GROUP 35B

FOUR-WHEEL ANTI-LOCK BRAKE SYSTEM (4ABS)

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GENERAL DESCRIPTION

M2351000100573

FEATURES

The 4ABS ensures directional stability and control during hard braking.
This ABS uses a 4-sensor 4-channel system that controls all four wheels independently of each other.

- EBD (Electronic Brake-force Distribution system) control has been added to provide the ideal braking force for the rear wheels.
- To shorten the lines and enhance data transmission reliability, communication with other ECU is performed over a CAN (Controller Area Network).

  NOTE: For further details on CAN communication, refer to GROUP 54C, CAN P.54C-13.
- Fail-safe function which ensures that safety is maintained.
- Diagnostic function which provides improved serviceability.

EBD CONTROL

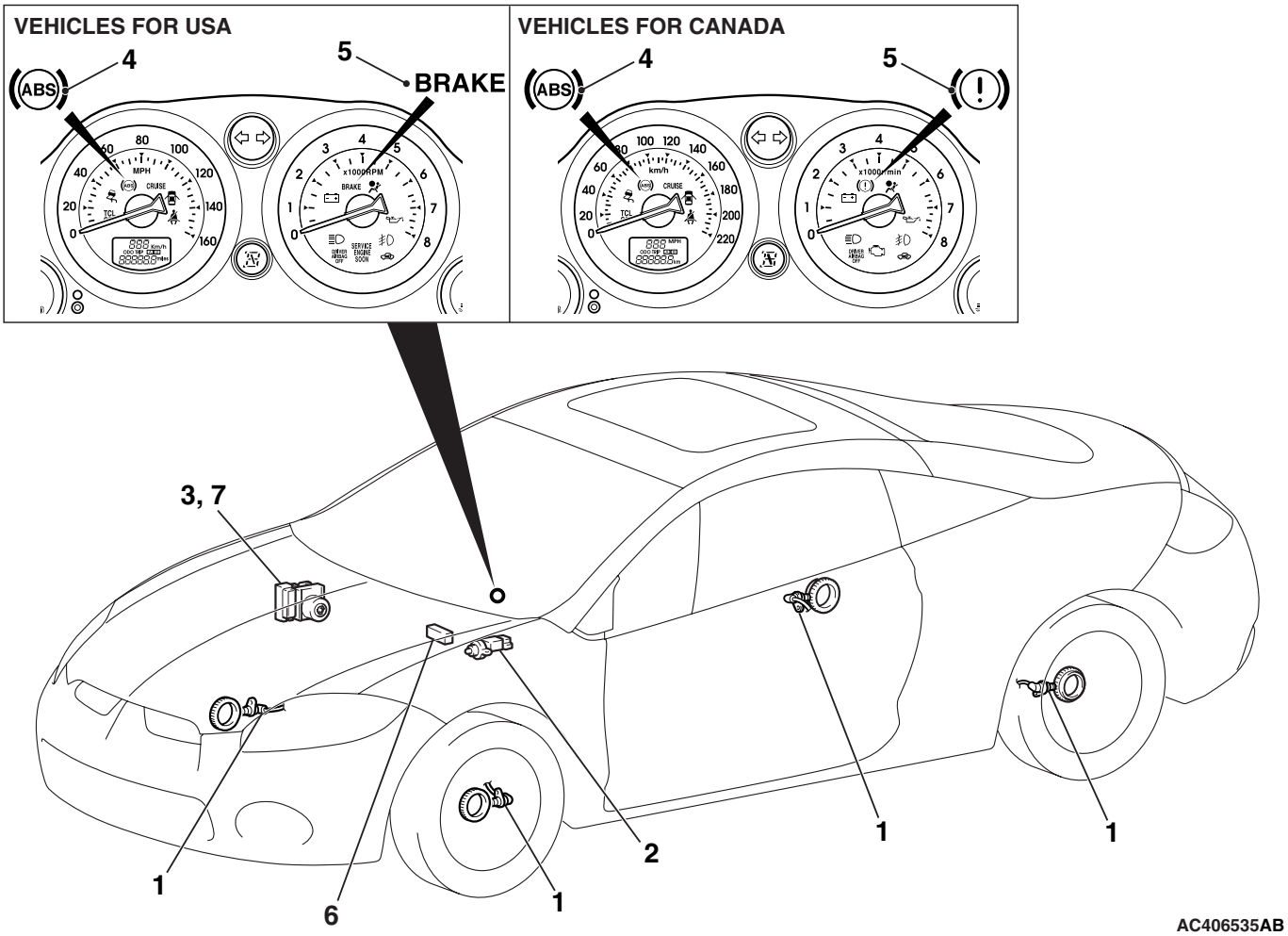
In ABS, electronic control is used so the rear wheel brake hydraulic pressure during braking is regulated by rear wheel control solenoid valves in accordance with the vehicle's rate of deceleration, and the front and rear wheel slippage which are calculated from the signals received from the various 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 and the condition of the road surface, the system reduces the required pedal depression force, particularly when the vehicle is heavily loaded.
- Because the duty placed on the front brakes is reduced, the increases in pad temperature can be controlled during front brake application to improve pad wear.
- Control valves such as the proportioning valve are not required.

SPECIFICATIONS

ITEM		SPECIFICATION
ABS control method		4-sensor, 4-channel
No. of wheel speed rotor teeth	Front	43
	Rear	43
Wheel speed sensor	Type	Magnet coil type
	Gap between sensor and rotor mm (in)	0.2 – 0.5 (0.008 – 0.020) <Non-adjustable type>

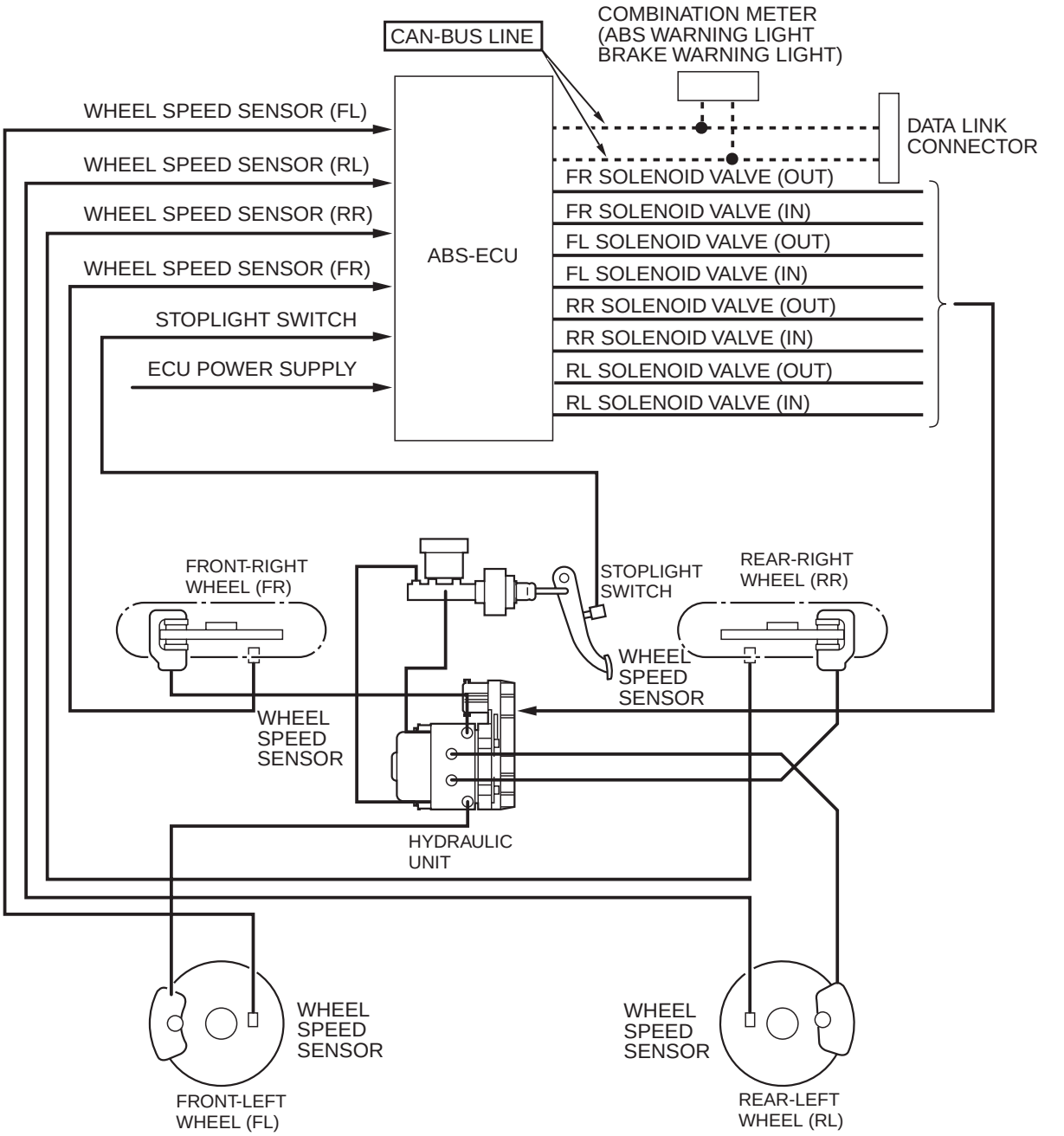
CONSTRUCTION DIAGRAM



NAME OF PART		NUMBER	OUTLINE OF FUNCTION
Sensor	Wheel speed sensor	1	Sends alternating current signals at frequencies which are proportional to the rotation speeds of each wheel to the ABS-ECU.
	Stoplight switch	2	Sends a signal to the ABS-ECU to indicate whether the brake pedal is depressed or not.
Actuator	Hydraulic unit	3	Drives the solenoid valves according to signals from the ABS-ECU in order to control the brake hydraulic pressure for each wheel.
	ABS warning light	4	Illuminates in response to signals from the ABS-ECU when a problem develops in the ABS system.
	Brake warning light	5	Illuminates in response to signals from the ABS-ECU when a problem develops in the EBD system.
Data link connector		6	Outputs the diagnostic trouble codes and allows communication with the scan tool.
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 (scan tool compatible).

TSB Revision

SYSTEM CONFIGURATION DIAGRAM



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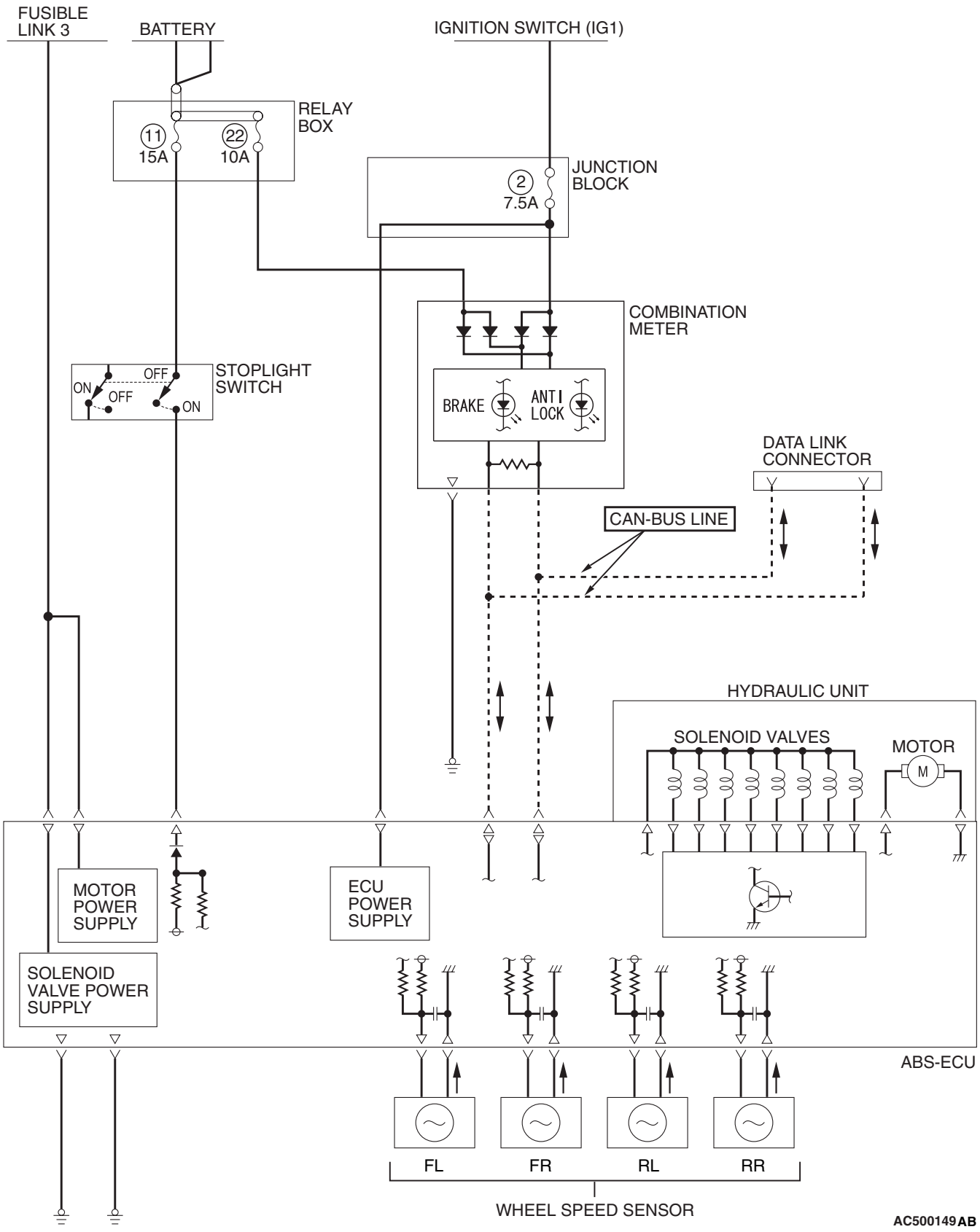
ABS ELECTRICAL CIRCUIT DIAGRAM



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CONSTRUCTION DESCRIPTION

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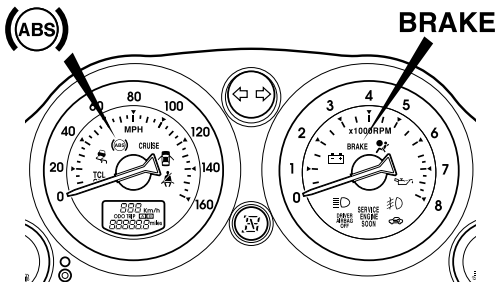
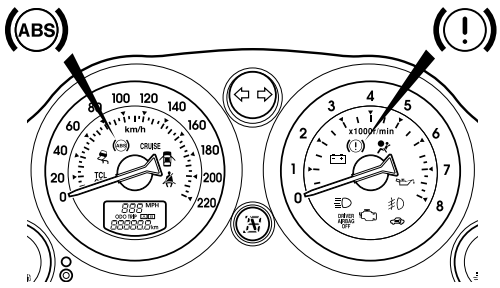
The 4ABS system is basically the same as that of the 2002 Lancer, except the following:

VEHICLES FOR USA



VEHICLES FOR CANADA



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ACTUATORS

ABS WARNING LIGHT/EBD "BRAKE" WARNING LIGHT

The ABS warning light/EBD "BRAKE" warning light illuminates in the following cases:

- During initial check when the ignition switch is at the "ON" position (for approximately 3 seconds)
- When a problem develops in the ABS/EBD system
- Poor ABS-ECU connector connection

ELECTRONIC CONTROL UNIT (ECU)

DIAGNOSTIC FUNCTIONS

The ABS-ECU includes the following functions to make system inspection easier.

All of the following functions can be carried out using the scan tool.

- Diagnostic trouble code output
- Service data output
- Actuator testing

DIAGNOSTIC TROUBLE CODE OUTPUT (AND FAIL-SAFE FUNCTION)

DTC	ITEM	ACTION DURING FAIL-SAFE OPERATION				
		CONTROL		WARNING LIGHT		RESTORING AFTER FAILURE
		ABS	EBD	ABS	EBD "BRAKE"	
C1200 <FR> C1205 <FL> C1210 <RR> C1215 <RL>	Wheel speed sensor system • Wheel speed sensor line break • Wheel speed sensor short circuit	Prohibited	Prohibited during problems with wheel speed sensors for the rear wheels	ON	ON during problems with wheel speed sensors for the rear wheels	Restart ignition
C1201 <FR> C1206 <FL> C1211 <RR> C1216 <RL>	Wheel speed sensor system • Wheel speed sensor transmitting error	Prohibited	Prohibited during problems with wheel speed sensors for the rear wheels	ON	ON during problems with wheel speed sensors for the rear wheels	Restart ignition and maintain a speed between 2 mph (3 km/h) and 4 mph (6 km/h) with all wheels for 0.016 second.
	Wheel speed sensor system • ABS/EBD control timing error	Prohibited	Prohibited	ON	ON	Restart ignition
C1226 <FR> C1236 <FL> C1246 <RR> C1256 <RL>	Inlet valve system • Inlet valve short circuit • Inlet valve ON error • Inlet valve OFF error	Prohibited	Prohibited	ON	ON	Restart ignition
C1231 <FR> C1241 <FL> C1251 <RR> C1261 <RL>	Outlet valve system • Outlet valve short circuit • Outlet valve ON error • Outlet valve OFF error	Prohibited	Prohibited	ON	ON	Restart ignition
C1271	Motor system • Motor lock • Motor OFF error • Motor ON error	Prohibited	Permitted	ON	OFF	Restart ignition when the motor system is normal.
C1276	Inlet valve system and outlet valve system • Inlet valve system and outlet valve system internal circuit damage	Prohibited	Prohibited	ON	ON	Restart ignition
C1607	ABS-ECU system • ABS-ECU internal circuit damage	Prohibited	Prohibited	ON	ON	Restart ignition

DTC	ITEM	ACTION DURING FAIL-SAFE OPERATION				
		CONTROL		WARNING LIGHT		RESTORING AFTER FAILURE
		ABS	EBD	ABS	EBD "BRAKE"	
C1860	Electrical system • ECU power supply or voltage problem (high voltage)	Prohibited	Prohibited	ON	ON	Normal voltage is restored for more than 1 second
C1861	Electrical system • ECU power supply or voltage problem (low voltage)	Prohibited	Permitted	ON	OFF	Normal voltage is restored for more than 1 second
U1073	CAN communications system • Bus off	Permitted	Permitted	OFF	OFF	Restart ignition

SERVICE DATA OUTPUT

The data input from all sensors and switches can be read using the scan tool.

MUT-III SCAN TOOL DISPLAY	ITEM NO.	CHECK ITEM	DISPLAY OR UNIT
FL wheel speed sensor	01	Front-left wheel speed sensor	km/h or mph
FR wheel speed sensor	02	Front-right wheel speed sensor	km/h or mph
RL wheel speed sensor	03	Rear-left wheel speed sensor	km/h or mph
RR wheel speed sensor	04	Rear-right wheel speed sensor	km/h or mph
Power supply voltage	05	ABS-ECU power supply voltage	V
Stop lamp switch (input)	06	Stoplight switch	ON/OFF

ACTUATOR TESTING

The scan tool can be used to force-drive all solenoid valves and the pump motor.

MUT-III SCAN TOOL DISPLAY	ITEM NO.	ITEM	PARTS TO BE ACTIVATED
FL wheel ABS drive	01	Solenoid valve for front-left wheel	Solenoid valves and pump motors in the hydraulic unit (simple inspection mode)
FR wheel ABS drive	02	Solenoid valve for front-right wheel	
RL wheel ABS drive	03	Solenoid valve for rear-left wheel	
RR wheel ABS drive	04	Solenoid valve for rear-right wheel	

SYSTEM OPERATION

M2351004000307

<VEHICLE WITHOUT TCL>
In terms of operation, the system is basically the same as that of the LANCER.

<VEHICLE WITH TCL>
Refer to GROUP35C, System Operation P.35C-13.

NOTES