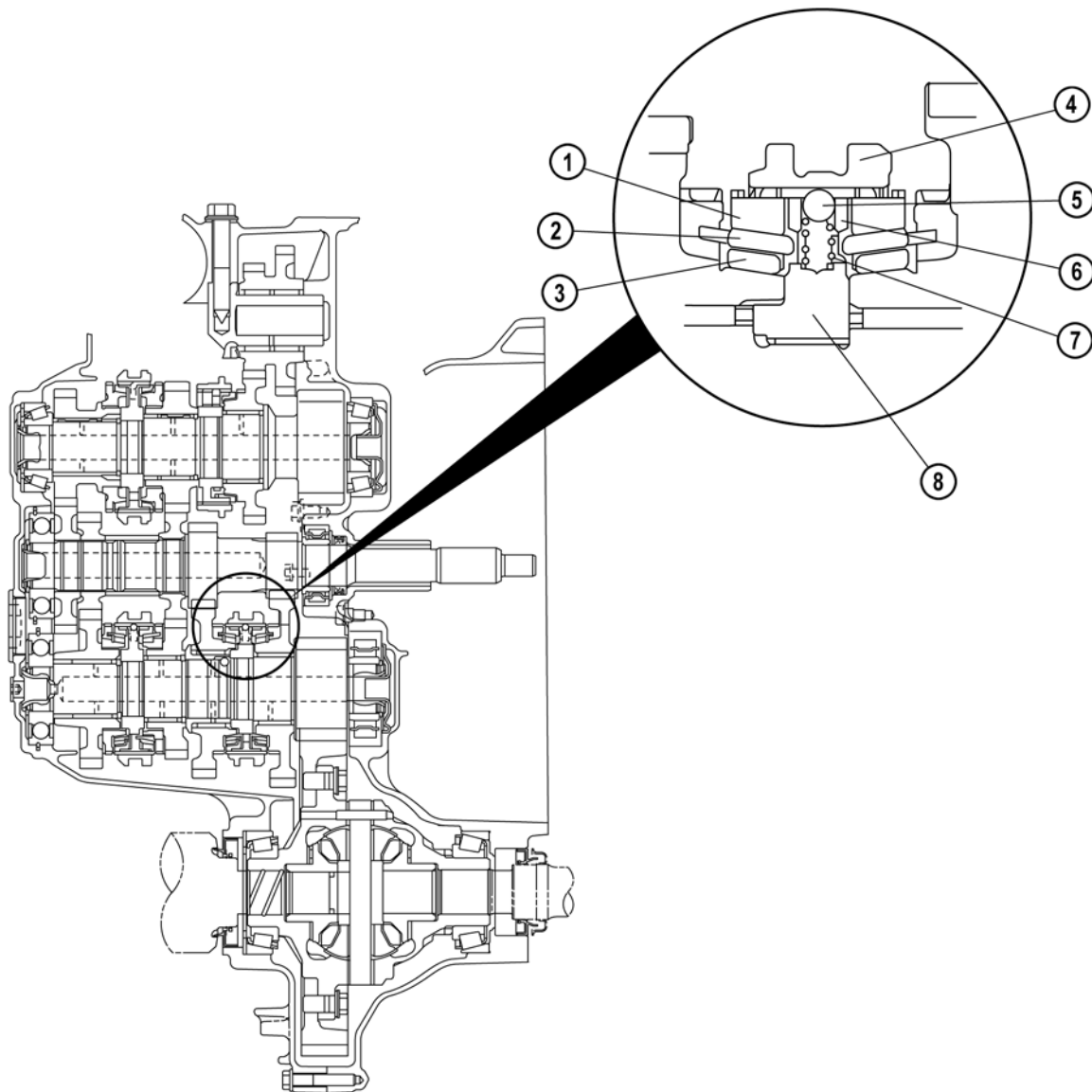
Reverse Gear



M6FL_05022

Synchronizer Clutch Hub

- A ball-type detent mechanism is used in each clutch hub to reduce the overall dimensions of the hub.
- The ball-type detent mechanism consists of a coil-type synchronizer key spring, synchronizer key, and ball. Its function is essentially the same as the radial-type spring found in other transaxles.

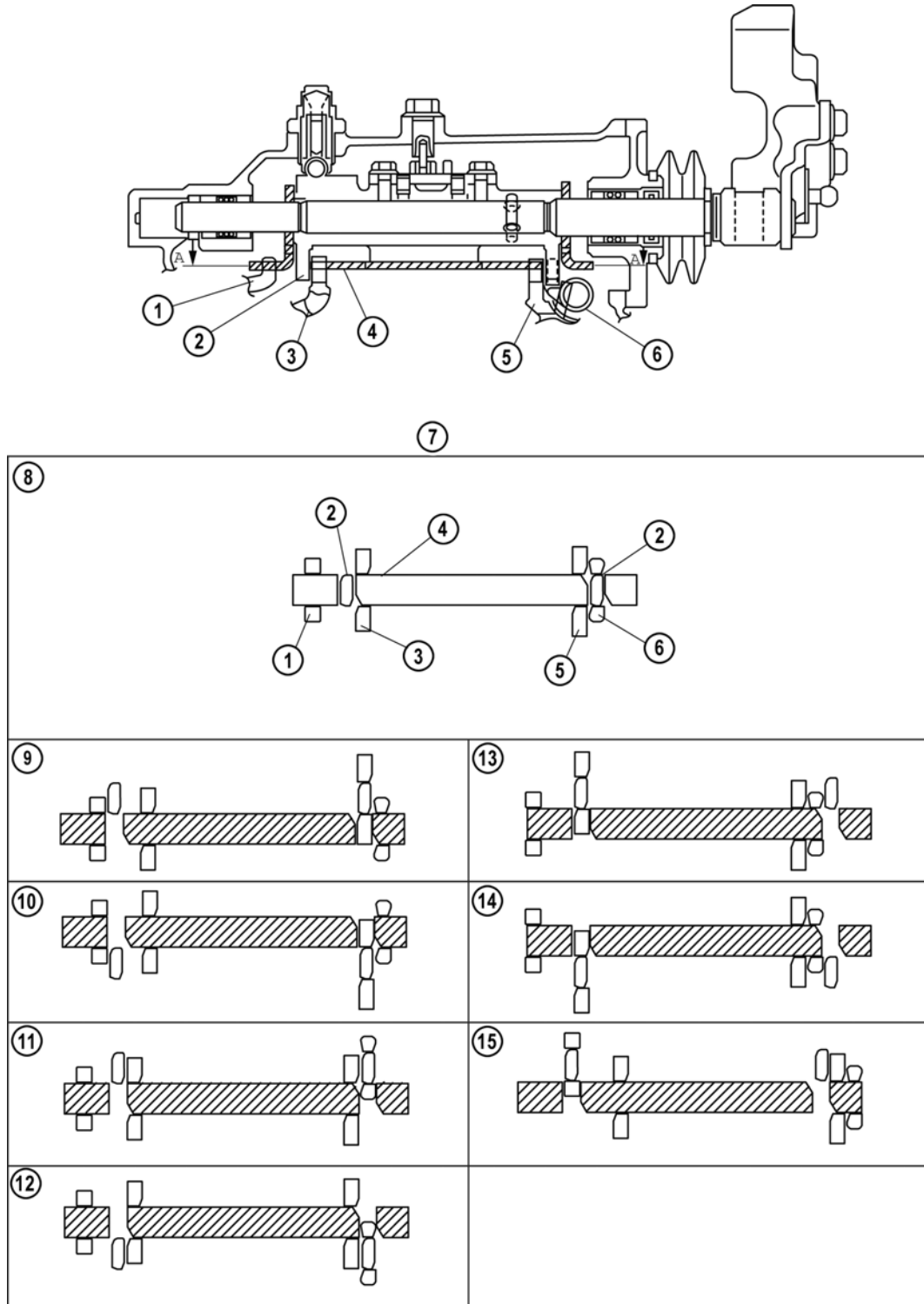


M6FL_05023

- | | | | |
|---|-------------------|---|------------------|
| 1 | Synchronizer ring | 5 | Ball |
| 2 | Middle ring | 6 | Synchronizer key |
| 3 | Inner ring | 7 | Spring |
| 4 | Hub sleeve | 8 | Clutch hub |

Shift Interlock Mechanism

- The shift interlock mechanism prevents two gears being engaged at a time. During shifting, the shift forks and control rod, except for the one in operation, are locked in the neutral position by the interlock plate.

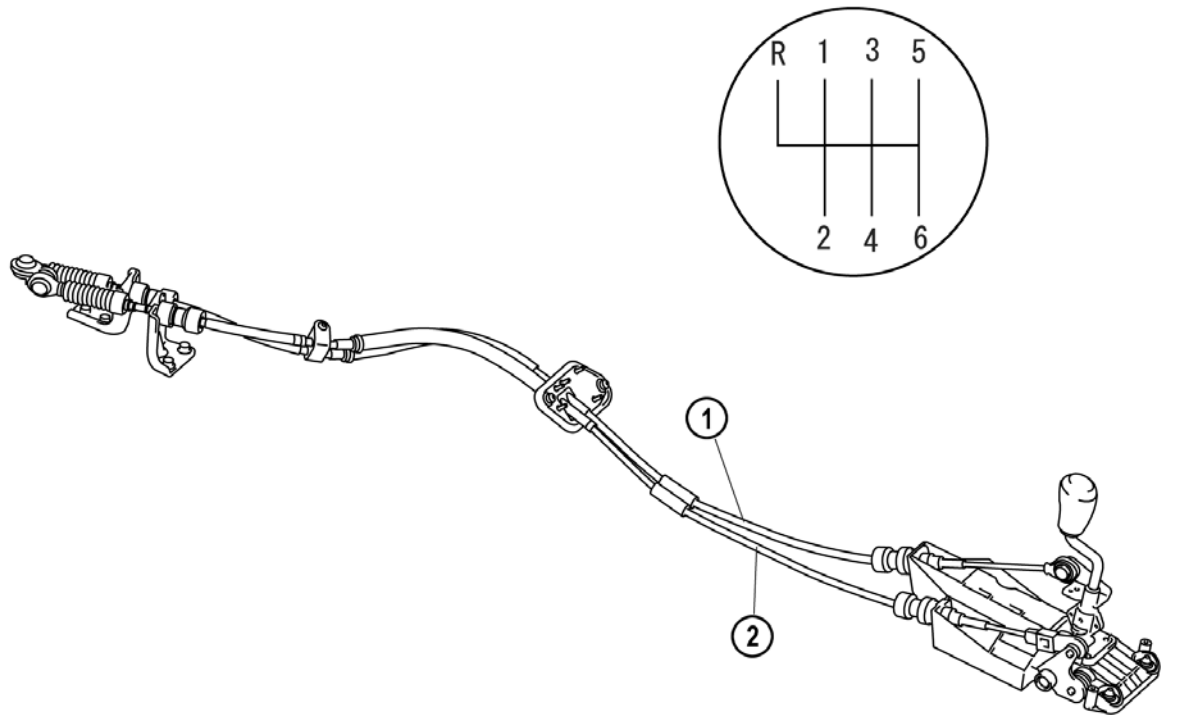


M6FL_05024

- | | | | |
|---|-------------------------------|----|--------------|
| 1 | Reverse shift fork | 9 | First gear |
| 2 | Inner lever | 10 | Second gear |
| 3 | Fifth/sixth gear shift fork | 11 | Third gear |
| 4 | Interlock plate | 12 | Fourth gear |
| 5 | First/second gear shift fork | 13 | Fifth gear |
| 6 | Third/fourth gear control rod | 14 | Sixth gear |
| 7 | A-A sectional view | 15 | Reverse gear |
| 8 | Neutral | | |

Shift Mechanism

- A cable operated shift mechanism similar to that on the previous Mazda6 is used.
- The selector cable is adjusted the same way as on the previous Mazda6.
- The reverse lockout mechanism is the same as on Mazda6 with G66M-R transaxle.



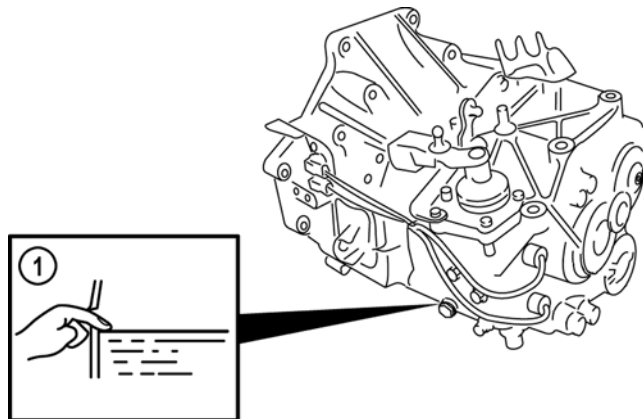
M6FL_05015

1 Shift cable

2 Select cable

Transaxle Oil

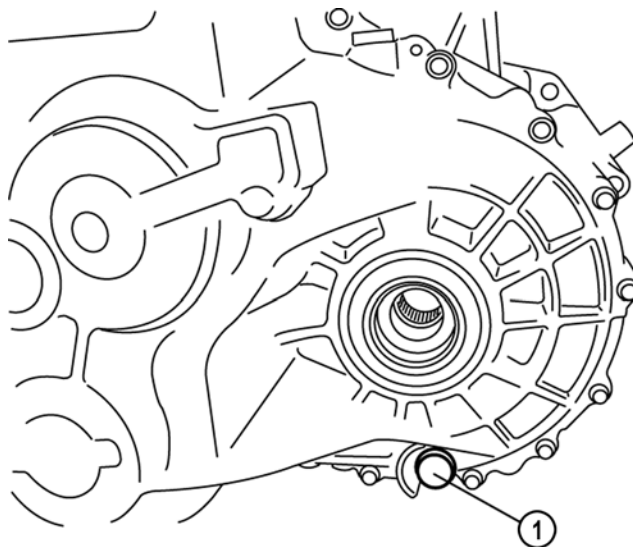
- The A26M-R manual transaxle is filled with 2.55 litres of manual transaxle oil which complies with the specification API Service GL-4 or GL-5 (grade) and SAE 75W-90 (viscosity).
- To check the transaxle oil level, verify that the oil level is near the brim of the plug port.



M6FL_05025

- 1 Oil level check

Drain Plug Location



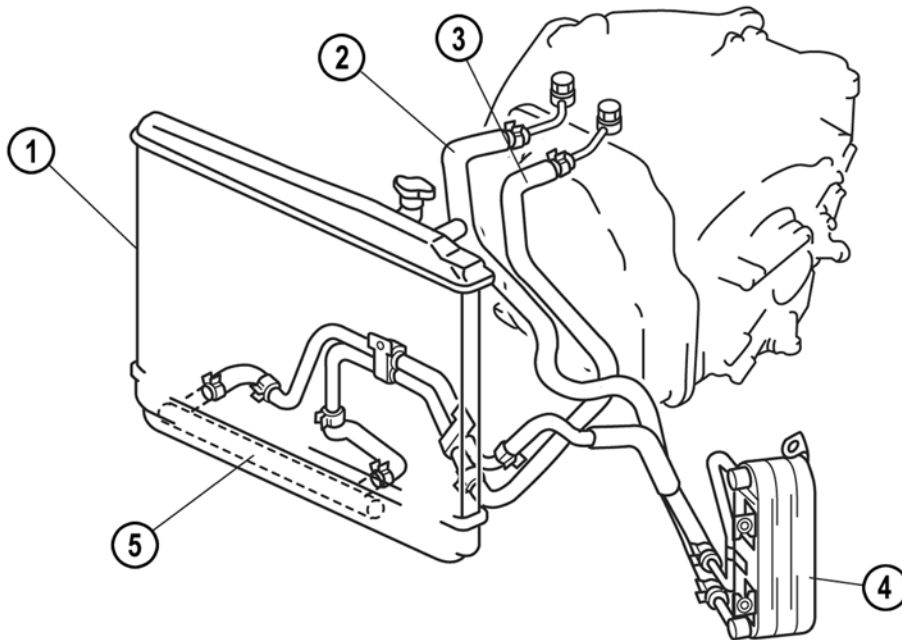
M6FL_05026

- 1 Drain plug

Notes:

Features

- The JA5AX-EL automatic transaxle with AWD has been basically carried over from the previous Mazda6 AWD (comprising the running changes of revised final drive ratio and the deletion of cruise control).
- An air cooling type oil cooler has been introduced for improved cooling of the automatic transmission fluid.



M6FL_05014

- 1 Radiator
- 2 Oil pipe (from oil cooler)
- 3 Oil pipe (to oil cooler)

- 4 Air cooling type oil cooler
- 5 Water cooling type oil cooler

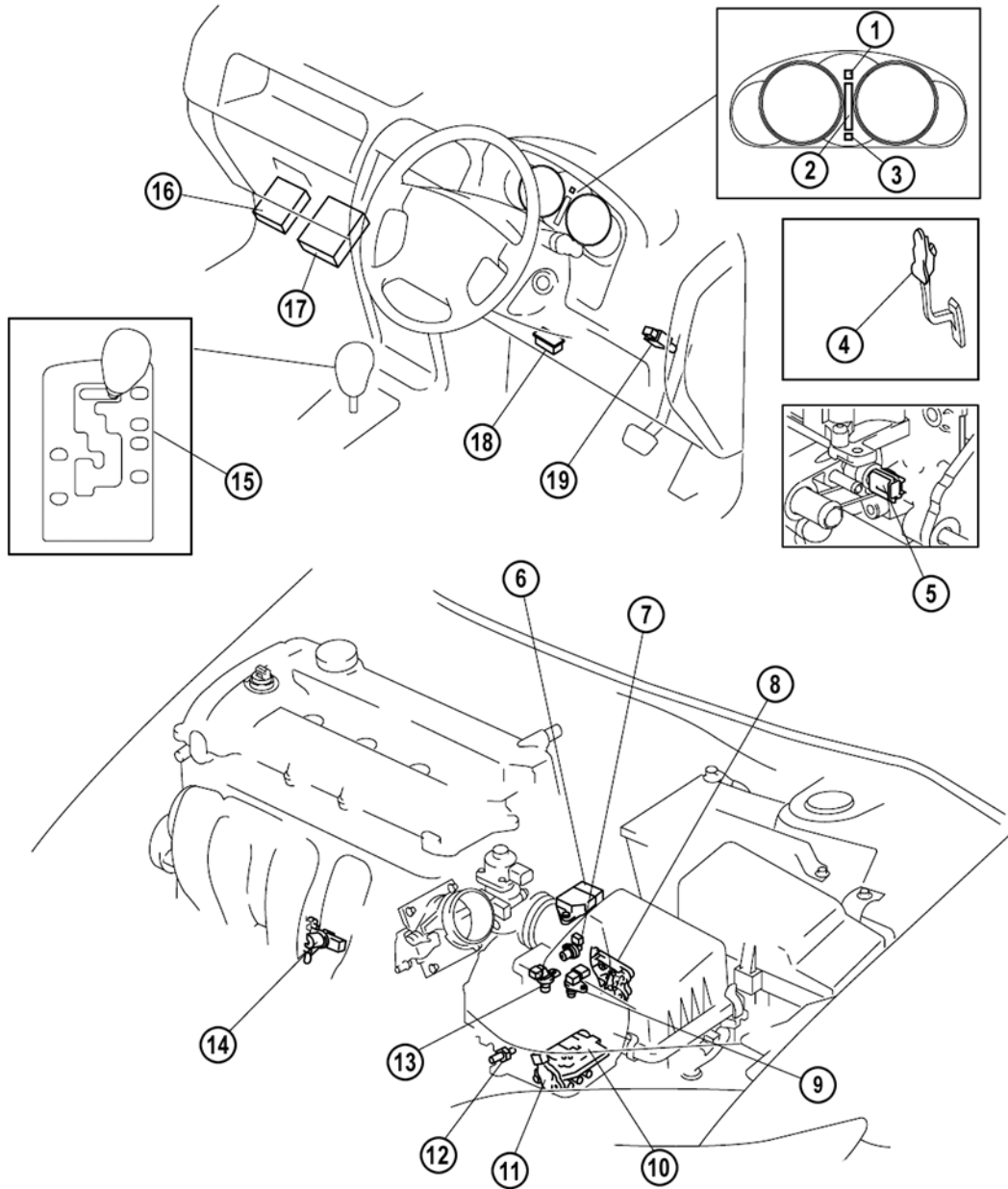
Notes:

Features

- The new FS5A-EL five-speed automatic transaxle is available as an option for Mazda6 Facelift fitted with LF or with L3 engine.
- The FS5A-EL uses one double planetary gear set and one single reduction planetary gear set. Hydraulic control is provided by six shift solenoid valves and two pressure control solenoid valves.
- The solenoid valves are electronically controlled by a separate **Transaxle Control Module (TCM)**.
- The new FS5A-EL five-speed automatic transaxle is based on the proven FN4A-EL four-speed automatic transaxle. To upgrade the transaxle to a five-speed transaxle, the following components have been added:
 - reduction planetary gear set
 - one-way clutch No. 2
 - reduction brake
 - direct clutch
 - secondary control valve body
 - intermediate shaft speed sensor
- To facilitate the fifth gear, the secondary gear drives the output gear through the reduction planetary gear set.
- The selector lever has a separate position (M-range) for manual up- and down-shifts.
- The instrument cluster displays the selector lever position (P-R-N-D-M), the actual gear which is engaged and in case of a malfunction the ATX MIL ("AT").

Transmission Control System

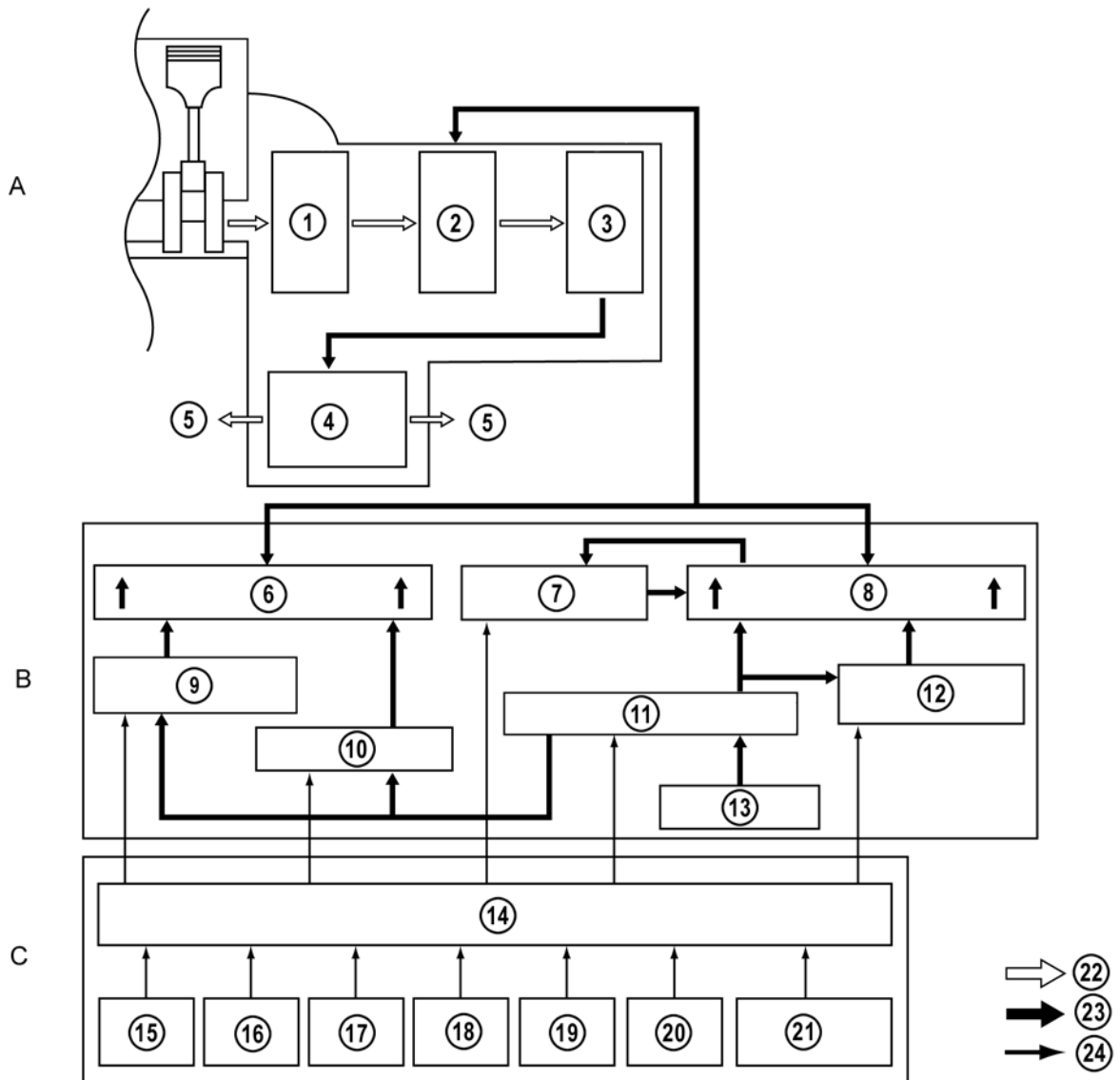
Structural View



M6FL_05035

- | | | | |
|----|-----------------------------------|----|---|
| 1 | ATX MIL | 11 | TR sensor |
| 2 | Selector lever position indicator | 12 | Oil pressure switch |
| 3 | Actual gear display | 13 | Turbine shaft speed |
| 4 | APP sensor | 14 | CKP sensor |
| 5 | ECT sensor | 15 | Selector lever unit comprising:
- M-range switch,
- UP switch,
- DOWN switch |
| 6 | MAF sensor | 16 | TCM |
| 7 | Output shaft speed sensor | 17 | PCM |
| 8 | Secondary control valve body | 18 | DLC |
| 9 | Intermediate shaft speed sensor | 19 | Brake switch |
| 10 | Control valve body | | |

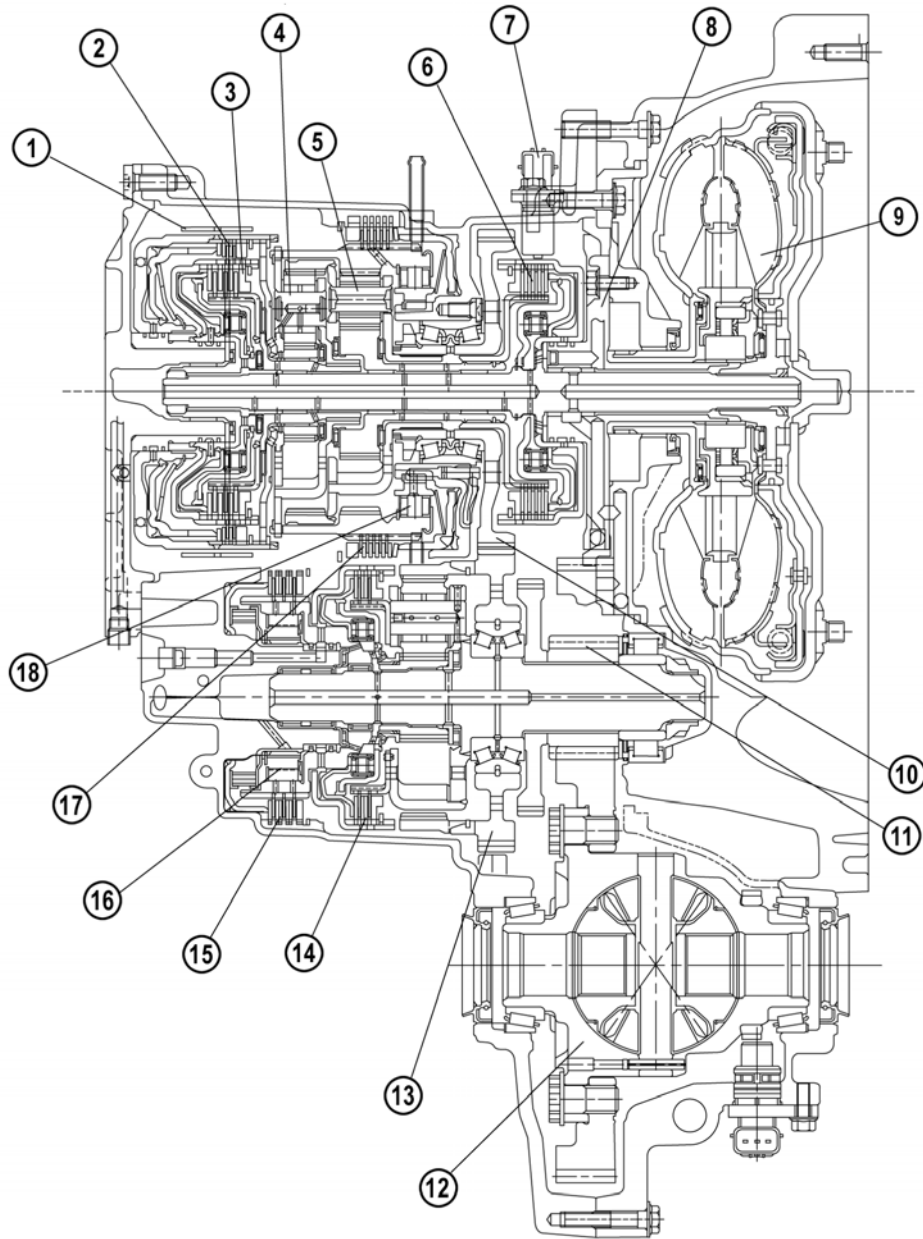
Operation Diagram



M6FL_05032

A	Powertrain mechanism	12	Shift solenoid A, B, C
B	Hydraulic pressure control mechanism	13	Oil pump
C	Electronic control mechanism	14	TCM
1	Torque converter	15	Oil pressure switch signal
2	Brake clutch	16	Output shaft speed
3	Planetary gear	17	Oil temperature
4	Differential	18	Turbine shaft speed
5	Tire	19	Engine speed
6	Secondary control valve body	20	Throttle position signal
7	Shift solenoid D, E	21	Intermediate shaft speed
8	Primary control valve body	22	Power flow
9	Pressure control solenoid B	23	Hydraulic pressure control signal
10	Shift solenoid F	24	Electronic signal
11	Pressure control solenoid A		

Cross-Sectional View

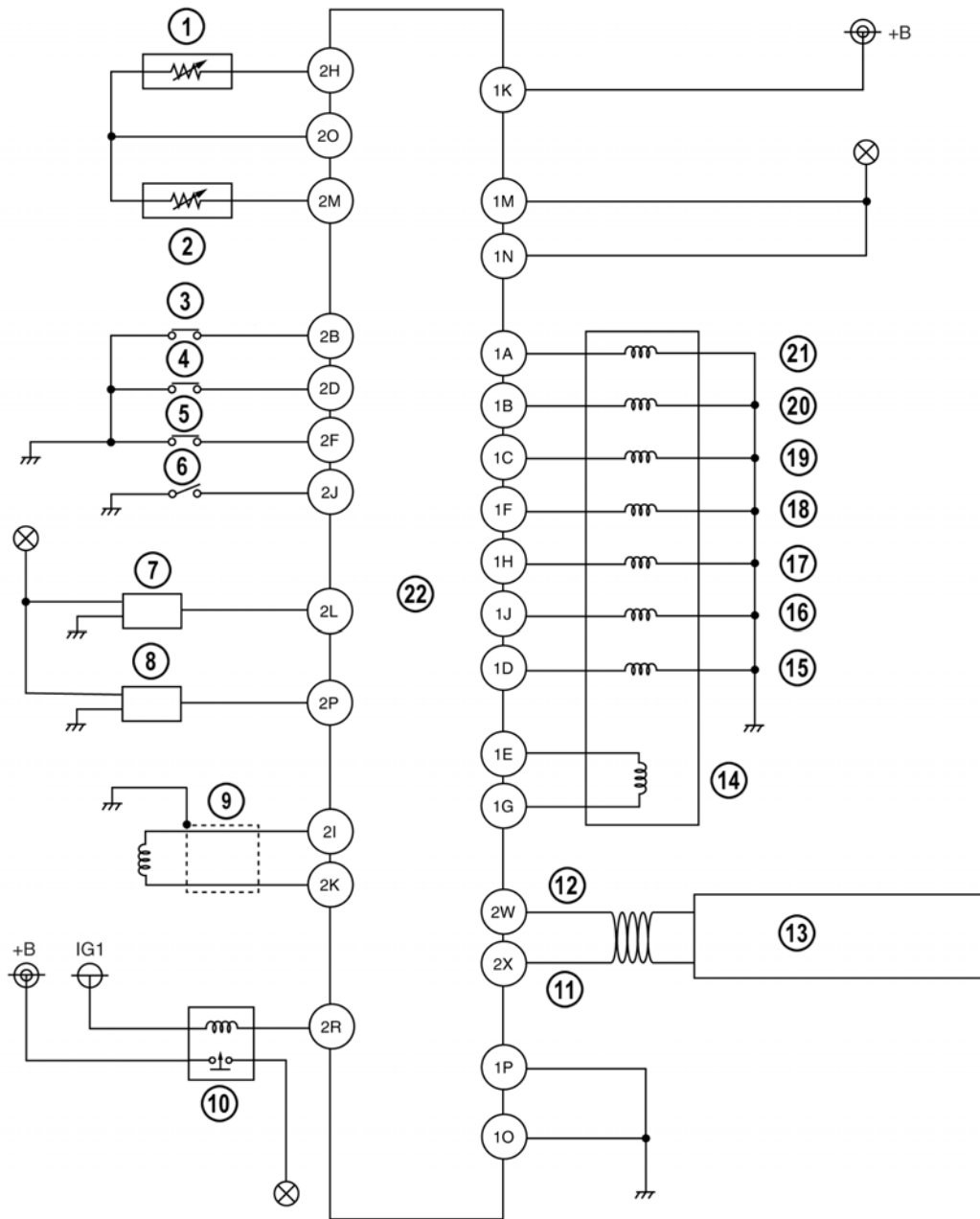


M6FL_05030

- | | | | |
|---|----------------------|----|-----------------------|
| 1 | Band brake | 10 | Primary gear |
| 2 | Reverse clutch | 11 | Output gear |
| 3 | 3-4 clutch | 12 | Differential |
| 4 | Rear planetary gear | 13 | Secondary gear |
| 5 | Front planetary gear | 14 | Direct clutch |
| 6 | Forward clutch | 15 | Reduction brake |
| 7 | Oil pressure switch | 16 | One-way clutch No. 2 |
| 8 | Oil pump | 17 | Low and reverse brake |
| 9 | Torque converter | 18 | One-way clutch No. 1 |

Electronic Control

Wiring Diagram



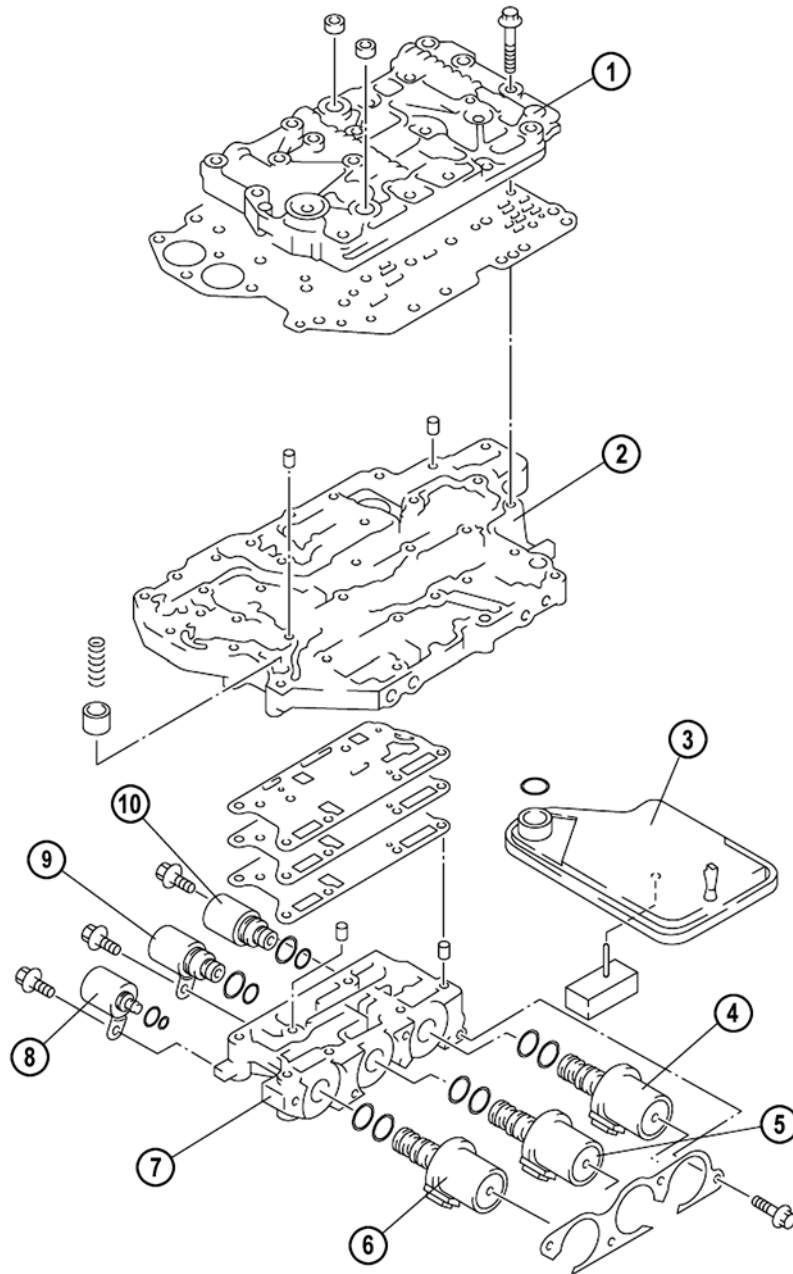
M6FL_05031

1	Inhibitor switch	12	CAN_H
2	ATF temperature sensor	13	PCM, ABS/DSC, instrument cluster
3	M-range switch	14	Pressure control solenoid A
4	UP switch	15	Pressure control solenoid B
5	Down switch	16	Shift solenoid F
6	Oil pressure switch	17	Shift solenoid E
7	Intermediate shaft speed sensor	18	Shift solenoid D
8	Output shaft speed sensor	19	Shift solenoid C
9	Turbine shaft speed sensor	20	Shift solenoid B
10	ATX main relay	21	Shift solenoid A
11	CAN_L	22	TCM

Hydraulic Control

Control Valve Body

- The main control valve body basically has been carried over from the FN4A-EL automatic transaxle.

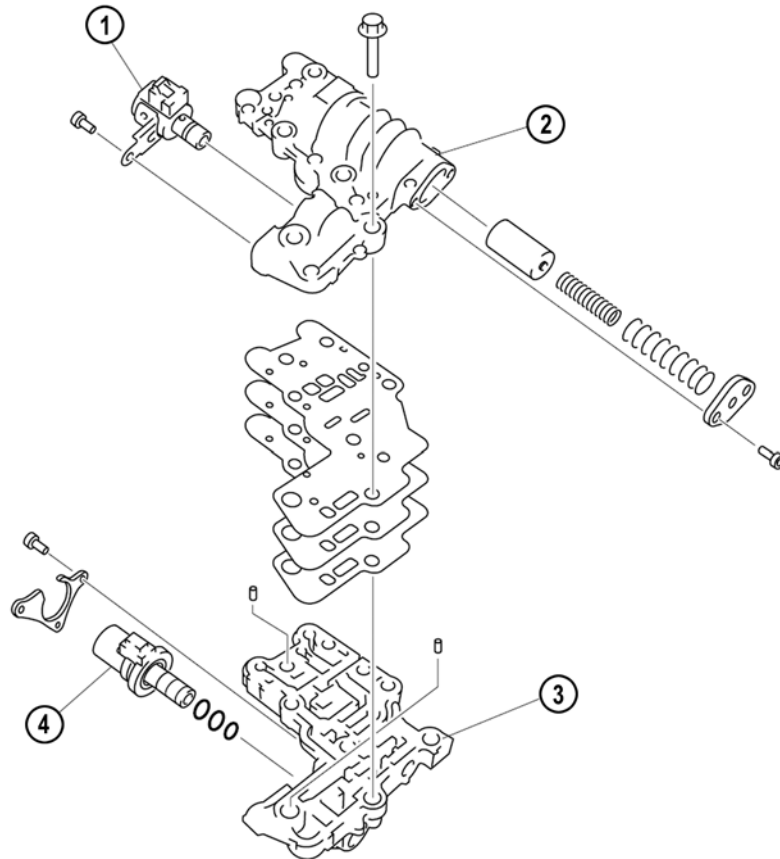


M6FL_05033

- | | | | |
|---|---------------------------------|----|-----------------------------|
| 1 | Control valve body - upper part | 6 | Shift solenoid A |
| 2 | Control valve body - lower part | 7 | Solenoid valve body |
| 3 | Oil strainer | 8 | Pressure control solenoid A |
| 4 | Shift solenoid B | 9 | Shift solenoid D |
| 5 | Shift solenoid C | 10 | Shift solenoid E |

Secondary Control Valve Body

- The secondary control valve body has been added to accommodate one more shift solenoid and an additional pressure control solenoid.



M6FL_05033

- | | | | |
|---|---|---|---|
| 1 | Shift solenoid F | 3 | Secondary control valve body - lower part |
| 2 | Secondary control valve body - upper part | 4 | Pressure control solenoid B |

Notes:

08

Restraint System

08 Restraint System

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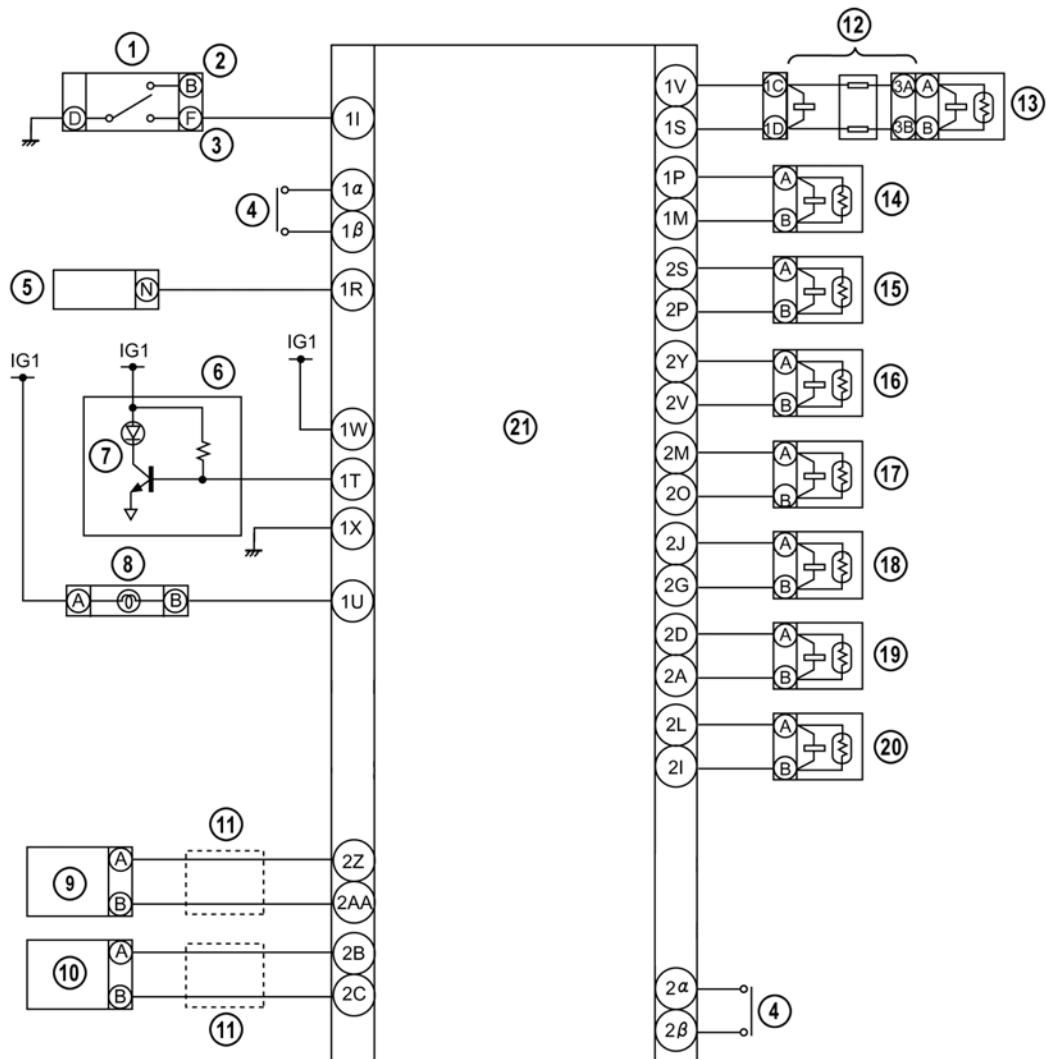
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Restraints

Features

- The restraints system of the Mazda6 Facelift has been basically carried over from the previous Mazda6, except the following:
 - A **PAD (Passenger Airbag Deactivation)** switch has been added (supersedes the occupancy sensor for the front passenger seat).
 - The front airbags for driver and front passenger use single stage deployment.
 - The crash zone sensor has been discontinued.

Wiring Diagram



M6FL_08001

- | | | | |
|----|------------------------------------|----|---|
| 1 | PAD switch | 12 | Clock spring |
| 2 | PASS AIRBAG ON | 13 | Driver-side air bag module |
| 3 | PASS AIRBAG OFF | 14 | Passenger-side air bag module |
| 4 | Poor connection detector bar | 15 | Driver-side pre-tensioner seat belt |
| 5 | Data Link Connector (DLC) | 16 | Driver-side curtain air bag module |
| 6 | Instrument cluster | 17 | Driver-side side air bag module |
| 7 | Air bag system warning light | 18 | Passenger-side pre-tensioner seat belt |
| 8 | PAD indicator | 19 | Passenger-side curtain air bag module |
| 9 | Driver-side side air bag sensor | 20 | Passenger-side side air bag module |
| 10 | Passenger-side side air bag sensor | 21 | SAS (Sophisticated Airbag Sensor) control module |
| 11 | Twisted pair | | |

09

Body & Accessories

09 Body & Accessories

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09 Body & Accessories

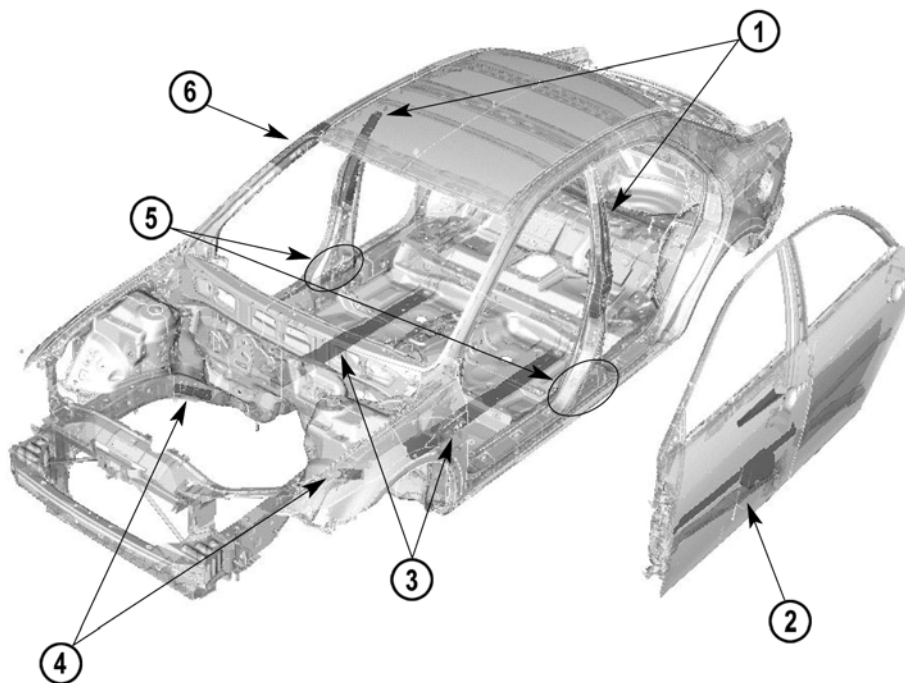
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Body

- Basically the bodystructure was carried over from the previous Mazda6 model.
- To gain a better Euro **NCAP (New Car Assessment Programme)** rating, some parts of the body have been additionally reinforced.
- This also improves the rigidity of the chassis and raised local body stiffness to match the upgraded powertrain.
- The front bumper was revised, the front grille redesigned (now with a larger Mazda badge) and the design of the rear bumper was refined.

Reinforced Body Shell



M6FL_09001

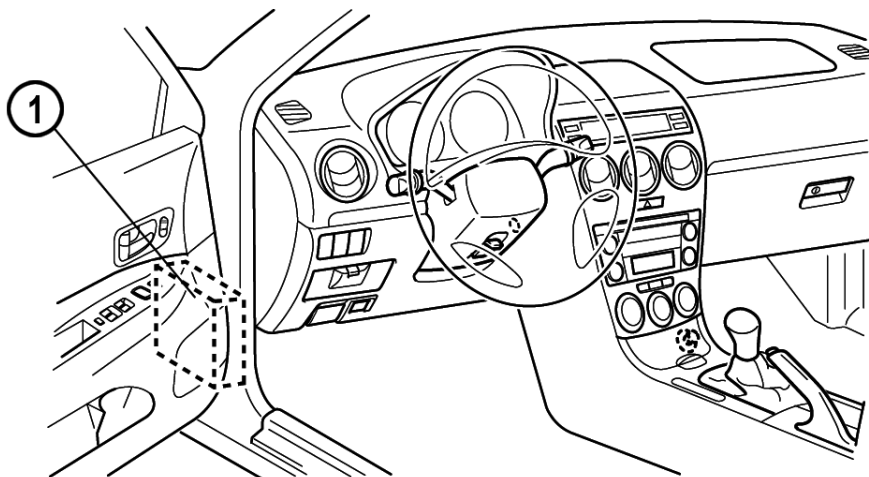
- | | | | |
|---|---|---|---|
| 1 | Increased thickness of B-pillar reinforcement | 4 | Increased thickness of front frame reinforcement |
| 2 | Increased rigidity of door outer panel | 5 | Optimized rigidity of lower B-pillar (redesigned outer reinforcement and gussets) |
| 3 | Additional body frame reinforcement | 6 | Reinforced upper A-pillar (driver's side only) |

Notes:

Body Control Module (BCM)

- The following relays are built into the BCM:
 - Door lock/unlock relays
- The BCM controls the following systems:
 - Turn/hazard light system
 - Rear wiper system
 - Room light control system
 - Power door lock system
 - Keyless entry system (without advanced keyless entry system)
 - Theft-deterrent system
- The BCM is connected to the CAN Databus and diagnosis can be done using WDS.

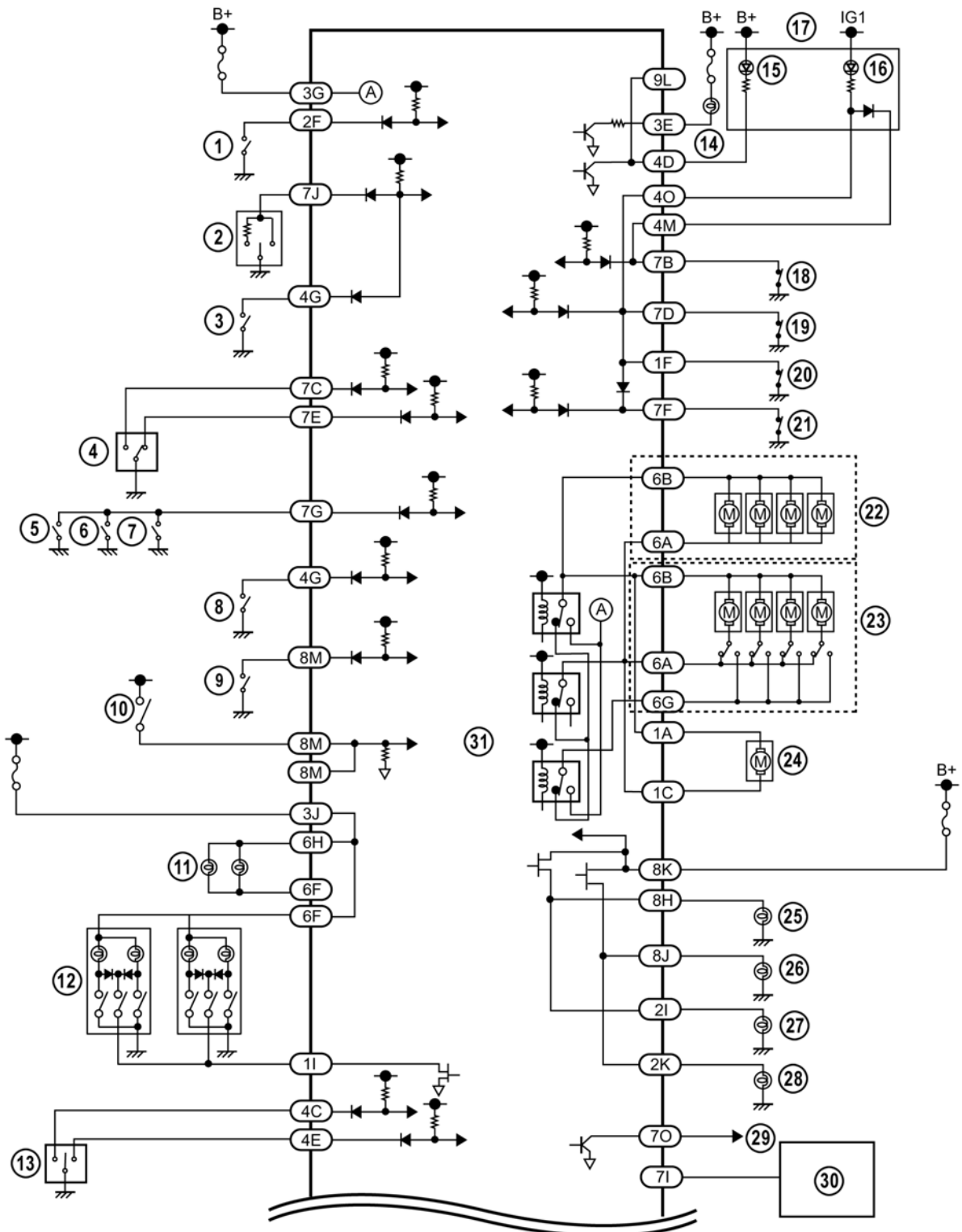
NOTE: The BCM does not require any programming or initialization after replacing.



M6FL_09002

1 BCM

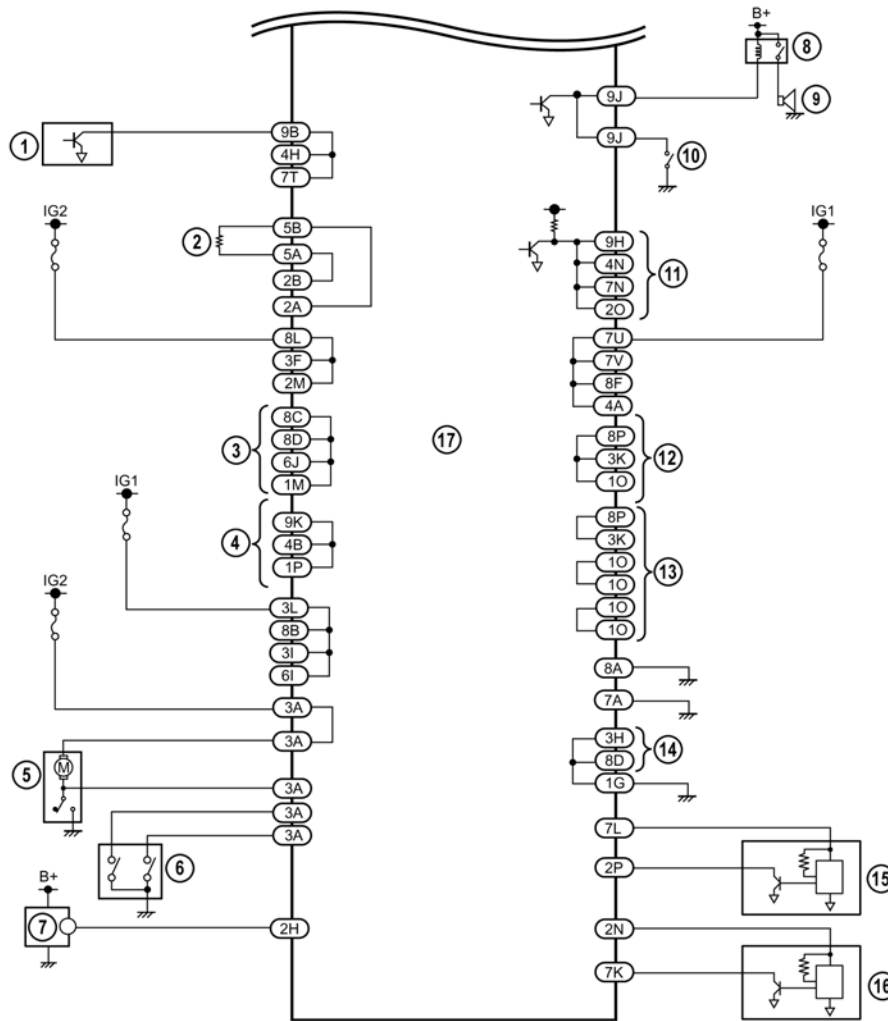
BCM Wiring Diagram



M6FL_09003

- | | | | |
|----|--|----|---|
| 1 | Trunk compartment light switch (4SD (4-Door Sedan)) | 17 | Instrument cluster |
| | Cargo compartment light switch (5HB (5-Door Hatchback), WGN (Wagon)) | | |
| 2 | Driver's side door key cylinder switch | 18 | Door switch (passenger's side) |
| 3 | Hazard switch | 19 | Door switch (rear, left) |
| 4 | Driver's side door lock-link switch | 20 | Door switch (rear, right) |
| 5 | Rear left side door lock-link switch | 21 | Door switch (driver's side) |
| 6 | Rear right side door lock-link switch | 22 | Door lock actuators (without double locking system) |
| 7 | Passenger's side door lock-link switch | 23 | Door lock actuators (with double locking system) |
| 8 | Hazard switch | 24 | Trunk lid opener (4SD)
Liftgate lock actuator (5HB, WGN) |
| 9 | Bonnet switch | 25 | Front turn light (RH (Right Hand)) |
| 10 | Key reminder switch | 26 | Front turn light (LH (Left Hand)) |
| 11 | Courtesy light | 27 | Rear turn light (RH) |
| 12 | Map light | 28 | Rear turn light (LH) |
| 13 | Turn switch | 29 | To Power Window Main Switch |
| 14 | Ignition key cylinder illumination | 30 | Keyless control module (with advanced keyless system)
Keyless receiver (with keyless entry system) |
| 15 | Security light | 31 | BCM |
| 16 | Door ajar warning light | | |

BCM Wiring Diagram (Continued)



M6FL_09004

- | | | | |
|---|--|----|-------------------------------------|
| 1 | DSC (Dynamic Stability Control) with DSC
ABS (Antilock Brake System) CM
(Control Module) (with ABS) | 10 | Horn switch |
| 2 | Fuel gauge sender unit | 11 | To DLC (Data Link Connector) |
| 3 | To brake light switch | 12 | To back-up light switch |
| 4 | To tail light | 13 | To audio system |
| 5 | Rear wiper motor | 14 | To headlight leveling switch |
| 6 | Rear wiper switch | 15 | Intruder sensor (front) |
| 7 | Theft-deterrent siren | 16 | Intruder sensor (rear) (WGN only) |
| 8 | Horn relay | 17 | BCM |
| 9 | Horn | | |

BCM PID Table

PID/data monitor item	Unit/Condition (Tester display)	Input/output part	BCM terminal
CCNT_GE	—	DTC	—
B_AJAR	Open/Closed	Bonnet switch	8M
TRUNK_AJAR	Open/Closed	Trunk compartment light switch	2F
REAR_AJAR	Open/Closed	Rear door switch (LH/RH)	7D, 1F
RF_AJAR	Open/Closed	Front door switch (RH)	7F
LF_AJAR	Open/Closed	Front door switch (LH)	7B
HAZARD	On/Off	Hazard warning switch	4G
WPINT_REAR	On/Off	Rear wiper switch (INT position)	4J
TURN_SW_R	On/Off	Turn switch (RH)	4E
TURN_SW_L	On/Off	Turn switch (LH)	4C
LLSW_D	LOCK/UNLOCK	Driver-side door lock-link switch	7C, 7E
LLSW_P_R	LOCK/UNLOCK	Except driver-side door lock-link switch	7G

M6FL_09T001

BCM On-Board Diagnostic System

- The on-board diagnostic system of the BCM consists of the following functions:
 - Constant monitor
 - Self test
 - PID monitor

Constant Monitor

- The constant monitor is carried out whenever the ignition is ON. If a fault is detected, a DTC will be stored in the BCM. When the ignition is switched off, DTCs stored by the constant monitor will be deleted. The constant monitor only monitors the following systems:
 - Rain sensor
 - Battery voltage
 - BCM IC (Integrated Circuit)

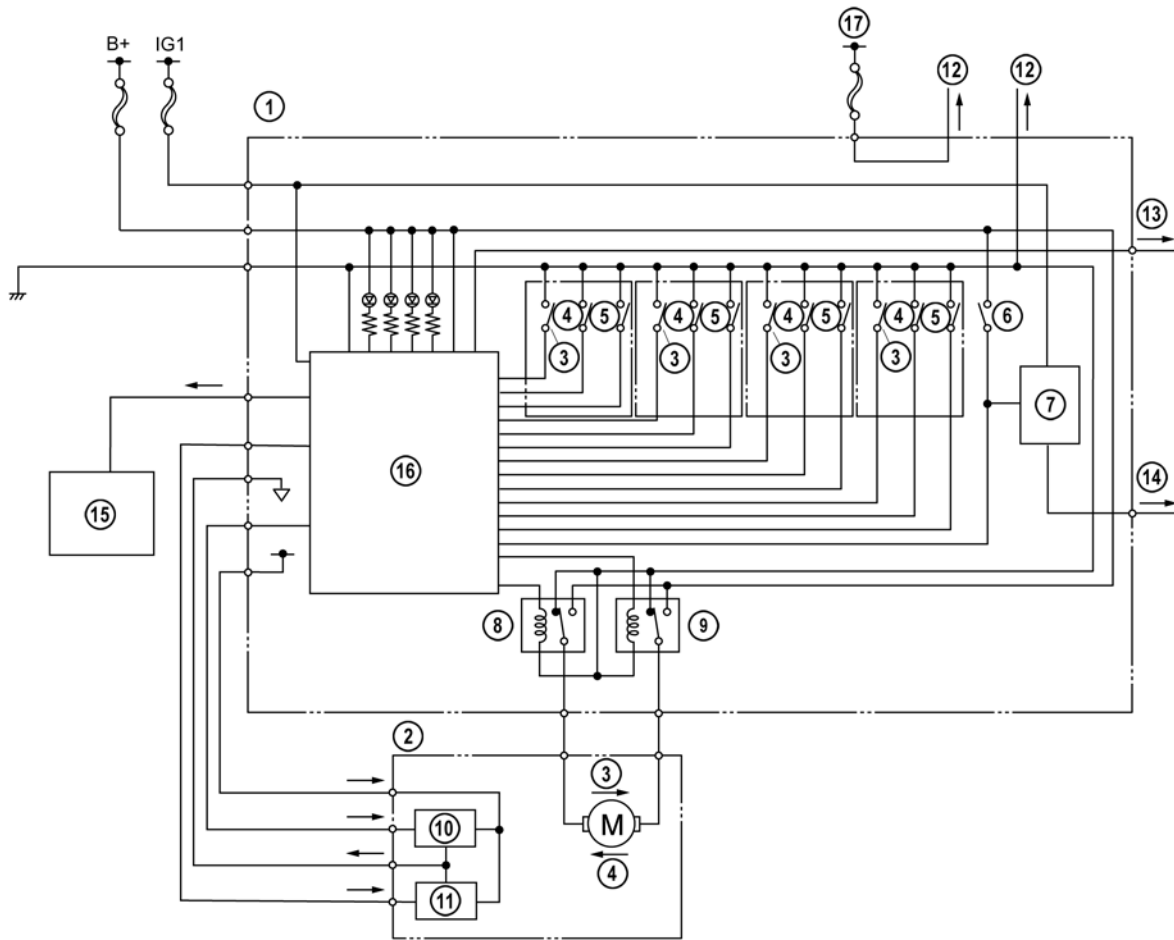
Self Test

- All systems other than those tested in the constant monitor, are monitored during the self-test. If a fault is detected, a DTC will be stored in the BCM.
- The self-test function allows BCM DTCs to be displayed on WDS. To view these, connect WDS to the vehicle and select the option **Toolbox→Self Test→Modules→GEM**.
- When the ignition is switched off, DTCs stored by the self-test will be deleted.
- To conduct the self test, the following conditions must first be met:
 - Ignition switch ON
 - All switches other than ignition switch OFF
 - All doors, bonnet, trunk lid and liftgate are closed and unlocked
 - Parking brake is engaged

Power Window System

- The power window system is essentially the same as that on the current Mazda5 and has the following features:
 - Manual open/close function on all windows.
 - Auto open/close function on all windows.
 - Auto reverse pinch protection function on all windows.
 - Two step down function on all windows.
 - Ignition off timer function (40 seconds) is used.
 - Exterior opening/closing function available.
 - Power window motors with Hall sensors are used.
 - Illumination **LEDs** (**L**ight **E**mitting **D**iode) are used in the power window main switch and subswitches.

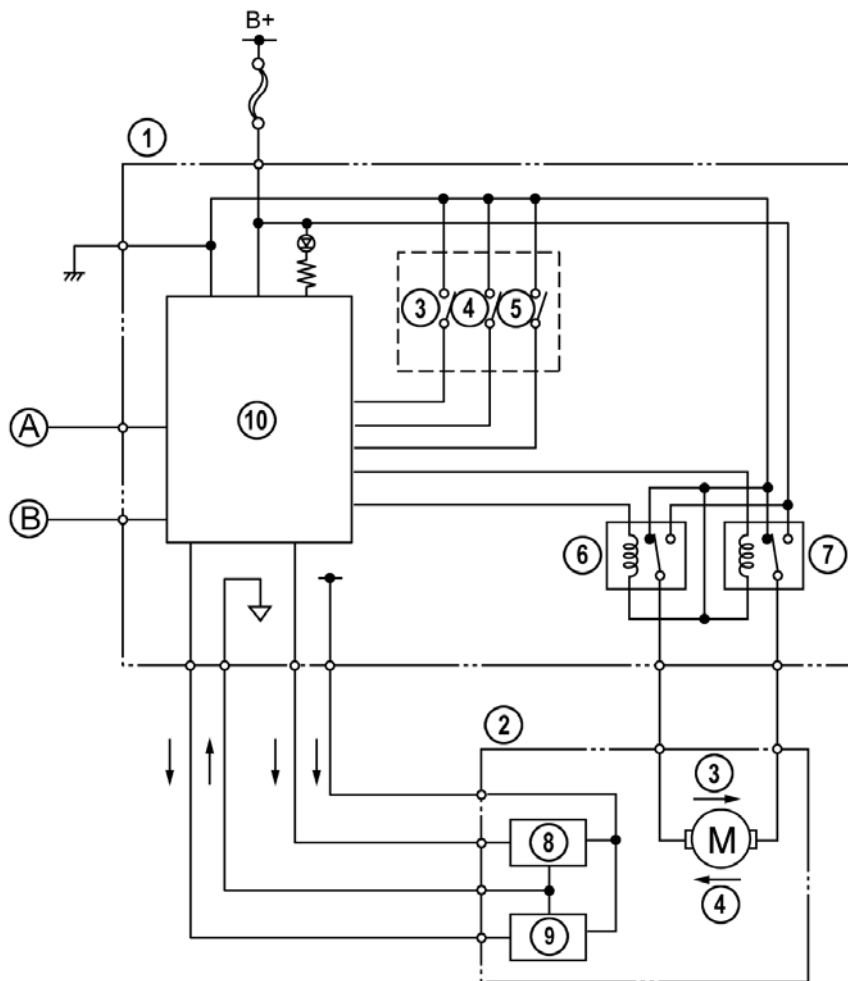
Power Window Main Switch



M6FL_09005

- | | | | |
|---|------------------------------------|----|---|
| 1 | Power window main switch | 10 | Hall effect switch 1 |
| 2 | Power window motor (driver's side) | 11 | Hall effect switch 2 |
| 3 | Close | 12 | To power mirror switch |
| 4 | Open | 13 | To power window subswitch A |
| 5 | Auto | 14 | To power window subswitch B |
| 6 | Power-cut switch | 15 | BCM |
| 7 | Conjunction circuit | 16 | P/W (Power Window) CM |
| 8 | Close relay | 17 | ACC (Accessory (position ignition switch)) |
| 9 | Open relay | | |

Power Window Subswitch



M6FL_09006

- | | | | |
|---|------------------------|----|-------------------------------|
| 1 | Power window subswitch | 7 | Open relay |
| 2 | Power window motor | 8 | Hall effect switch 1 |
| 3 | Close | 9 | Hall effect switch 2 |
| 4 | Open | 10 | P/W CM |
| 5 | Auto | A | To power window main switch A |
| 6 | Close relay | B | To power window main switch B |

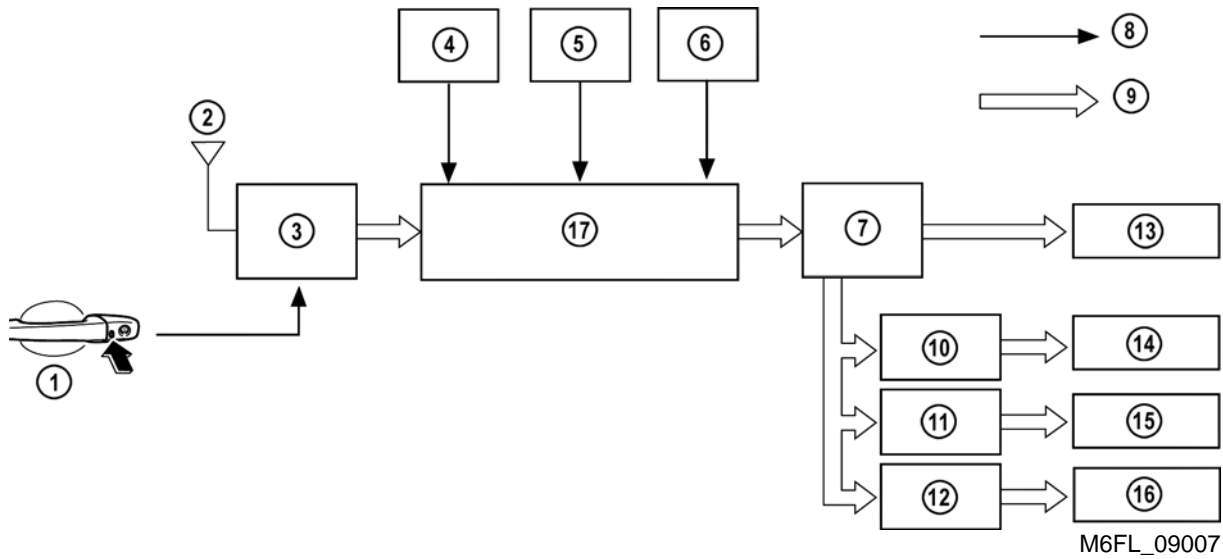
Exterior Opening/Closing

- The exterior opening/closing function allows all of the windows to either be opened, or closed simultaneously from outside the vehicle.
- By pressing the driver's door request switch, or the LOCK button on a card key or a retractable type key transmitter for approximately 1.5 seconds, all of the windows can be closed.
- Conversely, by pressing and holding the UNLOCK button on a card key or a retractable type key transmitter for approximately 1.5 seconds, all of the windows can be opened.
- The windows will be closed using manual mode (i.e. when the LOCK button or request switch is released, the windows will stop closing immediately), however when the UNLOCK button is being pressed the windows will open in automatic mode (windows will open fully, even if UNLOCK switch is released while they are still moving).
- If any button on the transmitter is pressed during the automatic open operation, the window will stop opening immediately.
- During **IG (Ignition) OFF** timer operation (power window system operates approx. 40 s after IG OFF), the power window switch operation has priority over the exterior open/close function.

Operation Prohibition

- When the following conditions are met before, or during window operation, the exterior open/close function does not operate.
 - One of the doors or the tailgate is open (when the door switch is ON)
 - The key is inserted in the steering lock (when the keyless switch is ON)
 - The push switch is pressed in or the start knob (ignition switch) is in a position other than the LOCK (with advanced keyless system)
 - The transmitter is not in the reception area
 - The card key (transmitter) is not in the reception area when the driver-side request switch is operated (with advanced keyless system)
 - The transmitter is operated during the operation (LOCK, UNLOCK)

Window Closing Operation with Request Switch

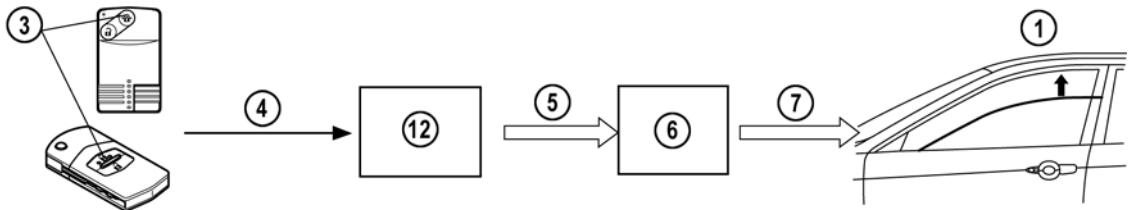


- | | | | |
|---|--------------------------------|----|---|
| 1 | Request switch (driver's side) | 10 | P/W subswitch (RF (Right Front)) |
| 2 | Keyless receiver | 11 | P/W subswitch (LR (Left Rear)) |
| 3 | Keyless control module | 12 | P/W subswitch (RR (Right Rear)) |
| 4 | Door latch switch | 13 | P/W motor (LF (Left Front)) |
| 5 | Start knob/Key reminder switch | 14 | P/W motor (RF) |
| 6 | Cargo compartment light switch | 15 | P/W motor (LR) |
| 7 | Power window main switch | 16 | P/W motor (RR) |
| 8 | Input signal | 17 | BCM |
| 9 | Control signal | | |

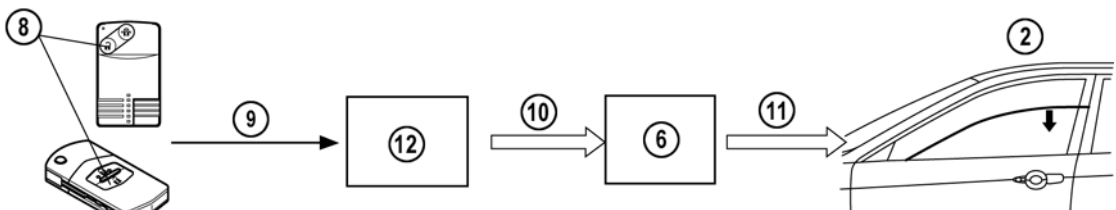
M6FL_09007

Operation with Transmitter

①



②



M6FL_09008

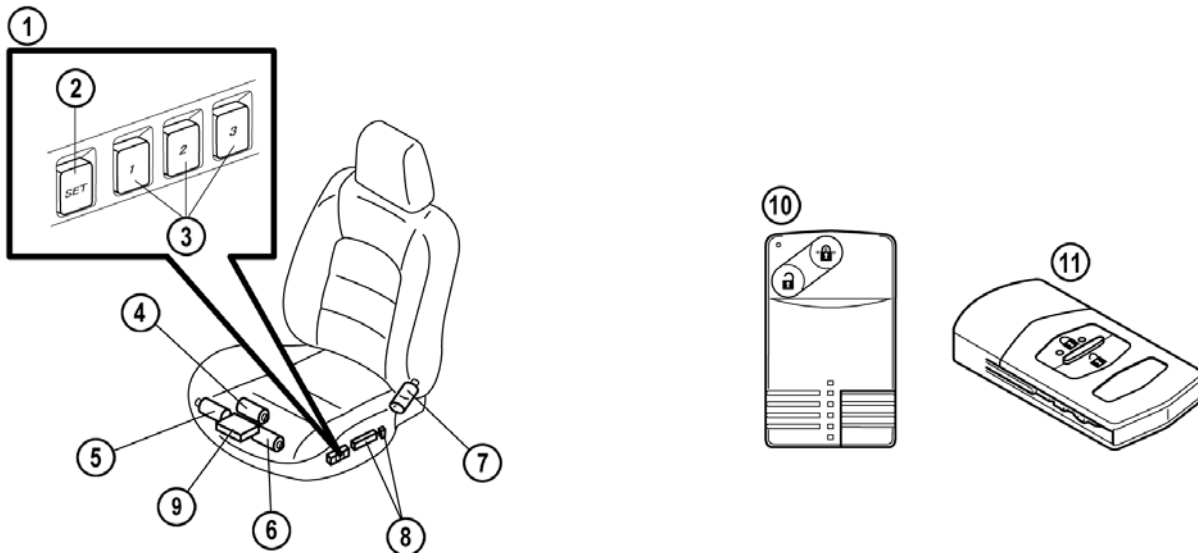
- 1 Close operation
- 2 Open operation
- 3 Close (lock button held approx. 1.5 s)
- 4 Lock signal
- 5 Close request signal
- 6 P/W switch

- 7 Close operation signal
- 8 Open (unlock button held approx. 1.5 s)
- 9 Unlock signal
- 10 Open request signal
- 11 Open operation signal
- 12 BCM

Power Seat

- A power seat with memory function has been adopted.
- The memory function slides the seat into a previously stored position according to the used memory switch or according to the transmitter that was used to open the vehicle.

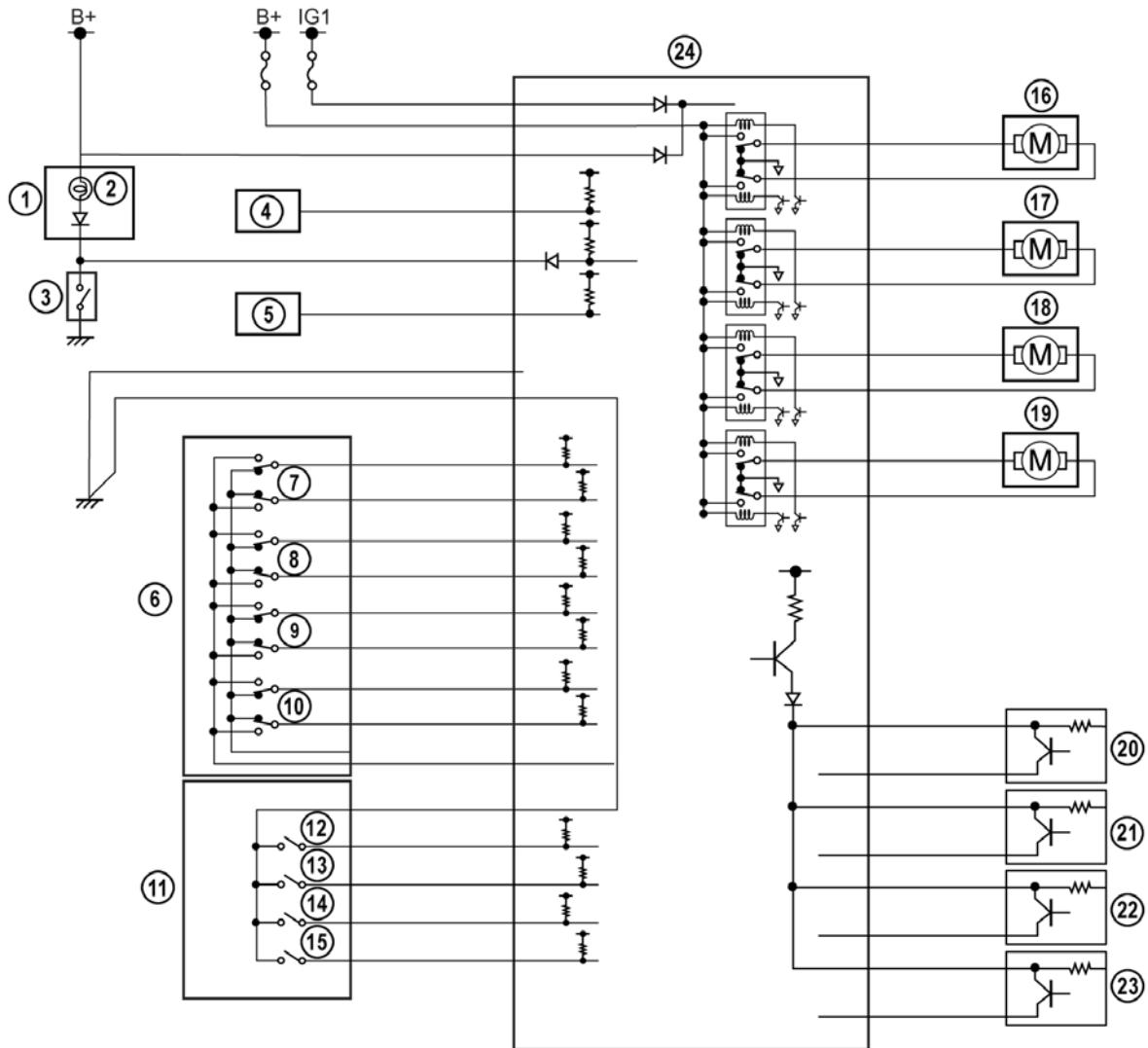
Power Seat Structural View



M6FL_09009

- | | | | |
|---|------------------------|----|--|
| 1 | Position memory switch | 7 | Recliner motor |
| 2 | Set switch | 8 | Power seat switches |
| 3 | Memory switches | 9 | Position memory control module |
| 4 | Slide motor | 10 | Transmitter (with advanced keyless system) |
| 5 | Rear tilt motor | 11 | Transmitter (with keyless entry system) |
| 6 | Front tilt motor | | |

Power Seat Wiring Diagram



M6FL_09010

- | | |
|--|---------------------------------------|
| 1 Instrument cluster | 13 Memory switch 1 |
| 2 Door ajar warning light | 14 Memory switch 2 |
| 3 Door switch (driver's side) | 15 Memory switch 3 |
| 4 ABS / DSC CM | 16 Slide motor |
| 5 -Keyless control module (with advanced Keyless system) | 17 Front tilt motor |
| -BCM (without advanced Keyless) | |
| 6 Power seat switch | 18 Rear tilt motor |
| 7 Slide switch | 19 Recliner motor |
| 8 Front tilt switch | 20 Position sensor (slide motor) |
| 9 Rear tilt switch | 21 Position sensor (front tilt motor) |
| 10 Recliner switch | 22 Position sensor (rear tilt motor) |
| 11 Position memory switch | 23 Position sensor (recliner motor) |
| 12 Set switch | 24 Position memory control unit |

Seat Position Memory

- Three seat positions can be programmed in the position memory control module corresponding to the memory switch.
- An additional seat position can be programmed corresponding to each transmitter.
- Programming of the seat position is possible according to the following procedures.

Seat Position Programming Using the Memory Switches

1. Slide the seat manually to the desired position.
2. Press and hold the set switch. Then press one of the memory switches 1, 2, or 3.
3. Buzzer sounds and the seat position is programmed.

Seat Position Programming Using the Transmitter

1. Slide the seat manually to the desired position.
2. Press and hold the set switch. Then press the UNLOCK button on the transmitter.
3. Buzzer sounds and seat position is programmed.

NOTE: If the vehicle battery is disconnected for more than 5s, all of the seat position memory will be erased.

Seat Positioning Using Memory Switch

- If all of the following conditions are met, the seat position is automatically called up by the memory switch operation.
 - Door is open (door switch on).
 - Seat position has been programmed.
 - Ignition switch is in the LOCK position.
 - Vehicle is stopped (vehicle speed 2 km/h [1.24 mph] or less).

Seat Positioning Using Transmitter

- When the door is opened within approx. 2 s after it is unlocked using the transmitter, the auto call up operation slides the seat to the programmed position.

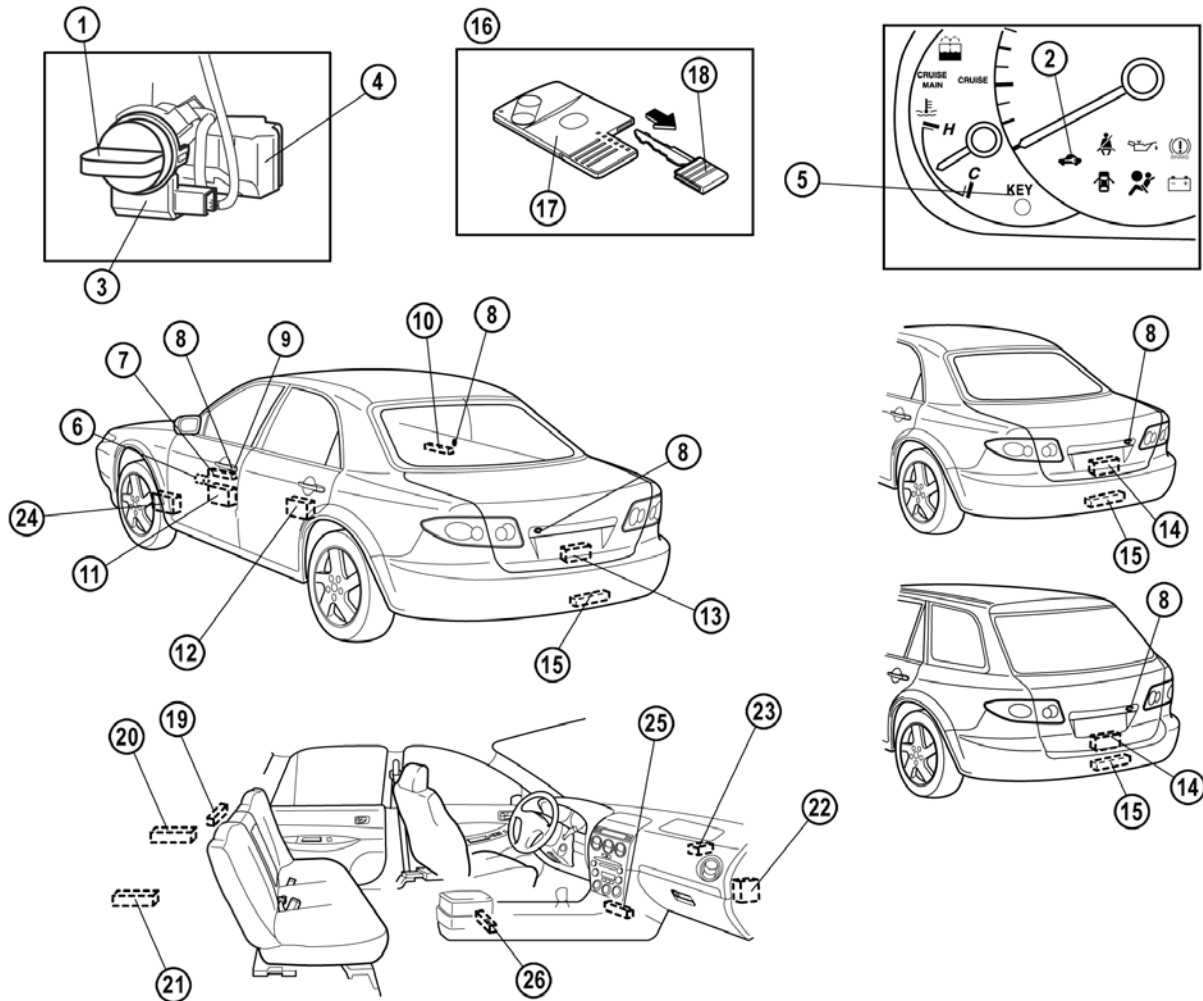
Security and Locks

- The security and lock system on the Mazda6 Facelift has the following features:
 - Advanced Keyless Entry and Starting System has been adopted (option).
 - Power door lock system controlled by the BCM is used.
 - Double-locking function is used.
 - Auto re-lock function is used.
 - Theft deterrent system controlled by BCM is used.

Vehicles with Advanced Keyless Entry and Start System

- The Advanced Keyless Entry and Start System allows the vehicle to be unlocked and started without using a key. As long as the driver has an advanced keyless entry card key in their possession, operation of the doorlocks and start knob (to start the engine) can be achieved without actually removing the card key from their pocket or bag.
- Unlocking and locking of doors can be achieved either by using the auxiliary key, by pushing the buttons on the remote transmitter (card key), or simply by pressing the request switches on each door.
- An answer-back function provides visual and audible confirmation of door lock operation.
- A guidance function consisting of two indicator lights and two buzzers informs the driver if the system is not being used correctly, or if there is a fault.
- A rolling code type transmitter is used in the card key to reduce the possibility of theft.
- Up to **6 card keys are programmable** to the keyless control module.

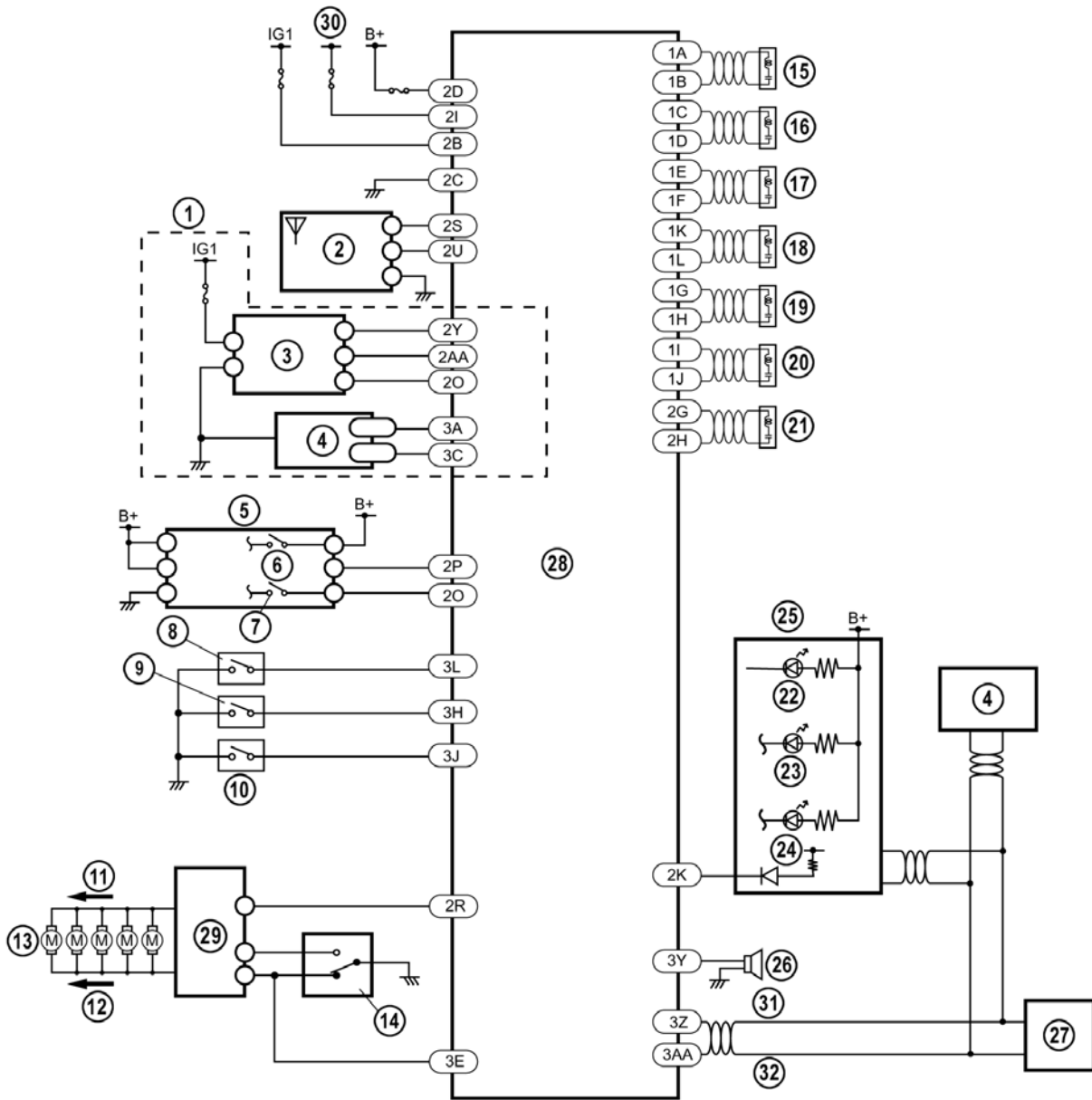
Advanced Keyless System Structural View



M6FL_09011

- | | |
|--|--|
| 1 Start knob (ignition switch) | 14 Liftgate latch and lock actuator (5HB, WGN) |
| 2 Security light (with immobilizer system) | 15 Keyless antenna (exterior, rear) |
| 3 Coil antenna (with immobilizer system) | 16 Card key |
| 4 Steering lock unit | 17 Transmitter |
| 5 Keyless warning light (green)
Keyless warning light (red) | 18 Auxiliary key |
| 6 Keyless buzzer | 19 Keyless antenna (interior, rear) (4SD) |
| 7 Keyless antenna (driver side) | 20 Keyless antenna (interior, LR) (5HB, WGN) |
| 8 Request switch | 21 Keyless antenna (interior, RR) (5HB, WGN) |
| 9 Front door key cylinder | 22 Keyless control module |
| 10 Keyless antenna (passenger side) | 23 Keyless receiver |
| 11 Front door latch and lock actuator | 24 BCM |
| 12 Rear door latch and lock actuator | 25 Keyless antenna (interior, front) |
| 13 Trunk lid opener (4SD) | 26 Keyless antenna (interior, middle) |

Advanced Keyless System Wiring Diagram

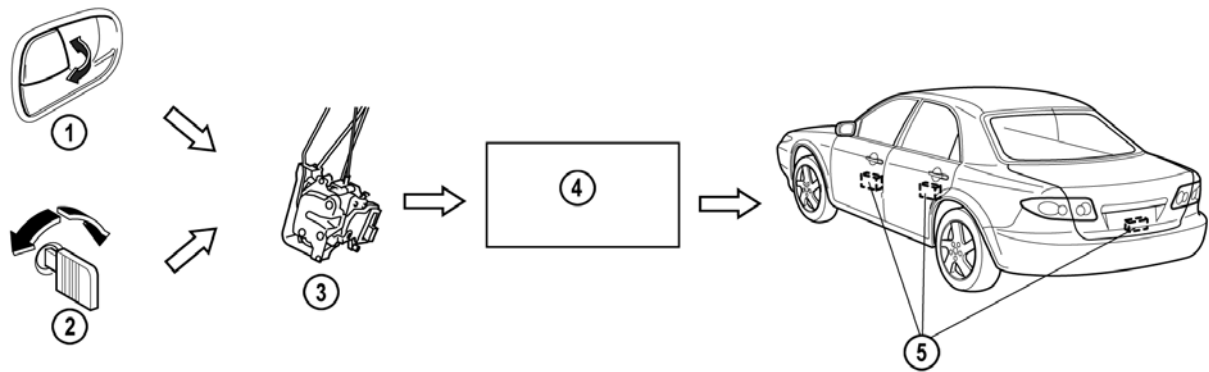


M6FL_09012

- | | | | |
|----|----------------------------------|----|--|
| 1 | With immobilizer system | 17 | Keyless antenna (exterior, rear) |
| 2 | Keyless receiver | 18 | Keyless antenna (interior, middle) |
| 3 | Coil antenna | 19 | Keyless antenna (interior, rear) (4SD)
Keyless antenna (interior, RR) (5HB,
WGN) |
| 4 | PCM | 20 | Keyless antenna (interior, LR) (5HB,
WGN) |
| 5 | Steering lock unit | 21 | Keyless antenna (interior, front) |
| 6 | Push switch | 22 | Security light |
| 7 | Key reminder switch | 23 | Keyless indicator light (green) |
| 8 | Request switch (liftgate) | 24 | Keyless warning light (red) |
| 9 | Request switch (driver side) | 25 | Instrument cluster |
| 10 | Request switch (passenger side) | 26 | Keyless buzzer |
| 11 | LOCK | 27 | DLC |
| 12 | UNLOCK | 28 | Keyless control module |
| 13 | Door lock actuator | 29 | BCM |
| 14 | Door lock link switch | 30 | ACC |
| 15 | Keyless antenna (driver side) | 31 | CAN-L (Controller Area Network-Low) |
| 16 | Keyless antenna (passenger side) | 32 | CAN-H (Controller Area Network-High) |

Power Door Lock System

- When the driver's door is unlocked or locked with the key, or by pushing the lock knob, the lock link switch in the door lock actuator sends a lock or unlock signal to the BCM, which operates the locks on all doors.

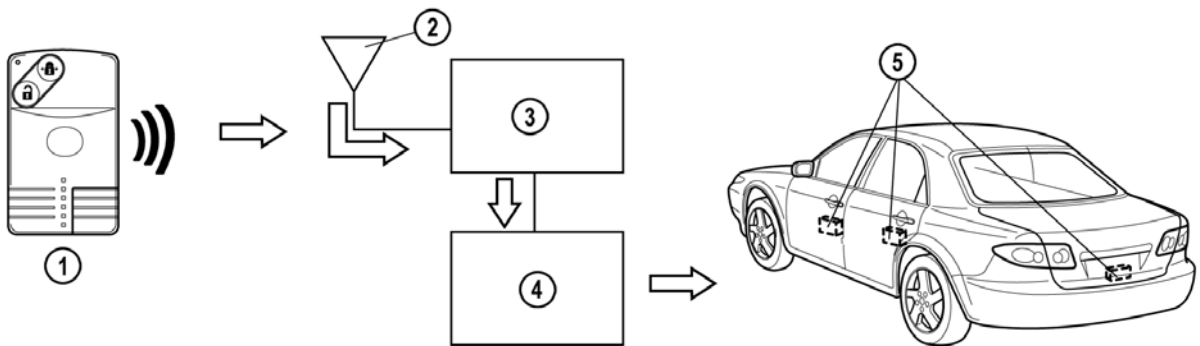


M6FL_09013

- | | | | |
|---|--|---|----------------|
| 1 | Driver's door lock knob | 4 | BCM |
| 2 | Driver's door key cylinder | 5 | Lock actuators |
| 3 | Door lock-link switch (in driver's door lock actuator) | | |

Vehicle Entry Using the Transmitter

- When either of the buttons on the transmitter are pushed, the transmitter **ID** (**I**dentification) and a rolling code are transmitted as radio waves. The signal is detected by the keyless receiver and communicated to the Keyless Control Module. The Keyless Control Module verifies that the ID of the key is valid, and sends a signal to the BCM to operate the door lock actuators.
- If any of the conditions below are met while the lock button is being pressed, the doors will not be locked:
 - The auxiliary key is in the ignition.
 - The start knob is in any position other than LOCK.
 - The start knob is being pressed.
 - Any of the doors are open.
- The keyless control module then sends a signal to the keyless buzzer, and to the BCM to operate the hazard lights (answer back function).
- If any of the conditions below are met while the unlock button is being pressed, the doors will not be unlocked:
 - The auxiliary key is in the ignition.
 - The start knob is in any position other than LOCK.
 - The start knob is being pressed.



M6FL_09014

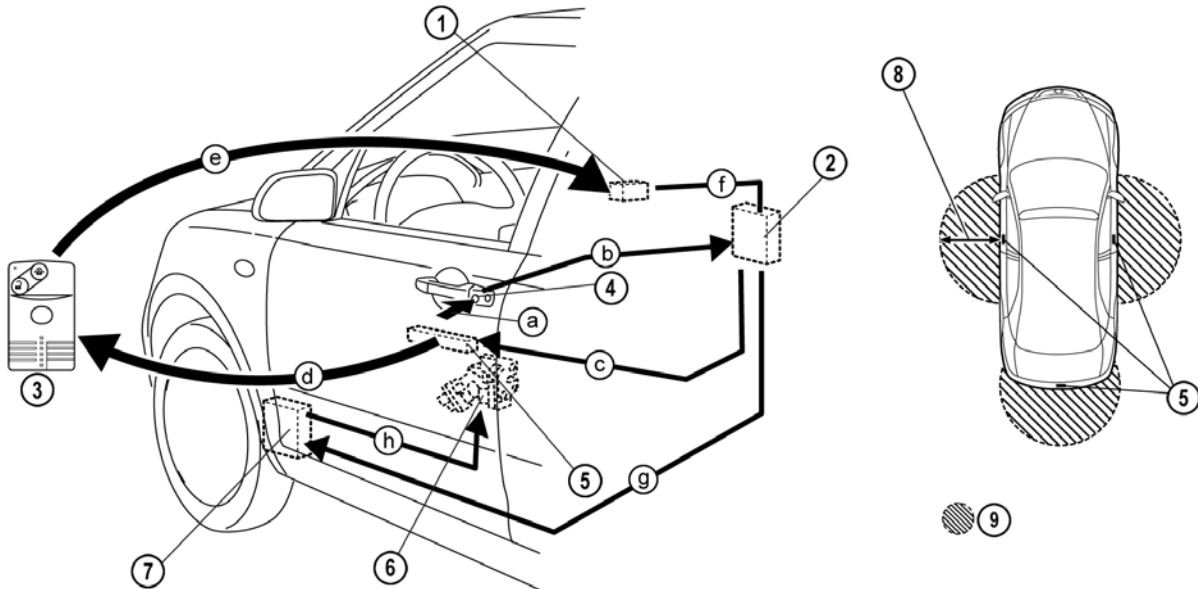
- 1 Transmitter (card key)
- 2 Keyless receiver
- 3 Keyless control module

- 4 BCM
- 5 Lock actuator

Vehicle Entry Using the Request Switches

- Whenever one of the request switches is pressed, the keyless control module transmits an ID request signal via the keyless antennas to the card key. If the driver's door request switch is operated, for example, the ID request signal will only be transmitted to the area outside the driver's door. The same occurs respectively for the other request switches.
- When the card key receives the ID request signal, the indicator light on it flashes once, and it transmits its ID to the keyless receiver, which passes the information on to the keyless control module.
- The keyless control module verifies that the ID of the card key is valid, and sends a signal to the BCM to operate the door lock actuators.
- The keyless control module then sends a signal to the keyless buzzer, and to the BCM to operate the hazard lights (answer back function).
- When a request switch is pushed, the doors will only lock if the following conditions are all met:
 - The card key is not inside the vehicle.
 - All doors and lift gate are closed.
 - Auxiliary key is not in the ignition.
 - Start knob is in the LOCK position, and also not being pressed.
 - The card key is within the reception range of the antennas (card key is outside the vehicle).
- Double locking can be activated using the request buttons two consecutive times on the driver or passenger door.

- When a request switch is pushed, the doors will only unlock if the following conditions are all met:
 - Auxiliary key is not in the ignition.
 - Start knob is in the LOCK position, and also not being pressed.
 - The card key is within the reception range of the antennas (card key is outside the vehicle).



M6FL_09015

- | | | | |
|---|------------------------|---|--------------------------------|
| 1 | Keyless receiver | 6 | Lock actuator |
| 2 | Keyless control module | 7 | BCM |
| 3 | Transmitter (card key) | 8 | Reception range (exterior) |
| 4 | Request switch | 9 | Radius: approx. 80 cm {2.6 ft} |
| 5 | Keyless antennas | | |

Operation in detail:

- a) The request button is pressed.
- b) The request signal is sent by wire to the keyless control module.
- c) The keyless control module sends a signal through the antenna.
- d) The antenna sends a signal to the card key.
- e) The card key sends its ID to the keyless receiver.
- f) The keyless receiver forwards the ID to the keyless control module. The keyless control module checks the ID.
- g) If the ID is valid, the keyless control module sends a signal to the BCM.
- h) The BCM operates the door lock actuators to unlock the doors.

Auto Re-lock Function

- The doors will automatically re-lock 30 seconds after being unlocked unless any of the following conditions are met:
 - Any of the doors or liftgate are opened.
 - The auxiliary key is inserted in the ignition.
 - The start knob is pressed.
 - Any of the buttons of the transmitter are operated (the auto re-lock timer will be reset to '0' if the UNLOCK button is pressed).
 - Any of the request switches are pushed.

Out of Range Auto Lock Function

- If the card key moves out of the reception range of the antennas while all the doors are closed, the doors will automatically be locked (this function is set to OFF for new vehicles).
- The keyless buzzer sounds one time and the system enters 'standby mode' (but locks are not operated) when the following conditions are met:
 - All doors and liftgate are closed (door switch OFF) after one or more having been opened (door switch ON).
 - The card key is not inside the vehicle.
 - The card key is within the reception range of the antennas (card key is outside the vehicle).
 - Auxiliary key is not in the ignition.
 - Start knob is in the LOCK position, and also not being pressed.
- Approximately two seconds after the keyless antenna determines that no card keys are within range; the doors are locked.
- The hazard lights flash once to indicate the doors are locked.

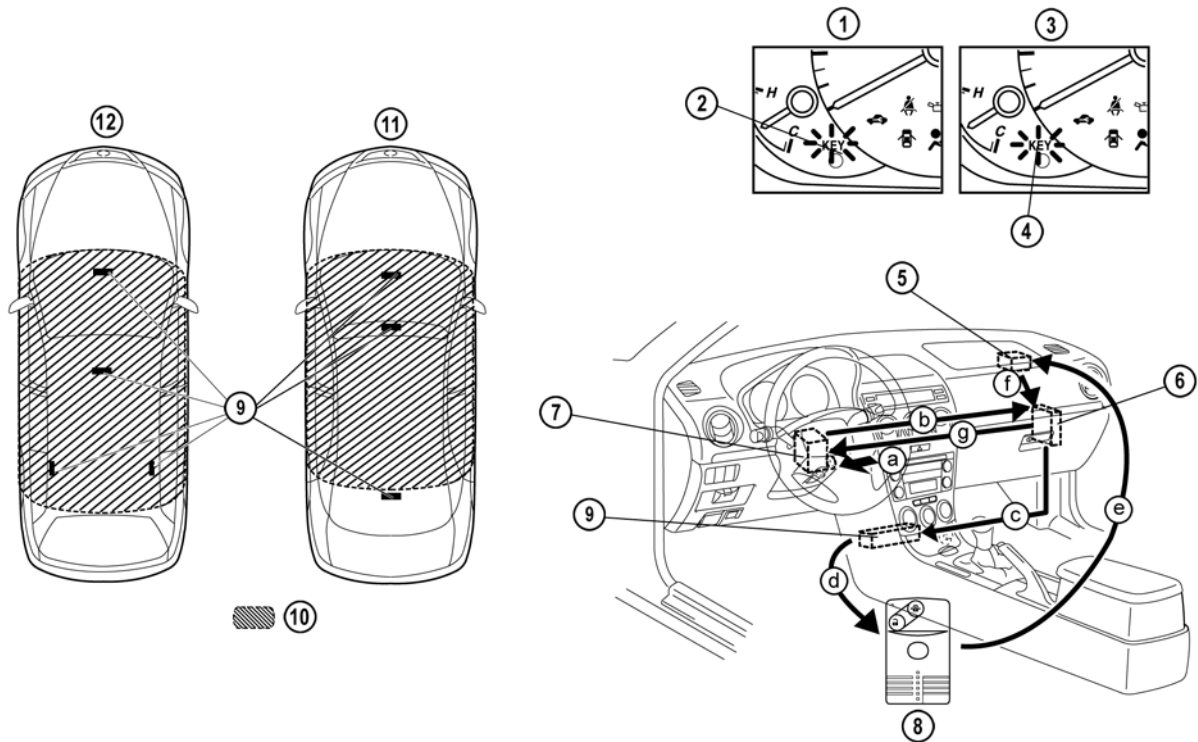
Advanced Keyless Engine Start Function

- If a card key is with the driver when they enter the car, the engine can be started merely by operating the start knob; without inserting a key in the ignition.
- When the start knob is pressed the keyless control module transmits an ID request signal inside the vehicle, via the keyless antennas.
- When the card key receives the ID request signal, the indicator light on it flashes once, and it transmits its ID to the keyless receiver, which passes the information on to the keyless control module.
- The keyless control module verifies that the ID of the card key is valid, and unlocks the start knob lock. At the same time, it illuminates the keyless indicator light (green) in the instrument cluster.

NOTE: If the ID of the card cannot be identified (unregistered card key or flat card key battery) the start knob lock will not be unlocked and the keyless indicator light will blink red.

- The card key ID is verified a second time when the ignition is turned to the ON position (indicator light on card key flashes once), and a permission signal is sent to the PCM to allow the engine to be started (immobilizer function).

Advanced Keyless Engine Start Structural View



M6FL_09016

- | | |
|---|-------------------------------|
| 1 ID verification Not OK | 7 Steering lock unit |
| 2 Keyless warning light (red) (flash) | 8 Transmitter (card key) |
| 3 ID verification OK | 9 Keyless antenna |
| 4 Keyless indicator light (green) (illuminated) | 10 Reception range (interior) |
| 5 Keyless receiver | 11 4SD |
| 6 Keyless control module | 12 5HB, WGN |

Operation in detail:

- a) The start knob is pressed.
- b) The request signal is sent by wire to the keyless control module.
- c) The keyless control module sends a signal through the antenna.
- d) The antenna sends a signal to the card key.
- e) The card key sends its ID to the keyless receiver.
- f) The keyless receiver forwards the ID to the keyless control module. The keyless control module checks the ID.
- g) If the ID is valid, the keyless control module sends a signal to the steering lock unit to unlock the steering lock.

Customization

- The following functions can be switched ON or OFF using WDS:
 - Out of range auto-lock function (set to OFF from factory).
 - Lock/unlock answer back function (set to OFF from factory).
 - Low card key battery warning (set to ON from factory).

Card Key

- A thin, card type transmitter has been adopted.
- The card key incorporates buttons to lock and unlock the doors and to disable the intrusion sensor (when burglar alarm is fitted), a button type battery (CR2025), an auxiliary key, and an indicator light.
- When the LOCK or UNLOCK buttons are operated or a request signal is received from the vehicle, the indicator light illuminates.
- If the advanced keyless entry system is malfunctioning, the driver's door can be opened and the engine started using the auxiliary key.
- A transponder is built into the auxiliary key for vehicles with immobilizer system.
- Expected battery life for the card key is approximately one year.

Guidance Function

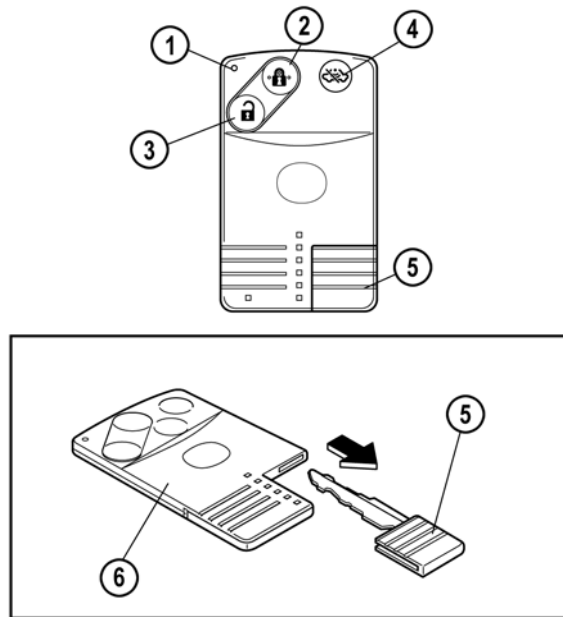
- The user is informed of faults or misuse of the system via the warning light and buzzer in the instrument cluster, or the buzzer in the driver's door.

Item	Operation condition	Keyless buzzer (outside the vehicle)	Instrument cluster			
			Buzzer (Interior)	Keyless warning light (red)	Keyless indicator light (green)	
Warning	Start knob not in LOCK warning	Driver's door is open with start knob in ACC position	-	Sounds 6 times	-	-
	Card key out of vehicle warning ^{*1}	Card key cannot be detected inside vehicle with driver's door open and start knob not in LOCK position	-	Sounds 3 times ^{*2}	Flashes ^{*4}	-
		Card key cannot be detected inside vehicle with all doors closed and start knob not in LOCK position	Sounds 3 times	-	Flashes ^{*4}	-
		Card key cannot be detected inside vehicle with start knob not in LOCK position and under any condition other than above	-	-	Flashes ^{*4}	-
	Door lock inoperable warning	Request switch is pressed from outside vehicle with proper card key inside vehicle and another card key carried	Sounds 3 times	-	-	-
		Request switch is pressed with card key is carried and a door open or start knob not in LOCK position	Sounds 3 times	-	-	-
	Battery voltage low indication	Card key battery voltage depleted	-	-	-	Flashes (Approx. 30s after IG OFF)
Guidance	Start knob operable guidance	Start knob is operable (lock released) when it is pressed	-	-	-	On (Max. 3 s)
	Start knob inoperable guidance	Start knob is inoperable (locked) when it is pressed	-	-	Flashes	-
	Lock/unlock answer back	Doors are locked/unlocked with normal/advanced keyless entry function	Locked: Once Unlocked: Twice	-	-	-

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- *1: If the start knob is turned to the LOCK position with the card key out of the vehicle, the start knob is inoperable (the engine cannot be restarted). For vehicles with immobilizer system, the engine cannot be restarted by turning the start knob from the ACC position to the START position even though the start knob has not been turned to the LOCK position.
- *2: When the ignition switch is OFF (except for LOCK position), "Start knob not in LOCK warning" (buzzer sound) overrides.
- *3: Initial setting is OFF.
- *4: Stops flashing and goes out if the card key is detected inside the vehicle.

Card Key Structural View



M6FL_09017

- 1 Indicator light
- 2 Lock button
- 3 Unlock button

- 4 Intruder sensor cut-off button (with theft-deterrent system)
- 5 Auxilliary key
- 6 Transmitter

Programming New Card Keys

NOTE: Do not program card keys while WDS or any other computer devices are in the vehicle. Make sure all card keys are operational and have good batteries.

NOTE: Auxiliary keys have to be programmed separately as ignition keys.

With Two or More Card Keys

- If two or more registered card keys are available, additional keys can be programmed without the use of WDS. A maximum of six card keys can be programmed.
- 1. Bring the two registered card keys (key 1 and key 2), and the card keys to be programmed into the vehicle and close all doors.
- 2. Insert auxiliary key in ignition lock.

NOTE: The procedure below must be completed up to step six within 30 seconds of inserting the auxiliary key in the ignition lock.

3. Turn the ignition ON.
4. Push the UNLOCK button on card key 1 once.
5. Push the UNLOCK button on card key 2 once.
6. Turn ignition switch to ACC then back to ON three times.
7. Open and close the driver's door three times. The door lock actuators will lock once, then unlock to confirm that key programming mode is active.
8. Push the UNLOCK button on the card key to be programmed twice. The door lock actuators will lock once, then unlock to confirm that programming was successful.
9. To program additional card keys, remove the auxiliary key from the ignition lock and repeat the above process again from the start.

With WDS

1. Establish communication between WDS and the vehicle.
2. Select the option **Toolbox→Body→Security→PATS Functions**.
3. Carry out the security access procedure (read out the WDS outcode, and input the corresponding incode).
4. Select the option Card Key Programming. The door lock actuators will lock once, then unlock to confirm that key programming mode is active.
5. Push the UNLOCK button on the card key to be programmed twice. The door lock actuators will lock once, then unlock to confirm that programming was successful.
6. To program additional card keys, remove the auxiliary key from the ignition and repeat the above process again from step 4.

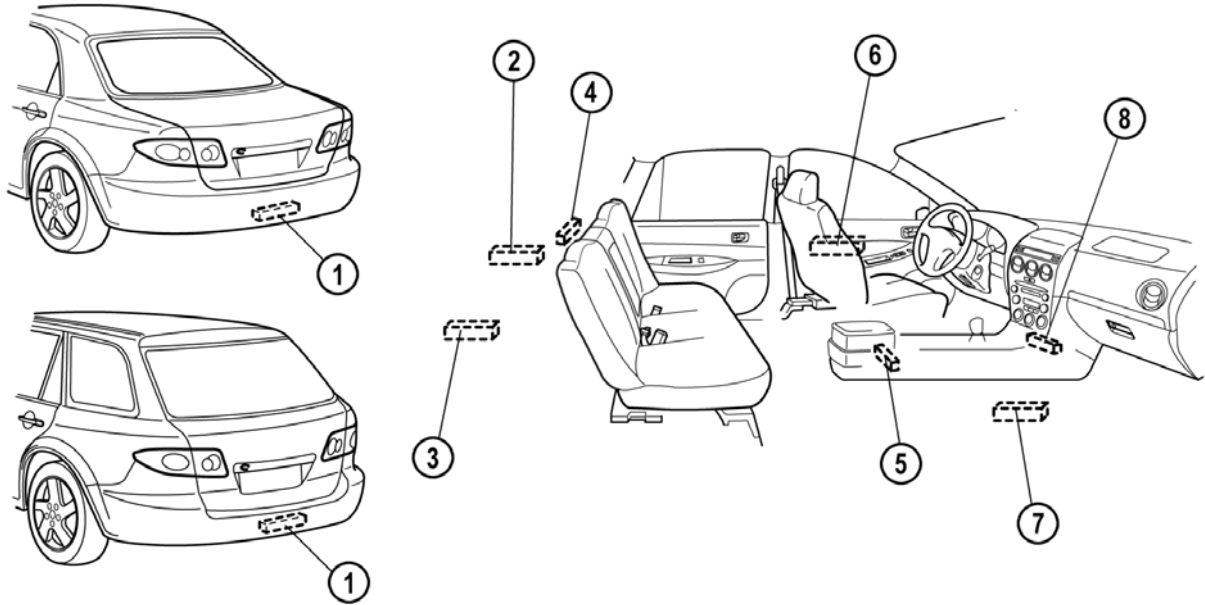
Erasing Registered Card Keys

1. Establish communication between WDS and the vehicle.
2. Select the option **Toolbox→Body→Security→PATS Functions**.
3. Carry out the security access procedure (read out the WDS outcode, and input the corresponding incode).
4. Select the option Card Key Clearing.
5. Complete procedure by programming at least two new card keys.

Keyless Antennas

- A total of six to seven (depending on the body style) antennas send request signals to card keys, and relay card key ID's to the keyless control module.
- The keyless antennas built into the front doors can output signals to both inside or outside the vehicle, and change the level of radio waves (output to inside or outside the vehicle) depending on whether a card key is detected inside or outside the vehicle.
- The signal received by the antenna with the strongest signal is used by the keyless control module to identify the card key.

Keyless Antennas Structural View

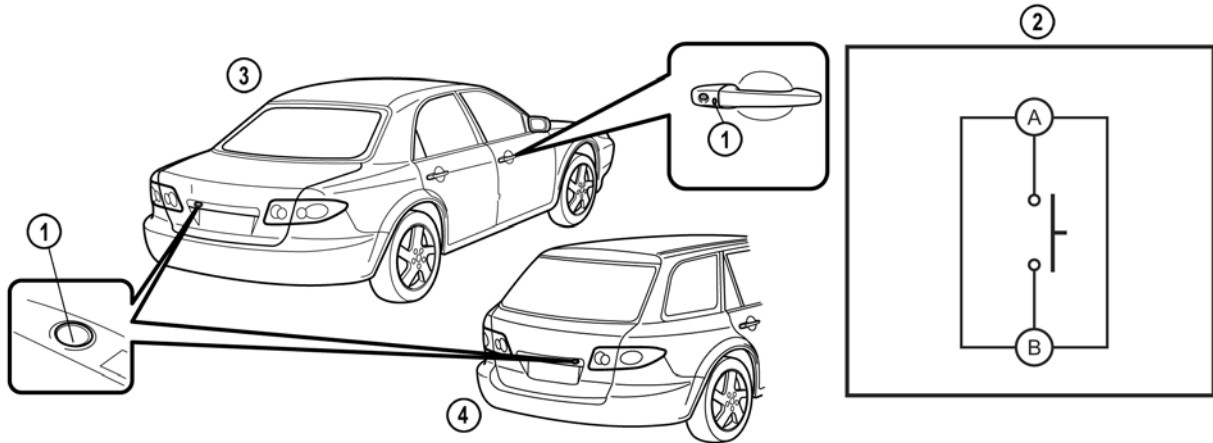


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- | | | | |
|---|---|---|--|
| 1 | Keyless antenna (exterior, rear) | 5 | Keyless antenna (interior, middle) |
| 2 | Keyless antenna (interior, RR) (5HB, WGN) | 6 | Keyless antenna (exterior, driver side) |
| 3 | Keyless antenna (interior, LR) (5HB, WGN) | 7 | Keyless antenna (exterior, passenger side) |
| 4 | Keyless antenna (interior, rear) (4SD) | 8 | Keyless antenna (interior, front) |

Request Switches

- Request switches are installed to driver's door, passenger's door, and liftgate respectively. When the request switch is pressed, the keyless control module sends a request signal to the card key. The request switch on the driver's door can also be used to open and close the windows (see section 9, "Power Window System")

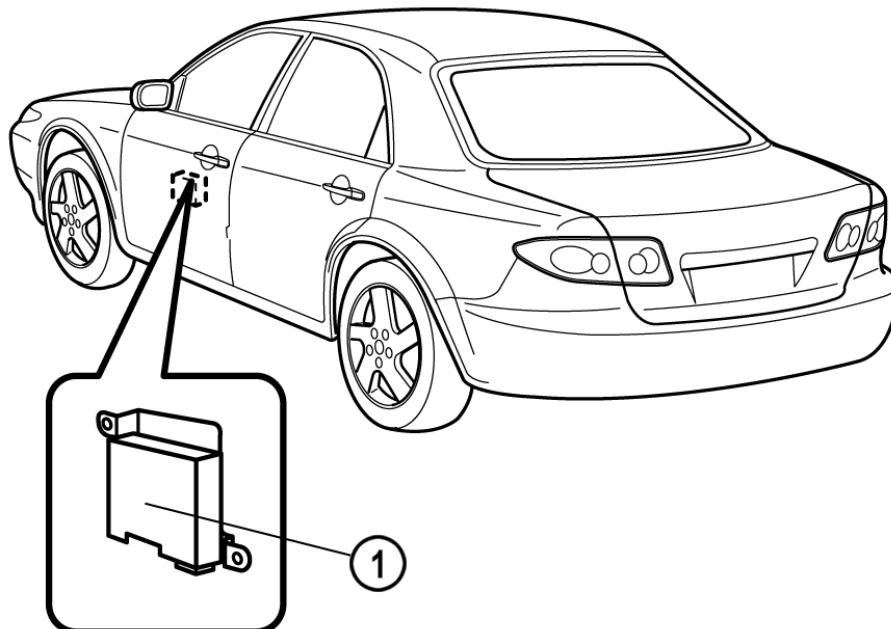


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- | | |
|----------------------------|------------|
| 1 Request switch | 3 4SD |
| 2 Internal circuit diagram | 4 5HB, WGN |

Keyless Buzzer

- The keyless buzzer is installed inside the driver's door. To access it, the door trim panel and speaker must be removed.



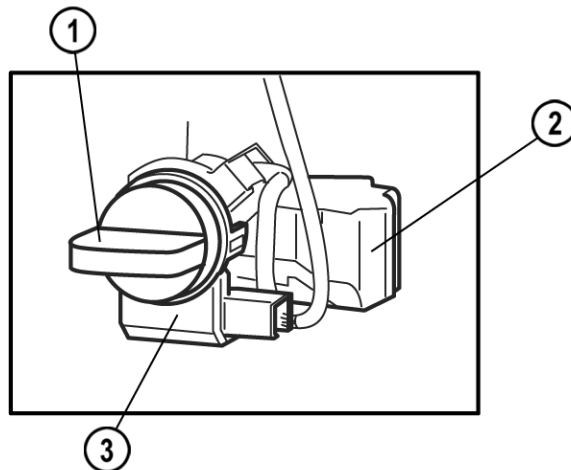
M6FL_09020

- | |
|------------------|
| 1 Keyless buzzer |
|------------------|

Steering Lock Unit

- The steering lock unit consists of the steering lock and the start knob, which is blocked in OFF position. When the start knob is pushed in a request signal is sent by the keyless antennas. If the keyless control module successfully identifies a valid card key, the keyless indicator light illuminates green, and the ignition can be switched on. If for some reason the card key cannot be identified, or is not functioning, the start knob can be removed and the auxiliary key inserted to start the engine.

Steering Lock Unit Structural View



M6FL_09021

- | | |
|----------------------|----------------|
| 1 Start knob | 3 Coil antenna |
| 2 Steering lock unit | |

Steering Lock Unit Programming

- If the steering lock unit is replaced, the new unit must be programmed using WDS.

NOTE: Do not program the steering lock while WDS or any other computer devices are in the vehicle. Make sure all card keys are operational and have good batteries.

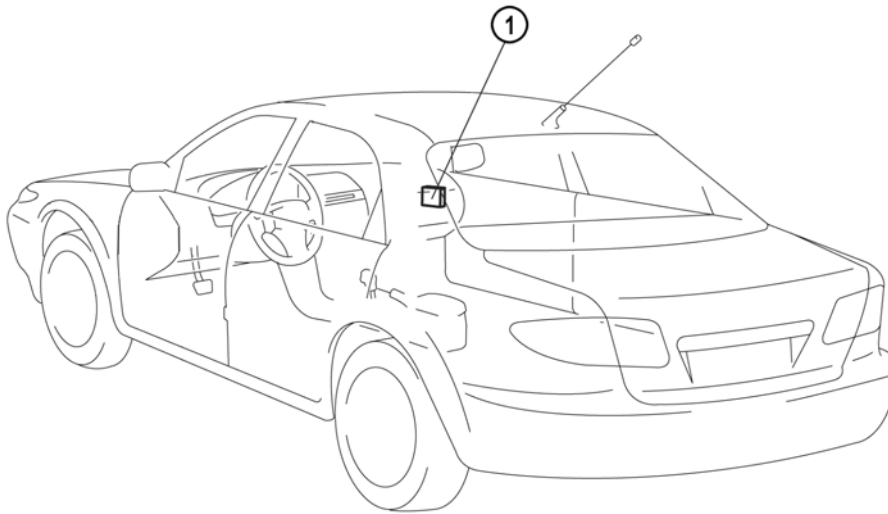
NOTE: To program the steering lock unit a registered card key is necessary. If there is no programmed card key, perform the steering lock unit programming after the card key programming.

1. Enter the vehicle with a registered card key.
2. Establish communication between WDS and the vehicle.
3. Select the option **Toolbox→Body→Security→PATS Functions**.
4. Carry out the security access procedure (read out the WDS outcode, and input the corresponding incode).
5. Select the option Steering Lock Unit Programming and follow instructions on WDS to complete programming.

Keyless Control Module

- The keyless control module is only fitted to vehicles with advanced keyless system.
- The keyless control module is located behind the right side kick panel.

NOTE: When replacing the keyless control module, the new module has to be configured. To do this connect WDS to the vehicle and select the option **Toolbox→Module Programming→Programmable Module Installation→RKE**. Follow instructions on WDS to complete programming.



M6FL_09022

- 1 Keyless control module (with advanced keyless system)

Advanced Keyless System Diagnosis

- The on-board diagnostic system consists of the following functions:
 - Self-test
 - PID monitor
 - Simulation test function

Self Test

- The self-test function allows the Advanced Keyless Entry system DTCs to be displayed. To view these, connect WDS to the vehicle and select the option **Toolbox→Self Test→Modules→RKE**.

PID Monitor

- The PID monitor function allows the PIDs for the Advanced Keyless Entry system to be monitored. To view these connect WDS to the vehicle and select the option **Toolbox→Datalogger→Modules→RKE.**

PID/Data Monitor Table

PID name (definition)	Data contents	Unit/ Operation	Terminal
DTC_CNT	Number of continuous DTCs	-	-
RPM	Engine speed	RPM	3Z, 3AA
VSS	Vehicle speed	KPH	3Z, 3AA
VPWR	Supply voltage	V	2D
NUMCARD	Number of programmed card keys	-	-
NUMKEY*	Number of programmed key ID numbers	-	-
DRSW_D	Door switch (Driver's door)	OPEN/ CLOSE	2R
DRSW_ALL	Door switch (All doors and liftgate)	OPEN/ CLOSE	2R
REQ_SW_D	Request switch (Driver's door)	On/Off	3H
REQ_SW_P	Request switch (Passenger door)	On/Off	3J
REQ_SW_BK	Request switch (Trunk lid/Liftgate)	On/Off	3L
LOCK_SW_D	Door lock-link switch	On/Off	3E
IMMOBI	Immobilizer system equipped or not	On*/Off	-
TR/LG_SW	Trunk/liftgate latch switch	OPEN/ CLOSE	2R
IG_KEY_IN	Key reminder switch	Key-In/ Key-Out	2O
IG_SW_ST	Ignition switch (Push switch)	Pushed/ Not Pushed	2N
BUZZER	Keyless buzzer	On/Off	3Y
PWR_IG1	Power supply (IG1)	On/Off	2B
PWR_ACC	Power supply (ACC)	On/Off	2I

* : Vehicles with immobilizer system

M6FL_09T003

Simulation Test

- The simulation test function allows certain PIDs for the Advanced Keyless Entry system to be activated. To do this, connect WDS to the vehicle and select the option **Toolbox→Datalogger→Modules→RKE**.

Active Command Mode Table

Command name	Output part name	Unit/ Operation	Terminal
BZR_OUT	Keyless buzzer	On/Off	3Y
BZR_INN	Interior buzzer (Instrument cluster)	On/Off	3Z, 3AA
LNP_RED	Keyless warning light (red)	On/Off	3Z, 3AA
LNP_GREEN	Keyless indicator light (green)	On/Off	3Z, 3AA
HAZARD	Hazard flashers	On/Off	2R
DR_LOCK	All doors Lock/Off	Lock/Off	2R
DR_UNLOCK	All doors Unlock/Off	Unlock/Off	2R
SUPERLOCK	All doors Lock/Off	Lock/Off	2R

M6FL_09T004

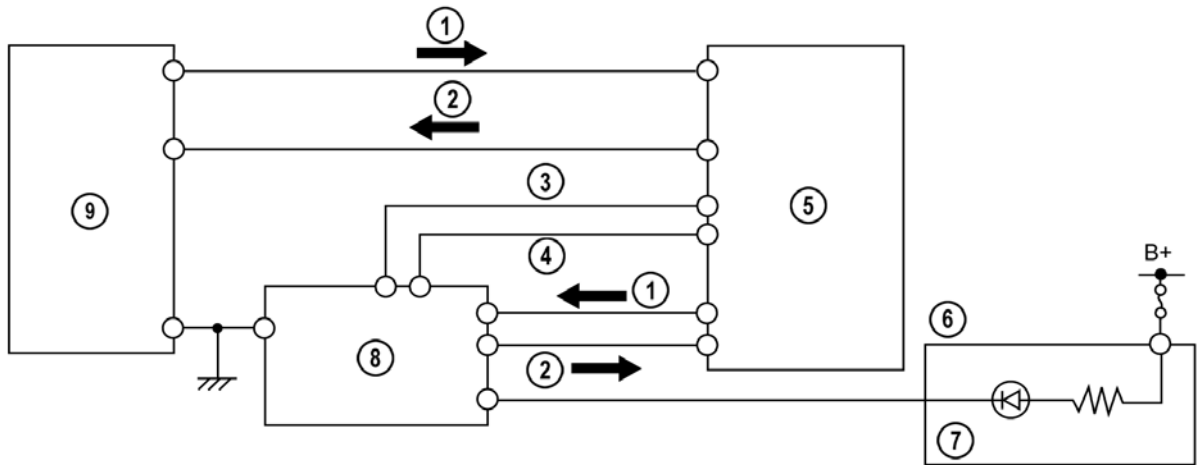
Immobilizer System on Vehicles with Advanced Keyless System

- The immobilizer system is a vehicle theft prevention device that only allows keys that have previously been programmed to the vehicle to start the engine. It functions to prevent theft by means such as a forged key or hotwiring.
- It consists of the key (with built-in transponder), coil antenna, PCM, and keyless control module.
- The immobilizer system activates automatically when the start knob is turned to the LOCK or ACC position. (The security light in the instrument cluster flashes while the immobilizer system is activated.)
- When the start knob is pressed (push switch ON) and turned to the ON position with a previously programmed auxiliary key, the immobilizer system deactivation operation begins automatically. The engine is allowed to start only after the deactivation operation is completed successfully. (The security light illuminates for 3 s and then goes out when the immobilizer system has been deactivated.)
- The immobilizer system cannot be disabled.
- Due to immobilizer system characteristics, the engine cannot be started unless two or more keys are programmed. Therefore, when resetting the immobilizer system (PCM replacement, keyless control module replacement, or replacement of all programmed keys), two or more keys usable with the immobilizer system must be readied before starting the operation.
- A **maximum of eight keys** can be programmed to one vehicle. The PID/data monitor function can be used to verify the number of keys programmed to the vehicle.
- A **maximum of six card keys** can be programmed to one vehicle. The PID/data monitor function can be used to verify the number of keys programmed to the vehicle.
- If there is a system malfunction or the immobilizer system is not properly deactivated due to deactivation operation failure, the malfunction location can be verified by the flashing pattern of the security light in the instrument cluster, or using the malfunction diagnosis function of the on-board diagnostic system.

CAUTION: If any of the following items are touching or near the key head, signal communication between the key and vehicle is negatively affected, resulting in the engine not starting or a key programming error. Do not perform procedures if any of the following items are touching or near the key head.

- Any metallic object
- Spare keys or keys for other vehicles equipped with an immobilizer system
- Any electronic device, or any credit or other cards with magnetic strips

Immobilizer System Wiring Diagram



M6FL_09023

- 1 Tx
- 2 Rx
- 3 CAN-High
- 4 CAN-Low
- 5 Keyless control module
- 6 Instrument cluster
- 7 Security light
- 8 PCM
- 9 Coil antenna

- When immobilizer system component parts (key, PCM, steering lock unit and keyless control module) are replaced, the system must be reset as described below. Refer to the Workshop Manual for the detailed reset procedure.

Component part	Setting
Key addition	Key ID number of added key must be programmed. Key ID number programming can be performed according to the following methods: <ul style="list-style-type: none"> Method for programming additional keys using two keys that can start the engine Method using the WDS or equivalent
Key clearing	The programmed key ID number can only be cleared using the WDS or equivalent. When clearing key ID numbers using the WDS or equivalent, all the programmed key ID numbers are cleared.
PCM replacement	<ul style="list-style-type: none"> The key ID numbers for all keys that were being used must be programmed using the WDS or equivalent. Two or more keys must be programmed.
Keyless control module replacement	<ul style="list-style-type: none"> Card key and steering lock unit must be programmed. The key ID numbers for all keys that were being used must be programmed using the WDS or equivalent. Two or more keys must be programmed.
Steering lock unit replacement (including key replacement)	<ul style="list-style-type: none"> Steering lock unit must be programmed. The key ID number must be programmed using the WDS or equivalent. Two or more keys must be programmed.
Coil antenna replacement	Immobilizer system resetting is not necessary.

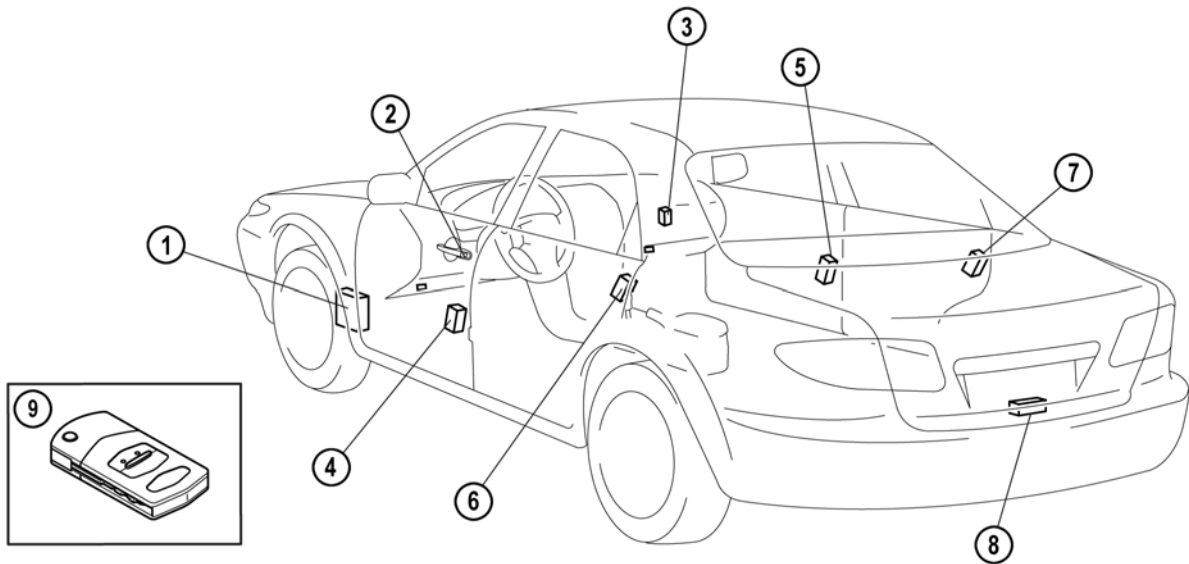
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Notes:

Vehicles without Advanced Keyless Entry System

- A keyless entry system similar to that on the Mazda5 is installed.
- A switchblade type retractable key has been adopted.

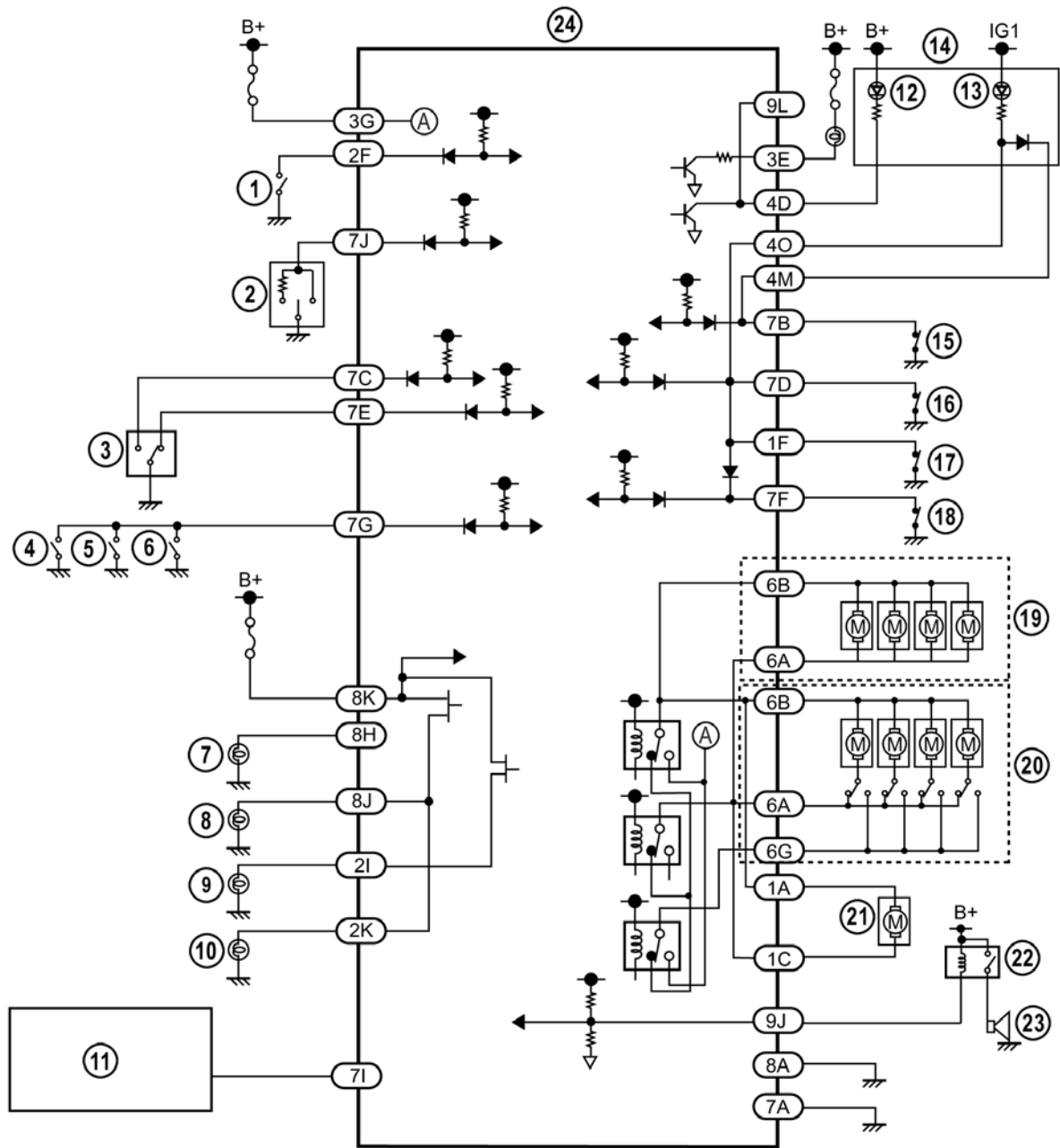
Keyless Entry System Structural View



M6FL_09024

- | | | | |
|---|--|---|---|
| 1 | BCM | 6 | Door lock actuator (rear left) |
| 2 | Key cylinder | 7 | Door lock actuator (rear right) |
| 3 | Keyless receiver | 8 | Trunk lid opener (4SD)
Liftgate lock actuator (5HB, WGN) |
| 4 | Door lock actuator (driver's side: door lock-link switch, key cylinder switch) | 9 | Transmitter |
| 5 | Door lock actuator (passenger's side; key cylinder switch) | | |

Keyless Entry System Wiring Diagram

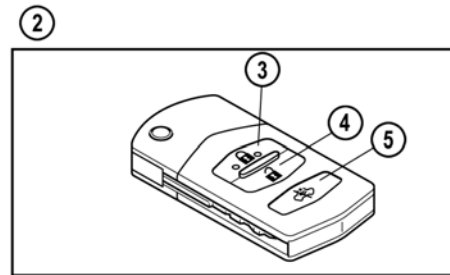
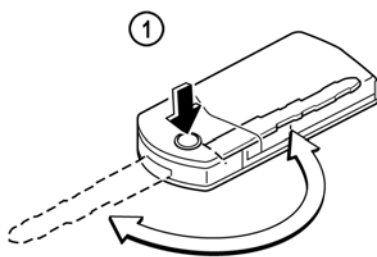


M6FL_09025

- | | | | |
|----|--|----|---|
| 1 | Trunk compartment light switch (4SD)
Liftgate latch switch (5HB, WGN) | 13 | Door ajar warning light |
| 2 | Door key cylinder switch (driver side) | 14 | Instrument cluster |
| 3 | Door lock-link switch (driver-side front door) | 15 | Door switch (driver-side front door) |
| 4 | Door lock-link switch (passenger-side front door) | 16 | Door switch (rear door RH) |
| 5 | Door lock-link switch (rear door RH) | 17 | Door switch (rear door LH) |
| 6 | Door lock-link switch (rear door LH) | 18 | Door switch (passenger-side front door) |
| 7 | Front turn light (RH) | 19 | Lock actuators (without double-locking) |
| 8 | Front turn light (LH) | 20 | Lock actuators (with double-locking) |
| 9 | Rear turn light (RH) | 21 | Trunk lid opener (4SD)
Liftgate lock actuator (5HB, WGN) |
| 10 | Rear turn light (LH) | 22 | Horn relay |
| 11 | Keyless receiver | 23 | Horn |
| 12 | Security light | 24 | BCM |

Transmitter

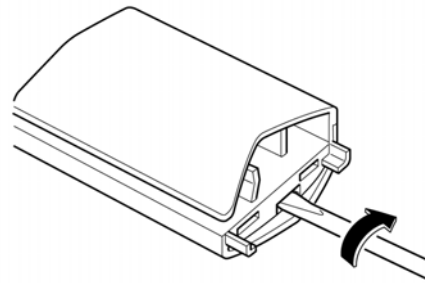
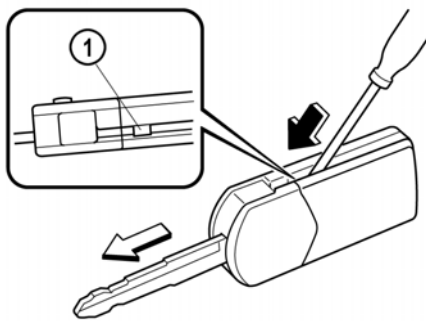
- The keyless transmitter incorporates buttons to lock and unlock the doors and to disable the intruder sensor (when burglar alarm is fitted), a button type battery (CR2025), and a retractable ignition key with integrated transponder.
- By pushing the release button on the transmitter the ignition key will automatically pop out. When the key is no longer needed, it can be folded back into the transmitter case.
- The key can be separated from the transmitter, and the transmitter case opened to allow battery replacement.



M5_09026

- 1 Retractable key
- 2 Keyless transmitter
- 3 Lock button

- 4 Unlock button
- 5 Intruder sensor cut-off button (with theft-deterrent system)



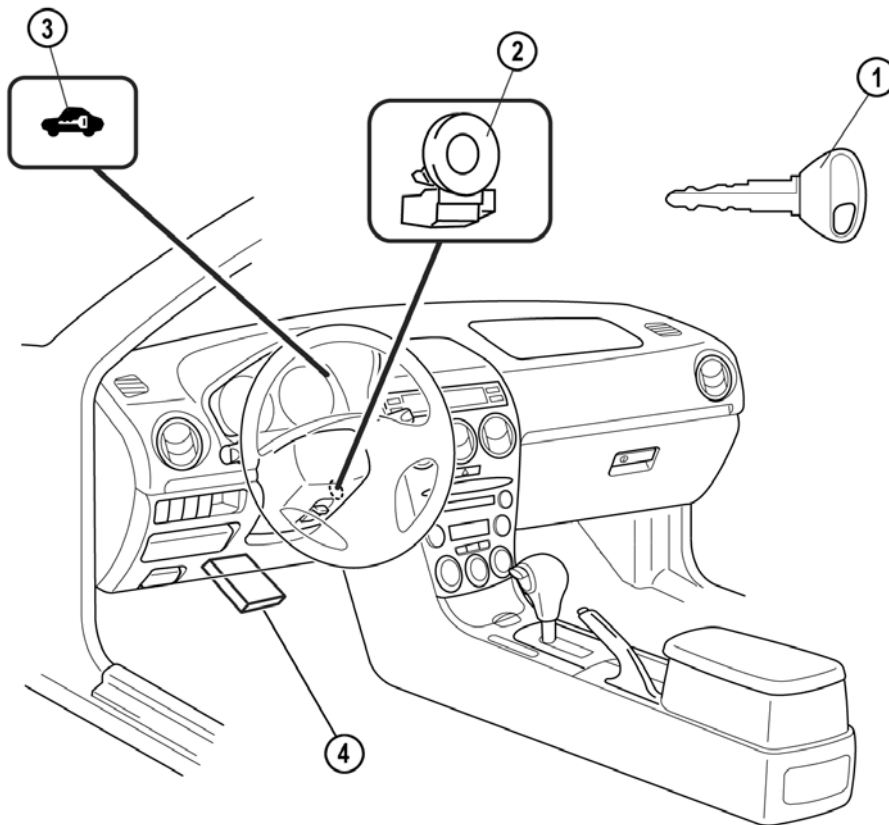
M5_09027

- 1 Tab

Immobilizer System on Vehicles without Advanced Keyless System

- A **PATS (Passive Anti-Theft System)**, which incorporates the former immobilizer unit function, has been adopted and is built into the PCM.
- The PATS prevents vehicle theft by only allowing keys that have been registered specifically for the vehicle to start the engine and prohibits the engine from being started using any other method (such as using an unregistered key or by shorting the starter relay circuit).
- The system is composed of the transponder equipped key, the coil antenna, and the PCM.
- If there is a malfunction in the system, the security light will display the DTC by flashing when the ignition switch is turned to the ON position. Also, the DTC can be displayed using the WDS.

Immobilizer System Structural View

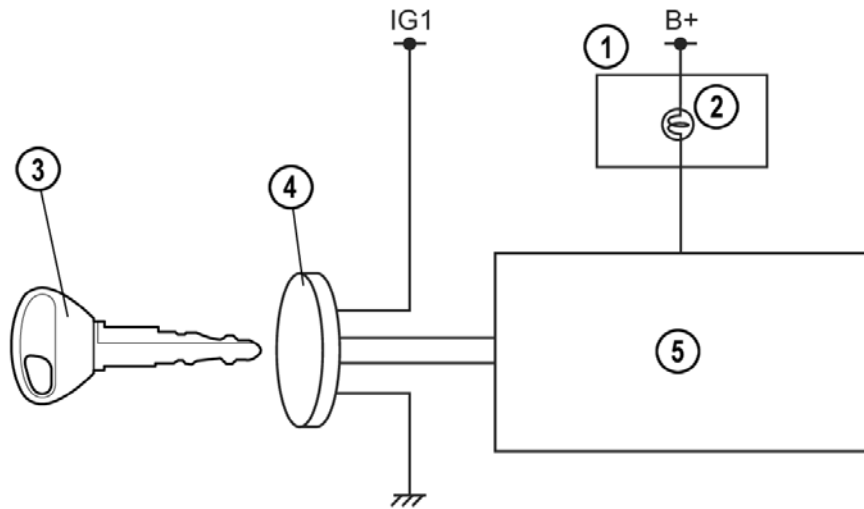


M6FL_09028

- 1 Key (transponder)
- 2 Coil antenna

- 3 Security light
- 4 PCM

Immobilizer System Wiring Diagram



M6FL_09029

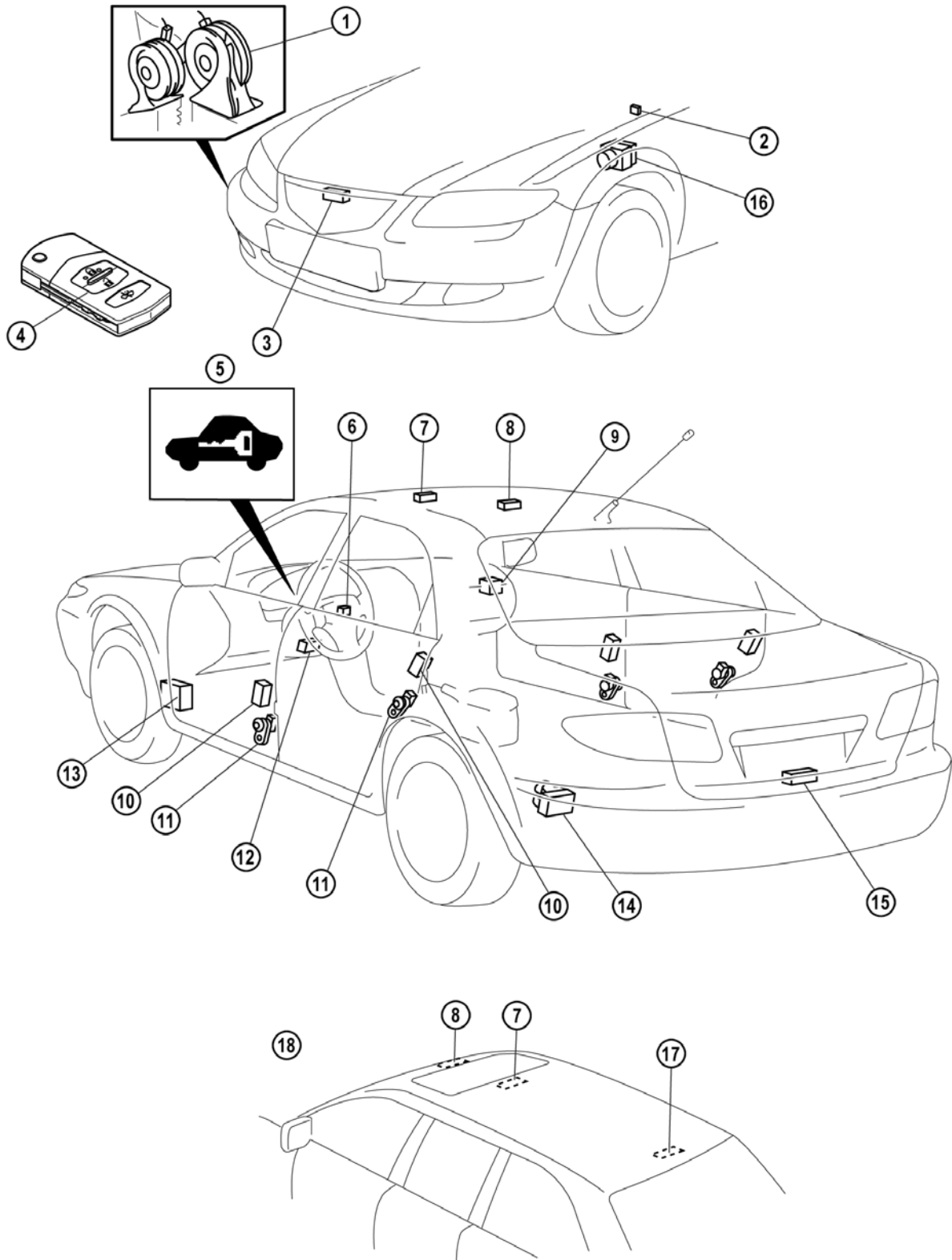
- 1 Instrument cluster
- 2 Security light
- 3 Key (transponder)

- 4 Coil antenna
- 5 PCM

Theft Deterrent System

- The theft deterrent system is standard equipment in Base and in Touring specification.
- The theft-deterrent system includes sound and light alarm. The system will be armed by locking the vehicle with the transmitter. The armed system alarms when the bonnet, the trunk lid (4SD) or liftgate (5HB, WGN), or a door is opened by means other than the transmitter. The turn lights flash and the horn and the theft-deterrent siren sound.
- When the transmitter unlock button is pressed, the alarm stops. Also a successful engine start stops the alarm.
- An intruder sensor has been installed in the forward part of the roof (4SD, 5HB: without sliding sunroof, WGN: with sliding sunroof) or in the center part of the roof (4SD, 5HB: with sliding sunroof, WGN: without sliding sunroof). The intruder sensor senses movement in the vehicle based on radio waves, and sends an alert signal to the theft-deterrent control module.
- A second intruder sensor has been installed in the rear part of the roof. (WGN)
- A theft-deterrent siren has been installed on the rear, left side of the trunk. The theft-deterrent siren includes an internal back-up power supply so that if power from the battery is cut by any means, the siren will still sound.

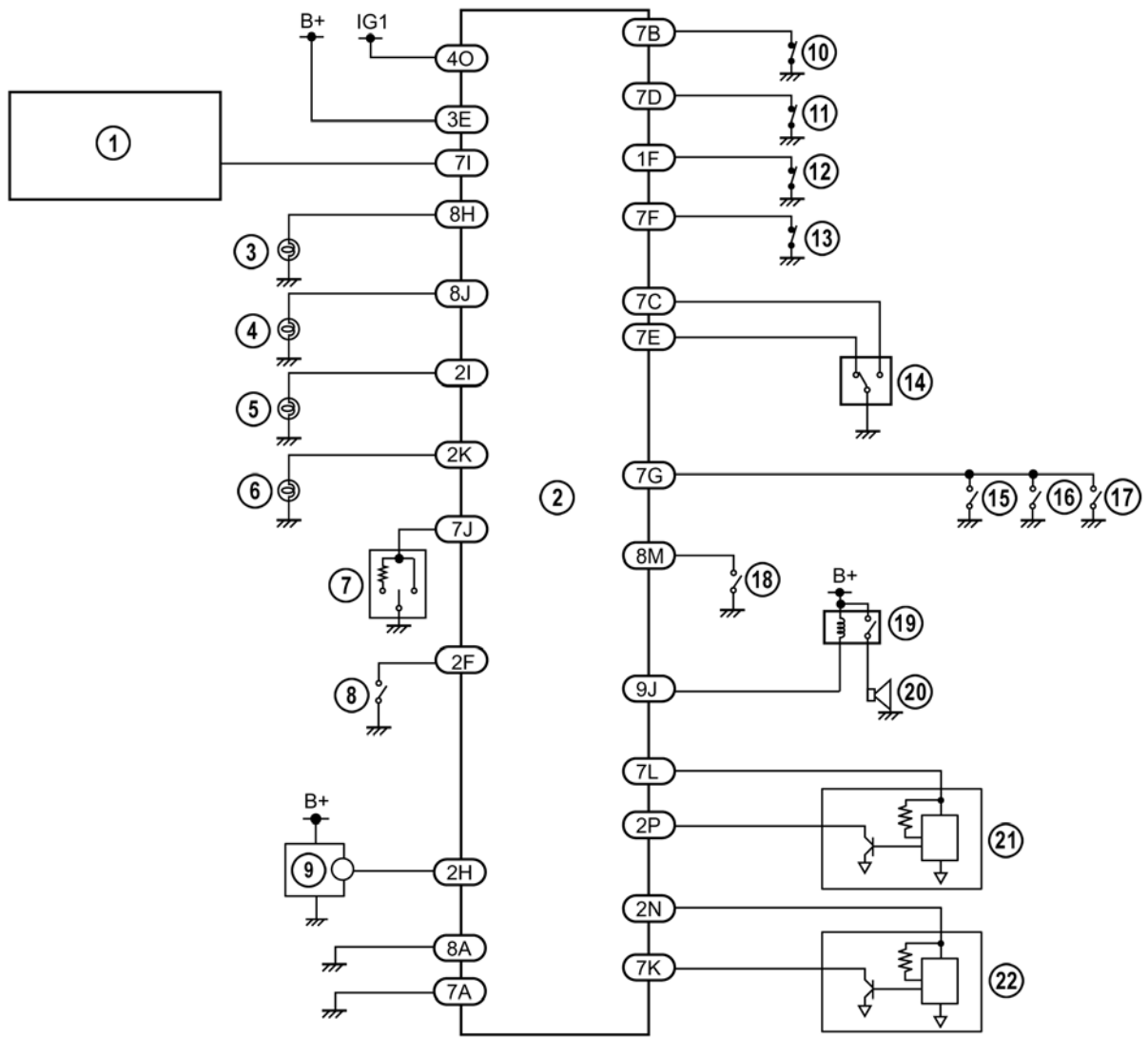
Theft Deterrent System Structural View



M6FL_09030

- | | | | |
|---|--|----|---|
| 1 | Horn | 10 | Front door latch and lock actuator (Driver's side) <ul style="list-style-type: none">•Front door latch switch•Door lock-link switch•Door key cylinder switch Front door latch and lock actuator (Passenger's side) <ul style="list-style-type: none">•Front door latch switch |
| 2 | Horn relay | 11 | Door switch |
| 3 | Bonnet switch | 12 | Coil antenna |
| 4 | Transmitter | 13 | BCM |
| 5 | Security light | 14 | Theft-deterrent siren |
| 6 | Key reminder switch | 15 | Trunk lid light switch (4SD)
Cargo compartment light switch (5HB, WGN) |
| 7 | Intruder sensor (Vehicles without sliding sunroof) | 16 | ABS or DSC CM |
| 8 | Intruder sensor (Vehicles with sliding sunroof) | 17 | Intruder sensor (WGN) |
| 9 | Keyless control module | 18 | WGN |

Theft Deterrent System Wiring Diagram

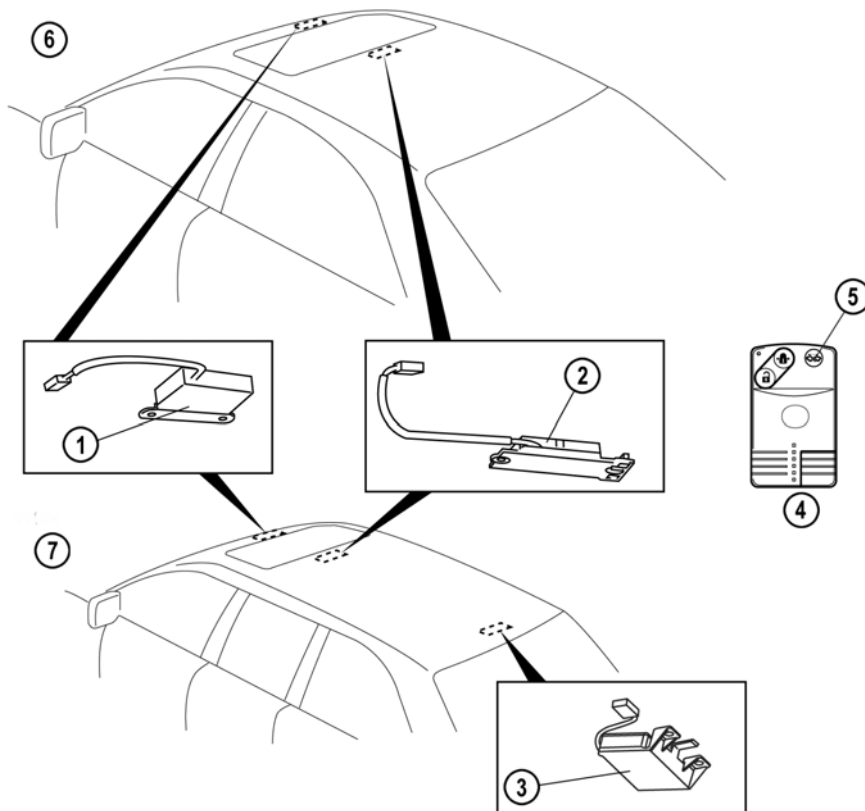


M6FL_09031

- | | | | |
|----|--|----|---|
| 1 | <ul style="list-style-type: none">Keyless control module with Advanced Keyless SystemKeyless receiver w/o Advanced Keyless System | 12 | Door switch (rear door LH) |
| 2 | BCM | 13 | Door switch (passenger-side front door) |
| 3 | Front turn light (RH) | 14 | Door lock-link switch (driver-side front door) |
| 4 | Front turn light (LH) | 15 | Door lock-link switch (passenger-side front door) |
| 5 | Rear turn light (RH) | 16 | Door lock-link switch (rear door RH) |
| 6 | Rear turn light (LH) | 17 | Door lock-link switch (rear door LH) |
| 7 | Door key cylinder switch (driver side) | 18 | Bonnet switch |
| 8 | Trunk compartment light switch (4SD)
Liftgate latch switch (5HB, WGN) | 19 | Horn relay |
| 9 | Theft deterrent siren | 20 | Horn |
| 10 | Door switch (driver-side front door) | 21 | Intruder sensor (front) |
| 11 | Door switch (rear door RH) | 22 | Intruder sensor (rear) (WGN only) |

Intruder Sensor

- The intruder sensor is located in the center part of the roof on sliding sunroof-equipped vehicles or in the forward part of the roof on sliding sunroof non-equipped vehicles.
- The intruder sensor detects movement in the vehicle by radio waves and sends the detection signal to the BCM.
- An intruder sensor cut-off switch has been installed on the keyless entry system transmitter as well as on the advanced keyless transmitter. If the intruder sensor cut-off switch is pressed while the theft-deterrent system is pre-armed, the intruder sensor is switched off.



M6FL_09032

- | | |
|---|----------------------------------|
| 1 Intruder sensor (without sliding sunroof) | 5 Intruder sensor cut-off switch |
| 2 Intruder sensor (with sliding sunroof) | 6 4SD, 5HB |
| 3 Rear intruder sensor (WGN) | 7 WGN |
| 4 Transmitter | |

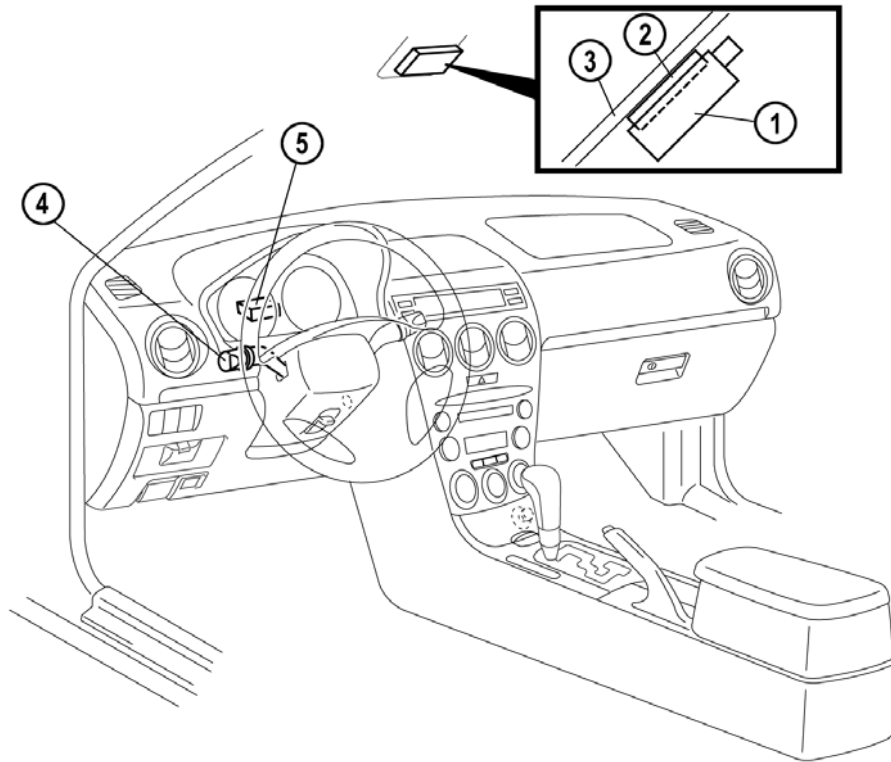
Lighting / Wiper System

- The lighting system of the Mazda6 Facelift is essentially the same like on the previous Mazda6. It has the following features:
 - Headlight with built-in front fog light, front turn and parking light has been adopted.
 - Discharge headlights, that illuminate a wide area, have been adopted for the headlights (low beam). (For vehicles equipped with discharge headlights.)
 - A headlight auto levelling system, which responds to the vehicle attitude and automatically adjusts the optical axis of the headlights, has been adopted. (For vehicles equipped with discharge headlights.)
 - An auto light / wiper control module that automatically illuminates and turns off the headlights and controls the front wipers has been adopted.
 - Stepped reflectors have been adopted to the rear combination lights.

Auto Light System

- An auto light system that automatically and optimally illuminates and turns off the headlights in any situation according to the level of light above and in front of the vehicle has been adopted.
- The auto light / wiper control module is connected via a single data wire to the DLC for rain sensor resetting, adjusting the sensitivity of the auto light sensor and for diagnostics.

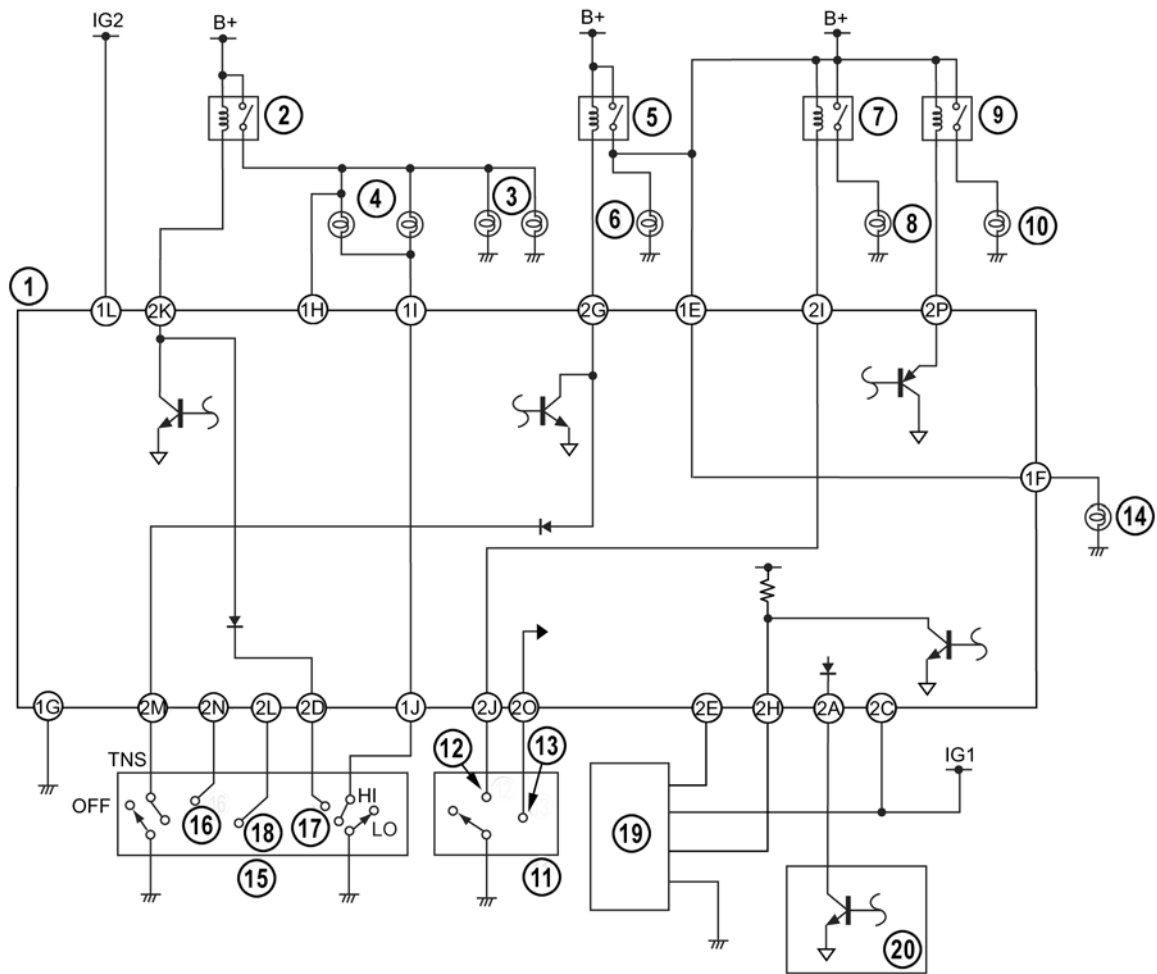
Auto Light System Structural View



M6FL_09033

- 1 Auto light sensor
- 2 Sensor diode
- 3 Windshield
- 4 Light switch
- 5 Auto light / wiper control module

Auto Light System Wiring Diagram

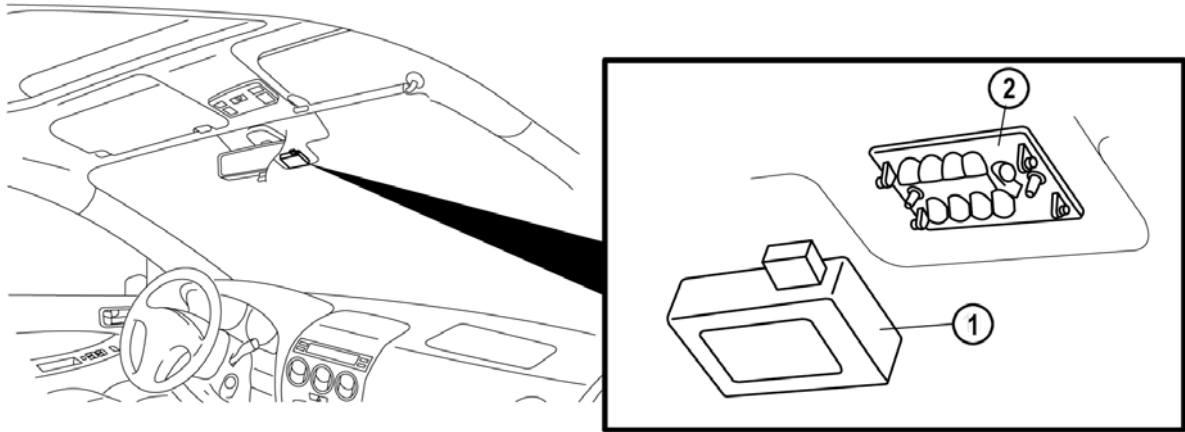


M6FL_09034

- | | |
|--|------------------------------------|
| 1 Auto light / wiper control module | 11 Front and rear fog light switch |
| 2 Headlight relay | 12 Front fog light switch |
| 3 Headlight (low-beam) | 13 Rear fog light switch |
| 4 Headlight (high-beam) | 14 Illumination light |
| 5 TNS (Tail N umber S ide lights) relay | 15 Headlight switch |
| 6 Parking light/taillight/license plate light | 16 Headlight |
| 7 Front fog light relay | 17 Flash-to-pass |
| 8 Front fog light | 18 Auto light switch |
| 9 Rear fog relay | 19 Auto light sensor |
| 10 Rear fog light | 20 ABS or DSC CM |

Auto Light Sensor

- Installed behind the rearview mirror (windshield center) and integrated with the rain sensor as a single unit.



M6FL_09035

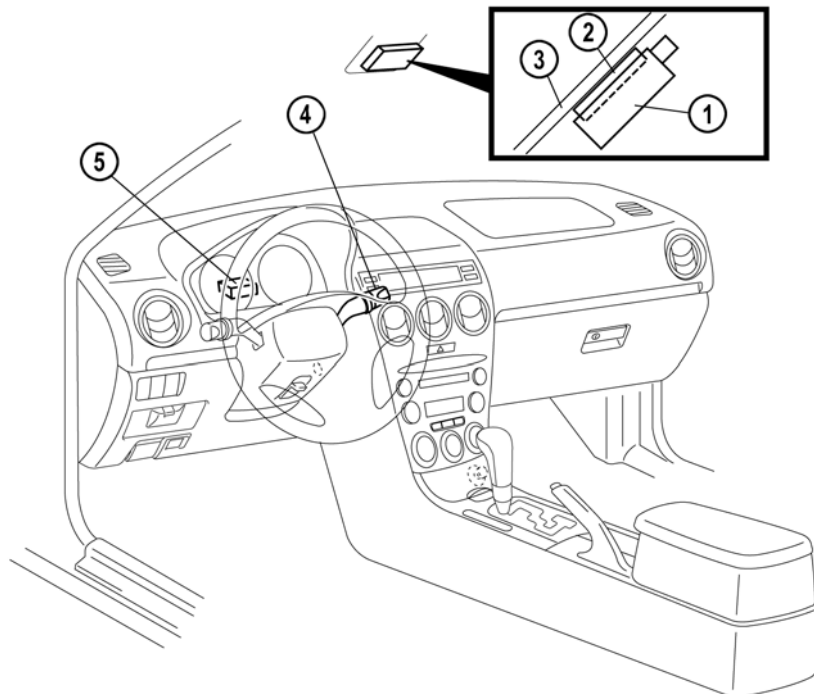
1 Auto-light sensor

2 Lens sensor

Wiper / Washer System

- The wiper / washer system is essentially carried over from the previous Mazda6.
- An auto wiper system that detects rainfall on the windshield and automatically controls all operation (stop, interval, low, and high) has been adopted, removing the burden of operating switches from the driver.
- The auto wiper system is essentially carried over from the Mazda3 except that there is now a separate control module, which controls the auto wiper operation as well as the auto light operation.
- The rain sensor can be adjusted using WDS. This can be necessary after replacing the windshield for example.

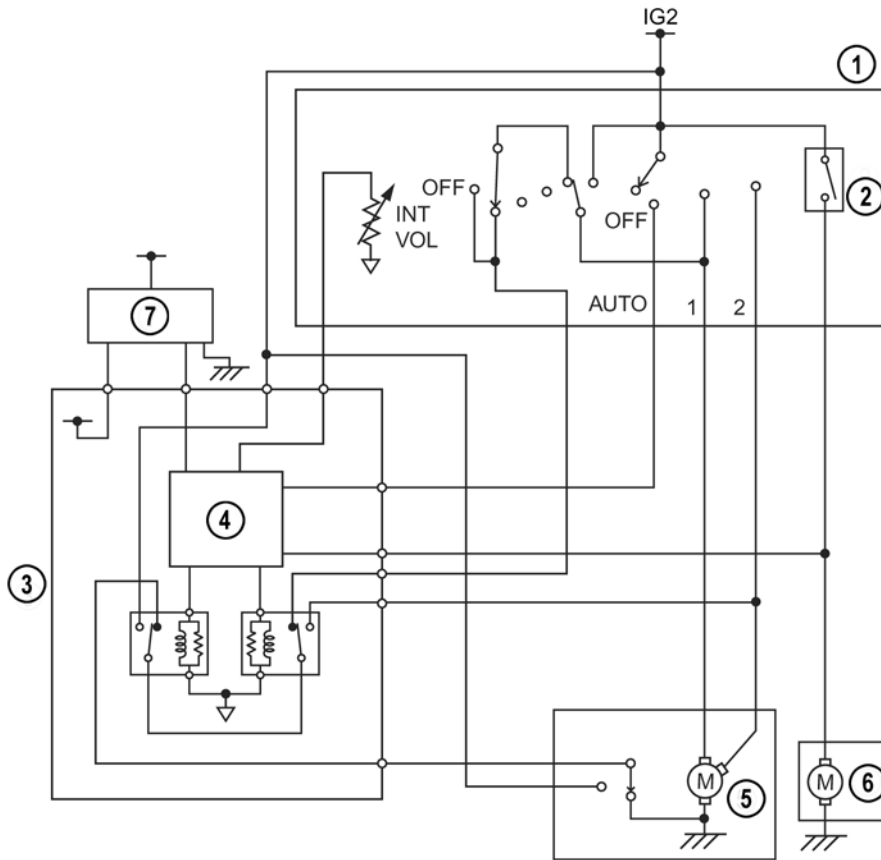
Auto Wiper System Structural View



M6FL_09036

- | | | | |
|---|--------------|---|-----------------------------------|
| 1 | Rain sensor | 4 | Wiper and washer switch |
| 2 | Sensor diode | 5 | Auto light / wiper control module |
| 3 | Windshield | | |

Auto Wiper System Wiring Diagram



M6FL_09037

- | | | | |
|---|------------------------------------|---|-------------------------|
| 1 | Windshield wiper and washer switch | 5 | Windshield wiper motor |
| 2 | Windshield washer switch | 6 | Windshield washer motor |
| 3 | Auto light / wiper control module | 7 | Rain sensor |
| 4 | Microcomputer | | |

Rainfall Detection Function

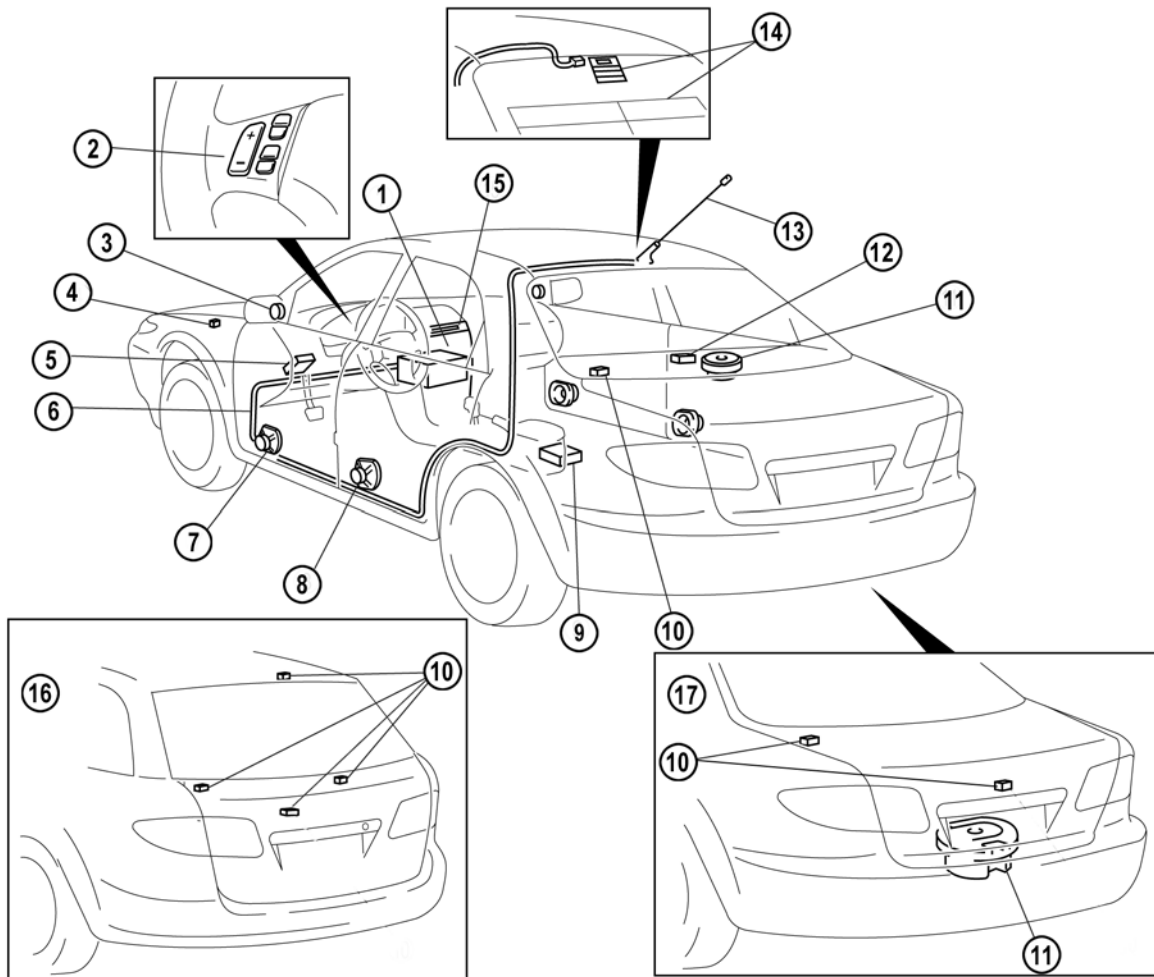
- The LED in the rain sensor emits infrared light that is reflected off the windshield via the lens sensor and then received by the photodiode in the rain sensor. If the rate of reflected infrared light is reduced, it is determined that rain is contacting the windshield and the intensity of the rainfall is calculated from the amount of reflection rate reduction.

Entertainment Systems

Audio System

- The center panel module has been adopted
- The center panel module consists of:
 - the audio unit
 - the control unit (automatic A/C only)
 - the audio switch
 - the A/C switch
 - the hazard warning switch
 - the rear window defroster switch.
- The audio unit consists of the following parts:
 - Base unit
 - Lower module (cassette deck or **MD (Mini Disc)** player)
 - Cover
- Lower module (cassette deck or MD player) are options.
- The audio control switch is located on the steering wheel for audio operation.
- Four speakers are installed as standard, one each to the front and rear doors. For BOSE specified systems, 7 speakers, including the door speakers, are installed on the inner garnish of the front doors (tweeters), and in the rear package (4SD) or temporary spare tire (5HB, WGN) (woofer).
- A noise filter has been installed on the brake light and rear window defroster circuit, and a condenser has been installed on the high-mount brake light and rear wiper motor circuit for improved noise reduction.
- All information related to the audio system appears on the information display's **LCD (Liquid Chrystal Display)**.

Audio System Structural View



M6FL_09038

- | | | | |
|---|---|----|---|
| 1 | Center panel module (built-in audio unit) | 10 | Condenser |
| 2 | Audio control switch | 11 | Woofer (BOSE) |
| 3 | Tweeter (BOSE) | 12 | Noise filter (rear window defroster) |
| 4 | Woofer relay (BOSE) | 13 | Center roof antenna |
| 5 | Noise filter (brake switch) | 14 | Glass antenna (not for EU (European Union) market) |
| 6 | Antenna feeder | 15 | Information display |
| 7 | Front door speaker | 16 | WGN |
| 8 | Rear door speaker | 17 | 5HB |
| 9 | Audio amplifier (BOSE) | | |

Specifications

Item			Specification	
			Bose	Standard
			Type B	Type C
Rated voltage (V)			12	12
Frequency band	AM	LW (KHZ)	153-279	153-279
		MW (KHZ)	531-1602	531-1602
	FM	(MHZ)	87.5-108.0	87.5-108.0
Information system			RDS	RDS
Audio amplifier maximum output power (W)			25 x 4 (External type audio amplifier)	25 x 4
Output impedance (Ohm)			2	4

M6FL_09T006

- The mute function for hands-free telephone systems has been discontinued.
- To install a mobile phone hands-free device, use the accessory wiring harness, which contains cut-off relays to mute the speakers while the phone is operating.

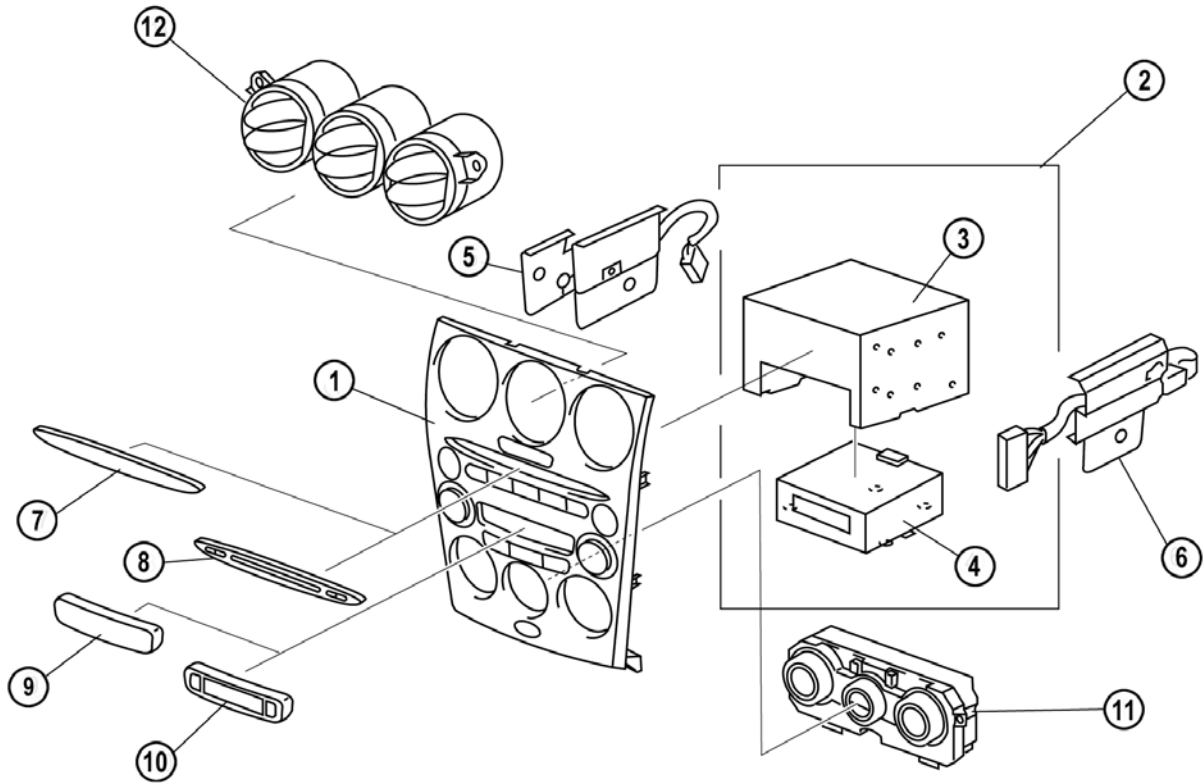
Speaker

Item		Specification					
		Door speaker			Tweeter	Woofer	
		Standard	Bose			4 SD	5 HB, WGN
			Front	Rear			
Maximum input (W)		25			100		
Impedance (Ohm)	4	2		3.2	0.5		
Size (in)	5.5 x 7.5	6.5	5.25	2	9	5.25	

M6FL_09T007

Centre Panel Module

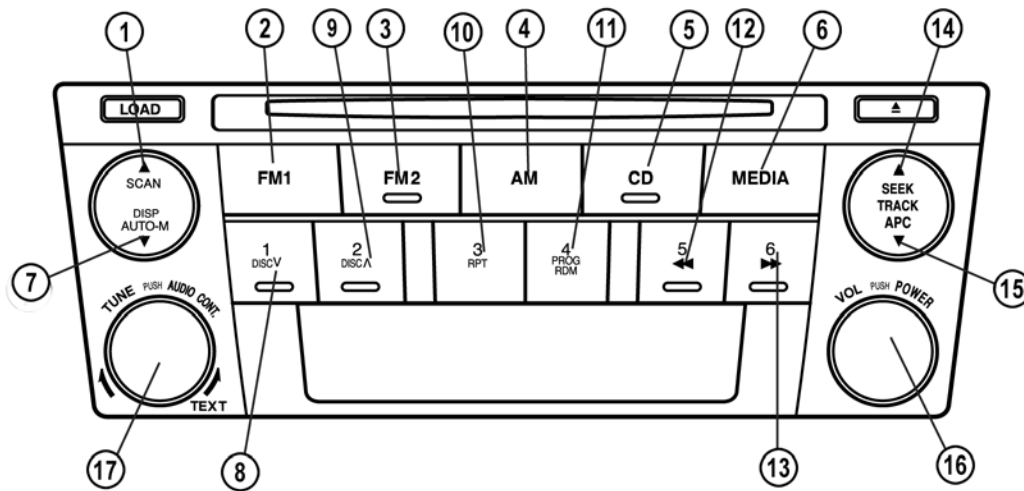
- The center panel module consists of the audio unit, switches and the heater control unit. A lower module (cassette deck or MD player) can be added to the radio/**CD** (Compact Disc) player base unit.



M6FL_09039

- | | | | |
|---|---------------------------------|----|--------------------------------------|
| 1 | Center panel | 7 | Cover (without upper module) |
| 2 | Audio unit | 8 | Cover (with upper module) |
| 3 | Base unit | 9 | Cover (without lower module) |
| 4 | Lower module | 10 | Cover (with lower module) |
| 5 | Circuit board (manual A/C only) | 11 | Climate control unit (auto A/C only) |
| 6 | Information display harness | 12 | Ventilator grille |

Centre Panel Structural View



M6FL_09040

- | | | | |
|---|-------------------|----|-----------------------------|
| 1 | SCAN button | 10 | Preset button "3" |
| 2 | FM1 button | 11 | Preset button "4" |
| 3 | FM2 button | 12 | Preset button "5" |
| 4 | AM button | 13 | Preset button "6" |
| 5 | CD button | 14 | SEEK button (upper) |
| 6 | MEDIA button | 15 | SEEK button (lower) |
| 7 | AUTO-M button | 16 | POWER/VOLUME button |
| 8 | Preset button "1" | 17 | AUDIO CONT/TUNE/TEXT button |
| 9 | Preset button "2" | | |

Audio On-board Diagnostic System

- The on-board diagnostic system is similar to the Mazda3 (BK), and consists of the following functions:
 - Self-diagnostic function
 - Diagnostic assist function

Self Diagnostic Function

- The self-diagnostic function allows DTCs in the audio unit to be displayed. It can be entered as follows:
 1. Turn the ignition switch to the ACC or ON position.
 2. Turn the POWER switch off.
 3. While pressing the POWER button, simultaneously press the FM1/2 button and the MEDIA button for 2 seconds or more.

Diagnostic Assist Function

- The diagnostic assist function allows the different components of the audio system to be checked. The procedures for entering it are shown below:

Component Tested	Procedure
Buttons	With the audio power on, press the POWER button and simultaneously press the MEDIA button for approximately 1 second.
Speakers	With the audio power on, press the POWER button and simultaneously press the AUTO M button for approximately 1 second.
Radio reception	With the audio power on, press the POWER button and simultaneously press the PRESET 2 button for approximately 1 second.

M6FL_09T008

Car Navigation System

- The Mazda6 Facelift is equipped with a new navigation system, manufactured by Denso. It uses the **GPS (Global Positioning System)**, a European map **DVD (Digital Versatile Disc)**, the vehicle speed signal and an incorporated gyro sensor.
- The speed of operation has been improved.
- A split screen function has been introduced for more convenient route guidance.
- A **TMC (Traffic Message Channel)** function and a **DRGS (Dynamic Route Guidance System)** have been introduced to automatically select a detour in case of traffic jams.
- The voice guidance and screen display can be set to the following languages:
 - English (British), English (American), German, French, Italian, Spanish, Dutch, Portuguese, Swedish, Danish, Norwegian and Finnish.

Specifications

Navigation Unit

Item	Specification
Unit type	Stand alone
Rated voltage	12 V
Rom type	DVD-ROM (Read Only Memory)
Voice guidance output power	5 W

M6FL_09T009

LCD Unit

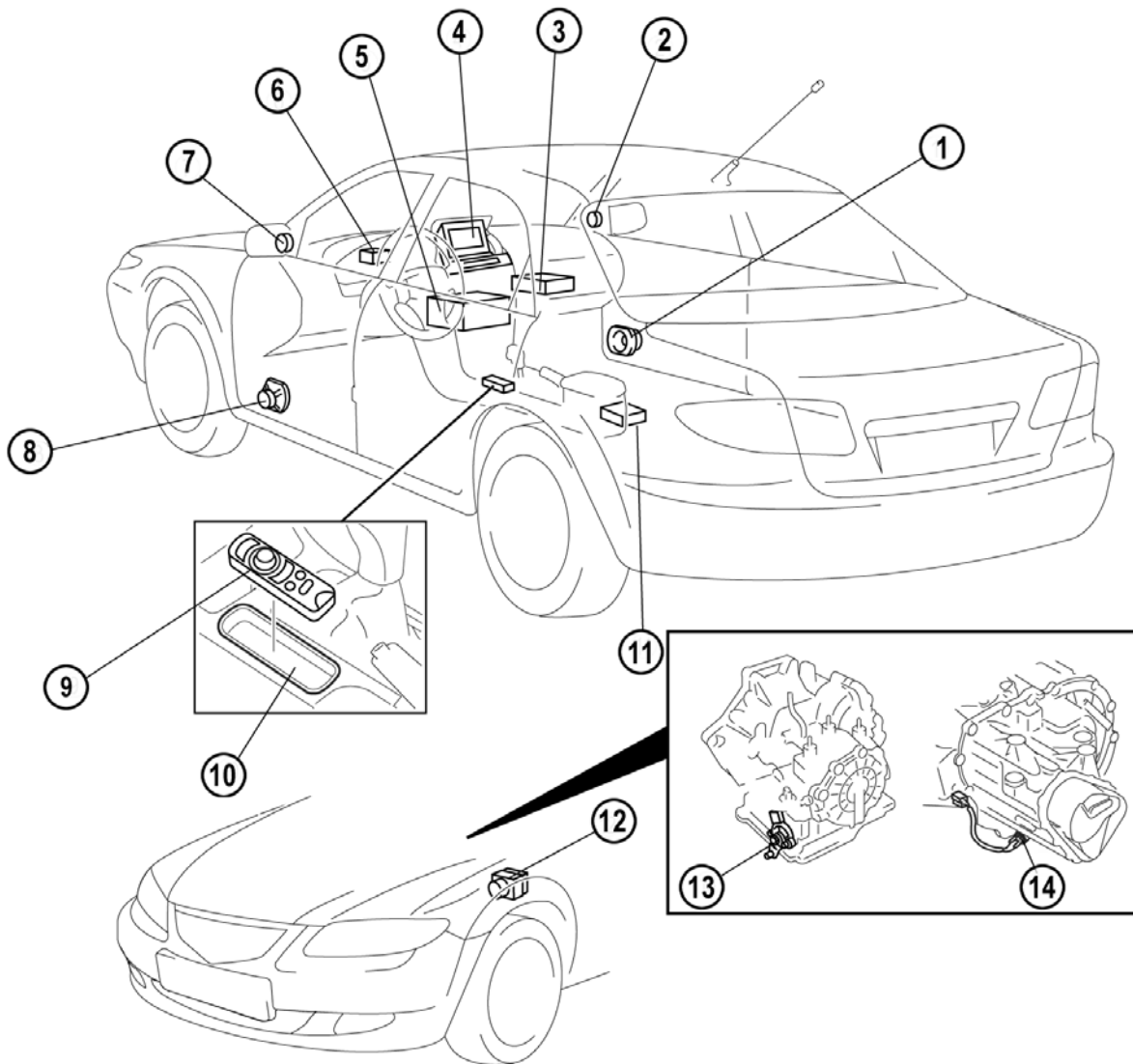
Item	Specification	
Unit type	Pop-up	
Rated voltage	12 V	
Display	Size	7 inch (wide)
	Type	LCD TFT (Thin Film Transistor), Full-color

M6FL_09T010

Speaker

- The system uses the audio speakers in the driver's door (refer to section 09 Audio System).

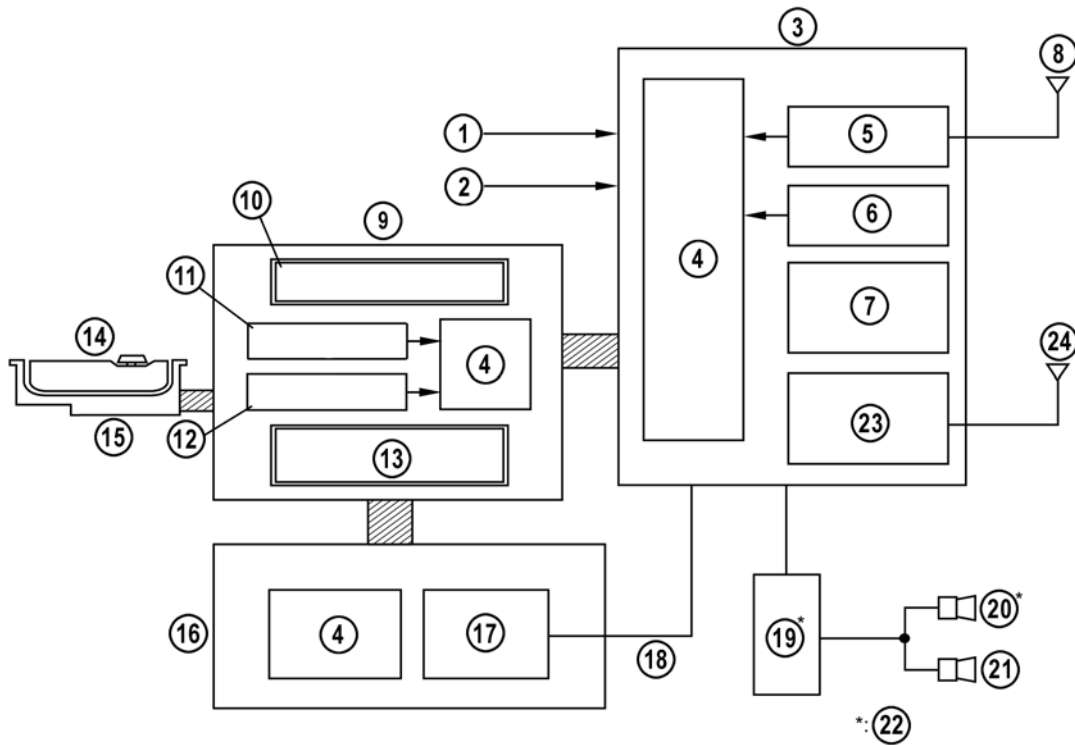
Parts Location



M6FL_09041

- | | |
|------------------------------|------------------------------|
| 1 Front door speaker (right) | 8 Front door speaker (left) |
| 2 Tweeter (right) (BOSE) | 9 Remote control |
| 3 Car-navigation unit | 10 Cradle |
| 4 LCD unit | 11 Audio amplifier (BOSE) |
| 5 Audio unit | 12 ABS or DSC CM |
| 6 GPS antenna | 13 TR switch (ATX) |
| 7 Tweeter (left) (BOSE) | 14 Backup-light switch (MTX) |

System Overview

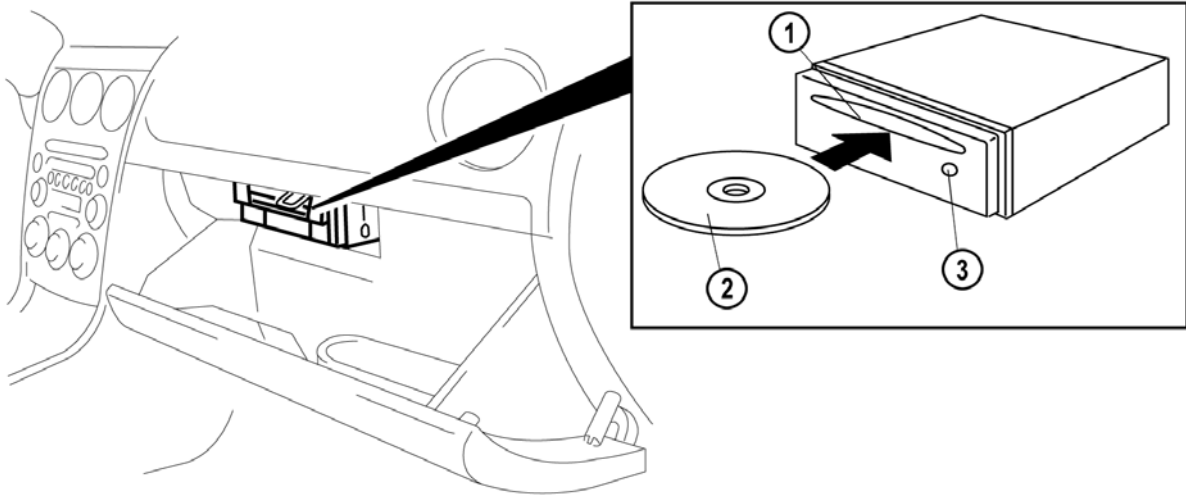


M6FL_09042

- | | | | |
|----|---|----|----------------------------------|
| 1 | ABS or DSC CM | 13 | Information display |
| 2 | TR switch (ATX) or back-up light switch (MTX) | 14 | Remote control |
| 3 | Car-navigation unit | 15 | Cradle |
| 4 | CPU | 16 | Audio unit |
| 5 | GPS receiver | 17 | Power amplifier |
| 6 | Gyro sensor | 18 | Speaker output to driver's side |
| 7 | DVD driver | 19 | Audio amplifier |
| 8 | GPS antenna | 20 | Tweeter (driver side) |
| 9 | LCD unit | 21 | Front door speaker (driver side) |
| 10 | LCD | 22 | BOSE system only |
| 11 | Tilt switch | 23 | RDS-TMC tuner |
| 12 | OPEN/CLOSE switch | 24 | RDS-TMC antenna |

Car Navigation Unit

- The car navigation unit is located in the glove compartment and incorporates the DVD-ROM drive and the gyro sensor.



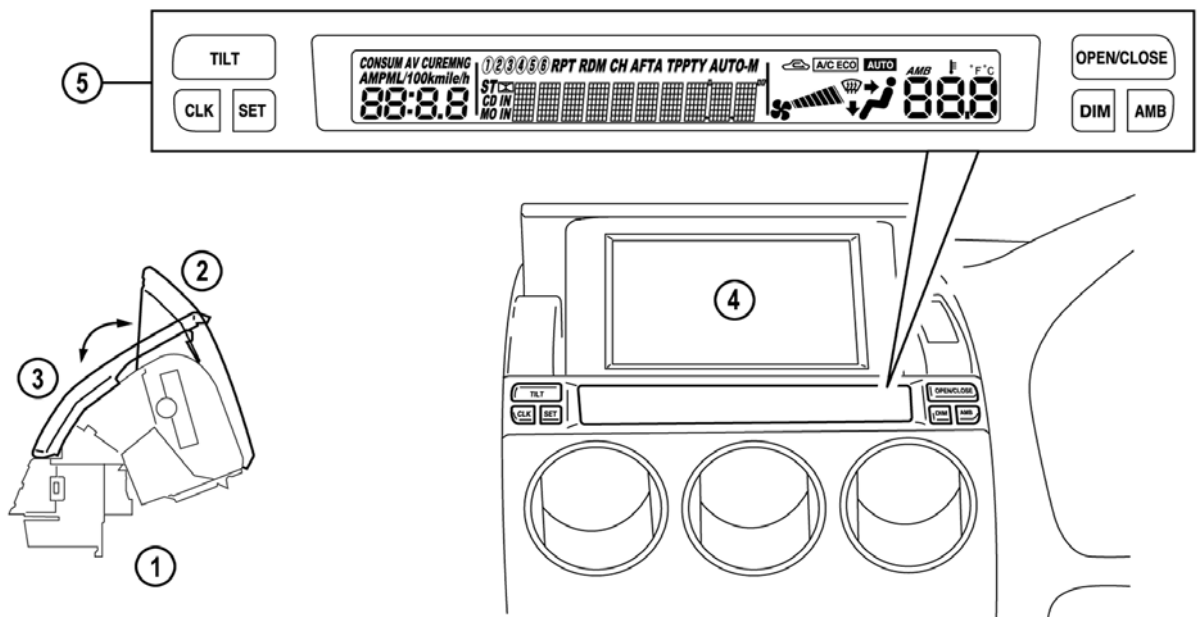
M6FL_09043

- 1 DVD-ROM loading slot
- 2 DVD-ROM

- 3 Eject button

LCD Unit

- The LCD unit of the navigation system is a pop-up type TFT monitor incorporated in the dashboard.
- The information display below shows information about the audio, **DIS** (Driver Information System) and A/C.
- The LCD unit features a private bi-directional serial bus to the navigation unit and the audio unit. All necessary video signals are separately sent as a video signal (**RGB Red Green Blue** (= Video Driver Standard)).
- It features different illumination modes for the navigation display. The driver can select between automatic, day and night mode.



M6FL_09044

- 1 LCD unit assembly
- 2 Open
- 3 Close

- 4 LCD unit
- 5 Information display

Screen Layout

- Different display modes can be selected with the split screen function. Some of the different options are shown below.

One-Screen Map Display



M5_09058

Dual Screen Map Display with Different Scales



M5_09059

Map and Turn List



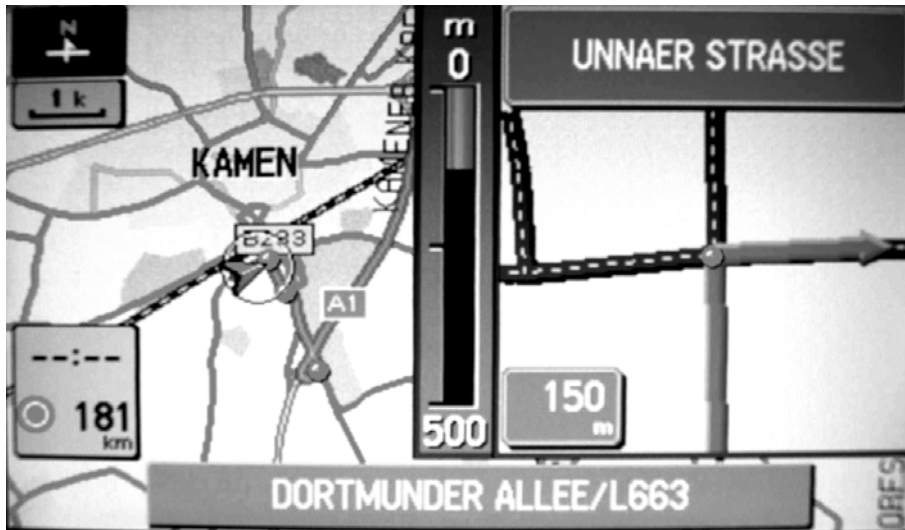
M5_09060

Map and Turn Arrows



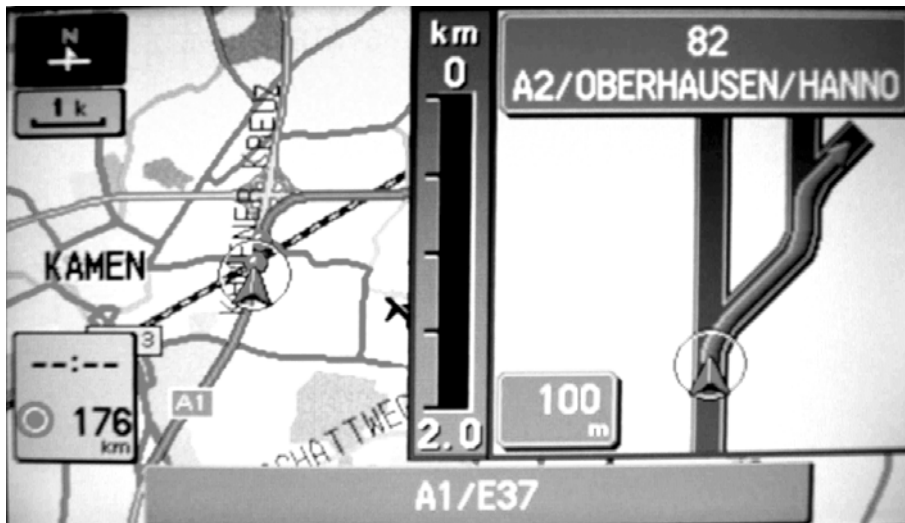
M5_09061

Automatically Enlarged Illustration of a nearby Intersection on Main Roads



M5_09062

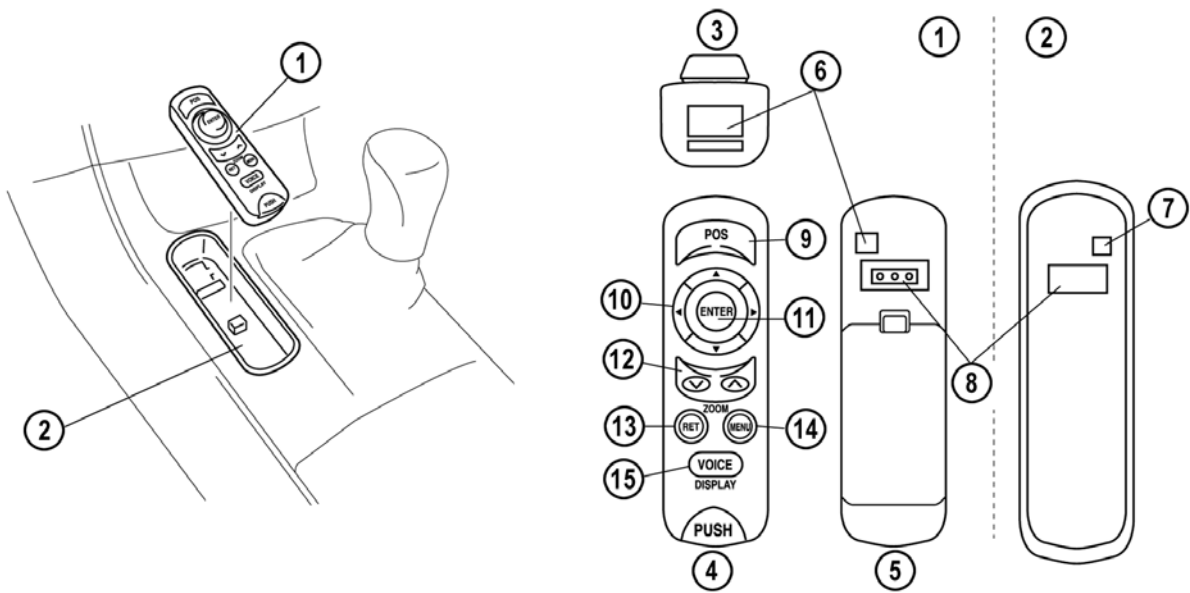
Automatically Enlarged Illustration of a Nearby Intersection on Motorways



M5_09063

Remote Control and Cradle

- A remote control with an appropriate cradle has been adopted. The remote control and cradle are located on the centre console.
- An infrared sensor that receives signals from the remote control is located on the cradle. The signals received are sent to the LCD unit.
- The remote control uses batteries as a power source when not in the cradle and uses the power supply connector when set in the cradle.
- The batteries are not charged when the remote control is in the cradle.

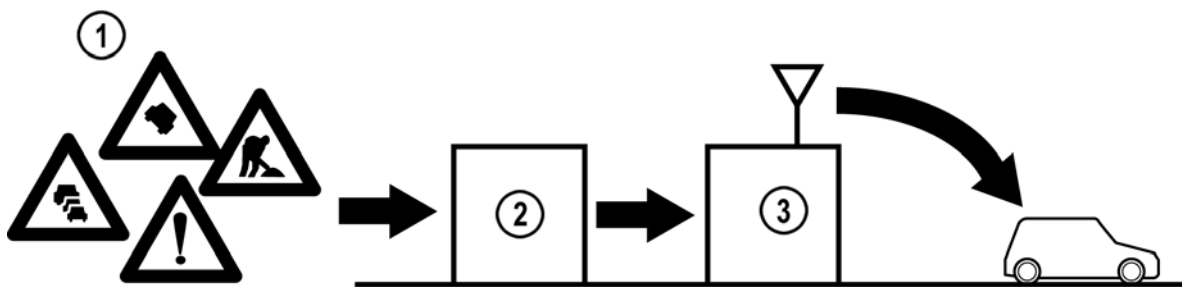


M6FL_09051

- 1 Remote control
- 2 Cradle
- 3 Front view
- 4 Top view
- 5 Underside view
- 6 Infrared transmitter
- 7 Infrared sensor
- 8 Power supply connector
- 9 Position button (Displays the current position)
- 10 Joystick (Selects items by tilting it up, down, right and left)
- 11 Enter button (Executes a selected item)
- 12 Zoom button (Changes the map scale)
- 13 Return button (Returns to the previous screen)
- 14 Menu button (Selects a menu)
- 15 Voice button (Initiates verbal guidance for route maneuvers and adjusts the display)

Traffic Message Channel

- The TMC function is a specific application of the **RDS (Radio Data System)**, using an FM receiver that is incorporated in the navigation unit. It receives traffic messages and forwards the received information to the CPU. The messages can be displayed and the route can be automatically recalculated when there are traffic jams along the first selected route.
- TMC is a free of charge service, regarding traffic information, provided from a lot of radio stations. The quality of the information varies, depending on the radio station and on how they receive their information, either only by the police and listeners or in addition by companies providing more detailed information. Sometimes the verbal information from a radio station is different to the TMC information they provide.



M6FL_09052

- 1 Traffic messages
- 2 Traffic information center
- 3 Radio broadcast station

- The TMC icon is shown on the display when the system receives at least one radio station that features TMC information.



M5_09070

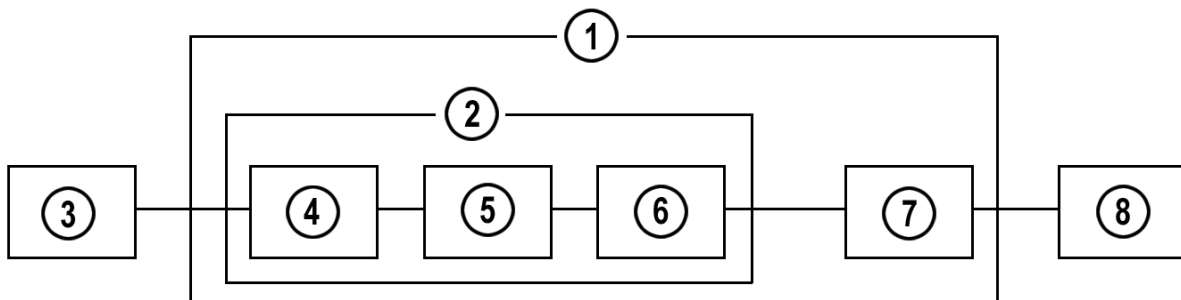
- 1 TMC icon

- Traffic events will be considered within a distance of 25 km from the current location of the vehicle and be displayed by a sign on the display in the scale 50m...4km.
- The colour and type of the sign depends on the traffic information. The colours which are related to the events are described in the following table:

Category	Colour
Stationary Traffic	Red
Traffic Jam	Orange
Accidents	Pink
Closed Road	Black
Road Works/Danger	Pink
Road Conditions/Weather/Delays	Yellow
Parking/Out of order	Grey

M6FL_09T011

- Inside the vehicle the TMC signals are processed as shown below.



M6FL_09054

- | | |
|---|-----------------------------|
| 1 Navigation ECU (Electronic Control Unit) | 5 Decoder |
| 2 RDS-TMC Receiver | 6 CPU Communication Control |
| 3 Vehicle Antenna | 7 Navigation |
| 4 FM Tuner | 8 Display |

- Each traffic event is indicated by one sign.



M5_09072

- 1 Icon for traffic event

Availability of TMC in Europe

- TMC is generally available in the countries shown on the map below.

NOTE: Even when the TMC displays traffic events on other roads, the DRGS recalculates the route only for traffic events on motorways.

NOTE: A TMC information about a heavy traffic jam does not necessarily mean that the navigation system will re-route the vehicle. Re-routing always depends on local facts.



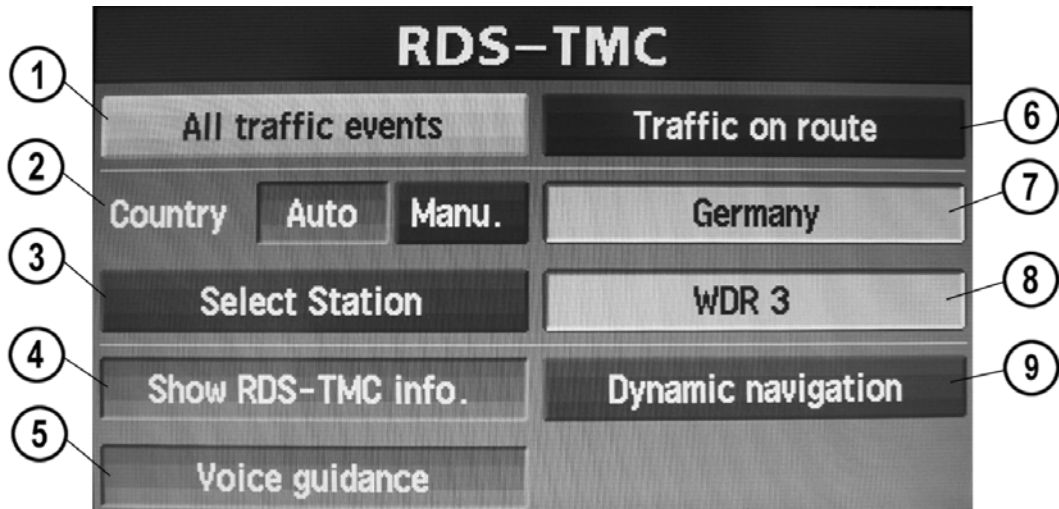
M5_09073

1 Covered

2 Under preparation

How to Enable TMC and DRGS

- To switch on the TMC and DRGS first select “RDS-TMC” from the main menu. A new menu will be displayed where the customer can select between some options.



M5_09074

- | | |
|---|---|
| 1 Displays traffic events on the guided route | 6 Enables TMC |
| 2 Selected country | 7 Switches between automatic and manual country selection |
| 3 Selected TMC radio station | 8 Selects a TMC radio station |
| 4 Enables DRGS | 9 Displays all traffic events |
| 5 Enables verbal information regarding traffic events | |

Diagnostics

- If a malfunction is suspected, the navigation system has to be checked according to the Workshop Manual.

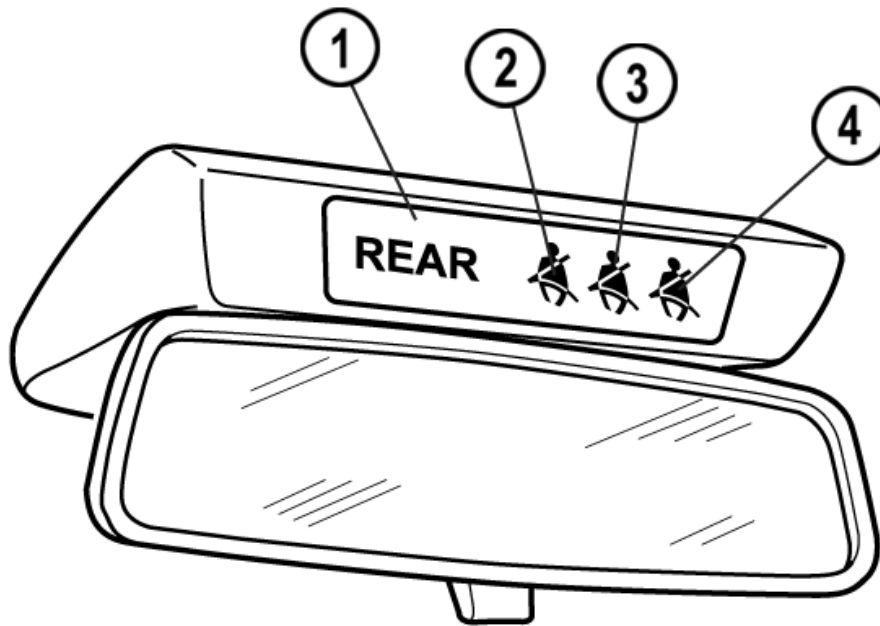
Rear Seat Belt Warning Alarm

- The rear seat belt warning LEDs are installed on the installation area of the rear view mirror.
- The indicator and the buzzer are built-in corresponding to the seat belt for each rear seat.

Operation

- After the ignition switch is turned to the ON position, each indicator illuminates continuously while the generator warning light is illuminating:
 - green when the seat belt is fastened (buckle switch is on)
 - red when the seat belt is not fastened (buckle switch is off)
- Each indicator turns off if the condition corresponds to any of the following:
 - When the ignition switch is in the LOCK position.
 - When approx. 40 s have elapsed since the generator warning light turned off (engine runs).
- If the buckle switch signal changes (on to off, or off to on) with the ignition switch in the ON position and the indicator is not illuminated, the corresponding seat belt indicator illuminates.
- In addition, when the buckle switch is changed from off to on (seat belt was unfastened), the buzzer inside the rear seat belt reminder indicator sounds for approx. 0.5 sec to alert the driver.

Rear Seat Belt Warning Alarm Structural View

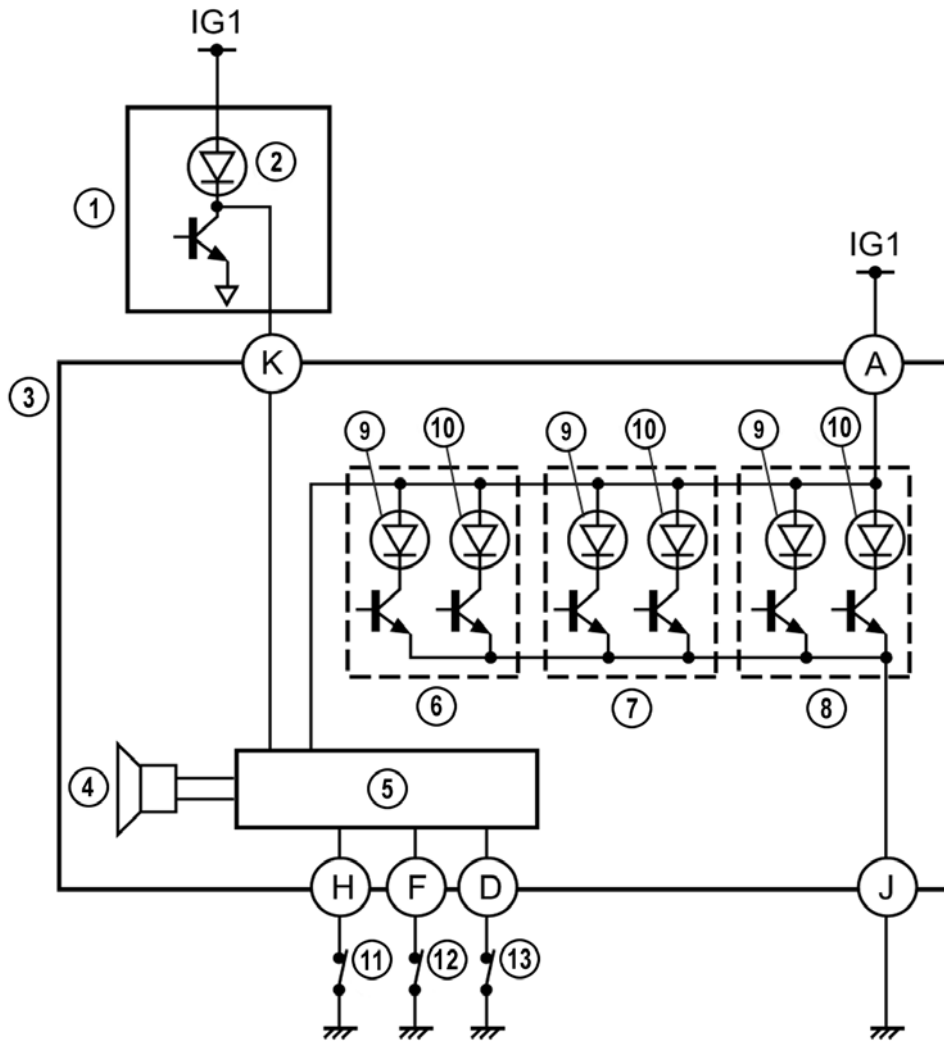


M6FL_09058

- 1 Rear seat belt reminder indicator
- 2 Rear left seat belt

- 3 Rear center seat belt
- 4 Rear right seat belt

Rear Seat Belt Warning Alarm Wiring diagram



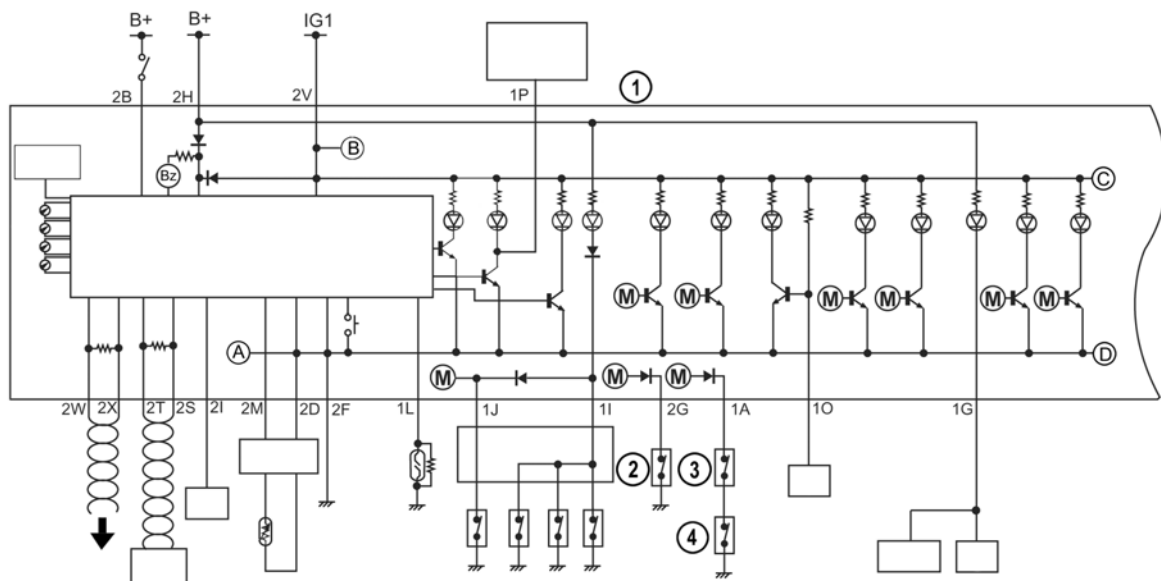
M6FL_09059

- | | |
|-------------------------------------|----------------------------------|
| 1 Instrument cluster | 8 Rear right seat belt indicator |
| 2 Generator warning light | 9 Red (unfastened) |
| 3 Rear seat belt reminder indicator | 10 Green (fastened) |
| 4 Buzzer | 11 Buckle switch (rear left) |
| 5 Microcomputer | 12 Buckle switch (rear center) |
| 6 Rear left seat belt indicator | 13 Buckle switch (rear right) |
| 7 Rear center seat belt indicator | |

Front Seat Belt Warning Alarm

- Driver seat belt warning alarm operates with a single buckle switch like the seat belt warning alarm from the previous Mazda6.
- The seat belt warning light in the instrument cluster shows if the driver is not buckled while ignition is on or engine runs. An additional warning tone sounds when vehicle speed exceeds 20 km/h.
- Driver seat belt warning alarm chime can be switched off using WDS.
- A front passenger seat belt warning alarm was added to Mazda6 Facelift, using an occupancy sensor to detect whether the front passenger seat is occupied or not and a buckle switch to indicate the buckle situation.
- The warning light in the instrument cluster shows if the passenger is not buckled when vehicle speed is higher than 20 km/h. Then also the warning sound occurs.
- Passenger seat belt warning alarm chime can be switched off using WDS.

Front Seat Belt Warning Alarm Wiring Diagram



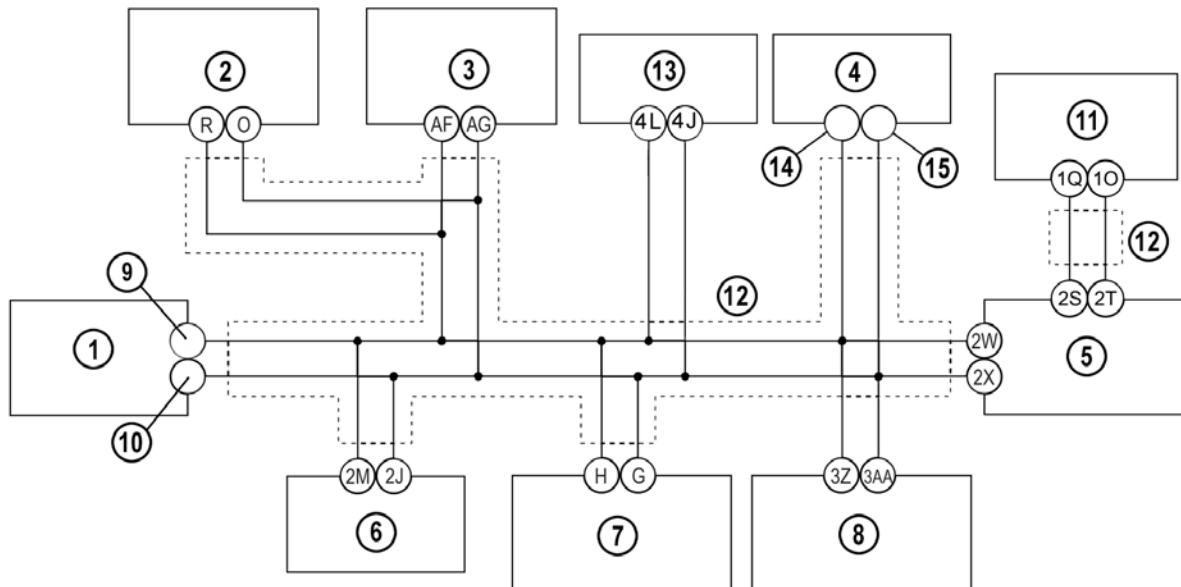
M6FL_09060

- | | |
|---------------------------------|------------------------------------|
| 1 Instrument cluster | 3 Buckle switch (passenger's side) |
| 2 Buckle switch (driver's side) | 4 Occupancy sensor |

Controller Area Network (CAN) System

- Due to the simplification of the wiring harness, a CAN system for transmission of multiplex input/output signals among electrical modules has been adopted.
- Twisted-pair wiring is used for connections between the following modules (each electrical module hereafter referred to as a CAN system-related module):
 - PCM
 - TCM (ATX)
 - 4WD CM (4WD)
 - DSC CM (with DSC)
 - ABS CM (with ABS)
 - Keyless control module (with advanced keyless system)
 - Instrument cluster
 - BCM

- With an on-board diagnostic function included for each multiplex module, display of DTCs using the WDS or equivalent has improved serviceability.



M6FL_09061

- | | | | |
|---|--|----|---|
| 1 | PCM | 9 | 2R (except MZR-CD (RF Turbo))
39 (MZR-CD (RF Turbo)) |
| 2 | DSC CM (with DSC) | 10 | 2U (except MZR-CD (RF Turbo))
13 (MZR-CD (RF Turbo)) |
| 3 | ABS CM (with ABS) | 11 | Audio unit |
| 4 | Data link connector | 12 | Twisted pair |
| 5 | Instrument cluster | 13 | BCM |
| 6 | TCM (ATX) | 14 | CAN-L |
| 7 | 4WD CM (4WD) | 15 | CAN-H |
| 8 | Keyless control module (advanced keyless system) | | |

List of Abbreviations

2WD	2-Wheel Drive	CAN-L	Controller Area Network-Low
4SD	4-Door Sedan	CD	Compact Disc
4WD	4-Wheel Drive	CKP	Crankshaft Position
5HB	5-Door Hatchback	CM	Control Module
A/C	Air Conditioning	CMDTC	Continous Mode DTC
ABS	Antilock Brake System	CMP	Camshaft Position
ACC	Accessory (position ignition switch)	CPU	Central Processing Unit
AM	Amplitude Modulation	DC	Direct Current
APP	Accelerator Pedal Position	DIS	Driver Information System
ATF	Automatic Transmission Fluid	DLC	Data Link Connector
ATX	Automatic Transaxle	DPF	Diesel Particulate Filter
AWD	All Wheel Drive	DRGS	Dynamic Route Guidance System
B+	Battery Positive pole	DSC	Dynamic Stability Control
BARO	Barometric Pressure	DTC	Diagnostic Trouble Code
BCM	Body Control Module	DVD	Digital Versatile Disc
CAN	Controller Area Network	EBD	Electronic Brakeforce Distribution
CAN-H	Controller Area Network-High	ECT	Engine Coolant Temperature

List of Abbreviations

ECU	Electronic Control Unit	KS	Knock Sensor
EGR	Exhaust Gas Recirculation	LCD	Liquid Crystal Display
EGRVP	Exhaust Gas Recirculation Valve Position	LED	Light Emitting Diode
EU	European Union	LF	Left Front
FEEPROM	Flash Electronically Erasable Programmable Read Only Memory	LH	Left Hand
		LHD	Left Hand Drive
FM	Frequency Modulation	LR	Left Rear
GMR	Gigant Magnetic Resistive	LW	Long Wave
GPS	Global Positioning System	MAF	Mass Air Flow
GR	Gear	MAP	Manifold Absolute Pressure
HO2S	Heated Oxygen Sensor	MD	Mini Disc
IAC	Idle Air Control	MIL	Malfunction Indicator Light
IAT	Intake Air Temperature	MTX	Manual Transaxle
IC	Integrated Circuit	MW	Medium Wave
ID	Identification	NCAP	New Car Assessment Programme
IG	Ignition	NTC	Negative Temperature Coefficient
IG1	Ignition switch position 1	OCV	Oil Control Valve
ISV	Intake Shutter Valve		

List of Abbreviations

P/S	Power Steering	SAPS	Sulphate Ash, Phosphor, Sulphur
P/W	Power Window	SAS	Sophisticated Airbag Sensor
PAD	Passenger Airbag Deactivation	SST	Special Service Tool
PATS	Passive Anti Theft System	TCM	Transaxle Control Module
PCM	Powertrain Control Module	TCS	Traction Control System
PCV	Positive Crankcase Ventilation	TFT	Thin Film Transistor
PID	Parameter Identification	TMC	Traffic Message Channel
PSP	Power Steering Pressure	TNS	Tail Number Side lights
RDS	Radio Data System	TP	Throttle Position
RF	Right Front	TR	Transaxle Range
RGB	Red Green Blue (Video Driver Standard)	TWC	Three-Way Catalyst
RH	Right Hand	Tx	Transmit wire (Data Bus)
RHD	Right Hand Drive	VAD	Variable Air Duct
RKE	Remote Keyless Entry	VBC	Variable Boost Control
ROM	Read Only Memory	VIN	Vehicle Identification Number
RR	Right Rear	VIS	Variable Intake-air System
Rx	Receive wire (Data Bus)	VSS	Vehicle Speed Sensor

List of Abbreviations

VTCS **V**ariable **T**umble **C**ontrol
 System

WDS **W**orldwide **D**iagnostic
 System

WGN **W**agon