MazTech
MAZDA TECHNICIAN TRAINING PROGRAMS

TRAINING MANUAL

MPV Facelift

MME Technical Training 2004

ZOOM-ZOOM

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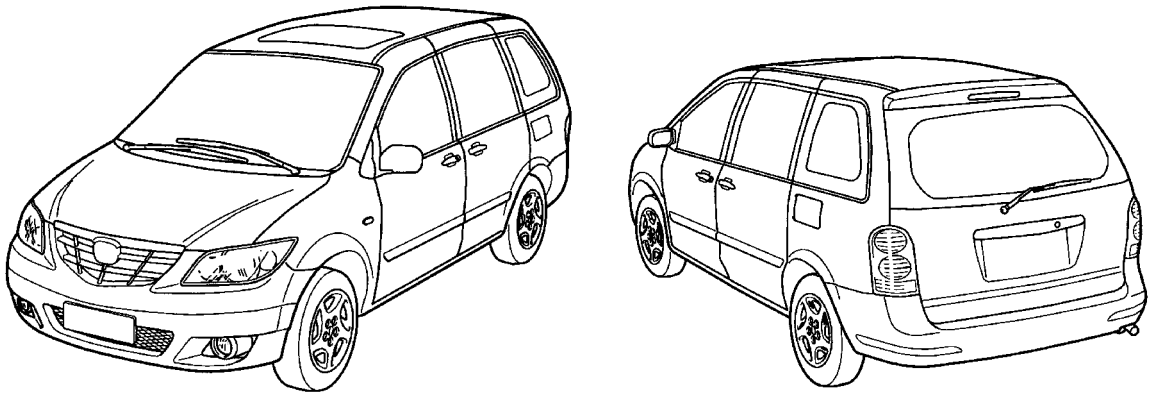
General Information

Introduction

- The new Mazda MPV facelift has now been further enhanced to ensure it continues to meet the demands of European customers looking for a vehicle that is safe, fun to be in and drive, with lots of space and flexibility. At the same time, full compliance with EOBD regulations of the RF-T engine models and the inclusion of a Karakuri seat version all improve on what was already a successful formula.

Overview



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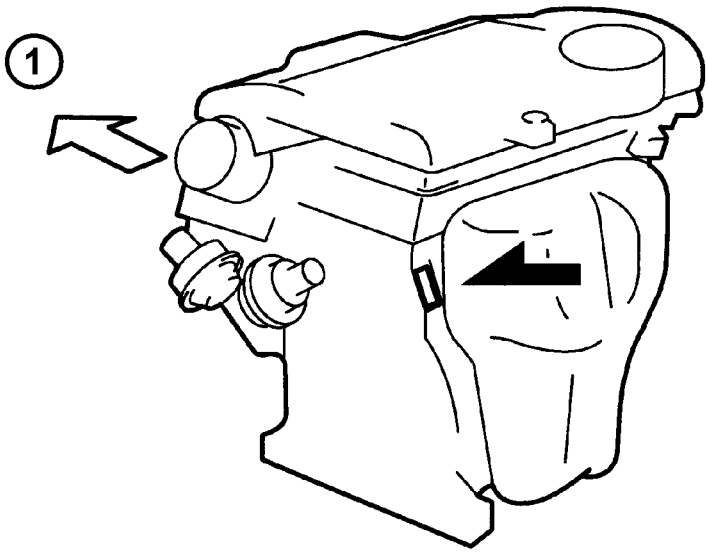
Exterior dimensions

Item		2.3L, Euro 4	2.0L-Diesel, Euro 3
Overall length	mm	4805	
Overall width	mm	1830	
Overall height	mm	1785 (roof rail standard)	
Wheel base	mm	2840	
Front tread	mm	1540	
Rear tread	mm	1550	

Homologation

Engine number location

L3



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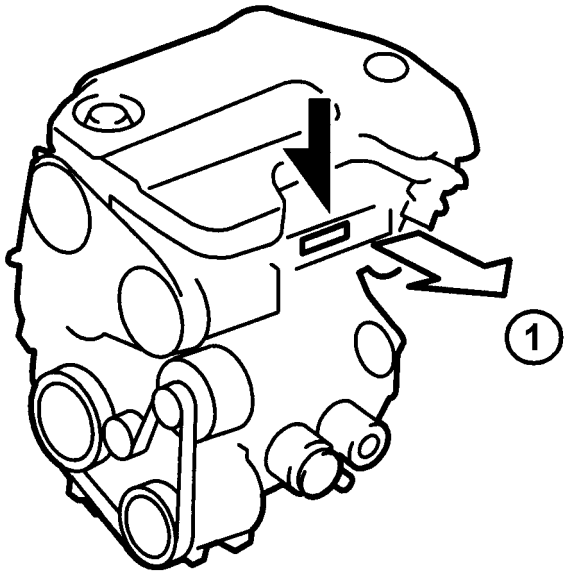
1 Front

RF-T



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1 Front

Scheduled maintenance

- The following items in the maintenance schedule have been changed

Maintenance Item	Maintenance Interval (Number of months or kilometers (miles), whichever comes first)									
	Months	12	24	36	48	60	72	84	96	108
	×1000 km	20	40	60	80	100	120	140	160	180
	×1000 miles	12.5	25	37.5	50	62.5	75	87.5	100	112.5
GASOLINE ENGINE										
Engine valve clearance	Audible inspect every 120,000km (75,000miles), if noisy, adjust									
Evaporative system (if installed)			I			I			I	
Front and rear suspension and ball joints		I		I		I		I		
Drive shaft dust boots		I		I		I		I		
Exhaust system and heat shields	Inspect every 80,000km (50,000miles) or 60 months									
Cabin air filter (if installed)(pollen filter)		R		R		R		R		

Scheduled maintenance

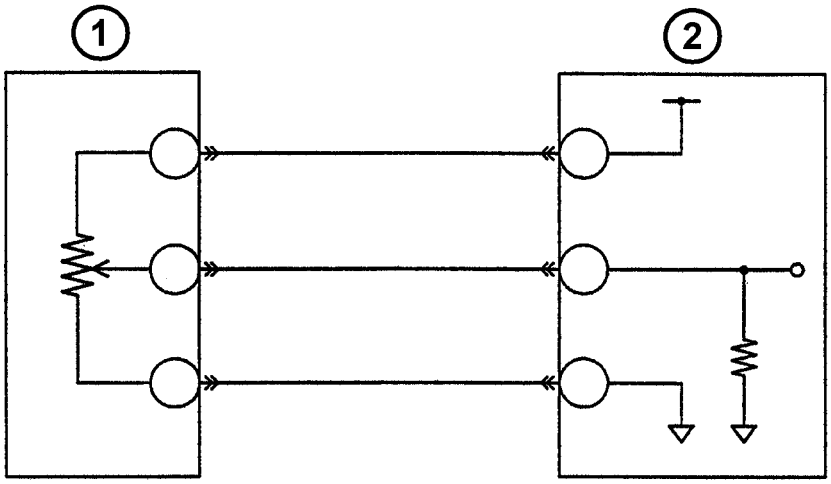
Emission System (RF)

Features

- An **EGR** (**E**xhaust **G**as **R**ecirculation) valve position sensor has been added to allow compliance with EOBD regulations

EGR valve position sensor

- The **EGRVP** (**EGR V**alve **P**osition) sensor is located at the EGR valve 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.



Diesel_B_series_4

1 EGRVP sensor 2 PCM

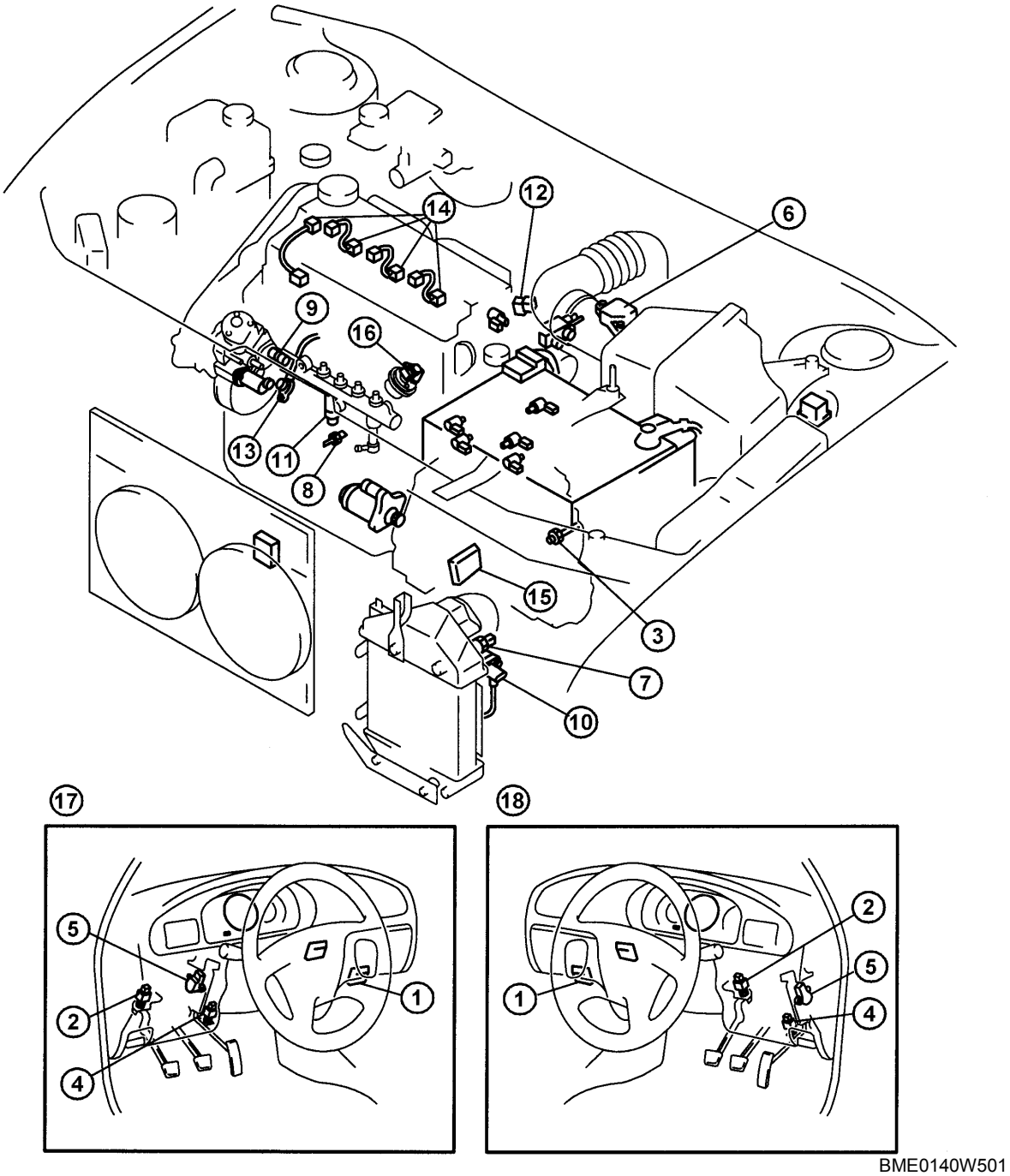
- The signal of the EGRVP sensor serves to detect a malfunction of the EGR valve, i.e. the **PCM** (**P**owertrain **C**ontrol **M**odule) permanently compares the sensor information with the actual EGR amount. The amount of recirculated exhaust gas is determined from the difference between target intake air amount (calculated from the engine speed and the fuel injection amount) and the actual intake air amount detected by the **MAF** (**M**ass **A**ir **F**low) sensor.

Control System (RF)

Features

- To comply with EOBD regulations, diagnostic test modes and corresponding DTCs have been added

Parts location



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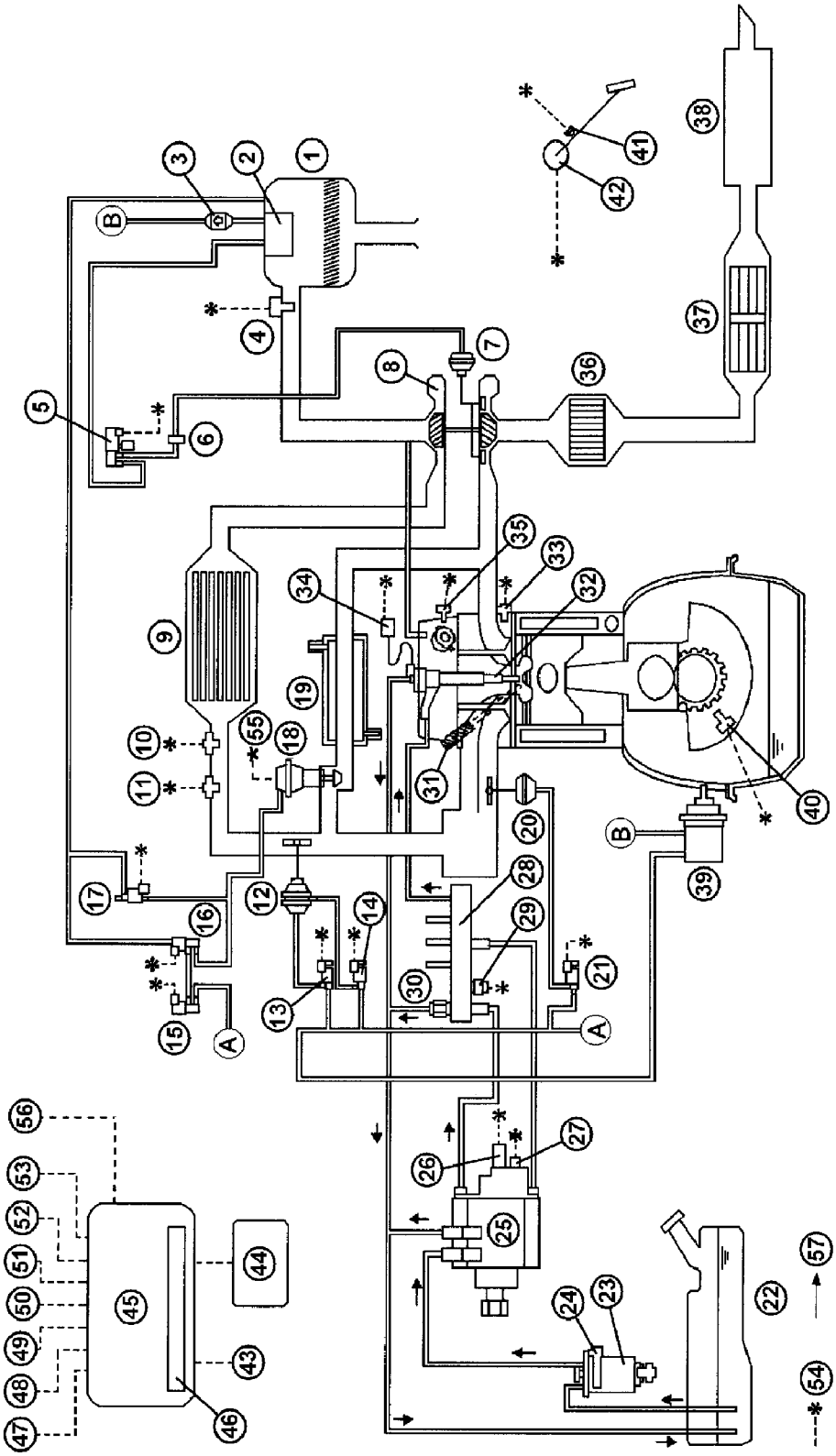
Parts location (continued)

1 PCM (with built-in BARO sensor)
2 Clutch pedal position switch
3 Neutral switch
4 Idle switch
5 Accelerator pedal position sensor
6 MAF/IAT sensor
7 IAT sensor No.2
8 ECT sensor
9 Fuel temperature sensor
10 Boost sensor
11 Fuel pressure sensor
12 CMP sensor
13 CKP sensor
14 Calibration resistor
15 IDM
16 EGR valve position sensor
17 L.H.D.
18 R.H.D.

System overview



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System overview (continued)

1 Air cleaner
2 Vacuum chamber
3 VBC check valve
4 MAF/IAT sensor
5 VBC solenoid valve
6 Vacuum damper
7 Guide blade actuator
8 Turbocharger
9 Charge air cooler
10 IAT sensor No.2
11 Boost sensor
12 Intake shutter valve actuator
13 Intake shutter solenoid valve (half)
14 Intake shutter solenoid valve (full)
15 EGR solenoid valve (vacuum)
16 EGR solenoid valve (vent)
17 EGR control solenoid valve
18 EGR valve
19 EGR water cooler
20 VSC valve actuator
21 VSC solenoid valve
22 Fuel tank
23 Fuel filter
24 Fuel warmer
25 Supply pump
26 Suction control valve
27 Fuel temperature sensor
28 Common rail
29 Fuel pressure sensor
30 Fuel pressure limiter
31 Glow plug
32 Fuel injector
33 ECT sensor
34 Calibration resistor
35 CMP sensor
36 Warm up oxidation catalytic converter
37 Oxidation catalytic converter
38 Silencer
39 Vacuum pump
40 CKP sensor
41 Idle switch
42 APP sensor
43 Glow plug relay
44 IDM
45 PCM
46 BARO sensor
47 PCM control relay
48 Engine switch
49 Starter (starter signal)
50 Neutral switch
51 Clutch pedal position switch
52 A/C switch
53 CAN bus
54 To PCM
55 EGR valve position sensor
56 DLC-2
57 Fuel flow

Relationship chart

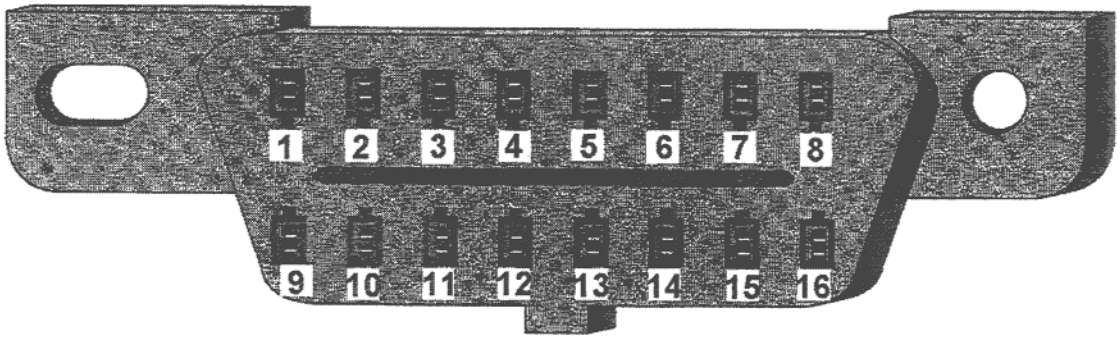
×: Applicable

Item	Idle speed control	Glow control	VSC	Boost pressure control	Fuel injection amount control	Fuel injection timing control	Multiple fuel injection control	EGR control	Electrical fan control	A/C cut-off control	Immobilizer system
Input device											
Battery				×						×	
Starter (starter signal)	×	×	×	×	×	×	×	×	×		×
Starter relay	×	×	×	×	×	×	×	×	×		×
Clutch pedal position switch	×		×		×	×	×		×		×
Neutral switch	×		×		×	×	×		×		×
Idle switch	×		×		×	×	×		×		×
A/C switch	×				×				×	×	×
Refrigerant pressure switch	×				×				×	×	×
Accelerator position sensor	×		×	×	×		×		×	×	×
MAF/IAT sensor			×			×	×	×	×		
IAT sensor No.2					×		×				
ECT sensor	×	×	×		×	×	×	×	×	×	×
Fuel temperature sensor							×				
BARO sensor (integrated in PCM)				×				×	×		
Boost sensor		×		×	×				×		
Fuel pressure sensor					×	×		×	×		
CMP sensor			×	×	×	×	×				
CKP sensor	×		×	×	×	×	×	×	×		×
ABS HU/CM (CAN signal)	×	×	×		×	×	×		×		
Calibration resistor					×		×				
Immobilizer unit											
EGR valve position sensor									×		
Suction control valve								×			
IDM	×				×	×	×				
VSC solenoid valve			×								
VBC solenoid valve				×							
EGR control solenoid valve									×		
EGR solenoid valve (vacuum)									×		
EGR solenoid valve (vent)									×		
Intake shutter solenoid valve (half)									×		
Intake shutter solenoid valve (full)									×		
Glow indicator light		×									
Glow plug relay		×									
Main fan relay										×	
A/C relay											×
Fan control module										×	

Relationship Chart

DLC-2 outline

- The **DLC**-2 (**D**ata **L**ink **C**onnector-2) located in the driver compartment is a service connector defined by EOBD regulations.



DLC-2

1	Not used	9	Not used
2	Not used	10	Not used
3	Not used	11	Not used
4	Chassis ground	12	Not used
5	Signal ground	13	Not used
6	CAN high (+)	14	CAN low (-)
7	ISO 9141 (K line)	15	Not used
8	Not used	16	Battery power supply (B+)

On-board diagnostic system

Diagnostic test modes

- To meet EOBD regulations, the following diagnostic test modes have been adopted:

Diagnostic test mode	Item
Mode 01	Sending diagnostic data (PID data monitor/On-board system readiness test)
Mode 02	Sending freeze frame data
Mode 03	Sending emission-related malfunction code (DTC)
Mode 04	Clearing/resetting emission-related malfunction information
Mode 07	Sending continuous monitoring system test results (pending code)
Mode 09	Request vehicle information

Recording of continuous monitoring system test results

- These appear when a problem is detected in a monitored system

1-drive cycle type

– If any problems are detected in the first drive cycle, pending codes will be stored in the PCM memory, as well as DTCs.

– After pending codes are stored, if the PCM determines that the system is normal in any future drive cycle, the PCM deletes the pending codes.

2-drive cycle type

– The code for a failed system is stored in the PCM memory in the first drive cycle. If the problem is not found in the second drive cycle, the PCM determines that the system returned to normal or the problem was mistakenly detected, and deletes the pending code. If the problem is found in the second drive cycle too, the PCM determines that the system has failed, and stores the pending codes, and the DTCs.

– After pending codes are stored, if the PCM determines that the system is normal in any future drive cycle, the PCM deletes the pending codes.

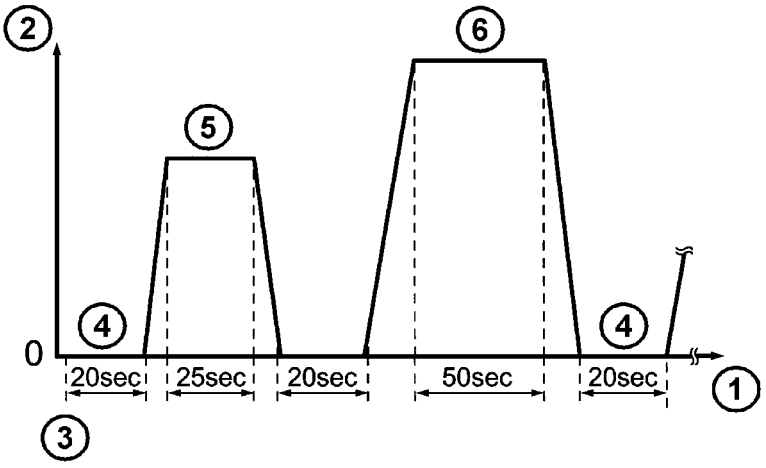
On-board diagnostic system (continued)

OBD drive mode

- With the addition of system monitors for EOBD, it is now necessary to carry out the OBD Drive Mode to confirm the absence of the below DTCs:
  - P0101: MAF sensor circuit range/performance problem
  - P0106: Boost sensor circuit range/performance problem
  - P0401: EGR flow insufficient detected
  - P0402: EGR flow excessive detected
  - P0404: EGR valve stuck
  - P2227: BARO sensor circuit range/performance problem

To conduct the OBD Drive Mode:

1. Warm up the engine to normal operating temperature.
2. Verify all accessory loads (A/C, headlights, blower fan, rear window defroster) are off.
3. Drive the vehicle five times in the driving mode indicated in the figure on a road with a 0% gradient.
4. Stop the vehicle.
5. Verify no DTCs are present.



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1	Time	4	Idle
2	Vehicle Speed	5	Above 35 km/h {21.7 mph} (2nd gear)
3	Start Engine	6	Above 50 km/h {31 mph} (3nd gear)

On-board diagnostic system (continued)

PID monitor

- The **PID** (**P**arameter **Id**entification) monitor function allows the PIDs of the PCM to be monitored. To do this connect the **WDS** (**W**orldwide **D**iagnostic **S**ystem) to the vehicle and select the option **Toolbox→Datalogger→Modules→PCM.**

Monitor item	Definition	Unit/Condition
ACCS	A/C relay	On/Off
AC_REQ	A/C switch	On/Off
ACR	A/C relay	On/Off
APS1	Accelerator pedal position sensor No.1 - voltage	V
APS2	Accelerator pedal position sensor No.2 - voltage	V
ARPMDES	Target engine speed	RPM
BARO	Barometric pressure	Pa / inHg
		V
BOOST_DSD	Desired boost pressure	Pa psi Bar
COLP	Refrigerant pressure switch (middle)	On/Off
CPP	Clutch pedal position switch	On/Off
CPP/PNP	neutral switch	Neutral/Drive
CR_1	Calibration resistor voltage 1	V
CR_2	Calibration resistor voltage 2	
CR_3	Calibration resistor voltage 3	
CR_4	Calibration resistor voltage 4	
DEC_CMP	Fuel correction for deceleration	mm^3/Stroke
DSC_ACT	DSC control enable/disable	Enabled/Disabled
DTCCNT	DTC count	-
ECT	Engine coolant temperature	°C / °F
		V
EGRA	Exhaust gas recirculation solenoid valve (vent)	%
EGRV	Exhaust gas recirculation solenoid valve (vacuum)	%
EGRV2	Exhaust gas recirculation control solenoid valve	On/Off
EGRVP	EGR valve position	V
FAN_DUTY	Variable fan duty cycle	%
FFH_STAT	FFH status	Active/Inactive
FIP_FL	FIP flow control	A
		%
FIP_FL_DSD	FIP flow desired	mm^3/Stroke

On-board diagnostic system (continued)

PID monitor (continued)

Monitor item	Definition	Unit/Condition
FIP_LRN	FIP learning amount	A
FIP_MODE	FIP duty control status	Normal/Fixed_1/Fixed_2/Disabled
FIP_SCV	Suction control valve	A
		V
FLT	Fuel temperature	°C / °F
FLTV	FLT signal voltage	V
FRP	Fuel pressure sensor	V
		Pa
FRP_A	FRP after fuel injection	Pa
GLWPG V	Glow plugs	V
GPC	Glow plug control	On/Off
IASV	Intake shutter solenoid valve (half) control	On/Off
IASV2	Intake shutter solenoid valve (full) control	On/Off
IAT	Intake air temperature	°C / °F
		V
IAT2	Intake air temperature No.2	°C / °F
		V
ICP	Injector control pressure	Pa psi Bar
IMRC	VSC solenoid valve	On/Off
INGEAR	In gear	On/Off
INJ_LRN_DIS	Distance from the last injector learning	m mile
INJ_MODE	Fuel injection timing control status	Normal/Disabled/Splitted/Fixed
INJ_TIM	Fuel injection timing	°
INJ1_CMP	Injector 1 correction value	mm^3/Stroke
INJ2_CMP	Injector 2 correction value	
INJ3_CMP	Injector 3 correction value	
INJ4_CMP	Injector 4 correction value	
ISC_CMP	Fuel correction for idle speed control	mm^3/Stroke
IVS	Idle switch	Idle/Off Idle

On-board diagnostic system (continued)

PID monitor (continued)

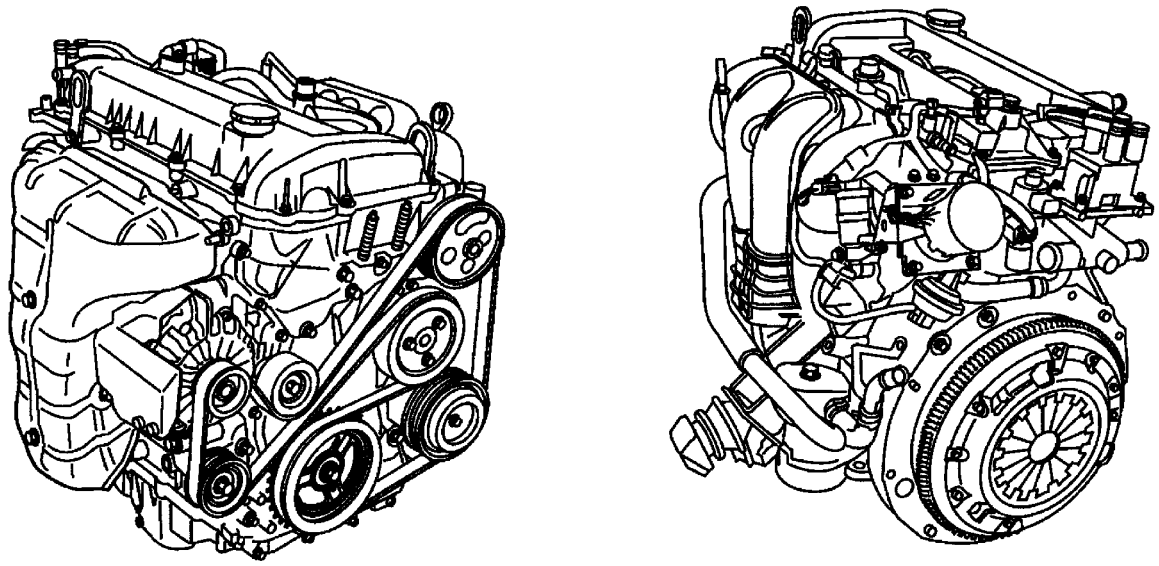
Monitor item	Definition	Unit/Condition	
MAF	Mass air flow amount	g/s	
		V	
MAF_C	MAF per cylinder	G	
MAF_C_DSD	MAF per cylinder desired	g	
MAF_LRN_DIS	Distance from the last MAF learning	m mile	
MAINRLY	PCM control relay	On/Off	
MAP	Manifold absolute pressure	V	
		Pa	inHg
MIL	Malfunction indicator lamp	On/Off	
MULTI_INJ	Multiple fuel injection control status	1_INJ/2_INJ/3_INJ/4_INJ/5_INJ/Disabled	
RPM	Engine speed	RPM	
START_SW	Starter switch value	On/Off	
TC_CMP	Fuel correction for traction control	mm^3/Stroke	
VBCV	VBC solenoid valve control	%	
VFDES	Volume fuel desired	mm^3/Stroke	
VPWR	Battery positive voltage	V	
VSS	Vehicle speed	KPH	MPH

L3 Engine

Features

- The L3 engine is basically carried over from the present MPV (LW) except for the following:
  - Catylitic convertor performance has been improved.
  - Engine management maps in PCM altered to suit improved catalytic convertor performance
  - Engine oil capacity has been increased

Overview



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Lubrication

Specifications

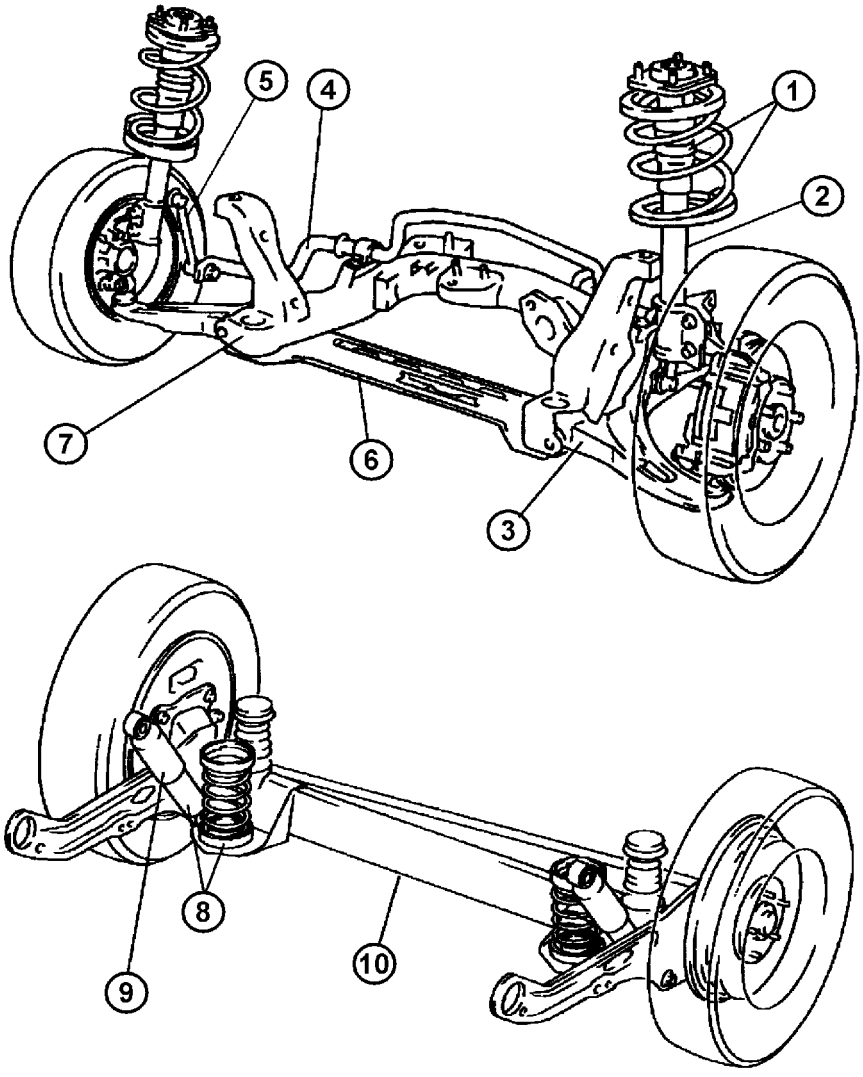
Item		Specification
Oil pressure (reference value)	(kPa {kgf/cm^2, psi} [rpm])	300-549 {3.1-5.6, 44-80} [3,000]
Oil capacity (Approx. quantity)	Total (Dry engine) (L {US qt, Imp qt})	5.1 {5.4, 4.5}
	Oil replacement (L {US qt, Imp qt})	4.0 {4.2, 3.5}
	Oil and oil filter replacement (L {US qt, Imp qt})	4.4 {4.6, 3.9}

Front and Rear Suspension

Features

- New front and rear dampers with multi-layer valves have been adopted (Karakuri seat version only)

Parts Location



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1	Front shock absorber and spring	6	Transverse member
2	Front shock absorber	7	Front crossmember
3	Front lower arm	8	Rear shock absorber and spring
4	Front stabilizer	9	Rear shock absorber
5	Stabilizer control link	10	Torsion beam axle

Conventional Brake System

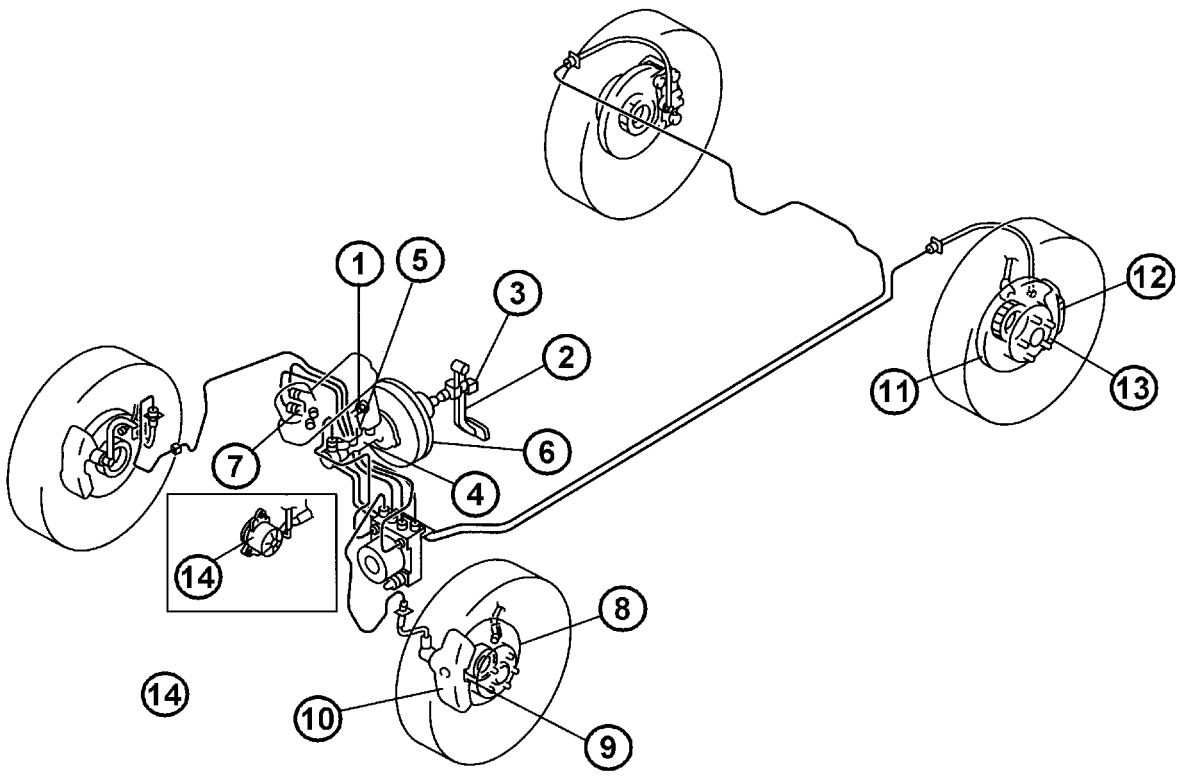
Features

- The brake system on the F/L MPV has undergone the following changes:
  - Ventilated rear disc brakes have been adopted
  - Larger bore master cylinder has been adopted
  - A tandem diaphragm power brake unit has been adopted
  - Replacement procedure for master cylinder has been changed

Specifications

		L3	RF-T
Master cylinder	Type	Tandem	
	Cylinder diameter (mm {in})	25.4 {1.0}	
Power brake unit	Diameter (mm {in})	213.4 + 240.2 {8.40 + 9.43}	
Front disc brake	Type	Ventilated	
	Disc plate dimensions (outer diameter x thickness) (mm {in})	274 x 28 {10.8 x 1.1}	296 x 28 {11.7 x 1.1}
Rear disc brake	Type	Ventilated	
	Disc plate dimensions (outer diameter x thickness) (mm {in})	286 x 18 {11.3 x 0.7}	

Parts location



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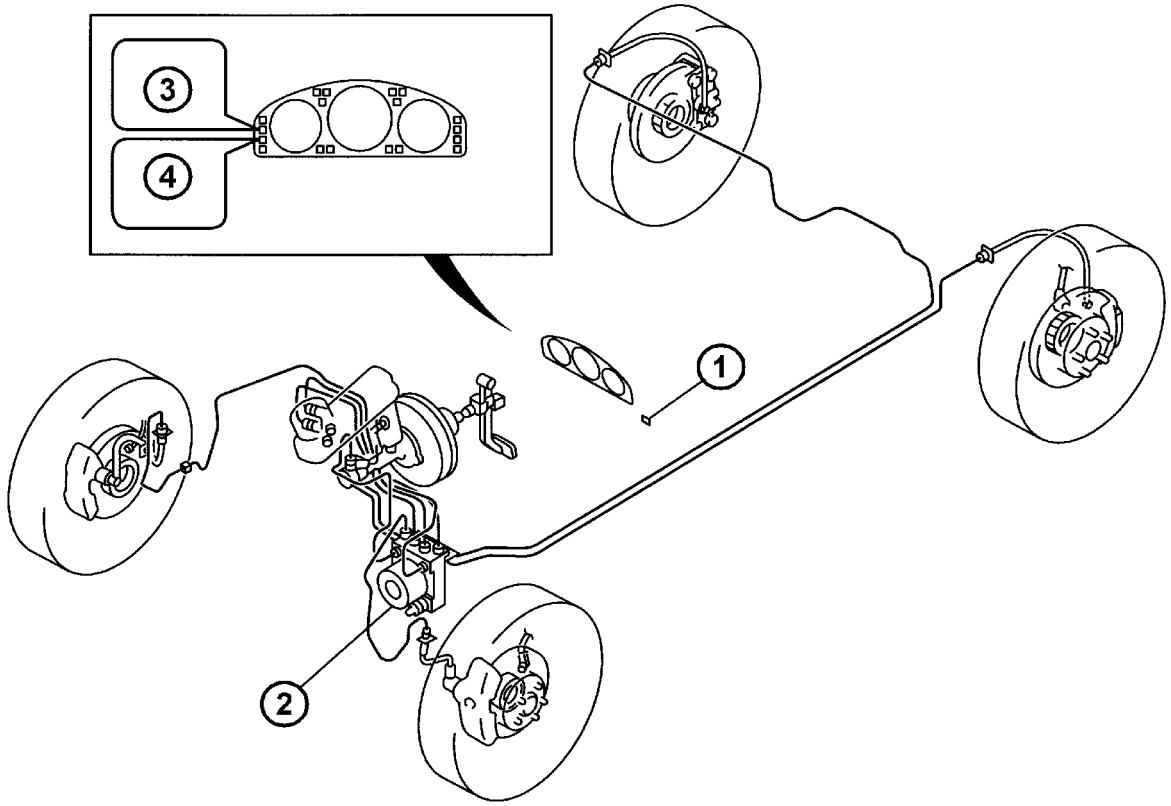
1	Vacuum hose check valve	8	Front brake (disc)
2	Brake pedal	9	Disc pad (front)
3	Brake switch	10	Caliper (front)
4	Master cylinder	11	Rear brake (disc)
5	Fluid level sensor	12	Disc pad (rear)
6	Power brake unit	13	Caliper (rear)
7	Brake pipe joint	14	Vacuum pump (MZR-CD (RF Turbo))

Traction Control System (RF-T)

Features

- **TCS** (**T**raction **C**ontrol **S**ystem) has been adopted for RF-T engine models.

Parts location



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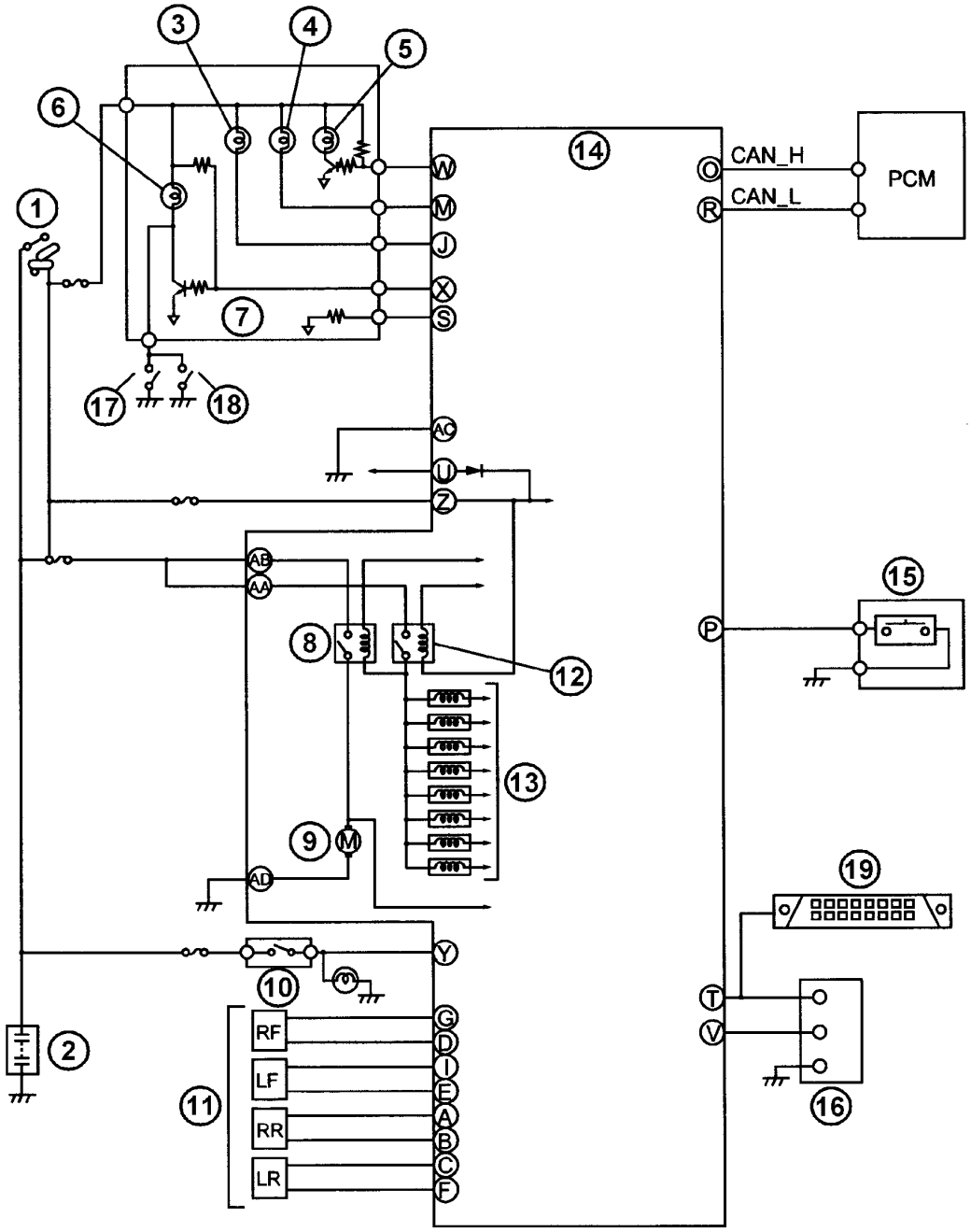
1	TCS off switch	3	TCS OFF
2	ABS/TCS HU/CM	4	TCS

Wiring diagram



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1	Ignition switch	11	ABS wheel-speed sensor
2	Battery	12	Fail-safe relay
3	TCS OFF light	13	Solenoid valve
4	TCS indicator light	14	ABS/TCS HU/CM
5	ABS warning light	15	TCS OFF switch
6	BRAKE system warning light	16	Data link connector (DLC)
7	Instrument cluster	17	Parking brake switch
8	Motor relay	18	Brake fluid level sensor
9	ABS motor	19	Data link connector-2 (DLC-2)
10	Brake switch		

Control system

- Communication between the ABS/TCS module and the PCM is carried out through a high-speed **CAN**-BUS (**C**ontroller **A**rea **N**etwork-BUS).

Data sent
- Torque reduction request
- Wheel speeds of all four wheels

Data received
- Engine speed
- Engine torque
- Throttle valve opening angle
- Vehicle speed

On-board diagnostic system

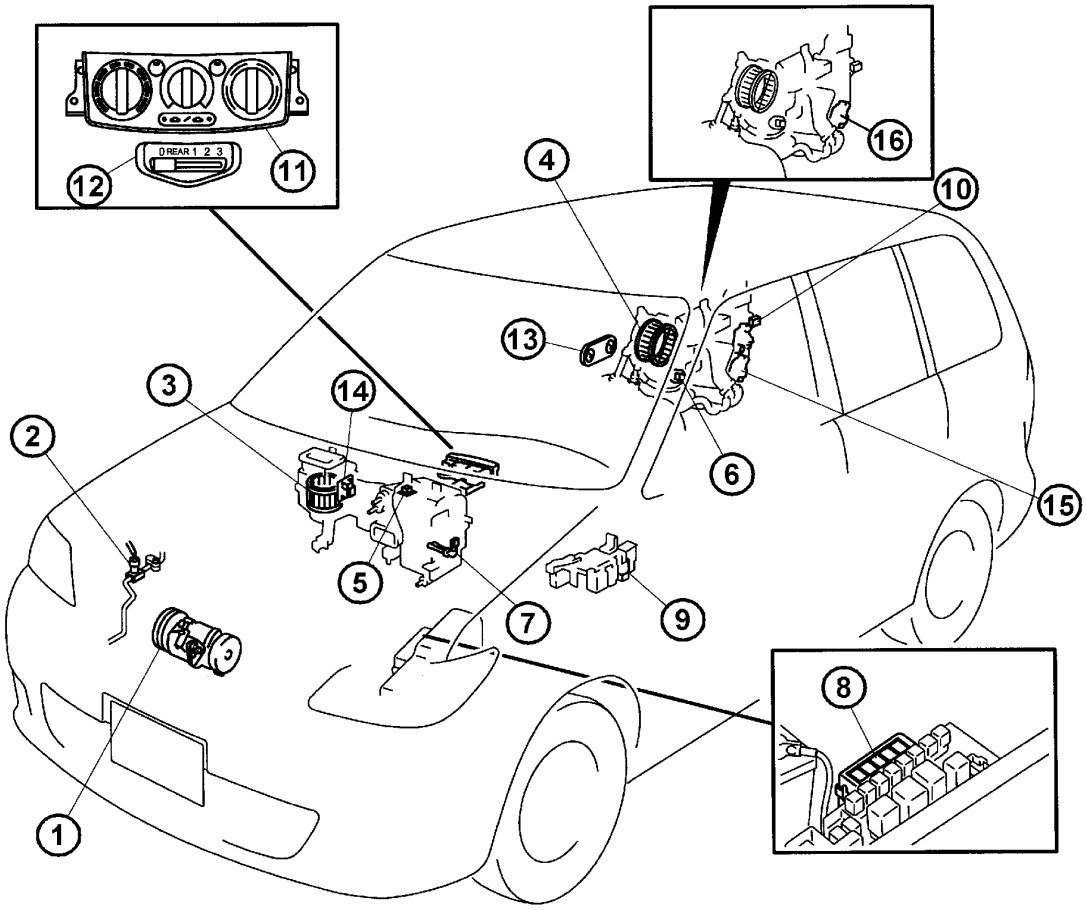
- The on-board diagnostic system for the RF-T TCS is basically the same as that for the L3 engine system except for the following:
  - Diagnostic procedures for DTCs C1117,C1119, U0100, U0073 are different than those for the L3 engine

Rear Climate Control

Features

- A two-dial type rear climate control unit has been adopted
- The air-mix door and airflow mode door are actuated by a single actuator, eliminating the air mix actuator (vehicles fitted with rear A/C and heater only)
- A ½ hot position (actuator in center position) is available on some models (vehicles fitted with rear heater only)

Parts location



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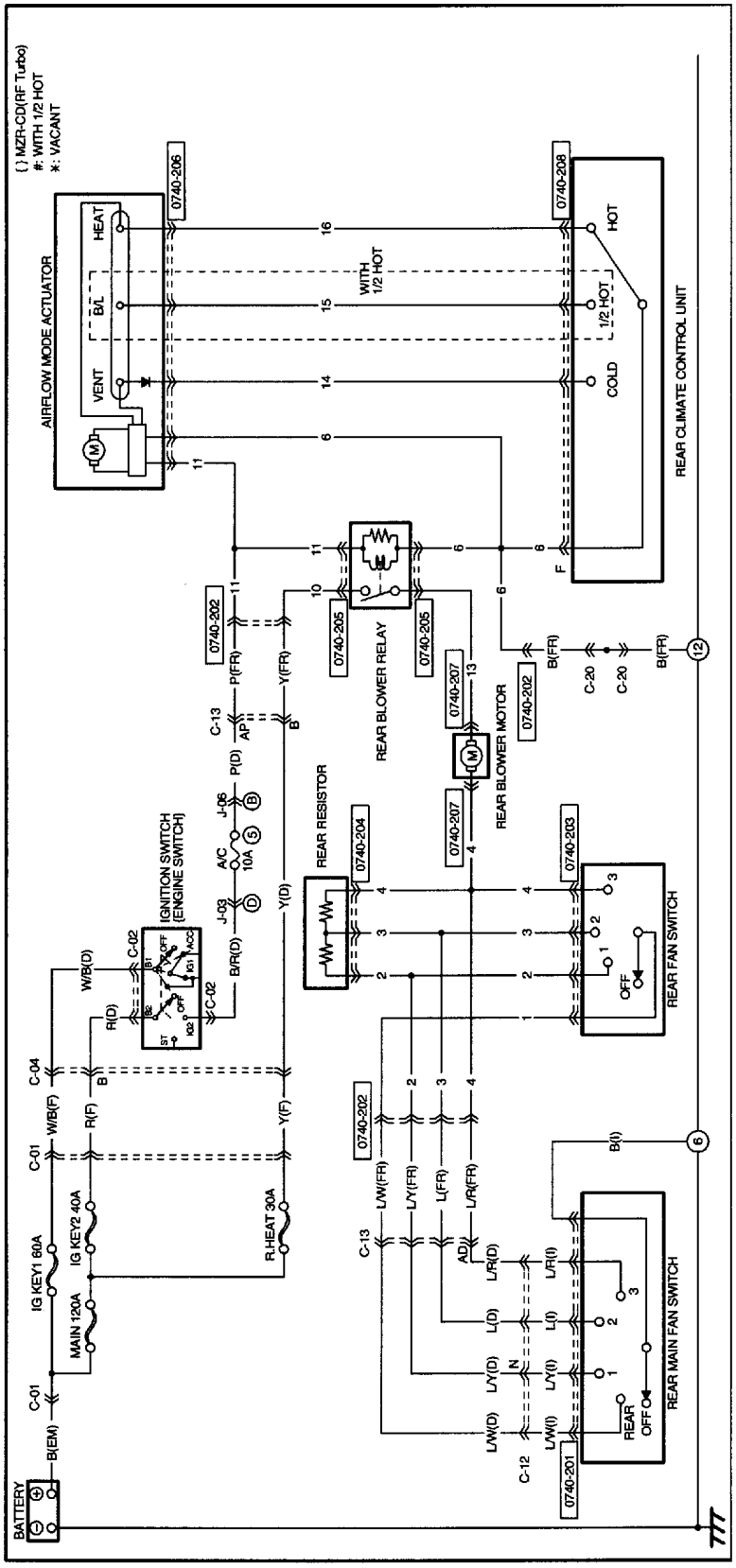
1	Magnetic clutch	9	Front blower relay
2	Refrigerant pressure switch	10	Rear blower relay
3	Front blower motor	11	Front climate control unit
4	Rear blower motor	12	Rear main fan switch
5	Front resistor	13	Rear climate control unit
6	Rear resistor	14	Intake actuator
7	Thermosensor	15	Rear airflow mode actuator (heater only)
8	A/C relay	16	Rear airflow mode/mix actuator (A/C and heater)

Wiring diagram



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Fuel Fired Heater

On-board diagnostic system

- A self test/combustion test procedure, and lockout reset procedure have been added
- PID and simulation item tables have been added to the workshop manual
- A symptom troubleshooting index for the fuel fired heater has been added to the workshop manual.

Combustion test

1. Connect the SST (WDS or equivalent) to the vehicle DLC-2 16-pin connector
2. Select the "Supplemental Heater Test" in the "Supplemental Heater Menu" of the "Guided Diagnosis" function
3. Perform the KOEO Self Test/Combustion Test

NOTE: If the water heater unit is operating, the water heater unit will reject the test command. Perform the DTC reading procedure after the water heater unit stops operating

Lockout reset (using WDS)

1. Connect the SST (WDS or equivalent) to the vehicle DLC-2 16-pin connector
2. Select "CLR_LOCKOUT" and "LOCKOUT
3. Turn "CLR_LOCKOUT" to ON using the simulation function
4. Verify that the "LOCKOUT" reading changes to "Unlocked"

Lockout reset (not using WDS)

For factory equipped water heater unit

1. Turn the ignition switch to the OFF position
2. Remove the W.HEAT 40 A fuse from the main fuse block for more than 5 seconds
3. Re-install the W.HEAT 40 fuse

For vehicles with a transmitter or timer

1. Turn the ignition switch to the OFF position
2. Remove the power supply 40 A fuse from the heater wiring harness for approx. 3 seconds
3. Re-install the power supply 40 A fuse
4. Press and hold down the ON switch of the transmitter or timer for approx. 3 seconds
5. Remove the power supply 40 A fuse from the heater wiring harness for approx. 3 seconds
6. Re-install the power supply 40 A fuse

On-board diagnostic system (continued)

PID monitor

PID Name	Definition	Unit/Condition	
CCNTFFH	Number of continuous codes)	-	
ECT	Engine coolant temperature	°C	°F
VPWR_FFH	Module supply voltage	V	
VPWR_LMT	Low voltage threshold	V	
FAN	Fan control	%	
GPD	Glow plug duty cycle	%	
BLOWRMTR	Blower motor	On/Off	
FP	Fuel pump	On/Off	
WATER_PMP	Water pump	On/Off	
GLOW PLUG	Glow plugs	On/Off	
COMB_FAN	Combustion air fan	On/Off	
LOCKOUT	Heater lockout	Lock/Unlock	
FS	Flame sensor	On/Off	
HEATER	Heater status	Inactive/Active	
HEATER_SW	Heater activation switch	Inactive/Active	

Simulation Test Item Table

Item	Definition	Operation
CLR_LOCKOUT	Heater lockout mode clearing command	On/-
FUEL_PRIME	Fuel pump priming command (The fuel pump is activated for 5 seconds.)	On/-

Body and Accessories

Features

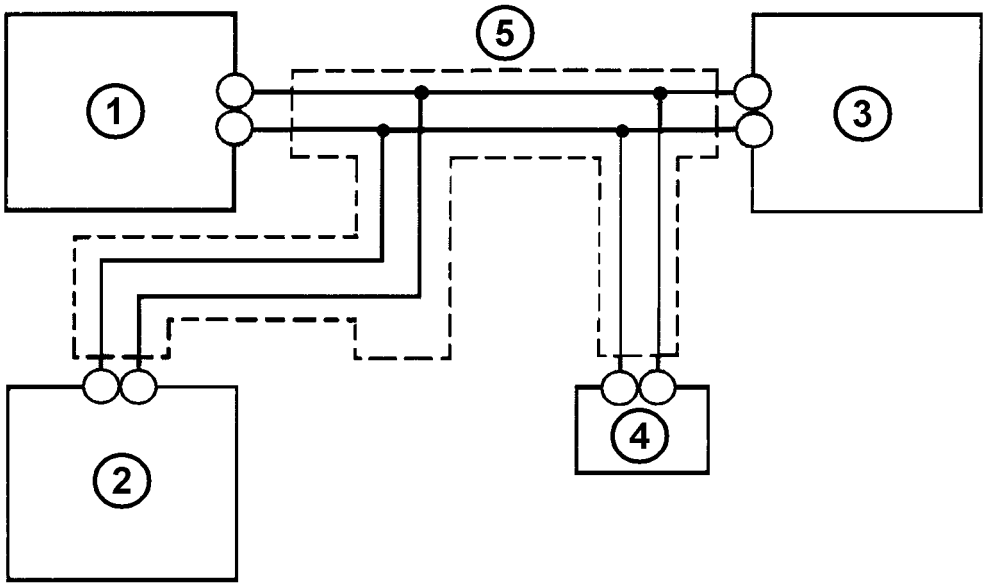
- The headlamp design has been changed
- Seven new body colours have been introduced: Blue Pacific Mica, Gloaming Silver, Razor Blue, Nordic Green Mica, Titanium Grey II Mica, Arctic White, Snowflake White Pearl
- A three spoke steering wheel has been adopted
- Karakuri seats are available on some versions
- Driver information system now available for diesel vehicles

Multiplex communication system

- A high-speed CAN multiplex communication system, as well as the existing ISO 9141 communication system have been adopted on diesel engine vehicles.

CAN

- The following modules are connected to the CAN bus:
  - PCM
  - ABS/TCS module
  - Fuel fired heater
  - DLC-2



CAN diagram MPV

1	PCM	4	DLC-2
2	ABS/TCS module	5	Twisted wires
3	Fuel fired heater		

ISO 9141

- The following items are connected to the ISO 9141 network:
  - ABS/TCS module
  - DLC-2
  - DLC-1

ABS	**A**nti-Lock **B**rake **S**ystem	**L.H.D.**	**L**eft **H**and **D**rive
A/C	**A**ir **C**onditioning	**R.H.D.**	**R**ight **H**and **D**rive
BARO	**Baro**metric Pressure	**MAF**	**M**ass **A**ir **F**low
CAN*	**C**ontroller **A**rea **N**etwork	**MAP**	**M**anifold **A**bsolute **P**ressure
CKP	**C**ran**k**shaft **P**osition	**OBD**	**O**n **B**oard **D**iagnostics
CMP	**C**a**m**shaft **P**osition	**PCM**	**P**owertrain **C**ontrol **M**odule
CPP	**C**lutch **P**edal **P**osition	**PID**	**P**arameter **Id**entification
DLC	**D**ata **L**ink **C**onnector	**SST**	**S**pecial **S**ervice **T**ool
DSC	**D**ynamic **S**tability **C**ontrol	**TCS**	**T**raction **C**ontrol **S**ystem
DTC	**D**iagnostic **T**rouble **C**ode	**VBC**	**V**ariable **B**oost **C**ontrol
ECT	**E**ngine **C**oolant **T**emperature	**VSC**	**V**ariable **S**wirl **C**ontrol
EGR	**E**xhaust **G**as **R**ecirculation	**VSS**	**V**ehicle **S**peed **S**ensor
HU/CM	**H**ydraulic **U**nit/**C**ontrol **M**odule	**WDS**	**W**orldwide **D**iagnostic **S**ystem
IDM	**I**njector **D**river **M**odule		
KOEO	**K**ey **O**n **E**ngine **O**ff		