
EQUIPMENT

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FEATURES

New equipment and new functions have been adopted to provide a complete equipment line-up.

Improved reliability

1. Adoption of waterproof connectors inside the engine compartment
2. Equipped with a fuse box and relay box

Improved visibility and safety Improved ease of use and convenience

1. Adoption of a large headlamp assembly in which the turn-signal lamp and the position lamp are integrated for improvement in visibility
2. Equipped with high-mounted stop lamp
3. Equipped with a large combination meter
4. Equipped with the center display that indicates various vehicle information
5. Equipped with an immobilizer system
6. Equipped with a headlamp leveling system

Improved serviceability

1. Equipped with two diagnosis connectors for inspection using the MUT-II
2. Adoption of an ignition timing checking function using the MUT-II
3. Components such as the hazard lamp switch and fog lamp switch can be easily installed and removed through adoption of a one-touch plug-in method (inserting directly into sockets).
4. Adoption of a smart wiring system (SWS) to reduce the weight and complexity of harnesses.

Improved merchantability

1. Adoption of a smart wiring system (SWS), ETACS-ECU and front-ECU with new functions such as automatic headlamp cut-out, fog lamp reminder function, initial continuous operation for rear intermittent wipers and linked rear intermittent wiper operation on backing up.

NOTE

For the general description and features of the heater and air conditioning, refer to P.7-30.

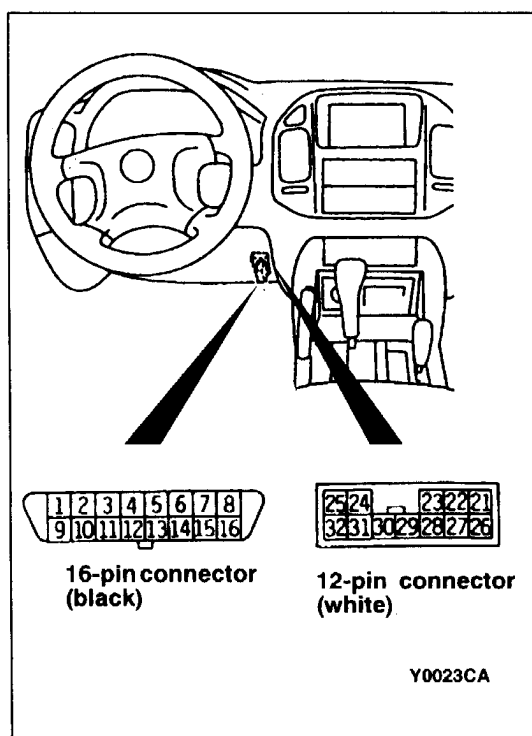
DIAGNOSIS SYSTEM

The diagnosis system comprises the following functions to assure better serviceability.

Function	GDI, DI-diesel	A/T	Super select 4WD	HBB	4ABS	Auto-cruise	Im-mobi-lizer	SRS	SWS
Diagnosis code output	○	○	○	○	○	○	–	○	○
Service data output	○	○	○	○	○	○	–	○	–
Actuator test	○	○	○	○	○	–	–	–	–
Simplified inspection code output (Same indication pattern as for diagnosis code with warning lamps or indicator lamps.)	–	○ (N range)	○ (Center differential lock)	○ (Brake)	○ (ABS)	○ (Auto-cruise)	–	–	–
Diagnosis code retained in memory	○ Until battery is turned off					○ EEPROM*1			
Diagnosis code erased by MUT-II	○	○	○	○	○	○	○	–	–

NOTE

*1 : Data is retained in memory until it is electrically cleared.



DIAGNOSIS CONNECTORS

Diagnosis connectors (centralized terminals for inspection) are used to enable inspection by the MUT-II.

Diagnosis connector (16 pins)

1. Diagnosis control
2. –
3. –
4. Ground
5. Ground
6. –
7. GDI, DI-diesel, Immobilizer, A/T, HBB, 4ABS, SWS
8. –
9. ETACS
10. –
11. Auto A/C
12. SRS
13. –
14. –
15. –
16. Battery power supply

Diagnosis connector (12 pins)

21. to 25. –
26. GDI
27. to 32. –

BATTERY

The specifications of the battery are as follows.

SPECIFICATION

Type	75D23L	80D26L	95D31L
Capacity (5 HR) Ah.	54	58	70
Reserve capacity min.	118	133	159
Cold cranking current A [at – 18°C]	520	582	622

IMMOBILIZER SYSTEM

The immobilizer system consists of the ignition key, the key ring antenna, the immobilizer-ECU, and the engine-ECU<GDI M/T,4M41>, engine-A/T-ECU<GDI A/T> or fuel cut valve controller<4D56>. The ignition key has a built-in transponder as the oscillator. The key ring antenna is installed on the steering lock key cylinder. Only the registered ignition key permits the engine to start, therefore, the engine can never be started by means of a forged key or by connecting the ignition wiring directly. The system is significantly safe and reliable against theft. In addition, the driver has only to turn the ignition

switch to the “ON” position to activate the immobilizer system. If the ignition key is lost or another ignition key is added, all the key must be registered again by using the scan tool MB991502 (MUT–II) for security reasons.

CONSTRUCTION DIAGRAM

The system prevents the engine from being started deviously to protect the vehicle from theft. The operation is as follows.

1. When the ignition switch is turned “ON” position, the engine-ECU<GDI M/T,4M41>, engine-A/T-ECU<GDI A/T> or fuel cut valve controller <4D56> sends a requirement for the encrypted code to the immobilizer-ECU (at this time, the engine is remobilized).
2. When the immobilizer-ECU receives the requirement from the engine-ECU<GDI M/T, 4M41>, engine-A/T-ECU<GDI A/T> or fuel cut valve controller<4D56> transponder inside the ignition key via the antenna. The energized transponder sends the encrypted code back to the immobilizer-ECU via the antenna.
3. The immobilizer-ECU judges the encrypted code with its code logic in itself. If they are identical, the immobilizer-ECU sends the encrypted code to the engine-ECU<GDI M/T, 4M41>, engine-A/T-ECU<GDI A/T> or fuel cut valve controller<4D56>.
4. If the engine-ECU<GDI M/T,4M41>, engine-A/T-ECU<GDI A/T> or fuel cut valve controller <4D56> can not receive the encrypted code, the engine will be immobilized.

DISPOSITION WHEN REPLACING IMMOBILIZER SYSTEM RELATED PARTS

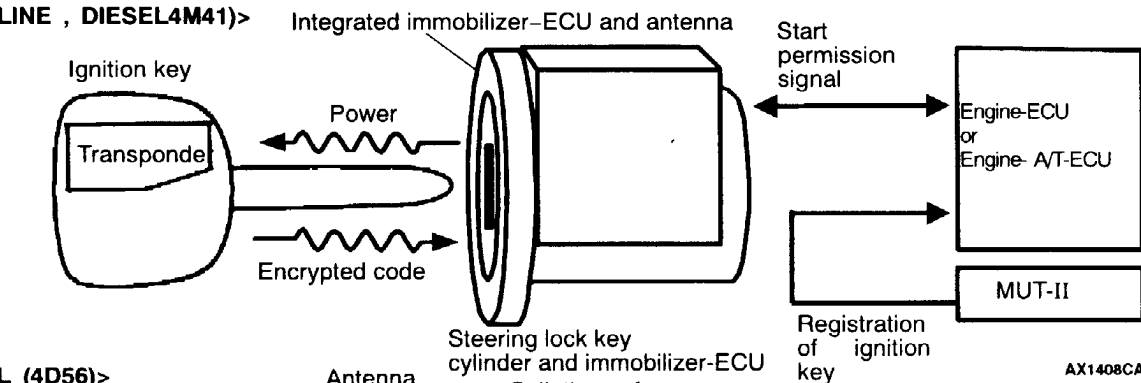
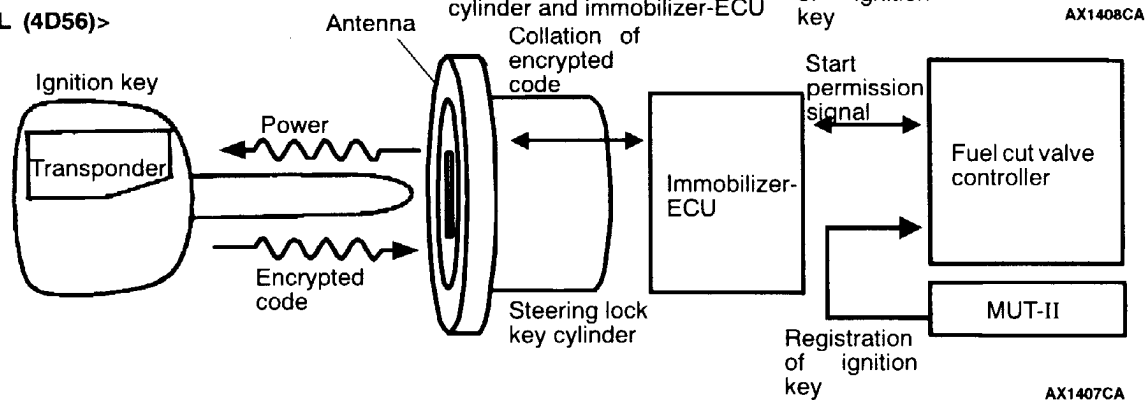
The replacing immobilizer system related parts is as follows. When the ignition key is re-registered with the MUT-II, the originally registered ignition key registration information will be lost.

<PETROL, DIESEL (4M41)>

	Engine-ECU <GDI M/T, 4M4> Engine-A/T-ECU <GDI A/T>	Immobilizer-ECU	Ignition key
When replacing engine-ECU <GDI M/T, 4M4>, engine- A/T-ECU <GDI A/T>	–	Replacement required	Replacement and re- registration are required.
When rewriting engine-ECU	–	Replacement not required	Replacement not required, re-registration not required
When replacing immobilizer- ECU	Replacement not required	–	Replacement not required, registration are required
When adding ignition key newly	Replacement not required	Replacement not required	Register ignition key to be added and re-register all other ignition keys.
When ignition key is lost	Replacement not required	Replacement not required	Re-register all other ignition keys except the lost one.

<DIESEL (4D56)>

	Fuel cut valve controller	Immobilizer-ECU	Ignition key
When replacing Fuel cut valve controller	–	Replacement required	Replacement not required, re-registration not required
When replacing immobilizer- ECU	Replacement not required (Initialization is required.)	–	Replacement and re-regis- tration are required.
When adding ignition key newly	Replacement not required	Replacement not required	Register ignition key to be added and re-register all other ignition keys.
When ignition key is lost	Replacement not required	Replacement not required	Re-register all other ignition keys except the lost one.

<GASOLINE , DIESEL4M41>**<DIESEL (4D56)>**

LIGHTING

EXTERIOR LAMPS

- The headlamps have built-in position lamps which make the headlamps shine dimly when the tail lamps are turned on at dusk. This improves the vehicle's visibility to others during the time of dusk.
- Free-curve reflectors and plastic lenses with a no-cut design have been adopted, and front fog lamps with a design that is clear and full of depth have also been provided as an option.
- The rear combination lamps incorporate vacuum metallised aluminium reflectors to enhance their impression of sparkle and depth and to increase the feeling of high quality.
- The high-mounted stop lamp has been installed to the back door.

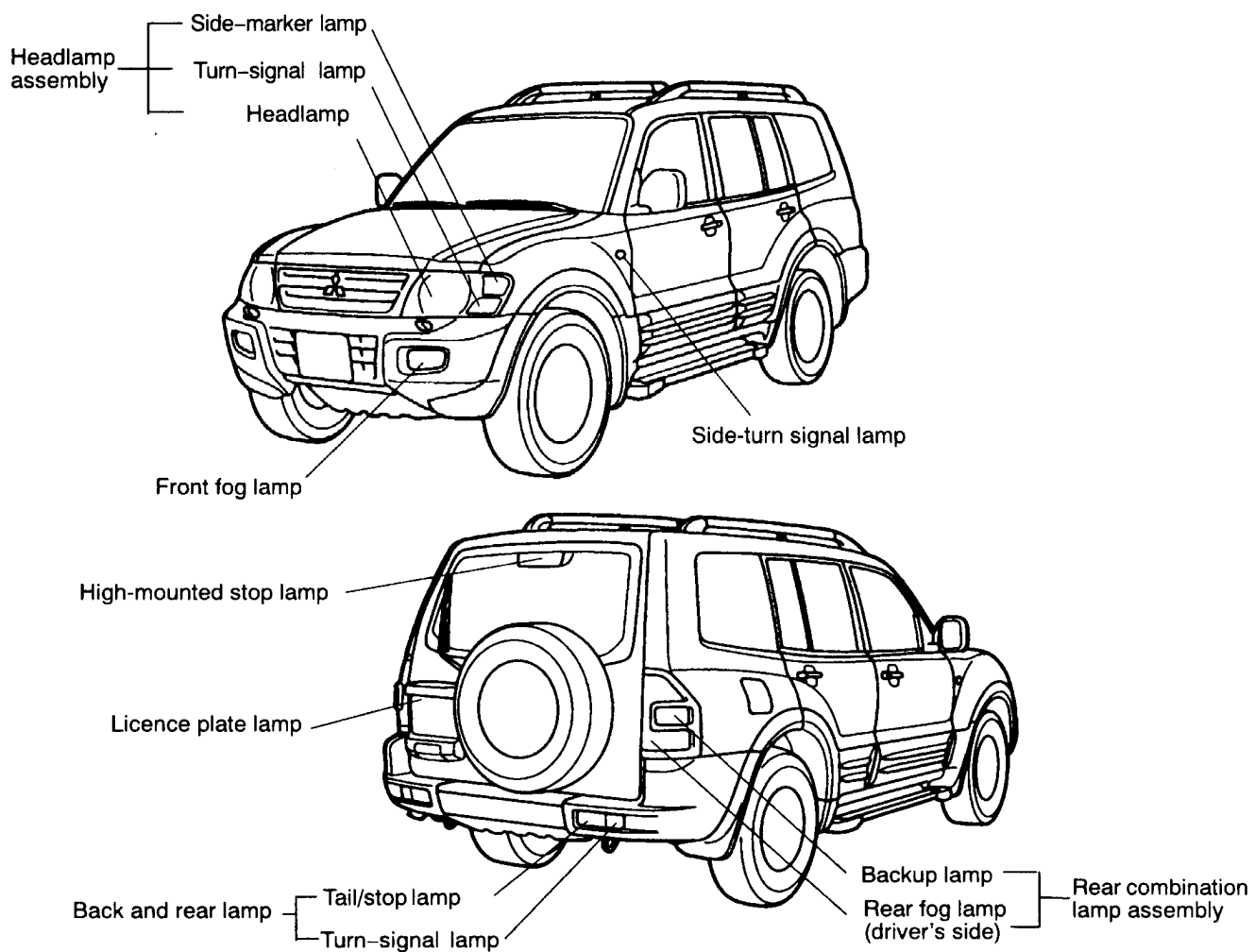
SPECIFICATIONS

Item		Specifications
Headlamp W	High beam/Low beam	60/55 (HB4)
	Front side marker lamp	5
	Front turn signal lamp (inside head-lamp unit)	21
Front fog lamp W		51W* ¹ or 55W* ²
Side-turn signal lamp W		5W
Rear combination lamp W	Backup	21
	Rear fog lamp	21
Back and rear lamp W	Turn-signal lamp	21
	Tail/stop	5 /21
High-mounted stop lamp W		16W* ¹ or 18W* ²
Licence plate lamp W		5W

NOTE

*¹ indicates the ECE notation and *² indicates the SAE notation.

CONSTRUCTION DIAGRAM



AY0016CY

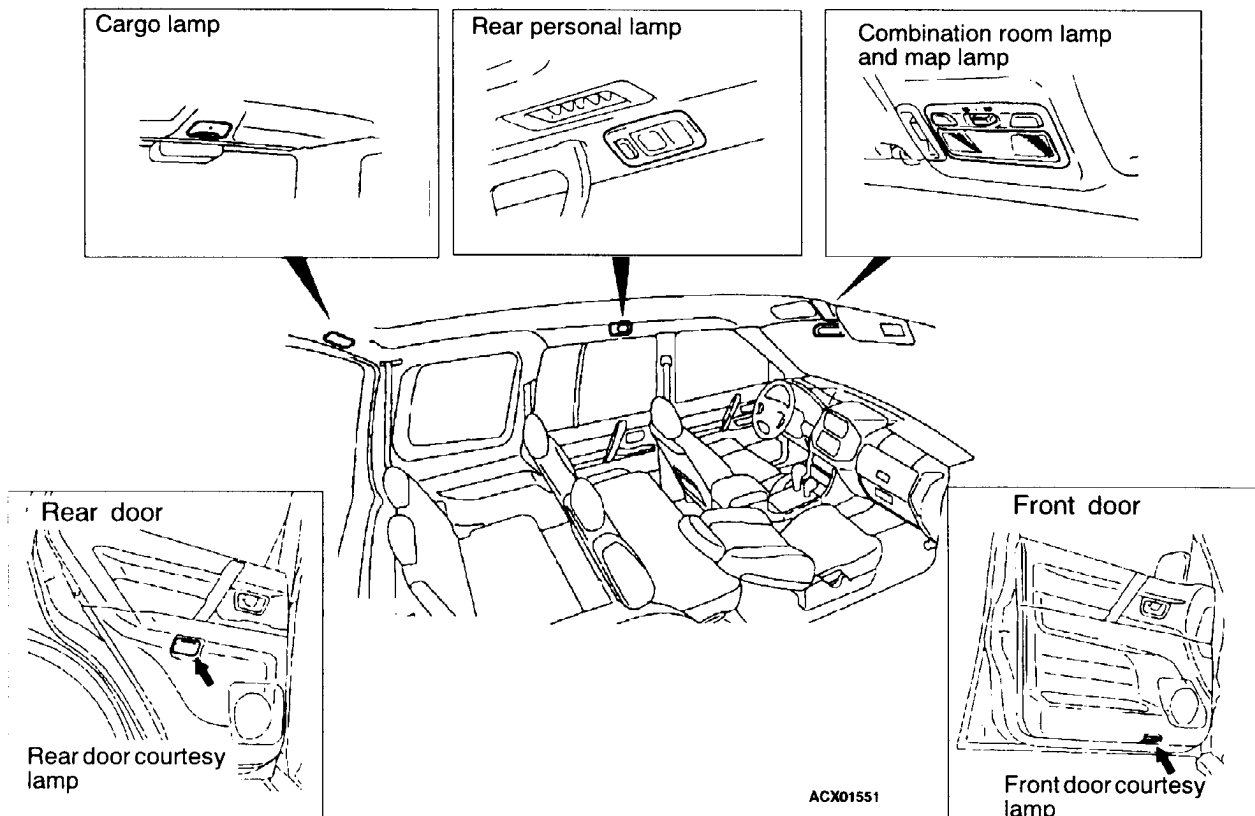
INTERIOR LAMPS

- A combination room lamp and map lamp that can be used at both the driver's side and passenger's side has been adopted.
- A luggage compartment lamp has been installed to the rear of the roof in the centre of the vehicle. When the back door or front doors are opened, this cargo light turns on to illuminate the luggage compartment and the rear of the vehicle (footing on road surfaces: when back door is open). The cargo lamp is fitted with a switch (ON: illuminates; DOOR: operation is linked to back door and front doors; OFF: stays switched off) to improve convenience of use.
- Door courtesy lamps are fitted to the front doors and rear doors. When a door is opened, the door courtesy lamp illuminates to increase the door's visibility to anyone behind. In addition, these lamps illuminate the footing area below the door, contributing to added ease when getting in and out of the vehicle.
- The rear personal lamps interlocked with the right and left rear doors are fitted for illumination of the rear seat.

SPECIFICATIONS

Item		Specifications
Combination room lamp and map lamp	Map lamp W × Number	7.5 × 2
	Room lamp W	7.5
Cargo lamp W × Number		8
Rear personal lamp W × Number		8 × 2
Door courtesy lamp W × Number		5 × 2

CONSTRUCTION DIAGRAM

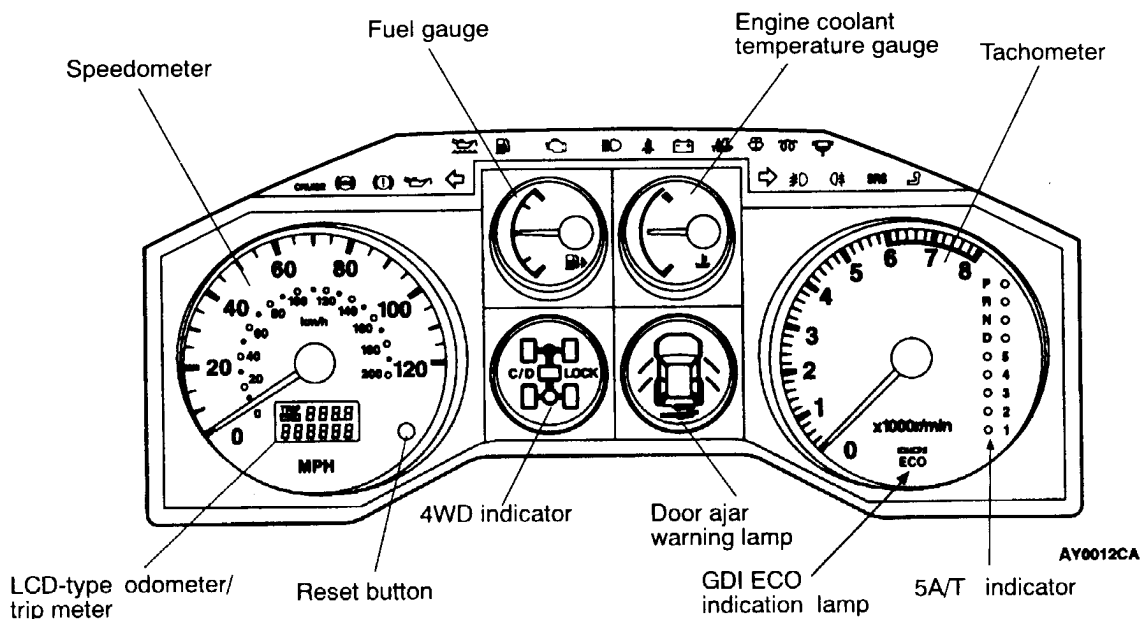


COMBINATION METER

The combination meter is an easy-to-see large analog type meter. At the center portion of the meter, the fuel gauge, the water temperature gauge, the door ajar warning lamp and the 4WD indicator lamp are arranged. At both sides, the speedometer and the tachometer are arranged, and at the upper portion, various warning lamps and indicator lamps are arranged. As stated above, the combination meter is designed so that the driver can get all vehicle information easily at a glance.

- The speedometer is an electronic speedometer which operates by means of pulse signals which are generated by the vehicle speed sensor equipped with the transmission.
- An LCD-type odometer/tripmeter has been adopted to make the display much easier to see. The odometer is displayed at all times, and the tripmeter includes a “twin trip” function (trip A and trip B), with either trip selectable using the reset button.
- The transmitted illumination method is adopted for the external shape of symbols and letterings on the 4WD indicator lamp to improve the visibility.
- The fuel gauge includes a triangular symbol which indicates the position of the fuel filler door. It indicates clearly that the fuel filler door is on the right side of the vehicle.
- A GDI ECO indication lamp has been provided to shown when the GDI engine is running at low fuel consumption mode.

CONSTRUCTION DIAGRAM



AUDIO SYSTEM

Radio with Tape Player and CD Player

- LW/MW/FM electronic tuning radio with tape player (With RDS function* and anti-theft function)
- LW/MW/FM electronic tuning radio with CD player (With RDS function* and anti-theft function)

- CD Player or CD changer<option>

Antenna

- Pillar antenna (driver's side) or Motor antenna

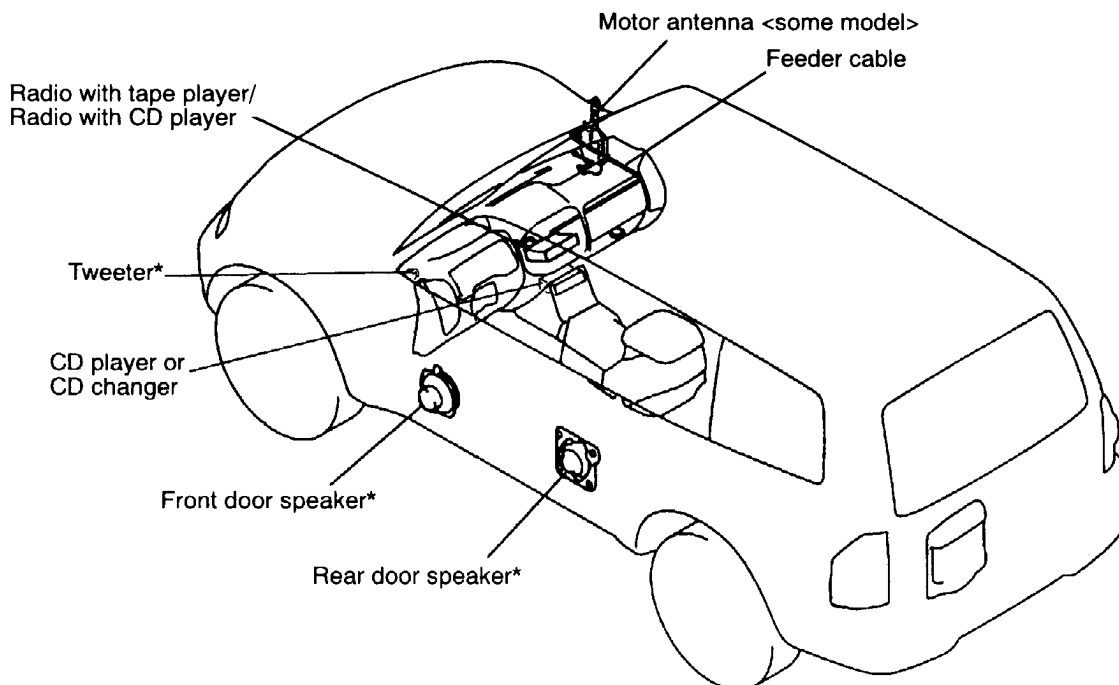
NOTE

RDS (Radio Data System): A kind of FM multiplex broadcasting that has the function of automatic switching to the traffic information broadcasting, automatic follow-up to the broadcasting station that is broadcasting the same program and indication of broadcasting station name, etc.

Speaker

LOCATION	Short wheelbase	Long wheelbase
Left and right front door (one each)	○ (full range-16cm)	○ (full range-16cm)
Left and right rear door (one each)	○ (full range-6" × 9")	○ (full range-6" × 9")
Deltas at the inner front section of left and right door (one each)	Tweeter	Tweeter

CONSTRUCTION DIAGRAM

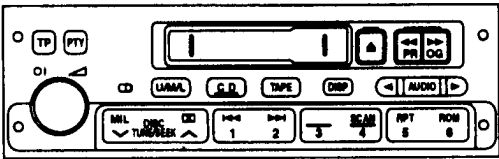


AY0022CA

NOTE

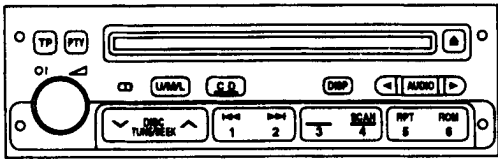
Speaker marked * are also installed on the opposite side.

Radio with tape player

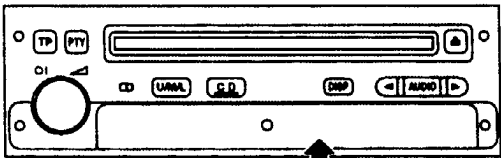


Y0019CA

Radio with CD player



Y0020CA



Y0021CA

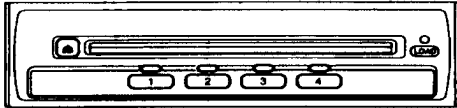
The radio key panel can be detached/ attached as you like.
You can prevent the radio main body from being stolen by carrying the key panel when you leave the vehicle.
When the key panel is removed, the alarm flash blinks.

CD Player



H11C004

CD changer



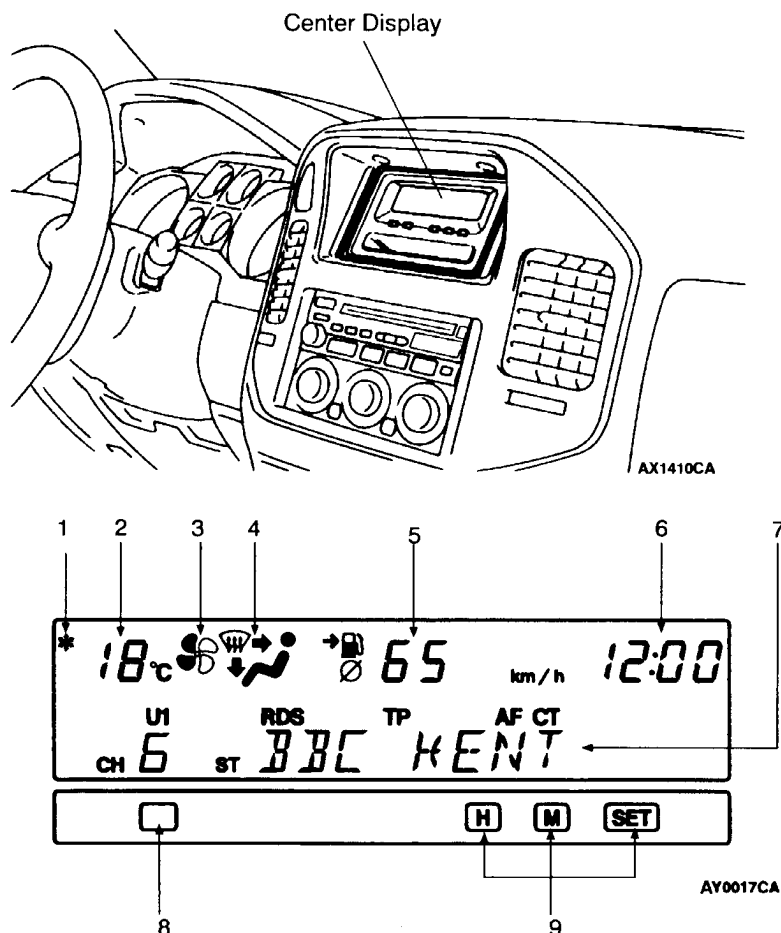
H12H078

CENTER DISPLAY

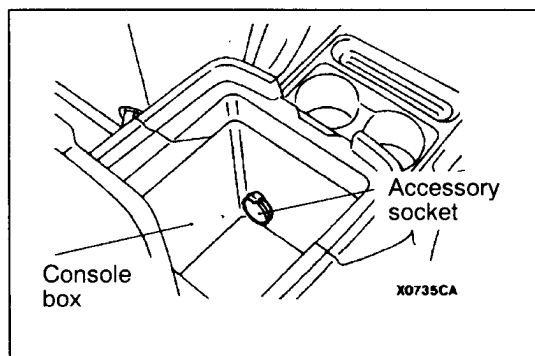
The center display that indicates various vehicle information is fitted.

The center display indicates various information as shown below based on the information sent from the

outside air temperature sensor, the A/C-ECU, the fuel gauge and the audio.



1. Icy road warning (When the outside air temperature falls below 3°C, the warning lamp flashes for approx. 10 seconds accompanied with the warning sound.)
2. Outside temperature
3. Blower speed
4. Air flow
5. Average fuel consumption/driving range/average speed <petrol-powered vehicles> or Date <diesel-powered vehicles>
6. Digital clock
7. Audio information
8. Display brightness button
9. Display unit selection button



ACCESSORY SOCKET<vehicles without rear heater>

A power socket for electrical accessories is located on the console box. This accessory socket can be used up to 120W.

SMART WIRING SYSTEM (SWS)

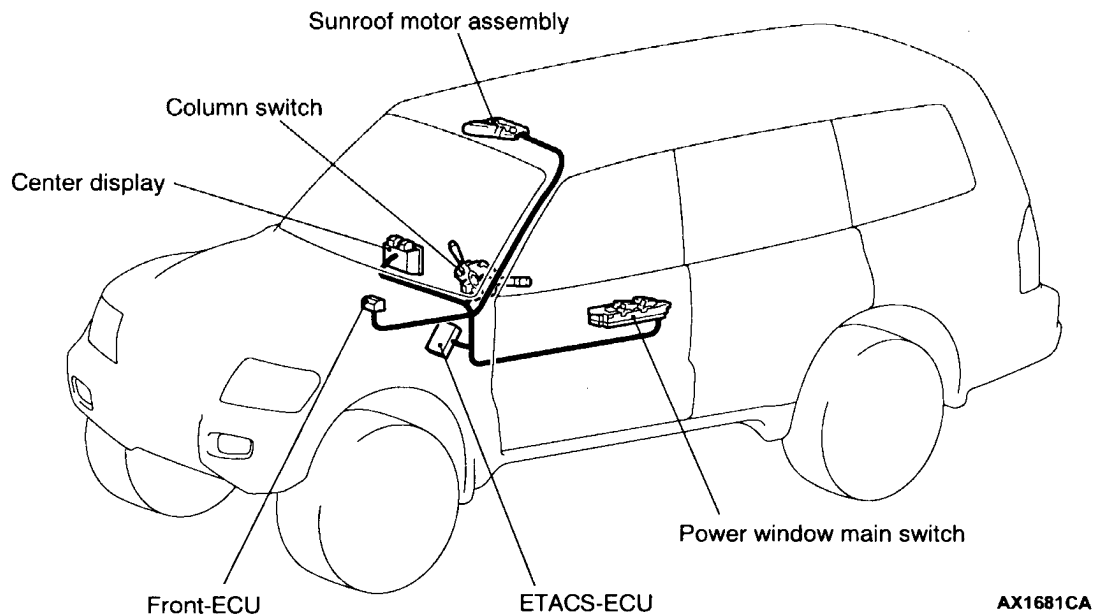
- The SWS permits multiple signals to be transmitted using a single wire harness. It was developed to help prevent harnesses from becoming excessively complex and heavy as more electrical devices are incorporated into vehicles.
- To enable multiplex signal transmission, the power window main switch, center display,

column switch, ETACS-ECU*, front-ECU, and sunroof motor assembly (this incorporates the sunroof-ECU) communicate using their built-in multiplex transmission circuitry.

NOTE

*: ETACS (Electronic Time and Alarm Control System)

CONSTRUCTION DIAGRAM



MULTIPLEX TRANSMISSION INPUTS AND OUTPUTS BY CIRCUIT

The following table shows the relationships between the input switches and sensors, the ECUs that are linked by multiplex transmission lines, and the output devices of circuits in which multiplex transmission is utilized.

NOTE

In the table shown below, the thick lines indicate multiplex communication lines between ECU and the thin lines indicate normal harness lines.

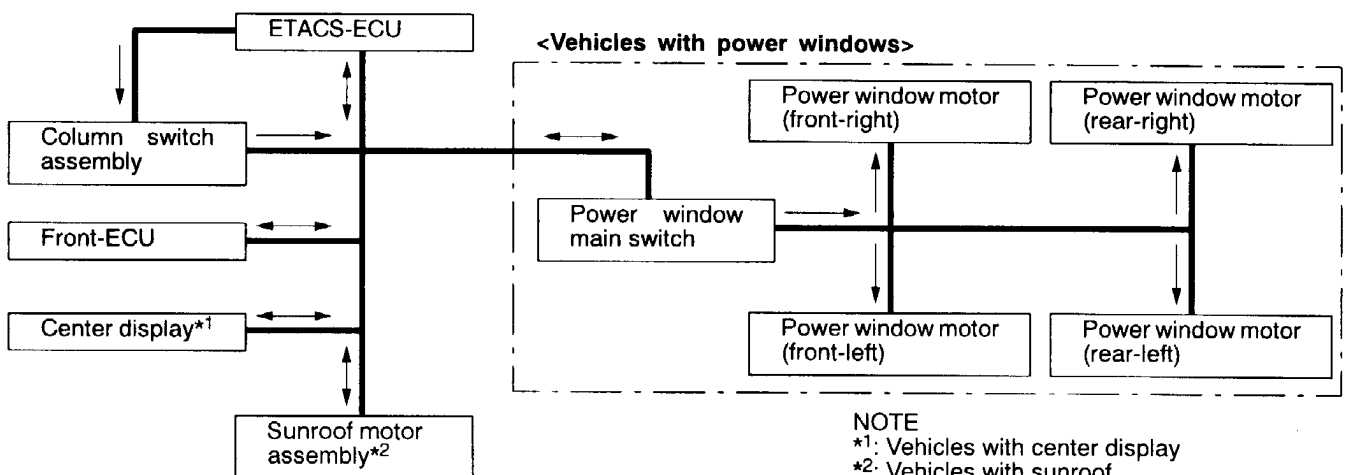
Names of circuits; input switches/sensors	ECUs/switches linked by multiplex transmission lines	Output devices
1. Buzzer • Light reminder warning buzzer function • Center display operation annunciation function <Vehicles with center display> • Ignition switch (IG₁) • Driver's door switch	ETACS-ECU Column switch (lighting switch) Center display	Buzzer (incorporated in ETACS-ECU)

Names of circuits; input switches/sensors	ECUs/switches linked by multi-plex transmission lines	Output devices
2. Power window <Vehicles with power windows> - Power window timer function - Ignition switch (IG₁) - Driver's door switch	ETACS-ECU Power window main switch	Power window relay
3. Sunroof <Vehicles with sunroof> - Sunroof timer function Ignition switch (IG₂) - Ignition switch (IG₁) - Driver's door switch	Sunroof motor assembly ETACS-ECU	Sunroof motor (incorporated in sunroof motor assembly)
4. Windshield wiper and washer - Windshield mist wiper operation - Windshield intermittent wiper operation - Windshield low-speed wiper operation - Windshield high-speed wiper operation - Windshield washer operation Column switch (windshield intermittent wiper interval adjusting knob) Ignition switch (ACC)	ETACS-ECU Column switch (Windshield wiper and washer switch) Front-ECU	- Windshield wiper motor - Windshield washer motor
5. Rear wiper and washer <Vehicles with rear wiper and washer> - Rear wiper operation - Rear washer operation - Ignition switch (ACC) - Back-up lamp switch <M/T> - Inhibitor switch (reverse) <A/T>	ETACS-ECU Column switch (Windshield wiper and washer switch)	- Rear wiper motor - Rear washer motor
6. Headlamp washer <Vehicles with headlamp washer> Headlamp washer operation Ignition switch (ACC)	ETACS-ECU Column switch (Headlamp washer switch) Front-ECU	Headlamp washer motor

Names of circuits; input switches/sensors	ECUs/switches linked by multiplex transmission lines	Output devices
7. Lighting - Headlamp and tail lamp operation - Headlamp automatic shutdown function - Daytime running lamp (DRL) function <Vehicles with DRL> - Front fog lamp operation <Vehicles with front fog lamp> - Rear fog lamp operation - Ignition switch (IG₁) - Driver's door switch - Front fog lamp switch <Vehicles with front fog lamp switch> - Rear fog lamp switch Ignition switch (IG₂)	ETACS-ECU ↓ Column switch (lighting switch) ↓ Front-ECU	Rear fog lamps - Headlamps - Tail lamps - Front fog lamps <Vehicles with front fog lamps>
8. Flasher Turn-signal lamp operation Ignition switch (IG₁)	ETACS-ECU ↓ Column switch (lighting switch)	Turn-signal lamps

COMMUNICATION METHOD

Data lines for multiplex communication are connected between the front-ECU, ETACS-ECU, column switch assembly, sunroof motor assembly, center display, power window main switch, and power window motors as illustrated below.

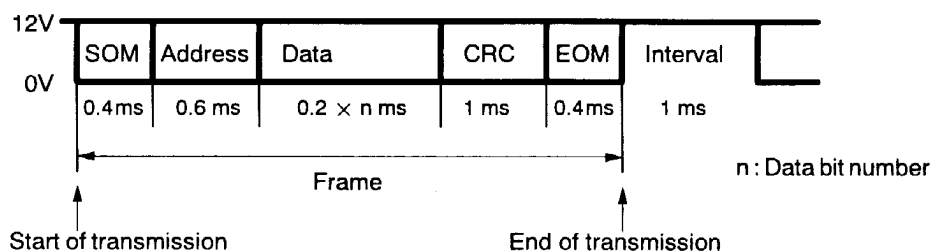


Communication data composition

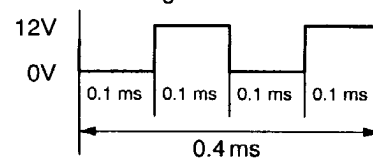
The communication data frame, which an ECU transmits, is composed of SOM, Address, Data, CRC and EOM. Data is transmitted to the column switch, center display, ETACS-ECU, front-ECU, power window main switch, and sunroof motor assembly in that order. Data transmission to the column switch is triggered by data request by the ETACS-ECU. Each ECU identifies an address data of the transmitted data frame, and then transmits the address data according to its own transmission order. In addition, the front-ECU, power window main switch and sunroof motor assembly transmit acknowledgement signal, which indicates correct data reception.

COMMUNICATION DATA STRUCTURE

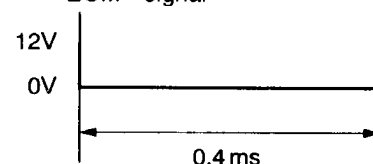
Multiple communication line



"SOM" signal

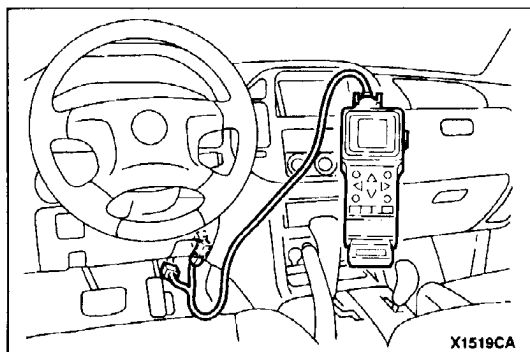
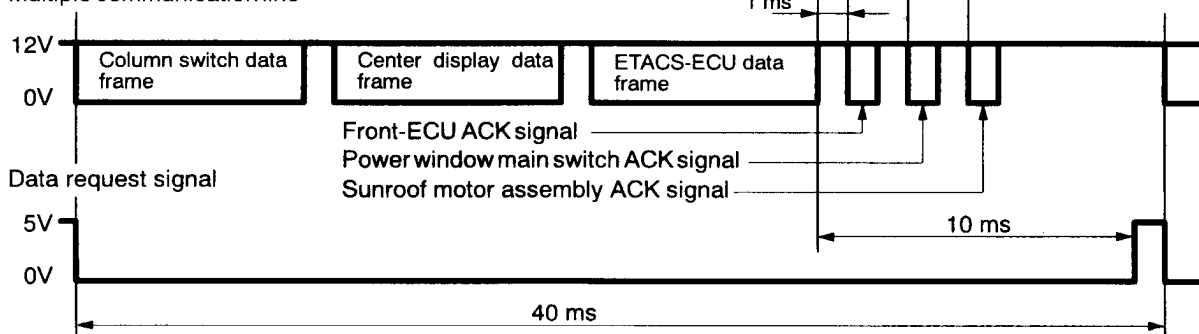


"EOM" signal



BASIC SEQUENCE

Multiple communication line



DIAGNOSIS FUNCTION

1. Checking SWS Input Signals Using MUT-II

With a MUT-II plugged into the diagnosis connector, operation of the switches that provide inputs to the SWS causes the MUT-II's internal buzzer to sound. Thus, it is possible to check whether the switches are functioning properly.

Input Signal Check Function

Input signal		Buzzer operation condition
Ignition switch (ACC)		Turned from LOCK (OFF) to ACC
Ignition switch (IG1)		Turned from ACC to ON
Key reminder switch <Vehicles with keyless entry system>		Ignition key removed from ignition key cylinder (from inserted position)
Hazard lamp switch		Turned from OFF to ON
Front fog lamp switch <Vehicles with front fog lamp>		
Rear fog lamp switch		
Back-up lamp switch <M/T, vehicles with rear wiper and washer>		Shift lever moved to R position
Inhibitor switch (reverse) <A/T, vehicles with rear wiper and washer>		Selector lever moved to R position
Rear wiper motor auto-stop signal <Vehicles with rear wiper and washer>		Rear wiper begins to operate (The input signal is sent before the rear wiper begins operate)
Driver's door switch		Driver's door opened from closed condition
Door switches		All doors closed to any door opened
Front passenger's door lock key cylinder switch <Vehicles with central door locking system>		Turn the key to the locked or unlocked
Back door lock key cylinder switch <Vehicles with central door locking system>		
Driver's door lock actuator switch <Vehicles with central door locking system>		Driver's door lock knob moved from lock position to unlock position or vice versa
Column switch	Tail lamp switch	Turned the lighting switch from OFF to tail lamp position
	Headlamp switch	Turned the lighting switch from tail lamp position to headlamp position
	Dimmer switch	Turned from OFF to ON
	Passing switch	
	Turn-signal lamp switch	
	Windshield mist wiper switch	
	Windshield intermittent wiper switch	
	Windshield low-speed wiper switch	
	Windshield high-speed wiper switch	
	Windshield intermittent wiper interval adjusting knob	Rotate the windshield intermittent wiper interval adjusting knob from FAST to SLOW when the ignition switch is in ON position (The ETACS-ECU sends a signal around the medium knob position)
	Windshield washer switch	Turned from OFF to ON
	Rear wiper switch <Vehicles with rear wiper and washer>	
	Rear washer switch <Vehicles with rear wiper and washer>	
	Headlamp washer switch <Vehicles with headlamp washer>	
Power window main switch	Any switch <Vehicles with power windows>	Turned from OFF to ON
Transmitter	Any switch <Vehicles with keyless entry system>	Turned from OFF to ON when the ignition switch is in ON position

Input signal		Buzzer operation condition
Sunroof switch	Any switch <Vehicles with sunroof>	Turned from OFF to ON
Center display	Any switch <Vehicles with center display>	Turned from OFF to ON when the ignition switch is in ON position

2. Reading Diagnosis Code Outputs Using MUT-II

There are four diagnosis items related to the SWS.

Diagnosis Items

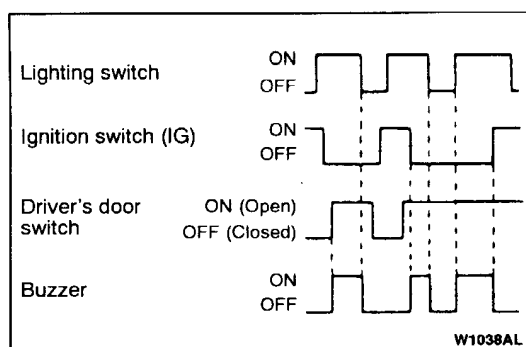
MUT-II code No.	Details of diagnosis
11	Fault related to ETACS-ECU The ETACS-ECU monitors its own transmitted data, and it issues a diagnosis code if an error occurs in 15 consecutive cycles (0.6 second). If the ETACS-ECU's transmitted data subsequently become normal for 15 cycles (0.6 second), the diagnosis code is erased.
12	Fault related to column switch or faulty connection to ETACS-ECU The ETACS-ECU issues a diagnosis code if the column switch performs transmissions (three or more cycles in one second) that do not comply with the transmission request signal from the ETACS-ECU. If the column switch subsequently performs transmissions that comply with the transmission request signal from the ETACS-ECU continuously for one second, the diagnosis code is erased.
13	Fault related to front-ECU The ETACS-ECU issues a diagnosis code if signals transmitted from the front-ECU to the ETACS-ECU are erroneous for 15 consecutive cycles (0.6 second). If signals transmitted from the front-ECU to the ETACS-ECU subsequently become normal for 15 consecutive cycles, the diagnosis code is erased.
21	Short circuit in communication line The ETACS-ECU issues a diagnosis code if any SWS communication line's voltage remains at the low level for 0.3 second. If subsequently the voltage of the ETACS-ECU's data line remains at the high level for 0.3 second or signals from the ECUs and switches are applied normally to the ETACS-ECU, the diagnosis code is erased. When this code is displayed, no other code is displayed.

FUNCTIONS CONTROLLED VIA SWS AND RESPONSIBLE ECUS

The relationship between ECUs and functions controlled by the respective ECUs through SWS is as shown below.

No.	Function	Control ECU (s)
1	Light reminder warning buzzer function	ETACS-ECU, column switch
2	Center display operation annunciation function <Vehicles with center display>	ETACS-ECU, RV meter or center display
3	Central door locking system <Vehicles with central door locking system>	ETACS-ECU
4	Forgotten key prevention function <Vehicles with keyless entry system>	ETACS-ECU
5	Keyless entry hazard answerback function <Vehicles with keyless entry system>	ETACS-ECU
6	Power window timer function <Vehicles with power windows>	ETACS-ECU, power window main switch
7	Sunroof timer function <Vehicles with sunroof>	ETACS-ECU, sunroof motor assembly
8	Windshield wiper and washer control function	ETACS-ECU, front-ECU, column switch
9	Rear wiper and washer control function <Vehicles with rear wipe and washer>	ETACS-ECU, column switch
10	Headlamp washer control function <Vehicles with headlamp washer>	ETACS-ECU, front-ECU, column switch

No.	Function	Control ECU (s)
11	Ignition key hole illumination lamp control function	ETACS-ECU
12	Headlamp automatic shutdown function	ETACS-ECU, front-ECU, column switch
13	Flasher timer function	ETACS-ECU, column switch
14	Front fog lamp control function <Vehicles with front fog lamp>	ETACS-ECU, front-ECU, column switch
15	Rear fog lamp control function	ETACS-ECU, column switch
16	Room lamp control function <Vehicles with keyless entry system>	ETACS-ECU
17	Configuration function <Vehicles with keyless entry system>	ETACS-ECU, column switch



Operation

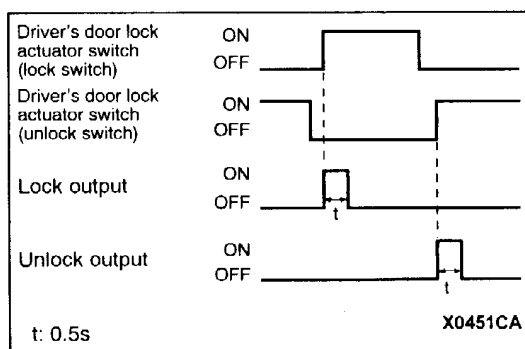
1. Light Reminder Warning Buzzer Function

When the driver's door is opened with lighting switch in the ON (tail lamp switch or headlamp switch) position and ignition switch in the LOCK (OFF) or ACC position, the buzzer will sound continuously to remind the driver that the lamps (tail lamps or headlamps) are ON.

This function does not work if the lighting switched off through the headlamp automatic shutdown function. In addition, the ignition key reminder warning buzzer function has a priority over this function.

2. Center Display Operation Annunciation Function <Vehicles with Center Display>

On vehicles with center display, the buzzer (peeps) sounds when the operation switch of the audio and navigation systems is pressed.



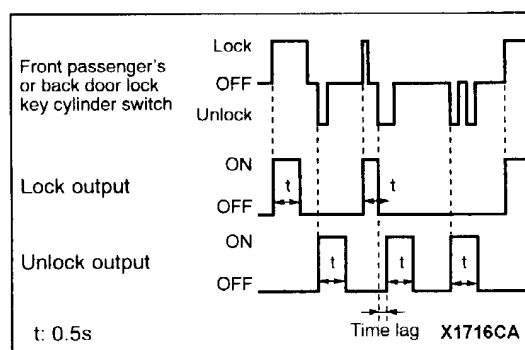
3. Central Door Locking System <Vehicles with Central Door Locking System>

(1) Door Locking and Unlocking by Operating the Driver's Door

When the lock switch is turned ON after the unlock switch on the driver's door lock actuator switch is OFF, the ETACS-ECU gives a lock output for 0.5 second. When the unlock switch is turned ON after the lock switch on the driver's door lock actuator switch is OFF, the ETACS-ECU gives an unlock output for 0.5 second.

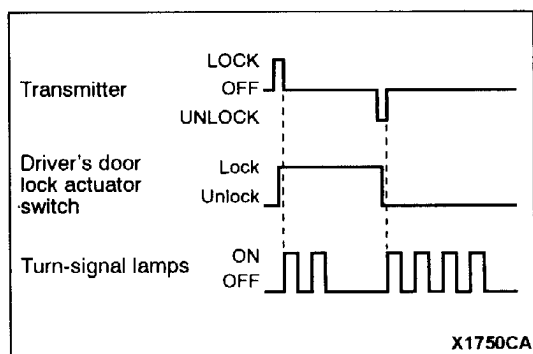
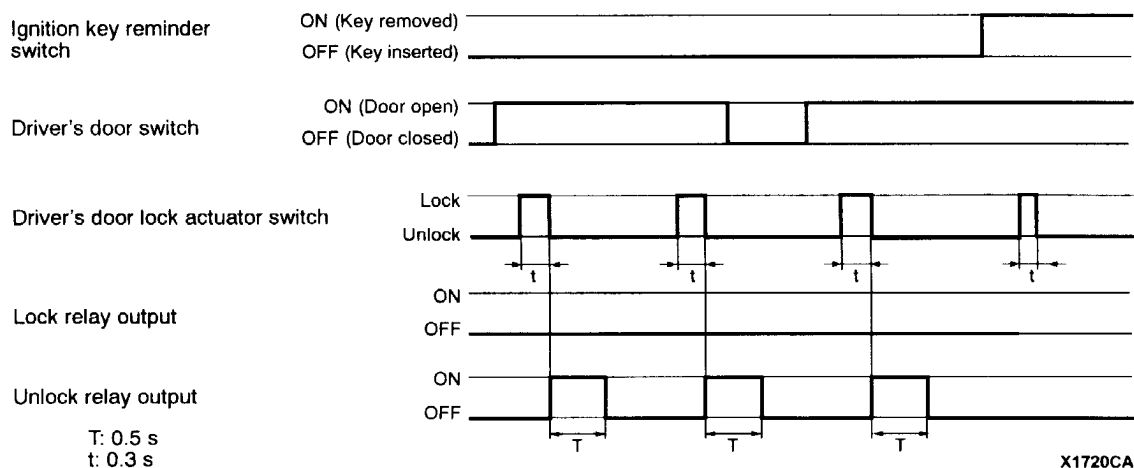
(2) Door Locking and Unlocking by Operating the Front Passenger's Door Key or Back Door Key

When the front passenger's door key or back door key is operated, the ETACS-ECU gives a lock or unlock output for 0.5 second.



4. Forgotten Key Prevention Function <Vehicles with Keyless Entry System>

If, with the key reminder switch OFF and the driver's door switch ON, the driver's door lock switch is turned ON after the door unlock switch in the front door lock actuator is turned OFF, the ETACS-ECU waits 0.3 second then gives an unlock relay output for 0.5 second, thereby preventing the doors from being locked. This operation prevents the ignition key from being locked inside the vehicle. This function takes precedence over the central door locking control function.

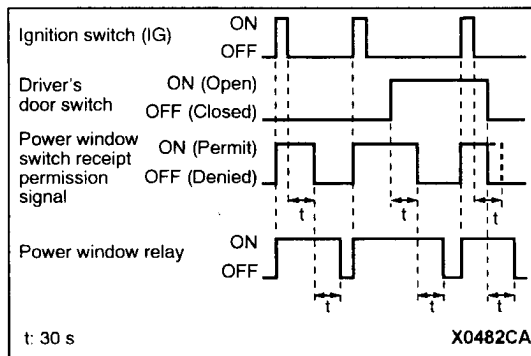


5. Keyless Entry Hazard Answerback Function <Vehicles with Keyless Entry System>

The keyless entry hazard answerback function facilitates confirmation of door locking and unlocking operations even in daylight. When a LOCK signal from the keyless entry transmitter is applied to the ETACS-ECU, all of the turn-signal lamps flash twice. When an UNLOCK signal from the keyless entry transmitter is applied to the ETACS-ECU, all of the turn-signal lamps flash four times. Note that an unlock answerback is given only when the state of the door unlock switch has change from OFF to ON.

NOTE

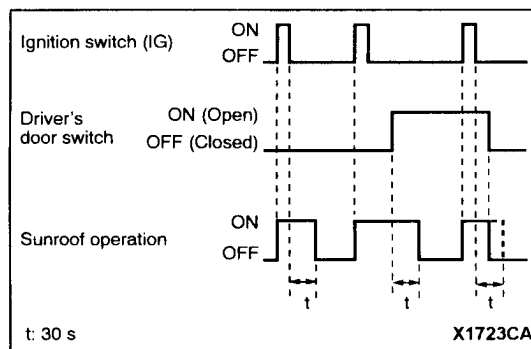
- (1) Refer to P.7-28 for the answerback of the room lamp.
- (2) On and OFF of this function can be switched by the configuration function. (Refer to P.7-29.)



6. Power Window Timer Function <Vehicles with Power Windows>

With the ignition switch in the ON position, the power window relay and power window switch receipt permission signal (a SWS signal transmitted from the ETACS-ECU) are turned ON (the power window switch receipt permission signal remains ON for 30 seconds after the ignition switch is turned OFF), enabling opening and closing of the power windows. When the receipt permission signal goes OFF, the power window main switch prevents opening and closing of the windows. The power window relay goes OFF ten seconds after the receipt permission signal goes OFF.

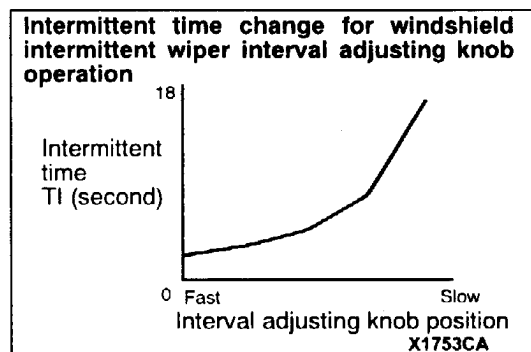
If the driver's door is opened during timer operation, the receipt permission signal goes ON for additional 30 seconds. If the driver's door is subsequently closed during this period, the receipt permission signal goes OFF. The power window relay goes OFF ten seconds after the receipt permission signal goes OFF.



7. Sunroof Timer Function <Vehicles with Sunroof>

When the ignition switch is turned from ON position to LOCK (OFF) or ACC position, the sunroof will be ready to work for 30 seconds.

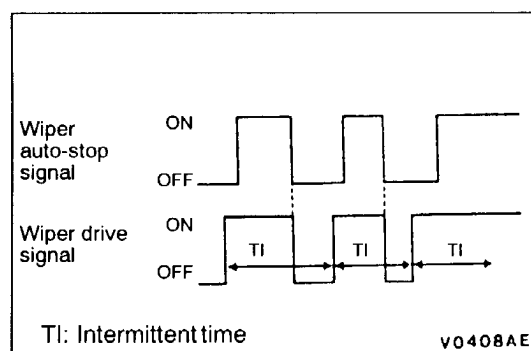
If the driver's door is opened during the timer operation, the timer operates for another 30 seconds starting from that point. However, the timer operation discontinues if the door is closed during that period.



8. Windshield Wiper and Washer Control Function

• Windshield Intermittent Wiper Operation

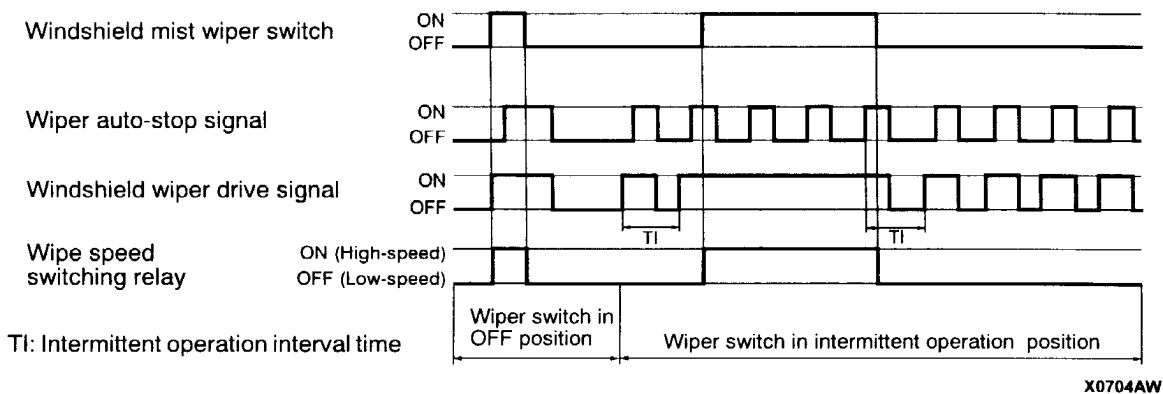
- (1) The ETACS-ECU derives the intermittent time (approx. 2 – 18 seconds) which is calculated from the intermittent period signal from the column switch. It then outputs this interval to the front-ECU as SWS data.



- (2) The front-ECU determines the intermittent time T_I from the SWS signal input, and turn on the wiper signal relay. After the wiper signal relay turns on the wiper auto-stop relay turns on, and it turns off again when the wipers reach the stop position. When the wiper auto-stop relay turns off, the wiper signal relay turns off and the wipers stop. After the number of seconds for intermittent time T_I has passed since the wiper signal relay turned on, the wiper signal relay turns back on and the above operation is repeated.

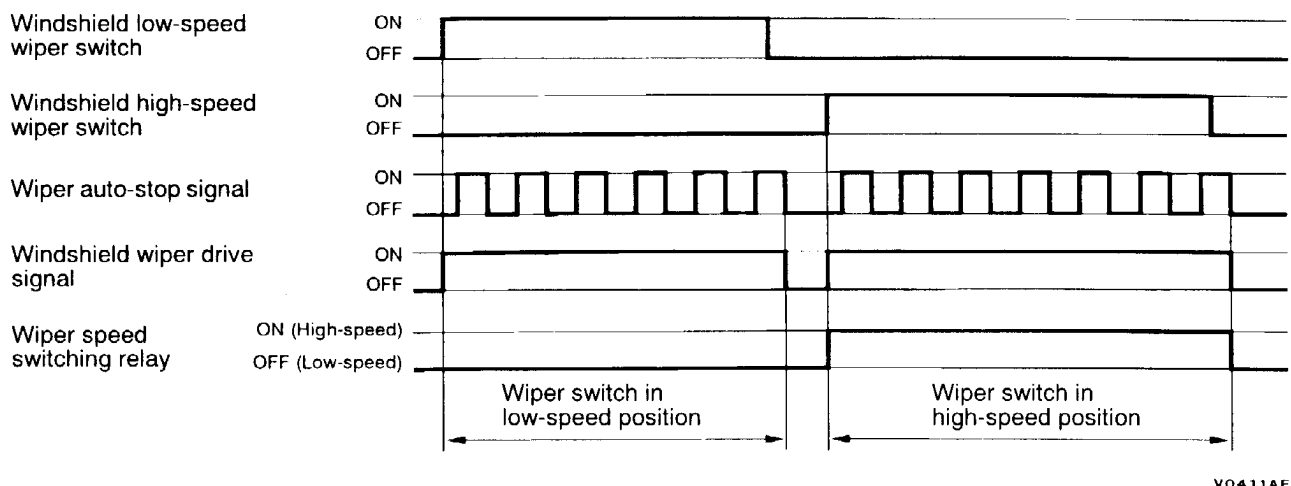
- Windshield Mist Wiper Operation

If the windshield mist wiper switch at the steering column is turned ON when the ignition switch is in the ACC or ON position, the mist wiper switch signal to the front-ECU is set to high and this switches the wiper drive signal ON. Simultaneously, the wiper speed switching relay turns ON (high-speed) to cause the wiper to operate at high-speed during the ON state period. If the windshield mist wiper switch is turned ON while the wiper is operating intermittently, the above series of operation takes place as long as the windshield mist wiper switch stays in the ON position. After the switch is turned OFF, intermittent wiper operation resumes starting TI seconds after the wiper auto-stop signal was last turned ON.



- Windshield Low-speed/High-speed Wiper Operation

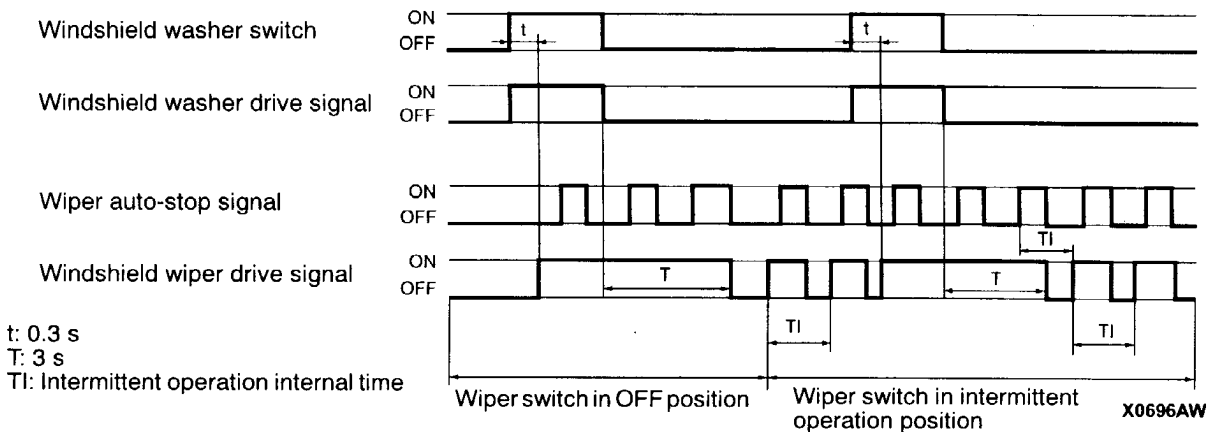
If the wiper switch is turned to the low-speed position with the ignition switch in the ACC or ON position, the wiper low-speed drive signal (an SWS signal from the column switch assembly) applied to the front-ECU turns ON and the wiper high-speed drive signal (an SWS signal from the column switch assembly) applied to the front-ECU turns OFF. Thus, the wiper drive signal turns ON, the wiper speed switching relay turns OFF (low-speed), and the wipers operate at low-speed mode. If the wiper switch is subsequently turned to the high-speed position, the wiper low-speed drive signal (an SWS signal from the column switch assembly) applied to the front-ECU turns OFF and the wiper high-speed drive signal (an SWS signal from the column switch assembly) applied to the front-ECU turns ON. Thus, the wiper drive signal turns ON, the wiper speed switching relay turns ON (high-speed), and the wipers operate at high-speed mode.



- Windshield Washer Operation

If the windshield washer switch of the column switch assembly is turned ON with the ignition switch in the ACC or ON position, the washer switch signal (an SWS signal from the column switch assembly) applied to the front-ECU goes high. When 0.3 second has subsequently elapsed, the wiper drive signal turns ON. Three seconds after the windshield washer switch signal goes low, the wiper drive signal goes OFF.

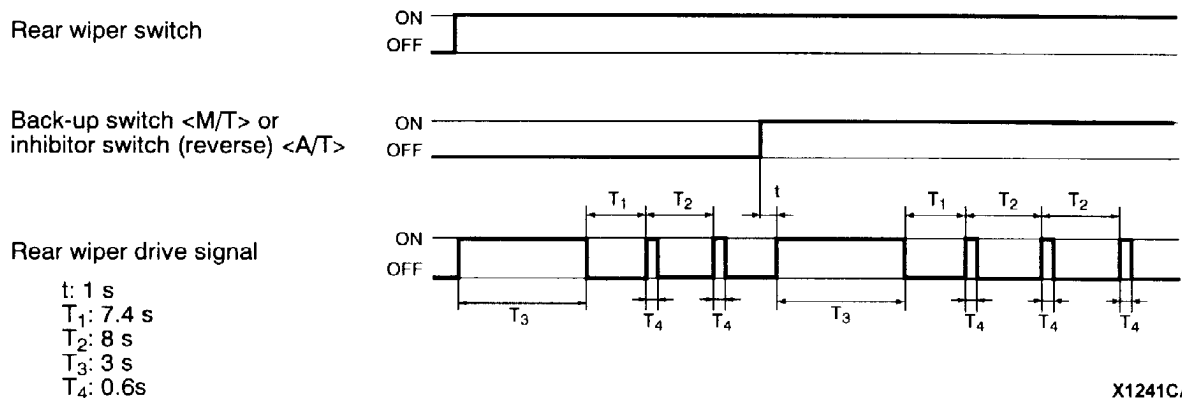
If the wipers are operating intermittently when the washer switch is turned ON, they continue operating intermittently when washer control is complete.



9. Rear Wiper and Washer Control Function <Vehicles with Rear Wiper and Washer>

- Rear Wiper Operation

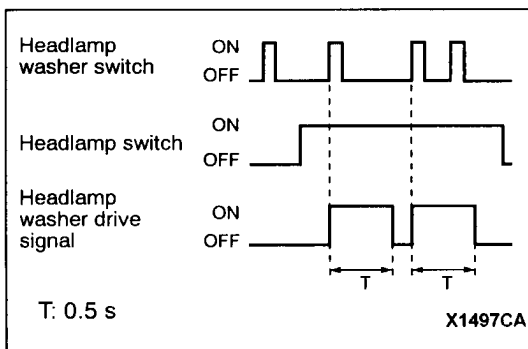
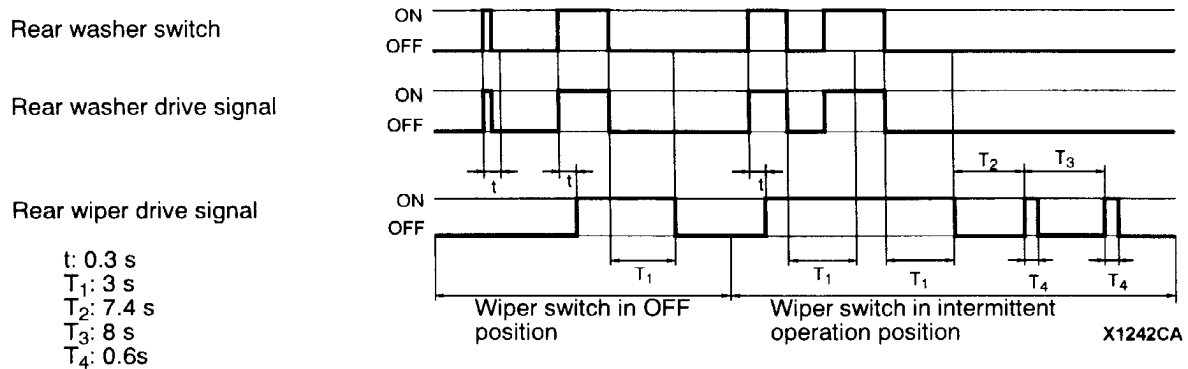
If the rear wiper switch of the column switch assembly is turned ON with the ignition switch in the ACC or ON position, the ETACS-ECU turns ON the rear wiper drive signal for three seconds (approx. two operations). 7.4 seconds later, the wiper begins the intermittent operation with 8 seconds' cycle. If the shift lever <M/T> or the selector lever <A/T> is moved to the R position when the rear wiper switch of the column switch assembly is turned ON and the ignition switch is in any position other than OFF, the back-up lamp switch <M/T> or the inhibitor switch (reverse) <A/T> is turned ON. One second later, the ETACS-ECU turns ON the rear wiper drive signal for three seconds (approx. two operations) to clear the rear field of view. 7.4 seconds later, the wiper returns to the intermittent operation with 8 seconds' cycle.



- Rear Washer Operation

If the washer switch at the steering column is placed in the ON position when the ignition switch is in the ACC or ON position, the rear washer switch signal to the ETACS-ECU is set to high. The wiper drive signal turns ON 0.3 seconds after this and turns OFF three seconds after the rear washer switch signal has become low.

If the rear wiper is in intermittent operation when the rear washer switch is turned ON, the rear wiper again continues the intermittent operation with 8 seconds' cycle from 7.4 seconds later since the rear drive signal is turned OFF.



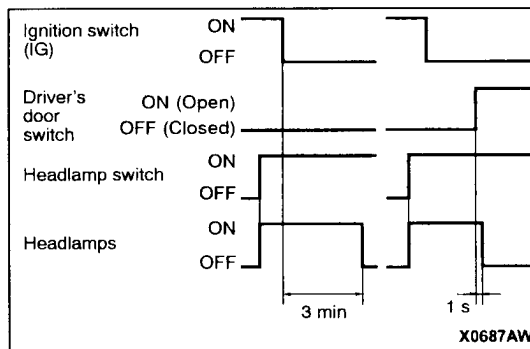
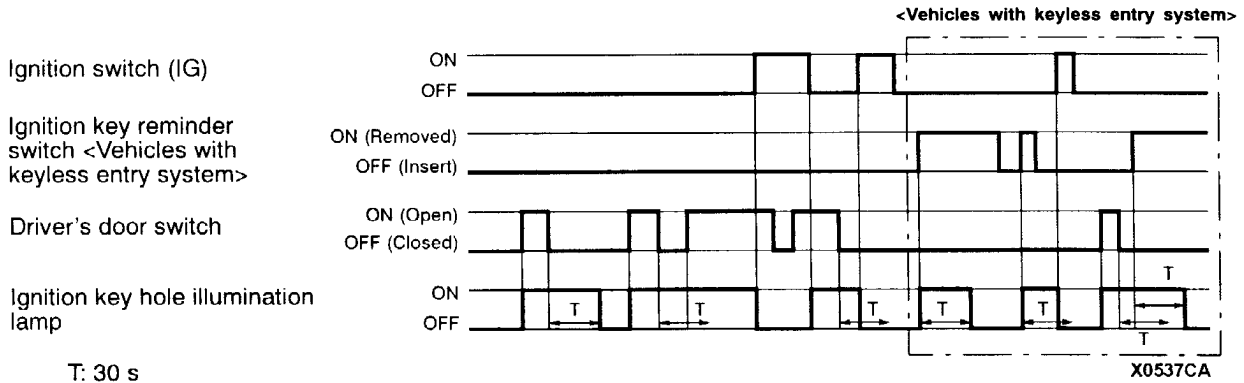
10. Headlamp Washer Control Function <Vehicles with Headlamp Washer>

If the headlamp washer switch at the steering column is placed in the ON position when the ignition switch is in the ACC or ON position and the headlamp switch is in the ON position, the headlamp washer drive signal is turned ON for 0.5 second.

11. Ignition Key Hole Illumination Lamp Control Function

When the ignition switch is turned to LOCK (OFF) or ACC position with the driver's door opened. The ignition key hole illumination lamp is illuminated.

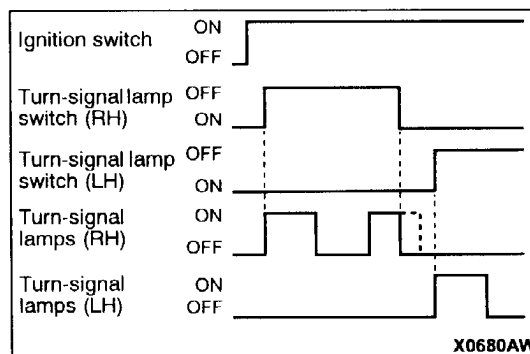
If the door is closed in that state, the lamp goes out after 30 seconds. Vehicles with keyless entry system, it illuminates for 30 seconds after the ignition key is removed. In either case the lamp does out when the ignition switch is turned to ON position.



12. Headlamp Automatic Shutdown Function

If the ignition switch is turned to LOCK (OFF) or ACC position or the ignition key is removed, when the headlamps are on, the headlamps will be switched off in three minutes. If the driver's door is opened within that three-minute period, the headlamps will be switched off automatically. This prevents the battery from being discharged.

In addition, if the headlamps are turned on when the ignition switch is at LOCK (OFF) or ACC position or with the ignition key removed, the headlamps will not be switched off.



13. Flasher Timer Function

(1) Turn-signal Lamp

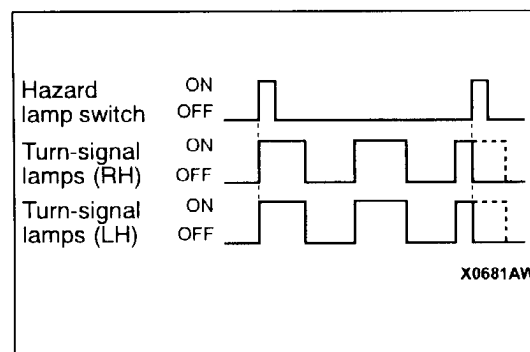
When the left or right turn-signal switch is turned ON with the ignition switch in the ON position, drive (flash) signals for the turn-signal lamps are issued. If the bulb blows in any turn-signal lamp, the flash speed is reduced to alert the driver.

(2) Hazard Lamp

When an OFF to ON change in the input signal from the hazard lamp switch is detected, the turn-signal lamps' operating condition is inverted. (The lamps are caused to flash if they were initially off, and they are turned off if they were initially flashing.)

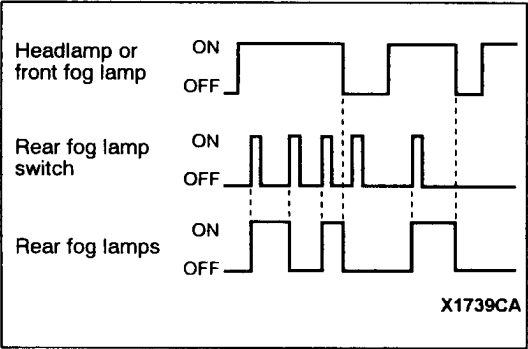
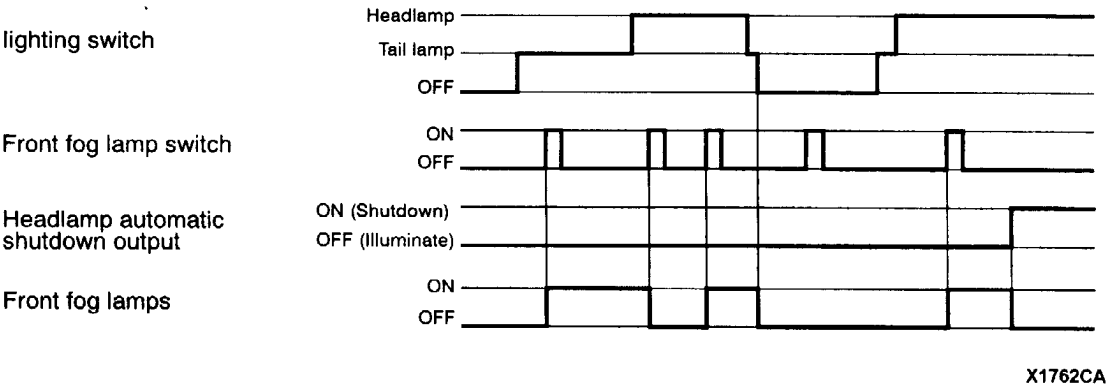
NOTE

The hazard lamp switch is a push-and-return type



14. Front Fog Lamp Control Function <Vehicles with Front Fog Lamp>

If the front fog lamp switch is turned ON at the condition that the headlamp or the tail lamp is turned ON, the front fog lamp is turned ON. Whenever the tail lamps are turned ON at the next time, the front fog lamps will always be OFF regardless of the switch positions.



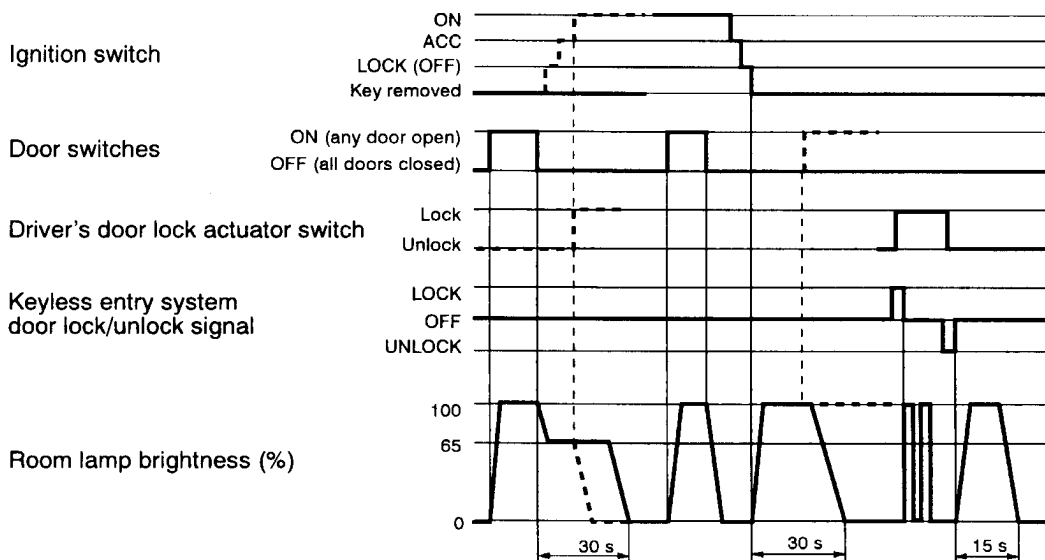
15. Rear Fog Lamp Control Function

If the fog lamp switch is turned ON when the headlamp or the front fog lamp is turned ON, the rear fog lamp is switched ON and OFF alternatively. If the headlamp and the front fog lamp are turned OFF during lighting of the rear fog lamp, the rear fog lamp is turned OFF at the same time.

16. Room Lamp Control Function <Vehicles with Keyless Entry System>

With the room lamp switch in the DOOR position, the ETACS-ECU controls the room lamp as follows:

- (1) Occupant Ingress/Egress (Ignition Switch: OFF)
When any door is opened, the room lamp illuminates at 100% brightness. When the door is closed, the lamp's brightness is reduced to 65% for 30 seconds, after which the lamp goes out. If, during timed illumination, the ignition switch is turned ON or the doors are locked, the lamp goes out immediately.
- (2) Occupant Ingress/Egress (Ignition Switch: ON)
When any door is opened, the room lamp illuminates at 100% brightness. When the door is closed, the lamp goes out.
- (3) Ignition Key Removed with All Doors Closed
When the ignition key is removed with all doors closed, the room lamp illuminates 100% brightness for 30 seconds then goes out. If the ignition key is reinserted or the doors are locked while the lamp is illuminated, the lamp goes out immediately.
- (4) Keyless Entry Room Lamp Answerback
To facilitate confirmation of the keyless entry system's operation, the room lamp flashes twice when the doors are locked and illuminates at 100% brightness for 15 seconds when the doors are unlocked.



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NOTE

The broken lines indicate signal levels and corresponding lamp operation during timed illumination periods when the ignition switch is turned ON, the door lock switch is turned ON, or any door is opened.

17. Configuration Function <Vehicles with Keyless Entry System>

Through special operation of input switches, it is possible to disable and enable the functions listed below. Settings are retained even if the battery is disconnected.

- Keyless entry hazard answerback function
- Initialization of abovementioned functions

(1) Configuration Mode Entry Conditions

When all of the conditions listed below are satisfied, the ETACS-ECU causes the buzzer to sound once to indicate that it has entered configuration mode.

- Hazard lamp switch: OFF
- Diagnosis control: ON (MUT-II connected or terminal 1 of diagnosis connector connected to earth)
- Key reminder switch: OFF (ignition key inserted)
- Ignition switch: LOCK (OFF)
- Driver's door switch: OFF (driver's door closed)
- Windshield washer switch turned ON for more than 10 seconds with all of above conditions satisfied

(2) Configuration Mode Cancellation Conditions

The ETACS-ECU cancels the configuration mode when any of the conditions listed below is satisfied.

- Diagnosis control: OFF (MUT-II disconnected or terminal 1 of diagnosis connector disconnected from earth)
- Key reminder switch: ON (ignition key removed)
- Ignition switch: any position other than LOCK (OFF)
- Driver's door switch: ON (driver's door open)
- No configuration performed within three minutes of entry to configuration mode (If configuration is performed within first three minutes, monitoring continues for three minutes from that point.)
- Any other warning buzzer output occurs

(3) Configuration of Functions

Function	Configuration procedure
Keyless entry hazard answerback	If the transmitter's LOCK switch is turned ON twice within two seconds, the lock answerback function's enabled/disabled status is inverted. ● When function is enabled, buzzer sounds once (initial status). ● When function is disabled, buzzer sounds twice. If the transmitter's UNLOCK switch is turned ON twice within two seconds, the unlock answerback function's enabled/disabled status is inverted. ● When function is enabled, buzzer sounds once (initial status). ● When function is disabled, buzzer sounds twice.
Initialization of abovementioned functions	If the windshield washer switch is turned ON for more than 20 seconds, the buzzer sounds twice and all functions are initialized. (The configuration mode entry buzzer sounds after 10 seconds, but the switch must be kept ON for 20 seconds to achieve initialization.) If the windshield washer switch is kept ON for more than 20 seconds without prior entry of the configuration mode, the configuration mode is entered after 10 seconds and initialization does not take place.

HEATER AND AIR CONDITIONER

The draft resistance is reduced by integrating the heater, the cooling unit and the center duct for the front heater and the air-conditioner system, which resulted in increase of the flow rate of air and reduction of noise. Two types of air-conditioners are available, which are the manual type air-conditioner

and the fully automatic air-conditioner.

The dual air-conditioner, the rear heater and the rear cooler are equipped as standard or as option on some models to improve the comfortableness of the passenger seating on the rear seat.

FEATURES

Improved comfort	1. Adoption of two-level full air mix heater 2. Adoption of low-noise, high-capacity heater and air conditioner system 3. Adoption of clean air filter which filters out dust and pollen to maintain a more comfortable passenger compartment <Some models> 4. Improved heating performance through adoption of an inside air mix damper 5. Improved comfort for the rear seats through adoption of a rear air conditioner <Vehicles with dual A/C, rear cooler or rear heater>
Improved ease of operation	1. Adoption of dial-type switches on the heater and air conditioner control panel 2. Rear defogger switch with timer built into front air conditioner control panel 3. Adoption of rear fan switch on the front floor console <Vehicles with dual A/C, rear cooler or rear heater> 4. Linking of rear air conditioner air outlet changeover to temperature adjustment switch <Vehicles with dual A/C, rear cooler or rear heater>
Maintenance of field of vision (Improved safety)	1. Adoption of a ventilation system with greater outside air ventilation hole surface and larger air outlet, to help prevent windows from fogging up 2. Adoption of a flow speed-type defroster and a high-performance heater to increase air flow and air speed and increase the speed of windshield defogging
Improved fuel efficiency	1. Optimised idle speed control that corresponds to air conditioner load 2. Adoption of sub-cooling-type condenser 3. Adoption of blower linear controller <Vehicles with full automatic A/C>
Protection of the global environment	Adoption of a new refrigeration system
Improved serviceability	1. Adoption of a structure to prevent O-rings from falling out of pipe joints to improve serviceability and reliability 2. Use of MUT-II and special tool (tension meter cartridge set) to adjust the drive belt tension 3. Integration of condenser and receiver to reduce gas leaks and improve serviceability 4. Comprehensive MUT-II-compatible diagnosis function <Vehicles with full automatic A/C>

SPECIFICATIONS

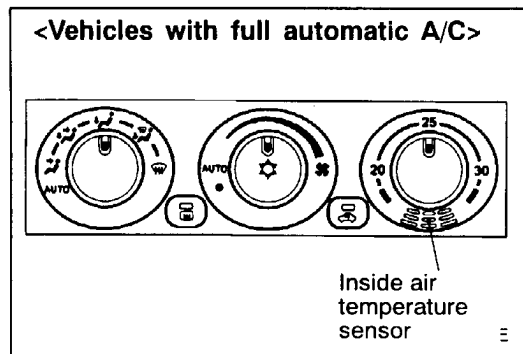
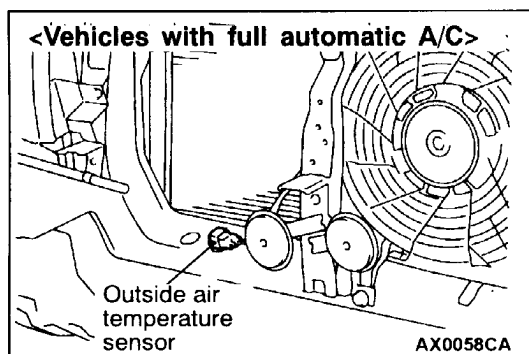
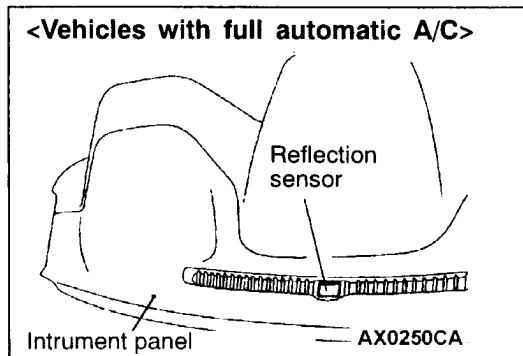
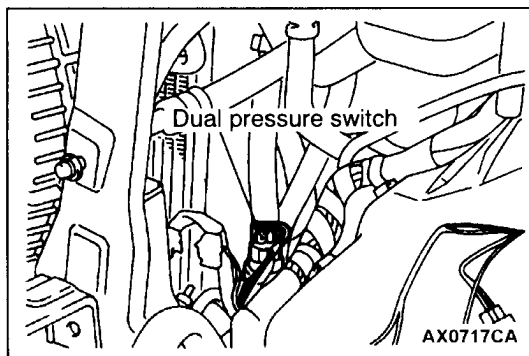
Item			Single A/C	Dual A/C*1
Front heater unit type			Two-level flow air mix type	←
Front heater control type			Dial type	←
Front air conditioner switch type			Pushbutton type	←
Rear heater unit type <Vehicles with dual A/C, rear heater or rear cooler>			–	Two-level flow air mix type*2
Compressor type			10S17C (Inclined-plate type)	←
Dual pressure switch kPa	High-pressure switch	ON →	3 140 ± 200	←
		OFF →		
	Low-pressure switch	ON →	196 ± 20	←
		OFF →		
Refrigerant			R134a (HFC-134a)	←
Type				
Charging amount g			500 ± 20	780 ± 20
Compressor oil quantity ml			120 ± 20	140 ± 20

Item			Capacity
Heating capacity kW	Front		5.5
	Rear	Floor console	0.16
		Quarter trim	1.9
	PTC heater		0.33
Cooling capacity kW	Front		5.1
	Rear		2.0

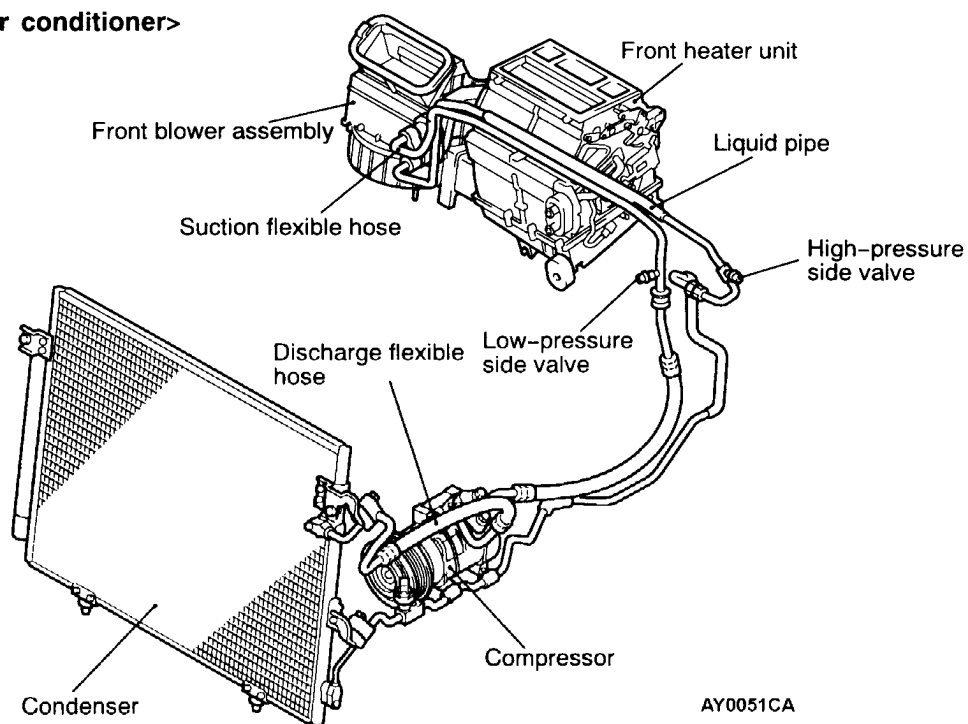
NOTE:

*¹ contains the rear cooler.*² contains the rear heater.

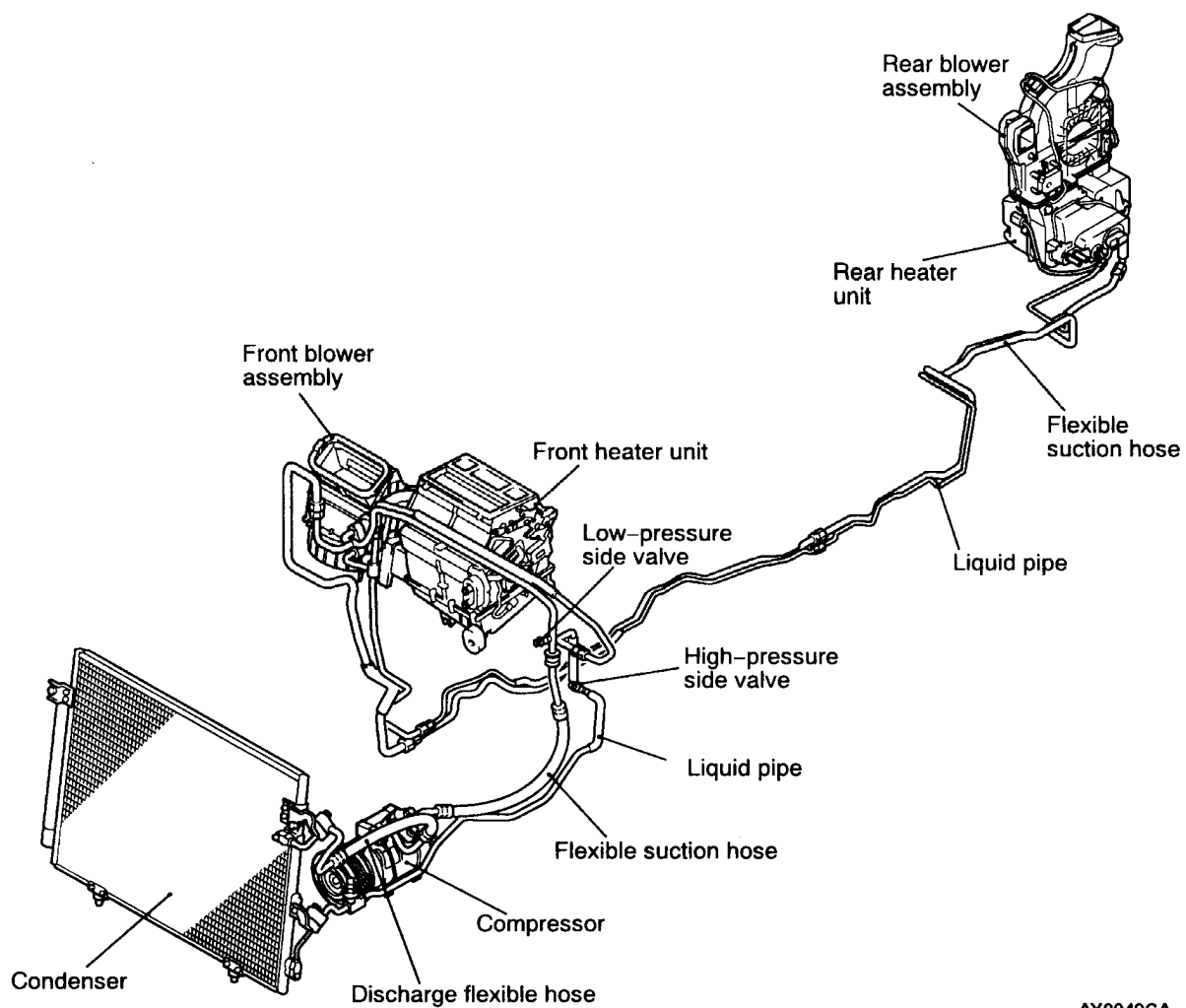
STRUCTURAL DIAGRAM



<Vehicles with single air conditioner>



<Vehicles with dual A/C or rear cooler>

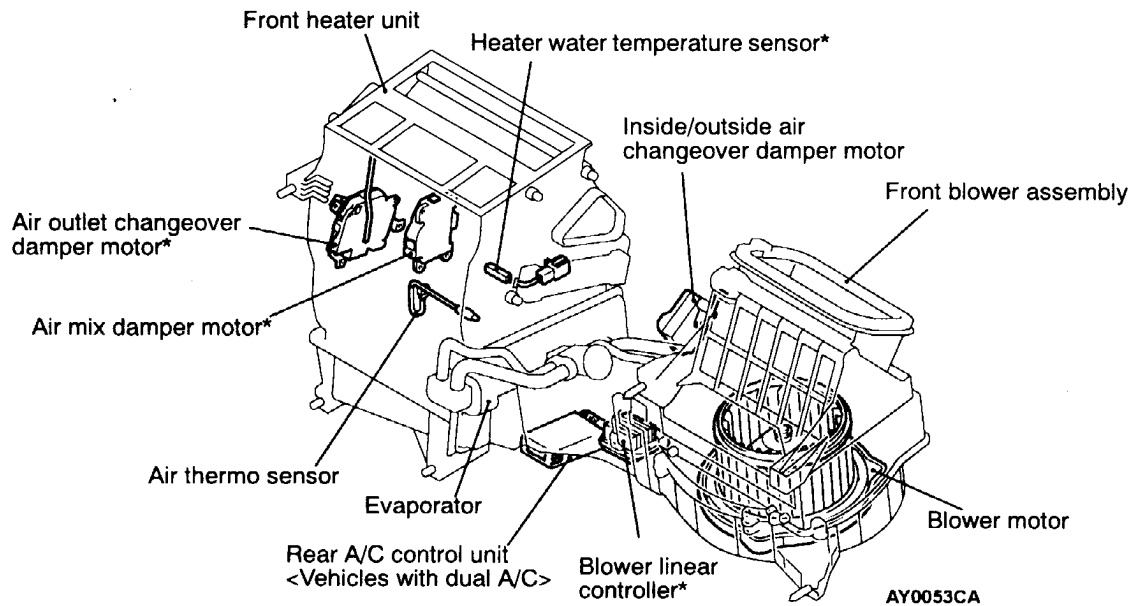


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NOTE:

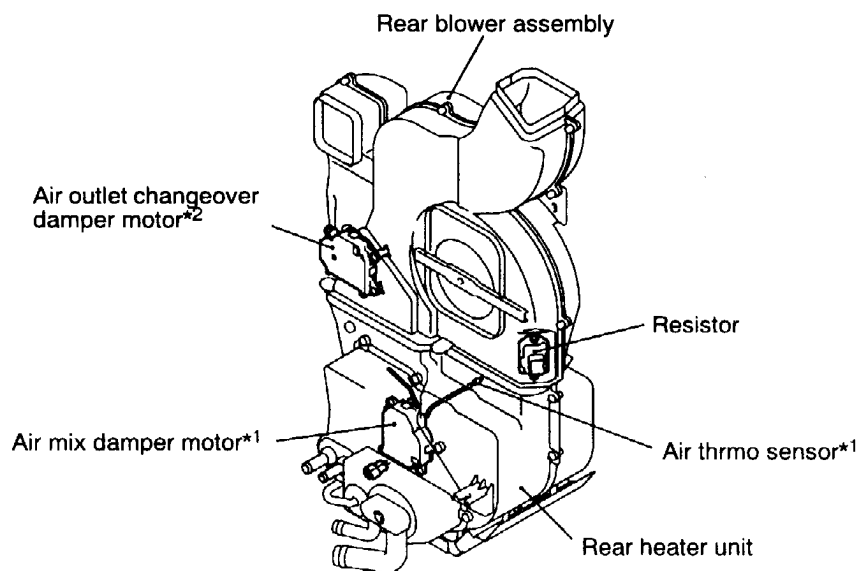
The condenser fan is shown in the illustration of the radiator.

FRONT A/C



NOTE: * Fitted only on the vehicle equipped with full automatic air-conditioner.

REAR A/C<VEHICLES WITH DUAL A/C, REAR COOLER , REAR HEATER (LONG WHEELBASE)>

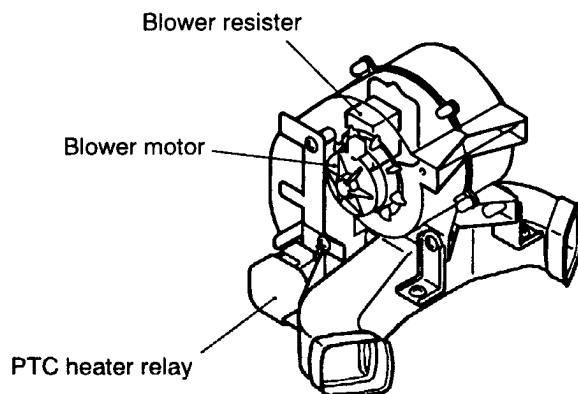


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NOTE:

*1 Fitted only on the vehicle equipped with dual air-conditioner and rear heater.

*2 Fitted only on the vehicle equipped with dual air-conditioner.

REAR HEATER UNIT<SOME MODELS (SHORT WHEELBASE)>

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HEATER AND AIR CONDITIONER SYSTEM

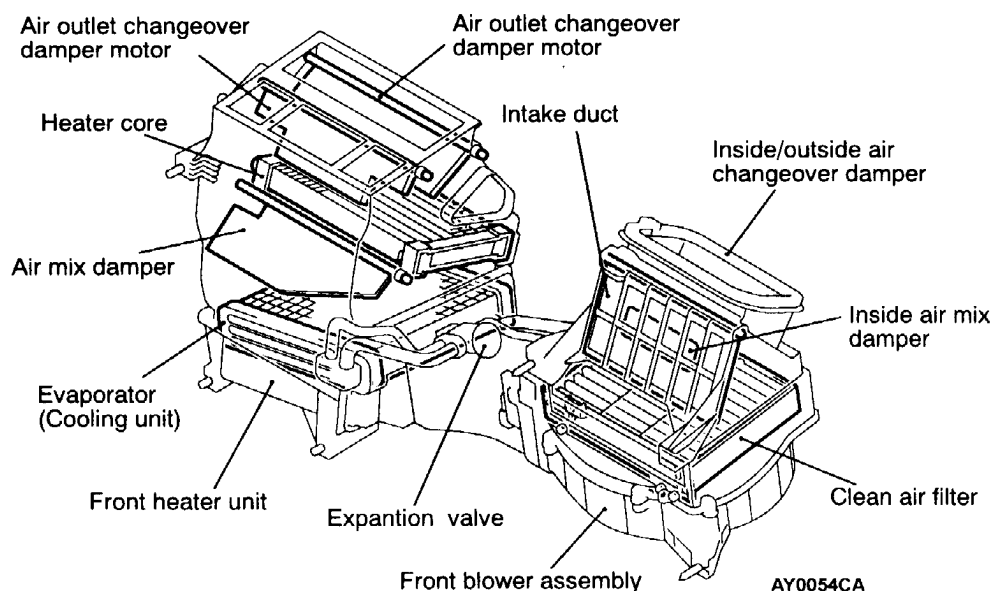
DESCRIPTION OF STRUCTURE AND OPERATION

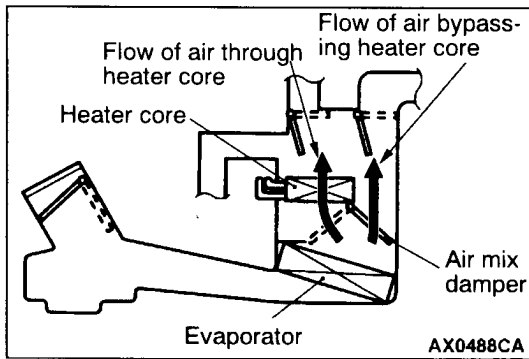
FRONT BLOWER ASSEMBLY AND FRONT HEATER UNIT

The following front blower assembly and front heater unit have been adopted to improve capacity, reduce operating noise and improve cooling performance, while also improving the environment inside the passenger compartment

- Adoption of two-level flow full air mix heater
- Integration of heater and cooling unit

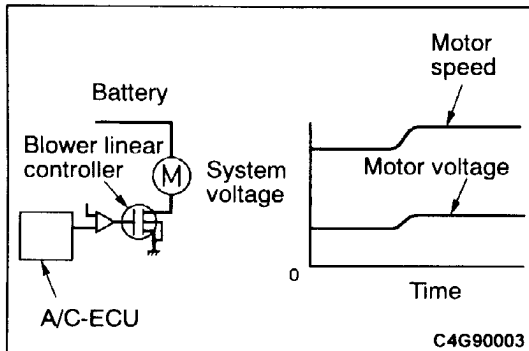
- Enlarged area and optimised shape for front blower assembly outside air ventilation holes
- Adoption of clean air filter for filtering out dust and pollen <Some models>
- Improved heating performance through adoption of inside air mix damper





Two-level flow full air mix heater

Air flows inside the front heater unit along two levels: one that goes through the heater core, and one that bypasses the heater core, and the temperature is controlled by a single air mix damper. In addition, the two-level flow full air mix heater has a low air flow resistance, so that the air flow volume could be increased and operating noise could be reduced.



Blower motor control

A non-stepped motor voltage control method using a blower linear controller is used to control the blower motor speed. (Refer to P.7-33.)

This method controls excessive blower motor operation to reduce fuel consumption and reduce operating noise.

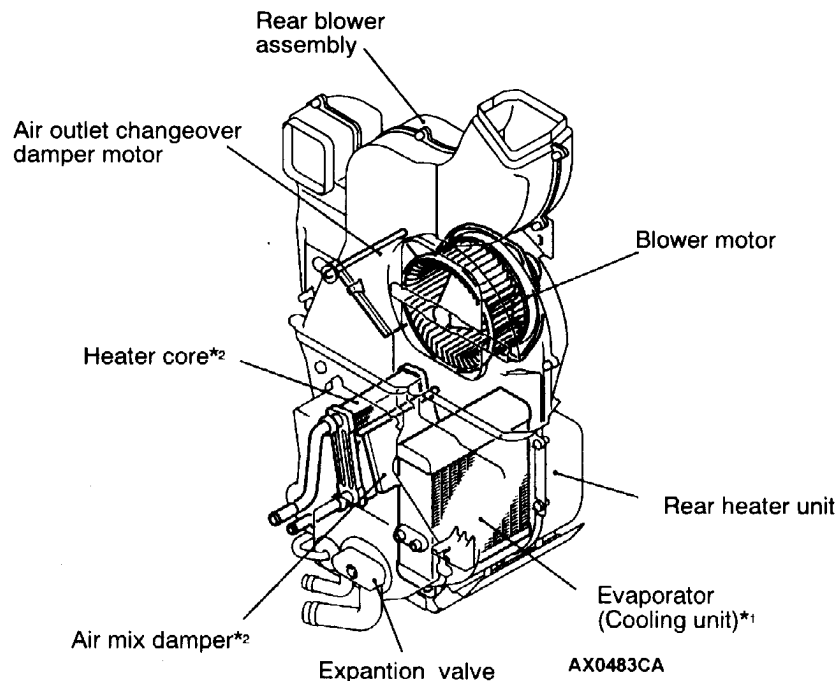
The blower linear controller controls the motor speed in a non-stepped way by varying the voltage applied to the motor in accordance with switching signals from the A/C-ECU.

REAR BLOWER ASSEMBLY AND REAR HEATER UNIT

<VEHICLES WITH DUAL AIR CONDITIONER, REAR COOLER OR REAR HEATER>

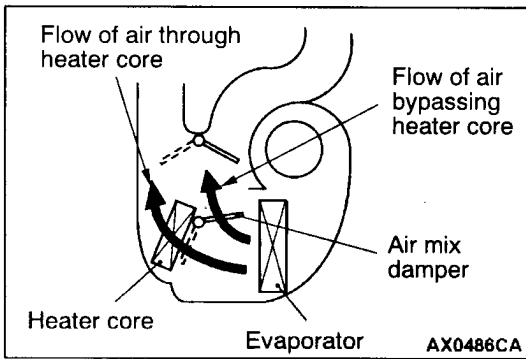
The following rear blower assembly and rear heater unit have been adopted in some vehicle models to improve comfort for the rear seats.

- Adoption of two-level flow full air mix heater
- Integration of heater and cooling unit



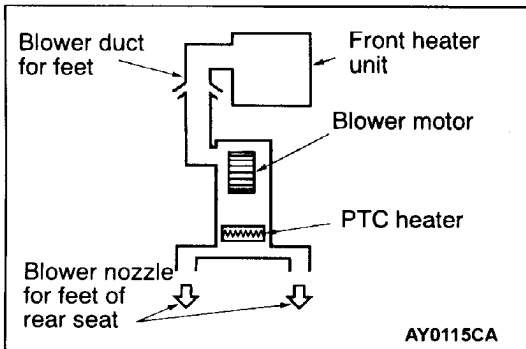
NOTE:

- *1 Fitted only on the vehicle equipped with dual air-conditioner and rear cooler.
- *2 Fitted only on the vehicle equipped with dual air-conditioner and rear heater.



Two-level flow full air mix heater

Air flows inside the rear heater unit along two levels: one that goes through the heater core, and one that bypasses the heater core, and the temperature is controlled by a single air mix damper. In addition, the two-level flow full air mix heater has a low air flow resistance, so that the air flow volume could be increased and operating noise could be reduced.

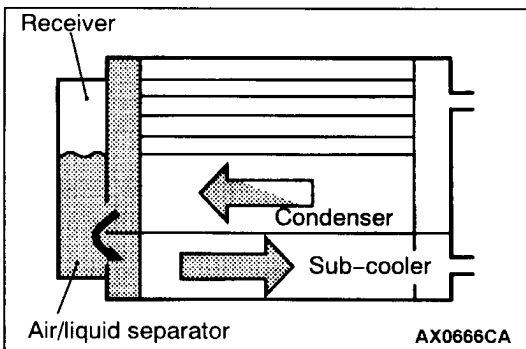


REAR HEATER UNIT

<SOME MODELS (SHORT WHEELBASE)>

The rear heater unit is fitted in the floor console to improve comfortableness of the rear seat.

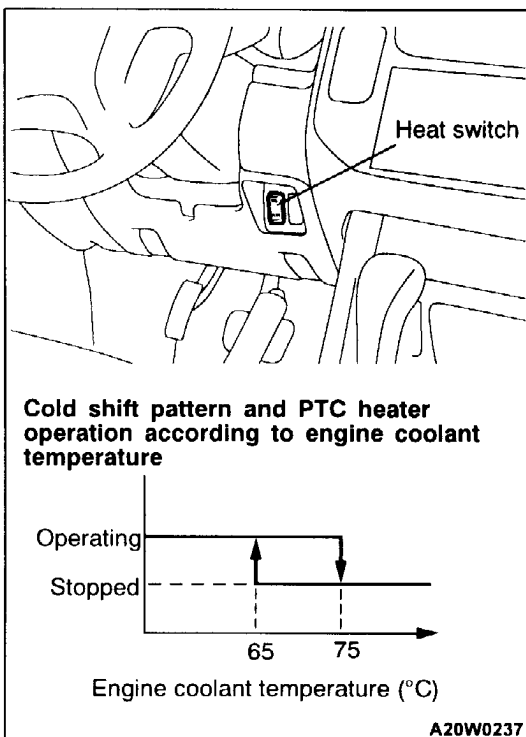
The rear heater unit heats the air sent from the front heater unit by the PTC heater (Positive Temperature Coefficient) to raise the air temperature blown out at the feet of the rear seat.



CONDENSER

A sub-cooling type condenser with a sub-cooler added to the condenser has been adopted to improve heat exchange efficiency.

In addition, the condenser and receiver have been integrated to reduce the number of pipe connections, in order to reduce gas leaks and improve serviceability.



HEAT SWITCH <OPTION FOR VEHICLES WITH 4M41 ENGINE>

A heat switch has been adopted to help prevent drops in the engine coolant temperature in order to improve combustion efficiency for the diesel engine. When the heat switch turns on, the heater idle-up, cold shift pattern and PTC heater operate under the conditions given below (including cases where the conditions are satisfied by automatic air conditioner control) to increase the temperature of air blown out by the heater.

- Blower switch: ON
- Air outlet: FOOT, FOOT/DEF, DEF
- Selector lever position: Refer to the table below.

Device name	Selector lever position		
	P	N	D
Heater idle-up	Operate	Operate	Not operate
Cold shift pattern*	—	—	Operate
PTC heater*	Operate	Operate	Operate

NOTE

*: Only operates for 5 minutes in order to prevent battery power from being drained when the vehicle is stopped.

Heater idle-up

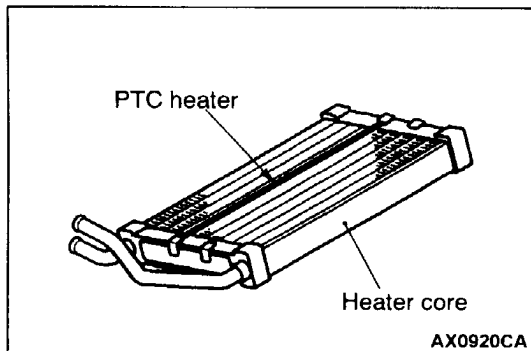
When the engine is idling, the idle speed is increased to 1200 r/min to increase the engine coolant temperature, in order to increase the temperature of the air blown out from the heater.

Cold shift pattern

The upshifting and downshifting of the A/T are carried out at higher engine speeds than for normal shifting to increase the engine coolant temperature, in order to increase the temperature of the air blown out from the heater.

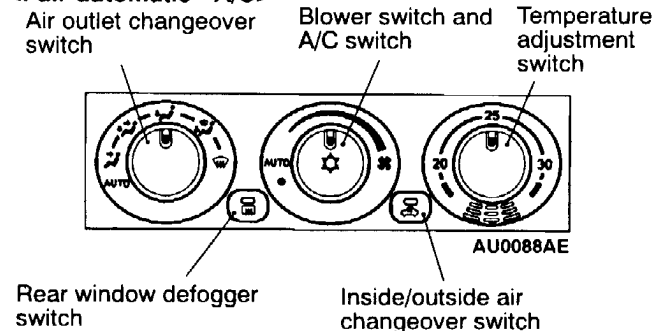
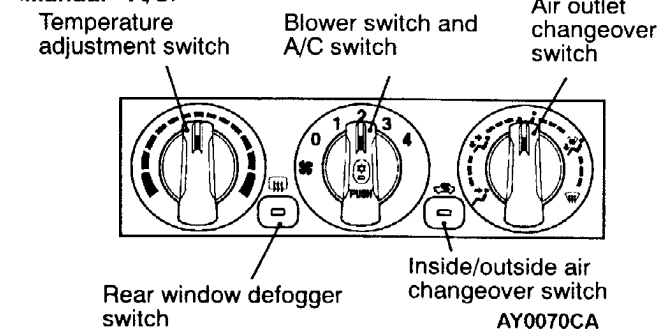
PTC heater

The PTC heater (Positive Temperature Coefficient electronic heater) which is installed to the front heater core heats the air which passes through the heater core in order to increase the temperature of the air blown out from the heater.

**HEATER AND AIR CONDITIONER CONTROL**

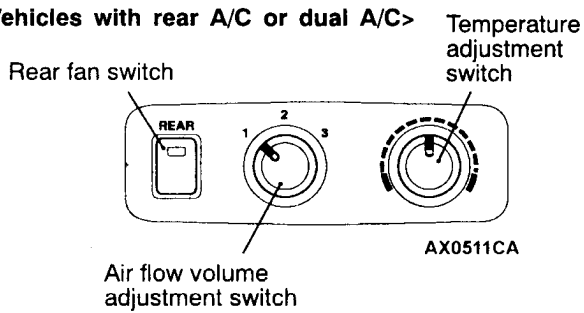
The following heater and air conditioner control has been adopted in order to provide improved operability and visibility.

- Adoption of dial-type switches
- Built-in rear window defogger switch with timer
- Air conditioner displays shown on center display <Some models>
- Adoption of a front/rear fan switch which allows the rear air conditioner to be turned on and off in the front console <Vehicles with dual A/C, rear cooler or rear heater>
- Linking of rear air conditioner air outlet changeover to temperature adjustment switch

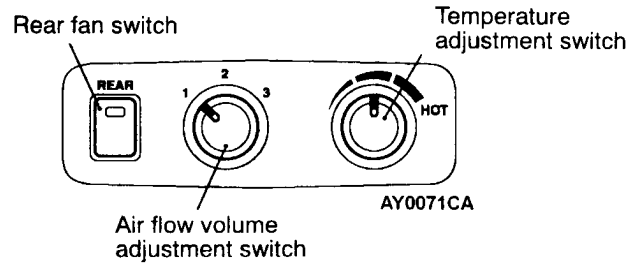
FRONT CONTROL PANEL**<Full automatic A/C>****<Manual A/C>**

REAR CONTROL PANEL

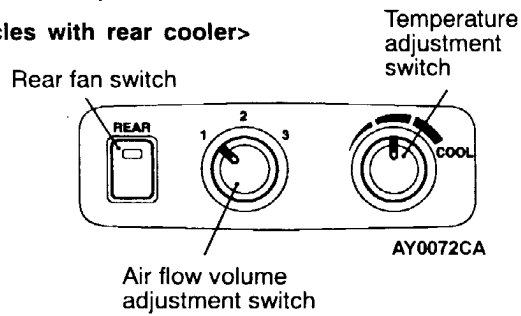
<Vehicles with rear A/C or dual A/C>



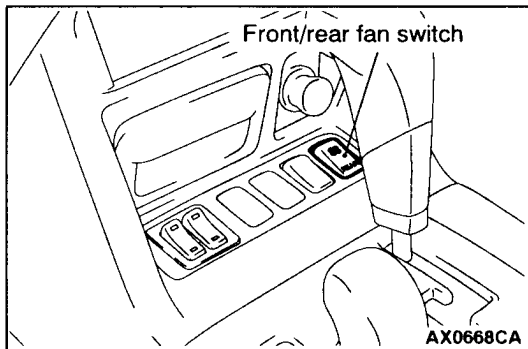
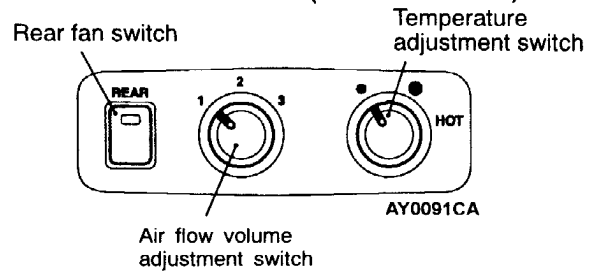
<Vehicles with rear heater (Long wheelbase)>



<Vehicles with rear cooler>

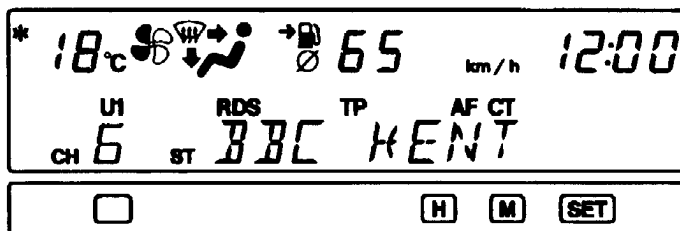


<Vehicles with rear heater (Short wheelbase)>

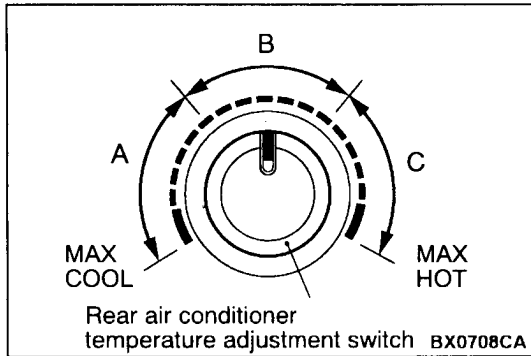


A/C DISPLAY

<Vehicles with center display>



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Rear A/C air outlet changeover

The air outlet changeover for the rear air conditioner operates at three levels in conjunction with the temperature set by the temperature adjustment switch, in order to make operation easier. (3 level)

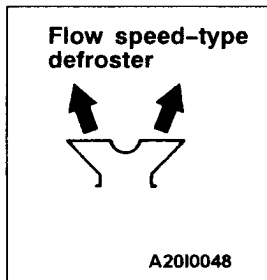
Temperature adjustment switch position	Air outlet port	
	Roof	Floor
A range	100%	0%
B range	60%	40%
C range	0%	100%

VENTILATION SYSTEM

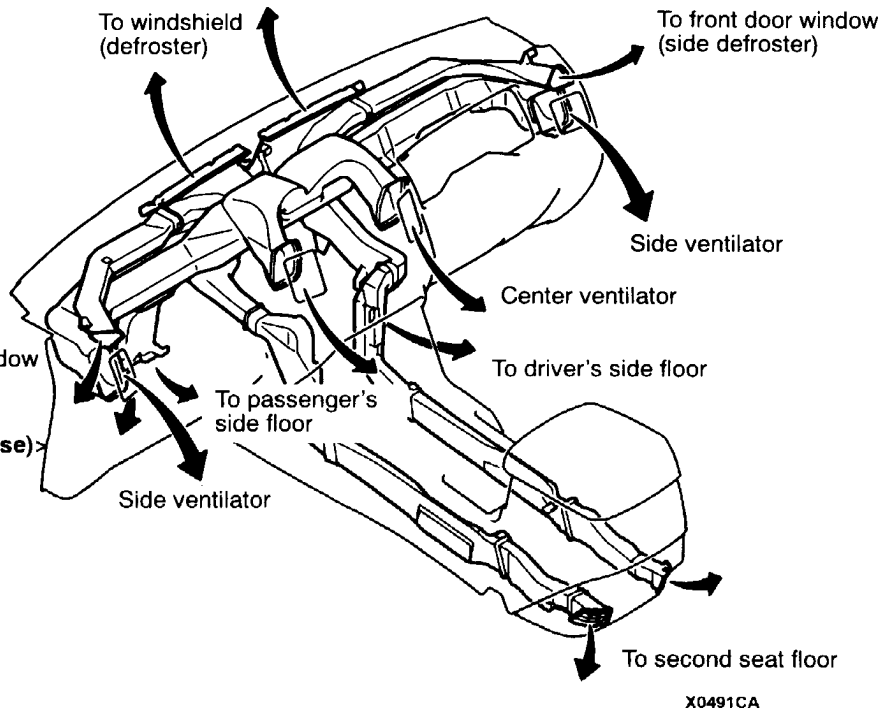
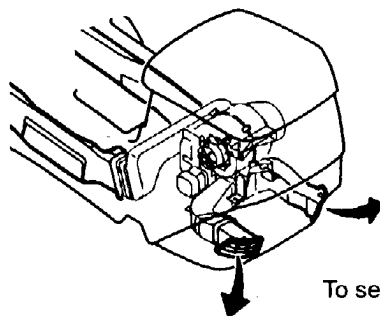
DESCRIPTION OF STRUCTURE AND OPERATION

A ventilation system with the following mechanism has been adopted in order to boost the ventilation capacity and to prevent the windows from fogging up

- Expanded ventilation hole area in front deck
- Larger air outlets underneath rear bumper
- Adoption of flow speed-type defroster



<Vehicles with rear heater (Short wheelbase)>



<Vehicles with dual A/C>

