EQUIPMENT

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GENERAL DESCRIPTION

The adoption of new accessories and functions has enhanced a lineup of equipment.



NOTE

Refer to P.7-20 for general information and features of the heater and air conditioner.

DIAGNOSTIC SYSTEM

Service quality has been improved by fitting diagnostic connectors for MUT-II inspection near the left knee area of the driver's seat on the instrument panel.

Diagnostic function	MPI	ABS	Immobilizer	SRS	SWS		
				air bag	ETACS	Column switch	Front ECU
Diagnosis code output	•	•	_	•	•	•	•
Diagnosis code output by volt- meter	_	_	_	_	•	•	•
Output of service data	•	•	_	•	-	_	_
Actuator test	•	•	_	-	-	-	_
Diagnostic output by warning lamp and indicator lamp	_	 (ABS warn- ing lamp) 	_	_	_	_	_
Diagnosis record storage	•	•	•	•	_	_	-
Erasure of diagnosis code by MUT-II	•	•	•	•	_	_	_
Pulse check by MUT-II	_	-	-	_	•	•	•
Pulse check by sounding buzzer	_	-	-	_	•	•	•



DIAGNOSIS CONNECTOR

Diagnosis connector (Black)				
1	Diagnosis control			
2, 3	-			
4	Grounding			
5	Grounding			
6	-			
7	MPI, ABS, immobilizer and SRS air bag			
8	-			
9	ETACS			
10	-			
11				
12	-			
13	-			
14	-			
15	_			

Diagnosis connector (Black)		
16	Battery	
Diagnostic connector (White)		
21 - 25	_	
26	MPI	
27 - 32	-	

BATTERY

Light and compact batteries have been adopted.

Item	Specifications
	44B20L
Voltage V	12
Capacity (5-hour rate Ah)	34
Electrolytic fluid specific gravity (fully charged state at 20°C)	1.280

IMMOBILIZER SYSTEM

The immobilizer system consists of the ignition key, the key ring antenna, the immobilizer-ECU, and the engine-ECU.

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

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 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 transponder inside the ignition key via the antenna. The energized transponder sends the encrypted code back to the immobilizer-ECU via the antenna.

immobilizer system. If the ignition key is lost or another ignition key is added, all the keys must be registered again by using the scan tool MB991502 (MUT-II) for security reasons.

- 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.
- 4. If the engine-ECU can not receive the encrypted code, the engine will be immobilized.

DISPOSITION WHEN REPLACING IMMOBILIZER SYSTEM RELATED PARTS

To replace immobilizer related parts, observe the table below. When the ignition key is re-registered with the MUT-II, the originally registered ignition key registration information will be lost.

	Engine-ECU	Immobilizer-ECU	Ignition key
When replacing engine-ECU	-	Replacement required	Replacement and re-registration are required.
When rewriting engine-ECU	_	Replacement not required	Replacement not required, re- registration not required
ECU	Replacement not re- quired	_	Replacement not required, regis- tration are required
When adding ignition key newly	Replacement not re- quired	Replacement not required	Register an additional ignition key and re-register all other ignition keys.
When ignition key is lost	Replacement not re- quired	Replacement not required	re-register all other ignition keys except the lost one.



LIGHTING

EXTERIOR LAMPS

- The large lens adjusted to the exclusive body has been equipped with model specific 4 bulb type headlamp incorporating front turn signal lamp, position lamp. The low beam is a projector type used as a compact but efficient wide light distributor.
- The front turn signal lamp adopts an aluminum metal evaporated reflector to improve visibility.
- The tail lamp and stop lamp make use of complementary colors to emit white color from the red lens to improve visibility.
- The inner lens of the tail lamp has been set with a reflex reflector to improve appearance.
- Rear fog lamps with outstanding visibility have been installed.
- A high mount stop lamp has been installed to the rear shelf.
- The lighting system is provided with headlamp auto-cut.

SPECIFICATIONS

Item		Specifications	
Headlamp assembly	High beam (Halogen bulb) W	60 (HB3)	
	Low beam (Halogen bulb) W	51 (HB4)	
Headlamp assembly	Position lamp W	5	
	Front turn signal lamp W	21	
Side turn signal lamp W		5	
Rear combination lamp	Tail/stop lamp W	5/21	
	Turn signal lamp W	21	
	Backup lamp W	21	
	Rear fog lamp W	21	
High mount stop lamp W		21	
License plate lamp W × number		5 × 2	

NOTE

The brackets () show the bulb type.

CONSTRUCTION DIAGRAM





NOTE

*: The driver's side is installed with a rear fog lamp, while the passenger's side is installed with a back-up lamp.

INTERIOR LAMPS

- A map lamp serving also as front room lamp which can be used at both the driver's seat and passenger sea is provided.
- A rear room lamp to light the backseat and trunk lamp to light the trunk are provided.

SPECIFICATIONS

Item	Specifications
Map lamp $W \times$ quantity	7.5 × 2
Front room lamp W	7.5
Rear room lamp W	8
Trunk lamp W	5

CONSTRUCTION DIAGRAM



COMBINATION METER

The combination meter is an easy-to-read pointer type meter. At the center is a tachometer, on the left side a speedometer, on the right side a fuel meter, engine coolant thermometer, and indicator lamp. It has a sport and efficient design to allow the driver to read the meters clearly.

- The tachometer displays the conditions of the current road using three indicators TARMAC, SNOW, and GRAVEL. [Refer to GROUP 2-Active Center Differential (Active Control System.)]
- A water spray indicator which lights up when the water splay switch is set to AUTO has been adopted.
- The speedometer is an electronic type speedometer which operates by the pulse signal generated by the speed sensor.
- A large and clear LCD type odo-tripmeter is provided. The odometer continuously displays values while the tripmeter adopts a twin-trip (trip A, trip B) function which is switched by a reset button. (Standard meter)
- The fuel gauge is provided with a triangular mark indicating the location of the fuel filler door to show clearly that the fuel filler door is on the left side of the car.

CONSTRUCTION DIAGRAM



SMART WIRING SYSTEM (SWS)

SWS is a minimal line system which transmits numerous signals using one wiring to control against increased weight and complication of harnesses which result from the increase in electronic accessories. Basically the same as the new SPACE RUNNER.

To transmit numerous signals, the ETACS-ECU*, column switch, front ECU, power window main switch (power window switch of the driver's seat side) incorporate multi-distribution circuits to carry out communication between control units.

NOTE

*: ETACS (Electronic Time and Alarm Control System)

CONSTRUCTION DIAGRAM



COMMUNICATION METHOD

The exclusive signal lines for transmitting the multi-distribution data are connected as follows between the ETACS-ECU, column switch (incorporated inside the column ECU), front ECU, power window main switch (incorporated inside the power window ECU) and power window motor assemblies (incorporated inside the power window ECU) for internal communication.



MULTI-DISTRIBUTION INPUT/OUTPUT BY CIRCUIT

Multi-distribution is employed by the following circuits. The relation of the input switches, sensors, ECUs connected by multi-distribution lines, and outputs are also shown below.

Circuit and input switch and sensor	ECUs and switches con- nected by multi-distribution	Output side
 Buzzer Lamp still ON reminder warning function Ignition switch (IG1) Driver's seat door switch 	ETACS-ECU Column switch (Lighting switch)	Buzzer (built-in ETACS- ECU)
 Power window Power window timer function Ignition switch (IG1) Driver's seat door switch 	ETACS-ECU Power window main switch Power window motors	Power window relay

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Ci	rcuit and input switch and sensor	ECUs and switches con- nected by multi-distribution	Output side		
3.	 Windshield wiper washer Windshield mist wiper Windshield low speed wiper Windshield high speed wiper Windshield washer 				
	Column switch	ETACS-ECU Column switch)	Mindobiold winer motor		
	Ignition switch (ACC)	Front ECU	Windshield washer motor		
4.	Lighting • Headlamp, tail lamp • Headlamp auto-cut function • Rear fog lamp				
	Ignition switch (IG1) Driver's seat door switch Vehicle speed signal Rear fog lamp switch	ETACS-ECU Column switch (Lighting switch)	Combination meter (High beam or rear fog lamp indicator) Illumination lamps Rear fog lamp		
	Ignition switch (IG2)	Front ECU	Headlamp Taillamps Rear fog lamp		
5.	Flasher • Turn signal lamp • Hazard warning lamp				
	 Ignition switch (IG1) Hazard warning lamp switch 	ETACS-ECU Column switch (Turn signal lamp switch)	Combination meter (Turn signal indicator) Turn signal lamps		



DIAGNOSTIC FUNCTION

DIAGNOSIS CODE SET

The ETACS-ECU sends diagnosis codes if the communication line is faulty when the MUT-II is connected.

NOTE Refer to the Workshop Manual for details of the diagnostic items.

SWS INPUT SIGNAL CHECK BY MUT-II

When the MUT-II is connected to the diagnostic connector, and switches input for the SWS are operated, the buzzer in the MUT-II sounds, indicating whether the operations of the switches are satisfactory or not.

INPUT SIGNALS THAT CAN BE CHECKED

Input signal		Conditions for sounding buzzer	
Ignition switch (ACC)		When the switch is turned from the LOCK (OFF) position to ACC	
Ignition sw	itch (IG1)	When the switch is turned from ACC to the ON position	
Hazard wa	rning lamp switch	When the switch is turned from the OFF to the ON position	
Rear fog la	imp switch	When the switch is turned from the OFF to the ON position	
Driver's se	at door switch	When the driver's seat door is opened from the closed state	
Various do	or switches	When one of the closed doors is opened	
Driver's seat door lock actuator		When the key cylinder or door lock knob of the driver seat is turned from LOCK to UNLOCK position, or from UNLOCK to LOCK position	
Speed signal		When the speed changes from less than 10 km/h to more than 10 km/h	
Column switch	Tail lamp switch	When the lighting switch is turned from one position to the tail lam position	
	Headlamp switch	When the lighting switch is turned from one position to the headlamp position	
	Dimmer switch	When the switch is turned from the OFF to the ON position	
	Passing switch		
	Turn signal lamp LH switch		
	Turn signal lamp RH switch		
	Windshield mist wiper switch		
	Windshield intermittent wiper switch		
	Windshield low speed wiper switch		
	Windshield high speed wiper switch		
	Windshield washer switch		
Multi-purpose fuse No.17 load		When the multi-purpose fuse No. 17 is used as the power supply load	

FUNCTIONS AND CONTROL OF SWS ECUS

The following functions are controlled by the SWS ECUs:

No.	Functions	Control ECU
1	Lamp still ON reminder warning function	ETACS-ECU, column switch
2	Central door lock control function	ETACS-ECU
3	Power window timer function	ETACS-ECU, power window main switch
4	Windshield wiper washer control function	ETACS-ECU, front ECU, column switch
5	Headlamp auto-cut function	ETACS-ECU, front ECU, column switch
6	Flasher timer function	ETACS-ECU, column switch
7	Rear fog lamp function	ETACS-ECU
8	Dimmer type room lamp control function	ETACS-ECU





When the tail lamp, fog lamp, or headlamp is ON, if the ignition switch is in "OFF" position and the driver's door is opened, a buzzer will sound continuously to warn that the lamp is illuminated. However, if the tail lamp or headlamp has been turned off by the headlamp auto-cut function, the buzzer will not sound.



CENTRAL DOOR LOCK CONTROL FUNCTION

When the driver's seat door is locked (after the unlock switch in the driver's seat door lock actuator is turned OFF, the lock switch is turned ON), the ETACS-ECU activates the lock relay output for 0.25 seconds and locks all doors. Next, when the driver's seat door is unlocked (after the lock switch in the driver's seat unlock actuator is turned OFF, the unlock switch is turned ON), the ETACS-ECU activates the unlock relay output for 0.25 seconds and unlocks all doors.



POWER WINDOW TIMER FUNCTION

When the ignition switch is turned to the ON position, the power window relay and power window switch reception permission signals (SWS signal sent from the ETACS) are turned ON. After the ignition switch is turned OFF, the system continues to turn ON the power window switch reception permission signal for about 30 seconds and to enable the opening and closing of the door window by the power window switch. The power window relay goes OFF about 30 seconds after the reception permission signal goes OFF. When the driver's seat door is opened while the timer is in operation, the reception permission signal will be turned ON for about 30 seconds from this point. However, if the driver's seat door is closed, the reception permission signal will be turned OFF. The power window relay goes OFF about 30 seconds after the reception permission signal goes OFF.

WINDSHIELD WIPER WASHER CONTROL FUNCTION

1. Mist wiper control

When the ignition switch is at the ACC or ON position, if the windshield mist wiper switch of the column switch is turned ON, the front ECU turns ON the windshield wiper drive signal. At the same time, the wiper speed switching relay is turned ON (HI), and while the windshield mist wiper switch is ON, the windshield wiper will operate at high speed. At the point the windshield mist switch is turned ON, if the windshield mist wiper has been operating intermittently, the same operations as the above will be performed while the windshield mist wiper switch is ON. After the windshield mist wiper switch goes OFF, the intermittent operations will be set again TI seconds after the windshield wiper auto-stop signal is turned ON last.



TI: Intermittent wiper intermittent time

2. Low Speed Wiper, High Speed Wiper Control

When the ignition switch is at the ACC or ON position, if the windshield low speed wiper switch of the column switch is turned ON, the front ECU turns ON the windshield wiper drive signal, turns OFF (LO) the windshield wiper speed relay, and operates the windshield wiper at low speed. Next, when the windshield high speed wiper switch is turned ON, the windshield wiper drive signal is turned ON, the windshield wiper speed switching relay is turned ON (HI), and the windshield wiper is operated at high speed.



3. Washer control

When the ignition switch is at the ACC or ON position, if the windshield washer switch of the column switch is turned ON, the front ECU turns ON the windshield washer relay. The windshield wiper drive signal is turned ON in 0.3 seconds until 3 seconds after the windshield washer switch goes OFF (The wiper drive signal output time varies according to the conditions. Refer to the following table for details) to operate the windshield wiper continuously. When the windshield washer switch is turned ON, if the windshield wiper is operating intermittently, intermittent operations will be continued after continuous operations.





	When wiper switch is OFF			When wiper switch is INT			When wiper switch is LO or HI		
t	0.3 seconds or less	0.3 - 0.5 seconds	0.5 - 0.7 seconds	0.7 seconds	Less than 0.2 seconds	0.3 - 0.5 seconds	0.5 - 0.7 seconds	0.7 seconds	-
Т	0 second	1 second	2 seconds	3 seconds	0 second	1 second	2 seconds	3 seconds	3 seconds

HEADLAMP AUTO-CUT FUNCTION

Even if the headlamp switch is ON, the head lamp will automatically go off in the following conditions to prevent the battery from discharging as a result of forgetting to turn off lights.

- (1) When the ignition key is turned from ON to OFF with the headlamp switch turned ON, and this state continues for 3 minutes, the headlamp will automatically be turned off. If the driver's seat door is opened during these 3 minutes, the lamp will go off 1 second later. (During the one second until it goes off, the light still ON reminder warning buzzer will sound. However, if the driver's seat door is opened with the ignition key inserted, the key inserted reminder warning buzzer will function first.)
- (2) When the tail lamp switch is turned ON with the ignition switch and lighting switch OFF, the lamp will not go off automatically.

The headlamp auto-cut function is cancelled by turning ON the lighting switch (tail or headlamp switch) or ignition switch.



Ignition switch (IG)	ON
Turn signal lamp	ON
switch RH	OFF
Turn signal lamp	ON
switch LH	OFF
Turn signal lamp output RH	ON OFF
Turn signal lamp	ON
output LH	OFF
	X0680AW

FLASHER TIMER FUNCTION

(1) The turn signal lamp output (flashing signal) is turned ON when the turn signal lamp ignition switch is ON and the turn signal lamp switch is ON (LH or RH). If the front turn signal lamp or rear turn signal lamp bulb has burned out, the flashing speed increases to indicate that the bulb has burned out.



(2) Detects the signal where the hazard warning lamp switch input changes from OFF to ON, and reverse the flashing state according to this signal. (Flashes when the hazard lamp is not flashing and turns off when flashing.) NOTE

The hazard warning lamp switch is a push-return switch.

REAR FOG LAMP CONTROL FUNCTION

If the rear fog lamp switch is turned ON when the headlamp is turned ON, the rear fog lamp is switched ON and OFF alternatively.

If the headlamp is turned OFF during lighting of the rear fog lamp, the rear fog lamp is turned OFF at the same time.



DIMMER TYPE ROOM LAMP CONTROL FUNCTION

When the room lamp switch is at the door position, the ETACS-ECU controls the lighting of the room lamp as follows.

- (1) When a door is opened to get on or get off the vehicle (when the ignition switch is OFF), the lamp lights up (100%), when closed, the lamp dims (65%), and goes off 15 seconds later. However if the ignition switch is turned ON while the timer illuminates or if door is locked, the lamp will go off at that point.
- (2) When a door is opened with the ignition switch ON, the lamp illuminates (100%), and goes off when closed.
- (3) When the ignition key is removed with all doors closed When the ignition key is removed with all doors closed, the lamp illuminates (65%) and goes off after 15 seconds. When the ignition key is inserted again while the lamp illuminates or when door is locked, the lamp goes off.

NOTE

The delay time until the room lamp goes off can be adjusted by the adjustment function. (Refer to P.7-29.)



NOTE

The dotted lines indicate that lighting mode when the ignition switch is turned ON, door is locked, or any door is opened during the timer illumination time.

HEATER AND AIR CONDITIONER

The heater and air conditioner system incorporating the heater and cleaning unit has reduced ventilation resistance to increase air volume and reduce noise.

FEATURES

Improvements in comfort	 Installation of two-ray blow full air mix heater Adoption of low noise, large air volume heater and air conditioner system Improvement of heater performance using an in-air mixing dumper
Improvements in opera- tion performance	 Installation of dial type control with excellent operation performance on the heater and air conditioner control panel Incorporation of rear defogger switch with timer into the control panel Increase in panel display size
Reliable visual field (improvement in safety)	 Achievement of ventilation system to defog windows by increasing the outside air intake duct area on the front deck and adopting a large air outlet Windshield defogging speed improvement derived from increase in air volume and wind speed by adopting a blower type defroster and high performance heater
Improvements in fuel economy	 Optimization of idle rotation speed according to air conditioner load Installation of sub-cooling type condenser
Global environment protection	 Adoption of a new refrigerant system
Improvements in service quality	 Improvement in service performance and reliability by adopting an O-ring dropout prevention structure for the refrigerant lines. Reduction of gas leakage and improvement in service performance by incorporating condenser and receiver

3. Enhancement of the MUT-II compatible diagnostic function

SPECIFICATIONS

Item		Specifications		
Heater unit type		Two-ray blow full air mix method		
Heater control method		Dial type		
Air conditioner switch ty	pe	Push button type		
Compressor type		MSC90C		
Refrigerant	Туре	R134a (HFC-134a)		
	Filled air volume g	550 ± 20		





HEATER AND AIR CONDITIONER SYSTEM CONSTRUCTION AND DESCRIPTION

BLOWER ASSEMBLY AND HEATER UNIT

The following blower assembly and heater unit has been adopted to increase air volume, reduce noise, improve air-conditioning performance, as well as improve the car interior air environment.

- Installation of two-ray blow full air mix heater
- Incorporation of heater and cleaning unit
- Increase in the outside air intake duct area size of the blower assembly and optimization of the shape
- Improvement of heater performance using an in-air mixing dumper





Two-Ray Blow Full Air Mix Heater

In the heater unit, there are two rays of air;one which passes through the heater core, and air which does not pass through the core. One air mix door is used for temperature control. The two-ray blow full mix heater with low ventilation resistance has increased air volume and has reduced noise.



CONDENSER

The heat exchange efficiency has been improved with the adoption of a sub-cooling type condenser added with a sub-cooled section. The reduction of line unions by incorporating the condenser and receiver has reduced a possibility of gas leakage and has increased service performance.

COMPRESSOR CLUTCH WITH TEMPERATURE FUSE

When the compressor is locked, friction heat generated by the contact of the compressor and the rotor melts the temperature fuse incorporated into the field core and causes the compressor clutch to be disengaged so that the compressor clutch with temperature fuse can prevent the drive belt from being damaged.

HEATER AND AIR CONDITIONER CONTROL

Adoption of the following heater and air conditioner control has improved operation performance and visual observation.

- Installation of dial type switch
- Incorporation of rear window defogger switch with timer
- Improved appearance by incorporating the center panel



VENTILATION SYSTEM

DESCRIPTION OF STRUCTURE AND OPERATION

The adoption of the following mechanism has increased air volume for ventilation and has achieved a ventilation system for defogging windows.

- Increasing the outside air intake duct area
- Increasing the size of air outlet on the back of the rear bumper
- Installation of blower type defroster





NOTES