
GROUP 35B

ANTI-SKID BRAKE SYSTEM (ABS)

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GENERAL INFORMATION

M2351000100625

FEATURES

The 4ABS ensures directional stability and controllability during hard braking.

This ABS uses a 4-sensor 3-channel system that controls the right and left front wheels independently of each other and controls the rear wheels simultaneously (select low control*). The basic system is the same as that of 2001 LANCER.

NOTE: *Select low control: Control system that compares the speeds of the right and left wheels and performs the same fluid pressure control on both wheels according to the speed of the wheel that is likely to be locked

- EBD (Electronic Brake-force Distribution system) control has been added to provide the ideal braking force for the rear wheels.
- Fail-safe function which ensures that safety is maintained
- Diagnostic function which provides improved serviceability

EBD CONTROL

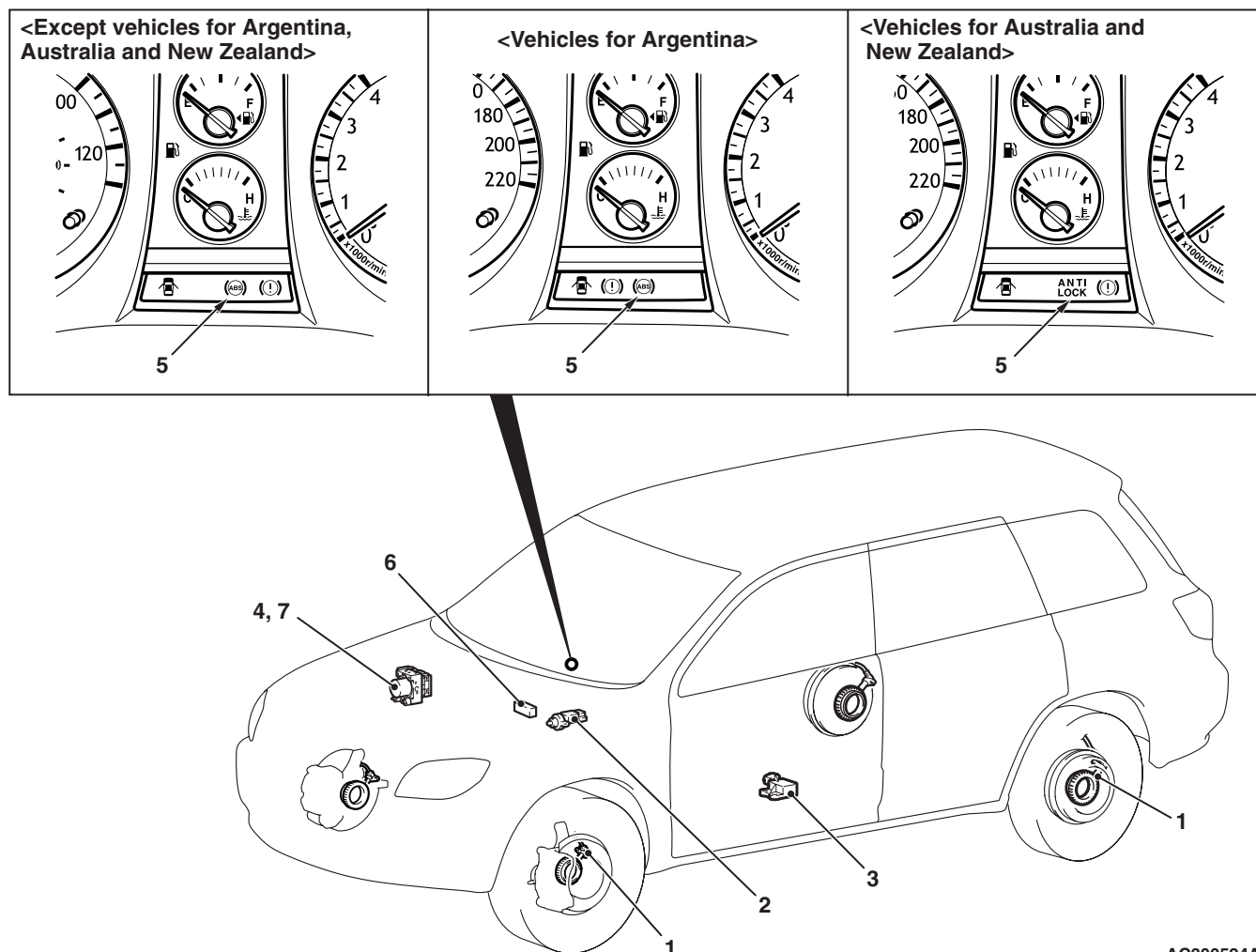
In ABS, electronic control is used so the rear wheel brake hydraulic pressure during braking is regulated by rear wheel control solenoid valves in accordance with the vehicle's rate of deceleration, and set the front and rear wheel slippage which are calculated from the signals received from the various wheel sensors. EBD control is a control system which provides a high level of control for both vehicle braking force and vehicle stability. The system has the following features:

- Because the system provides the optimum rear wheel braking force regardless of vehicle load conditions and the condition of the road surface, the system reduces the required pedal depression force, particularly when the vehicle is heavily loaded or driven on road surfaces with high frictional coefficients.
- Because the duty placed on the front brakes is reduced, the increases in pad temperature can be controlled during brakes application to improve the wear resistance characteristics of the pad.
- Control valves such as the proportioning valve are no required.

SPECIFICATIONS

Item		Specification
ABS control method		4-sensor, 3-channel
No. of ABS rotor teeth	Front	43
	Rear	43
ABS speed sensor	Type	Magnet coil type
	Gap between sensor and rotor mm	0.85 <Front (Non-adjustable type)> 0.3 –0.8 <Rear (Non-adjustable type)>

CONSTRUCTION DIAGRAM

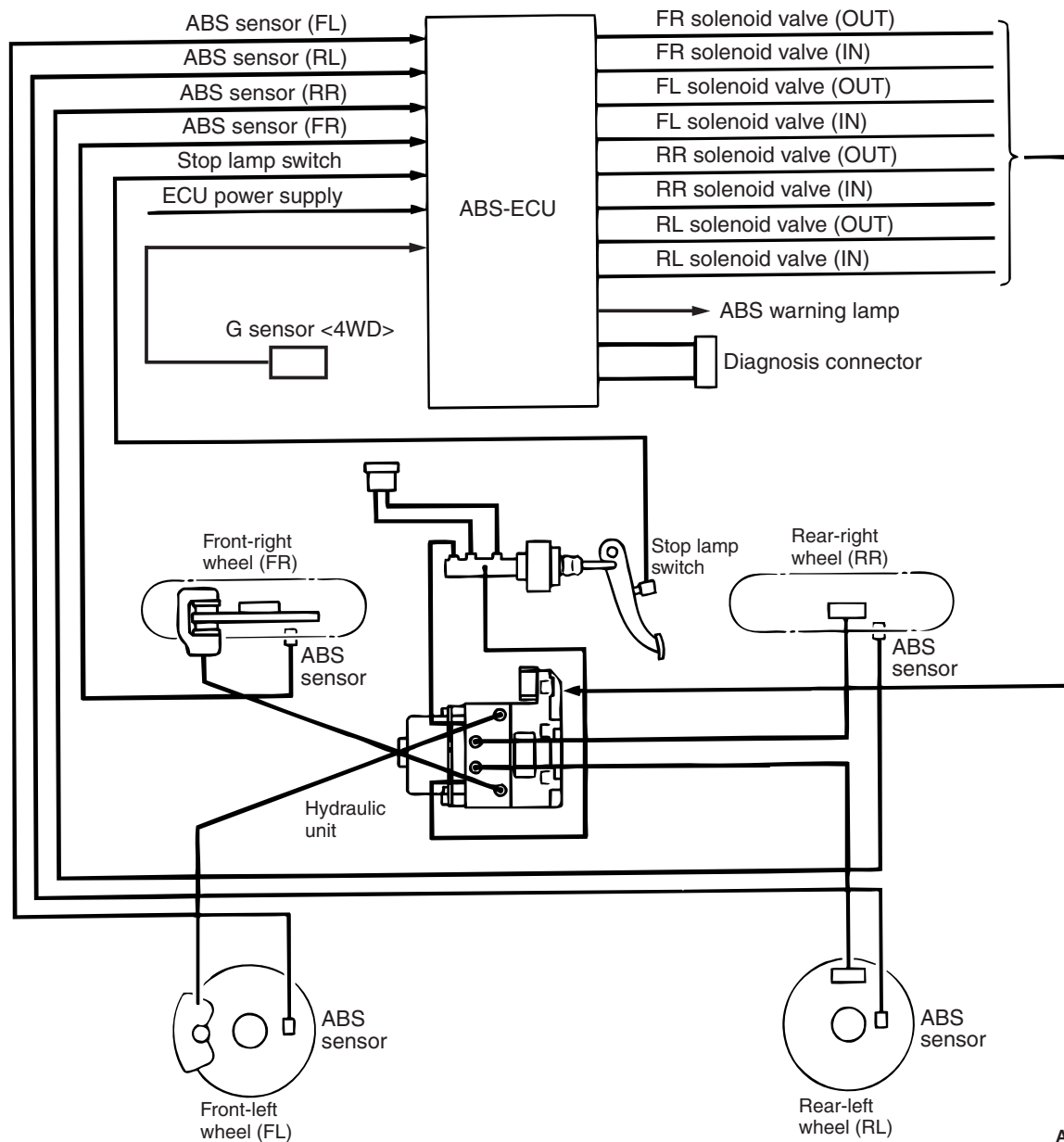


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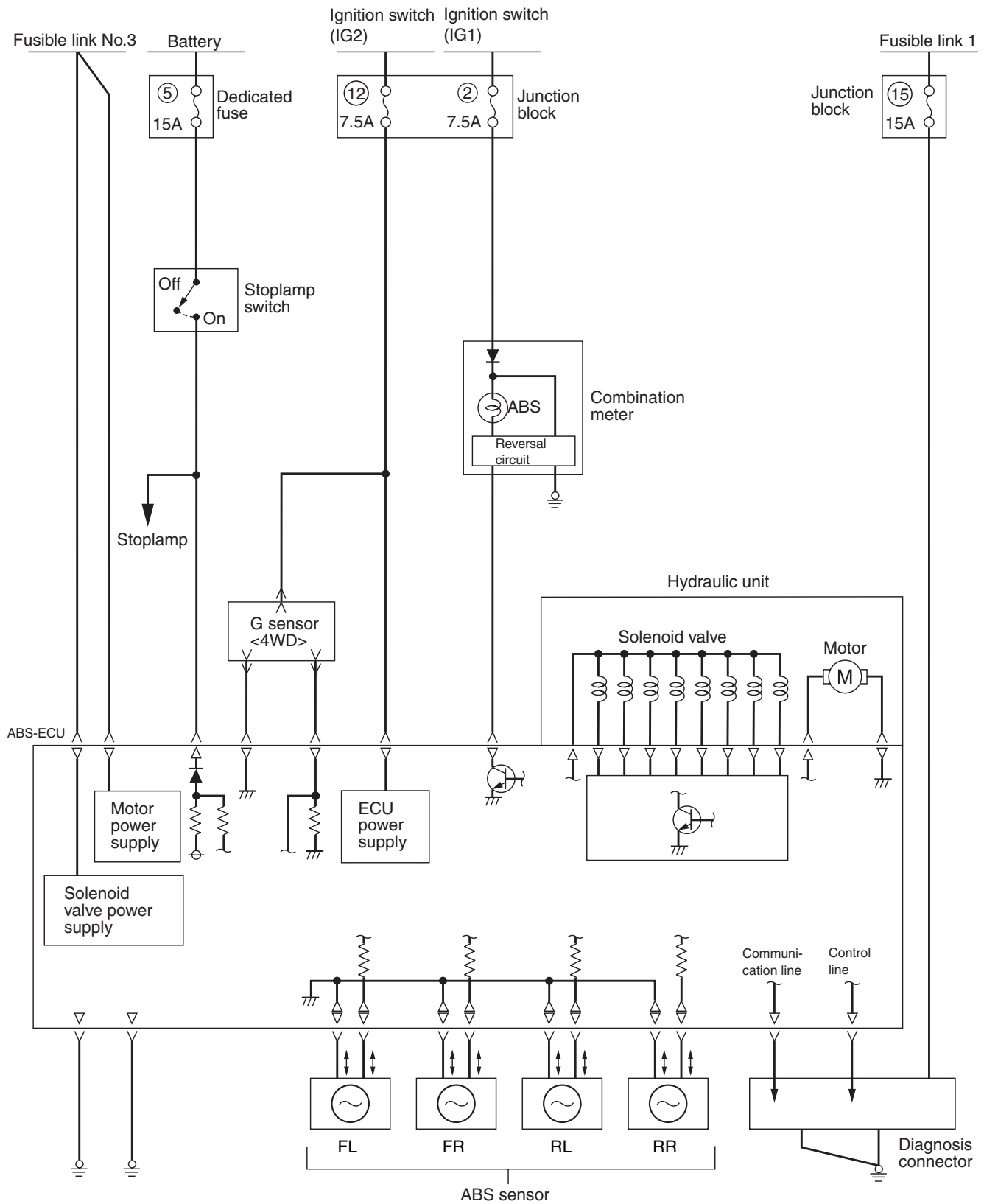
Name of part		Number	Outline of function
Sensor	ABS sensor	1	Send alternating current signals at frequencies which are proportional to the rotation speeds of each wheel to the ABS-ECU.
	Stoplamp switch	2	Sends a signal to the ABS-ECU to indicate whether the brake pedal is depressed or not.
	G sensor <4WD>	3	Detects acceleration in the travel direction of the vehicle and sends a signal that is converted to a voltage value to the ABS-ECU.
Actuator	Hydraulic unit	4	Drives the solenoid valves according to signals from the ABS-ECU in order to control the brake hydraulic pressure for each wheel.
	ABS warning lamp	5	Illuminates in response to signals from the ABS-ECU when a problem develops in the system.
Diagnosis connector		6	Outputs the diagnosis codes and allows communication with the M.U.T.-II/III.

Name of part	Number	Outline of function
ABS control unit (ABS-ECU)	7	Controls actuators (described above) based on the signals coming from each sensor.
		Controls the self-diagnosis and fail-safe functions.
		Controls the diagnostic function (M.U.T.-II/III compatible).

SYSTEM CONFIGURATION DIAGRAM



ABS ELECTRICAL CIRCUIT DIAGRAM



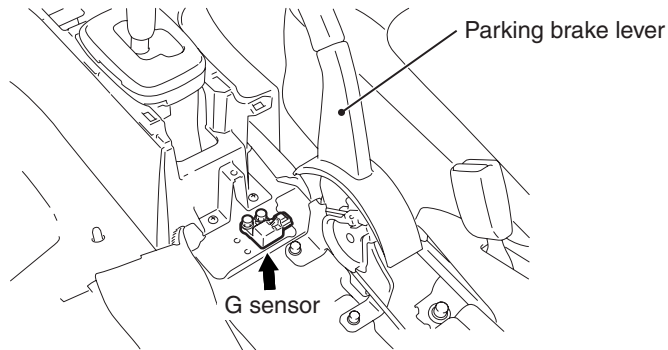
CONSTRUCTION DESCRIPTION

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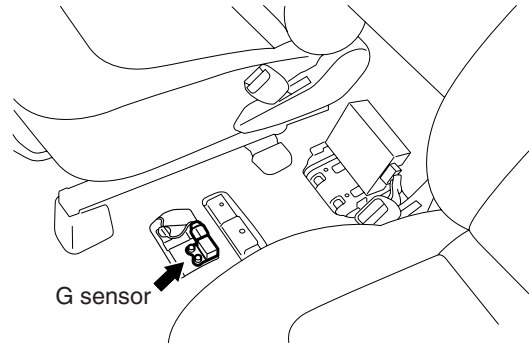
The construction is basically the same as that of the LANCER, except the following:

G-SENSOR <4WD>

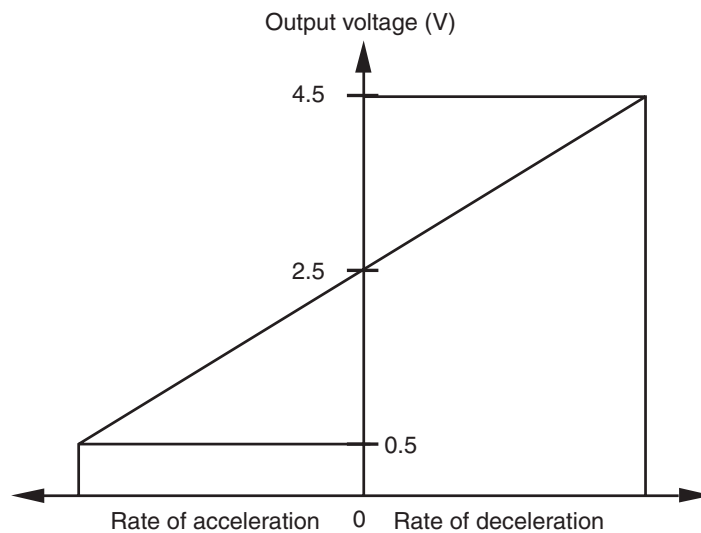
<L.H. drive vehicles>



<R.H. drive vehicles>



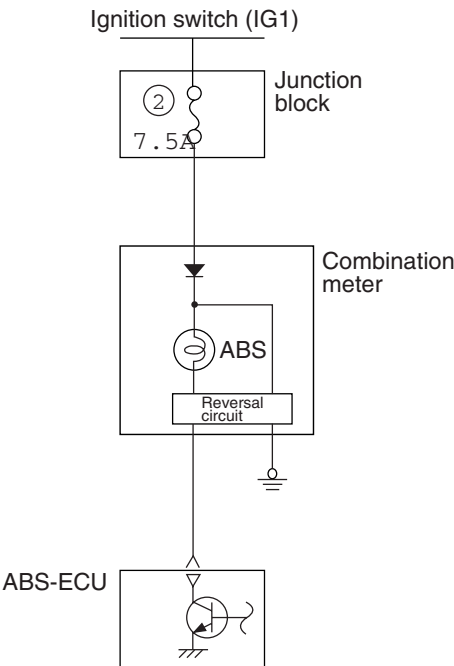
G SENSOR OUTPUT CHARACTERISTICS



AC309438AB

The G-sensor detects fore-and-aft accelerations of a vehicle with semiconductors, and sends signals representing voltage values to ABS-ECU. The ABS-ECU estimates the vehicle speed required for control according to the signals from the G sensor and ABS sensor.

ACTUATORS
ABS WARNING LAMP



AC300189AB

The ABS warning lamp is controlled by the ABS-ECU. The warning lamp drive circuit in the combination meter contains an reversal circuit, which turns the ABS warning lamp off when the transistor in the ABS-ECU is ON and turns the lamp on when the transistor is OFF. When the system is normal, the ABS-ECU keeps the transistor ON. When it detects a system error, it turns the transistor OFF to turn the ABS warning lamp on. The ABS warning lamp also comes on when the ABS-ECU connector is disconnected.

ELECTRONIC CONTROL UNIT (ECU)
DIAGNOSTIC FUNCTIONS

The ABS-ECU includes the following functions to make system inspection easier.
All of the above operations can be carried out using the M.U.T.-II/III.

- Diagnosis code output
- service data output
- Actuator testing

FAIL-SAFE FUNCTION

Diagnosis code No.	Item	Action during fail-safe operation		
		ABS control	EBD control	ABS warning lamp
11	Open circuit or short-circuit in ABS sensor (FR)	Control stopped if any faulty wheel detects	If faulty wheels include two rear wheels: Control stopped Other than the above: Control carried out	Illuminated
12	Open circuit or short-circuit in ABS sensor (FL)			
13	Open circuit or short-circuit in ABS sensor (RR)			
14	Open circuit or short-circuit in ABS sensor (RL)			

Diagnosis code No.	Item	Action during fail-safe operation		
		ABS control	EBD control	ABS warning lamp
16	Abnormal drop or rise in ABS-ECU power supply voltage	Control stopped	Control stopped (when high voltage) Control carried out (when low voltage)	Illuminated
21	ABS sensor (FR) system	If any faulty wheel detects: Control stopped in all wheels	If faulty wheels include two rear wheels: Control stopped Other than the above: Control carried out	Illuminated
22	ABS sensor (FL) system			
23	ABS sensor (RR) system			
24	ABS sensor (RL) system			
32	G sensor system <4WD>	Control stopped	Control carried out	Illuminated
41	Solenoid valve (FR) system	System interrupted	System interrupted	Illuminated
42	Solenoid valve (FL) system			
43	Solenoid valve (RR) system			
44	Solenoid valve (RL) system			
51	Valve relay ON problem	Control stopped	Control carried out	Illuminated
52	Valve relay OFF problem	System interrupted	System interrupted	Illuminated
53	Motor relay OFF problem	Control stopped	Control carried out	Illuminated
54	Motor relay ON problem	System interrupted	Control carried out	Illuminated
55	Motor system	Control stopped	Control carried out	Illuminated
63	ABS-ECU abnormality	System interrupted	System interrupted	Illuminated

NOTE: *Control stopped:* Control is not carried out until the ignition switch is turned to the "LOCK" (OFF) position. However, if the problem returns to normal, control is carried out again.

System interrupted: Control is not carried out until the ignition switch is turned to the "LOCK" (OFF) position.

DIAGNOSIS CODE INDICATION METHOD

The diagnosis codes can be checked using the M.U.T.-II/III, and also by the flashing of the ABS warning lamp. (Refer to Service Manual.)

DIAGNOSIS CODE CLEARING PROCEDURE

The diagnosis codes can be cleared using the M.U.T.-II/III or by special operation for the brake pedal. (Refer to Service Manual.)

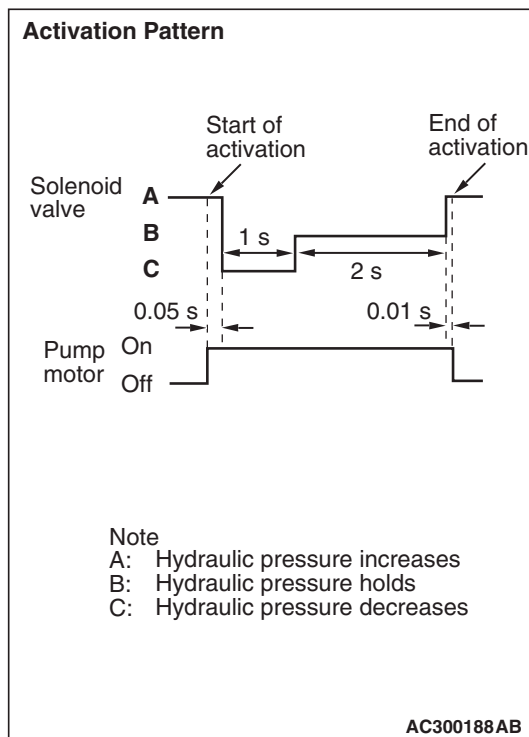
SERVICE DATA OUTPUT

The data input from all sensors and switches can be read using the M.U.T.-II/III.

Item No.	Check item	Checking requirement	Normal value
11	Front-right ABS sensor	Drive the vehicle	Vehicle speeds displayed on the speedometer and M.U.T.-II/III are identical.
12	Front-left ABS sensor		
13	Rear-right ABS sensor		
14	Rear-left ABS sensor		
21	ABS-ECU power supply voltage	Ignition switch power supply voltage and valve monitor voltage	10 –16 V
32	G-sensor <4WD>	<ul style="list-style-type: none"> Ignition switch: ON When vehicle is parked on a level surface. 	2.4 –2.6 V
		When vehicle is being driven	0.5 –4.5 V

The M.U.T.-II/III can be used to force-drive all solenoid valves and the pump motor.

ACTUATOR TEST



Item No.	Check item	Drive Contents
01	Solenoid valve for front-right wheel	Solenoid valves and pump motors in the hydraulic unit (simple inspection mode)
02	Solenoid valve for front-left wheel	
03	Solenoid valve for rear-right wheel	
04	Solenoid valve for rear-left wheel	

SYSTEM OPERATION

In terms of operation, the system is basically the same as that of the LANCER.