

GROUP 35C

ACTIVE STABILITY CONTROL SYSTEM (ASC)

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GENERAL INFORMATION

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ASC (Active Skid Control System) has been installed.

- The ASC system integrates the traction control function and skid control function.
- When Traction control function detects the slip of the driving wheel (ex. during startup on slippery surfaces), it automatically applies the brakes to control the wheel slip ratios. At the same time, Traction control function reduces the engine output and prevents the wheel spin.
- Skid control function responds to driving conditions and reduces the engine output and applies brake

force to four wheels independently to control the vehicle behavior.

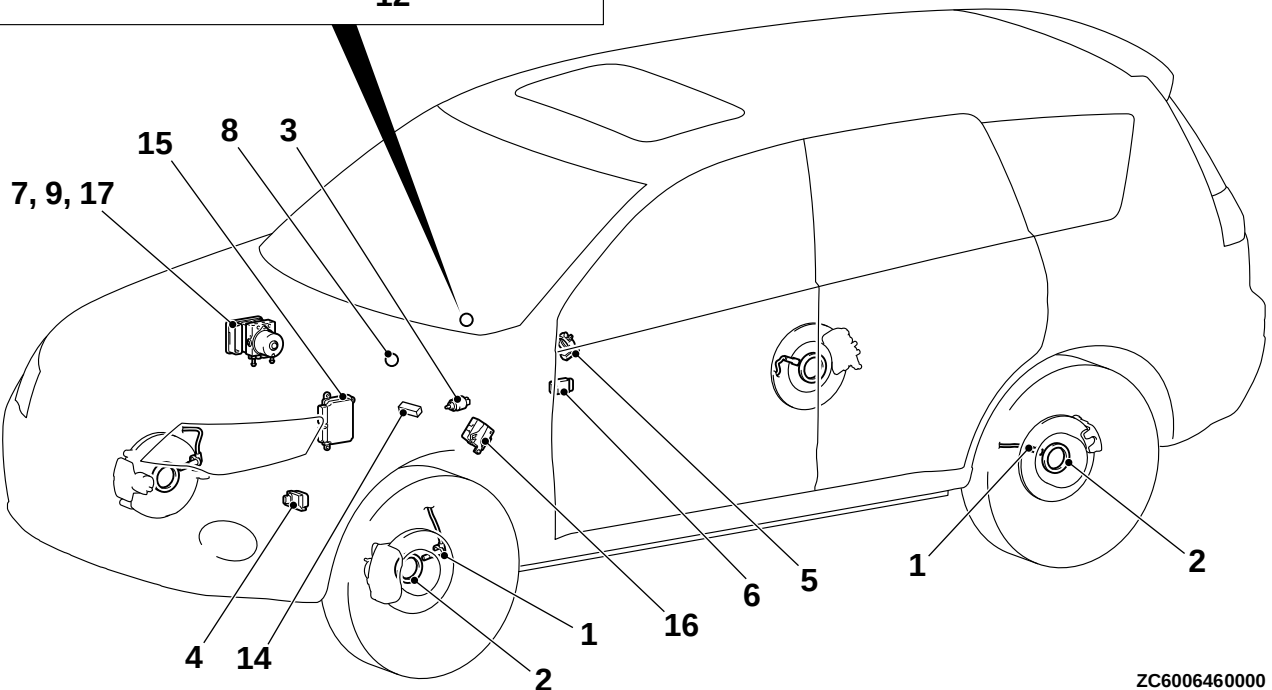
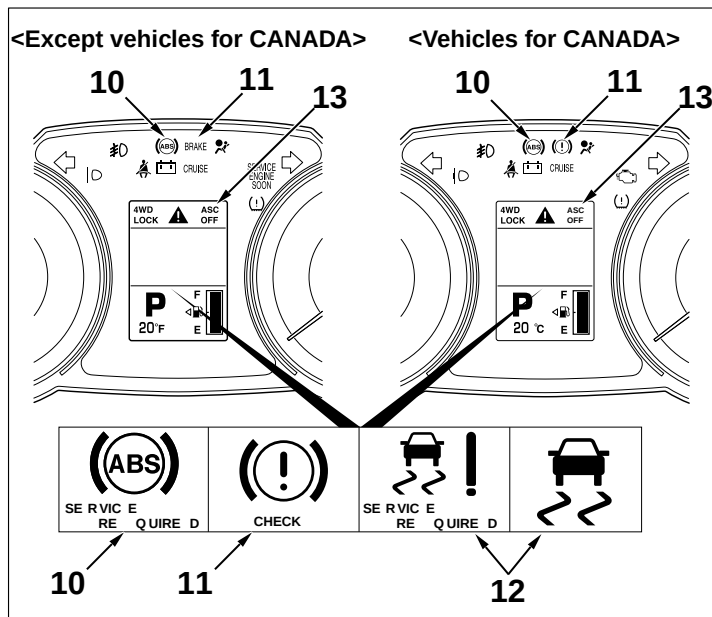
- Fail-safe function assures the safety.
- Serviceability improvement
- For reduced wiring harnesses and secure data communication, the CAN* communication has been adopted as a tool of communication with another ECU.

NOTE:

**For more information about CAN (Controller Area Network), refer to GROUP 54D P.54D-7.*

**ABS and ASC are controlled by the ASC-ECU.*

CONSTRUCTION DIAGRAM



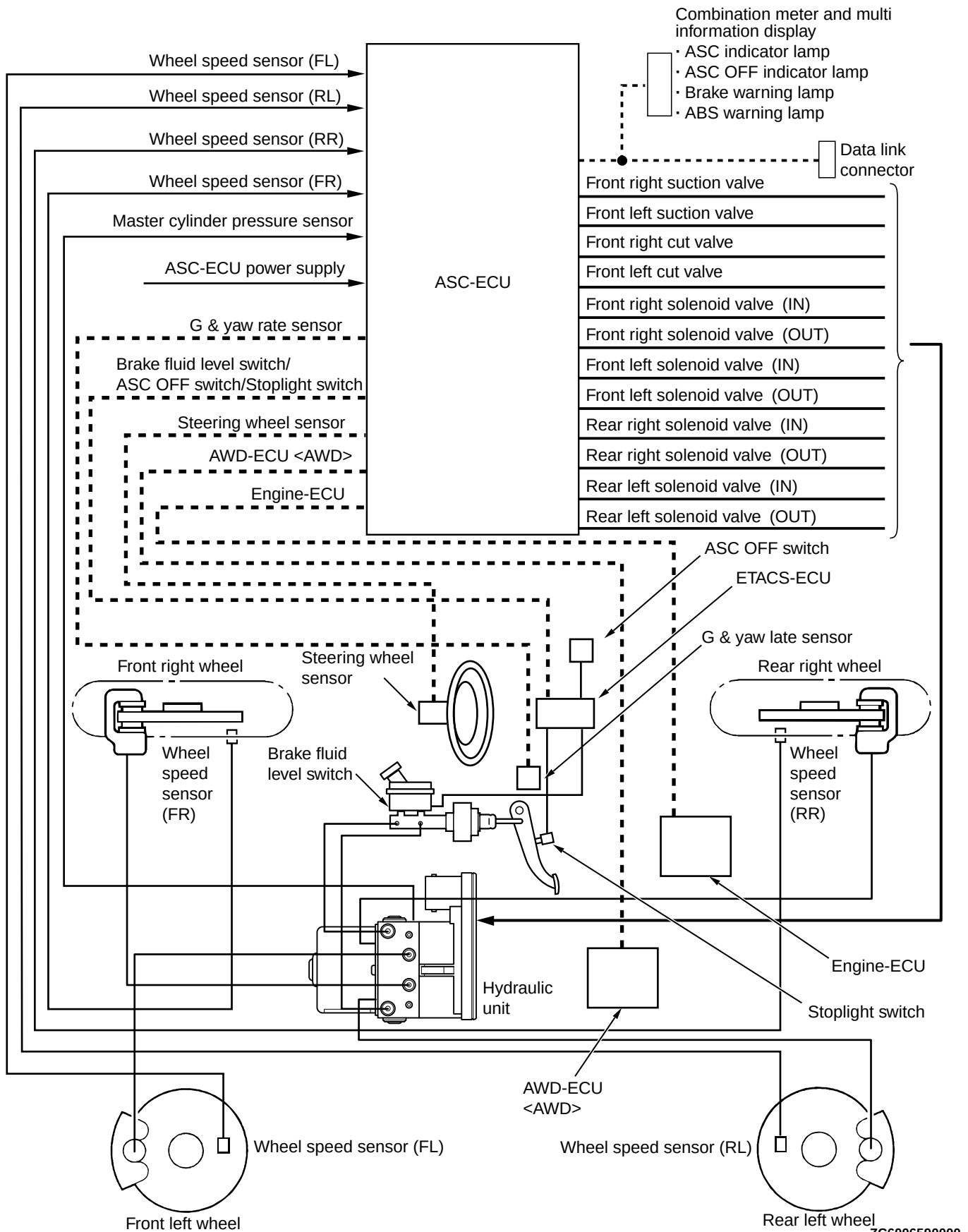
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NAME OF PART		NUMBER	OUTLINE OF FUNCTION
Sensor	Wheel speed sensor	1	Outputs the frequency signal in proportion to the rotation speed of each wheel to ASC-ECU.
	Magnetic encoder for wheel speed detection	2	The wheel speed sensor is a pulse generator. When the magnetic encoder for wheel speed detection (a plate on which north and south pole sides of the magnets are arranged alternately) rotates, it outputs frequency pulse signal in proportion to each wheel speed.

ACTIVE STABILITY CONTROL SYSTEM (ASC)
GENERAL INFORMATION

NAME OF PART		NUM BER	OUTLINE OF FUNCTION
	Stoplight switch	3	Outputs the signal indicating whether the brake pedal is depressed or not through ETACS to ASC-ECU via CAN-bus line.
	G&yaw rate sensor	4	Detects yaw rate longitudinal (AWD only) and lateral acceleration of a vehicle, and outputs signal to ASC-ECU via the CAN line.
	Steering wheel sensor	5	Detects the steering angle of the steering wheel, and outputs signal to ASC-ECU via the CAN bus line.
	ASC OFF switch	6	Outputs the ON/OFF signal through ETACS to ASC-ECU via CAN-bus line to turn on and off skid control function and traction control function.
	Pressure sensor	7	Integrated into the hydraulic unit, and outputs the signal for the brake fluid pressure in the master cylinder to ASC-ECU.
	Brake fluid level switch	8	Outputs a drop in the brake fluid level in the brake fluid reservoir tank through ETACS to ASC-ECU via CAN-bus line.
ACTUA TOR	Hydraulic unit	9	Drives the solenoid valve using the signal from ASC-ECU, and controls the brake fluid pressure for each wheel.
	ABS warning light	10	Informs the driver of the system status by illuminating, flashing, or turning off the warning light according to the signal from ASC-ECU.
	Brake warning light	11	Used as the warning light for the parking brake, brake fluid level, and EBD control. Informs the driver of the system status by illuminating, flashing, or turning off the warning light according to the signal from ASC-ECU.
	ASC operation indicator light	12	Traction control function and skid control function use the same display. Depending on the signal from ASC-ECU, the indicator light informs the driver of the system status by flashing when the system operates and by illuminating when skid control function or traction control function has a malfunction.
	ASC OFF indicator light	13	Informs the driver of skid control function and traction control function shutdown by the signal from ASC-ECU. Informs the driver that the brake system overheats and the brake traction control stops by flashing the indicator light in approximately 2 Hz.
Data link connector		14	Sets the diagnostic trouble code and establishes the communication with scan tool.
Engine ECU		15	Controls the engine output based on the signal from ASC-ECU.
AWD-ECU		16	Outputs the drive status to ASC-ECU.
ASC-ECU		17	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).

System configuration diagram



NOTE: The dotted line indicates the CAN-bus line.

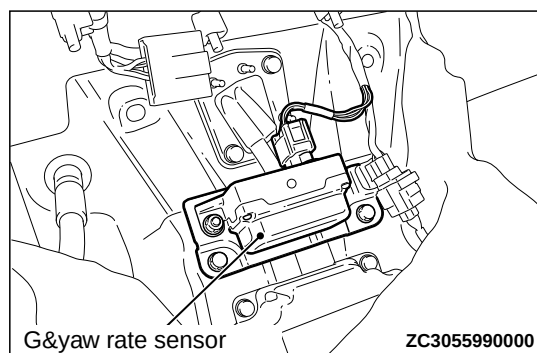
CONSTRUCTION DESCRIPTION

SENSOR

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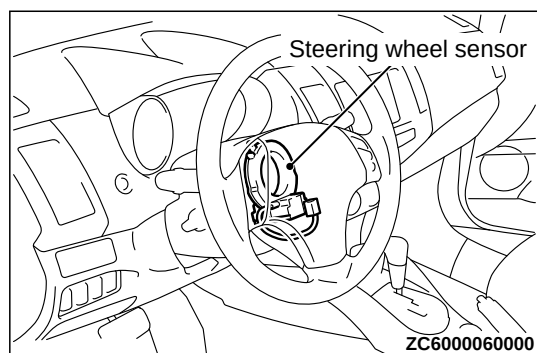
Wheel speed sensor

Refer to GROUP 35B, SENSOR P.35B-6.



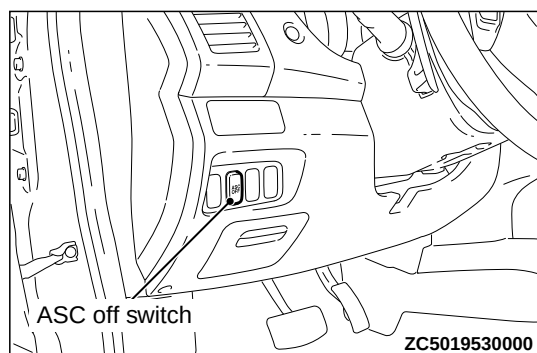
G AND YAW RATE SENSOR

This sensor is installed under the front floor console, and detects the yaw rate, lateral and longitudinal acceleration (AWD) of the vehicle. ABS employs the longitudinal acceleration.



STEERING WHEEL SENSOR

The steering wheel sensor is attached to the column switch, and detects the rotational angle of the steering wheel.



ASC OFF SWITCH

The ASC OFF switch is attached on the instrument panel to the left side of the driver's seat. Traction control and skid control functions can be deactivated by pressing this switch for 3 seconds or longer. Pressing this switch again resumes the active state. Pressing the ASC OFF switch for 15 seconds resumes the system to the active state, and the traction control and skid control function cannot be turned off until the ignition switch is turned on next time.

When the ignition switch is turned from "LOCK" (OFF) to ON position, traction control and skid control functions are constantly in the active state.

ASC OFF switch operation and system operation

ASC OFF switch control	Traction control function		Skid control function
	Brake control	Engine control	
ON	Enabled	Enabled	Enabled
OFF	Prohibited	Prohibited	Prohibited

NOTE: The Skid control function is available when the vehicle speed is about 15 km/h or more.

ACTUATOR

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HYDRAULIC UNIT

The hydraulic unit incorporates the ABS and ASC. The cut valve, pressure relief valve, suction valve,

suction damper, and pressure sensor have been added to the unit for the ASC.

NOTE: For the internal hydraulic circuit of the hydraulic unit, refer to P.35C-6.

ASC OPERATION INDICATOR LAMP, ASC OFF INDICATOR LAMP

The ASC system illuminates or flashes the ASC operation indicator light or ASC OFF indicator light in the following operation patterns, and informs the driver of the ASC system status.

ASC operation indicator light

- Flashes in 2 Hz during the skid control.
- Flashes in 2 Hz during the traction control.
- Turns ON when the system malfunction occurs.

ASC OFF indicator light

- ASC-ECU detects the overheat of the brake pads. When the brake traction control is prohibited, the ASC OFF indicator light flashes in approximately 2 Hz.
- Turns ON when the system malfunction occurs.
- Turns ON when the ASC OFF switch is pressed for 3 seconds or more, and the traction control function and the skid control function are disabled.

ASC operation indicator light, ASC OFF indicator light illumination and flashing patterns

State		ASC operation indicator light	ASC OFF indicator light
Normal	Normal	-	-
	Skid control function operated	Flashing (2 Hz)	-
	Traction control function operated	Flashing (2 Hz)	-
	Brake traction control function does not function to protect brake system.	-	Flashing (2 Hz)
Abnormal	Skid control function malfunction	ON	ON
	Traction control function malfunction	ON	ON
Scan tool connection	Actuator not operated	-	-
	Actuator operated	ON (After the actuator is operated)*1	ON (After the actuator is operated)*1

State		ASC operation indicator light	ASC OFF indicator light
		OFF (When the actuator is operating)* ²	OFF (When the actuator is operating)* ²

NOTE:

*¹After the actuator is operated, the light stays illuminated until the ignition switch is turned to the "LOCK" (OFF) position.

*²The ABS warning light flashes (2 Hz) while the actuator is operating.

ASC-ECU

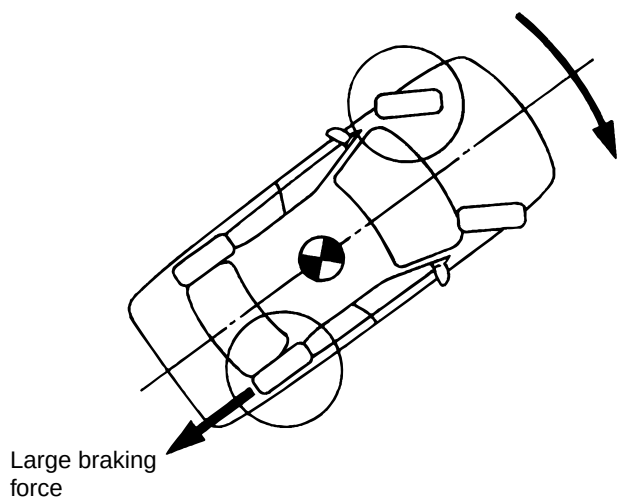
This ECU incorporates the ABS function, EBD function, Skid control function, and Traction control function.

SYSTEM CONFIGURATION

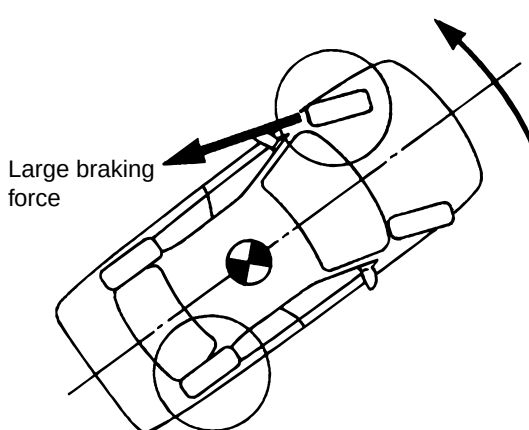
The hydraulic units of the ASC employ the automatic pressurization function. ASC systems also incorporate G and yaw rate sensor, steering wheel sensor, and master cylinder pressure sensor (integrated with hydraulic unit).

Example of Active Skid Control operation

<Generation of rotating force>



<Generation of counter-rotating force>



The Skid Control manages the vehicle attitude by creating a yaw moment from altering the balance between the cornering force and each wheel's braking mechanism.

For example, on a slippery surface, if the vehicle tends to be plowing out contrary to the driver's intention, a yaw moment (a rotational moment) is created to

CONTROL DESCRIPTION

ASC-ECU detects vehicle movement based on information from various sensors and calculates a model of ideal vehicle movement. ASC-ECU compares the actual vehicle movement with the ideal vehicle model, and manages the brake of the specific wheel so that the actual vehicle movement gets close to the ideal vehicle mode. It also controls the plowing out or spinning out condition by creating the yaw moment in the vehicle.

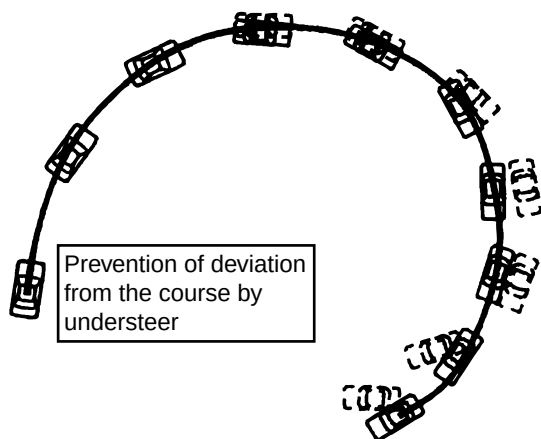
restrain the plowing out by increasing the rear-inside braking force. On the other hand, when the vehicle tends to be spinning out, a yaw moment (a restorative moment) is created to restrain the spinning out by increasing the front-outside wheel braking force. Furthermore, when it is determined that the vehicle is spinning out, safe and stable cornering is enabled by deceleration from reducing the engine output.

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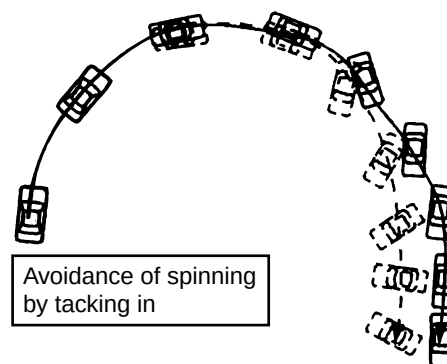
Example of the effect of control

Suppression of plowing out



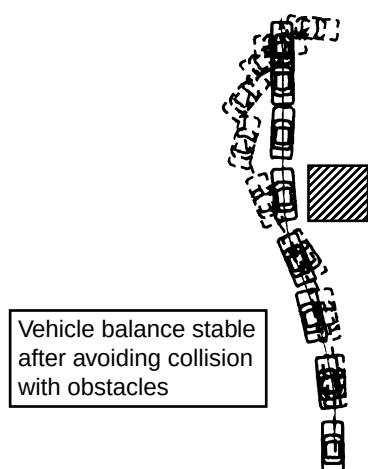
AC204505

Suppression of spinning out



AC204506

Improvement in ABS performance



AC204504

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Joint control

Skid control function transmits data necessary for control of ABS and traction control function, performing joint control.

Control system	Control content
ABS	Even during skid control operation, ABS performance is improved from the joint operation of the skid control.
Traction control function	During acceleration, engine output is governed through joint operation with skid control function.

Example of traction control function

Traction control function applies the brake automatically, sends the signal requesting engine speed reduction to the engine ECU, and prevents the loss of the driving force resulting from the slippage of

the driving wheel, when the driving wheels slip on the slippery road surface.

are processed depending on the cause of malfunction as shown below.

ASC-ECU has the following functions for easier system checks.

- Diagnostic trouble code set
- Service data output
- Actuator test

FAIL-SAFE FUNCTION

DTC	Item	EBD	ABS	Skid control		Traction control	
				Engine control	Brake control	Engine control	Brake control
C100A	Abnormality in FL wheel speed sensor circuit	Enabled (Prohibited when two or more wheels have fault.)	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C1015	Abnormality in FR wheel speed sensor circuit						
C1020	Abnormality in RL wheel speed sensor circuit						
C102B	Abnormality in RR wheel speed sensor circuit						
C1011	Abnormality in FL wheel speed sensor signal	Enabled (Prohibited when two or more wheels have fault.)	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C101C	Abnormality in FR wheel speed sensor signal						
C1027	Abnormality in RL wheel speed sensor signal						
C1032	Abnormality in RR wheel speed sensor signal						
C1014	Mutual monitoring of FL wheel speed sensor	Enabled (Prohibited when two or more wheels have fault.)	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C101F	Mutual monitoring of FR wheel speed sensor						
C102A	Mutual monitoring of RL wheel speed sensor						
C1035	Mutual monitoring of RR wheel speed sensor						

DTC	Item	EBD	ABS	Skid control		Traction control	
				Engine control	Brake control	Engine control	Brake control
C1041	Abnormality in periodical signal for FL wheel speed sensor	Enabled (Prohibited when two or more wheels have fault.)	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C1042	Abnormality in periodical signal for FR wheel speed sensor						
C1043	Abnormality in periodical signal for RL wheel speed sensor						
C1044	Abnormality in periodical signal for RR wheel speed sensor						
C1046	FL wheel speed sensor control phase time exceeded	Enabled (Prohibited when two or more wheels have fault.)	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C1047	FR wheel speed sensor control phase time exceeded						
C1048	RL wheel speed sensor control phase time exceeded						
C1049	RR wheel speed sensor control phase time exceeded						
C104B	Abnormality in FL wheel inlet valve system	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C104F	Abnormality in FR wheel inlet valve system						
C1053	Abnormality in RL wheel inlet valve system						
C1057	Abnormality in RR wheel inlet valve system						
C105F	Abnormality in FL wheel outlet valve system	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C1063	Abnormality in FR wheel outlet valve system						
C1067	Abnormality in RL wheel outlet valve system						
C105B	Abnormality in RR wheel outlet valve system						
C1200	Abnormality in FL/RR wheel cut valve system	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C1204	Abnormality in FR/RL wheel cut valve system						

ACTIVE STABILITY CONTROL SYSTEM (ASC)
CONSTRUCTION DESCRIPTION

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DTC	Item		EBD	ABS	Skid control		Traction control	
					Engine control	Brake control	Engine control	Brake control
C1208	Abnormality in FL/RR wheel suction valve system							
C120C	Abnormality in FR/RL wheel suction valve system							
C2104	Faulty valve power supply circuit		Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C1073	Faulty motor drive circuit		Enabled	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C2116	Abnormality in power supply voltage in pump motor		Enabled	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C121D	Abnormality in brake fluid pressure sensor circuit		Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
C121E	Abnormality in brake fluid pressure sensor output signal		Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
C1000	Abnormality in stoplight switch circuit		Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
C1009	Low brake fluid level		Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
C123B	Prolonged operation of ASC		Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
C2200	Abnormality in ASC-ECU		Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C2100	Abnormality in battery voltage (low voltage)	9.7 ± 0.3 V or less*1	Enabled	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
		8.0 ± 0.5 V or less*1	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C2101	Abnormality in battery voltage (high voltage)	18.0 ± 1.0 V or more	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C1395	Brake fluid filling not completed		Enabled	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C121C	Torque request signal rejection		Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
C1290	CAN time-out error		Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
C2203	VIN not recorded		Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
C2206	Change of valiant coding value		Enabled	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited

DTC	Item		EBD	ABS	Skid control		Traction control	
					Engine control	Brake control	Engine control	Brake control
C1210*2	Abnormality in G and yaw rate sensor	Abnormality in longitudinal G-sensor output voltage	Enabled	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C1242*2	Abnormality in G and yaw rate sensor	Abnormality in longitudinal G-sensor output signal	Enabled	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C123C	Abnormality in G and yaw rate sensor	Abnormality in lateral G-sensor output value	Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
		Abnormality in yaw rate sensor output value	Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
C2204	Internal abnormality in G and yaw rate sensor	Abnormality in internal circuit	Enabled	•Enabled (FWD) •Prohibited (AWD)	Prohibited	Prohibited	Prohibited	Prohibited
		Abnormality in lateral G-sensor output voltage	Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
		Abnormality in yaw rate sensor output voltage	Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
		Abnormality in G and yaw rate sensor supply voltage	Enabled	•Enabled (FWD) •Prohibited (AWD)	Prohibited	Prohibited	Prohibited	Prohibited
C2111	Sensor power supply circuit	Low input	Enabled	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C2112	Sensor power supply circuit	High input	Enabled	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited

ACTIVE STABILITY CONTROL SYSTEM (ASC)

CONSTRUCTION DESCRIPTION

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DTC	Item		EBD	ABS	Skid control		Traction control	
					Engine control	Brake control	Engine control	Brake control
C2114	Abnormality in G and yaw rate sensor operation voltage	Low voltage (6.5 ± 0.5 V or less)	Enabled	▪Enabled (FWD) ▪Prohibited (AWD)	Prohibited	Prohibited	Prohibited	Prohibited
C2115	Abnormality in G and yaw rate sensor operation voltage	High voltage (18.0 ± 1.0 V or more)	Enabled	▪Enabled (FWD) ▪Prohibited (AWD)	Prohibited	Prohibited	Prohibited	Prohibited
C123A	Abnormality in sensor calibration		Enabled	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
C1219	Abnormality in steering wheel sensor signal		Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
C121A	Steering wheel sensor neutral point not learned		Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
C2205	Internal abnormality in steering wheel sensor		Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
C1608	Implausible diagnosis data		Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
U0001	Bus-off		Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
U0100	Engine time-out error		Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
U0101	A/T time-out error		Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
U0114 *2	AWD-ECU time-out error		Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
U0126	Steering wheel sensor time-out error		Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
U0141	ETACS time-out error		Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
U0125	G and yaw rate sensor message time-out error/ message error		Enabled	▪Enabled (FWD) ▪Prohibited (AWD)	Prohibited	Prohibited	Prohibited	Prohibited
U0401	Engine malfunction detected		Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
U0428	Steering wheel sensor CRC, message error		Enabled	Enabled	Prohibited	Prohibited	Prohibited	Prohibited
U1003	G and yaw rate sensor bus-off		Enabled	▪Enabled (FWD)	Prohibited	Prohibited	Prohibited	Prohibited

DTC	Item	EBD	ABS	Skid control		Traction control	
				Engine control	Brake control	Engine control	Brake control
			*Prohibited (AWD)				
U1415	Variant coding not completed	Enabled	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
U1417	Variant coding value invalid (includes faulty installation)	Enabled	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited

NOTE:

****1:** This diagnostic trouble code is not set with the vehicle speed of 20 km/h or less.

****2:** AWD only

Warning light, indicator light

DTC	Item	Brake warning light	ABS warning light	ASC ON indicator light	ASC OFF indicator light
C100A	Abnormality in FL wheel speed sensor circuit	OFF*1	ON*2	ON	ON
C1015	Abnormality in FR wheel speed sensor circuit				
C1020	Abnormality in RL wheel speed sensor circuit				
C102B	Abnormality in RR wheel speed sensor circuit				
C1011	Abnormality in FL wheel speed sensor signal	OFF*1	ON*2	ON	ON
C101C	Abnormality in FR wheel speed sensor signal				
C1027	Abnormality in RL wheel speed sensor signal				
C1032	Abnormality in RR wheel speed sensor signal				
C1014	Mutual monitoring of FL wheel speed sensor	OFF*1	ON*2	ON	ON
C101F	Mutual monitoring of FR wheel speed sensor				
C102A	Mutual monitoring of RL wheel speed sensor				
C1035	Mutual monitoring of RR wheel speed sensor				
C1041	Abnormality in periodical signal for FL wheel speed sensor	OFF*1	ON*2	ON	ON

ACTIVE STABILITY CONTROL SYSTEM (ASC)

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CONSTRUCTION DESCRIPTION

DTC	Item	Brake warning light	ABS warning light	ASC ON indicator light	ASC OFF indicator light
C1042	Abnormality in periodical signal for FR wheel speed sensor				
C1043	Abnormality in periodical signal for RL wheel speed sensor				
C1044	Abnormality in periodical signal for RR wheel speed sensor				
C1046	FL wheel speed sensor control phase time exceeded	OFF*1	ON*2	ON	ON
C1047	FR wheel speed sensor control phase time exceeded				
C1048	RL wheel speed sensor control phase time exceeded				
C1049	RR wheel speed sensor control phase time exceeded				
C104B	Abnormality in FL wheel inlet valve system	ON	ON	ON	ON
C104F	Abnormality in FR wheel inlet valve system				
C1053	Abnormality in RL wheel inlet valve system				
C1057	Abnormality in RR wheel inlet valve system				
C105F	Abnormality in FL wheel outlet valve system	ON	ON	ON	ON
C1063	Abnormality in FR wheel outlet valve system				
C1067	Abnormality in RL wheel outlet valve system				
C105B	Abnormality in RR wheel outlet valve system				
C1200	Abnormality in FL/RR wheel cut valve system	ON	ON	ON	ON
C1204	Abnormality in FR/RL wheel cut valve system				
C1208	Abnormality in FL/RR wheel suction valve system				
C120C	Abnormality in FR/RL wheel suction valve system				
C2104	Faulty valve power supply circuit	ON	ON	ON	ON
C1073	Faulty motor drive circuit	OFF	ON*2	ON	ON
C2116	Abnormality in power supply voltage in pump motor	OFF	ON*2	ON	ON

DTC	Item		Brake warning light	ABS warning light	ASC ON indicator light	ASC OFF indicator light
C121D	Abnormality in brake fluid pressure sensor circuit		OFF	OFF	ON	ON
C121E	Abnormality in brake fluid pressure sensor output signal		OFF	OFF	ON	ON
C1000	Abnormality in stoplight switch circuit		OFF	OFF	ON	ON
C1009	Low brake fluid level		OFF	OFF	ON	ON
C123B	Prolonged operation of ASC		OFF	OFF	ON	ON
C2200	Abnormality in ASC-ECU		ON	ON	ON	ON
C2100	Abnormality in battery voltage (low voltage)	9.7 ± 0.3 V or less ^{*3}	OFF	ON	ON	ON
		8.0 ± 0.5 V or less ^{*3}	ON	ON	ON	ON
C2101	Abnormality in battery voltage (high voltage)	18.0 ± 1.0 V or more	ON	ON	ON	ON
C1395	Brake fluid filling not completed		OFF	Flash (1 Hz)	OFF	OFF
C121C	Torque request signal rejection		OFF	OFF	ON	ON
C1290	CAN time-out error		OFF	OFF	ON	ON
C2203	VIN not recorded		OFF	ON	OFF	OFF
C2206	Change of variant coding value		OFF	ON	ON	ON
C1210 ^{*4}	Abnormality in G and yaw rate sensor	Abnormality in longitudinal G-sensor output voltage	OFF	ON	ON	ON
C1242 ^{*4}	Abnormality in G and yaw rate sensor	Abnormality in longitudinal G-sensor output signal	OFF	ON	ON	ON
C123C	Abnormality in G and yaw rate sensor	Abnormality in lateral G-sensor output value	OFF	OFF	ON	ON
		Abnormality in yaw rate sensor output value	OFF	OFF	ON	ON
C2204	Internal abnormality in G and yaw rate sensor	Abnormality in internal circuit	OFF	▪OFF (FWD) ▪ON (AWD)	ON	ON

ACTIVE STABILITY CONTROL SYSTEM (ASC)
CONSTRUCTION DESCRIPTION

DTC	Item		Brake warning light	ABS warning light	ASC ON indicator light	ASC OFF indicator light
		Abnormality in lateral G-sensor output voltage	OFF	OFF	ON	ON
		Abnormality in yaw rate sensor output voltage	OFF	OFF	ON	ON
		Abnormality in G and yaw rate sensor supply voltage	OFF	•OFF (FWD) •ON (AWD)	ON	ON
C2111	Sensor power supply circuit	Low input	OFF	ON	ON	ON
C2112	Sensor power supply circuit	High input	OFF	ON	ON	ON
C2114	Abnormality in G and yaw rate sensor operation voltage	Low voltage (6.5 ± 0.5 V or less)	OFF	•OFF (FWD) •ON (AWD)	ON	ON
C2115	Abnormality in G and yaw rate sensor operation voltage	High voltage (18.0 ± 1.0 V or more)	OFF	•OFF (FWD) •ON (AWD)	ON	ON
C123A	Abnormality in sensor calibration		OFF	ON	ON	ON
C1219	Abnormality in steering wheel sensor signal		OFF	OFF	ON	ON
C121A	Steering wheel sensor neutral point not learned		OFF	Flashing (2 Hz)	OFF	OFF
C2205	Internal abnormality in steering wheel sensor		OFF	OFF	ON	ON
C1608	Implausible diagnosis data		OFF	OFF	OFF	OFF
U0001	Bus-off		OFF	OFF	OFF	OFF
U0100	Engine time-out error		OFF	OFF	OFF	OFF
U0101	A/T time-out error		OFF	OFF	OFF	OFF
U0114 *4	AWD-ECU time-out error		OFF	OFF	OFF	OFF
U0126	Steering wheel sensor time-out error		OFF	OFF	OFF	OFF
U0141	ETACS time-out error		OFF	OFF	OFF	OFF
U0125	G and yaw rate sensor message time-out error/message error		OFF	•OFF (FWD) •ON (AWD)	ON	ON

DTC	Item	Brake warning light	ABS warning light	ASC ON indicator light	ASC OFF indicator light
U0401	Engine malfunction detected	OFF	OFF	ON	ON
U0428	Steering wheel sensor CRC, message error	OFF	OFF	ON	ON
U1003	G and yaw rate sensor bus-off	OFF	•OFF (FWD) •ON (AWD)	ON	ON
U1415	Variant coding not completed	OFF	ON	ON	ON
U1417	Variant coding value invalid (includes faulty installation)	OFF	ON	ON	ON

NOTE:

- *1: Turns on when two or more wheels are faulty.
- *2: Stays on until the vehicle speed reaches 10 km/h when the ignition switch is turned to ON next time.
- *3: This diagnostic trouble code is not set with the vehicle speed of 20 km/h or less.
- *4: AWD only

DIAGNOSTIC TROUBLE CODE READING METHOD

There are 70 diagnosis items (FWD) or 73 diagnosis items (AWD). The diagnostic trouble code can be checked using the M.U.T.-III scan tool.

HOW TO ERASE DIAGNOSTIC TROUBLE CODE MEMORY

Diagnostic trouble code can be erased using the M.U.T.-III scan tool.

Data list output

The following items input to ASC-ECU can be read using scan tool.

NOTE: For service data items, refer to Workshop Manual.

ACTUATOR TEST

Using the M.U.T.-III scan tool, the actuators can be forcibly operated. The M.U.T.-III scan tool can also bleed the active stability control system.

When ASC-ECU is disabled, the actuator test cannot be performed.

NOTE:

- Scan tool uses the ABS data list.
- For the actuator test specification, refer to Workshop Manual.

CALIBRATION

After the G and yaw rate sensor and steering wheel sensor have been replaced with new ones, calibration must be performed using the M.U.T.-III scan tool*.

NOTE:

- The M.U.T.-III scan tool uses the ABS data list.
- *: For calibration, refer to Workshop Manual.

DESCRIPTION OF CONSTRUCTION AND OPERATION

ACTIVE SKID CONTROL OPERATION

ASC-ECU receives various kinds of information from the engine ECU, AWD-ECU, ETACS-ECU, A/T-ECU, steering wheel sensor, G and yaw rate sensor, and wheel speed sensor. When ECU determines the vehicle runs in the spinning out or plowing out direction based on the signal sent from these sensors, ASC-ECU drives each valve and pump motor and controls the braking force to be applied to the wheels.

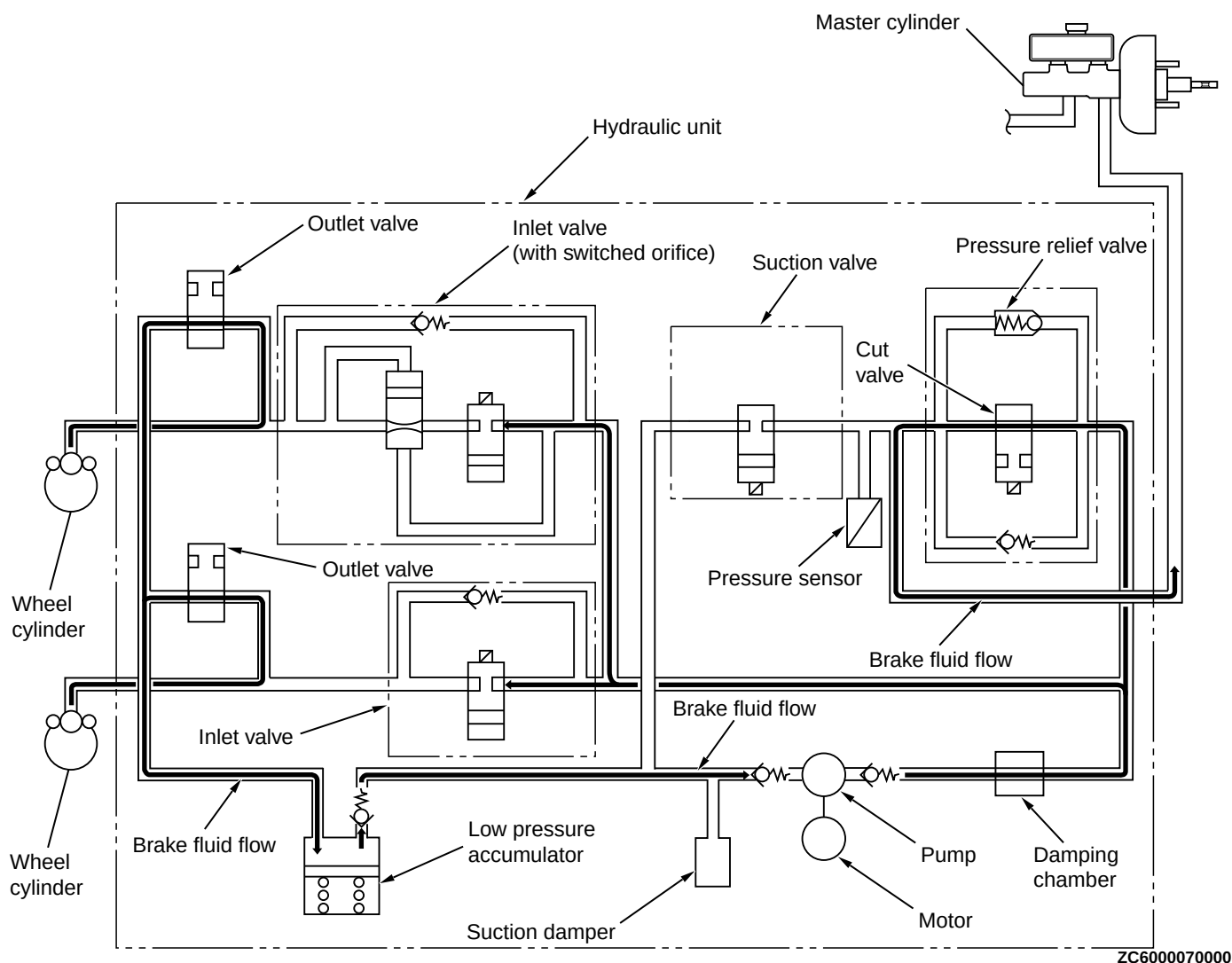
M23506100006USA0000010000

When the system increases the fluid pressure automatically, it closes the cut valve to shut off the pressure line to the suction valve, and drives the pump motor. For example, when the vehicle runs in the plowing out direction while turning to the right, ASC-ECU supplies the brake fluid from the pump to the front left wheel to apply the braking force on it.

ASC-ECU, the engine ECU, and AWD-ECU communicate with each other via CAN. When the accelerator pedal is depressed too far, the signal

requesting the engine output reduction is sent to the engine ECU. Depending on the situation, AWD control amount limitation signal is sent to the ASC-ECU to secure the ASC controllability.

When brake fluid pressure decreases during normal braking and ABS operation



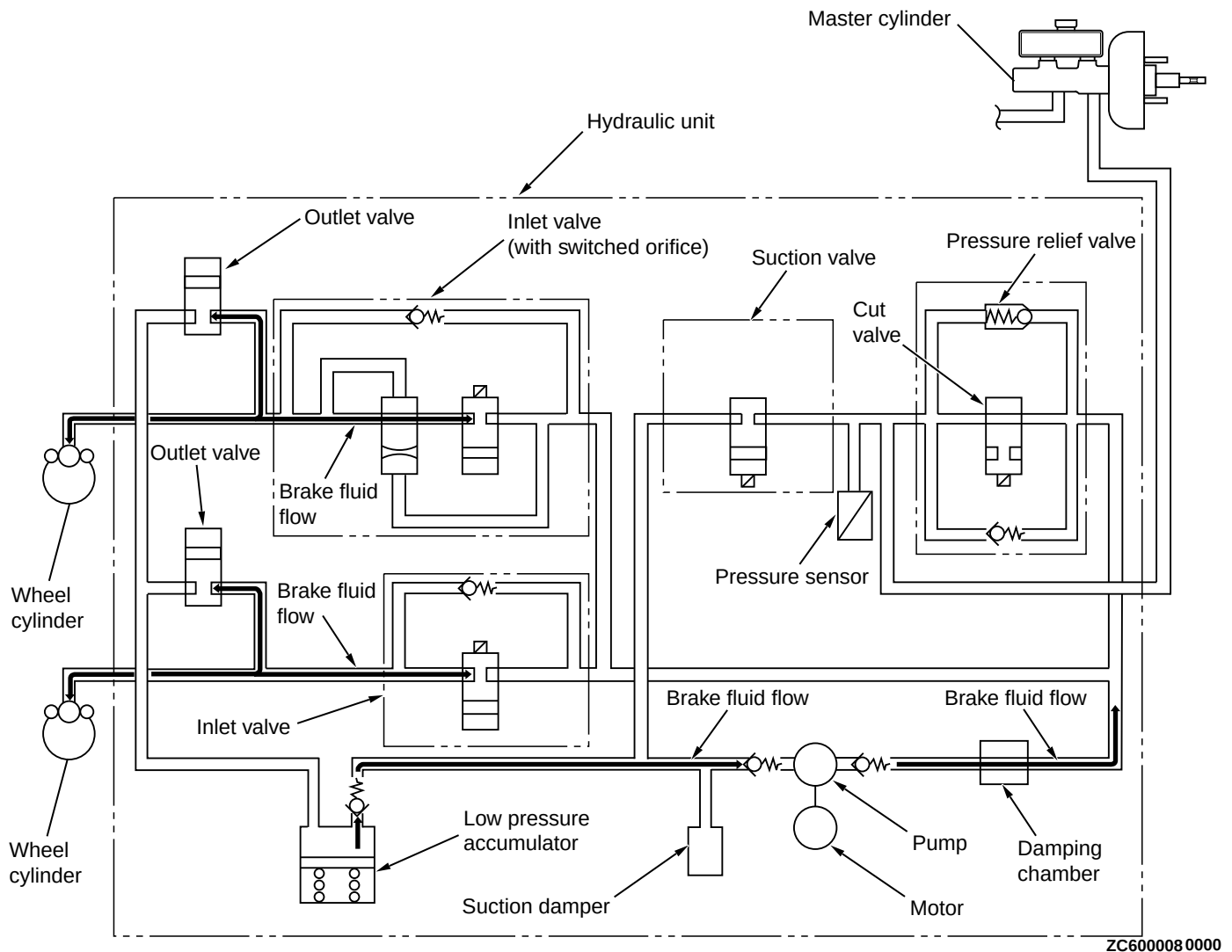
The brake fluid supplied from the wheel cylinder is stored in the low pressure accumulator. Then, the

stored brake fluid is returned to the master cylinder by driving the pump using the motor.

VALVE CONDITION

Item	Power status	Open/Close
Cut valve	OFF	Open
Suction valve	OFF	Closed
Inlet valve	ON	Closed
Outlet valve	ON	Open

When brake fluid pressure is held by ABS



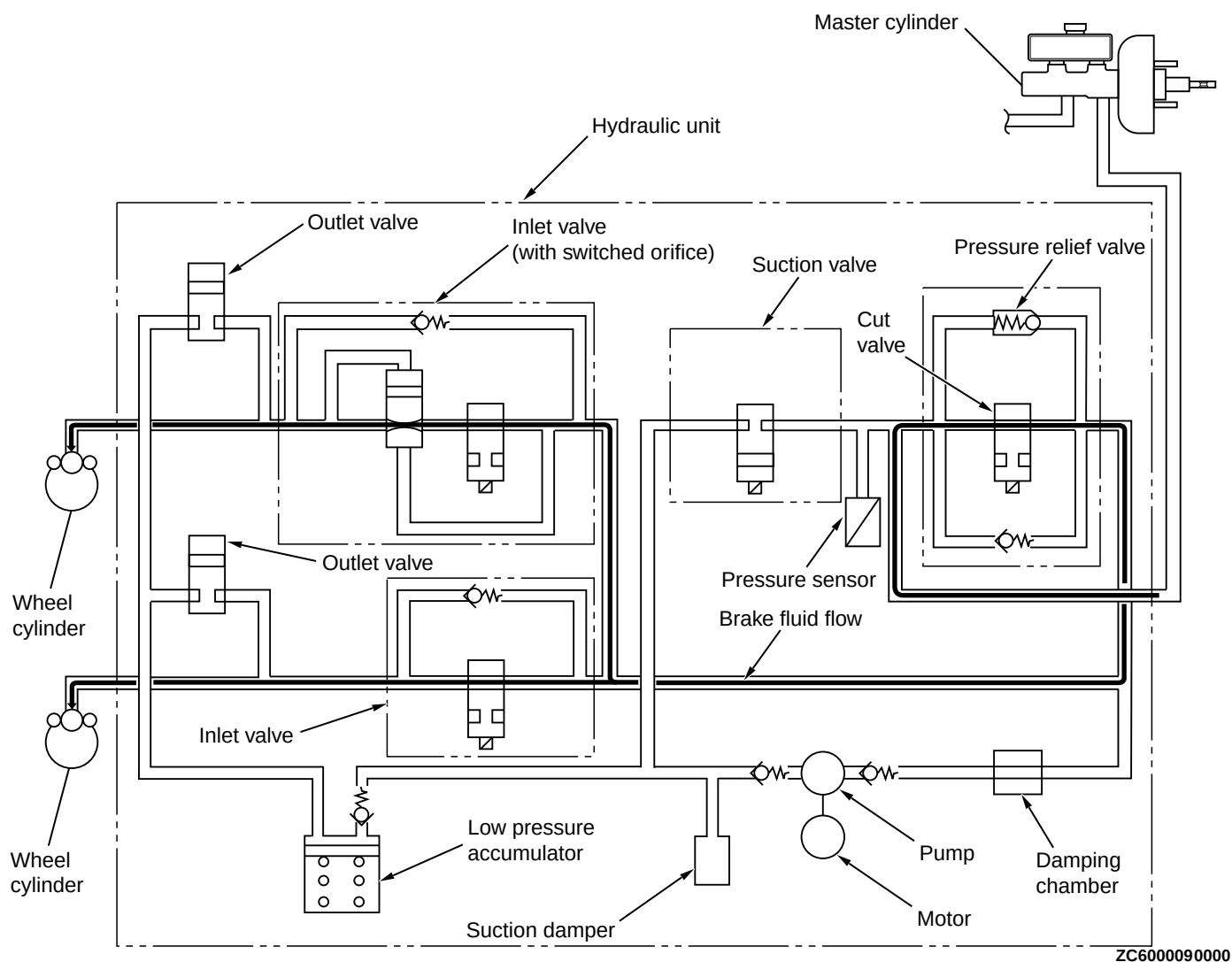
The system closes the inlet valve and outlet valve to hold the brake fluid pressure in the wheel cylinder. If

the brake fluid is stored in the low pressure accumulator, the brake fluid is returned to the master cylinder by driving the pump using the motor.

VALVE CONDITION

Item	Power status	Open/Close
Cut valve	OFF	Open
Suction valve	OFF	Closed
Inlet valve	ON	Closed
Outlet valve	OFF	Closed

WHEN BRAKE FLUID PRESSURE IS INCREASED BY ABS

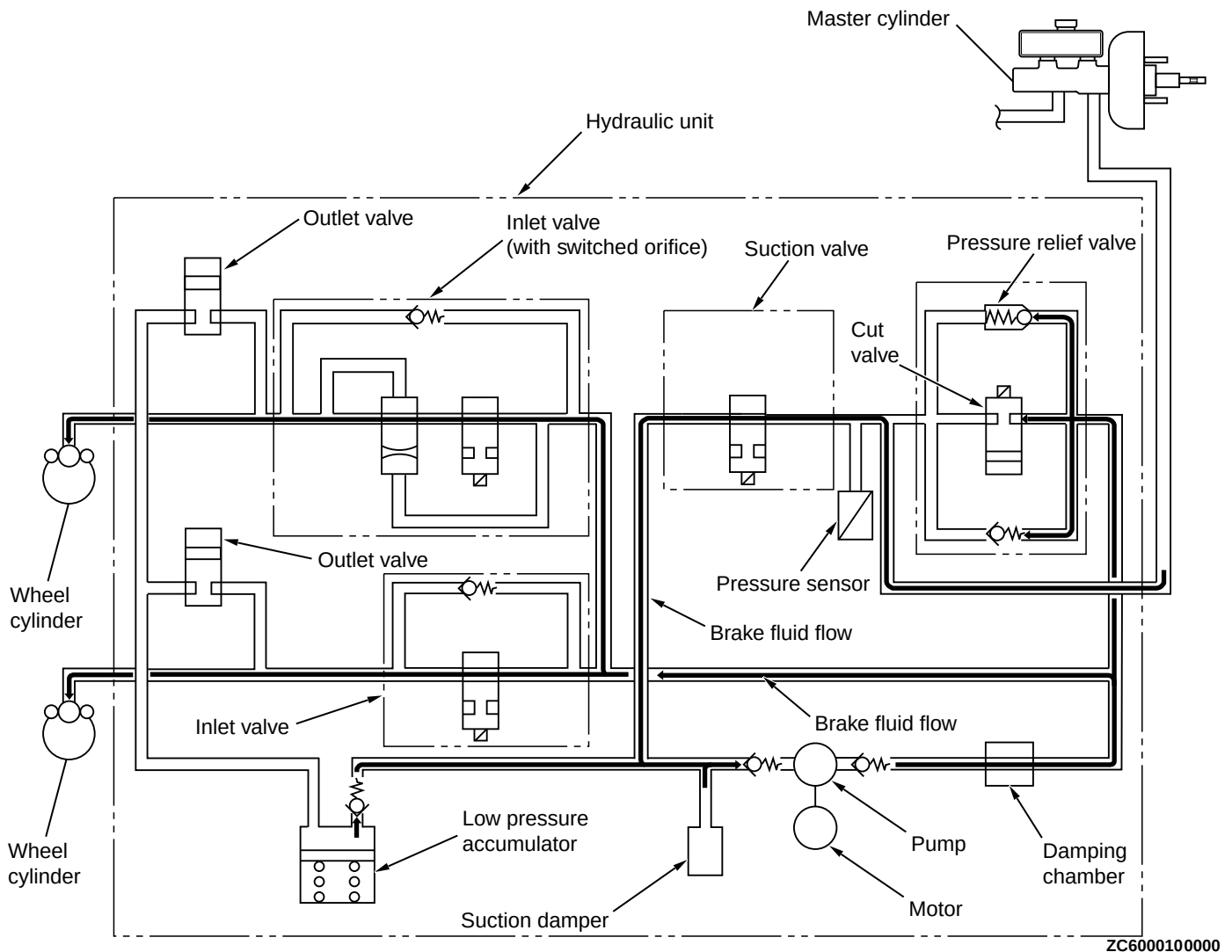


The system opens the inlet valve while closing the outlet valve to increase the brake fluid pressure in the wheel cylinder.

VALVE CONDITION

Item	Power status	Open/Close
Cut valve	OFF	Open
Suction valve	OFF	Closed
Inlet valve	OFF	Open
Outlet valve	OFF	Closed

When brake fluid pressure is increased by skid control (or increased by traction control)



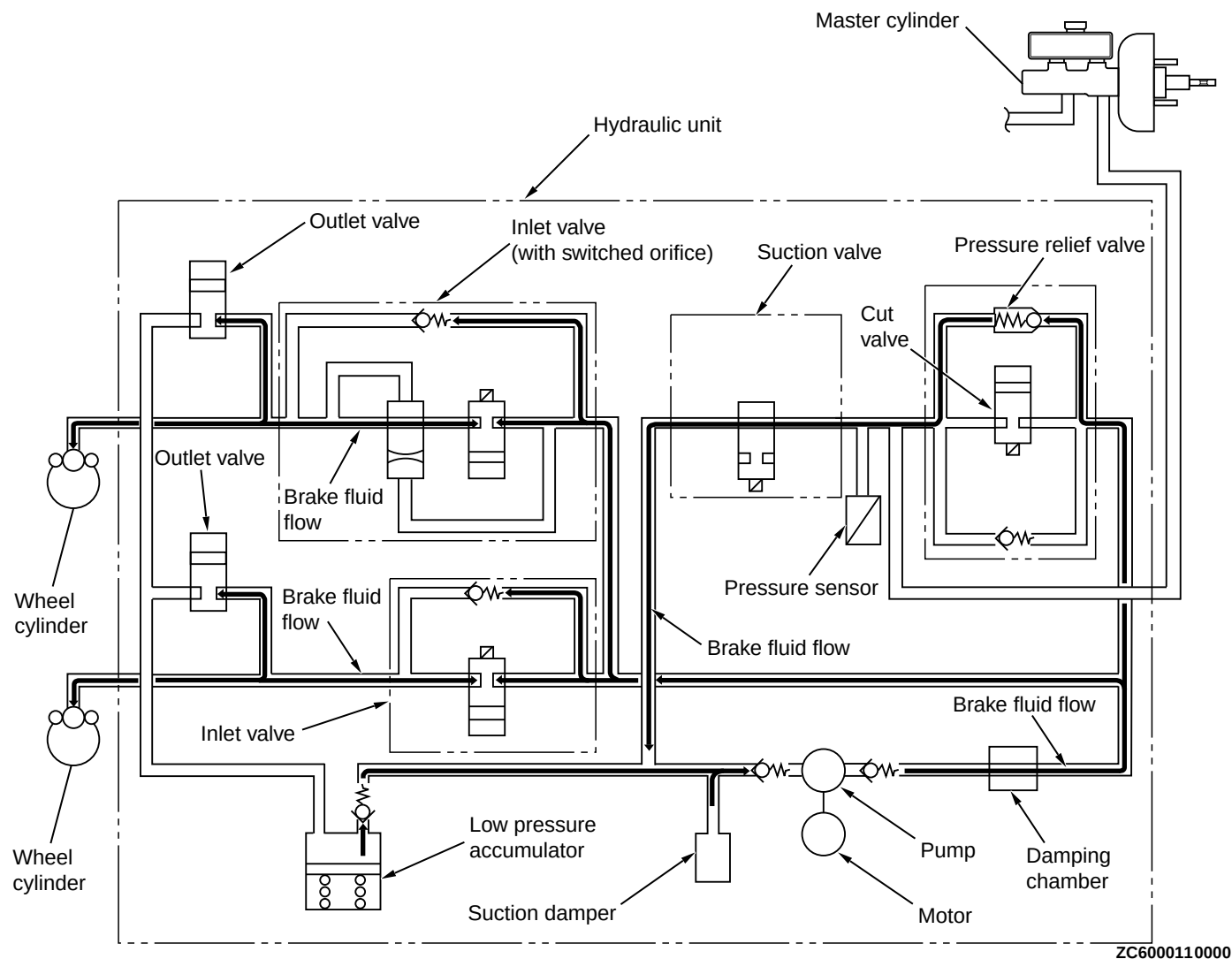
The system closes the cut valve to block the passage from the pump outlet to the master cylinder inlet, and opens the suction valve, connecting the passage from

the master cylinder to the pump inlet. The brake fluid from the master cylinder is supplied to the wheel cylinder.

VALVE CONDITION

Item	Power status	Open/Close
Cut valve	ON	Closed
Suction valve	ON	Open
Inlet valve	OFF	Open
Outlet valve	OFF	Closed

When brake fluid pressure is held by skid control (or held by traction control)

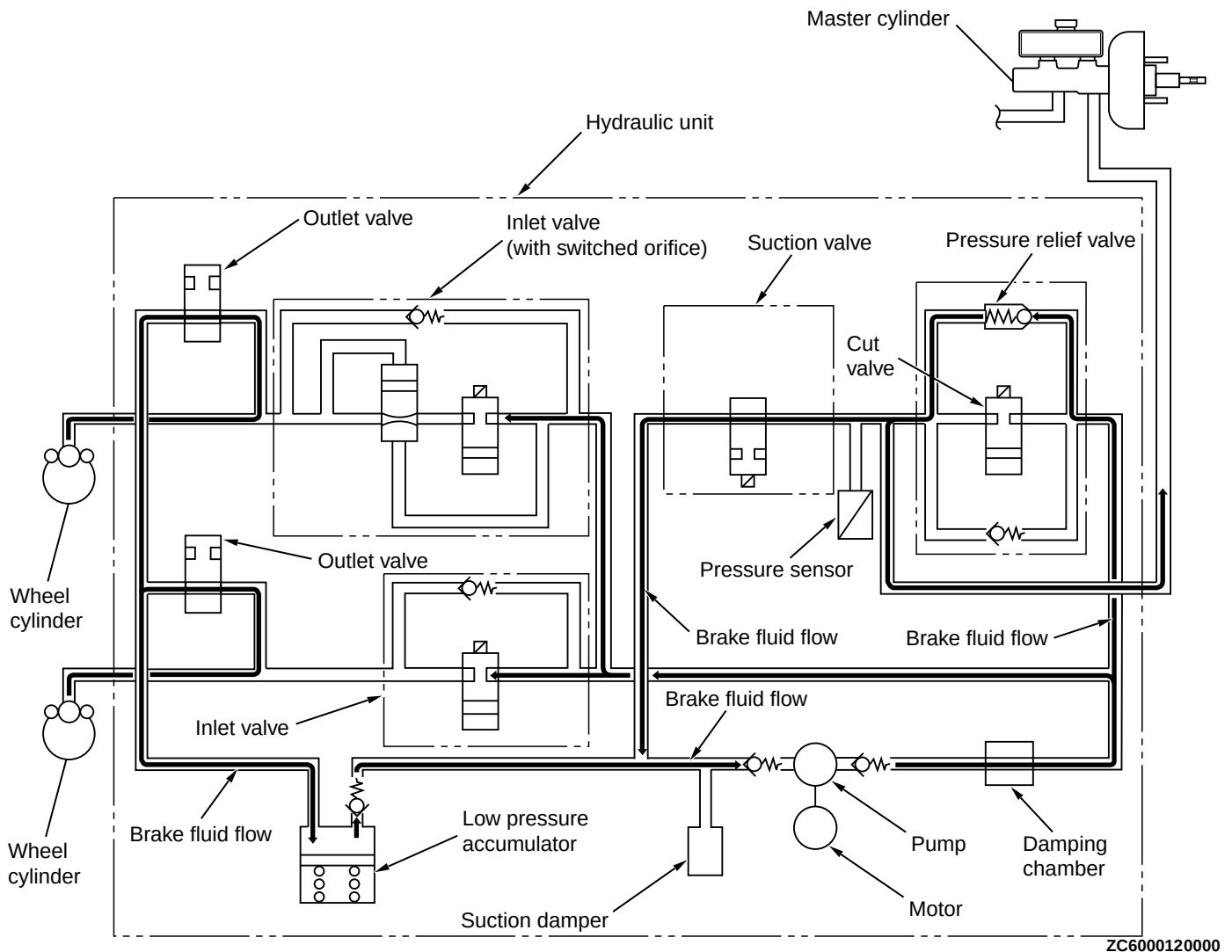


The system closes the inlet valve and outlet valve to hold the brake fluid pressure in the wheel cylinder.

The brake fluid pressurized by the pump returns to the pump through the pressure relief valve in the cut valve.

VALVE CONDITION		
Item	Power status	Open/Close
Cut valve	ON	Closed
Suction valve	ON	Open
Inlet valve	ON	Closed
Outlet valve	OFF	Closed

When brake fluid pressure is decreased by skid control (or decreased by traction control)



The system opens the outlet valve while closing the inlet valve to store the brake fluid filled in the wheel cylinder in the low pressure accumulator. The brake

fluid stored in the low pressure accumulator returns to the master cylinder through the pressure relief valve in the cut valve by driving the pump using the motor.

VALVE CONDITION

Item	Power status	Open/Close
Cut valve	ON	Closed
Suction valve	ON	Open
Inlet valve	ON	Closed
Outlet valve	ON	Open

TRACTION CONTROL OPERATION

The ASC-ECU receives various kinds of information from the engine ECU, AWD-ECU, steering wheel sensor, A/T-ECU, G and yaw rate sensor, and wheel speed sensor. When the ASC-ECU determines that a

driving wheel is slipping, it suppresses the wheel slippage. At this time, ASC-ECU controls the brake fluid pressure of the driving wheel determined to be slipping so that the torque is transferred to another driving wheel. Basically, the operations of ABS solenoid valve and ASC valve are the same. ASC-ECU, the engine ECU, and A/T-ECU communicate with each other via the CAN bus line. When the accelerator pedal is depressed too far, the signal requesting the engine speed reduction is sent to the engine ECU. The ASC-ECU performs joint control with A/T and secures the TCL controllability.