GROUP 1

BRAKING EQUIPMENT

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1.1. Mechanical condition and operation

1.1.1. Service brake pedal/hand lever pivot

M6101010100072

"Not Applicable"

1.1.2. Pedal/hand lever condition and travel of the brake operating device

M6101010200079

"Not Applicable"

1.1.3. Vacuum pump or compressor and reservoirs

M6101010300076

"Not Applicable"

1.1.4. Low pressure warning gauge or indicator

M6101010400073

"Not Applicable"

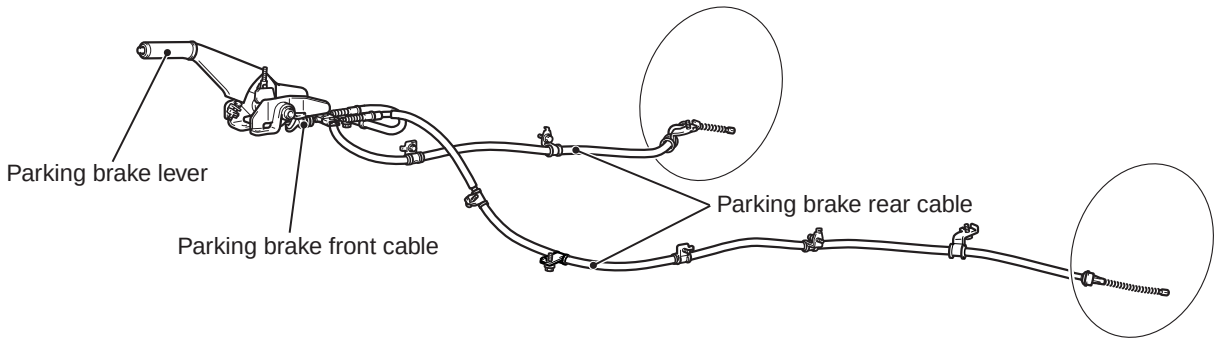
1.1.6. Parking brake activator, lever control, parking brake ratchet, electronic parking brake

M6101000100071

LEVER TYPE PARKING BRAKE

The parking brake is a mechanical rear-wheel acting type, and its operation utilizes a parking brake lever.

CONSTRUCTION DIAGRAM



AC500579AI

1.1.8. Couplings for trailer brakes (electrical & pneumatic)

M6101010800071

"Not Applicable"

1.1.9. Energy storage reservoir pressure tank

M6101010900078

"Not Applicable"

1.1.11. Rigid brake pipes

M6101011100075

"Not Applicable"

1.1.12. Flexible brake hoses

M6101011200072

"Not Applicable"

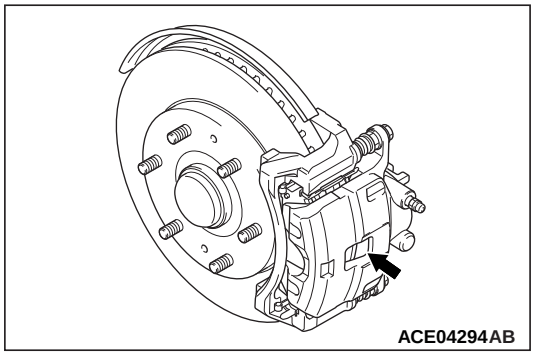
1.1.13. Brake linings and pads

M6101000200090

BRAKE PAD CHECK <1-PISTON>

⚠ CAUTION

If there is a significant difference in thickness between the brake pads at right and left, check the sliding area and the run-out of the brake disc.



1. Visually check the thickness of brake pad from the inspection hole of the caliper body.

   <Standard brake pads>
   Standard value: 9.5 mm
   Limit: 1.5 mm

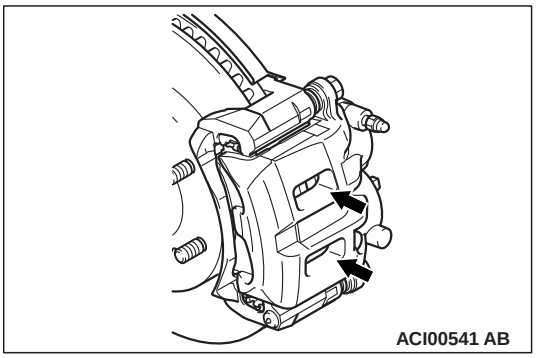
   <Low steel brake pads>
   Standard value: 10.0 mm
   Limit: 1.5 mm

2. If the brake pad thickness is less than the limit value, replace the brake pad.

BRAKE PAD CHECK <2-PISTON>

⚠ CAUTION

If there is a significant difference in thickness between the brake pads at right and left, check the sliding area and the run-out of the brake disc.



1. Visually check the thickness of brake pad from the inspection hole of the caliper body.

   Standard value: 12.0 mm
   Limit: 2.0 mm

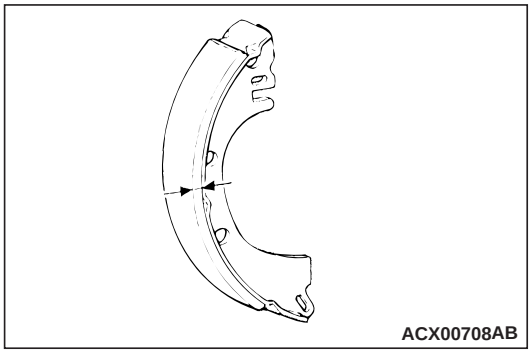
2. If the brake pad thickness is less than the limit value, replace the brake pad.

BRAKE LINING THICKNESS CHECK

⚠ CAUTION

- **Whenever the shoe and lining assembly is replaced, replace both RH and LH assemblies as a set to prevent the car from pulling to one side when braking.**
- **If there is a significant difference in the thickness of the shoe and lining assemblies on the left and right sides, check the sliding condition of the piston.**

1. Remove the brake drum.



2. Measure the thickness of the brake lining at the area with the worst wear.

   Standard value: 5.0 mm
   Limit:1.0 mm

3. Replace the shoe and lining assembly if the brake lining thickness is less than the limit or if it is not worn evenly. For installation procedures for the shoe and lining assembly.

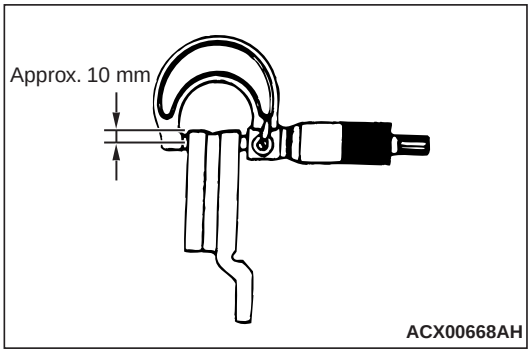
1.1.14. Brake drums, brake discs

M6101000300097

BRAKE DISC CHECK

BRAKE DISC THICKNESS CHECK

1. Remove contaminants or corrosion from the brake disc surface.



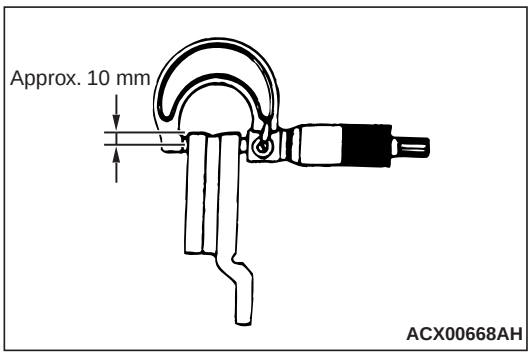
2. Use a micrometer to measure the brake disc thickness at minimum eight points which are 10 mm inward from its circumference.

   Standard value: 28.0 mm
   Limit: 26.4 mm

3. If the brake disc thickness is worn beyond the limit value at more than one point, replace the brake disc and check its run-out.

BRAKE DISC THICKNESS UNEVENNESS CHECK AND CORRECTION

1. Remove contaminants or corrosion from the brake disc surface.

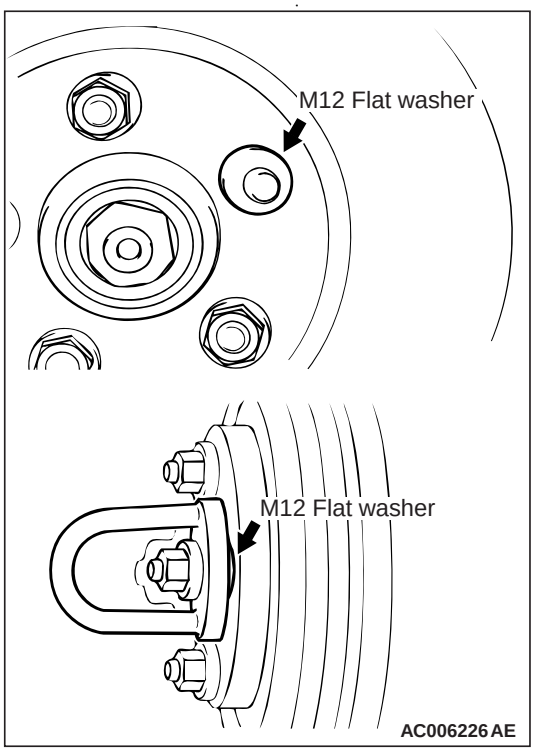


2. Use a micrometer to measure the brake disc thickness at minimum eight points which are 10 mm inward from its circumference. Then record the measurements.
3. If the brake disc thickness unevenness (the difference between the maximum and minimum values measured above) is 0.015 mm or less, it is within the standard value.
4. If the brake disc thickness unevenness exceeds the standard value, grind it according to the procedure below while it is mounted on the vehicle.

   NOTE: If it is suspected that the brake disc thickness will become less than the limit value after the grinding, replace the brake disc and check its run-out.

   (1) Check for wheel bearing looseness in the axial direction.

⚠ CAUTION



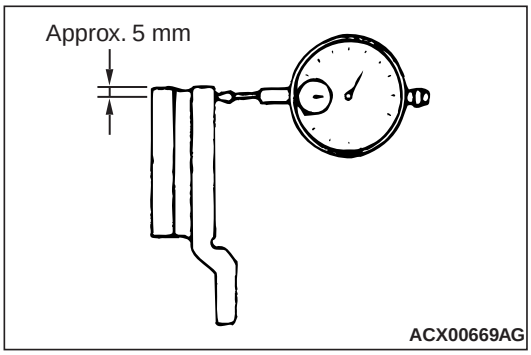
Insert M12 plain washer and then install the adapter as shown before grinding. Failure to use the M12 plain washer will cause the brake disc to be deformed and ground incorrectly.

- **To grind the brake disc, ensure that all the nuts (M12 X 1.5) are tightened evenly and in a diagonal sequence to the specified torque (100 N·m). Failure to use all the nuts (M12×1.5), excessive or uneven tightening torque will cause the brake disc to deform or judder.**

   (2) Correct the brake disc uneven thickness by grinding it while in place on the vehicle.

BRAKE DISC RUN-OUT CHECK AND CORRECTION

1. Check for wheel bearing looseness in the axial direction.
2. If the axial play is within the limit value, secure the brake disc by tightening the nut (M12×1.5) evenly to the specified torque (100 N·m).If the axial play still exceeds the limit value, replace the wheel bearing. Then secure the brake disc by tightening the nut (M12×1.5) evenly to the specified torque (100 N·m).

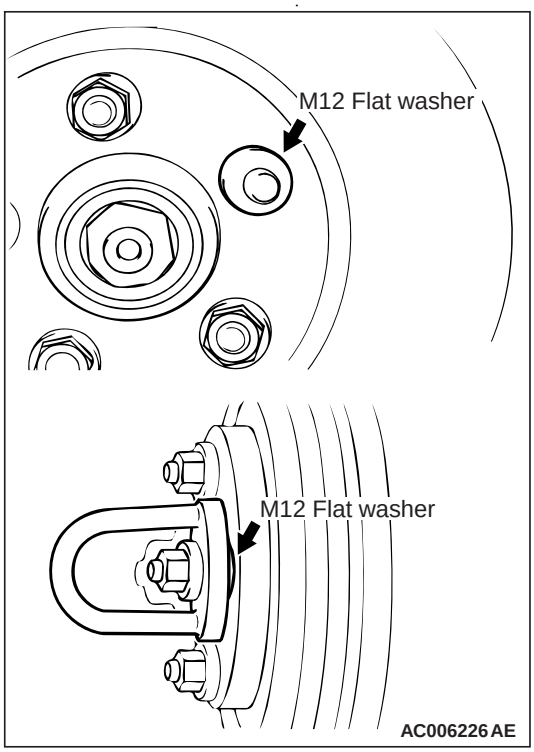


3. Place a dial gauge ca. 5 mm inward from the circumference of the brake disc to measure its run-out.

   Limit: 0.06 mm

4. If the brake disc run-out exceeds the limit value, rephase the brake disc to the hub so that the minimum brake disc run-out is obtained.

⚠ CAUTION



Insert M12 plain washer and then install the adapter as shown before grinding. Failure to use the M12 plain washer will cause the brake disc to be deformed and ground incorrectly.

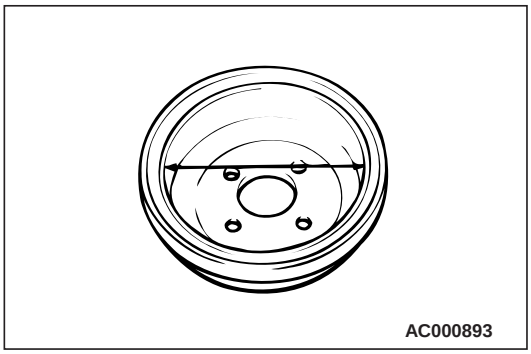
- **To grind the brake disc, ensure that all the nuts (M12 X 1.5) are tightened evenly and in a diagonal sequence to the specified torque (100 N·m). Failure to use all the nuts (M12×1.5), excessive or uneven tightening torque will cause the brake disc to deform or judder.**

5. If the brake disc run-out exceeds the limit value after rephasing, grind the disc while in place on the vehicle so that the brake disc run-out is within the limit value.

   NOTE: If it is suspected that the brake disc thickness will be below the limit value, replace the brake disc.Then rephase the brake disc so that the minimum brake disc run-out is obtained, or grind the disc while in place on the vehicle so that its run-out is below the limit value.

BRAKE DRUM INSIDE DIAMETER CHECK

1. Remove the brake drum.



2. Measure the inside diameter of the brake drum at two or more locations.

   Standard value:
   295 mm

   Limit:
   297 mm

3. Replace the brake drums, shoe and lining assembly when wear exceeds the limit value or is badly imbalanced.

1.1.15. Brake cables, rods, levers, linkages

M6101011500073

"Not Applicable"

1.1.16. Brake actuators (including spring brakes or hydraulic cylinders)

M6101011600070

"Not Applicable"

1.1.17. Load sensing valve

M6101011700077

"Not Applicable"

1.1.18. Slack adjusters and indicators

M6101011800074

"Not Applicable"

1.1.19. Endurance braking system (where fitted or required)

M6101011900071

"Not Applicable"

1.1.20. Automatic operation of trailer brakes

M6101012000071

"Not Applicable"

1.1.22. Test connections (where fitted or required)

M6101012200075

"Not Applicable"

1.1.23. Overrun brake

M6101012300072

"Not Applicable"

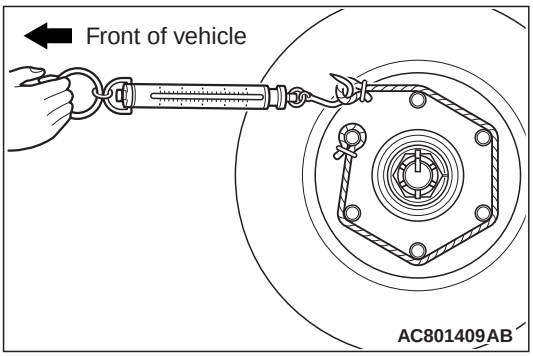
1.2 Service braking performance and efficiency

1.2.1. Performance

M6102000100074

BRAKE DRAG FORCE CHECK

1. Remove the pad assembly, pad and wear indicator assembly, shim, shim cover and clip.



2. Using a spring scale, measure the hub sliding torque in the forward direction with the pad assembly, pad and wear indicator assembly, shim, shim cover and clip removed.
3. Install the pad assembly, pad and wear indicator assembly, shim, shim cover and clip.
4. Start the engine, and depress the brake pedal lightly two or three times. Then stop the engine. (Depressing force: approximately 50 – 100 N)
5. Turn the brake disc 10 times in the forward direction.
6. Using a spring scale, measure the hub sliding torque in the forward direction with the pad assembly, pad and wear indicator assembly, shim, shim cover and clip installed.
7. Obtain the disc brake drag force (difference between measured values of item 2 and item 6).

   Standard value:
   56 N or less
8. If the brake drag force exceeds the standard value, disassemble the front brake assembly to check for fouling/rust on the piston sliding section, piston seal and piston boot deterioration, and confirm whether the pin slide properly.

1.2.2. Efficiency

M6102010200072

"Not Applicable"

1.3. Secondary (emergency) braking performance and efficiency (if met by separate system)

1.3.1. Performance

M6103000100077

"Not Applicable"

1.3.2. Efficiency

M6103010100078

"Not Applicable"

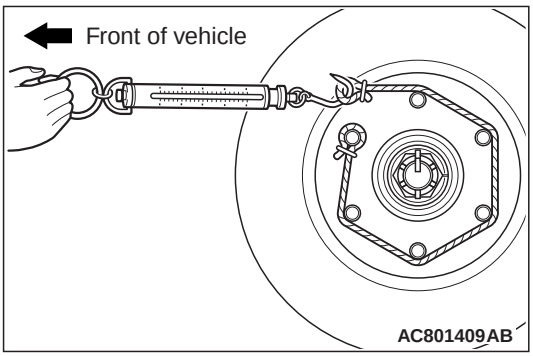
1.4. Parking braking performance and efficiency

1.4.1. Performance

M6104000100081

BRAKE DRAG FORCE CHECK

1. Remove the pad assembly, pad and wear indicator assembly, shim, shim cover and clip.



2. Using a spring scale, measure the hub sliding torque in the forward direction with the pad assembly, pad and wear indicator assembly, shim, shim cover and clip removed.
3. Install the pad assembly, pad and wear indicator assembly, shim, shim cover and clip.
4. Start the engine, and depress the brake pedal lightly two or three times. Then stop the engine. (Depressing force: approximately 50 – 100 N)
5. Turn the brake disc 10 times in the forward direction.
6. Using a spring scale, measure the hub sliding torque in the forward direction with the pad assembly, pad and wear indicator assembly, shim, shim cover and clip installed.
7. Obtain the disc brake drag force (difference between measured values of item 2 and item 6).

   Standard value:
   56 N or less
8. If the brake drag force exceeds the standard value, disassemble the front brake assembly to check for fouling/rust on the piston sliding section, piston seal and piston boot deterioration, and confirm whether the pin slide properly.

1.4.2. Efficiency

M6104010200078

"Not Applicable"

1.5. Endurance braking system performance

M6104500000078

"Not Applicable"

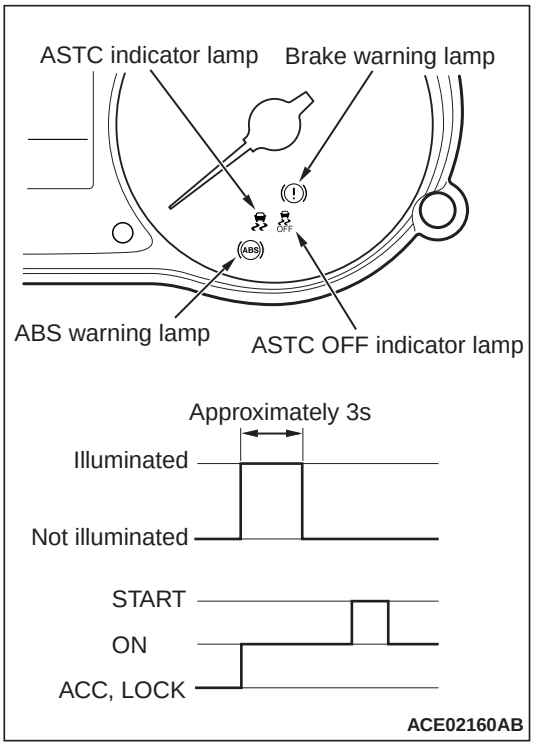
1.6. Anti-lock braking system (ABS)

M6105000000076

BRAKE WARNING LAMP, ABS WARNING LAMP, ASTC INDICATOR LAMP, ASTC OFF INDICATOR LAMP INSPECTION

Check that Anti-lock Brake System (ABS) warning lamp, brake warning lamp, ASTC indicator lamp and ASTC OFF indicator lamp illuminate as follows.

NOTE: The brake warning lamp is used as a warning lamp for parking brake, brake fluid level, and Electronic brake-force distribution (EBD) control.



1. When the ignition switch is turned to the "ON" position, ABS warning lamps, brake warning lamps, ASTC indicator lamp and ASTC OFF indicator lamp illuminate.
2. The ABS warning lamps, brake warning lamps, ASTC indicator lamp and ASTC OFF indicator lamp illuminate for three seconds*1 and then turn "OFF"*2.
3. Otherwise, check the diagnosis code.

NOTE:

- **1: The ABS warning lamp, ASTC indicator lamp may stay ON until the vehicle speed reaches 25 km/h. As far as ASTC-ECU sets any diagnosis code related to the wheel speed sensor malfunction or the motor malfunction as past trouble, ASTC-ECU continues illuminating the ABS warning lamp until it verifies that the malfunction for that code is resolved (startup check).*

If the steering wheel sensor or the G and yaw rate sensor system was detected to be defective during ignition switch being "ON" at the last time, the ASTC indicator lamp will illuminate until the vehicle speed reaches approximately 25 km/h, then the steering wheel is turned to either right or left and then the ECU determines that the system is normal.

- **2: The brake warning lamp does not turn OFF when the parking brake is applied or the brake fluid level is lowered.*

1.7 Electronic brake system (EBS)

M6106000000079

"Query raised for this content"

1.8 Brake fluid

M6107000000072

"Not Applicable"

GROUP 2

STEERING

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2.1. Mechanical condition

2.1.1. Steering gear condition

M6111000100072

"Not Applicable"

2.1.2. Steering gear casing attachment

M6111010200070

"Not Applicable"

2.1.3. Steering linkage condition

M6111010300077

"Not Applicable"

2.1.4. Steering linkage operation

M6111010400074

"Not Applicable"

2.1.5. Power steering

M6111010500071

"Not Applicable"

2.2. Steering wheel, column and handle bar

2.2.1. Steering wheel/handle bar condition

M6110110100077

"Not Applicable"

2.2.2. Steering column/yokes and forks and steering dampers

M6110110200074

"Not Applicable"

2.3. Steering play

M6110300000073

"Not Applicable"

2.4. Wheel alignment (X)2

M6110400000070

"Not Applicable"

2.5. Trailer steered axle turntable

M6110500000077

"Not Applicable"

2.6. Electronic Power Steering (EPS)

M6110600000074

"Not Applicable"

GROUP 3

VISIBILITY

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3.1. Field of vision

M6121100000073

"Not Applicable"

3.2. Condition of glass

M6121200000070

"Not Applicable"

3.3. Rear-view mirrors or devices

M6121300000077

"Not Applicable"

3.4. Windscreen wipers

M6121400000074

"Not Applicable"

3.5. Windscreen washers

M6121500000071

"Not Applicable"

3.6. Demisting system (X)2

M6121600000078

"Not Applicable"

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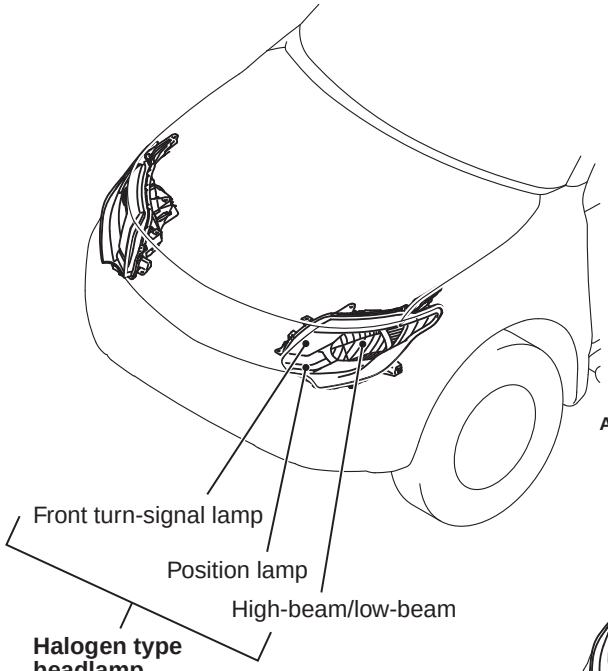
4.13. BATTERY(IES) 4-27

4.1. Headlamps

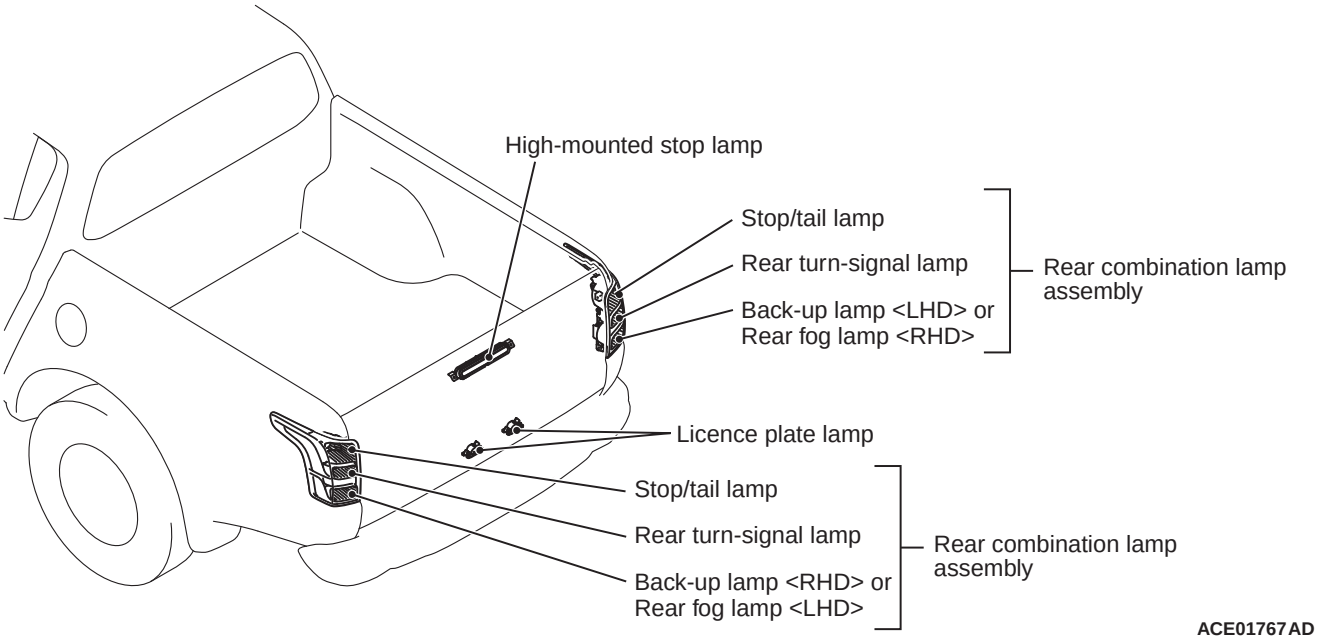
4.1.1. Condition and operation

M6131000100096

Construction diagram <VEHICLES FOR EUROPE>



ACE02836AB



- A headlamp assembly includes a headlamp bulb (high-beam / low-beam), a position lamp and a front turn-signal lamp.
- The system actuates the shield plate in the projector unit to switch the discharge type headlamp beams (low/high beams) when the driver operates the column switch (lighting switch) <Vehicles with discharge type headlamp>.
- The LED-type daytime running lamp has been installed to the headlamp <Vehicles with discharge type headlamp>.
- There are three types of front fog lamps; front fog lamp <vehicles without daytime running lamp>, front fog lamp <vehicles with daytime running lamp> and daytime running lamp. These are installed on the front bumper.
- Two types of the side turn-signal lamp have been established: the one attached to the fender panel and the one integrated into the door mirror.
- The rear combination lamp assembly are integrated with the stop/tail lamp, the rear turn-signal lamp, the back-up lamp and the rear fog lamp.
- The rear fog lamp has been installed to the driver's side.
- The LED-type high-mounted stop lamp have been integrated into the rear gate.
- The licence plate lamp has been installed in the upper part of the licence plate.
- The lighting system is provided with headlamp automatic-shutdown function.
- For the flasher timer function of the turn-signal lamps, the comfort flasher function has been adopted to improve the operability when changing lanes. When the turn-signal lamp switch (lighting switch) is operated for a short time, this function flashes the turn-signal lamp of the operated direction three times.

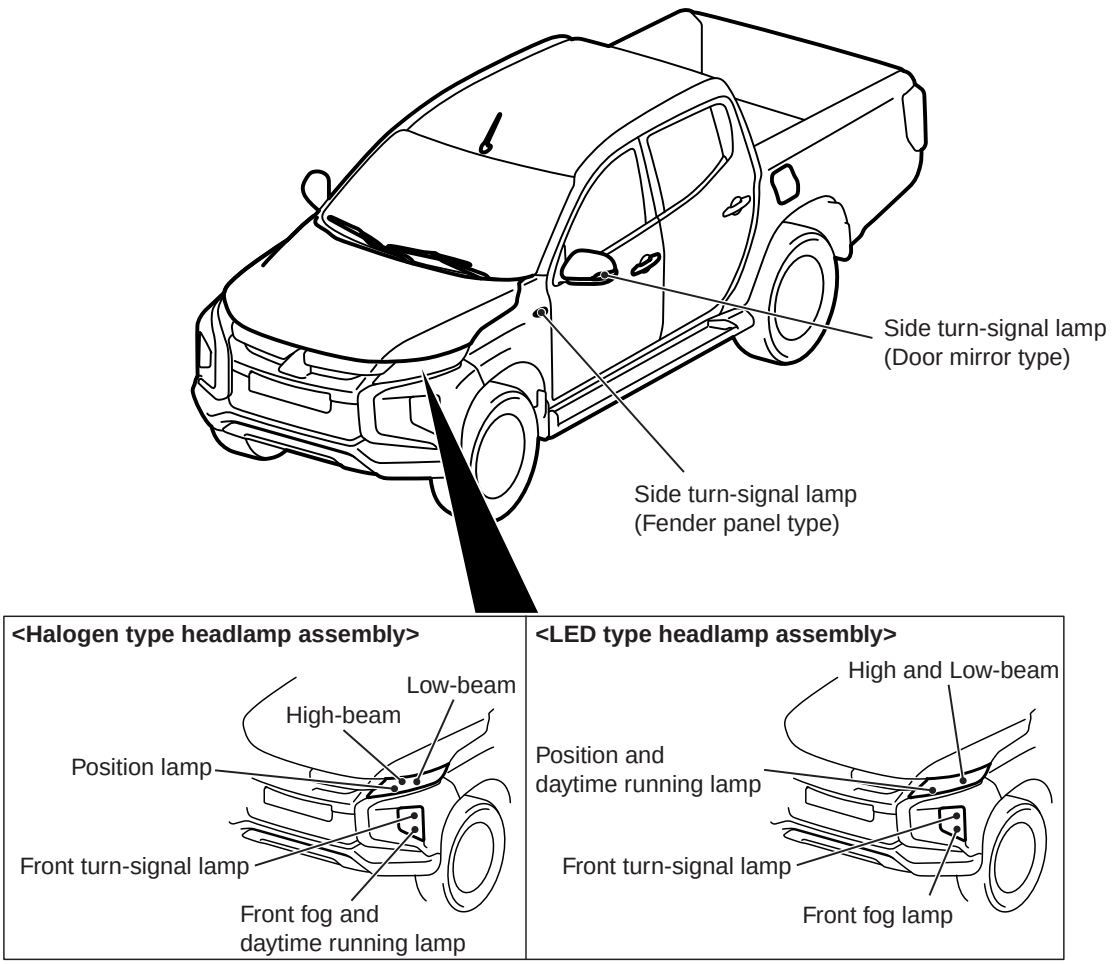
Specifications <VEHICLES FOR EUROPE>

Item		
Headlamp assembly <Vehicles with halogen type headlamp>	High-beam / low-beam W	60 / 55 (H4)
	Position lamp W	5 (W5W)
	Front turn-signal lamp W	21 (PY21W/P21W)
Headlamp assembly <Vehicles with discharge type headlamp>	High-beam / low-beam W	25 (D5S)
	Position lamp	LED type
	Front turn-signal lamp W	21 (PY21W)
	Daytime running lamp	LED type

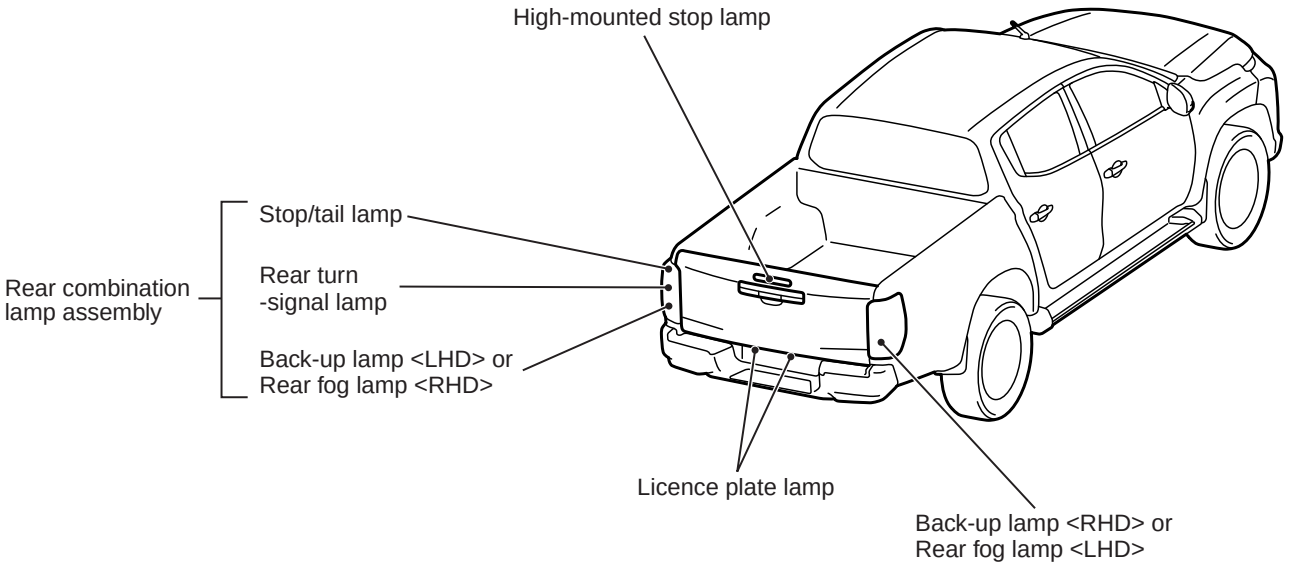
Item		
Front fog lamp	Front fog lamp (vehicles without daytime running lamp) W	19 (H16)
	Front fog lamp (vehicles with daytime running lamp) W	35 (H8)
Daytime running lamp	Daytime running lamp W	13 (P13W)
Side turn-signal lamp	Fender panel type W	5 (W5W)
	Door mirror type	LED type
Rear combination lamp	Stop/tail W	21/5 (P21/5W)
	Rear turn-signal W	21 (PY21W)
	Back-up lamp W	21 (P21W)
	Rear fog lamp W	21 (P21W)
High-mounted stop lamp		LED type
Licence plate lamp W		5 (W5W)

NOTE: The brackets ( ) show the bulb type.

Construction diagram <VEHICLES FOR RUSSIA (EASTERN EUROPE COUNTRIES)>



ACI02128 AB



4.1.2. Alignment

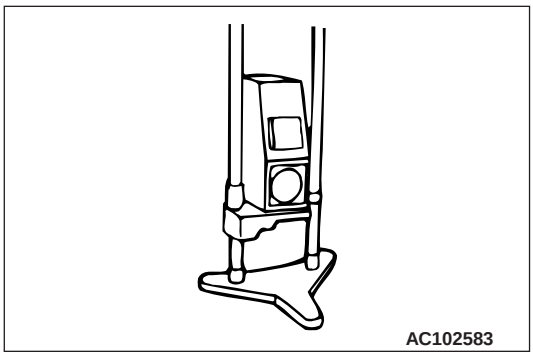
M6131000200093

PRE-AIMING INSTRUCTION <VEHICLES FOR EUROPE>

These conditions must be corrected before a satisfactory adjustment can be made.

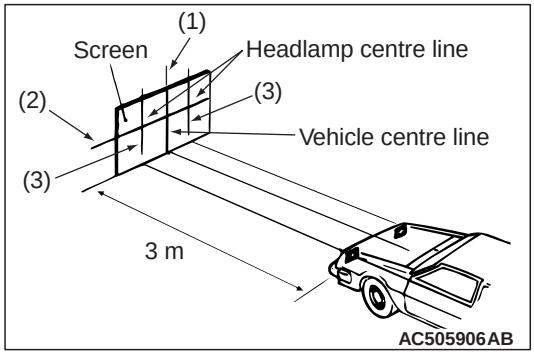
- Inspect tyre inflation, and adjust if it is necessary.
- If the fuel tank is not filled up, put weight in the luggage compartment to make up for the fuel shortage so that the weight will become 90% of full-state weight or heavier. (0.8 kg per litter)
- There should be no other load in the vehicle other than driver or substituted weight of approximately 75 kg placed in driver's position.
- Turn the headlamp levelling switch to the switch position "0."
- Thoroughly clean the headlamp lenses.

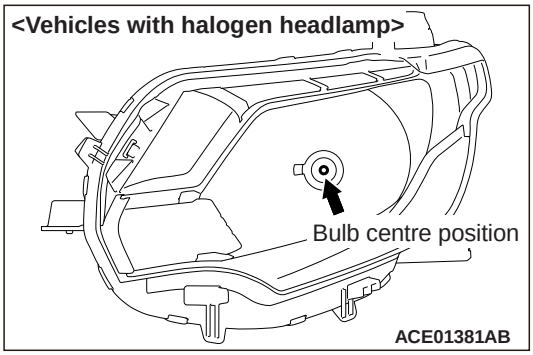
<USING A BEAM SETTING EQUIPMENT>

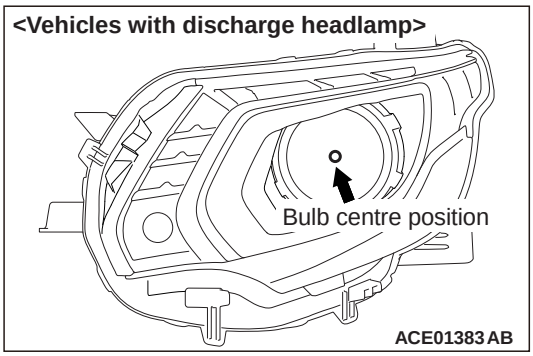


1. The headlamps should be aimed with the proper beam setting equipment, and in accordance with the equipment manufacture’s instructions.
2. Alternately turn the adjusting screw to adjust the headlamp aiming.

<USING A SCREEN>







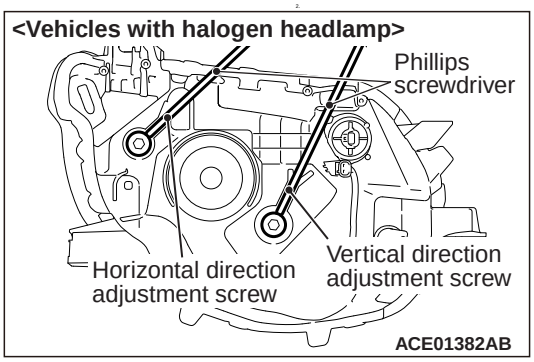
1. Place the vehicle on a level floor, perpendicular to a flat screen 3 m away from the bulb centre position of the low-beam.
2. Rock vehicle sideways to allow vehicle to assume its normal position.
3. To correct for distortion of the suspension, rock the bumpers on the front/rear side of the vehicle up and down three times alternately.
4. Run the engine at a speed of 2,000 r/min to charge the battery.
5. Four lines of adhesive tape (or equivalent markings) are required on screen or wall:
   (1) Position a vertical tape or mark so that it is aligned with the vehicle centre line.
   (2) Measure the distance from the bulb centre position to the floor. Transfer the measurement to the screen. Horizontal tape or mark on the screen is for reference of vertical adjustment.
   (3) Measure the distance from the centre line of the vehicle to the centre of each headlamp. Transfer the measurement to the screen. Vertical tape or mark on the screen with reference to the centre line of each headlamp bulb.

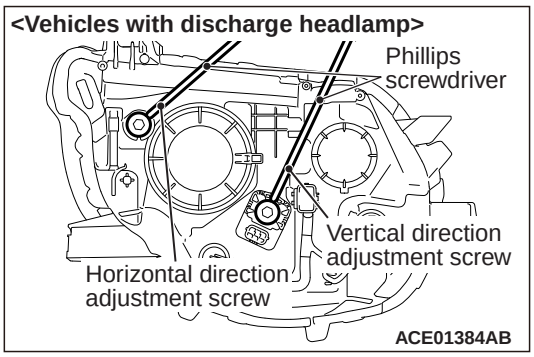
HEADLAMP ADJUSTMENT

⚠ CAUTION

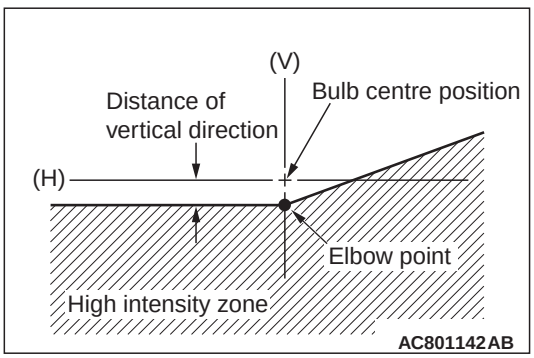
- **Do not cover a headlamp for more than three minutes to prevent the plastic headlamp lens deformation.**
- **Be sure to adjust the aiming adjustment screw in the tightening direction.**

1. The low-beam headlamp should project on the screen upper edge of the beam (cut-off).





If not the case, turn the adjusting screws to achieve the specified low-beam cut-off location on the aiming screen.



Standard value:

Vertical direction; 36 mm (0.69°) below horizontal (H)
Horizontal direction; Elbow point intersects the vertical line (V)

Limit:
Vertical direction; ±15 mm (±0.29°) from the horizontal cut-off line
Horizontal direction; ± 26 mm (±0.5°) from the vertical line (V)

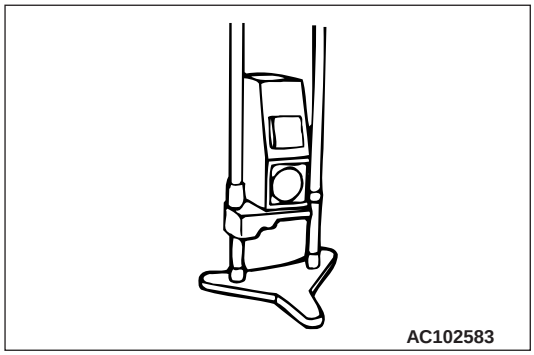
NOTE: The illustration shows LH drive vehicles. For RH drive vehicles, it is symmetrical.

PRE-AIMING INSTRUCTION <VEHICLES FOR RUSSIA (EASTERN EUROPE COUNTRIES)>

These conditions must be corrected before a satisfactory adjustment can be made.

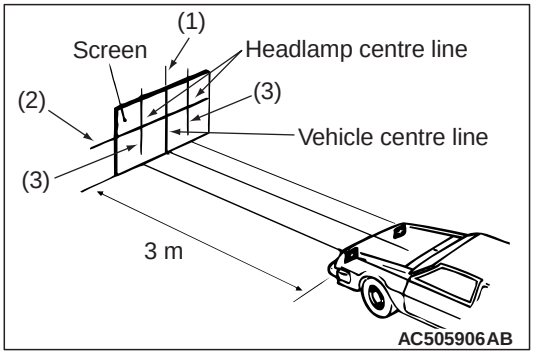
- Inspect tyre inflation, and adjust if it is necessary.
- If the fuel tank is not filled up, put weight in the luggage compartment to make up for the fuel shortage so that the weight will become 90% of full-state weight or heavier. (0.8 kg per litter)
- There should be no other load in the vehicle other than driver or substituted weight of approximately 75 kg placed in driver's position.
- Turn the headlamp levelling switch to the switch position "0."
- Thoroughly clean the headlamp lenses.

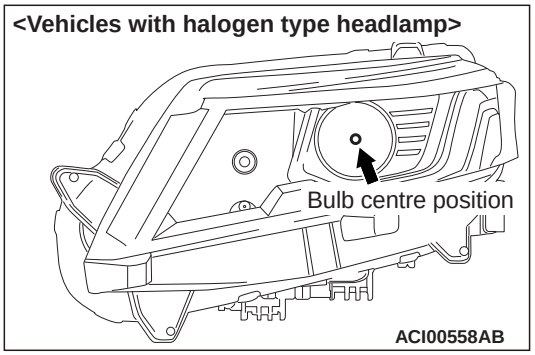
<USING A BEAM SETTING EQUIPMENT>

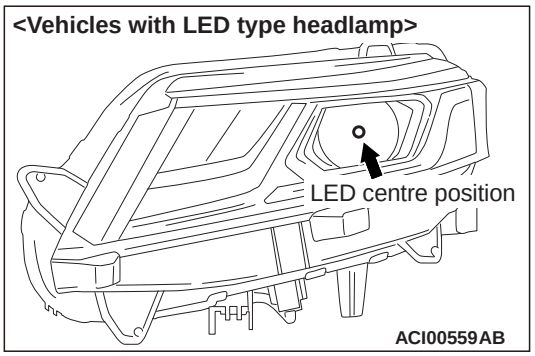


1. The headlamps should be aimed with the proper beam setting equipment, and in accordance with the equipment manufacture's instructions.
2. Alternately turn the adjusting screw to adjust the headlamp aiming.

<USING A SCREEN>







1. Place the vehicle on a level floor, perpendicular to a flat screen 3 m away from the bulb centre position of the low-beam.
2. Rock vehicle sideways to allow vehicle to assume its normal position.
3. To correct for distortion of the suspension, rock the bumpers on the front/rear side of the vehicle up and down 3 times alternately.
4. Run the engine at a speed of 2,000 r/min to charge the battery.
5. 4 lines of adhesive tape (or equivalent markings) are required on screen or wall:
   (1) Position a vertical tape or mark so that it is aligned with the vehicle centre line.
   (2) Measure the distance from the bulb or LED centre position to the floor. Transfer the measurement to the screen. Horizontal tape or mark on the screen is for reference of vertical adjustment.

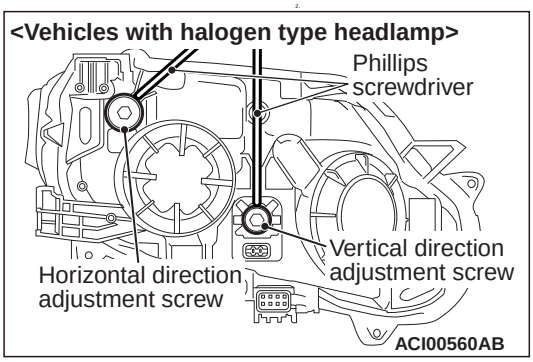
(3) Measure the distance from the centre line of the vehicle to the centre of each headlamp. Transfer the measurement to the screen. Vertical tape or mark on the screen with reference to the centre line of each headlamp bulb.

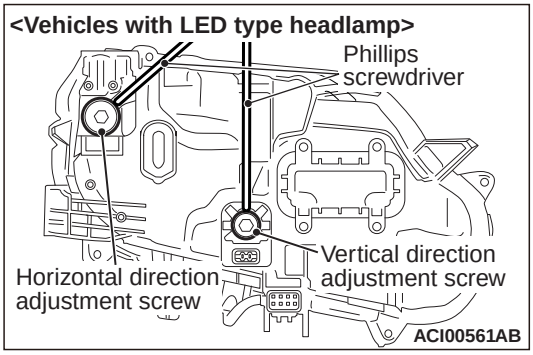
HEADLAMP ADJUSTMENT

⚠ CAUTION

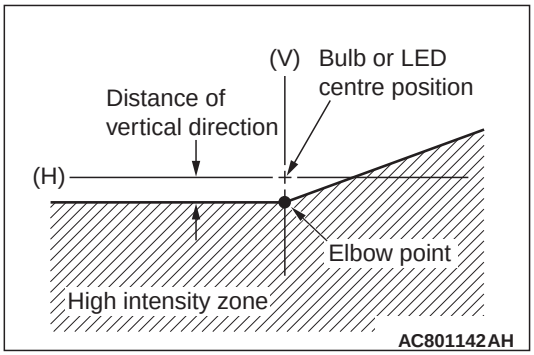
- **Do not cover a headlamp for more than 3 minutes to prevent the plastic headlamp lens deformation.**
- **Be sure to adjust the aiming adjustment screw in the tightening direction.**

1. The low-beam headlamp should project on the screen upper edge of the beam (cut-off).





If not the case, turn the adjusting screws to achieve the specified low-beam cut-off location on the aiming screen.



Standard value:
Vertical direction; 45 mm (0.86°) below horizontal (H)
Horizontal direction; Elbow point intersects the vertical line (V)

Limit:
Vertical direction; ±15 mm (±0.29°) from the horizontal cut-off line
Horizontal direction; ±26 mm (±0.5°) from the vertical line (V)

4.1.3. Switching

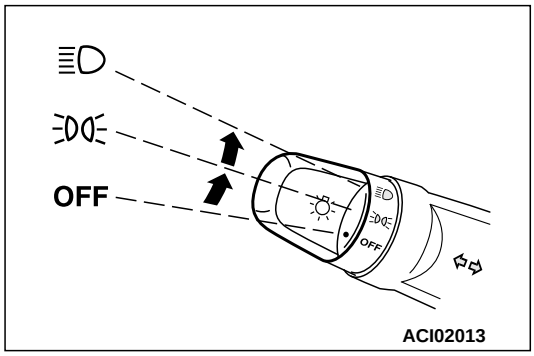
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Headlamps

NOTE:

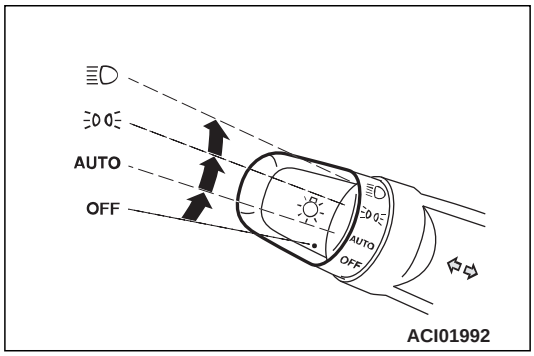
- *Do not leave the lamps on for a long time while the engine is stationary (not running). A run-down battery could result.*
- *When it rains, or when the vehicle has been washed, the inside of the lens sometimes becomes foggy, but this does not indicate a functional problem. When the lamp is switched on, the heat will remove the fog. However, if water gathers inside the lamp, we recommend you to have checked.*
- *The bulbs of high intensity discharge headlamps (if so equipped) have the following characteristics.*
  - *While the headlamps are used, the light will gradually become a bluish-white colour.*
  - *The life of a bulb becomes shorter as it is repeatedly turned on and off. When the bulb approaches the end of its life, the brightness may decrease, the bulb may flicker, and the light may become reddish in colour. If this occurs, have the vehicle inspected by a MITSUBISHI MOTORS Authorised Service Point.*

Type1
Rotate the switch to turn on the lamps.



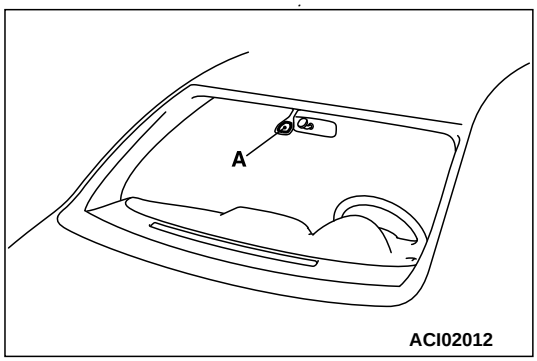
OFF	All lamps off
	Position, tail, licence plate and instrument panel lamps on
	Headlamps and other lamps go on

Type2
Rotate the switch to turn on the lamps.



OFF	All lamps off
AUTO	With the ignition switch or the operation mode is in ON, headlamps, position, tail, licence plate and instrument panel lamps turn on and off automatically in accordance with outside light level. All lamps turn off automatically when the ignition switch is turned to "OFF" position or the operation mode is put in OFF.
	Position, tail, licence plate and instrument panel lamps on
	Headlamps and other lamps go on

NOTE:
- *The sensitivity of the automatic on/off control can be adjusted. For further information, contact a MITSUBISHI MOTORS Authorised Service Point.*
- *If the front fog lamps (if so equipped) turn on when they are supposed to with the switch in the "AUTO" position, the lamps turn off automatically with the ignition switch or operation mode off.*
- *When the headlamps are turned off by the automatic on/off control with the ignition switch in the "ON" position or the operation mode in ON, the front fog lamps (if so equipped) and rear fog lamps also go off. When the headlamps are subsequently turned back on by the automatic on/off control, the front fog lamps also come on but the rear fog lamp stay off. If you wish to turn the rear fog lamp back on, operate the switch again.*



Do not cover the sensor (A) for the automatic on/off control by affixing a sticker or label to the windscreen.
- *If the lamps do not turn on or off with the switch in the "AUTO" position, manually operate the switch and we recommend you to have your vehicle checked.*

4.1.4. Compliance with requirements1.

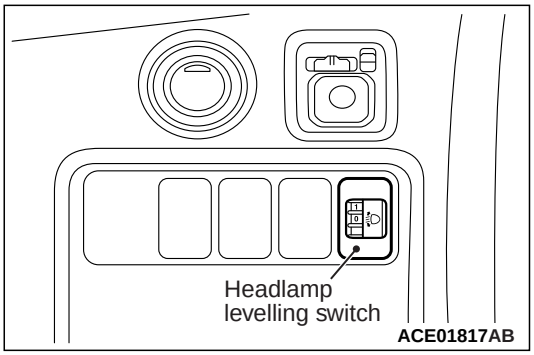
M6131000400075

"Not Applicable"

4.1.5. Levelling devices (where mandatory)

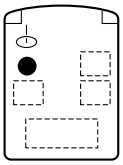
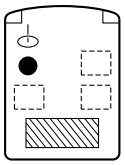
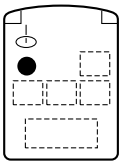
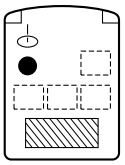
M6131000500072

HEADLAMP LEVELLING SYSTEM



The beam direction of the headlamps changes according to the number of passengers and the amount of load. The headlamp levelling function is a system that allows the driver to change the direction of headlamp beam so that the drivers of oncoming cars are not dazzled by the headlamps. The headlamp levelling switch allows changing the direction in five steps: 0 to 4.

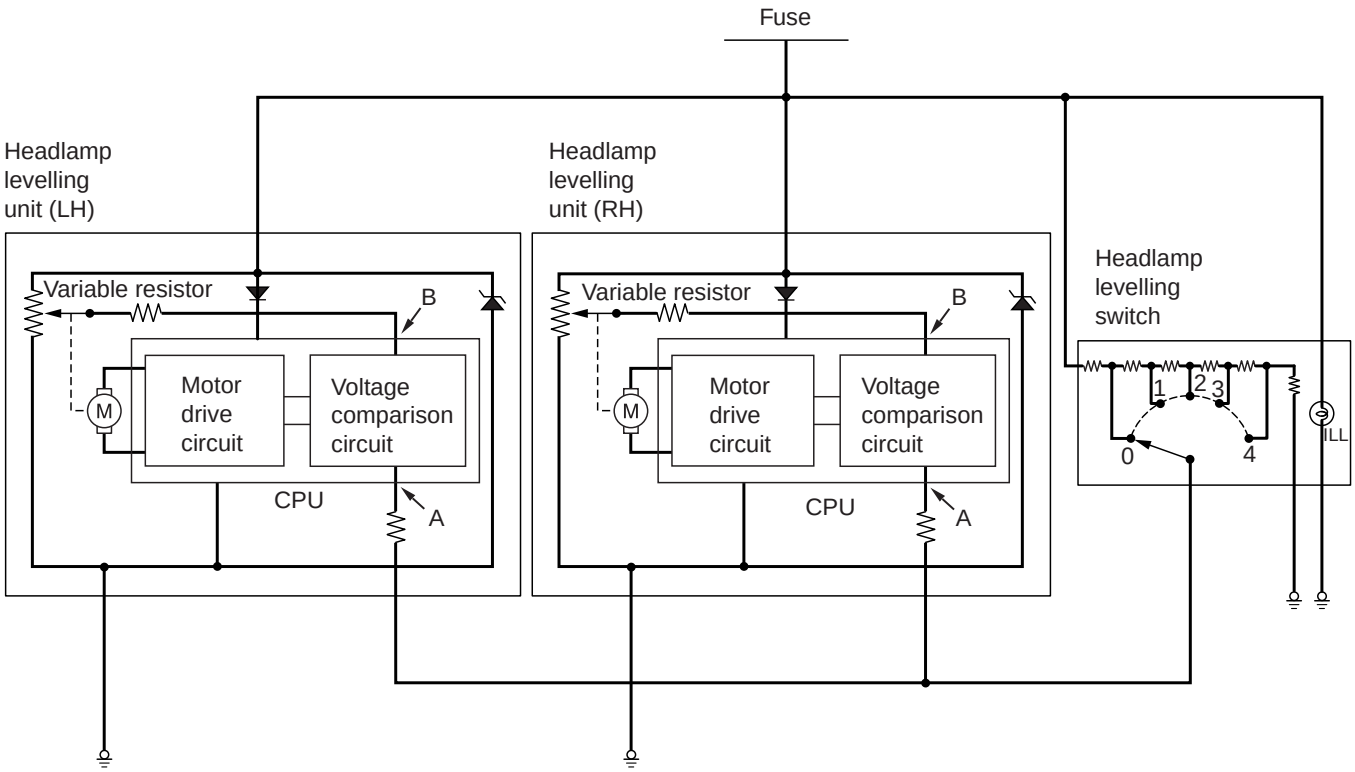
RELATIONSHIP BETWEEN THE SWITCH POSITIONS AND THE NUMBER OF PASSENGERS/LOADS

Cabin style	Club cab		Double cab	
Passenger and load	 AC510115	 AC510116	 AC510117	 AC510118
	Driver only	Driver and full luggage loading	Driver only	Driver and full luggage loading
Switch position	0	3*1 or 4*2	0	3*1 or 4*2

NOTE:

- **1: Tyre size: 245/65R17 or 205R16C*
- **2: Tyre size: 245/70R16*
- *Each switch position is for reference. In each switch position, when the headlamp beam is too high, turn the switch to one-level higher position.*

OPERATION



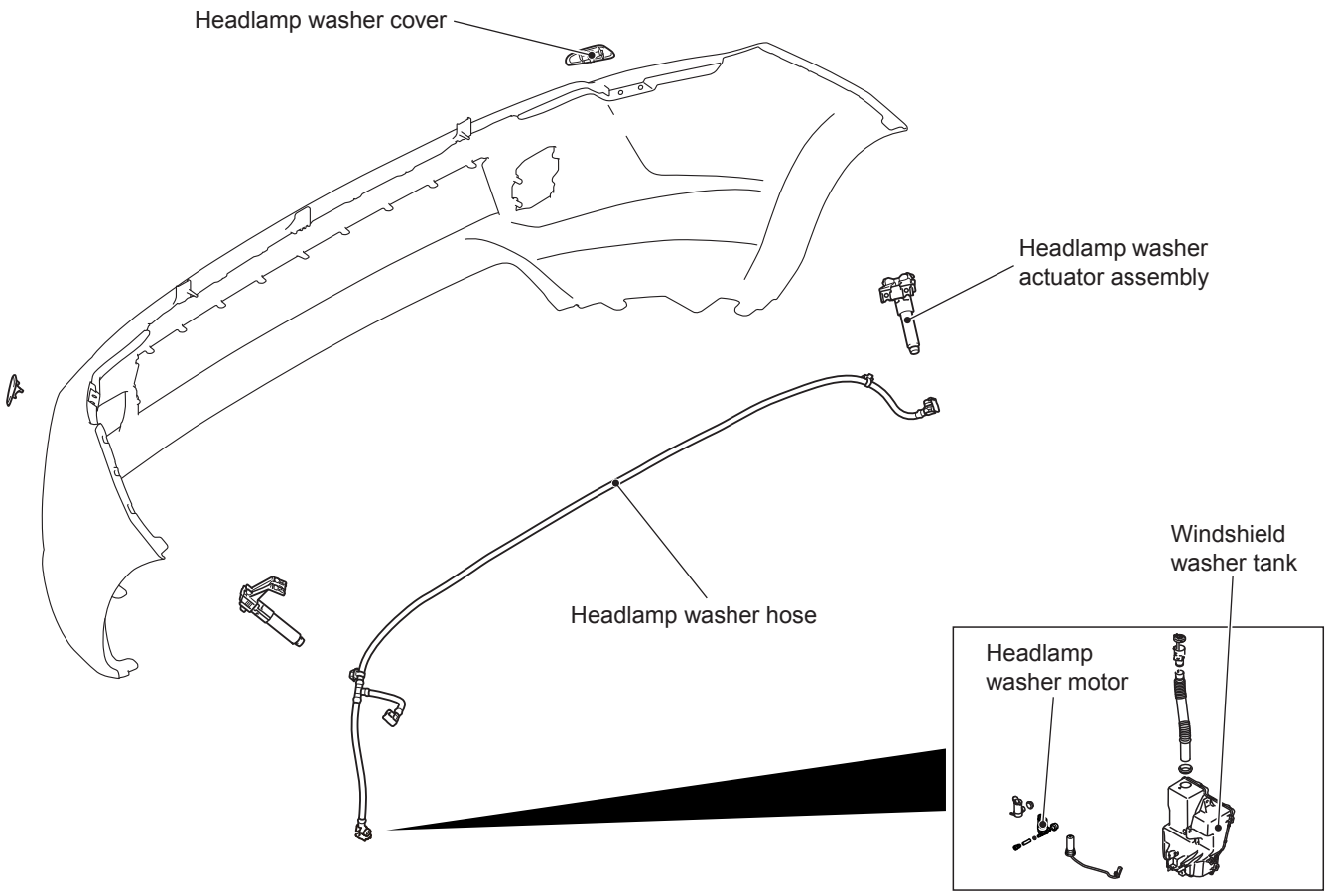
AC314086AB

1. The headlamp levelling switch increases the resistance as it is turned from 0 to 4. Turning the headlamp levelling switch changes the voltage at point A. When the headlamp levelling switch is turned from 0 to 4, the voltage at point A decreases. Upon detection of this voltage change, the headlamp levelling unit turns the motor to lower the beam direction. At this time, the resistance of the variable resistor in the headlamp assembly changes, and the voltage at point B decreases gradually. When the voltages at points A and B become equal, the headlamp levelling unit stops the motor.
2. Turning the headlamp levelling switch from 4 to 0 increases the voltage at point A, and then the headlamp levelling unit turns the motor in the direction opposite to that mentioned in Item 1, increasing the voltage at point B. When the voltages at points A and B become equal, the headlamp levelling unit stops the motor.
3. The headlamp levelling unit detects voltage changes caused by headlamp levelling switch operation, and turns the motor to change the directions of the headlamp reflectors for the adjustment of the headlamp beam direction.

4.1.6. Headlamp cleaning device (where mandatory)

M6131000600091

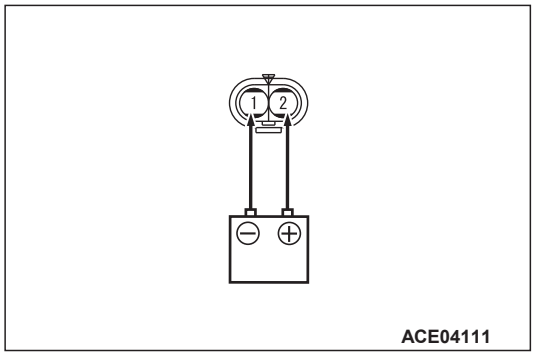
CONSTRUCTION DIAGRAM <VEHICLES FOR EUROPE>



ACI02066 AB

INSPECTION

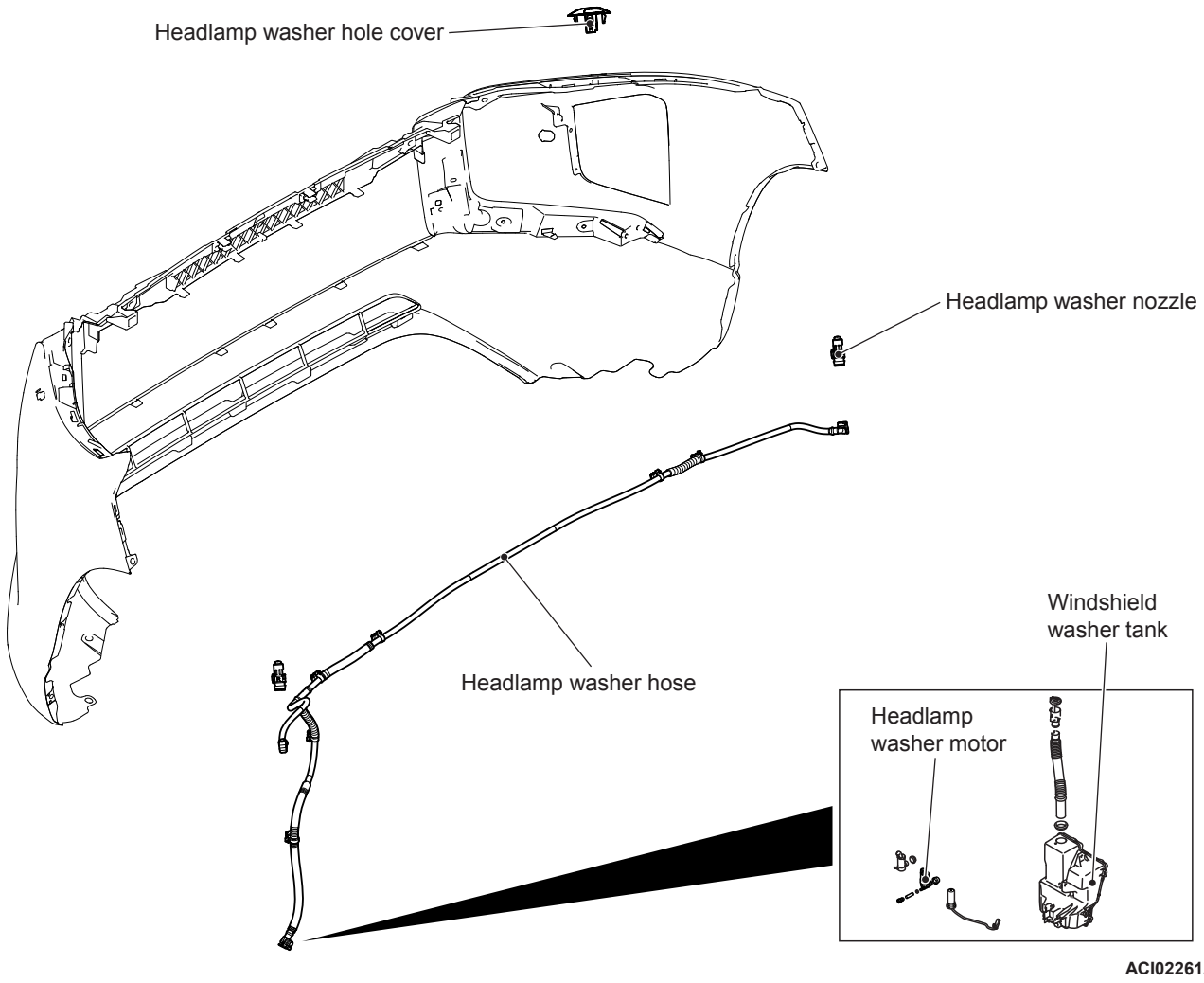
HEADLAMP WASHER MOTOR CHECK



ACE04111

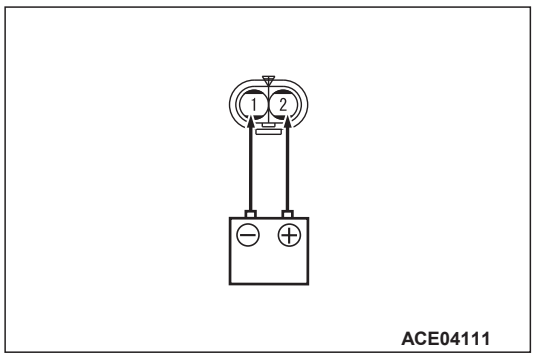
1. Remove the headlamp washer motor connector.
2. Check to see that the water is vigorously sprayed when connecting the positive battery terminal to terminal number 2 and terminal number 1 to the negative battery terminal.

CONSTRUCTION DIAGRAM <VEHICLES FOR RUSSIA (EASTERN EUROPE COUNTRIES)>



INSPECTION

HEADLAMP WASHER MOTOR CHECK



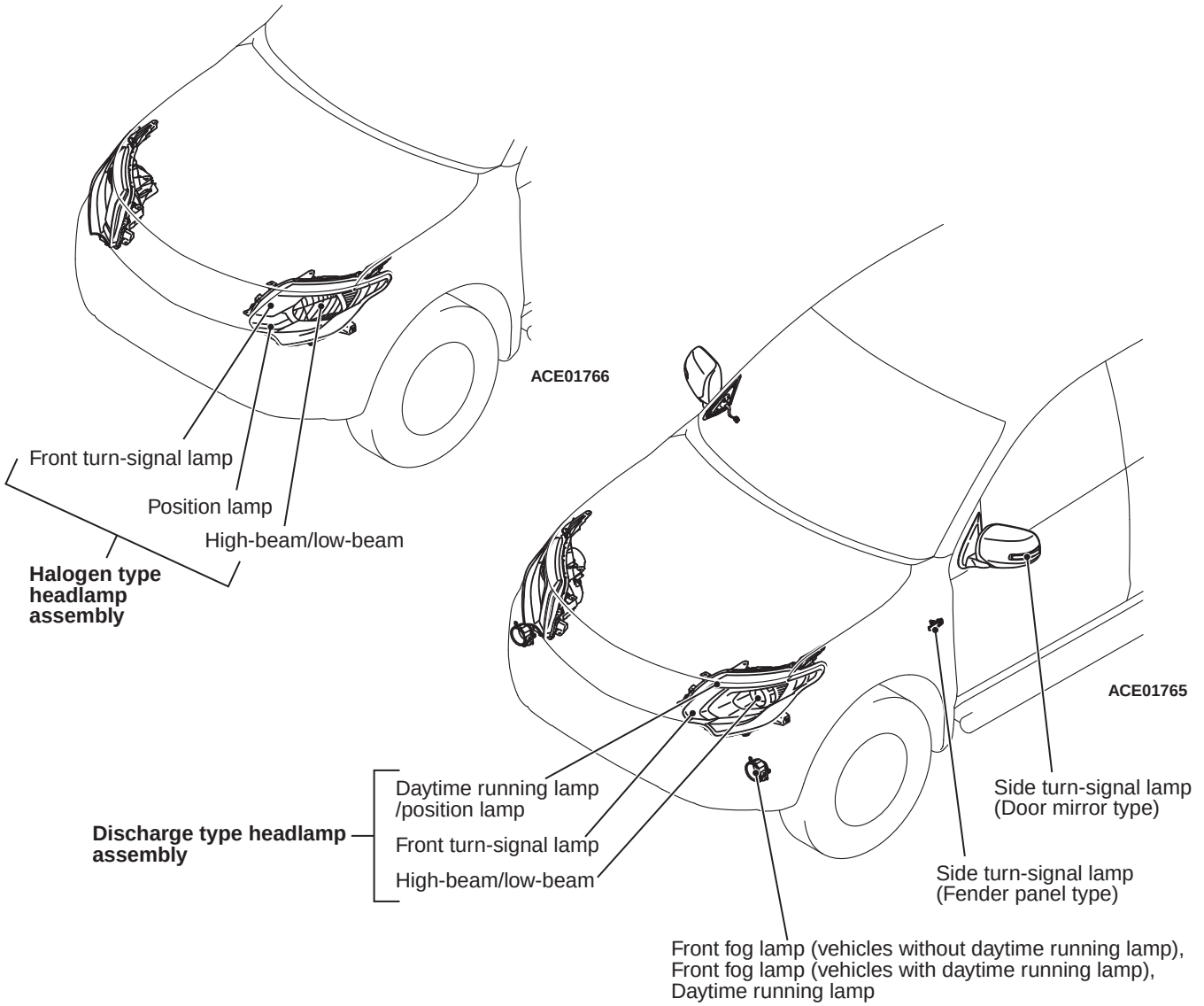
1. Remove the headlamp washer motor connector.
2. Check to see that the water is vigorously sprayed when connecting the positive battery terminal to terminal number 2 and terminal number 1 to the negative battery terminal.

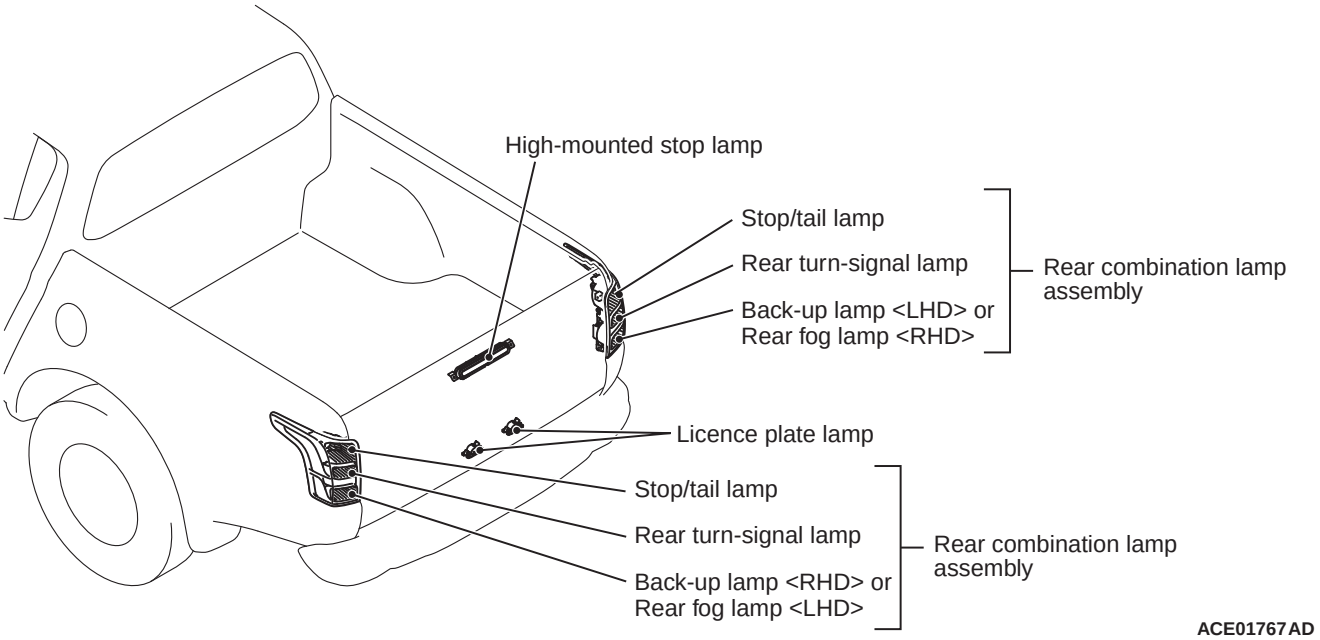
4.2. Front and rear position lamps, side marker lamps, end outline marker lamps and daytime running lamps

4.2.1. Condition and operation

M6132000100107

Construction diagram <VEHICLES FOR EUROPE>





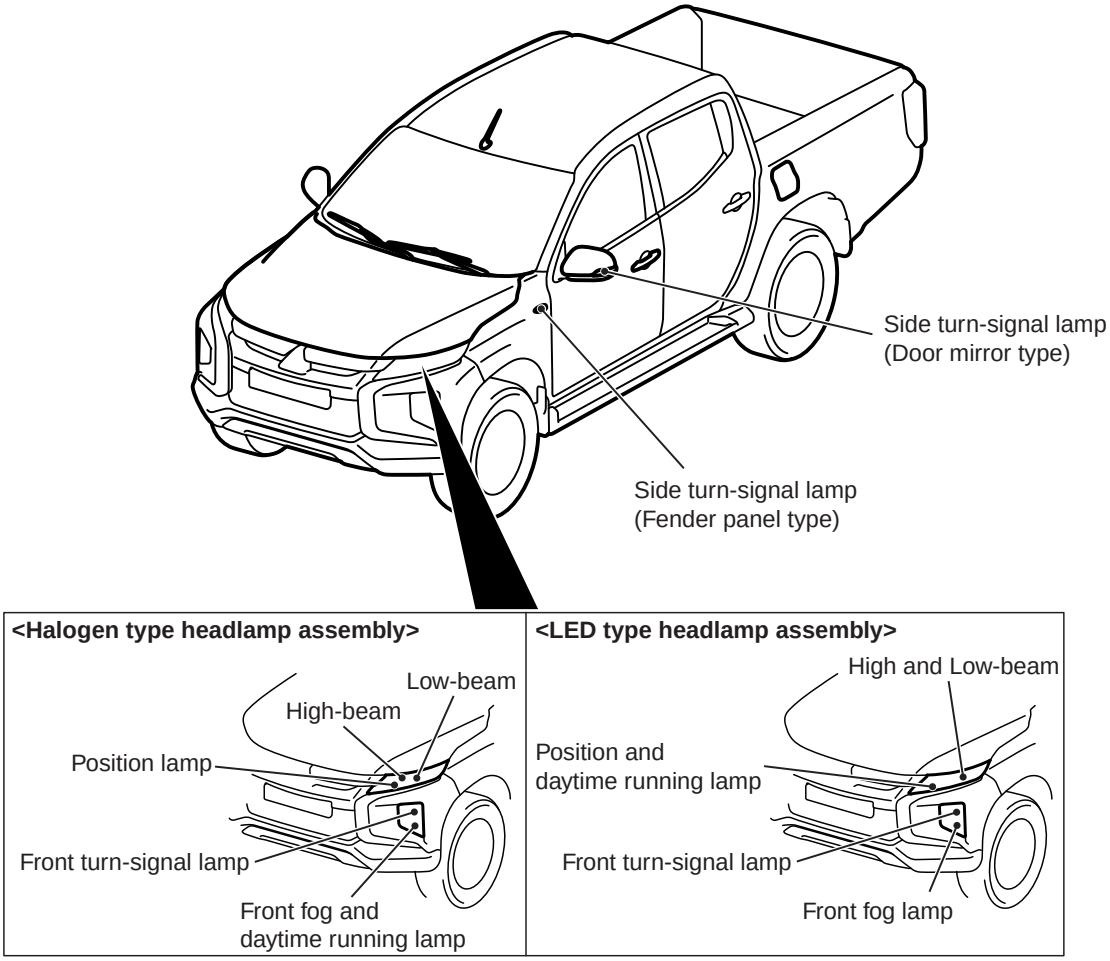
- A headlamp assembly includes a headlamp bulb (high-beam / low-beam), a position lamp and a front turn-signal lamp.
- The system actuates the shield plate in the projector unit to switch the discharge type headlamp beams (low/high beams) when the driver operates the column switch (lighting switch) <Vehicles with discharge type headlamp>.
- The LED-type daytime running lamp has been installed to the headlamp <Vehicles with discharge type headlamp>.
- There are three types of front fog lamps; front fog lamp <vehicles without daytime running lamp>, front fog lamp <vehicles with daytime running lamp> and daytime running lamp. These are installed on the front bumper.
- Two types of the side turn-signal lamp have been established: the one attached to the fender panel and the one integrated into the door mirror.
- The rear combination lamp assembly are integrated with the stop/tail lamp, the rear turn-signal lamp, the back-up lamp and the rear fog lamp.
- The rear fog lamp has been installed to the driver's side.
- The LED-type high-mounted stop lamp have been integrated into the rear gate.
- The licence plate lamp has been installed in the upper part of the licence plate.
- The lighting system is provided with headlamp automatic-shutdown function.
- For the flasher timer function of the turn-signal lamps, the comfort flasher function has been adopted to improve the operability when changing lanes. When the turn-signal lamp switch (lighting switch) is operated for a short time, this function flashes the turn-signal lamp of the operated direction three times.

Specifications <VEHICLES FOR EUROPE>

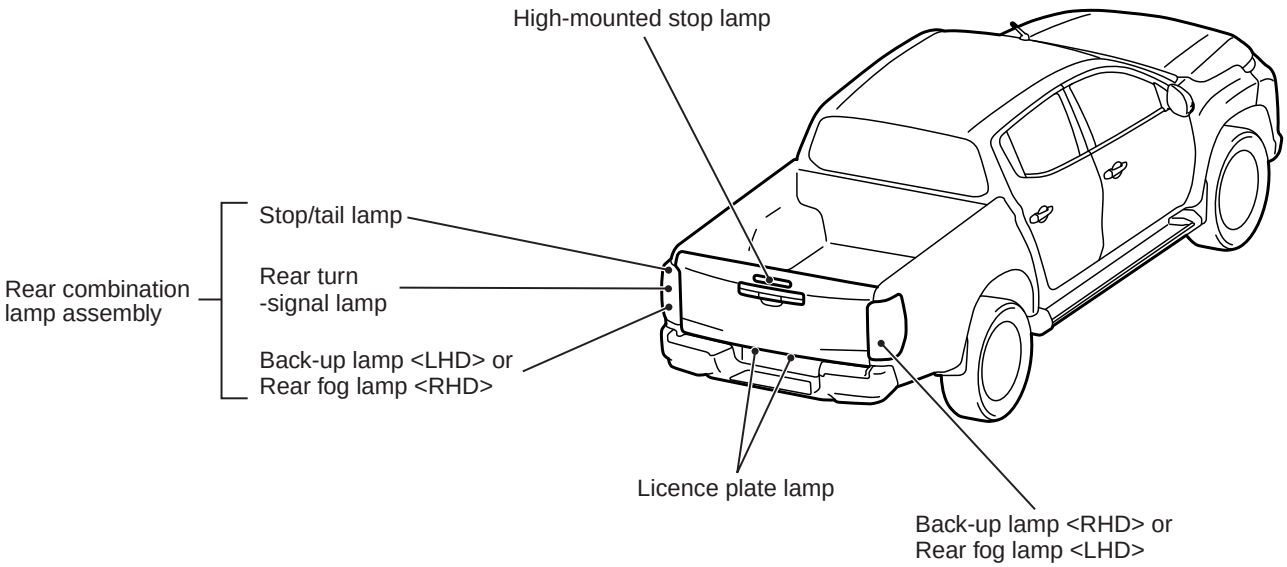
Item		
Headlamp assembly <Vehicles with halogen type headlamp>	High-beam / low-beam W	60 / 55 (H4)
	Position lamp W	5 (W5W)
	Front turn-signal lamp W	21 (PY21W/P21W)
Headlamp assembly <Vehicles with discharge type headlamp>	High-beam / low-beam W	25 (D5S)
	Position lamp	LED type
	Front turn-signal lamp W	21 (PY21W)
	Daytime running lamp	LED type
Front fog lamp	Front fog lamp (vehicles without daytime running lamp) W	19 (H16)
	Front fog lamp (vehicles with daytime running lamp) W	35 (H8)
Daytime running lamp	Daytime running lamp W	13 (P13W)
Side turn-signal lamp	Fender panel type W	5 (W5W)
	Door mirror type	LED type
Rear combination lamp	Stop/tail W	21/5 (P21/5W)
	Rear turn-signal W	21 (PY21W)
	Back-up lamp W	21 (P21W)
	Rear fog lamp W	21 (P21W)
High-mounted stop lamp		LED type
Licence plate lamp W		5 (W5W)

NOTE: The brackets ( ) show the bulb type.

Construction diagram <VEHICLES FOR RUSSIA (EASTERN EUROPE COUNTRIES)>



ACI02128 AB



ACI02260 AB

4.2.2. Switching

M6132000200074

"Not Applicable"

4.2.3. Compliance with requirements1

M6132000300071

"Not Applicable"

4.3. Stop Lamps

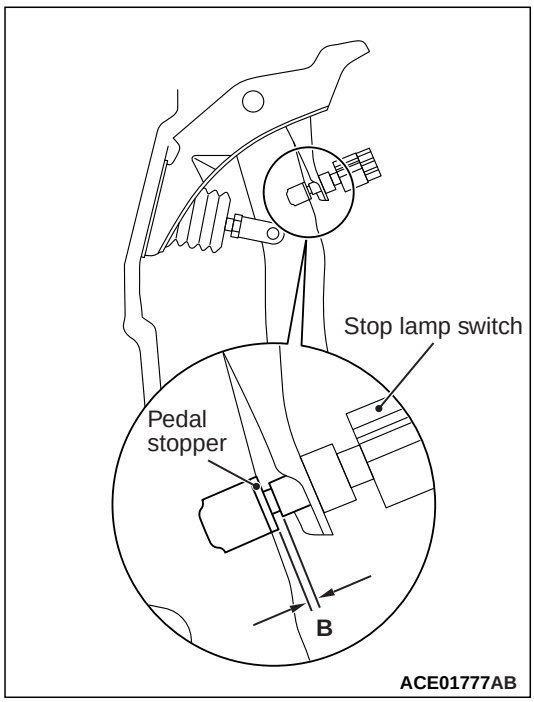
4.3.1. Condition and operation

M6133000100070

"Not Applicable"

4.3.2. Switching

M6133000200099



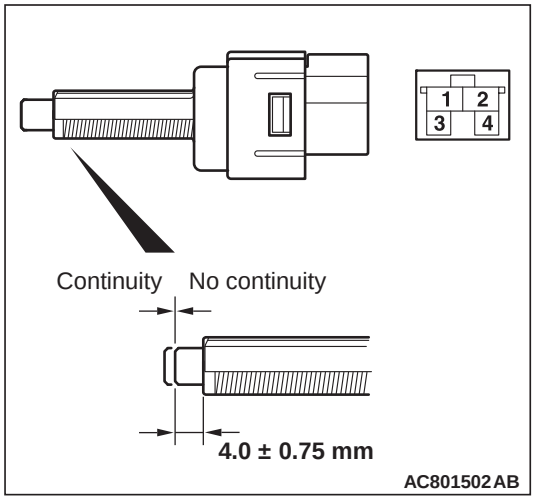
1. Check that the clearance between the stop lamp switch and the pedal stopper is as shown in the figure.
   Standard value (B): 0.5 – 1.5 mm

⚠ CAUTION
Make sure that the stop lamp is not illuminated when the brake pedal is not depressed.

STOP LAMP SWITCH CHECK <VEHICLES FOR EUROPE>

<Vehicles without cruise control>

⚠ CAUTION
Do not apply grease or lubricant to the switch and the switch installation section to avoid malfunction of the switch. In addition, do not use gloves which have grease on them.



Check for continuity between the terminals of the switch.

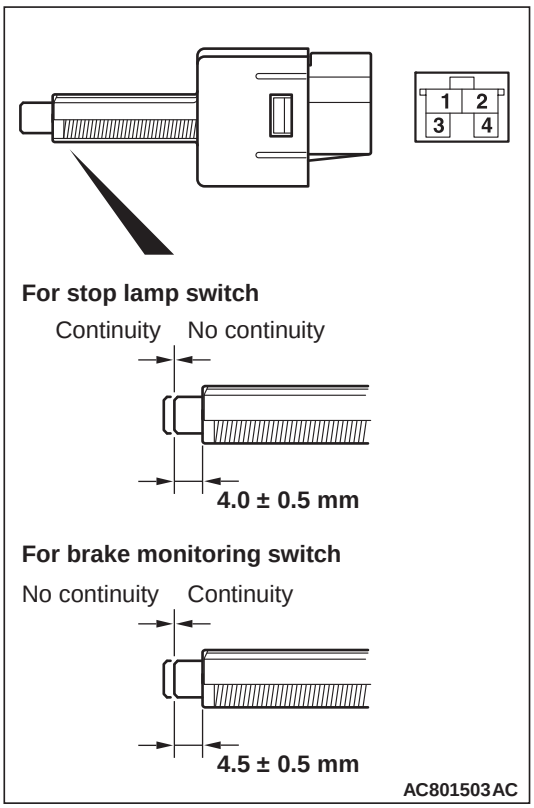
Check condition	Terminal connector of tester	Normal condition
At free position	1 – 2	Continuity exists (2 Ω or less)

Check condition	Terminal connector of tester	Normal condition
Press the plunger from the edge of the outer case by the dimension shown in the figure.	1 – 2	No continuity

<Vehicles with cruise control>

⚠ CAUTION

Do not apply grease or lubricant to the switch and the switch installation section to avoid malfunction of the switch. In addition, do not use gloves which have grease on them.



Check for continuity between the terminals of the switch.

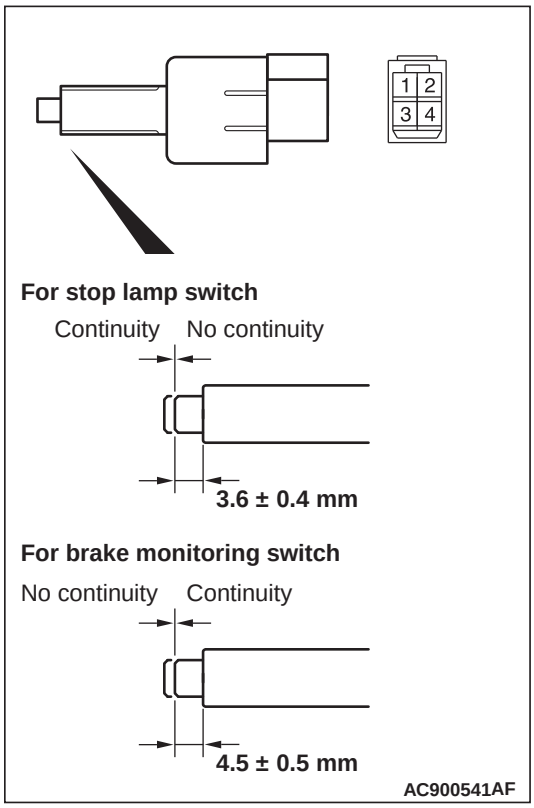
Check condition	Terminal connector of tester	Normal condition
At free position	1 – 2 (for stop lamp switch)	Continuity exists (2 Ω or less)
	3 – 4 (for brake monitoring switch)	No continuity

Check condition	Terminal connector of tester	Normal condition
Press the plunger from the edge of the outer case by the dimension shown in the figure.	1 – 2 (for stop lamp switch)	No continuity
	3 – 4 (for brake monitoring switch)	Continuity exists (2 Ω or less)

STOP LAMP SWITCH CHECK <VEHICLES FOR RUSSIA (EASTERN EUROPE COUNTRIES)>

⚠ CAUTION

Do not apply grease or lubricant to the switch and the switch installation section to avoid malfunction of the switch. In addition, do not use gloves which have grease on them.



Check for continuity between the terminals of the switch.

Check condition	Terminal connector of tester	Normal condition
At free position	1 – 2 (for stop lamp switch)	Continuity exists (2 Ω or less)
	3 – 4 (for brake monitoring switch)	No continuity
Press the plunger from the edge of the outer case by the dimension shown in the figure	1 – 2 (for stop lamp switch)	No continuity
	3 – 4 (for brake monitoring switch)	Continuity exists (2 Ω or less)

4.3.3. Compliance with requirements1.

M6133000300074

"Not Applicable"

4.4. Direction indicator and hazard warning lamps

4.4.1. Condition and operation

M6134000100073

"Not Applicable"

4.4.2. Switching

M6134000200070

"Not Applicable"

4.4.3. Compliance with requirements1.

M6134000300077

"Not Applicable"

4.4.4. Flashing frequency

M6134000400074

"Not Applicable"

4.5. Front and rear fog lamps

4.5.1. Condition and operation

M6135000100076

"Not Applicable"

4.5.2. Alignment (X)2

M6135000200073

"Not Applicable"

4.5.3. Switching

M6135000300070

"Not Applicable"

4.5.4. Compliance with requirements1.

M6135000400077

"Not Applicable"

4.6. Reversing lamps

4.6.1. Condition and operation

M6136000100079

"Not Applicable"

4.6.2. Compliance with requirements1

M6136000200076

"Not Applicable"

4.6.3. Switching

M6136000300073

"Not Applicable"

4.7. Rear registration plate lamp

4.7.1. Condition and operation

M6137000100072

"Not Applicable"

4.7.2. Compliance with requirements1

M6137000200079

"Not Applicable"

4.8. Retro-reflectors, conspicuity (retro reflecting) markings and rear marking plates

4.8.1. Condition

M6138000100075

"Not Applicable"

4.8.2. Compliance with requirements1

M6138000200072

"Not Applicable"

4.9. Tell-tales mandatory for lighting equipment

4.9.1. Condition and operation

M6139000100078

"Not Applicable"

4.9.2. Compliance with requirements1

M6139000200075

"Not Applicable"

4.10. Electrical connections between towing vehicle and trailer or semi-trailer

M6130100000071

"Not Applicable"

4.11. Electrical wiring

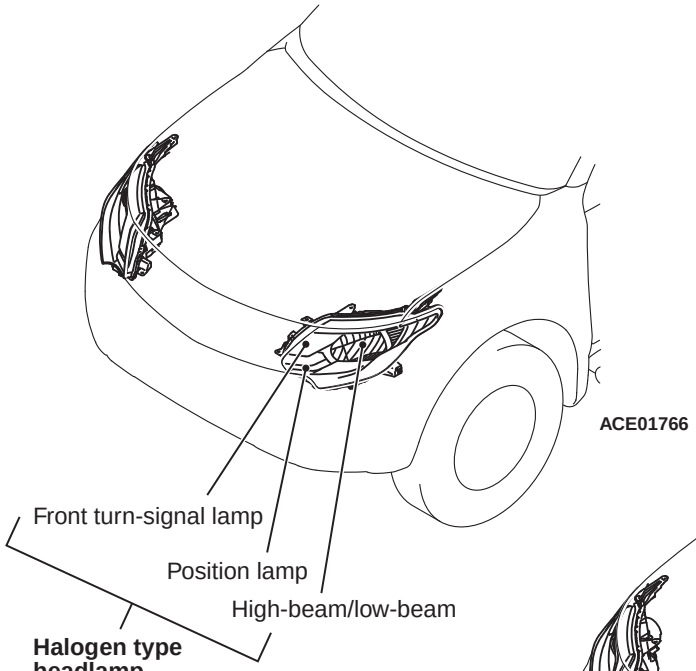
M6131100000074

"Query raised for this content"

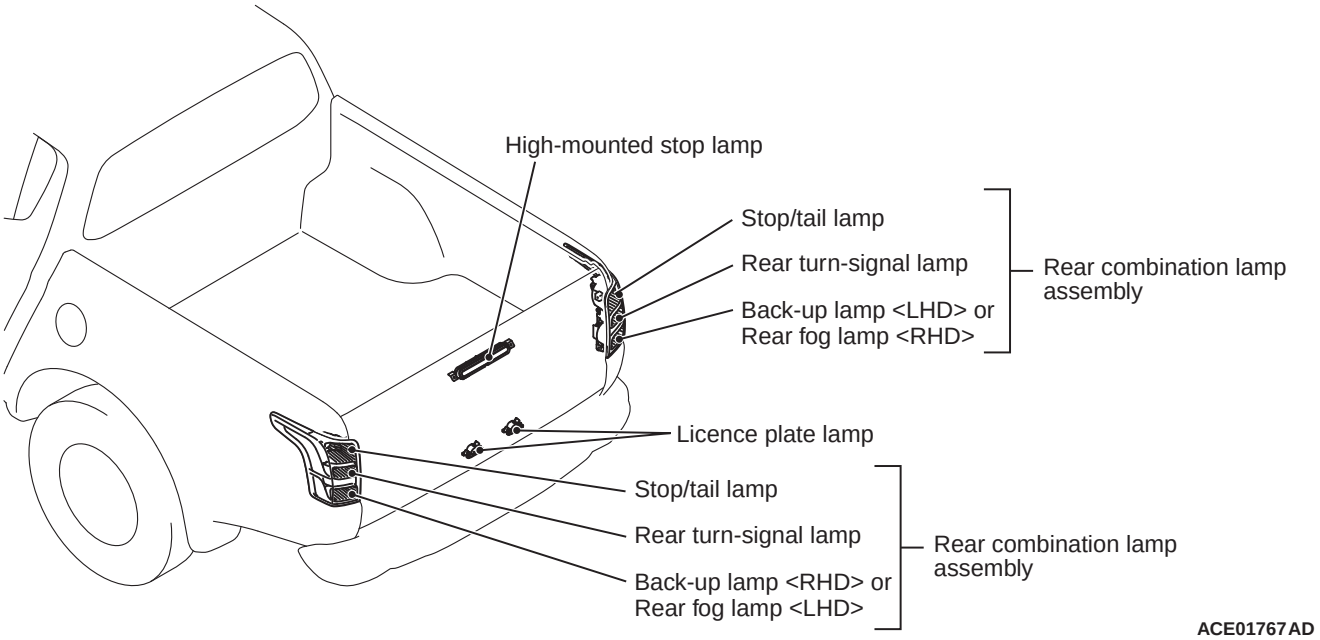
4.12. Non obligatory lamps and retro-reflectors (X)2

M6131200000093

Construction diagram <VEHICLES FOR EUROPE>



ACE02836AB



- A headlamp assembly includes a headlamp bulb (high-beam / low-beam), a position lamp and a front turn-signal lamp.
- The system actuates the shield plate in the projector unit to switch the discharge type headlamp beams (low/high beams) when the driver operates the column switch (lighting switch) <Vehicles with discharge type headlamp>.
- The LED-type daytime running lamp has been installed to the headlamp <Vehicles with discharge type headlamp>.
- There are three types of front fog lamps; front fog lamp <vehicles without daytime running lamp>, front fog lamp <vehicles with daytime running lamp> and daytime running lamp. These are installed on the front bumper.
- Two types of the side turn-signal lamp have been established: the one attached to the fender panel and the one integrated into the door mirror.
- The rear combination lamp assembly are integrated with the stop/tail lamp, the rear turn-signal lamp, the back-up lamp and the rear fog lamp.
- The rear fog lamp has been installed to the driver's side.
- The LED-type high-mounted stop lamp have been integrated into the rear gate.
- The licence plate lamp has been installed in the upper part of the licence plate.
- The lighting system is provided with headlamp automatic-shutdown function.
- For the flasher timer function of the turn-signal lamps, the comfort flasher function has been adopted to improve the operability when changing lanes. When the turn-signal lamp switch (lighting switch) is operated for a short time, this function flashes the turn-signal lamp of the operated direction three times.

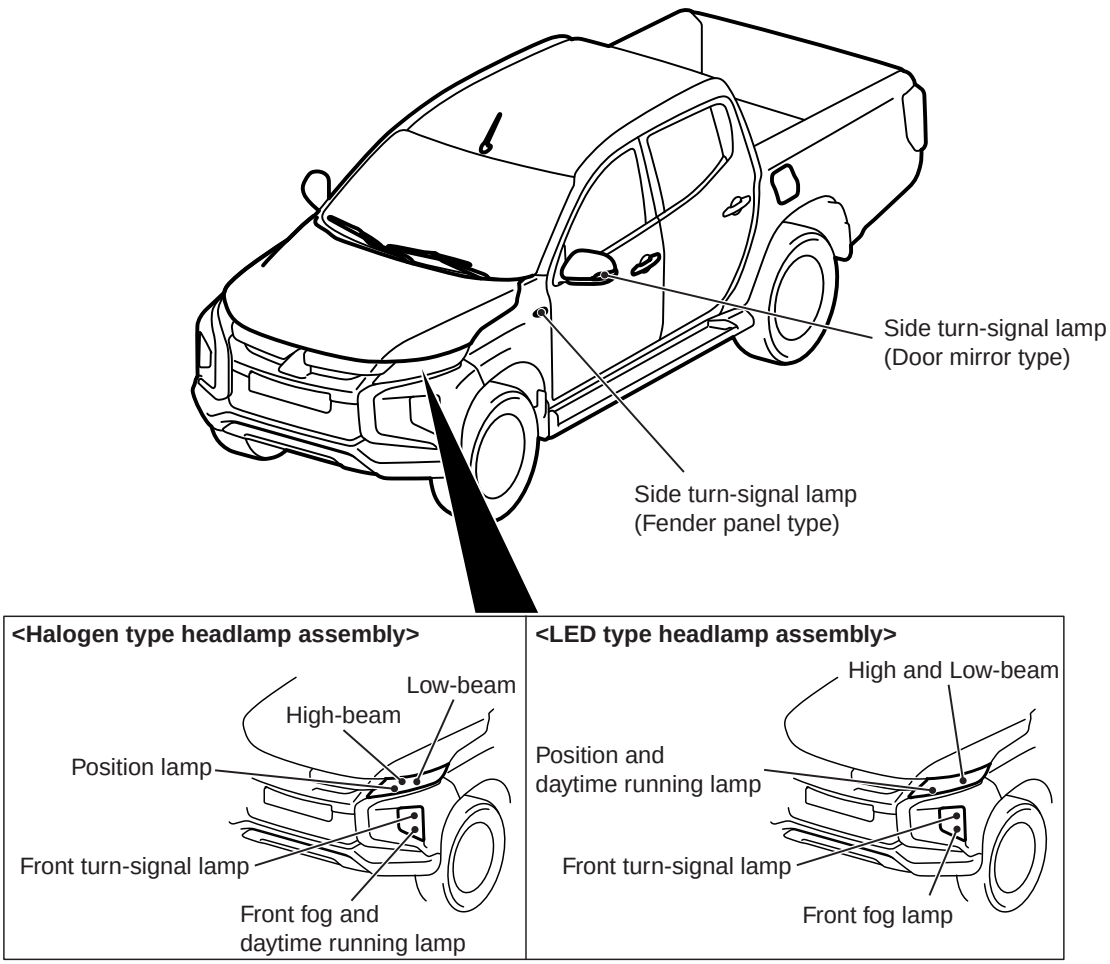
Specifications <VEHICLES FOR EUROPE>

Item		
Headlamp assembly <Vehicles with halogen type headlamp>	High-beam / low-beam W	60 / 55 (H4)
	Position lamp W	5 (W5W)
	Front turn-signal lamp W	21 (PY21W/P21W)
Headlamp assembly <Vehicles with discharge type headlamp>	High-beam / low-beam W	25 (D5S)
	Position lamp	LED type
	Front turn-signal lamp W	21 (PY21W)
	Daytime running lamp	LED type

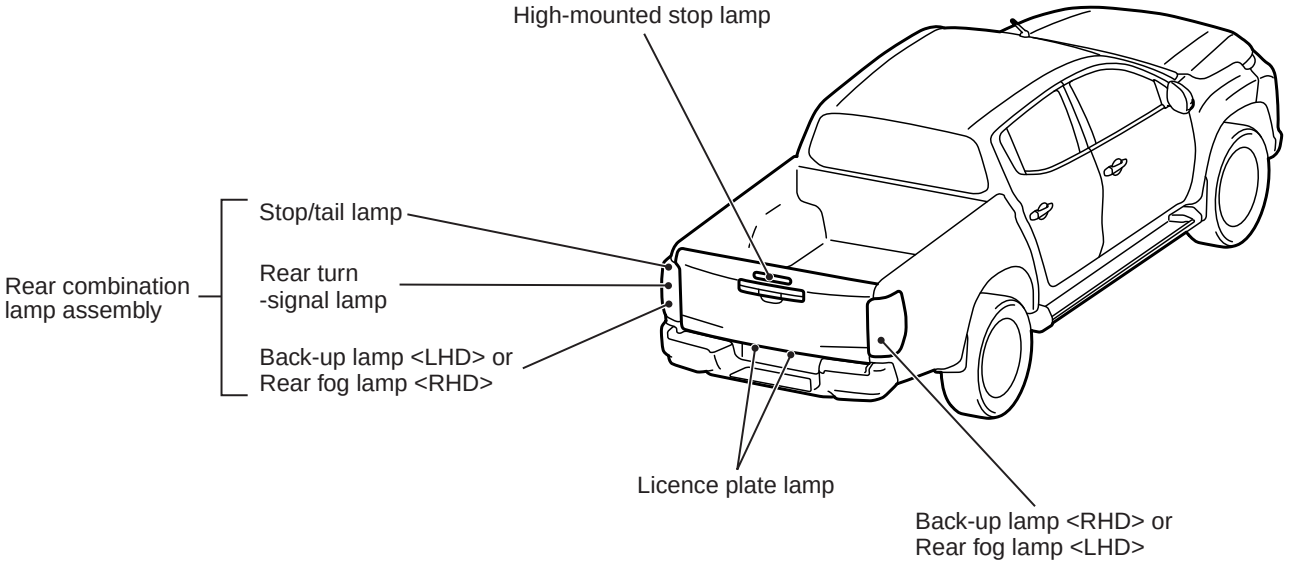
Item		
Front fog lamp	Front fog lamp (vehicles without daytime running lamp) W	19 (H16)
	Front fog lamp (vehicles with daytime running lamp) W	35 (H8)
Daytime running lamp	Daytime running lamp W	13 (P13W)
Side turn-signal lamp	Fender panel type W	5 (W5W)
	Door mirror type	LED type
Rear combination lamp	Stop/tail W	21/5 (P21/5W)
	Rear turn-signal W	21 (PY21W)
	Back-up lamp W	21 (P21W)
	Rear fog lamp W	21 (P21W)
High-mounted stop lamp		LED type
Licence plate lamp W		5 (W5W)

NOTE: The brackets ( ) show the bulb type.

Construction diagram <VEHICLES FOR RUSSIA (EASTERN EUROPE COUNTRIES)>



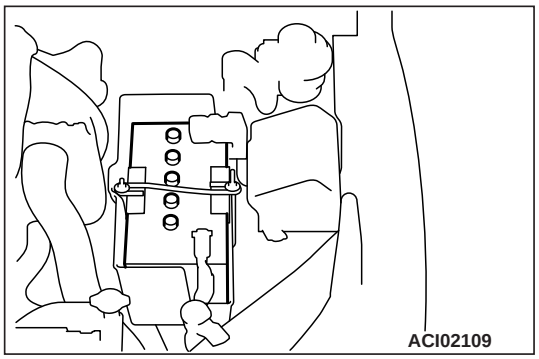
ACI02128 AB



ACI02260 AB

4.13. Battery (ies)

M6131300000089



Item	95D31L	115D31L	T-105
Voltage V	12	12	12
Capacity (5-hour rate) Ah	64	72	73
Electrolytic fluid specific gravity (fully charged state at 20°C)	1.220 – 1.290		1.250 – 1.290

GROUP 5

AXLES, WHEELS, TYRES AND SUSPENSION

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5.1. Axles

5.1.1. Axles

M6140100100079

FRONT AXLE

GENERAL INFORMATION <2WD>

- The front hub assembly which uses a unit bearing (double tapered roller bearing) is mounted on the knuckle.
- Rotor for detecting the wheel speed is press-fitted into the front hub.

<4WD>

The front axle consists of the front hub assembly, driveshaft, inner shaft, front differential, and it has the following features:

- A free-wheel mechanism that allows changeover between 2WD and 4WD while the vehicle is travelling.
- The wheel bearing uses a unit bearing (double tapered roller bearing) with strong transverse load bearing ability.
- Due to the use of the inner shaft, the right and left driveshafts are approximately the same in length. This reduces noise, vibration and torque steer.
- Rotor for detecting the wheel speed is press-fitted to the outboard joint outer wheel.

SPECIFICATIONS

<2WD>

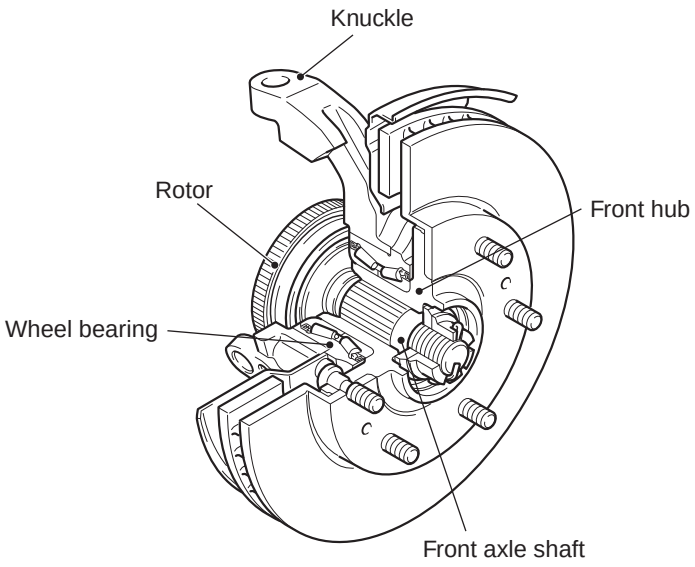
Item		Specification
Wheel bearing	Type	Unit bearing (double taper roller bearing)
	Bearing (OD × ID) mm	88 × 50

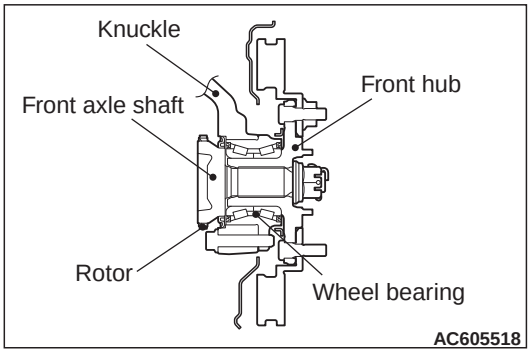
<4WD>

Item			Specification	
			Vehicles without freewheel clutch	Vehicles with freewheel clutch
Wheel bearing	Type		Unit bearing (double tapered roller bearing)	Unit bearing (double tapered roller bearing)
	Bearing (OD × ID) mm		88 × 50	88 × 50
Driveshaft	Length (joint to joint) × diameter mm	LH	323 × 29	323 × 29
		RH	327.6 × 29	327.6 × 29
Inner shaft	Length × diameter mm		470.0 × 31.5	342.7 × 29.5
	Bearing (OD × ID) mm		62 × 35	62 × 35
Differential	Reduction gear type		Hypoid gear	Hypoid gear
	Reduction ratio	M/T	3.692	3.692
		A/T	3.917	3.917

CONSTRUCTION DIAGRAM

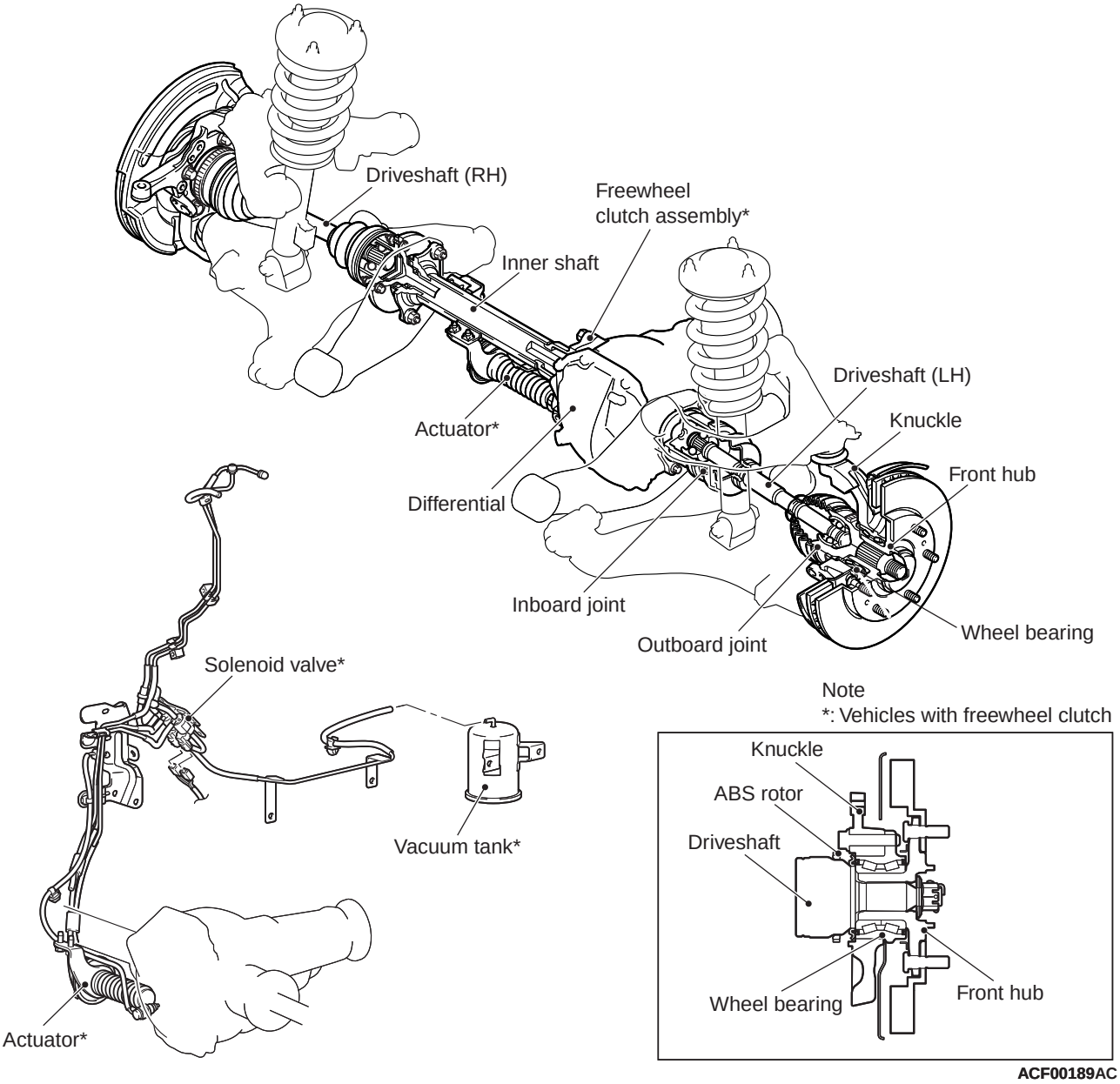
<2WD>





AC605517AC

<4WD>



REAR AXLE

GENERAL INFORMATION

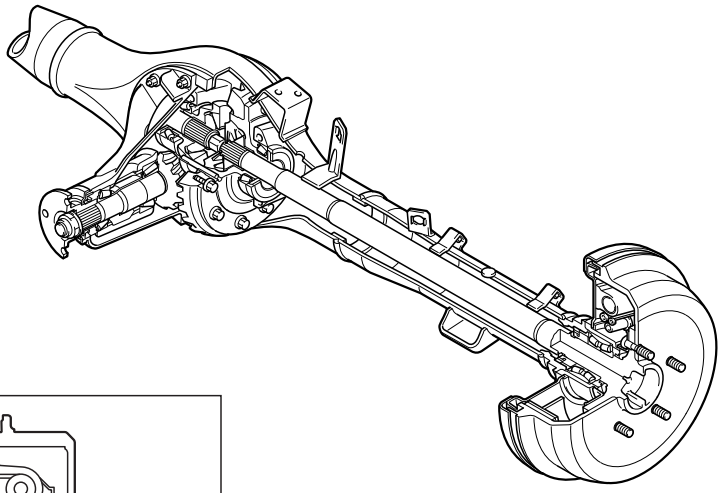
The rear axle has the following features:

- A banjo type semi-floating type axle has been incorporated.
- The wheel bearing is a double taper roller bearing and is highly resistant to a thrust load.
- ABS rotor for detecting the wheel speed is press-fitted to the retainer. <Vehicles with ABS>
- Hybrid limited slip differential has been adopted as optional.
- Rear differential lock system has been adopted as optional.

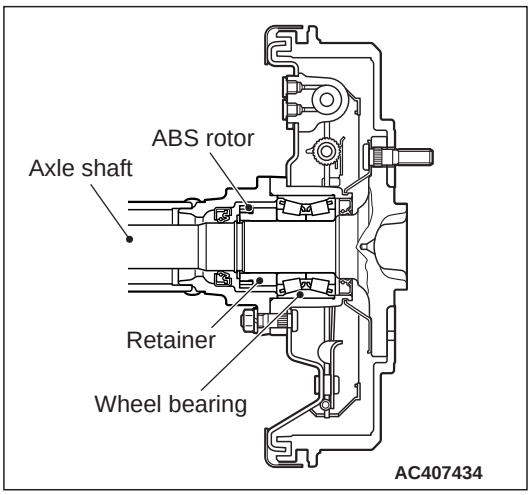
SPECIFICATIONS

Item			Specification
Axle housing	Type		Banjo
Axle shaft	Type		Semi-floating
	Shaft outer diameter (bearing part × centre part) × length mm	Vehicles without rear differential lock	40.0 × 34.5 × 736
		Vehicles with rear differential lock – LH	40.0 × 34.5 × 715
		Vehicles with rear differential lock – RH	40.0 × 34.5 × 752.25
	Bearing type		Double taper roller
	Bearing (OD × ID) mm		80 × 40

CONSTRUCTION DIAGRAM



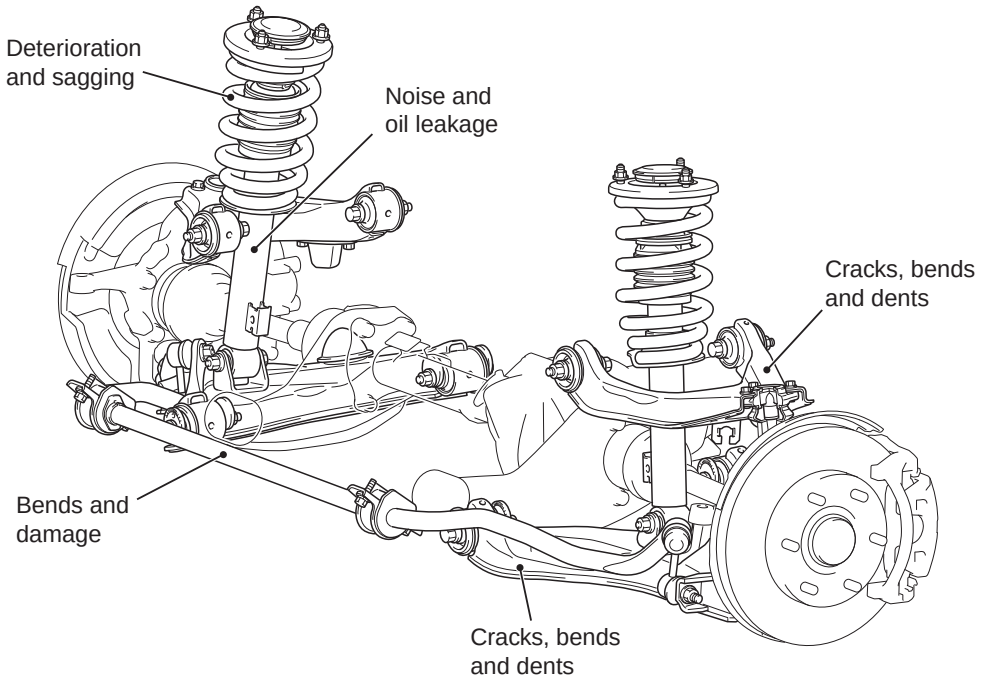
AC407432



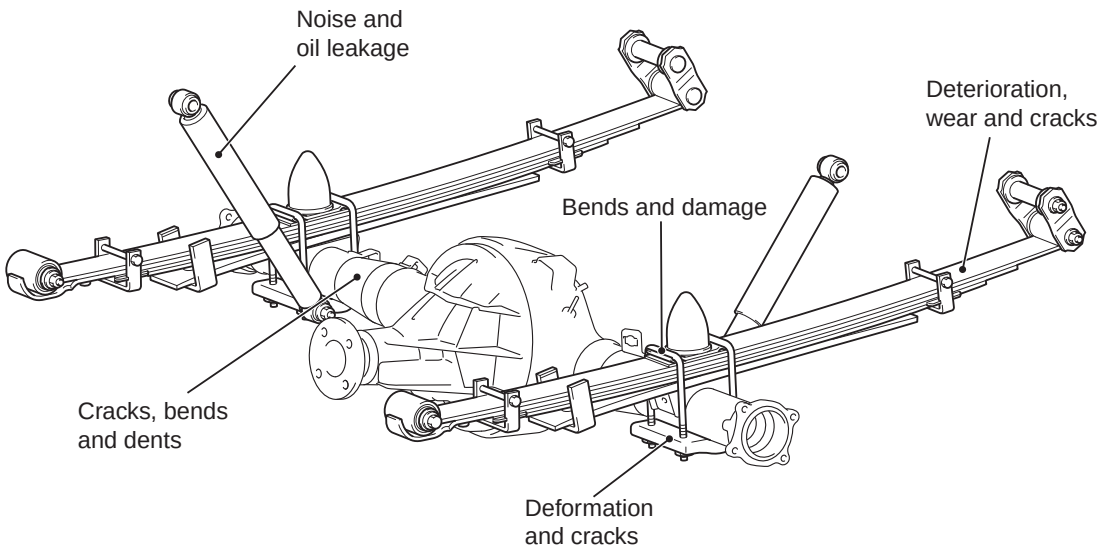
AC508436AB

CHECK SUSPENSION SYSTEM FOR DAMAGE AND LOOSENESS

FRONT SUSPENSION



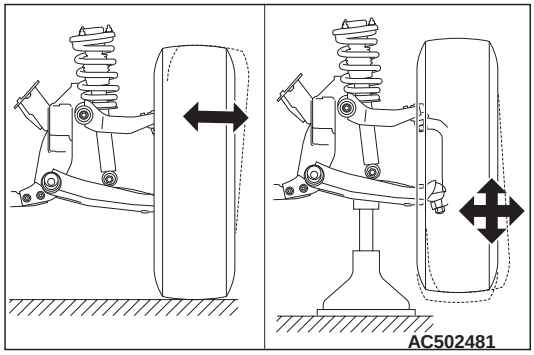
REAR SUSPENSION



AC508512AB

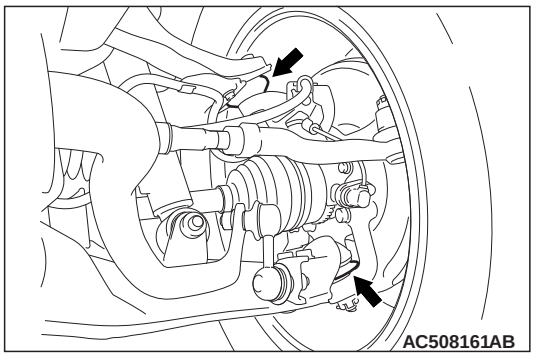
CHECK SUSPENSION ARM BALL JOINTS FOR PLAY, AND DUST COVERS FOR DAMAGE

BALL JOINTS FOR PLAY



1. With the vehicle unladen, check the top end of tyre for the amount of movement.
2. Remove the stabilizer link from the lower arm.
3. Jack up the lower arm and move the bottom of tyre to check the amount of movement.

DUST COVERS FOR DAMAGE

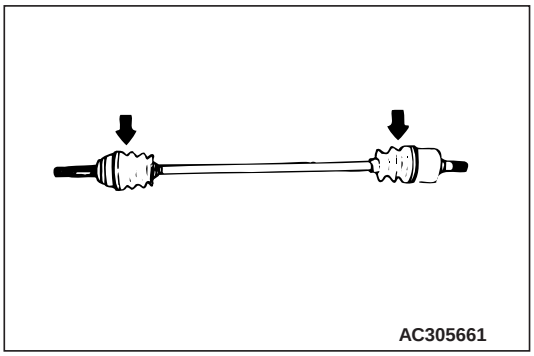


1. Press the lower arm ball joint cover with your finger to check that there are no cracks or damage in the lower arm ball joint cover.
2. If the lower arm ball joint cover is cracked or damaged, replace the lower arm ball joint assembly.

   NOTE: If the lower arm ball joint cover is cracked or damaged, it is possible that there may also be damage to the ball joint.
3. Press the upper arm ball joint cover with your finger to check that there are no cracks or damage in the upper arm ball joint cover.
4. If the upper arm ball joint cover is cracked or damaged, replace the upper arm ball joint assembly.

   NOTE: If the upper arm ball joint cover is cracked or damaged, it is possible that there may also be damage to the ball joint.

CHECK DRIVESHAFT BOOTS FOR DAMAGE

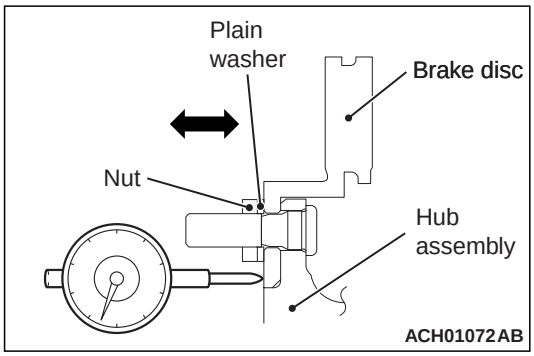


Check the driveshaft boots for damage.

CHECK FRONT WHEEL BEARINGS FOR PLAY

<FRONT WHEEL>

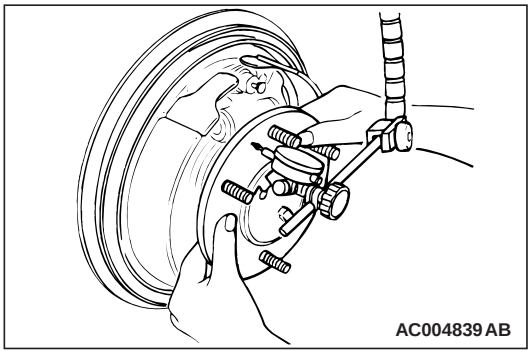
1. Remove the wheel assembly and the brake pad assembly.
2. Insert M12 plain washers, and tighten the nuts (M12 × 1.5) diagonally and evenly to the specified torque (147±10N·m) to secure the brake disc to the hub assembly.



3. Set a dial gauge as shown in the figure. Move the hub in the axial direction and measure the axial play.

   Limit: 0 mm
4. On completion, install the wheel assembly and the brake pad assembly.

<REAR WHEEL> AXLE SHAFT AXIAL PLAY CHECK



1. Measure the axle shaft axial play by using a dial indicator.

   Standard value: 0 – 0.3 mm

2. If not within specifications, replace the axle shaft assembly.

5.1.2. Stub axles

M6140100200076

"Not Applicable"

5.1.3. Wheel bearings

M6140100300073

"Not Applicable"

5.2. Wheels and tyres

5.2.1. Road wheel hub

M6140200100076

"Not Applicable"

5.2.2. Wheels

M6140200200114

GENERAL INFORMATION

The wheels and tyres of the following specifications have been established.

SPECIFICATIONS <VEHICLES FOR EUROPE>

<Road wheel and road tyre>

Item		**2WD**
Wheel	Type	Steel type Aluminium type*
	Size	16 × 6JJ 16 × 7J* 17 × 7 1/2J*
	Amount of wheel offset mm	38
	PCD mm	139.7
Tyre	Size	205R16C 8PR 110/108R 245/70R16 111S RF* 245/65R17 111S*

Item		4WD		
		DOUBLE CAB		
		GLX <LHD>	GLX <RHD>	GLS
Wheel	Type	Steel type Aluminium type*	Aluminium type Steel type*	Aluminium type
	Size	16 × 6JJ 16 × 7JJ* 17 × 7 1/2J*	16 × 6J 16 × 6JJ*	16 × 7J 17 × 7 1/2J*
	Amount of wheel offset mm	38	38	38
	PCD mm	139.7	139.7	139.7
Tyre	Size	205R16C 8PR 110/108R 245/70R16 111S RF* 245/65R17 111S*	205R16C 8PR 110/108R	245/70R16 111S RF 245/65R17 111S*

Item		4WD		
		CLUB CAB		
		GLX <LHD>	GLX <RHD>	GLS
Wheel	Type	Steel type	Aluminium type Steel type*	Aluminium type
	Size	16 × 6JJ	16 × 6J 16 × 6JJ*	16 × 7J 17 × 7 1/2J*
	Amount of wheel offset mm	38	38	38
	PCD mm	139.7	139.7	139.7
Tyre	Size	205R16C 8PR 110/108R	205R16C 8PR 110/108R	245/70R16 111S RF 245/65R17 111S*

Item		4WD
		SINGLE CAB
Wheel	Type	Steel type
	Size	16 × 6JJ
	Amount of wheel offset mm	38
	PCD mm	139.7
Tyre	Size	205R16C 8PR 110/108R

NOTE:

- **: Option.*
- *PCD indicates the pitch circle diameter of the wheel installation holes.*

<Spare wheel and spare tyre>

Item		**2WD**	**4WD**	
			DOUBLE CAB	
			GLX <LHD>	**GLX <RHD>**
Wheel	Type	Steel type	Steel type Aluminium type*	Steel type Aluminium type*
	Size	16 × 6JJ 16 × 7JJ* 17 × 7 1/2J*	16 × 6JJ 16 × 7JJ* 17 × 7 1/2J*	16 × 6JJ 16 × 6J*
	Amount of wheel offset mm	38	38	38
	PCD mm	139.7	139.7	139.7
Tyre	Size	205R16C 8PR 110/108R 245/70R16 111S RF* 245/65R17 111S*	205R16C 8PR 110/108R 245/70R16 111S RF* 245/65R17 111S*	205R16C 8PR 110/108R

Item		**4WD**	
		DOUBLE CAB	
		GLS <LHD>	**GLS <RHD>**
Wheel	Type	Steel type Aluminium type*	Aluminium type Steel type*
	Size	16 × 7JJ 17 × 7 1/2J*	16 × 7J 16 × 7JJ* 17 × 7 1/2J*
	Amount of wheel offset mm	38	38
	PCD mm	139.7	139.7
Tyre	Size	245/70R16 111S RF 245/65R17 111S*	245/70R16 111S RF 245/65R17 111S*

Item		**4WD**	
		CLUB CAB	
		GLX	**GLS**
Wheel	Type	Steel type	Aluminium type Steel type*
	Size	16 × 6JJ	16 × 7JJ 17 × 7 1/2J*
	Amount of wheel offset mm	38	38
	PCD mm	139.7	139.7
Tyre	Size	205R16C 8PR 110/108R	245/70R16 111S RF 245/65R17 111S*

Item		4WD
		SINGLE CAB
Wheel	Type	Steel type
	Size	16 × 6JJ
	Amount of wheel offset mm	38
	PCD mm	139.7
Tyre	Size	205R16C 8PR 110/108R

NOTE:

- **: Option.*
- *PCD indicates the pitch circle diameter of the wheel installation holes.*

<VEHICLES FOR RUSSIA (EASTERN EUROPE COUNTRIES)>

<Road wheel and road tyre>

Item		4WD	
		GLX	GLS
Wheel	Type	Steel type Aluminium type*	Aluminium type
	Size	16 × 6JJ 16 × 7J*	18 × 7 1/2J
	Amount of wheel offset mm	38	38
	PCD mm	139.7	139.7
Tyre	Size	205R16C 8PR 110/108R 245/70R16 111S RF*	265/60R18 110H

NOTE:

- **: Option.*
- *PCD indicates the pitch circle diameter of the wheel installation holes.*

<Spare wheel and spare tyre>

Item		**4WD**	
		DOUBLE CAB	
		GLX	**GLS**
Wheel	Type	Steel type	Aluminium type
	Size	16 × 6JJ 16 × 7JJ*	18 × 7 1/2J
	Amount of wheel offset mm	38	38
	PCD mm	139.7	139.7
Tyre	Size	205R16C 8PR 110/108R 245/70R16 111S RF*	265/60R18 110H

NOTE:

- **: Option.*
- *PCD indicates the pitch circle diameter of the wheel installation holes.*

5.2.3. Tyres

M6140200300111

GENERAL INFORMATION

The wheels and tyres of the following specifications have been established.

SPECIFICATIONS <VEHICLES FOR EUROPE>

<Road wheel and road tyre>

Item		**2WD**
Wheel	Type	Steel type Aluminium type*
	Size	16 × 6JJ 16 × 7J* 17 × 7 1/2J*
	Amount of wheel offset mm	38
	PCD mm	139.7
Tyre	Size	205R16C 8PR 110/108R 245/70R16 111S RF* 245/65R17 111S*

Item		4WD		
		DOUBLE CAB		
		GLX <LHD>	GLX <RHD>	GLS
Wheel	Type	Steel type Aluminium type*	Aluminium type Steel type*	Aluminium type
	Size	16 × 6JJ 16 × 7JJ* 17 × 7 1/2J*	16 × 6J 16 × 6JJ*	16 × 7J 17 × 7 1/2J*
	Amount of wheel offset mm	38	38	38
	PCD mm	139.7	139.7	139.7
Tyre	Size	205R16C 8PR 110/108R 245/70R16 111S RF* 245/65R17 111S*	205R16C 8PR 110/108R	245/70R16 111S RF 245/65R17 111S*

Item		4WD		
		CLUB CAB		
		GLX <LHD>	GLX <RHD>	GLS
Wheel	Type	Steel type	Aluminium type Steel type*	Aluminium type
	Size	16 × 6JJ	16 × 6J 16 × 6JJ*	16 × 7J 17 × 7 1/2J*
	Amount of wheel offset mm	38	38	38
	PCD mm	139.7	139.7	139.7
Tyre	Size	205R16C 8PR 110/108R	205R16C 8PR 110/108R	245/70R16 111S RF 245/65R17 111S*

Item		4WD
		SINGLE CAB
Wheel	Type	Steel type
	Size	16 × 6JJ
	Amount of wheel offset mm	38
	PCD mm	139.7
Tyre	Size	205R16C 8PR 110/108R

NOTE:

- **: Option.*
- *PCD indicates the pitch circle diameter of the wheel installation holes.*

<Spare wheel and spare tyre>

Item		**2WD**	**4WD**	
			DOUBLE CAB	
			GLX <LHD>	**GLX <RHD>**
Wheel	Type	Steel type	Steel type Aluminium type*	Steel type Aluminium type*
	Size	16 × 6JJ 16 × 7JJ* 17 × 7 1/2J*	16 × 6JJ 16 × 7JJ* 17 × 7 1/2J*	16 × 6JJ 16 × 6J*
	Amount of wheel offset mm	38	38	38
	PCD mm	139.7	139.7	139.7
Tyre	Size	205R16C 8PR 110/108R 245/70R16 111S RF* 245/65R17 111S*	205R16C 8PR 110/108R 245/70R16 111S RF* 245/65R17 111S*	205R16C 8PR 110/108R

Item		**4WD**	
		DOUBLE CAB	
		GLS <LHD>	**GLS <RHD>**
Wheel	Type	Steel type Aluminium type*	Aluminium type Steel type*
	Size	16 × 7JJ 17 × 7 1/2J*	16 × 7J 16 × 7JJ* 17 × 7 1/2J*
	Amount of wheel offset mm	38	38
	PCD mm	139.7	139.7
Tyre	Size	245/70R16 111S RF 245/65R17 111S*	245/70R16 111S RF 245/65R17 111S*

Item		**4WD**	
		CLUB CAB	
		GLX	**GLS**
Wheel	Type	Steel type	Aluminium type Steel type*
	Size	16 × 6JJ	16 × 7JJ 17 × 7 1/2J*
	Amount of wheel offset mm	38	38
	PCD mm	139.7	139.7
Tyre	Size	205R16C 8PR 110/108R	245/70R16 111S RF 245/65R17 111S*

Item		4WD
		SINGLE CAB
Wheel	Type	Steel type
	Size	16 × 6JJ
	Amount of wheel offset mm	38
	PCD mm	139.7
Tyre	Size	205R16C 8PR 110/108R

NOTE:

- **: Option.*
- *PCD indicates the pitch circle diameter of the wheel installation holes.*

<VEHICLES FOR RUSSIA (EASTERN EUROPE COUNTRIES)>

<Road wheel and road tyre>

Item		4WD	
		GLX	GLS
Wheel	Type	Steel type Aluminium type*	Aluminium type
	Size	16 × 6JJ 16 × 7J*	18 × 7 1/2J
	Amount of wheel offset mm	38	38
	PCD mm	139.7	139.7
Tyre	Size	205R16C 8PR 110/108R 245/70R16 111S RF*	265/60R18 110H

NOTE:

- **: Option.*
- *PCD indicates the pitch circle diameter of the wheel installation holes.*

<Spare wheel and spare tyre>

Item		**4WD**	
		DOUBLE CAB	
		GLX	**GLS**
Wheel	Type	Steel type	Aluminium type
	Size	16 × 6JJ 16 × 7JJ*	18 × 7 1/2J
	Amount of wheel offset mm	38	38
	PCD mm	139.7	139.7
Tyre	Size	205R16C 8PR 110/108R 245/70R16 111S RF*	265/60R18 110H

NOTE:

- **: Option.*
- *PCD indicates the pitch circle diameter of the wheel installation holes.*

5.3. Suspension system

5.3.1. Springs and stabiliser

M6140300100073

"Not Applicable"

5.3.2. Shock absorbers

M6140300200070

"Not Applicable"

5.3.2.1. efficiency testing of damping (X)2

M6140310100074

"Not Applicable"

5.3.3. Torque tubes, radius arms, wishbones and suspension arms

M6140300300077

"Not Applicable"

5.3.4. Suspension joints

M6140300400074

"Not Applicable"

5.3.5. Air suspension

M6140300500071

"Not Applicable"

GROUP 6

CHASSIS AND CHASSIS ATTACHMENTS

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6.1. Chassis or frame and attachments

6.1.1. General condition

M6150100100070

"Not Applicable"

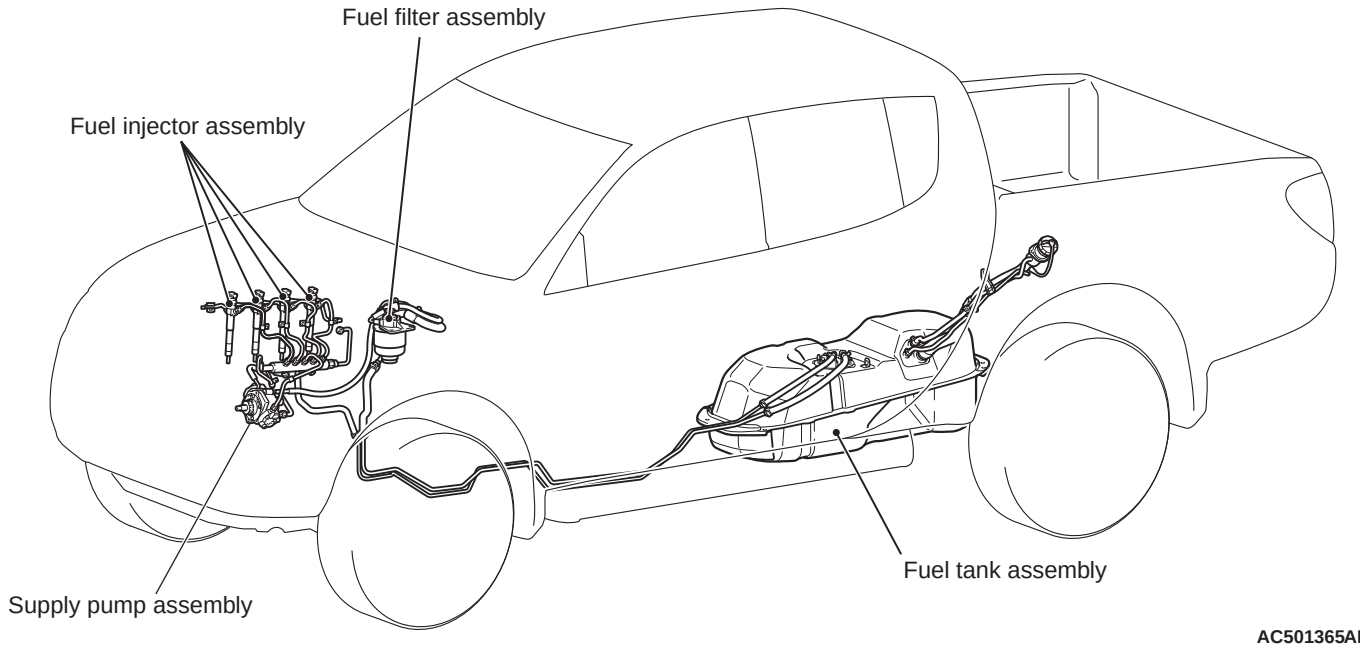
6.1.2. Exhaust pipes and silencers

M6150100200077

"Not Applicable"

6.1.3. Fuel tank and pipes (including heating fuel tank and pipes)

M6150100300074



AC501365AD

6.1.4. Bumpers, lateral protection and rear underrun devices

M6150100400071

"Not Applicable"

6.1.5. Spare wheel carrier (if fitted)

M6150100500078

"Not Applicable"

6.1.6. Mechanical coupling and towing device

M6150100600075

"Not Applicable"

6.1.7. Transmission

M6150100700072

"Not Applicable"

6.1.8. Engine mountings

M6150100800079

"Not Applicable"

6.1.9 Engine performance (X) 2

M6150100900076

"Query raised for this content"

6.2. Cab and bodywork

6.2.1. Condition

M6150200100077

"Not Applicable"

6.2.2. Mounting

M6150200200074

"Not Applicable"

6.2.3. Doors and door catches

M6150200300071

"Not Applicable"

6.2.4. Floor

M6150200400078

"Not Applicable"

6.2.5. Driver's seat

M6150200500075

"Not Applicable"

6.2.6. Other seats

M6150200600072

- Max Number of seats total (excluding driver's seat)
  - 1 <SINGLE CAB>
  - 3 <CLUB CAB>
  - 1 <CLUB CAB vehicles equipped with rear seatless option>
  - 4 <DOUBLE CAB>
- Number of rear-facing seats - 0

6.2.7. Driving controls

M6150200700079

"Not Applicable"

6.2.8. Cab steps

M6150200800076

"Not Applicable"

6.2.9. Other interior and exterior fittings and equipment

M6150200900073

"Not Applicable"

6.2.10. Mudguards (wings), spray suppression devices

M6150201000073

"Not Applicable"

6.2.11. Stand

M6150201100070

"Not Applicable"

6.2.12. Handgrips and footrests

M6150201200077

"Not Applicable"

GROUP 7

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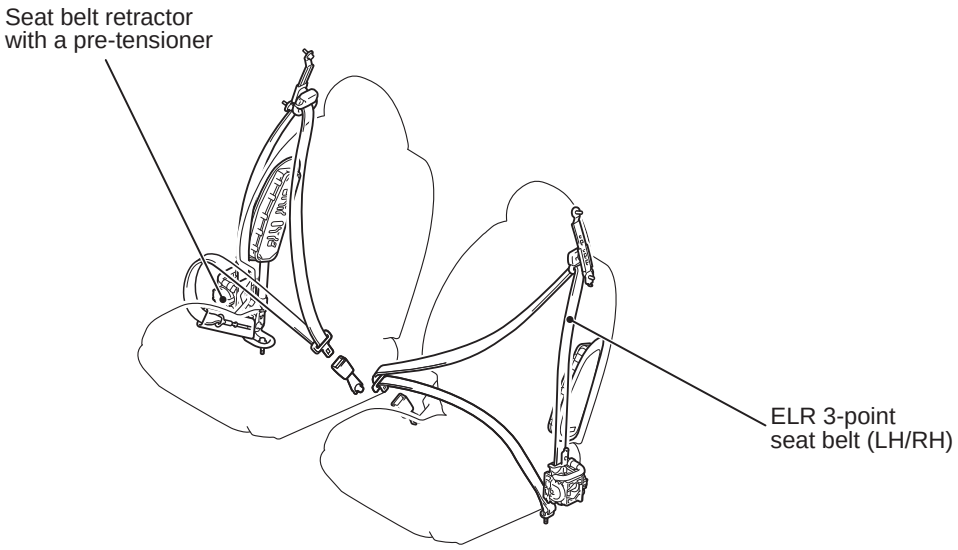
7.12 ELECTRONIC STABILITY CONTROL (ESC) IF FITTED/REQUIRED. 7-13

7.1. Safety-belts/buckles and restraint systems (as regards L category: L6/L7)

7.1.1. Security of safety-belts/buckles mounting

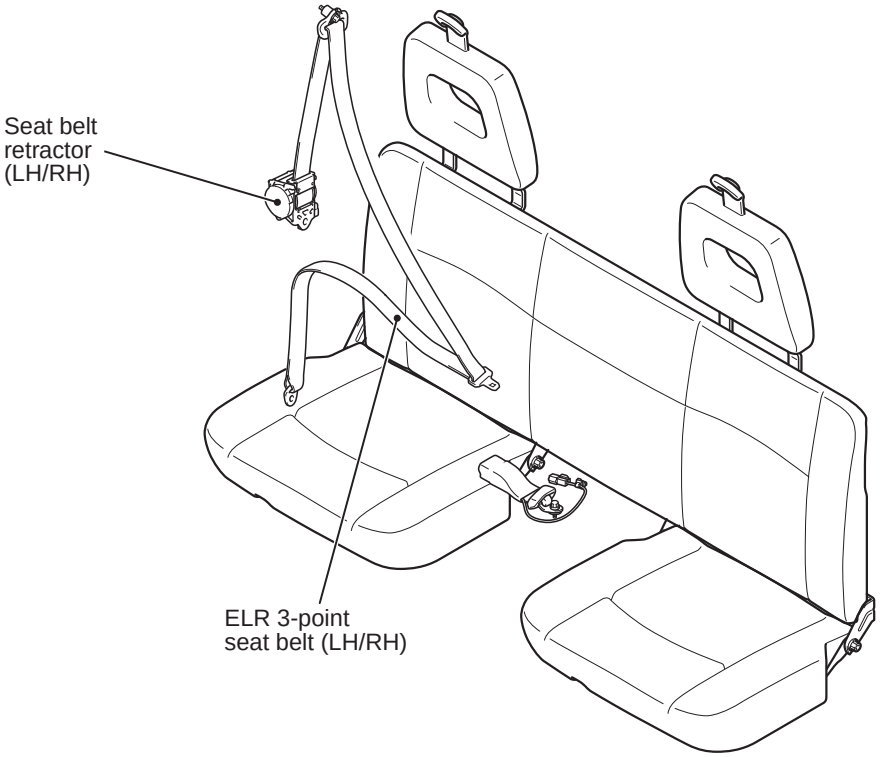
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<Front seat belt>



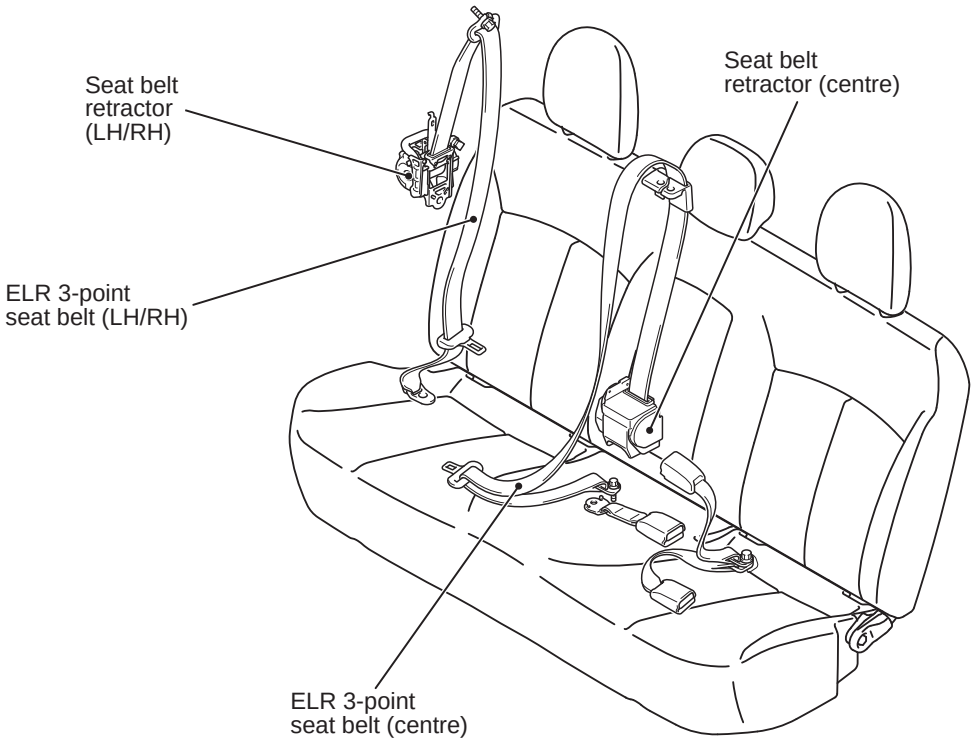
ACI02124 AB

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ACI02125 AB

<Rear seat belt (DOUBLE CAB)>

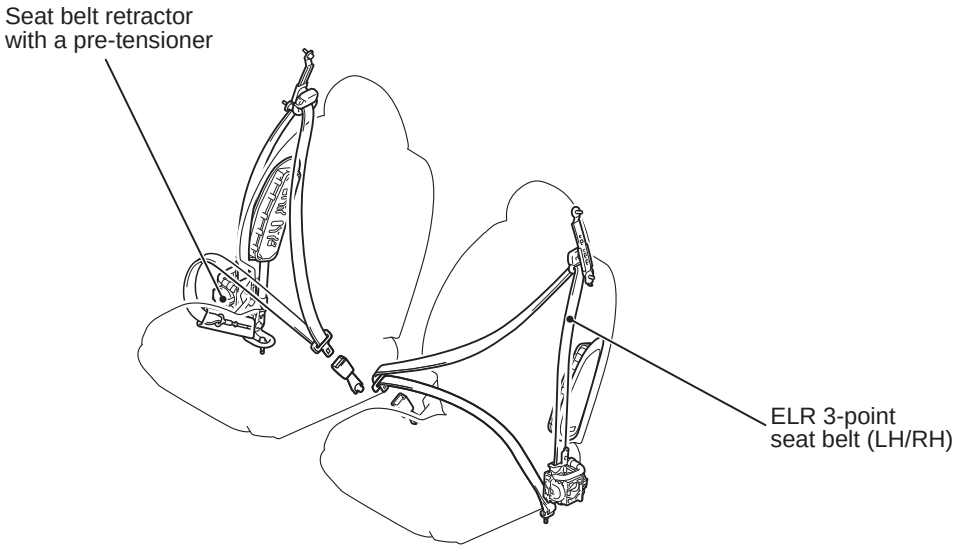


ACI02126 AB

7.1.2. Condition of safety-belts/buckles.

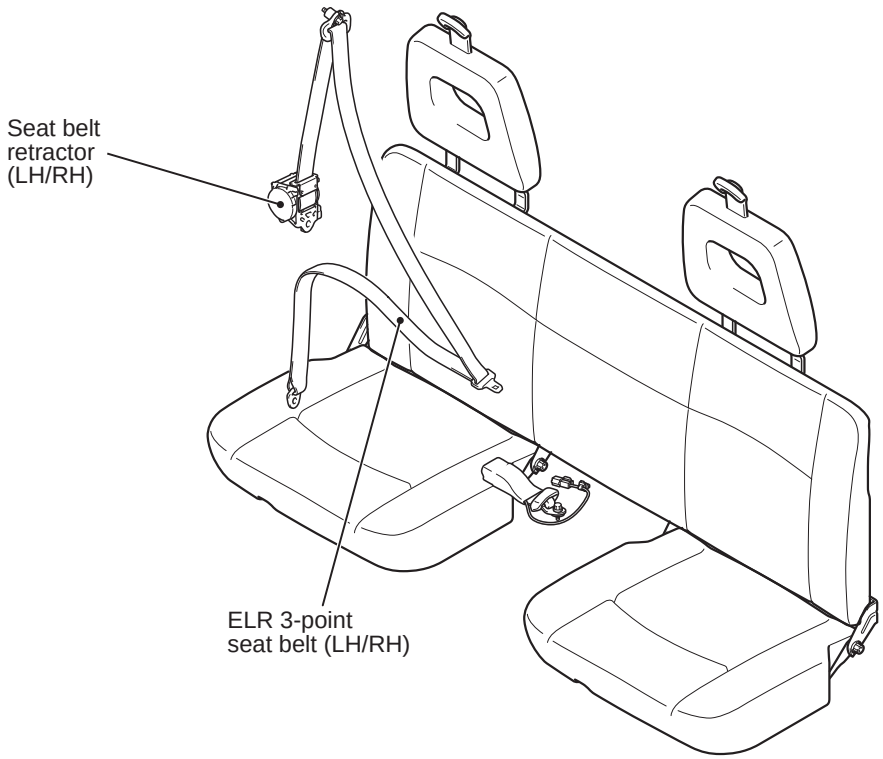
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<Front seat belt>



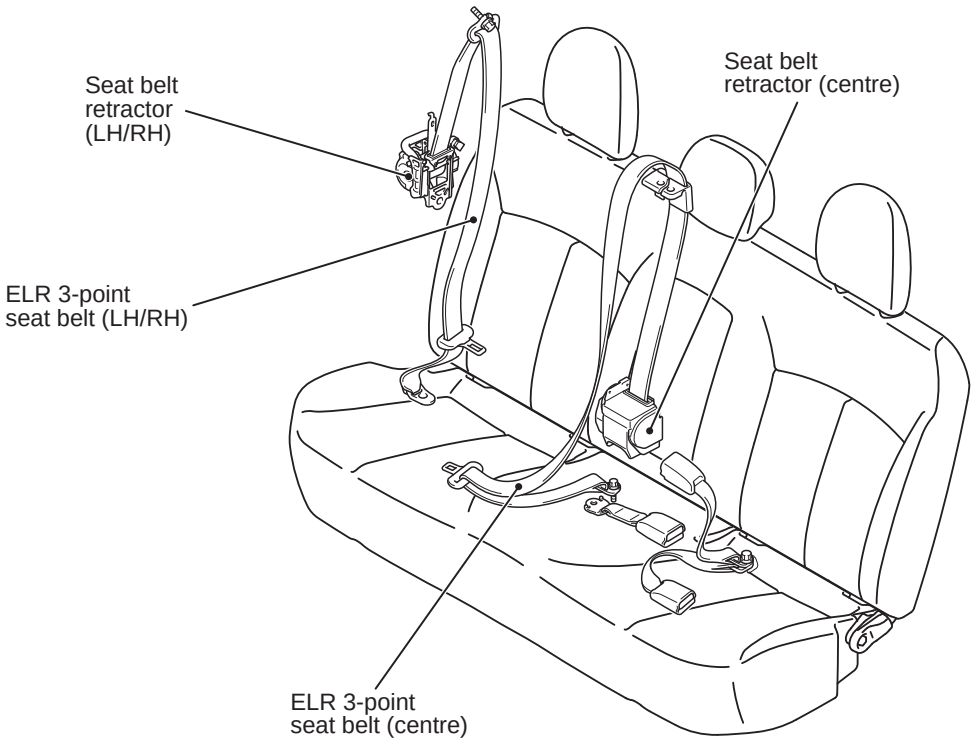
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<Rear seat belt (CLUB CAB)>



ACI02125 AB

<Rear seat belt (DOUBLE CAB)>

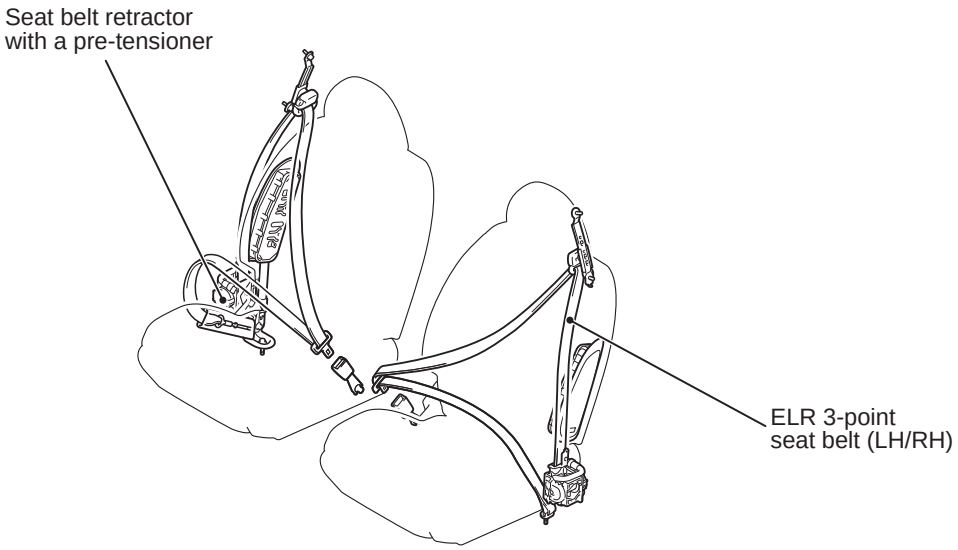


ACI02126 AB

7.1.3. Safety belt load limiter

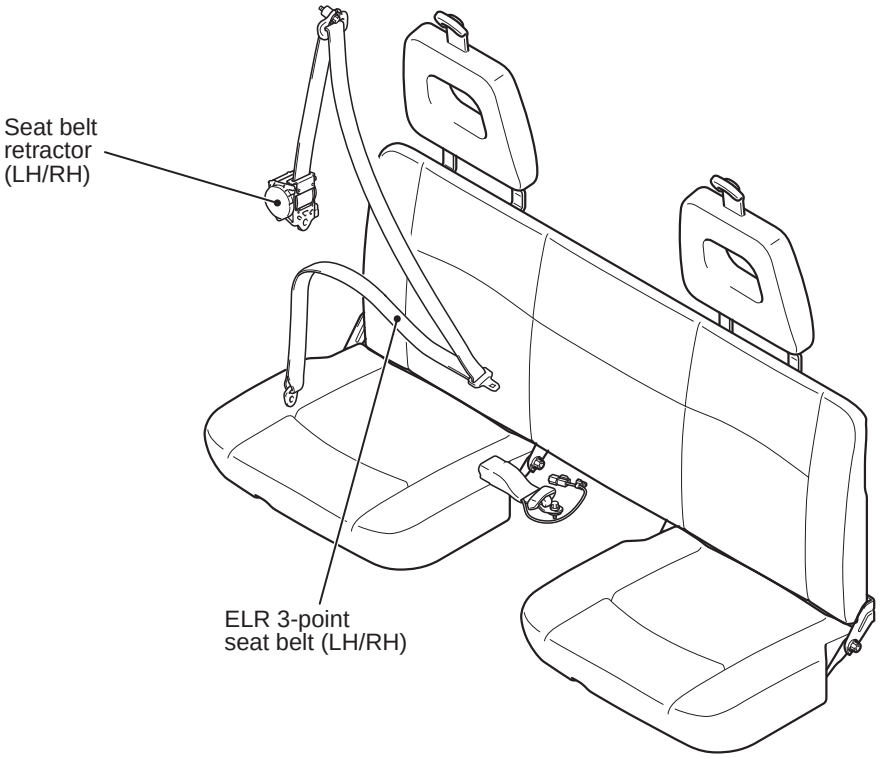
M6160100300075

<Front seat belt>



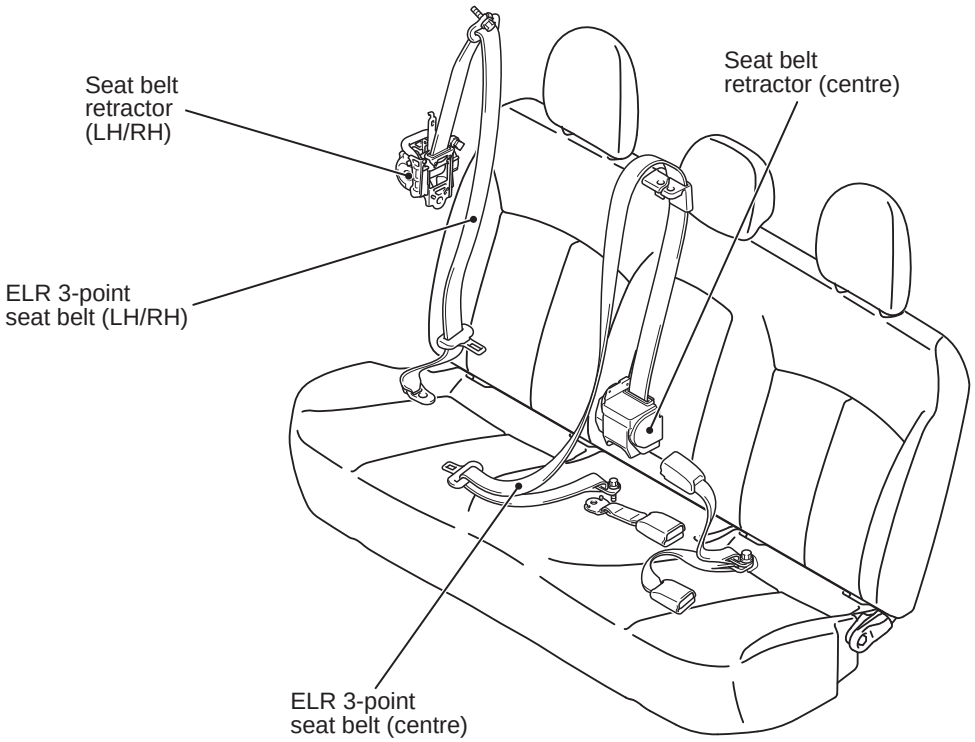
ACI02124 AB

<Rear seat belt (CLUB CAB)>



ACI02125 AB

<Rear seat belt (DOUBLE CAB)>



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7.1.4. Safety belt Pre-tensioners

M6160100400072

GENERAL INFORMATION

⚠ ***DANGER***

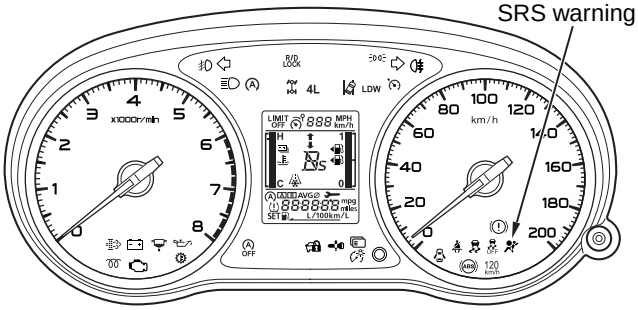
The SRS-ECU adopts the rollover specification that the curtain air bag and seat belt pretensioner operate at the occurrence of rollover. Therefore, do not tilt the vehicle to the right and left with the ignition switch turned to the "ON" position or tilt the SRS-ECU to the right and left with the ignition switch turned to the "ON" position and the harness installed.

The front air bag is designed to supplement the driver's and front passenger's seat belts to help reduce the risk or severity of injury to the driver and front passenger by activating and deploying both front air bags in certain frontal collisions. The side air bag are activated when an impact exceeds the threshold upon a side collision, and inflates to protect the heads of the occupants in the front and rear seats.

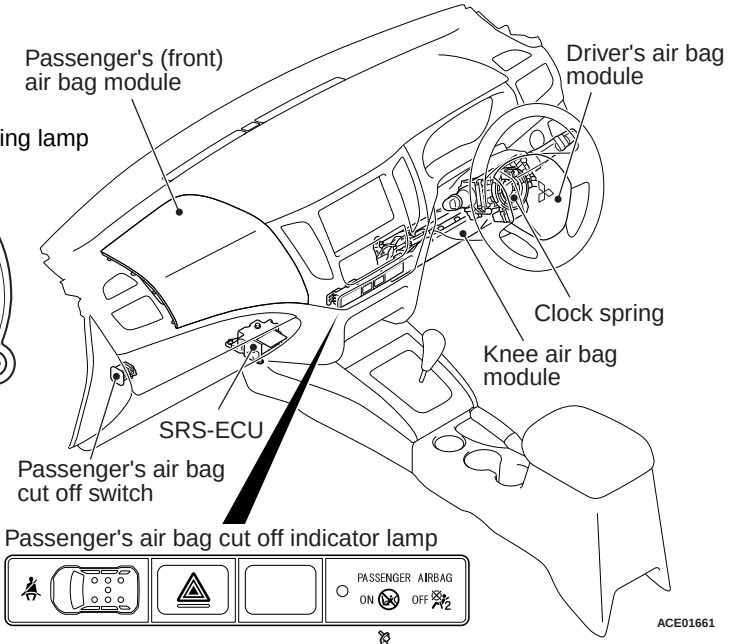
The Supplemental Restraint System (SRS) consists of air bag modules, SRS control unit (SRS-ECU), front impact sensors, side impact sensors, SRS warning lamp, clock spring, passenger’s air bag cut off switch, passenger’s air bag cut off indicator lamp and seat belt with pre-tensioner. Front air bags are located in the centre of the steering wheel and above the glove box. Side-airbags are located inside the front seatback assemblies. The curtain air bag module is installed in the roof side sections (from the driver's and the passenger's front pillars to the rear pillars). The knee air bag module is installed under the steering column. Each air bag is made up of a folded air bag and an inflator unit. The SRS-ECU is mounted on the front of the floor console and has a front air bag safing G-sensor, front air bag analogue G-sensor. The front impact sensor is installed out side of the radiator support reinforcement. The side impact sensor is installed in the lower parts of the centre pillars. The SRS warning lamp on the instrument panel indicates the operational status of the SRS. The clock spring is installed in the steering column. The passenger’s air bag cut off switch has been equipped in the instrument panel of passenger’s side. The passenger’s air bag cut off indicator

lamp is located above the centre upper panel. The lap pre-tensioner has been installed on the outer seat belt lower anchor side. The seat belt pre-tensioner is built into the driver's and passenger's front seat belt retractor or rear seat belt retractor.

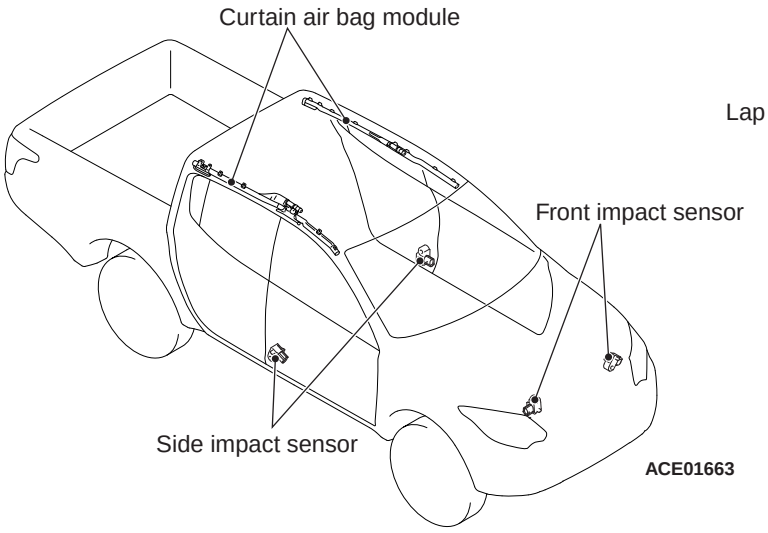
Only authorized service personnel should do work on or around the SRS components. Those service personnel should read this manual carefully before starting any such work.



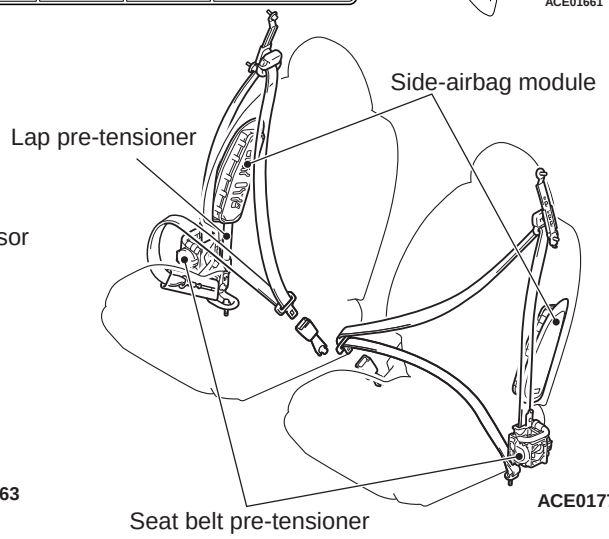
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7.1.5. Airbag

M6160100500079

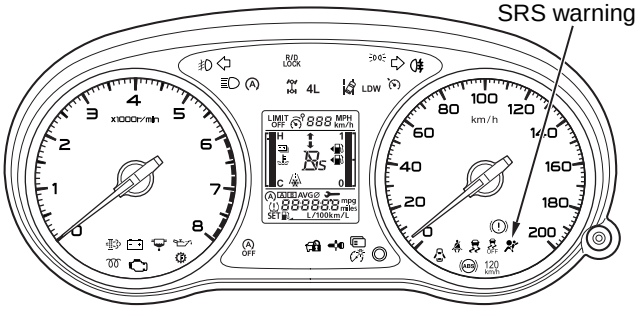
GENERAL INFORMATION

⚠ DANGER

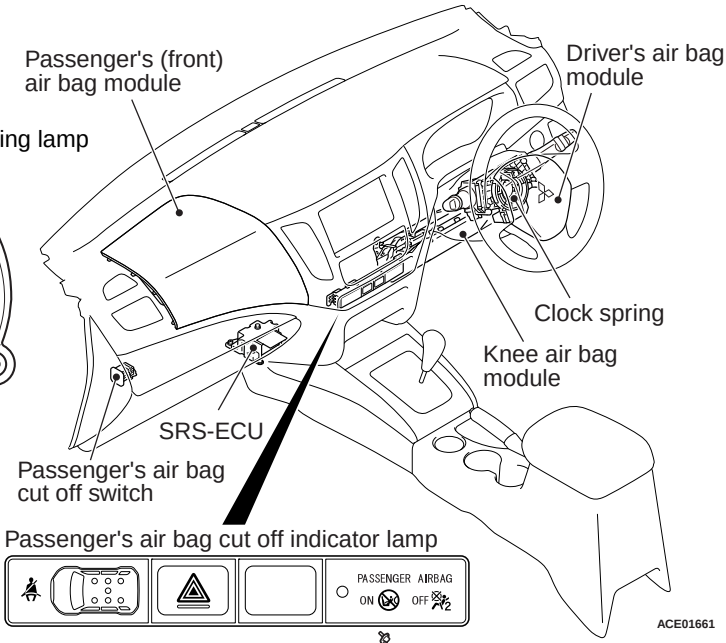
The SRS-ECU adopts the rollover specification that the curtain air bag and seat belt pre-tensioner operate at the occurrence of rollover. Therefore, do not tilt the vehicle to the right and left with the ignition switch turned to the "ON" position or tilt the SRS-ECU to the right and left with the ignition switch turned to the "ON" position and the harness installed.

The front air bag is designed to supplement the driver's and front passenger's seat belts to help reduce the risk or severity of injury to the driver and front passenger by activating and deploying both front air bags in certain frontal collisions. The side air bag are activated when an impact exceeds the threshold upon a side collision, and inflates to protect the heads of the occupants in the front and rear seats.

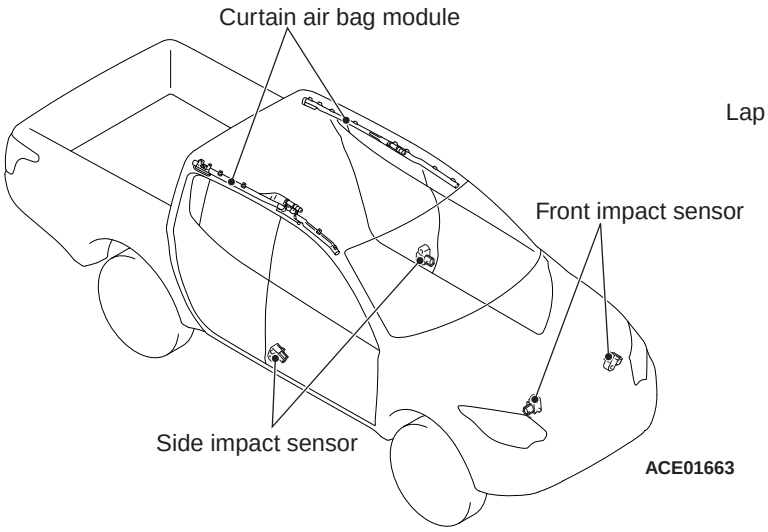
The Supplemental Restraint System (SRS) consists of air bag modules, SRS control unit (SRS-ECU), front impact sensors, side impact sensors, SRS warning lamp, clock spring, passenger's air bag cut off switch, passenger's air bag cut off indicator lamp and seat belt with pre-tensioner. Front air bags are located in the centre of the steering wheel and above the glove box. Side-airbags are located inside the front seatback assemblies. The curtain air bag module is installed in the roof side sections (from the driver's and the passenger's front pillars to the rear pillars). The knee air bag module is installed under the steering column. Each air bag is made up of a folded air bag and an inflator unit. The SRS-ECU is mounted on the front of the floor console and has a front air bag safing G-sensor, front air bag analogue G-sensor. The front impact sensor is installed out side of the radiator support reinforcement. The side impact sensor is installed in the lower parts of the centre pillars. The SRS warning lamp on the instrument panel indicates the operational status of the SRS. The clock spring is installed in the steering column. The passenger's air bag cut off switch has been equipped in the instrument panel of passenger's side. The passenger's air bag cut off indicator lamp is located above the centre upper panel. The lap pre-tensioner has been installed on the outer seat belt lower anchor side. The seat belt pre-tensioner is built into the driver's and passenger's front seat belt retractor or rear seat belt retractor.
Only authorized service personnel should do work on or around the SRS components. Those service personnel should read this manual carefully before starting any such work.



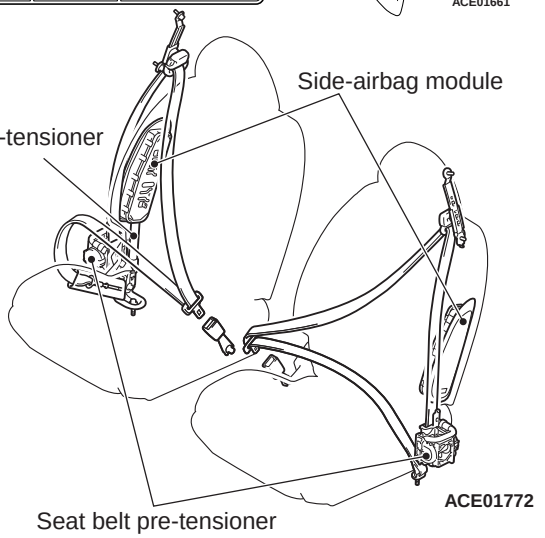
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7.1.6. SRS Systems

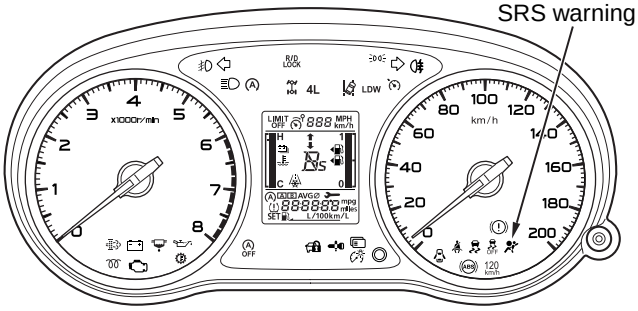
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GENERAL INFORMATION

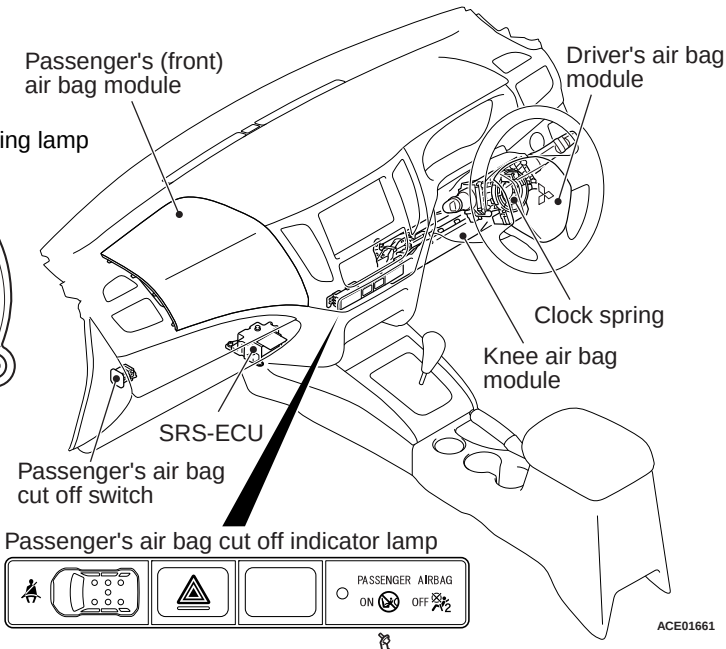
⚠ DANGER

The SRS-ECU adopts the rollover specification that the curtain air bag and seat belt pretensioner operate at the occurrence of rollover. Therefore, do not tilt the vehicle to the right and left with the ignition switch turned to the "ON" position or tilt the SRS-ECU to the right and left with the ignition switch turned to the "ON" position and the harness installed.

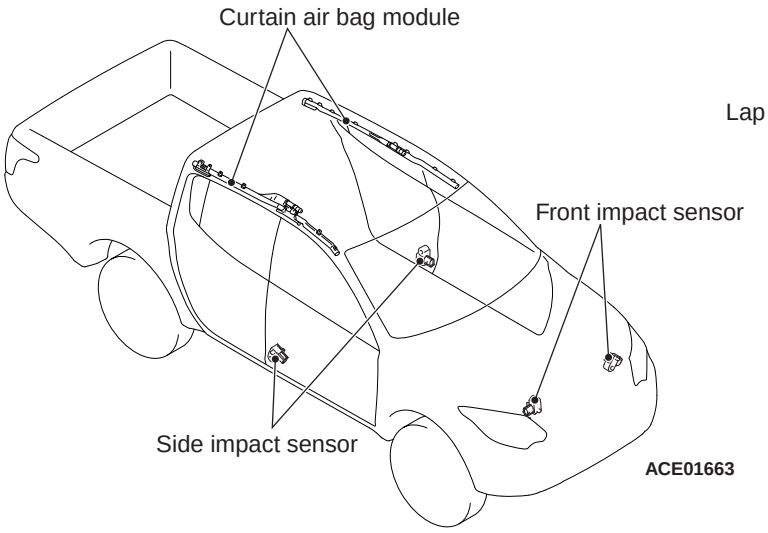
The front air bag is designed to supplement the driver's and front passenger's seat belts to help reduce the risk or severity of injury to the driver and front passenger by activating and deploying both front air bags in certain frontal collisions. The side air bag are activated when an impact exceeds the threshold upon a side collision, and inflates to protect the heads of the occupants in the front and rear seats.
The Supplemental Restraint System (SRS) consists of air bag modules, SRS control unit (SRS-ECU), front impact sensors, side impact sensors, SRS warning lamp, clock spring, passenger’s air bag cut off switch, passenger’s air bag cut off indicator lamp and seat belt with pre-tensioner. Front air bags are located in the centre of the steering wheel and above the glove box. Side-airbags are located inside the front seatback assemblies. The curtain air bag module is installed in the roof side sections (from the driver's and the passenger's front pillars to the rear pillars). The knee air bag module is installed under the steering column. Each air bag is made up of a folded air bag and an inflator unit. The SRS-ECU is mounted on the front of the floor console and has a front air bag safing G-sensor, front air bag analogue G-sensor. The front impact sensor is installed out side of the radiator support reinforcement. The side impact sensor is installed in the lower parts of the centre pillars. The SRS warning lamp on the instrument panel indicates the operational status of the SRS. The clock spring is installed in the steering column. The passenger’s air bag cut off switch has been equipped in the instrument panel of passenger’s side. The passenger’s air bag cut off indicator lamp is located above the centre upper panel. The lap pre-tensioner has been installed on the outer seat belt lower anchor side. The seat belt pre-tensioner is built into the driver's and passenger's front seat belt retractor or rear seat belt retractor.
Only authorized service personnel should do work on or around the SRS components. Those service personnel should read this manual carefully before starting any such work.



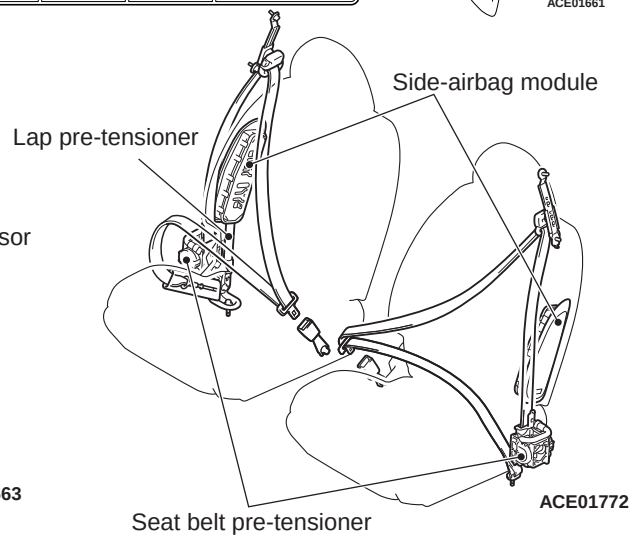
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ACE01772

ACE02569AC

7.2. Fire extinguisher (X)2

M6169200000090

"Not Applicable"

7.3. Locks and anti-theft device

M6169300000075

"Not Applicable"

7.4. Warning triangle (if required) (X)2

M6169400000072

"Not Applicable"

7.5. First aid kit. (if required) (X)2

M6169500000079

"Not Applicable"

7.6. Wheel chocks (wedges) (if required) (X)2

M6169600000076

"Not Applicable"

7.7. Audible warning device

M6169700000073

"Not Applicable"

7.8. Speedometer

M6169800000070

"Not Applicable"

7.9. Tachograph (if fitted/required)

M6169900000077

"Not Applicable"

7.10. Speed limitation device (if fitted/required)

M6161100000077

"Not Applicable"

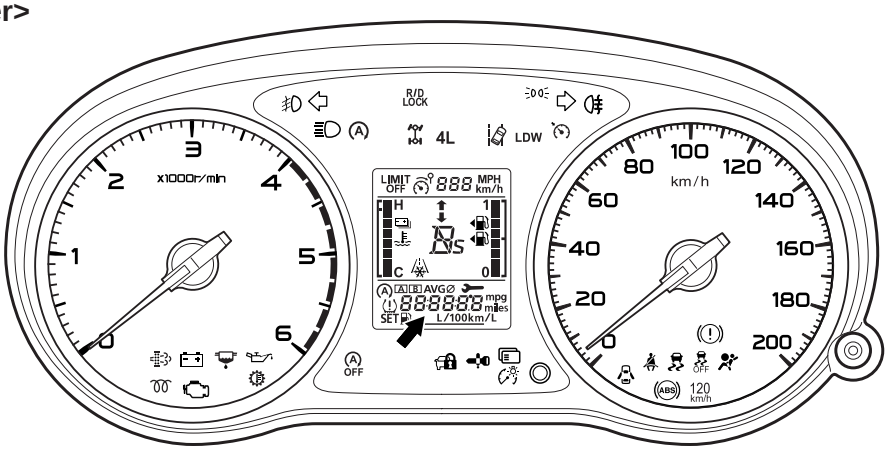
7.11 Odometer if available (X)2

M6160200000093

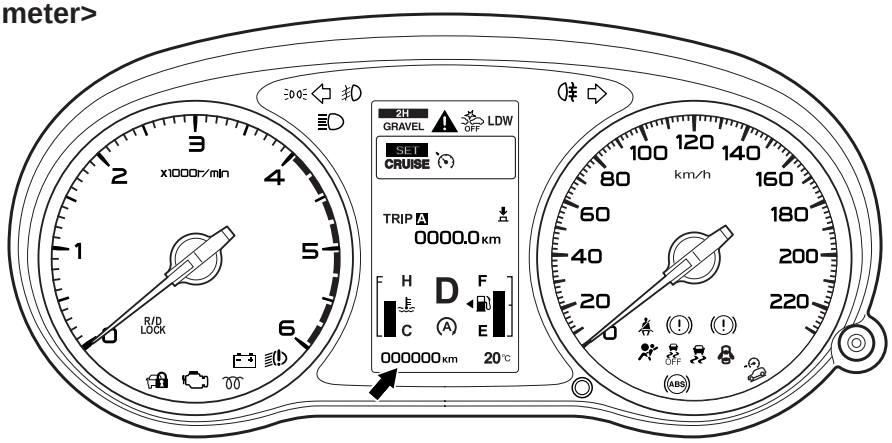
Visual Inspection

Check the odometer for displaying the total traveling distance of vehicle.

<Standard meter>



<High contrast meter>



ACI02127 AB

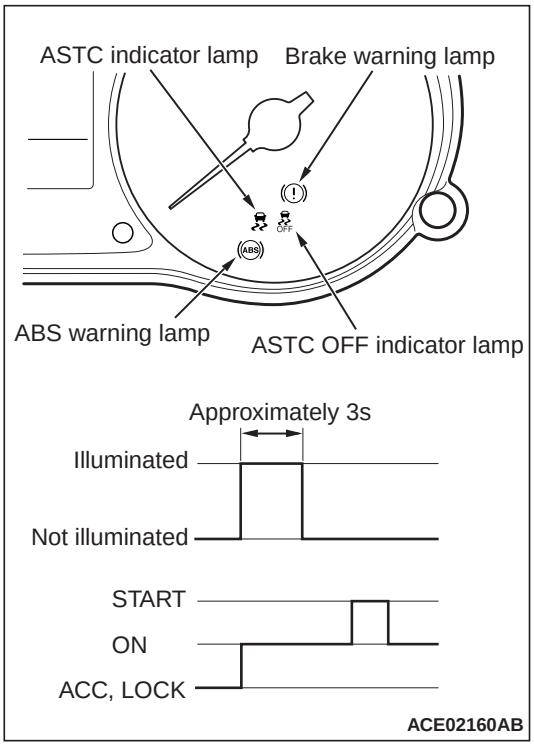
7.12 Electronic Stability Control (ESC) if fitted/required

M6161200000074

BRAKE WARNING LAMP, ABS WARNING LAMP, ASTC INDICATOR LAMP, ASTC OFF INDICATOR LAMP INSPECTION

Check that Anti-lock Brake System (ABS) warning lamp, brake warning lamp, ASTC indicator lamp and ASTC OFF indicator lamp illuminate as follows.

NOTE: The brake warning lamp is used as a warning lamp for parking brake, brake fluid level, and Electronic brake-force distribution (EBD) control.



1. When the ignition switch is turned to the "ON" position, ABS warning lamps, brake warning lamps, ASTC indicator lamp and ASTC OFF indicator lamp illuminate.
2. The ABS warning lamps, brake warning lamps, ASTC indicator lamp and ASTC OFF indicator lamp illuminate for three seconds*1 and then turn "OFF"*2.
3. Otherwise, check the diagnosis code.

NOTE:

- **1: The ABS warning lamp, ASTC indicator lamp may stay ON until the vehicle speed reaches 25 km/h. As far as ASTC-ECU sets any diagnosis code related to the wheel speed sensor malfunction or the motor malfunction as past trouble, ASTC-ECU continues illuminating the ABS warning lamp until it verifies that the malfunction for that code is resolved (startup check).*

If the steering wheel sensor or the G and yaw rate sensor system was detected to be defective during ignition switch being "ON" at the last time, the ASTC indicator lamp will illuminate until the vehicle speed reaches approximately 25 km/h, then the steering wheel is turned to either right or left and then the ECU determines that the system is normal.

- **2: The brake warning lamp does not turn OFF when the parking brake is applied or the brake fluid level is lowered.*

GROUP 8

NUISANCE

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8.1. Noise

8.1.1 Noise suppression system

M6170100100072

"Query raised for this content"

8.2. Exhaust emissions

8.2.1 Positive ignition engine emissions

8.2.1.1 Exhaust emissions control equipment

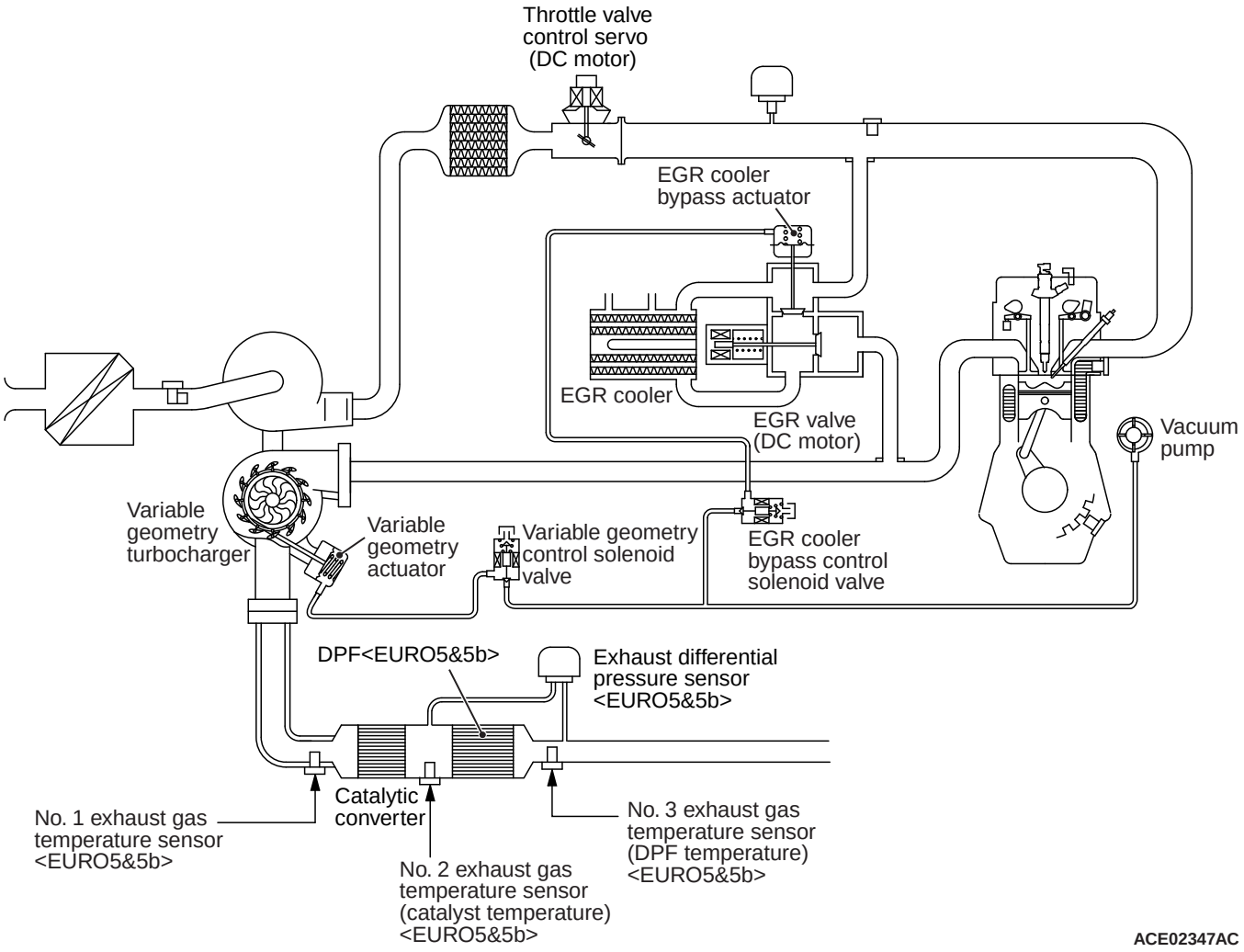
M6170200200117

GENERAL INFORMATION (EGR SYSTEM)

On the new emission control system for 4N1 engine,
the following changes have been made:

Improvement / Additions	Remark
EGR cooler bypass system added	By blocking the exhaust gas flow not to pass through the EGR cooler at the engine cold state, HC emissions are reduced.

SYSTEM CONFIGURATION DIAGRAM

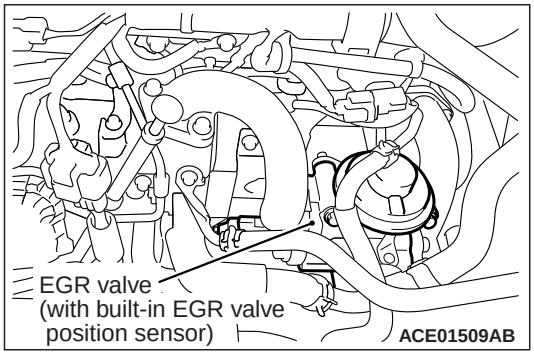


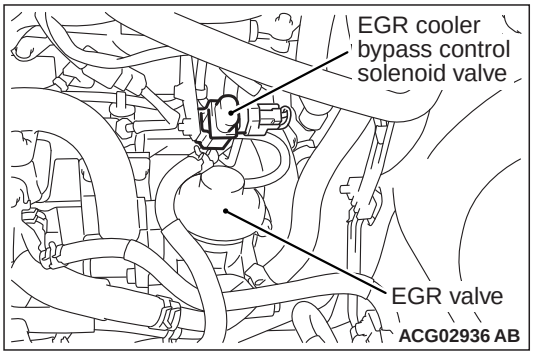
Exhaust gas cleaning devices list

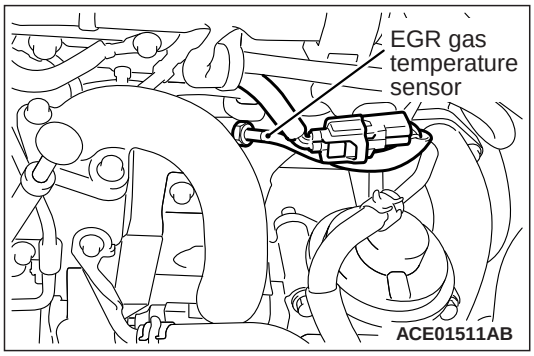
System	Objective/Function	Composition parts
Exhaust gas recirculation (EGR) system	NOx decrease Reduce NOx generation by controlling exhaust gas recirculation volume according to engine warm-up condition and driving conditions.	• EGR valve • EGR position sensor • EGR cooler • EGR cooler bypass control solenoid valve
Diesel particulate filter system <EURO5&5b>	Particulate matter (PM) is removed. PM accumulated in the diesel particulate filter is removed.	• Diesel particulate filter • No. 1 exhaust gas temperature sensor • No. 2 exhaust gas temperature sensor (catalyst temperature) • No. 3 exhaust gas temperature sensor (DPF temperature) • Exhaust differential pressure sensor

System		Objective/Function	Composition parts
Emission reduction system	Fuel injection control	Particulate matter (PM) decrease	Common rail system
	Catalytic converter	CO and HC decrease Reduces the CO and HC in the exhaust gas, by promoting their oxidation reaction.	Monolith catalyst

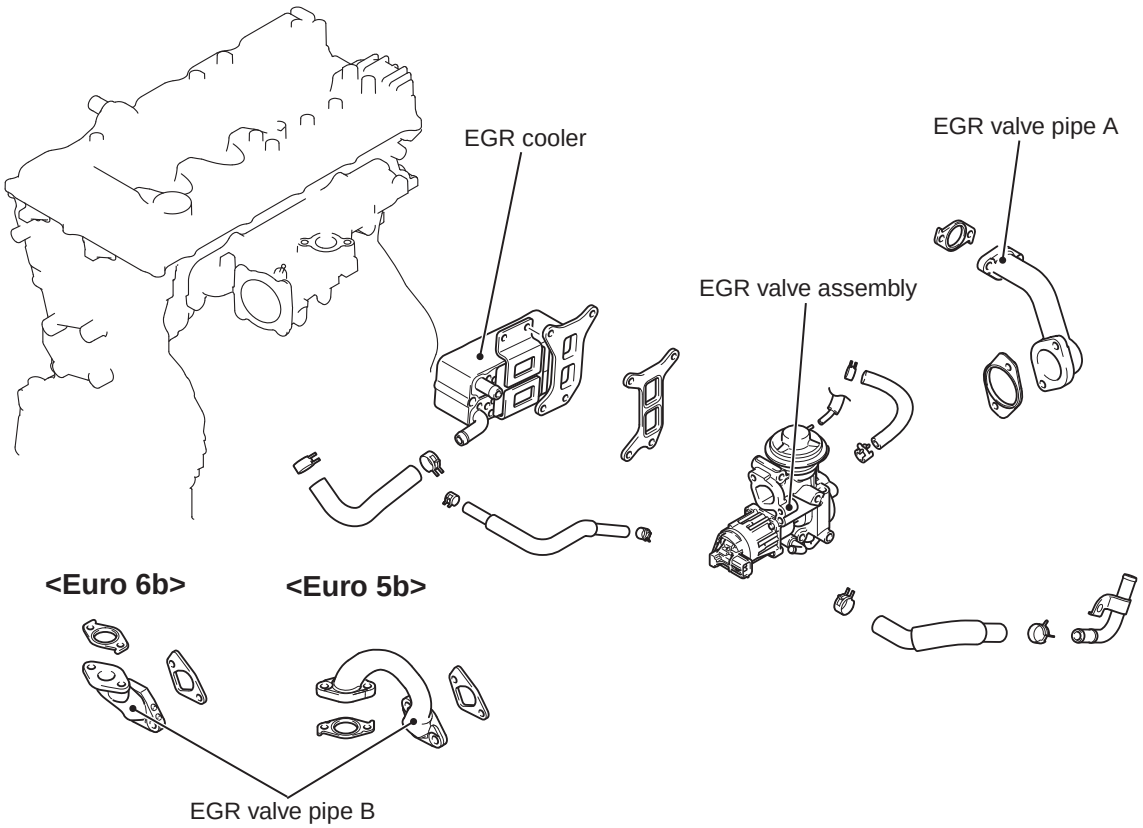
COMPONENT LOCATION (EGR SYSTEM)







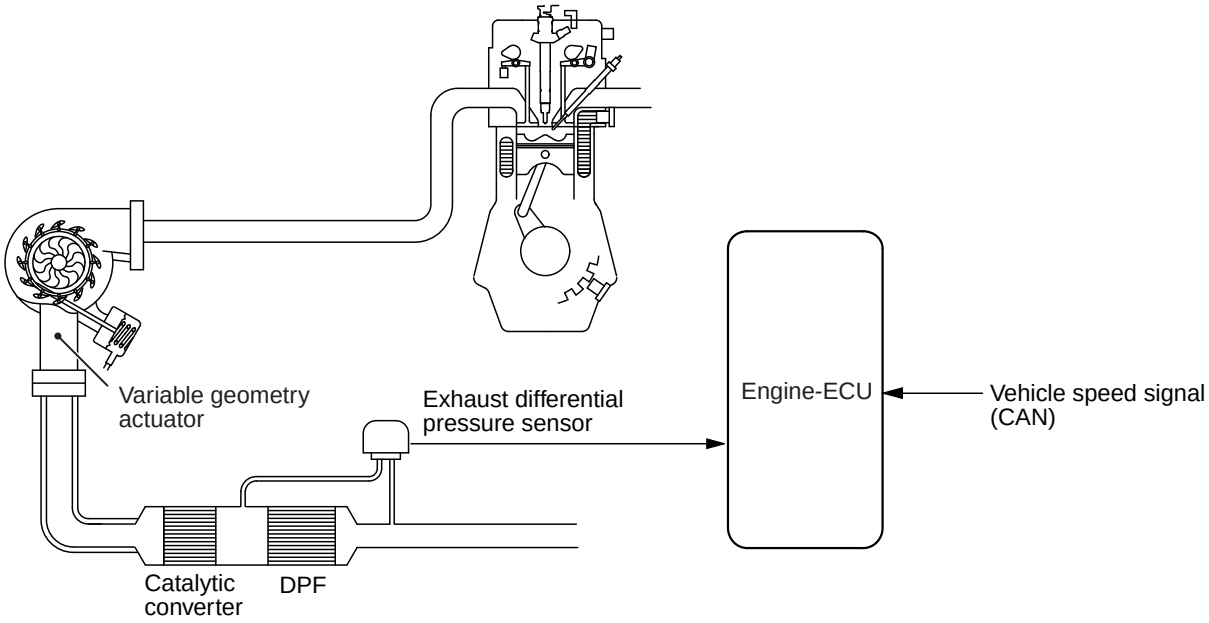
CONSTRUCTION DIAGRAM (EGR SYSTEM)



DIESEL PARTICULATE FILTER (DPF) SYSTEM <EURO5&5b>

Through the input signal sent from each sensor, the engine-ECU anticipates the amount of particulate matter (PM) accumulated in the DPF. Taking control of automatically regenerating the DPF under the certain condition, the engine-ECU removes the PM when the PM accumulates more than the standard. At the DPF regeneration, the DPF temperature is higher and the high temperature exhaust gas discharges.

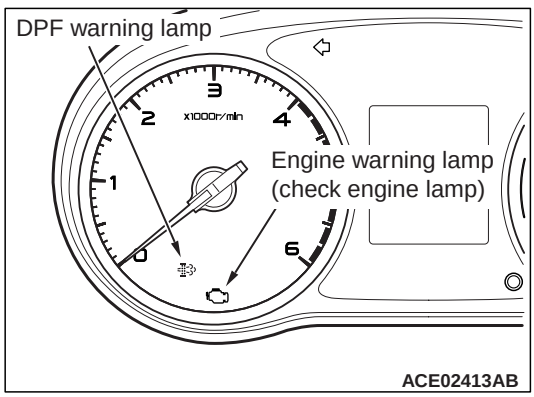
CONTROL OVER ANTICIPATING AMOUNT OF ACCUMULATED PM



ACE02409AB

Calculating the input signal sent from each sensor, the engine-ECU anticipates the amount of PM accumulated in the DPF. The anticipation method is as follows:

Anticipation by odometer	Calculating travel distance through vehicle speed signal, engine-ECU anticipates that PM accumulates more than criteria when specified travel distance is accumulated from previous DPF regeneration.
Anticipation by difference in pressure	Detecting difference in pressure before and after DPF through exhaust differential pressure sensor, engine-ECU anticipates amount of accumulated PM.
Anticipation by quantity survey	Engine-ECU anticipates amount of exhaust PM based on operation conditions, which multiplying allows engine-ECU to anticipate amount of accumulated PM.

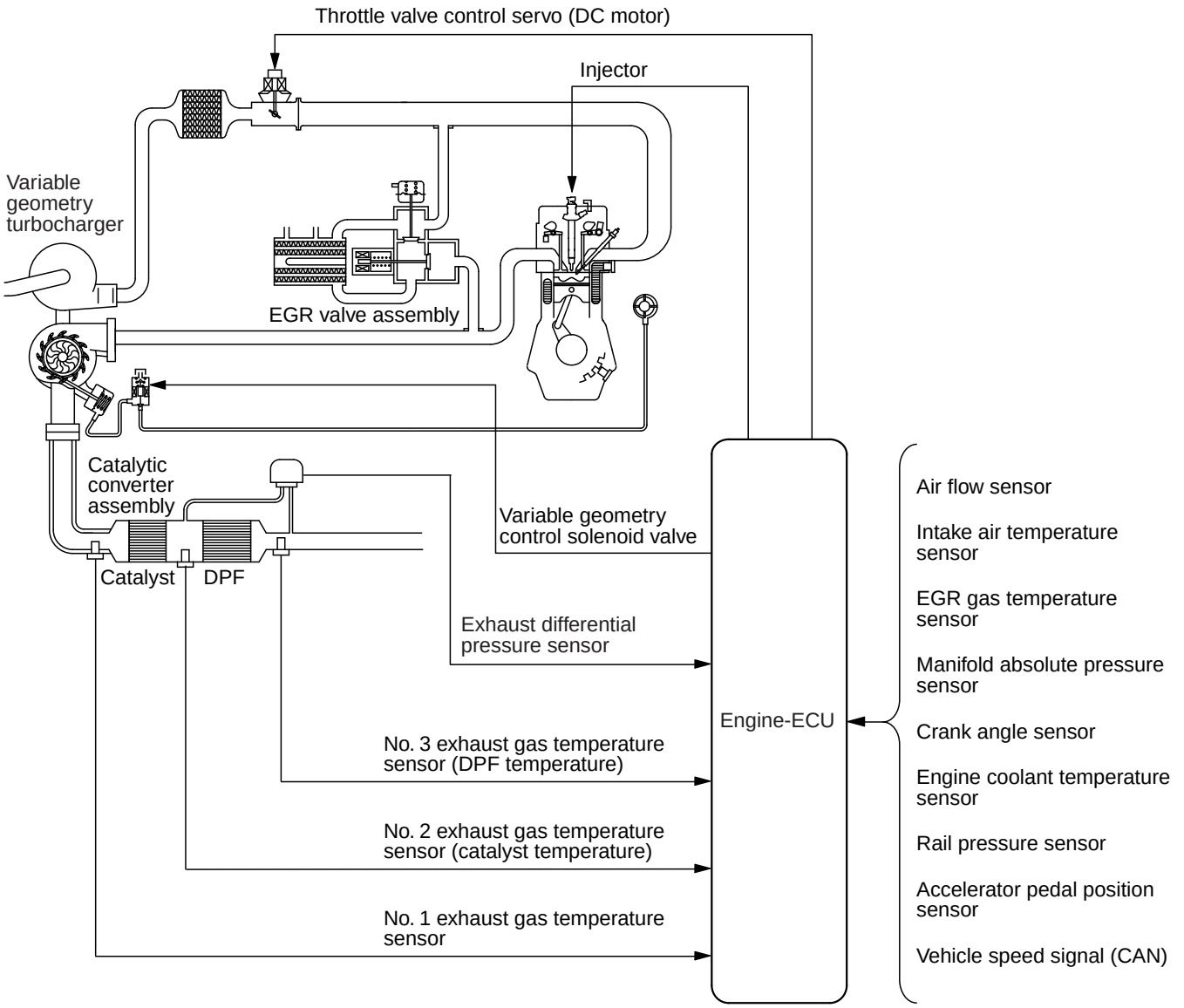


ACE02413AB

When detecting that the PM accumulates more than the standard in the DPF, the engine-ECU illuminates the DPF warning lamp. This encourages the driver to drive the vehicle under the conditions that are adequate to accomplish the DPF regeneration.

If the driver does not drive the vehicle under the conditions that are adequate to accomplish the DPF regeneration although the DPF warning lamp is illuminated, the PM accumulation in the DPF gets higher, and then the DPF can possibly reach its clogged or damaged level.
Thus, the engine-ECU not only illuminates the DPF warning lamp, but also illuminates the engine warning lamp to warn the driver that the vehicle must be brought to the workshop.
If such vehicle is brought to the workshop, the DPF regeneration must forcibly be carried out using M.U.T.-III there. When the engine-ECU detects the abnormality in the component related to the DPF or the DPF regeneration, the engine warning lamp is illuminated and the DPF lamp is blinked, too.

DPF REGENERATION CONTROL



ACE01565AB

The DPF regeneration has the forcible regeneration by M.U.T.-III and the automatic regeneration automatically performed while the vehicle is running. The automatic regeneration is performed under the following conditions:

- Engine: after warm-up
- Vehicle speed: 40 km/h or more
- Amount of accumulated PM exceeds specified value.

Performing the optimum engine control for the DPF regeneration, the engine-ECU increases the temperature up to the point at which the DPF regeneration can be carried out, and then keeps the temperature to burn the PM.

1. RISING TEMPERATURE CONTROL

Performing rising temperature control having two steps, the engine-ECU increases the temperature up to the point at which the DPF regeneration can be carried out. At the first, the engine-ECU drives the variable geometry control solenoid valve and the throttle valve control servo and then performs the fuel injection with the optimum injection pattern, decreasing the intake air amount. This allows the high temperature exhaust gas to discharge as well as allows the catalyst in the front of the DPF to be heated to about 200°C, resulting in the catalyst activated, which is monitored by the No. 1 exhaust gas temperature sensor.

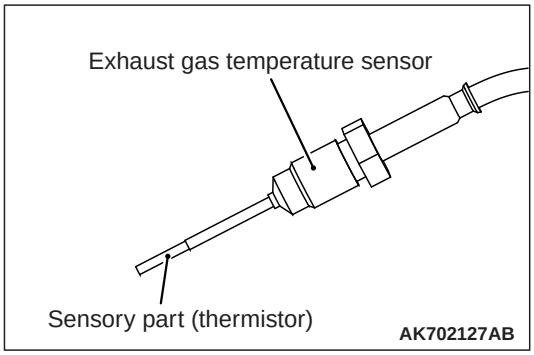
After the catalyst is activated, the engine-ECU performs the fuel injection called "post-injection" having more retarded timing than the usual timing. This allows the oxygen to react, in the catalyst, with the HC contained in the exhaust gas as well as allows the exhaust gas temperature to reach about 600°C at which the DPF regeneration can be carried out, which is monitored by the No. 2 exhaust gas temperature sensor (catalyst temperature).

2. REGENERATION CONTROL

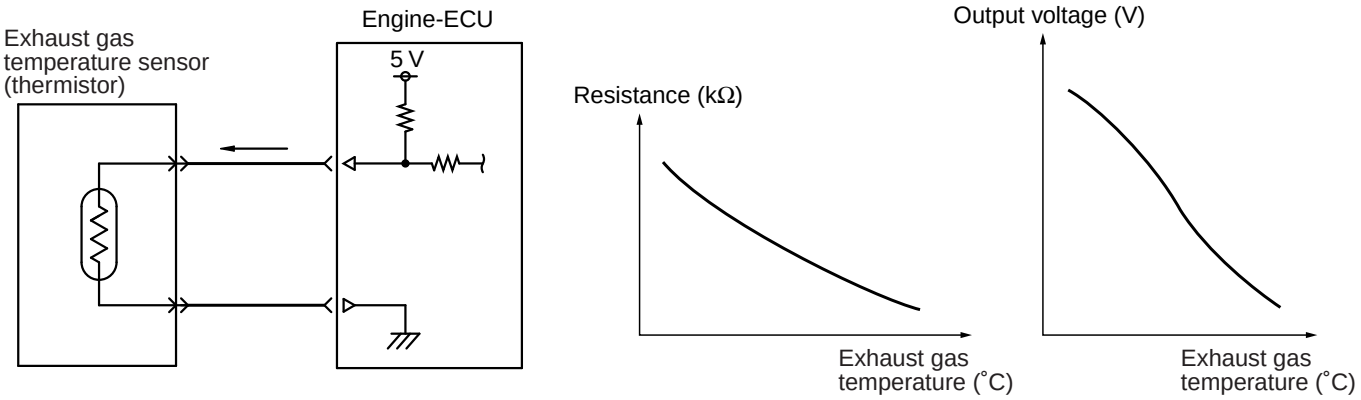
When starting to perform the DPF regeneration, the engine-ECU carries out the feedback control so that the temperature in the DPF can stabilize at about 600°C through the output signal of the No.3 exhaust gas temperature sensor (DPF temperature). Controlling the injection amount of the post-injection and the intake air amount regulates the temperature in the DPF.

When being out of the regeneration condition during the automatic regeneration, the DPF regeneration stops. If, however, satisfying the regeneration condition right after that, the DPF regeneration is continuously carried out.

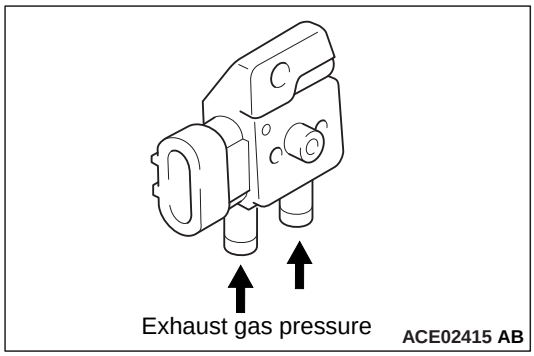
No. 1 EXHAUST GAS TEMPERATURE SENSOR, No. 2 EXHAUST GAS TEMPERATURE SENSOR (CATALYST TEMPERATURE), No. 3 EXHAUST GAS TEMPERATURE SENSOR (DPF TEMPERATURE)



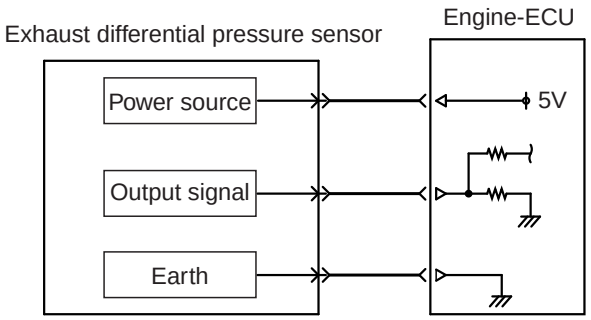
The No. 1 exhaust gas temperature sensor is installed to the upstream area of the catalyst, the No. 2 exhaust gas temperature sensor (catalyst temperature) is installed to the downstream area of the catalyst and the No. 3 exhaust gas temperature sensor (DPF temperature) is installed to the downstream area of the DPF. Each sensor detects the temperature in the each area through the change in the thermistor resistance and outputs the voltage to the engine-ECU in accordance with the temperature. The engine-ECU performs the DPF regeneration control through this output voltage. The sensor characteristics are as shown in the charts.

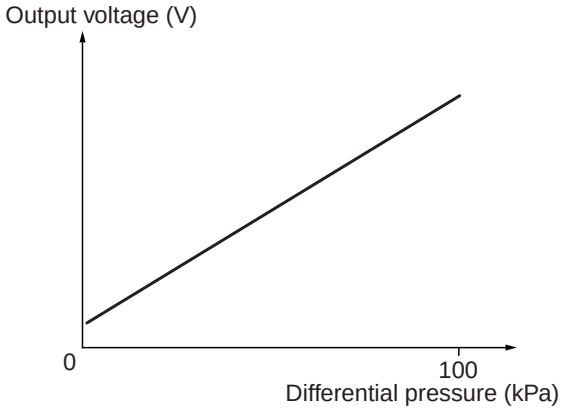


EXHAUST DIFFERENTIAL PRESSURE SENSOR



The exhaust differential pressure sensor is installed to rear end of cylinder head cover, the exhaust differential pressure sensor outputs the voltage to the engine-ECU in accordance with the difference in the voltage between the DPF upstream area and the DPF downstream area. The engine-ECU anticipates the amount of PM accumulated in the DPF through this output voltage. The sensor characteristics are as shown in the charts.



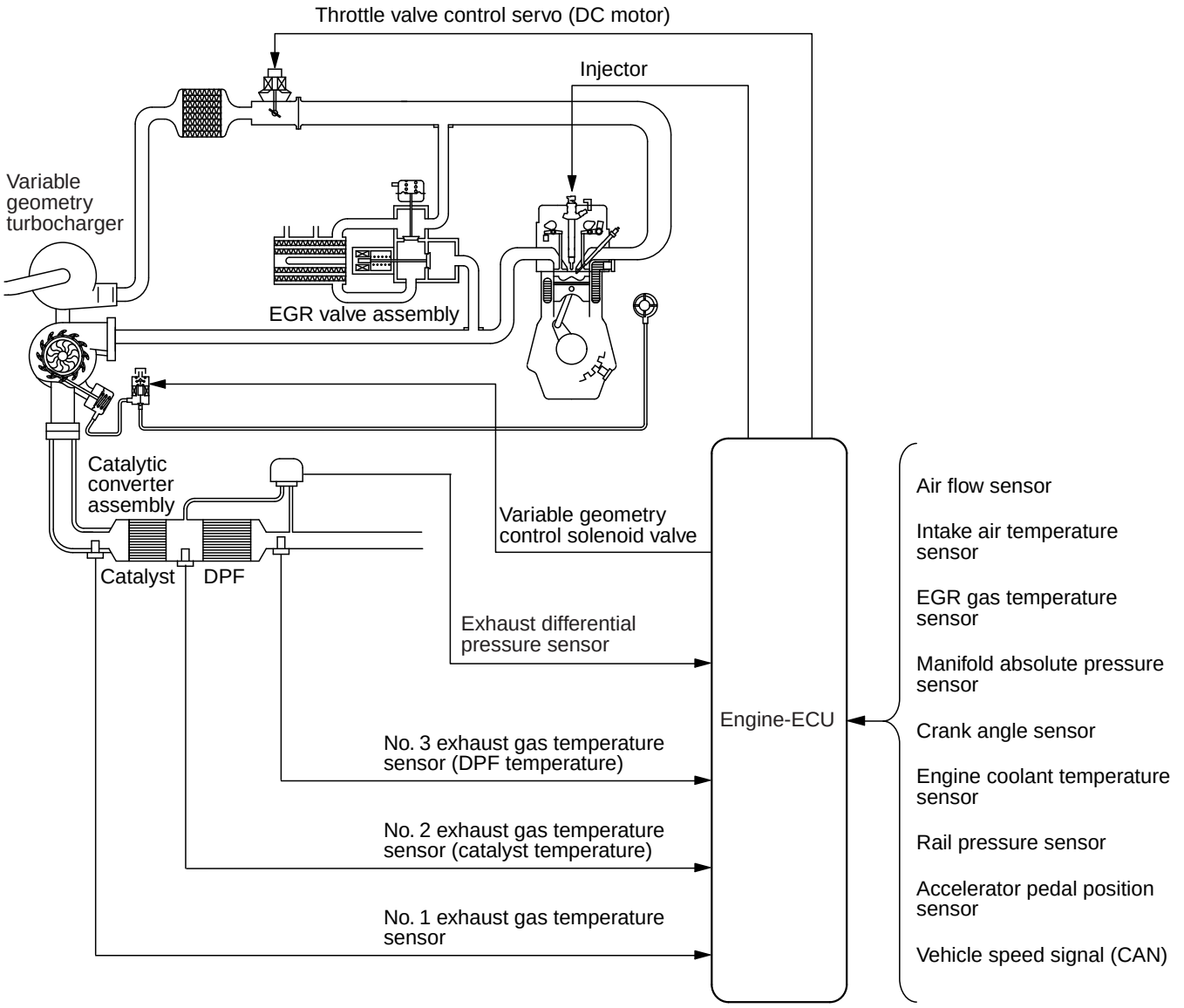


GENERAL INFORMATION (DIESEL PARTICULATE FILTER SYSTEM)

The Diesel Particulate Filter (DPF) system is used to adsorb and remove the Particulate Matter (PM) contained in the exhaust gas. The engine-ECU anticipates the amount of PM accumulated in the DPF through the input signal from each sensor.

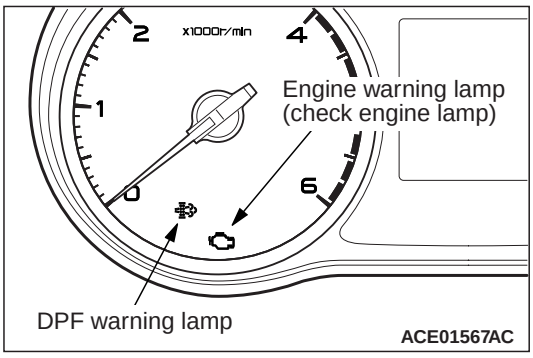
If the PM accumulates more than the standard, the engine-ECU carries out the control that automatically regenerates the DPF under certain conditions to remove the PM. At the DPF regeneration, the DPF temperature gets high and high temperature exhaust gases are given off.

SYSTEM DIAGRAM



ACE01565AB

DPF WARNING SIGNAL

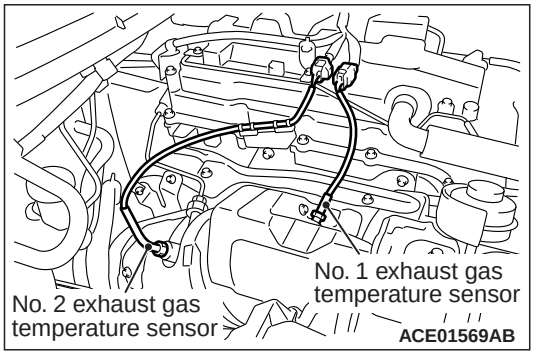


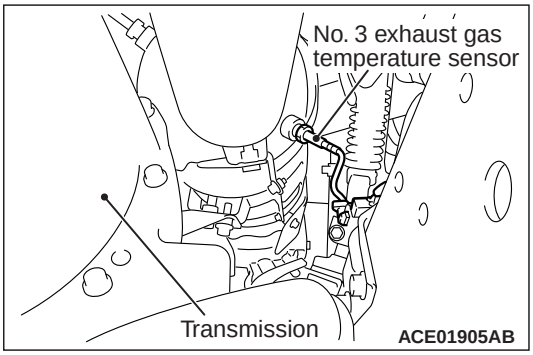
ACE01567AC

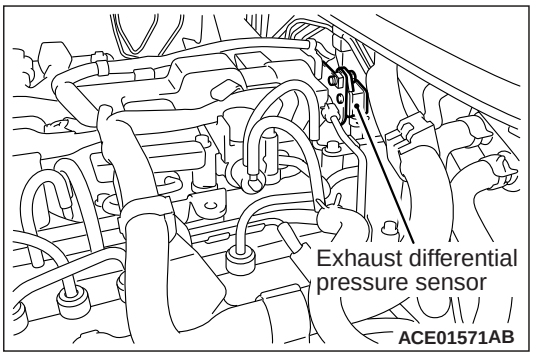
When the anticipated PM accumulation becomes larger in amount and reaches the specified level, the engine-ECU encourages the driver to drive under the driving conditions required for the DPF regeneration by illuminating the DPF warning lamp. When the PM accumulated in the DPF reaches its clogged or damaged level, the engine-ECU warns the driver that the vehicle must be brought to the workshop by illuminating the DPF warning lamp and illuminating the engine warning lamp. When the vehicle is brought into the shop with the DPF warning lamp illuminated, service the vehicle in accordance with the following procedures.

DPF warning lamp	Engine warning lamp	State and service
Being lit	Being lit	The engine-ECU estimates that the PM will excessively be accumulated in the DPF. At that time, the engine-ECU should set the diagnosis codes (No. P1498 and P2463). Carry out the troubleshooting regarding the set diagnosis codes. *NOTE: Diagnosis code No. P2463 should be set if the engine-ECU estimates that the PM will more excessively be accumulated after No. P1498 is set and the PM will reach the level where the DPF cannot be regenerated.*
Being lit	Not being lit	The status is that the driver is advised to drive the vehicle under the driving conditions in which the DPF automatic regeneration can be carried out because it is assumed that the PM is accumulated more than the specified value in the DPF. In this case, the DPF regeneration must be carried out using one of the following two methods: • After the engine warm-up, the vehicle must be driven at more than 40 km/h until the DPF warning lamp is extinguished. The driving time is approximately 20 minutes. It is all right that the vehicle or the engine stops during the driving. • The forcible DPF regeneration must be carried out.
Being blinked	Not being lit	The system assumes that the engine oil level is more than a predetermined. Change the engine oil and then use the M.U.T.-III to reset the learnt value on the dilution of the engine oil. *NOTE: The engine-ECU will set diagnosis code No. P252F.*

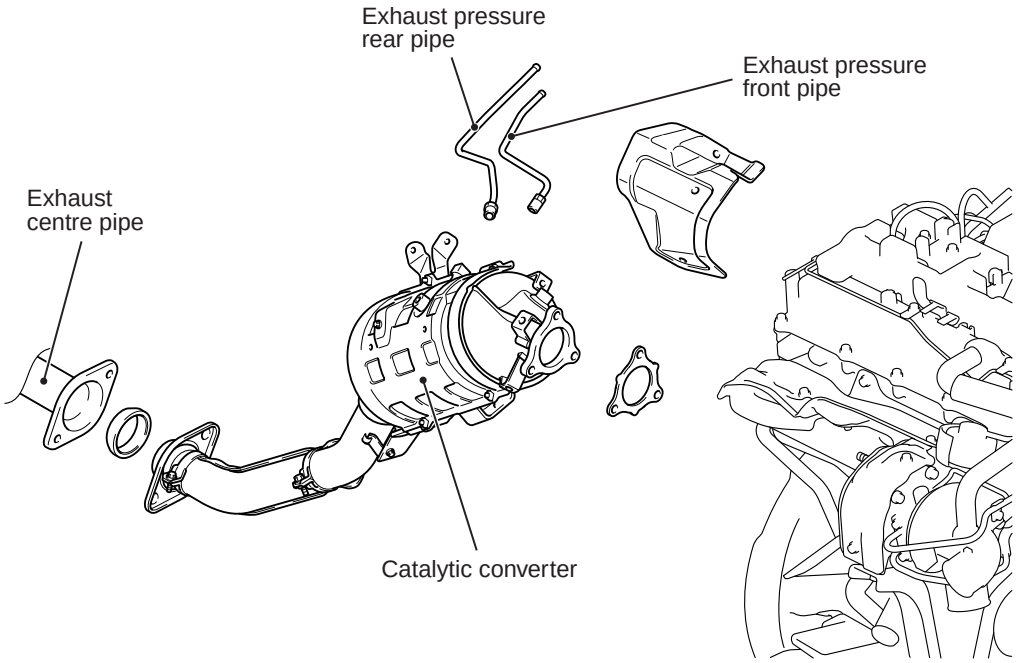
COMPONENT LOCATION (DPF SYSTEM)







CONSTRUCTION DIAGRAM (DPF SYSTEM)



ACI02069 AB

8.2.1.2 Gaseous emissions

M6170200300073

PRE-INSPECTION CONDITION

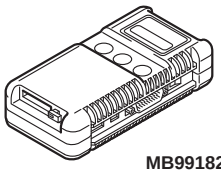
"Pre-inspection condition" refers to the condition that the vehicle must be in before proper engine inspection can be carried out. If you see the words "Set the vehicle to the pre-inspection condition" in this manual. It means to set the vehicle to the following condition.

- Engine coolant temperature 80 to 90°C
- Lamps, electric cooling fan and all accessories: OFF
- M/T: Neutral
- A/T: "P" range

MULTI USE TESTER (M.U.T.-III)

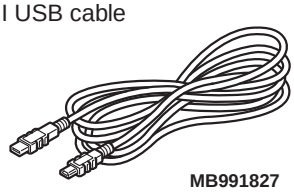
Multi use tester (M.U.T.-III) sub assembly

Vehicle communication interface (V.C.I.)



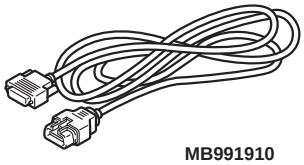
MB991824

M.U.T.-III USB cable



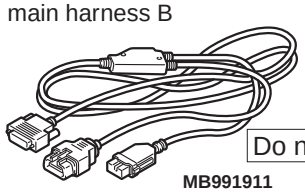
MB991827

M.U.T.-III main harness A



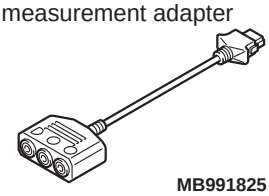
MB991910

M.U.T.-III main harness B



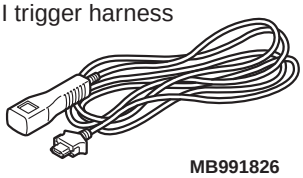
MB991911

M.U.T.-III measurement adapter



MB991825

M.U.T.-III trigger harness



MB991826

AC305090AK

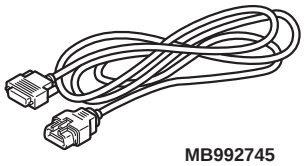
MULTI USE TESTER (M.U.T.-III)

Vehicle communication interface-Lite (V.C.I.-Lite)



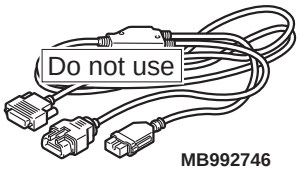
MB992744

V.C.I.-Lite main harness A



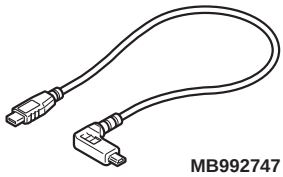
MB992745

V.C.I.-Lite main harness B



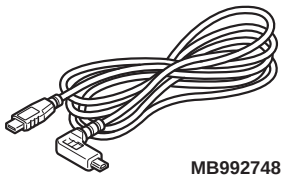
MB992746

V.C.I.-Lite USB cable short



MB992747

V.C.I.-Lite USB cable long



MB992748

ACB05419AB

- Both the special tool V.C.I. (MB991824) and the special tool V.C.I.-Lite (MB992744) can be used.

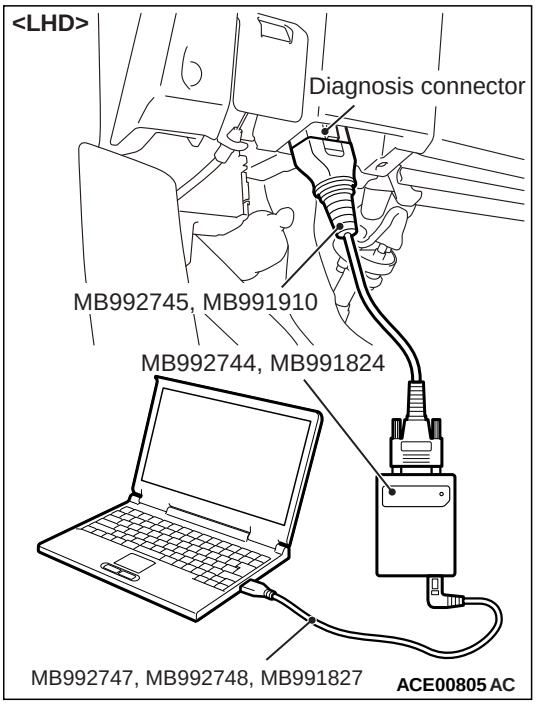
⚠ CAUTION

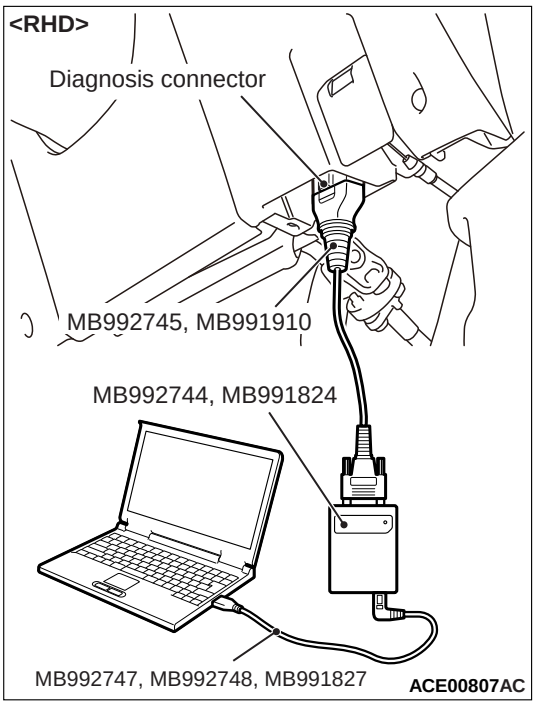
For the V.C.I., use MB991827 and MB991910. For the V.C.I.-Lite, use MB992745, MB992747 and MB992748.

- Refer to the "M.U.T.-III User's Manual" for instructions on handling the M.U.T.-III.

⚠ CAUTION

Turn the ignition switch to the "LOCK" (OFF) position <except vehicles with Keyless Operation System (KOS)> or put the power supply mode is OFF <vehicles with Keyless Operation System (KOS)> before connecting or disconnecting the M.U.T.-III.





Connect the M.U.T.-III to the diagnosis connector as shown in the illustration.

8.2.2 Compression ignition engine emissions

8.2.2.1 Exhaust emission control equipment

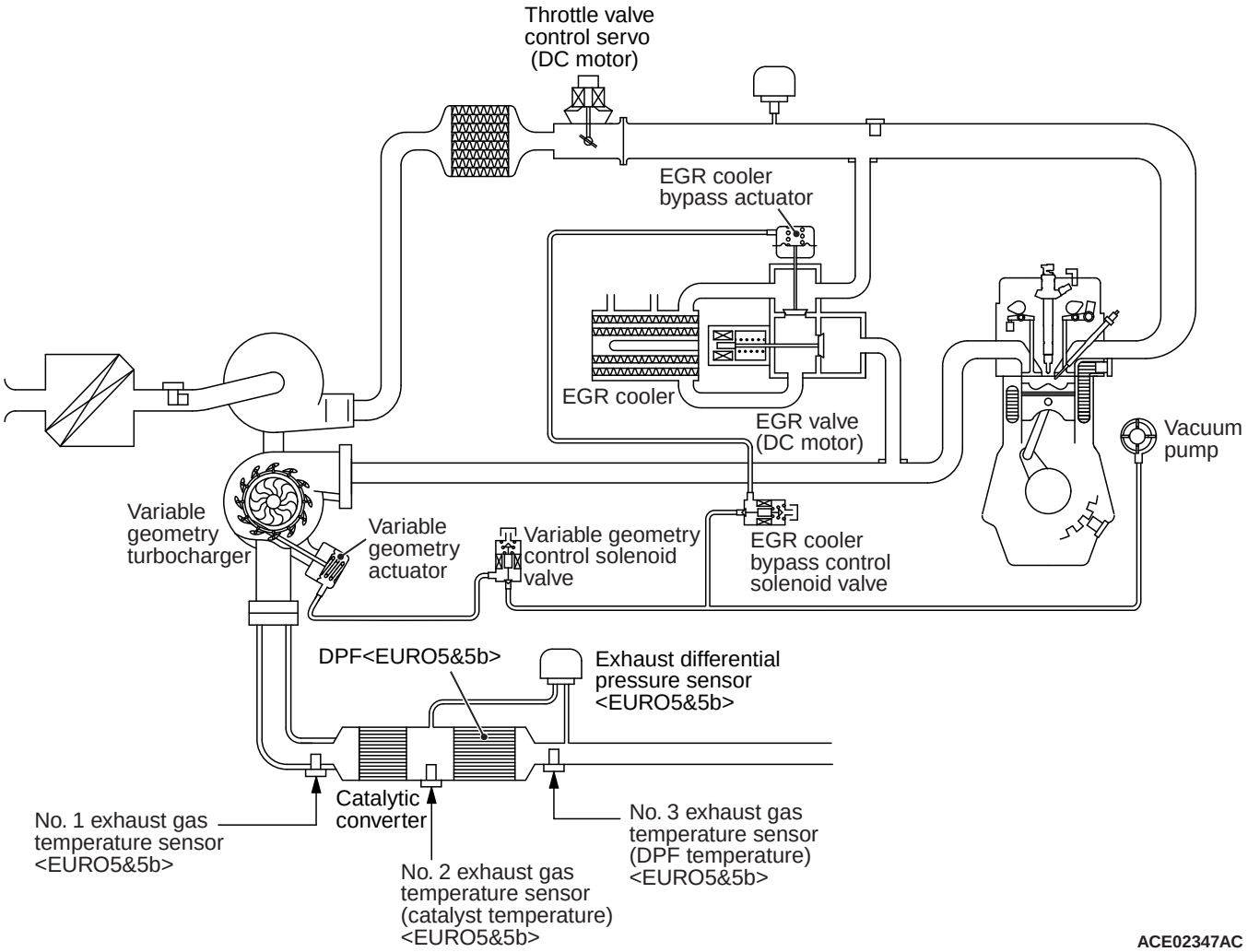
M6170201100102

GENERAL INFORMATION (EGR SYSTEM)

On the new emission control system for 4N1 engine,
the following changes have been made:

Improvement / Additions	Remark
EGR cooler bypass system added	By blocking the exhaust gas flow not to pass through the EGR cooler at the engine cold state, HC emissions are reduced.

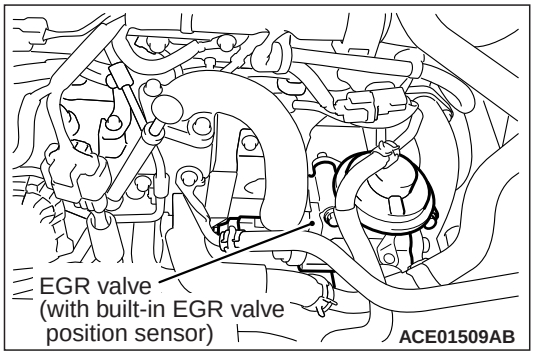
SYSTEM CONFIGURATION DIAGRAM

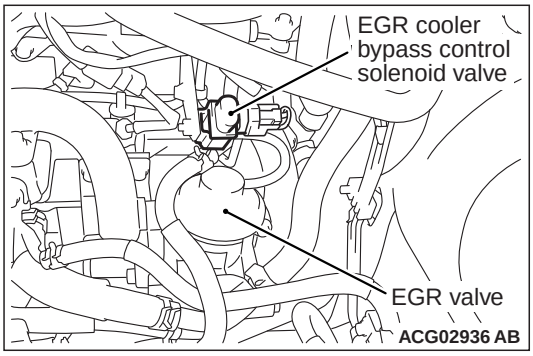


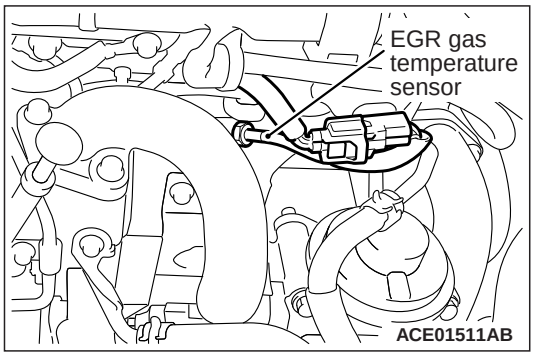
Exhaust gas cleaning devices list

System		Objective/Function	Composition parts
Exhaust gas recirculation (EGR) system		NOx decrease Reduce NOx generation by controlling exhaust gas recirculation volume according to engine warm-up condition and driving conditions.	• EGR valve • EGR position sensor • EGR cooler • EGR cooler bypass control solenoid valve
Diesel particulate filter system <EURO5&5b>		Particulate matter (PM) is removed. PM accumulated in the diesel particulate filter is removed.	• Diesel particulate filter • No. 1 exhaust gas temperature sensor • No. 2 exhaust gas temperature sensor (catalyst temperature) • No. 3 exhaust gas temperature sensor (DPF temperature) • Exhaust differential pressure sensor
Emission reduction system	Fuel injection control	Particulate matter (PM) decrease	Common rail system
	Catalytic converter	CO and HC decrease Reduces the CO and HC in the exhaust gas, by promoting their oxidation reaction.	Monolith catalyst

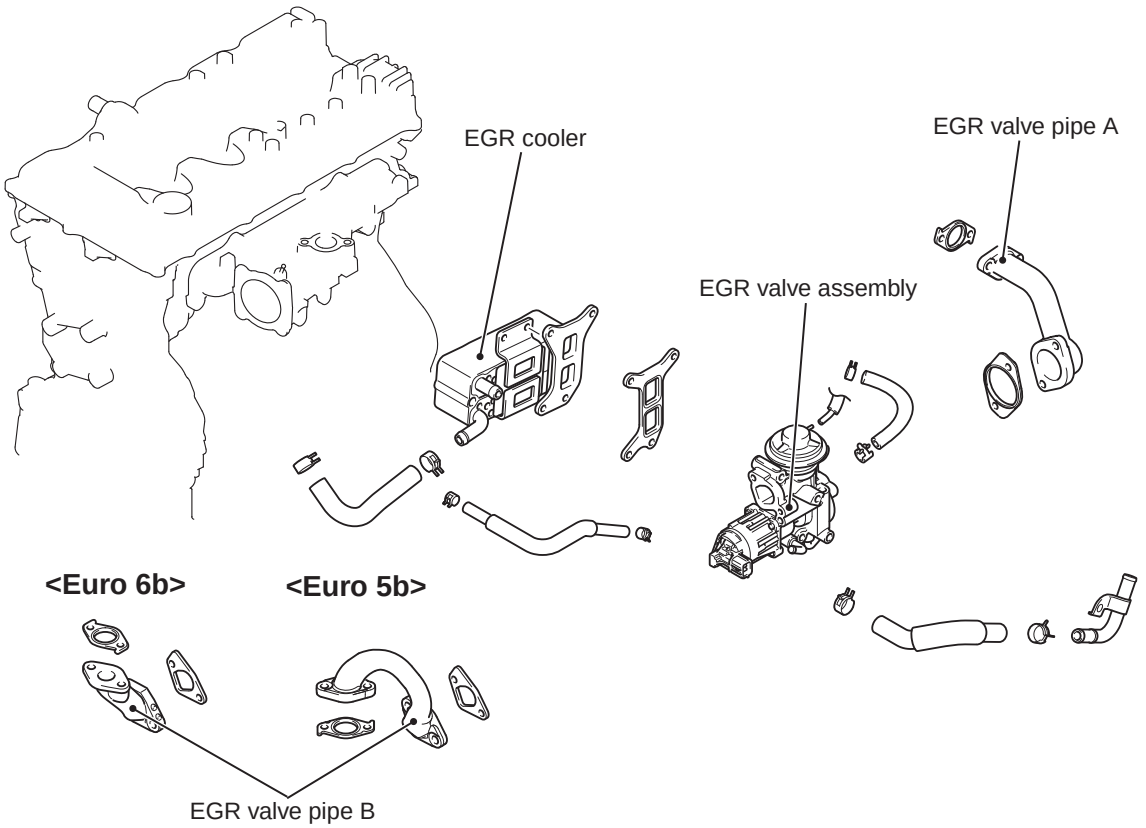
COMPONENT LOCATION (EGR SYSTEM)







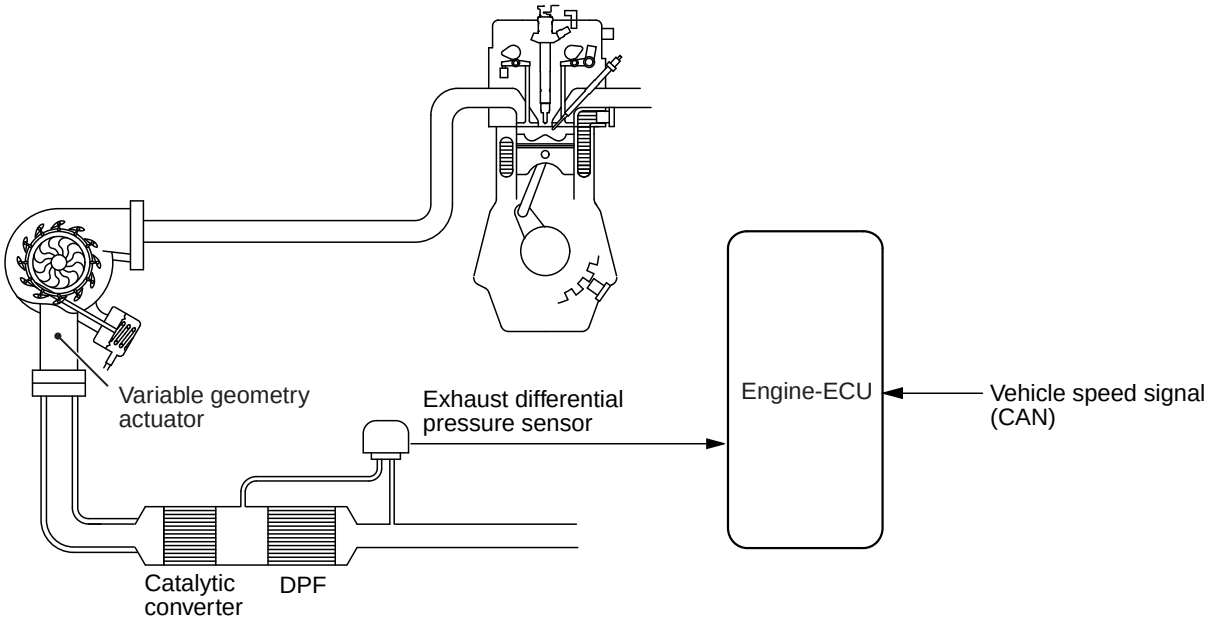
CONSTRUCTION DIAGRAM (EGR SYSTEM)



DIESEL PARTICULATE FILTER (DPF) SYSTEM <EURO5&5b>

Through the input signal sent from each sensor, the engine-ECU anticipates the amount of particulate matter (PM) accumulated in the DPF. Taking control of automatically regenerating the DPF under the certain condition, the engine-ECU removes the PM when the PM accumulates more than the standard. At the DPF regeneration, the DPF temperature is higher and the high temperature exhaust gas discharges.

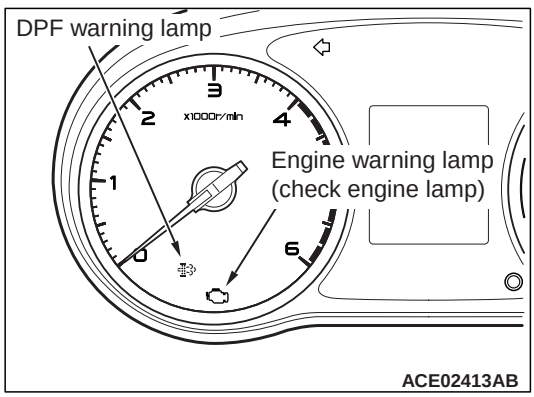
CONTROL OVER ANTICIPATING AMOUNT OF ACCUMULATED PM



ACE02409AB

Calculating the input signal sent from each sensor, the engine-ECU anticipates the amount of PM accumulated in the DPF. The anticipation method is as follows:

Anticipation by odometer	Calculating travel distance through vehicle speed signal, engine-ECU anticipates that PM accumulates more than criteria when specified travel distance is accumulated from previous DPF regeneration.
Anticipation by difference in pressure	Detecting difference in pressure before and after DPF through exhaust differential pressure sensor, engine-ECU anticipates amount of accumulated PM.
Anticipation by quantity survey	Engine-ECU anticipates amount of exhaust PM based on operation conditions, which multiplying allows engine-ECU to anticipate amount of accumulated PM.

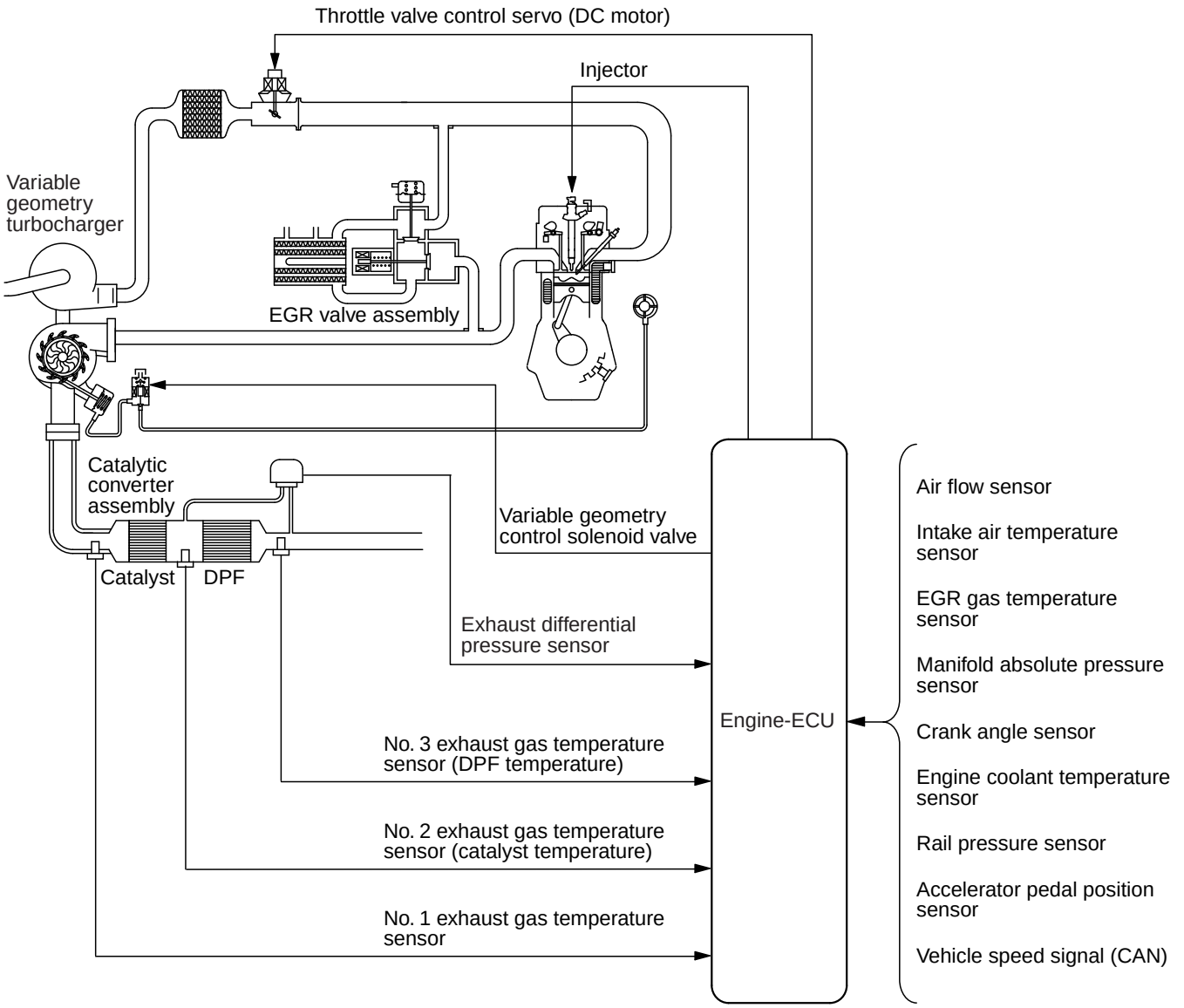


ACE02413AB

When detecting that the PM accumulates more than the standard in the DPF, the engine-ECU illuminates the DPF warning lamp. This encourages the driver to drive the vehicle under the conditions that are adequate to accomplish the DPF regeneration.

If the driver does not drive the vehicle under the conditions that are adequate to accomplish the DPF regeneration although the DPF warning lamp is illuminated, the PM accumulation in the DPF gets higher, and then the DPF can possibly reach its clogged or damaged level.
Thus, the engine-ECU not only illuminates the DPF warning lamp, but also illuminates the engine warning lamp to warn the driver that the vehicle must be brought to the workshop.
If such vehicle is brought to the workshop, the DPF regeneration must forcibly be carried out using M.U.T.-III there. When the engine-ECU detects the abnormality in the component related to the DPF or the DPF regeneration, the engine warning lamp is illuminated and the DPF lamp is blinked, too.

DPF REGENERATION CONTROL



ACE01565AB

The DPF regeneration has the forcible regeneration by M.U.T.-III and the automatic regeneration automatically performed while the vehicle is running. The automatic regeneration is performed under the following conditions:

- Engine: after warm-up
- Vehicle speed: 40 km/h or more
- Amount of accumulated PM exceeds specified value.

Performing the optimum engine control for the DPF regeneration, the engine-ECU increases the temperature up to the point at which the DPF regeneration can be carried out, and then keeps the temperature to burn the PM.

1. RISING TEMPERATURE CONTROL

Performing rising temperature control having two steps, the engine-ECU increases the temperature up to the point at which the DPF regeneration can be carried out. At the first, the engine-ECU drives the variable geometry control solenoid valve and the throttle valve control servo and then performs the fuel injection with the optimum injection pattern, decreasing the intake air amount. This allows the high temperature exhaust gas to discharge as well as allows the catalyst in the front of the DPF to be heated to about 200°C, resulting in the catalyst activated, which is monitored by the No. 1 exhaust gas temperature sensor.

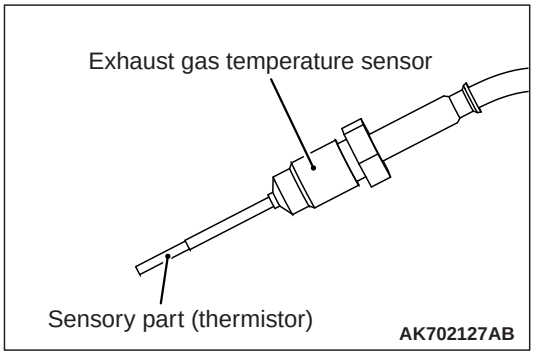
After the catalyst is activated, the engine-ECU performs the fuel injection called "post-injection" having more retarded timing than the usual timing. This allows the oxygen to react, in the catalyst, with the HC contained in the exhaust gas as well as allows the exhaust gas temperature to reach about 600°C at which the DPF regeneration can be carried out, which is monitored by the No. 2 exhaust gas temperature sensor (catalyst temperature).

2. REGENERATION CONTROL

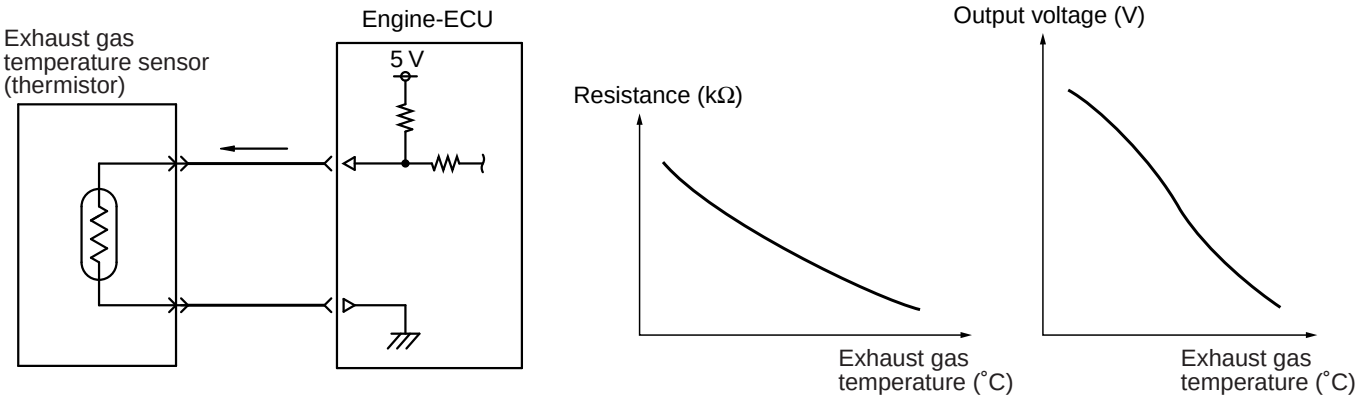
When starting to perform the DPF regeneration, the engine-ECU carries out the feedback control so that the temperature in the DPF can stabilize at about 600°C through the output signal of the No.3 exhaust gas temperature sensor (DPF temperature). Controlling the injection amount of the post-injection and the intake air amount regulates the temperature in the DPF.

When being out of the regeneration condition during the automatic regeneration, the DPF regeneration stops. If, however, satisfying the regeneration condition right after that, the DPF regeneration is continuously carried out.

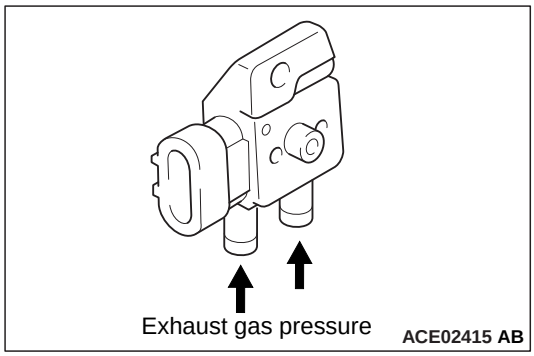
No. 1 EXHAUST GAS TEMPERATURE SENSOR, No. 2 EXHAUST GAS TEMPERATURE SENSOR (CATALYST TEMPERATURE), No. 3 EXHAUST GAS TEMPERATURE SENSOR (DPF TEMPERATURE)



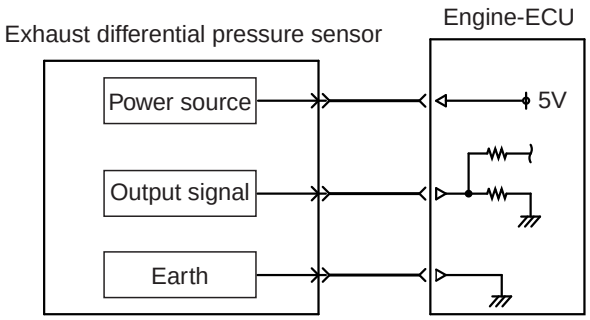
The No. 1 exhaust gas temperature sensor is installed to the upstream area of the catalyst, the No. 2 exhaust gas temperature sensor (catalyst temperature) is installed to the downstream area of the catalyst and the No. 3 exhaust gas temperature sensor (DPF temperature) is installed to the downstream area of the DPF. Each sensor detects the temperature in the each area through the change in the thermistor resistance and outputs the voltage to the engine-ECU in accordance with the temperature. The engine-ECU performs the DPF regeneration control through this output voltage. The sensor characteristics are as shown in the charts.

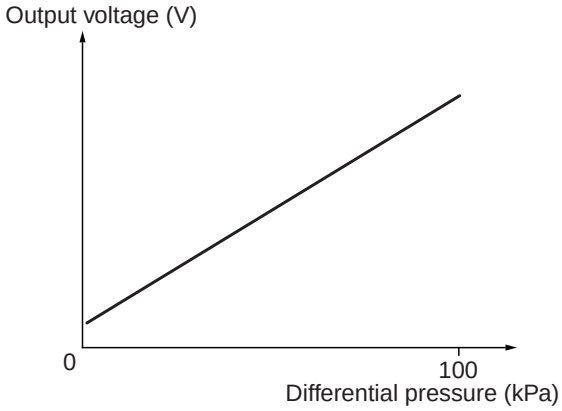


EXHAUST DIFFERENTIAL PRESSURE SENSOR



The exhaust differential pressure sensor is installed to rear end of cylinder head cover, the exhaust differential pressure sensor outputs the voltage to the engine-ECU in accordance with the difference in the voltage between the DPF upstream area and the DPF downstream area. The engine-ECU anticipates the amount of PM accumulated in the DPF through this output voltage. The sensor characteristics are as shown in the charts.





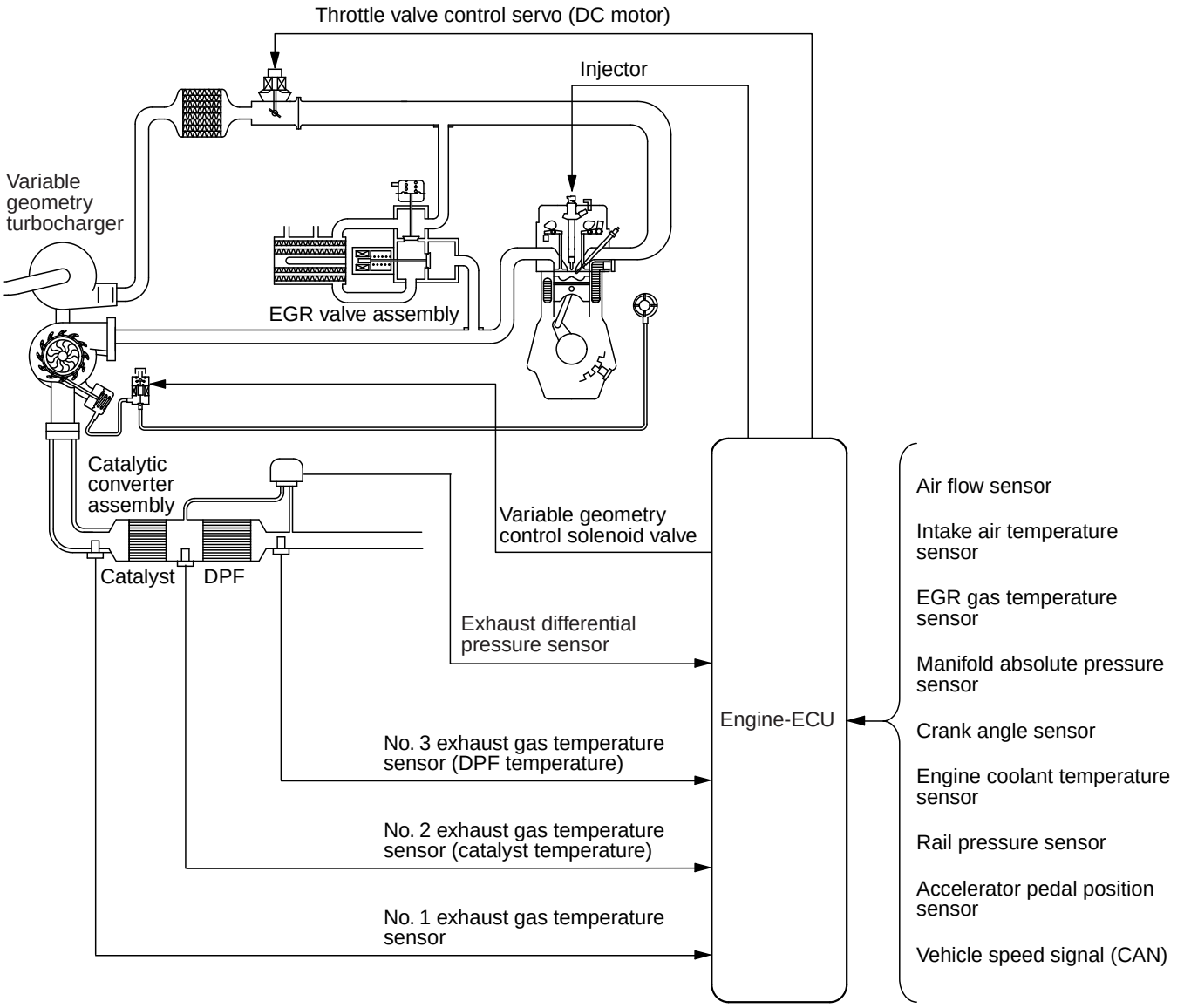
AK900001AB

GENERAL INFORMATION (DIESEL PARTICULATE FILTER SYSTEM)

The Diesel Particulate Filter (DPF) system is used to adsorb and remove the Particulate Matter (PM) contained in the exhaust gas. The engine-ECU anticipates the amount of PM accumulated in the DPF through the input signal from each sensor.

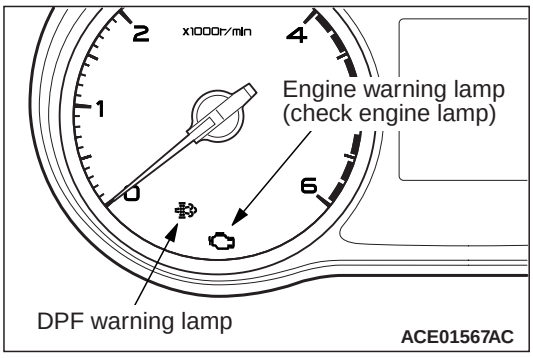
If the PM accumulates more than the standard, the engine-ECU carries out the control that automatically regenerates the DPF under certain conditions to remove the PM. At the DPF regeneration, the DPF temperature gets high and high temperature exhaust gases are given off.

SYSTEM DIAGRAM



ACE01565AB

DPF WARNING SIGNAL

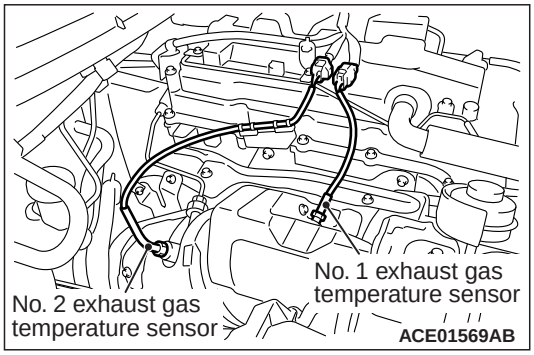


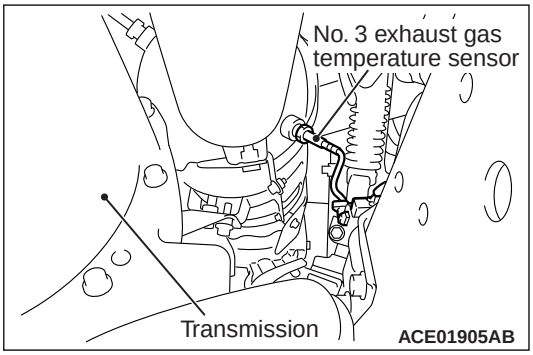
ACE01567AC

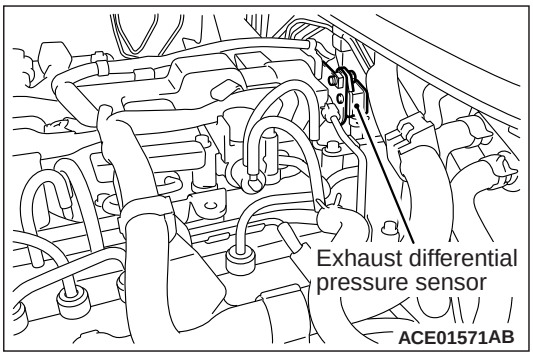
When the anticipated PM accumulation becomes larger in amount and reaches the specified level, the engine-ECU encourages the driver to drive under the driving conditions required for the DPF regeneration by illuminating the DPF warning lamp. When the PM accumulated in the DPF reaches its clogged or damaged level, the engine-ECU warns the driver that the vehicle must be brought to the workshop by illuminating the DPF warning lamp and illuminating the engine warning lamp. When the vehicle is brought into the shop with the DPF warning lamp illuminated, service the vehicle in accordance with the following procedures.

DPF warning lamp	Engine warning lamp	State and service
Being lit	Being lit	The engine-ECU estimates that the PM will excessively be accumulated in the DPF. At that time, the engine-ECU should set the diagnosis codes (No. P1498 and P2463). Carry out the troubleshooting regarding the set diagnosis codes. *NOTE: Diagnosis code No. P2463 should be set if the engine-ECU estimates that the PM will more excessively be accumulated after No. P1498 is set and the PM will reach the level where the DPF cannot be regenerated.*
Being lit	Not being lit	The status is that the driver is advised to drive the vehicle under the driving conditions in which the DPF automatic regeneration can be carried out because it is assumed that the PM is accumulated more than the specified value in the DPF. In this case, the DPF regeneration must be carried out using one of the following two methods: • After the engine warm-up, the vehicle must be driven at more than 40 km/h until the DPF warning lamp is extinguished. The driving time is approximately 20 minutes. It is all right that the vehicle or the engine stops during the driving. • The forcible DPF regeneration must be carried out.
Being blinked	Not being lit	The system assumes that the engine oil level is more than a predetermined. Change the engine oil and then use the M.U.T.-III to reset the learnt value on the dilution of the engine oil. *NOTE: The engine-ECU will set diagnosis code No. P252F.*

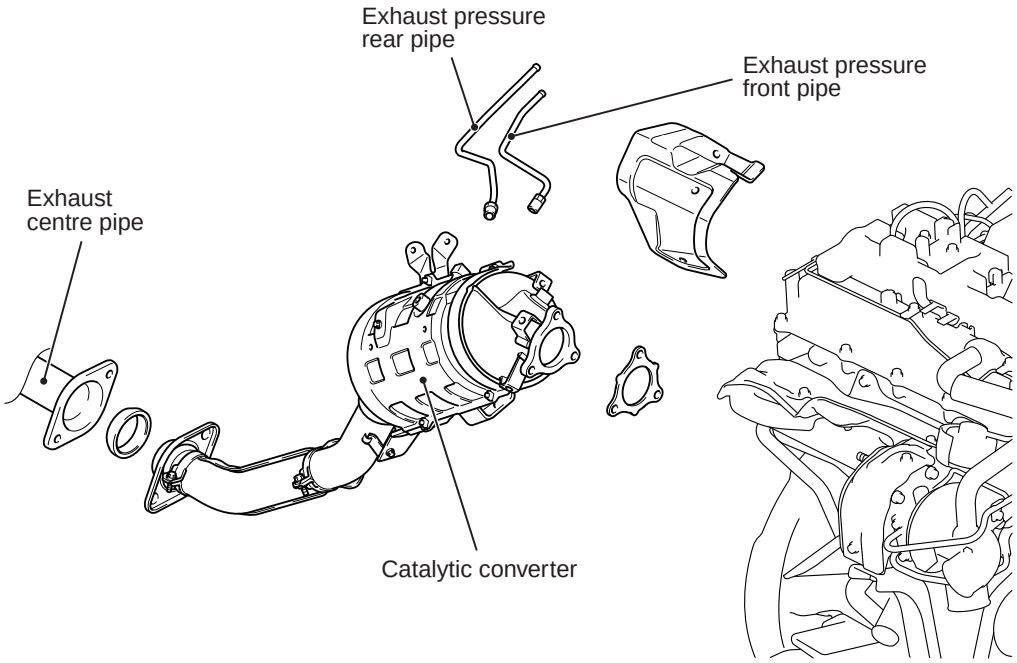
COMPONENT LOCATION (DPF SYSTEM)







CONSTRUCTION DIAGRAM (DPF SYSTEM)



ACI02069 AB

8.2.2.2 Opacity

M6170201200079

PRE-INSPECTION CONDITION

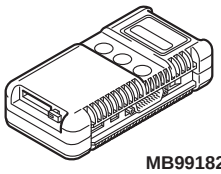
"Pre-inspection condition" refers to the condition that the vehicle must be in before proper engine inspection can be carried out. If you see the words "Set the vehicle to the pre-inspection condition" in this manual. It means to set the vehicle to the following condition.

- Engine coolant temperature 80 to 90°C
- Lamps, electric cooling fan and all accessories: OFF
- M/T: Neutral
- A/T: "P" range

MULTI USE TESTER (M.U.T.-III)

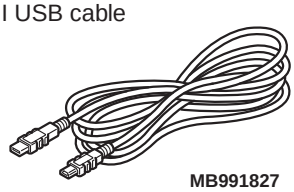
Multi use tester (M.U.T.-III) sub assembly

Vehicle communication interface (V.C.I.)



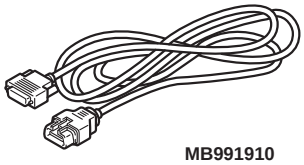
MB991824

M.U.T.-III USB cable



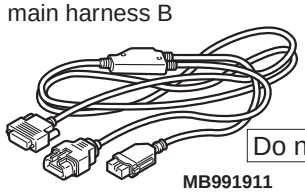
MB991827

M.U.T.-III main harness A



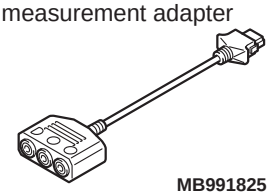
MB991910

M.U.T.-III main harness B



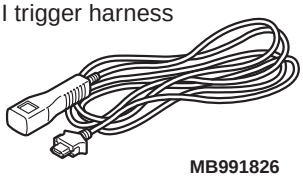
MB991911

M.U.T.-III measurement adapter



MB991825

M.U.T.-III trigger harness



MB991826

AC305090AK

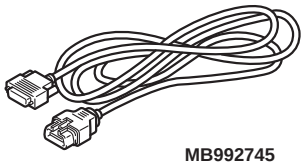
MULTI USE TESTER (M.U.T.-III)

Vehicle communication interface-Lite (V.C.I.-Lite)



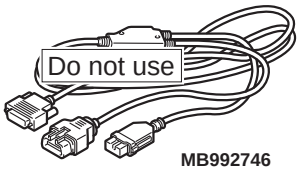
MB992744

V.C.I.-Lite main harness A



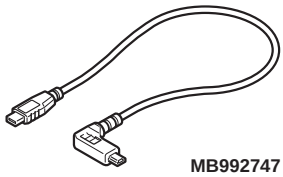
MB992745

V.C.I.-Lite main harness B



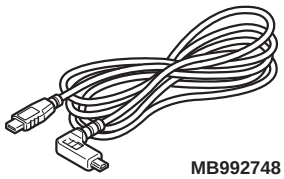
MB992746

V.C.I.-Lite USB cable short



MB992747

V.C.I.-Lite USB cable long



MB992748

ACB05419AB

- Both the special tool V.C.I. (MB991824) and the special tool V.C.I.-Lite (MB992744) can be used.

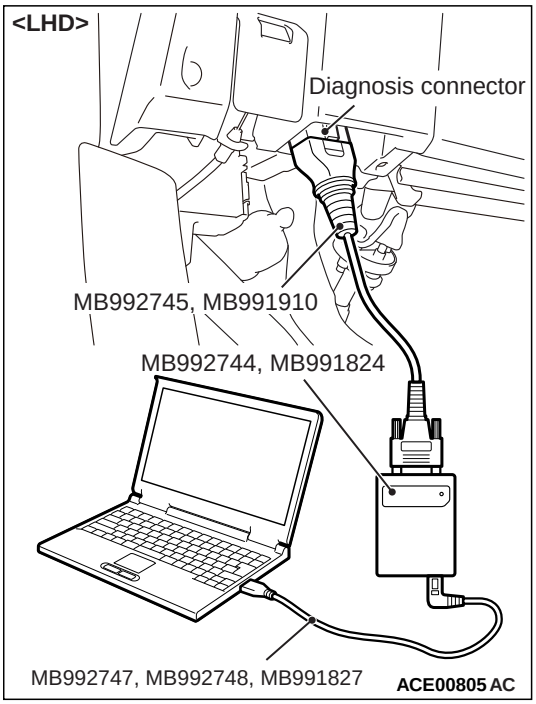
⚠ CAUTION

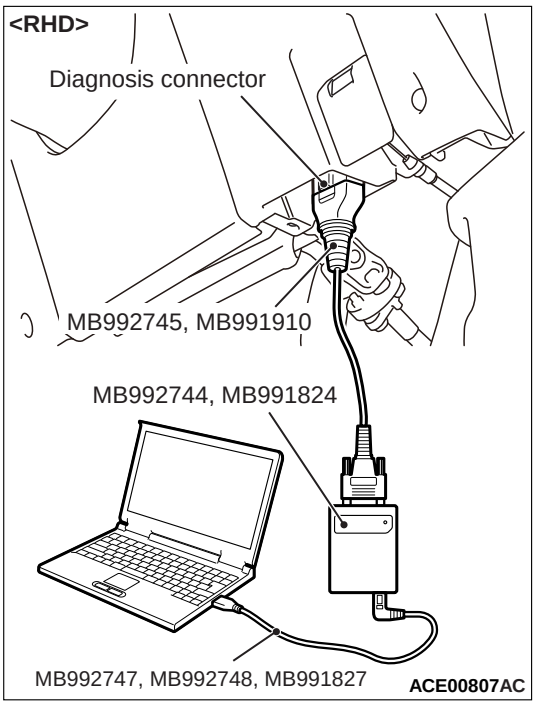
For the V.C.I., use MB991827 and MB991910. For the V.C.I.-Lite, use MB992745, MB992747 and MB992748.

- Refer to the "M.U.T.-III User's Manual" for instructions on handling the M.U.T.-III.

⚠ CAUTION

Turn the ignition switch to the "LOCK" (OFF) position <except vehicles with Keyless Operation System (KOS)> or put the power supply mode is OFF <vehicles with Keyless Operation System (KOS)> before connecting or disconnecting the M.U.T.-III.





Connect the M.U.T.-III to the diagnosis connector as shown in the illustration.

8.3. Electromagnetic interference suppression

M6170300000080

"Not Applicable"

8.4. Other items related to the environment

8.4.1. Fluid leaks

M6170400100073

"Not Applicable"

GROUP 9

SUPPLEMENTARY TESTS FOR PASSENGER-CARRYING VEHICLES CATEGORIES M2, M3

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9.1. Doors

9.1.1. Entrance and exit doors

M6180100100073

"Not Applicable"

9.1.2. Emergency exits

M6180100200070

"Not Applicable"

9.2. Demisting and defrosting system (X)2

M6180200000073

"Not Applicable"

9.3. Ventilation & heating system (X)2

M6180300000070

"Not Applicable"

9.4. Seats

9.4.1. Passenger seats (including seats for accompanying personnel)

M6180400100074

"Not Applicable"

9.4.2. Driver's seat (additional requirements)

M6180400200071

"Not Applicable"

9.5. Interior lighting and destination devices (X)2

M6180500000074

"Not Applicable"

9.6. Gangways, standing areas

M6180600000071

"Not Applicable"

9.7. Stairs and steps

M6180700000078

"Not Applicable"

9.8. Passenger communication system (X)2

M6180800000075

"Not Applicable"

9.9. Notices (X)2

M6180900000072

"Not Applicable"

9.10. Requirements regarding the transportation of children. (X)2

9.10.1. Doors

M6181000100079

"Not Applicable"

9.10.2. Signalling and special equipment

M6181000200076

"Not Applicable"

9.11. Requirements regarding the transportation of persons with reduced mobility (X)2

9.11.1. Doors, ramps and lifts

M6181100100076

"Not Applicable"

9.11.2. Wheelchair restraint system

M6181100200073

"Not Applicable"

9.11.3. Signalling and special equipment

M6181100300070

"Not Applicable"

9.12. Other special equipment (X)2

9.12.1. Installations for food preparation

M6181200100073

"Not Applicable"

9.12.2. Sanitary installation

M6181200200070

"Not Applicable"

9.12.3. Other devices (e.g. audio-visual systems)

M6181200300077

"Not Applicable"