

ANTI-LOCK BRAKE SYSTEM

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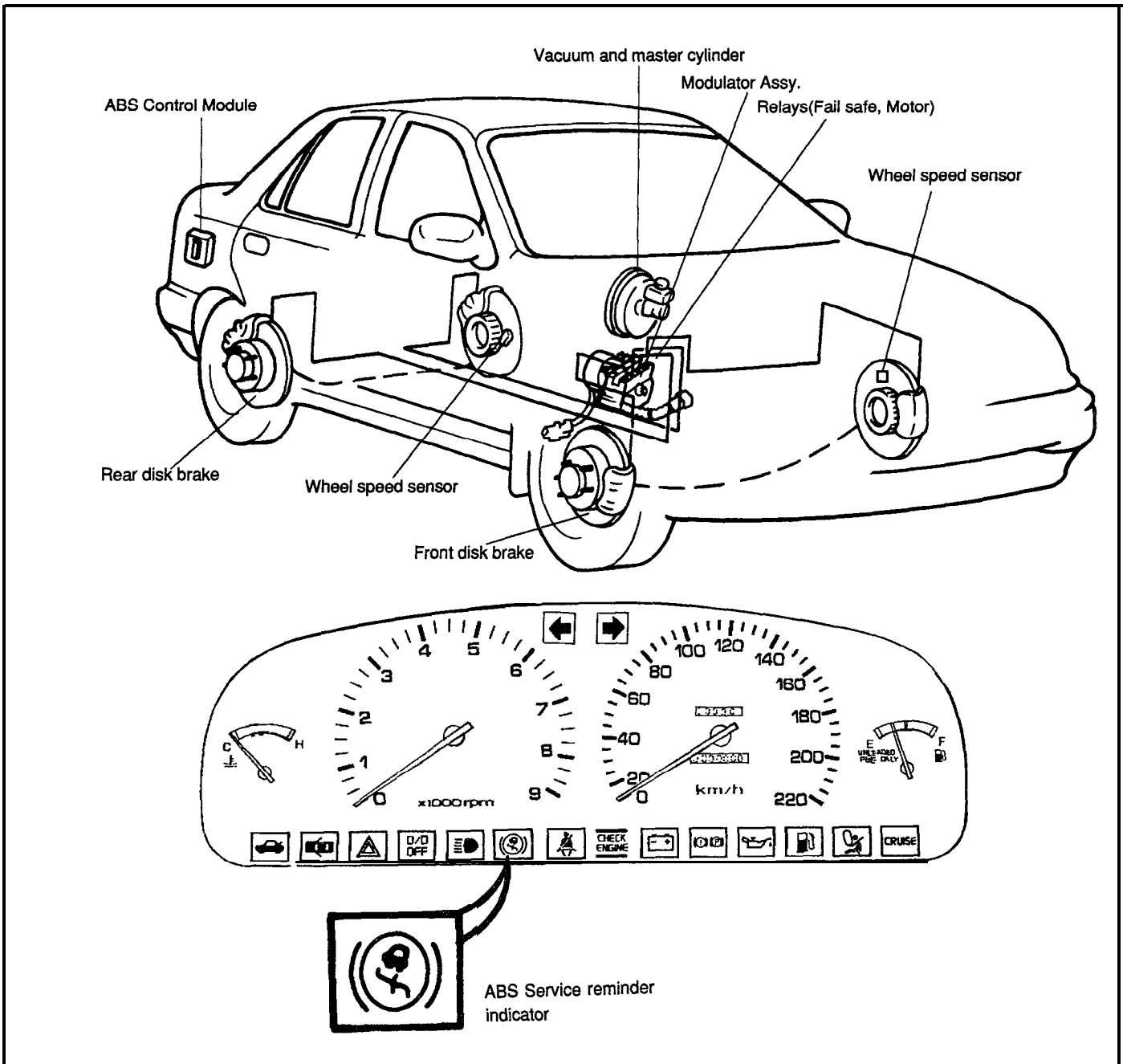
GENERAL SPECIFICATIONS

ABSCM (Anti-Lock Brake System Control Module)	
Operating voltage range	9.0-16.2V
Power consumption	150 mA or below
Controller fuse	10A
Operating temperature range	-40° to +80°C
ABS Service Reminder Indicator	
Power consumption	1.2W
Service Reminder Indicator fuse	10A
Modulator	
Operating voltage range	9.0-16.2V
Rated voltage	12v
Pump Motor fuse	30A
Solenoid fuse	20A
Operating temperature range	-40°C to 120°C

TIGHTENING TORQUE

	N.m	kg.cm	lb.ft
Sensor mounting bolt on the brake plate			
Front	7-11	70-110	5-8
Rear	17-26	170-260	12-19
Hydraulic unit mounting bolt	17-26	170-260	12-19
Hydraulic unit mounting bracket bolt	17-26	170-260	12-19
Six brake tubes on the Hydraulic Unit	13-17	130-170	9-12

SYSTEM COMPONENT

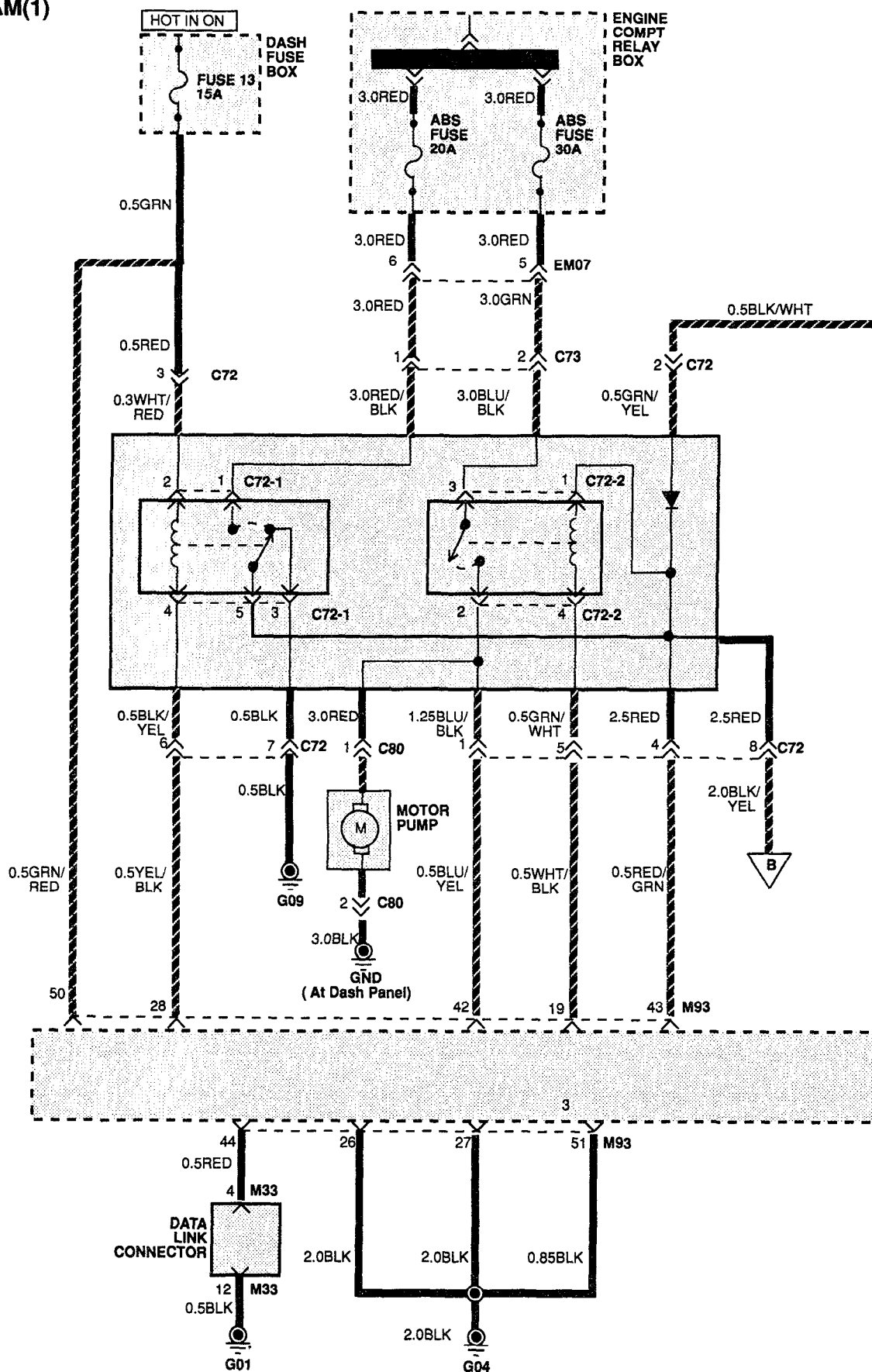


The Anti-Lock Brake System (ABS) controls the hydraulic brake pressure of all four wheels during sudden braking and braking on hazardous road surfaces, preventing the wheels from locking. The ABS provides the following benefits:

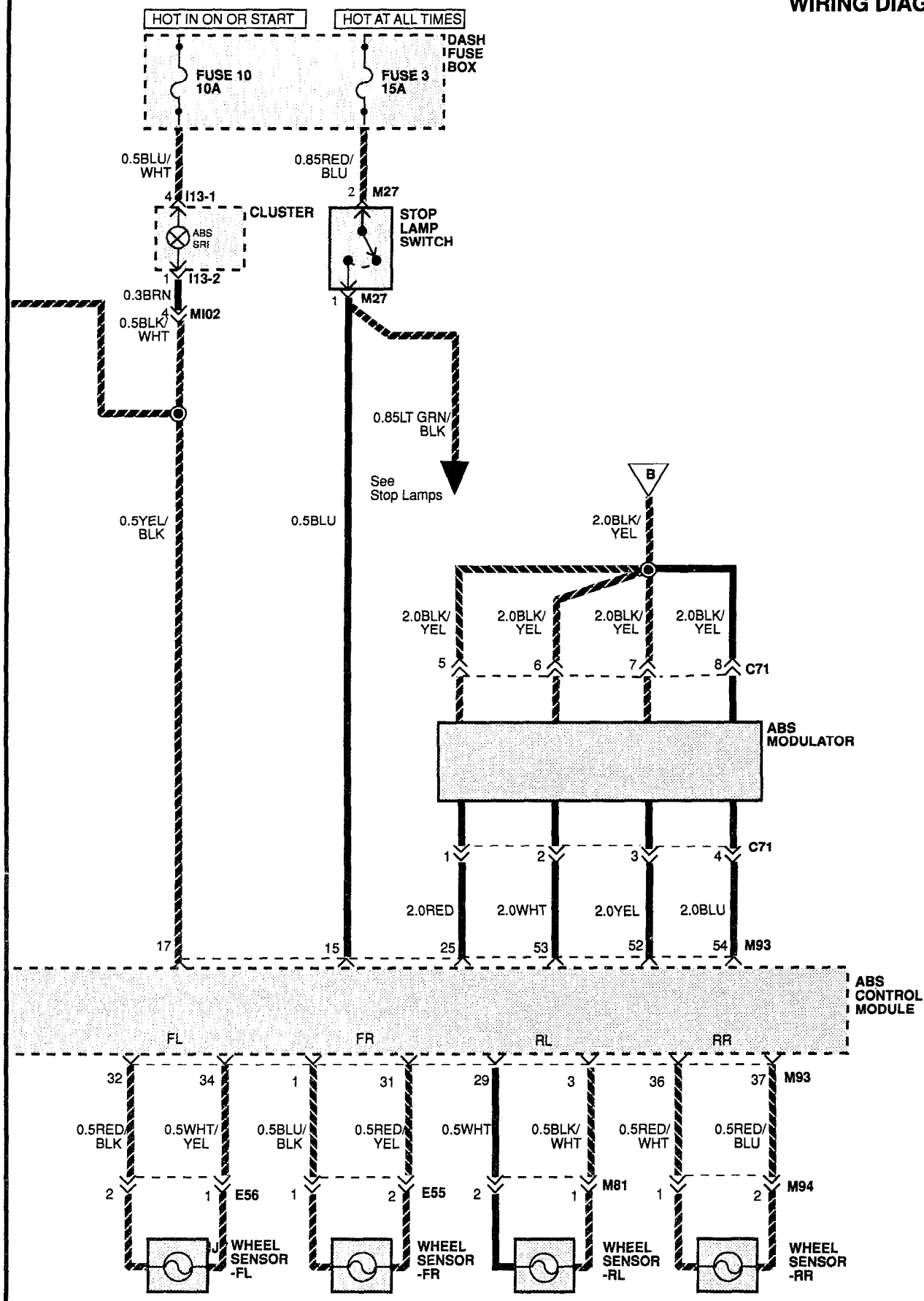
- (1) Enables steering around obstacles with a greater degree of certainty even during panic braking
- (2) Enables stopping during panic braking while allowing stability and steerability to a minimum, even on curves.

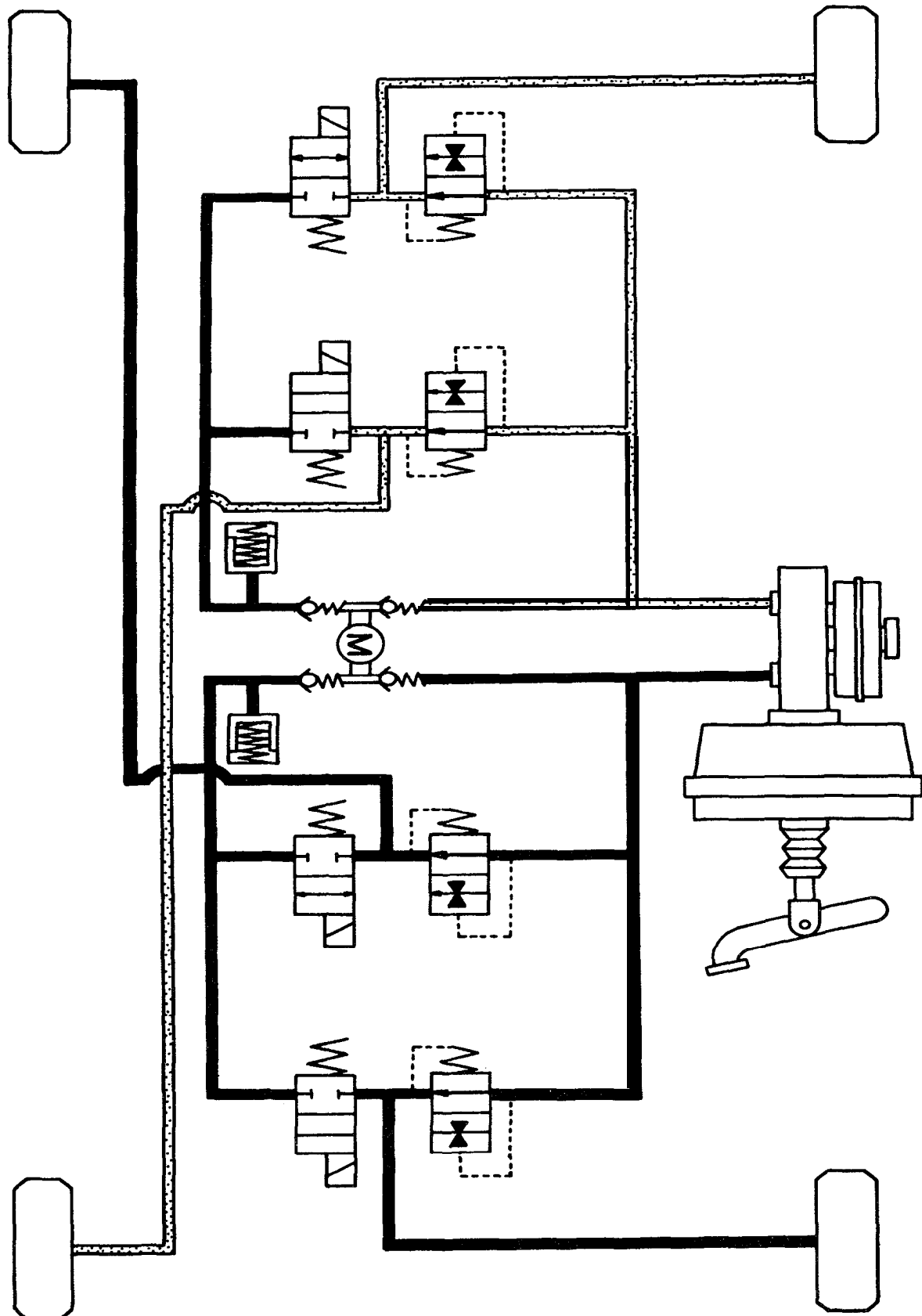
In case a malfunction occurs, a diagnosis function and fail-safe system have been included for serviceability.

WIRING DIAGRAM(1)



WIRING DIAGRAM(2)



**HYDRAULIC SYSTEM
DIAGRAM**

ABSCM CONNECTOR

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	X
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55

PIN NO.	PLUG ASSIGNMENT	I/O	PIN NO.	PLUG ASSIGNMENT	I/O
1	SENSOR RIGHT FRONT	I	34	SENSOR LEFT FRONT GND	I
3	SENSOR LEFT REAR GROUND	I	36	SENSOR RIGHT REAR	I
15	BRAKE LIGHT SWITCH	I	37	SENSOR RIGHT REAR GND	I
17	ABS SRI	O	42	MOTOR MONITOR LINE	I
19	MOTOR RELAY DRIVE	O	43	F/SF RELAY MONITOR	I
25	SOLENOID REAR RIGHT	O	44	DLC INPUT/OUTPUT	I/O
26	GROUND FOR SOLENOIDS	I	50	IGNITION SIGNAL	I
27	GROUND FOR SOLENOIDS	I	51	CONTROLLER GROUND	I
28	F/SF RELAY DRIVE	O	52	SOLENOID RIGHT FRONT	O
29	SENSOR LEFT REAR	I	53	SOLENOID LEFT REAR	O
31	SENSOR RIGHT FRONT GND	I	54	SOLENOID LEFT FRONT	O
32	SENSOR LEFT FRONT	I			

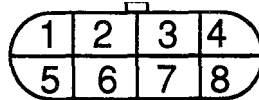
I : INPUT

O : OUTPUT F/SF : Fail safe

SRI : Service Reminder Indicator

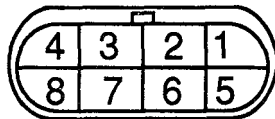
DLC : Data Link Connector

Modulator connector(C71)



PIN NO.	PLUG ASSIGNMENT	PIN NO.	PLUG ASSIGNMENT
1	RIGHT REAR SOLENOID GND	5	RIGHT REAR SOLENOID
2	LEFT REAR SOLENOID GND	6	LEFT REAR SOLENOID
3	RIGHT FRONT SOLENOID GND	7	RIGHT FRONT SOLENOID
4	LEFT FRONT SOLENOID GND	8	LEFT FRONT SOLENOID

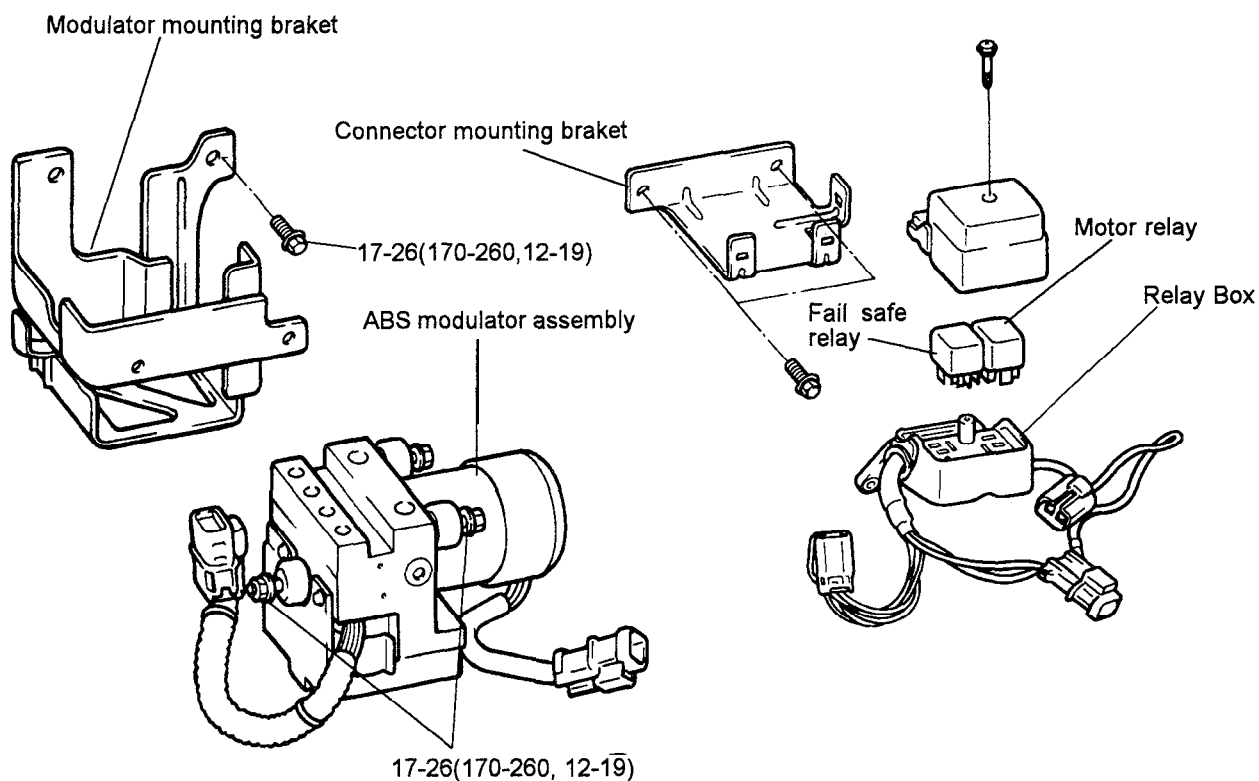
Relay Box connector(C72)



PIN NO.	PLUG ASSIGNMENT	PIN NO.	PLUG ASSIGNMENT
1	MOTOR MONITOR LINE	5	MOTOR RELAY DRIVE LINE
2	SRI DRIVE LINE	6	F/SF RELAY DRIVE LINE
3	F/SF RELAY POWER SUPPLY	7	RELAY GND
4	F/SF RELAY MONITOR LINE	8	MODULATOR POWER SUPPLY

ABS MODULATOR AND ABS RELAY

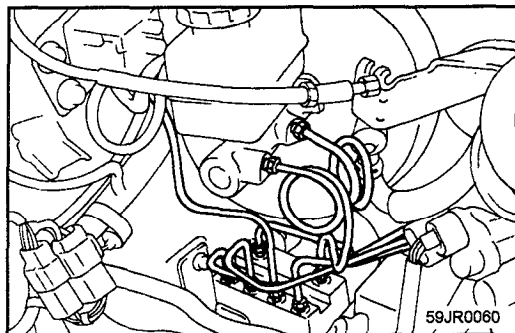
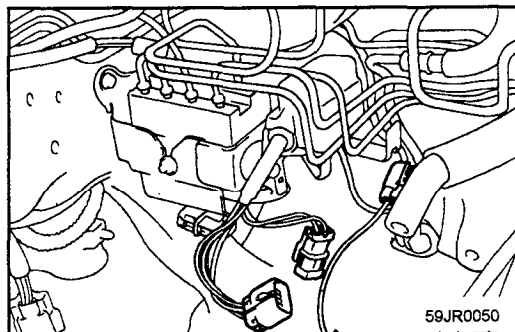
COMPONENTS



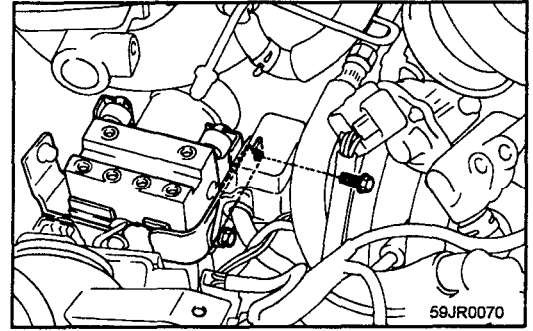
TIGHTENING TORQUE : N.m(kg.cm, lb.ft)

REMOVAL

1. Remove the Air cleaner assembly.
2. Disconnect the ABS Relay box harness, Motor Pump harness and modulator harness
3. Disconnect the brake tubes from the ABS modulator to the brake master cylinder and proportioning valve.



4. Remove the Relay box from modulator mounting bracket.



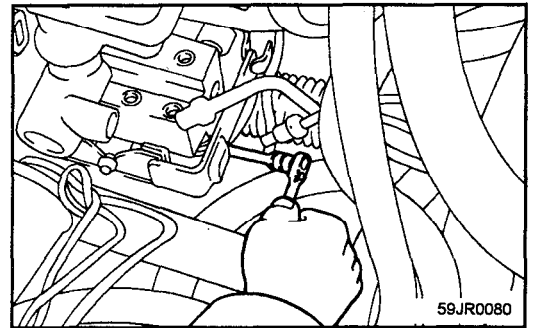
5. Remove the Modulator mounting Bracket and remove the modulator.

CAUTION

1. Never attempt to disassemble the ABS modulator
2. The modulator must be transported and stored in upright position and with sealed ports.
The modulator must not be drained.

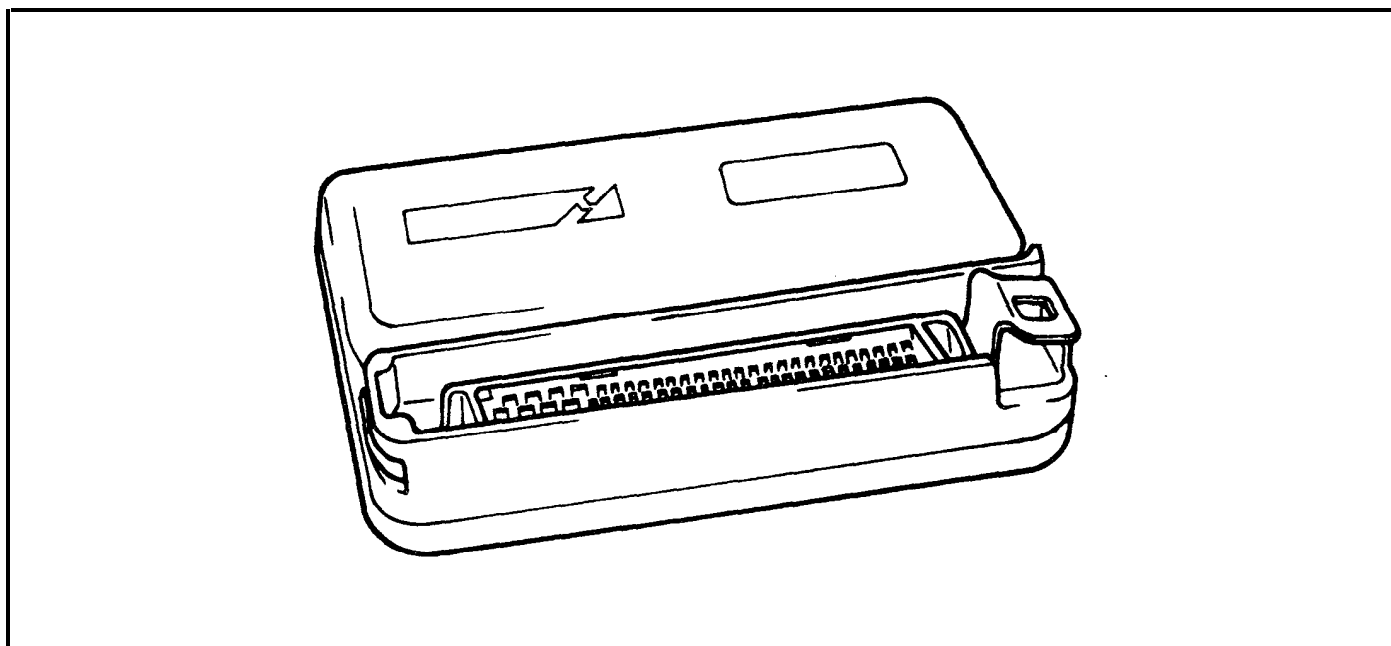
INSTALLATION

1. Follow the reverse order of Removal.
2. Tighten the modulator mounting bolts and brake tube nuts to the specified torque.

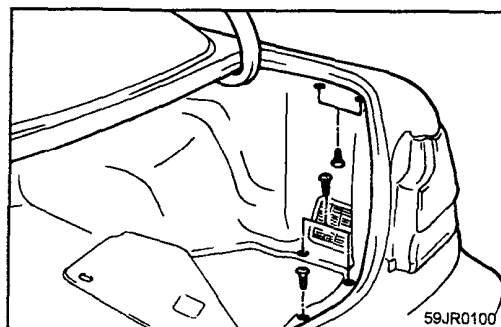


Tightening torque

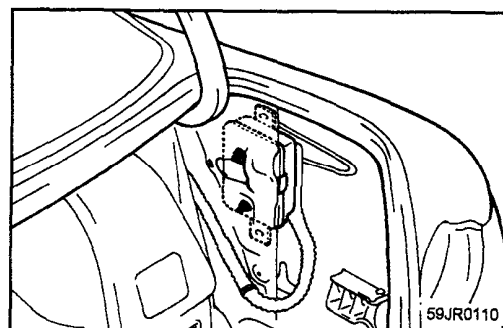
Modulator mounting bolt .. 1 7-26 N.m(170-260 kg.cm, 12-19 lb)
Brake tube nut..... 13-17 N.m(130-170 kg.cm, 9-12 lb)

ABSCM (ABS Control Module)**REMOVAL**

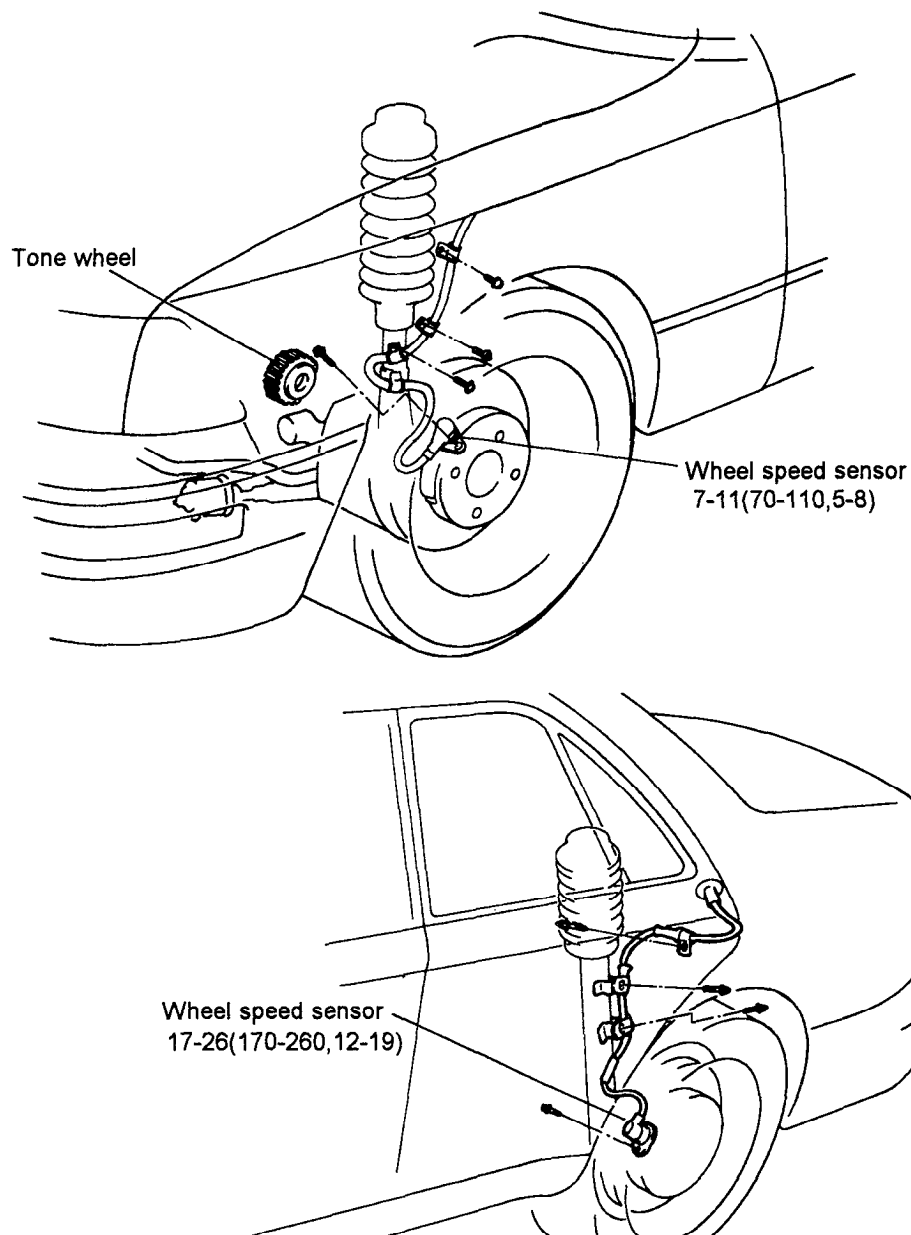
1. Remove the luggage side trim



2. Remove the ABSCM.



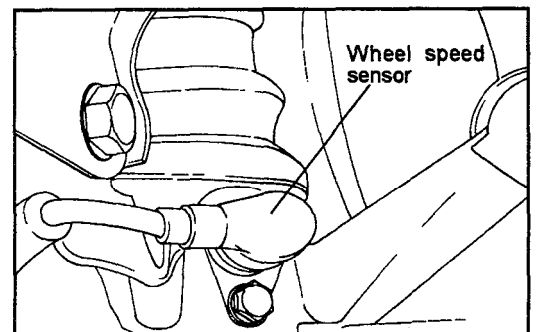
WHEEL SPEED SENSOR



TIGHTENING TORQUE

REMOVAL

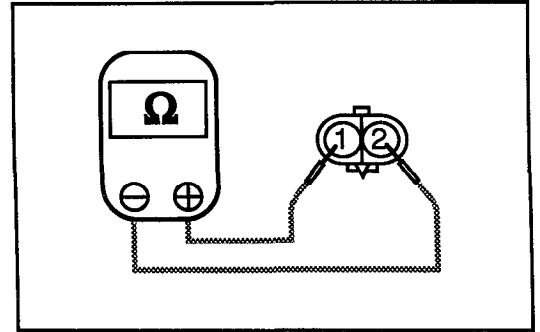
1. Disconnect the wheel speed sensor connector and mounting bolts.



INSPECTION

1. Connect an ohmmeter between the wheel speed sensor terminals and measure the resistance.

Service standard : Front : 1275-1495 Ω
Rear : 1260-1540 Ω

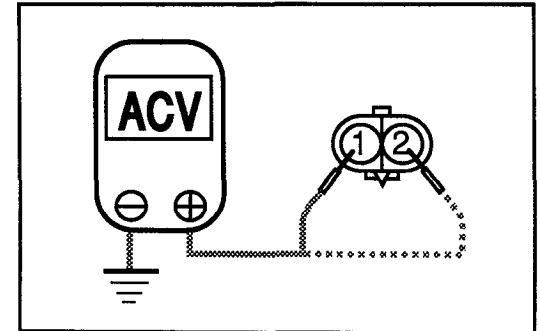


2. Connect a voltmeter between the wheel speed sensor terminals, and measure the voltage by turning the wheel.

NOTE

Set the voltmeter to measure AC voltage.

Service standard : AC voltage detected.



BLEEDING OF BRAKE SYSTEM

NOTE

There are no special bleeding procedure for the ABS SYSTEM. For bleeding please use the standard rules as described for the conventional brake system as follows.

BLEEDING OF BRAKE SYSTEM

1. Remove the reservoir cap and fill the brake reservoir with brake fluid.

CAUTION

Do not allow brake fluid remain on a painted surface. Wash it off immediately.

NOTE

When bleeding by pressurized fluid, do not depress the brake pedal.

2. Connect the vinyl tube to the wheel cylinder bleeder screw, and insert the other end of tube in a half full container of brake fluid.
3. Slowly pump the brake pedal several times.
4. While depressing the brake pedal fully, loosen the bleeder screw until fluid starts to run out. Then close the bleeder screw.

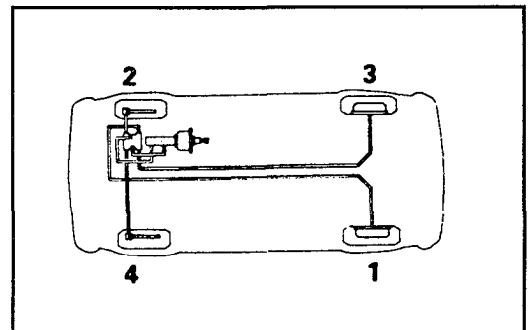
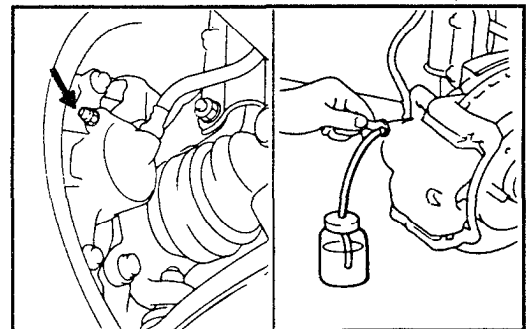
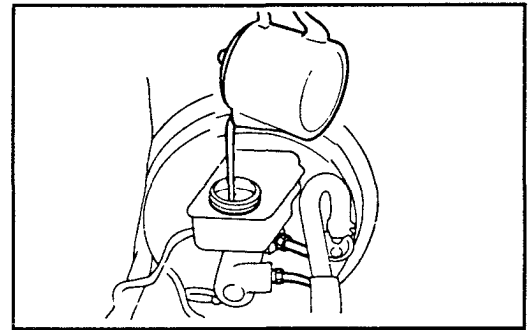
5. Repeat the 3 and 4 until there are no more bubbles in the fluid.
6. Tighten the bleeder plug screw.

Bleeder screw tightening torque

Front : 7-13 Nm (70-130 kg.cm, 5-10 lb.ft)

Rear : 8-20 Nm (80-200 kg.cm, 6-15 lb.ft)

7. Repeat the above procedure for each wheel in the sequence shown in the illustration.

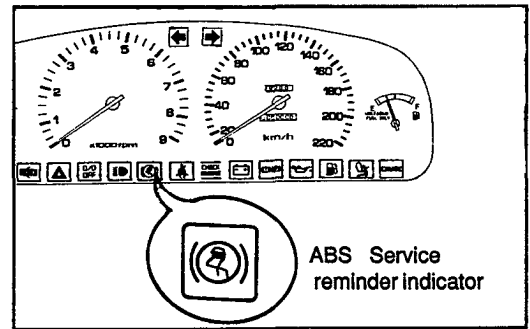


SYSTEM DIAGNOSIS STEP

INDICATOR CHECK

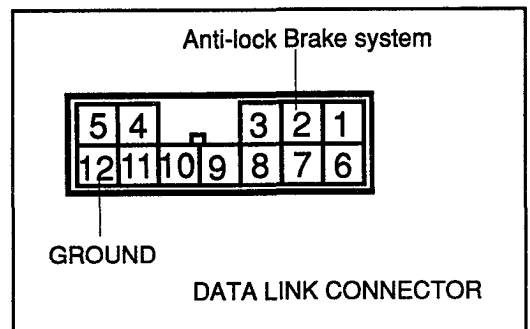
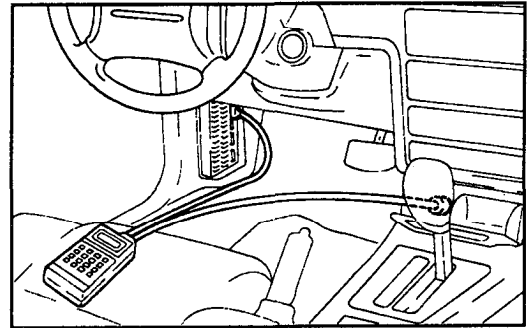
When the ignition switch is turned on, check that the ABS SRI goes ON for 6 seconds.

If the SRI is not illuminated immediately after ignition on, the ABS fail safe relay may be at fault.



SCAN TOOL CHECK

1. Turn the ignition OFF.
2. Connect the scan tool to the data link connector in the fuse box.
3. Connect the power-source terminal of the scan tool to the cigarette lighter socket.
4. Turn the ignition ON.
5. Use the scan tool to check the self-diagnosis codes.
6. After completion of the repair or correction of the problems, turn OFF the ignition switch; then erase the stored diagnostic trouble codes using the scan tool.
7. Disconnect the scan tool.

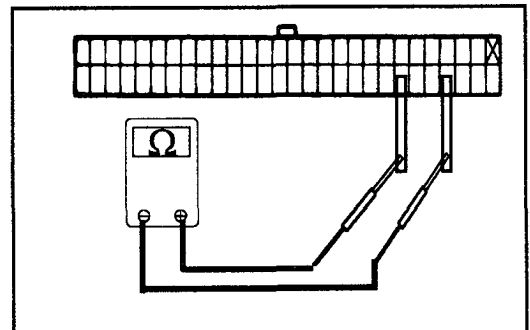


CONNECTOR CHECK

1. Remove the battery negative (-) terminal.
2. Disconnect the connectors and check the terminals following the troubleshooting procedure.

NOTE

When performing the test procedures, be careful not to damage the connector terminals.



Diagnostic trouble code chart

Diagnostic trouble code No.	Scan tool Display	Diagnosis item	Description
19	TONE WHEEL	CHECK THE TONE WHEELS	Check for a defective tone wheel on a wheel.
21	SOL. LF-SHRT	LEFT FRONT SOLENOID	Detection for short circuit to +12 Volt for the left front solenoid.
22	SOL. LF-OPEN	LEFT FRONT SOLENOID	Detection for open circuit or short circuit to GND for the left front solenoid.
23	SOL. RF-SHRT	RIGHT FRONT SOLENOID	Detection for short circuit to +12 Volt for the right front solenoid.
24	SOL. RF-OPEN	RIGHT FRONT SOLENOID	Detection for open circuit or short circuit to GND for the right front solenoid.
25	SOL. LR-SHRT	LEFT REAR SOLENOID	Detection for short circuit to +12 Volt for the left rear solenoid.
26	SOL. LR-OPEN	LEFT REAR SOLENOID	Detection for open circuit or short circuit to GND for the left rear solenoid.
27	SOL. RR-SHRT	RIGHT REAR SOLENOID	Detection for short circuit to +12 Volt for the right rear solenoid.
28	SOL. RR-OPEN	RIGHT REAR SOLENOID	Detection for open circuit or short circuit to GND for the right rear solenoid.
31	SNSR. LF-GAP	LEFT FRONT SENSOR	Detection for the air gap of the tone wheel. This detection will be activated if all wheel speeds are zero and the ABS-function is not active.
32	SNSR. RF-GAP	RIGHT FRONT SENSOR	Detection for the air gap of the tone wheel. This detection will be activated if all wheel speeds are zero and the ABS-function is not active.
33	SNSR. LR-GAP	LEFT REAR SENSOR	Detection for the air gap of the tone wheel. This detection will be activated if all wheel speeds are zero and the ABS-function is not active.
34	SNSR. RR-GAP	RIGHT REAR SENSOR	Detection for the air gap of the tone wheel. This detection will be activated if all wheel speeds are zero and the ABS-function is not active.
35	MOTOR PUMP	MOTOR PUMP	Faulty or seized up motor pump.

Diagnostic trouble code No.	Scan tool Display	Diagnosis item	Description
36	MP RLY-OPEN	MOTOR RELAY CIRCUIT	Detection for a open circuit or a short circuit to GND from the motor pump relay.
37	MP RLY-SHRT	MOTOR RELAY CIRCUIT	Detection for a short circuit to +12 Volt from the motor pump relay.
38	MP BATT-SHRT	PUMP MOTOR	Detection for a short circuit at the motor pump
39	MP GND-SHRT	PUMP MOTOR	Detection for a short circuit to GND at the motor pump
41	FAIL RLY-SHRT	FAIL SAFE RELAY	Fail safe relay contacts are short circuit.
42	FAIL RLY-OPEN	FAIL SAFE RELAY	Fail safe relay contacts are open circuit
43	FAIL COIL	FAIL SAFE RELAY COIL	The current from the fail safe relay is too high or too low
44	ABS SRI-GND	SERVICE REMINDER INDICATOR	Detection of a short circuit of the Service Reminder Indicator (Permanently on)
45	ABS SRI-DIODE	SERVICE REMINDER INDICATOR DIODE	Detection for a open circuit of the diode for the Service Reminder Indicator ABS.
54	ABS SRI-BATT	SERVICE REMINDER INDICATOR	Detection for a short circuit to +12V of the Service Reminder Indicator
55	ABS SRI-OPEN	SERVICE REMINDER INDICATOR	Detection for a open circuit of the Service Reminder Indicator ABS.
56	BATT. VOLT-LO	BATTERY VOLTAGE	Battery voltage out of the function range (Under voltage) for the system.
57	BATT.VOLT-HI	BATTERY VOLTAGE	Battery voltage out of the function range (Over voltage) for the system.
62	SNSR. LF-OPEN	LEFT FRONT SENSOR CIRCUIT	Sensor open circuit or short to 12 Volt detection for the left front wheel
63	SNSR. RF-OPEN	RIGHT FRONT SENSOR CIRCUIT	Sensor open circuit or short to 12 Volt detection for the right front wheel.
64	SNSR. LR-OPEN	LEFT REAR SENSOR CIRCUIT	Sensor open circuit or short to 12 Volt detection for the left rear wheel.
65	SNSR. RR-OPEN	RIGHT REAR SENSOR CIRCUIT	Sensor open circuit or short to 12 Volt detection for the right rear wheel.
66	SNSR. LF-SHRT	LEFT FRONT SENSOR CIRCUIT	Sensor short to GND detection for the left front wheel

Diagnostic trouble code No.	Scan tool Display	Diagnosis item	Description
67	SNSR. RF-SHRT	RIGHT FRONT SENSOR CIRCUIT	Sensor short to GND detection for the right front wheel.
68	SNSR. LR-SHRT	LEFT REAR SENSOR CIRCUIT	Sensor short to GND detection for the left rear wheel.
69	SNSR. RR-SHRT	RIGHT REAR SENSOR CIRCUIT	Sensor short to GND detection for the right rear wheel.
71	SNSR. LF-S. JMP	LEFT FRONT TONE WHEEL	Detection for missing teeth on the tone wheel or speed jumps over-100g on the left front wheel.
72	SNSR. RF-S.JMP	RIGHT FRONT TONE WHEEL	Detection for missing teeth on the tone wheel or speed jumps over-100g on the right front wheel.
73	SNSR. LR-S.JMP	LEFT REAR TONE WHEEL	Detection for missing teeth on the tone wheel or speed jumps over-100g on the left rear wheel.
74	SNSR. RR-S.JMP	RIGHT REAR TONE WHEEL	Detection for missing teeth on the tone wheel or speed jumps over -100g on the right rear wheel.
77	ABSCM-FAIL	ABSCM ERROR	Detection of a ABSCM (ABS Control module) error.

SERVICE DATA

SCAN TOOL (MUT) DISPLAY	DESCRIPTION	REMARKS
21. SOLENOID VALVES FL ON or OFF. FR ON or OFF RL ON or OFF. RR ON or OFF	Solenoid valves operation status	
31. WHEEL SPEED SENSORS (KPH) LF ***/RF ***/ LR ***/RR ***/	Wheel speed sensors sensing speed	Minimum level is 2 kph
36. MP. RLY ON or OFF	Motor pump relay	
38. MOTOR PUMP ON or OFF	Motor pump monitor	
41. FAILSAFE RLY ON or OFF	Failsafe relay	
44. ABS SRI ON or OFF	ABS service reminder indicator	
56. BATTERY VOLT *** V	Battery voltage	Operating condition of ABS : 10.0-16.2 V
81. STOP LAMP SW ON or OFF	Stop lamp switch	

ACTUATOR TEST

- Test condition : Ignition "ON"-

SCAN TOOL (MUT) DISPLAY	RECOGNITION	REMARKS
21. SOLENOID - LF	Front left solenoid valve operation (Click sounds)	Actuation time is limited to MAX. 20 seconds
23. SOLENOID - RF	Front right solenoid valve operation (Click sounds)	
25. SOLENOID - LR	Rear left solenoid valve operation (Click sounds)	
27. SOLENOID - RR	Rear right solenoid valve operation (Click sounds)	
36. MP. RLY	Motor pump relay operation (Click sounds)	

DIAGNOSTIC TROUBLE CHART

If a diagnostic trouble code is displayed during MUT checking.

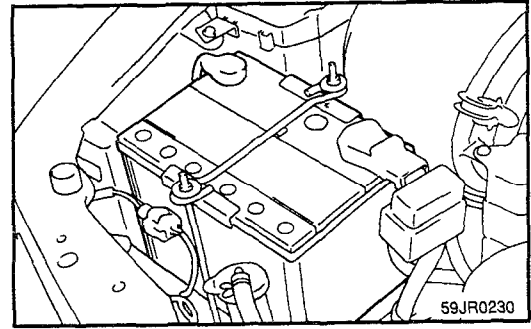
Check the circuit listed for that code in the table below and proceed to the page given.

Code No.	Inspection circuit or parts	See page
56, 57	Power supply	58A-20
44, 45, 54, 55	Service Reminder Indicator Circuit	58A-23
41, 42, 43	Fault/shutdown Relay	58A-28
37, 35, 38	Motor Pump Relay Motor Pump (Short B+)	58A-32
36, 39	Motor Pump (Short Ground)	58A-36
21, 23, 25, 27	Modulator (Solenoid valve) (Short to battery)	58A-40
22, 24, 26, 28	Modulator (Solenoid valve) (Short to ground)	58A-43
62, 63, 64, 65,	Speed sensor (Short to battery)	58A-46
66, 67, 68, 69,	Speed sensor (Short to ground))	58A-48
31, 32, 33, 34,	Speed sensor (Air gap)	58A-50
71, 72, 73, 74,19	Speed sensor (speed jump)	58A-53
	Stop Light Switch Circuit	58A-56
	Data link connector Circuit	58A-57
77	ABSCM (ABS Control Module)	58A-59

CIRCUIT INSPECTION

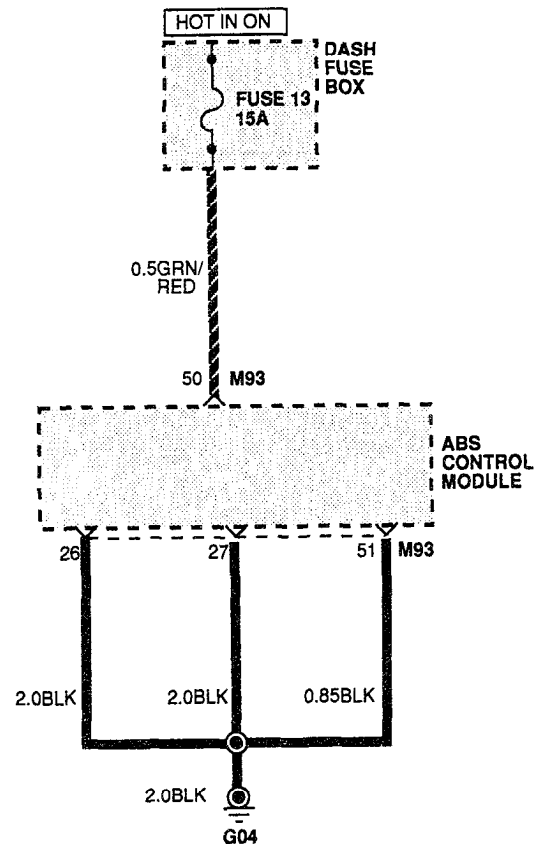
POWER SOURCE VOLTAGE

Detection of battery voltage out of the function range for the system.



Error Code	Scan tool Display	Symptom	Possible Cause
56	BATT. VOLT-LO	ABSCM power supply voltage is 8.9V or below	<ul style="list-style-type: none"> o Battery o Charging circuit o Harness connector between battery and ABSCM, ABSCM and body ground.
57	BATT. VOLT-HI	ABSCM power supply voltage is 16.2V or higher	

WIRING DIAGRAM

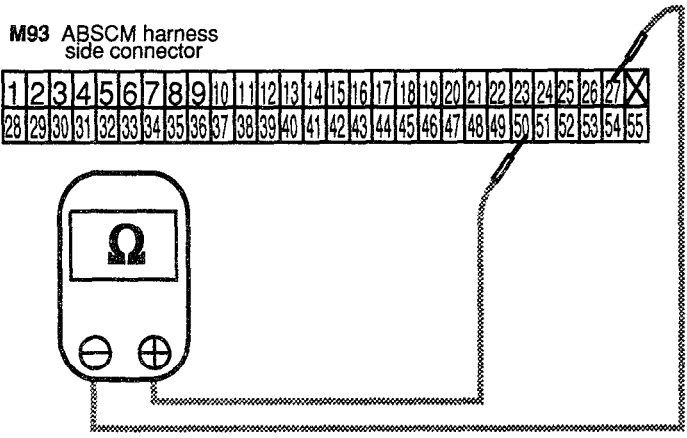


INSPECTION PROCEDURE

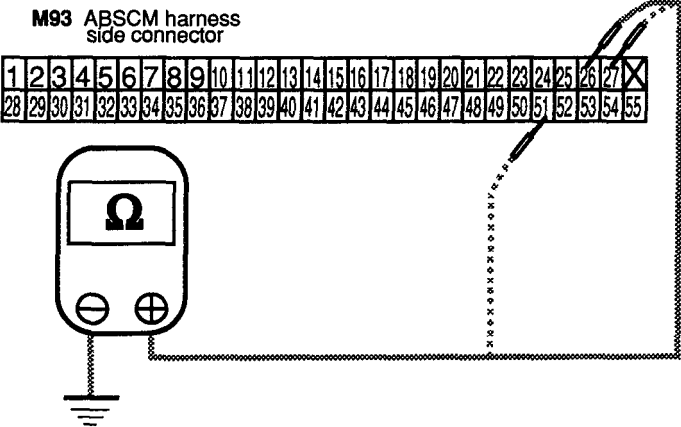
1. Check the ABSCM fuse

	<p>1. Remove the FUSE 18 and Inspect in the DASH FUSE BOX.</p> <p>LIMIT Continuity</p>
<p>OK → 2</p>	<p>NG → Replace Fuse 18 then recheck with MUT procedure.</p>

2. Check Voltage between Battery (+) and GND of ABSCM connector

<p>M93 ABSCM harness side connector</p> 	<p>1. Remove battery negative(-) terminal. 2. Remove the ABSCM and disconnect the connector 3. Connect battery negative(-) terminal 4. Turn ignition switch to ON position 5. Measure the supply voltage between terminals 50 and 27.</p> <p>LIMIT 9.5V ~ 14.2V</p>
<p>OK → Connect the ABSCM and re-check the diagnostic code, if code 56, 57 displayed, check and re-connect the ABSCM.</p>	<p>NG → 3</p>

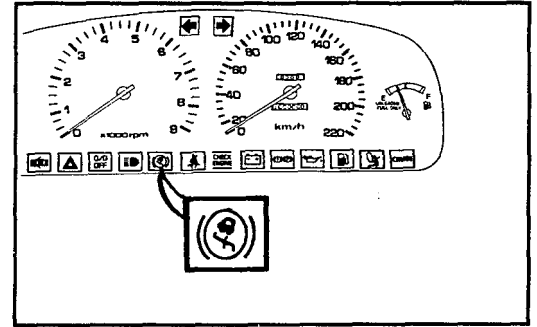
3. Check Continuity between the ABSCM connector GND and Body GND

 <p>M93 ABSCM harness side connector</p>		<ol style="list-style-type: none"> 1. Turn the ignition switch to the LOCK position. 2. Disconnect ABSCM connector. 3. Measure the ground connection between terminal 27 and body ground, terminal 26 and body ground, terminals 51 and body ground.
		<div style="border: 1px solid black; padding: 2px; display: inline-block;">LIMIT</div> <p>0.5 2 or below</p>
<p>Check for an open between the harness and the connector between the ABSCM and the battery</p>		<p>NG→</p> <ol style="list-style-type: none"> 1. Check ground connection for corrosion and loosing 2. Repair harness or connector.

ABS SRI (Service Reminder Indicator) Circuit.

If the trouble occurs, ABSCM lights the ABS-SRI while at the same time terminating ABS operation. At this time, the ABSCM records a diagnostic code in memory.

If the ABSCM detects a fault in the Anti-Lock Brake System, the ABSCM turns the ABS SRI on and disables the ABS. At the same time a trouble code is stored in the ABSCM memory.

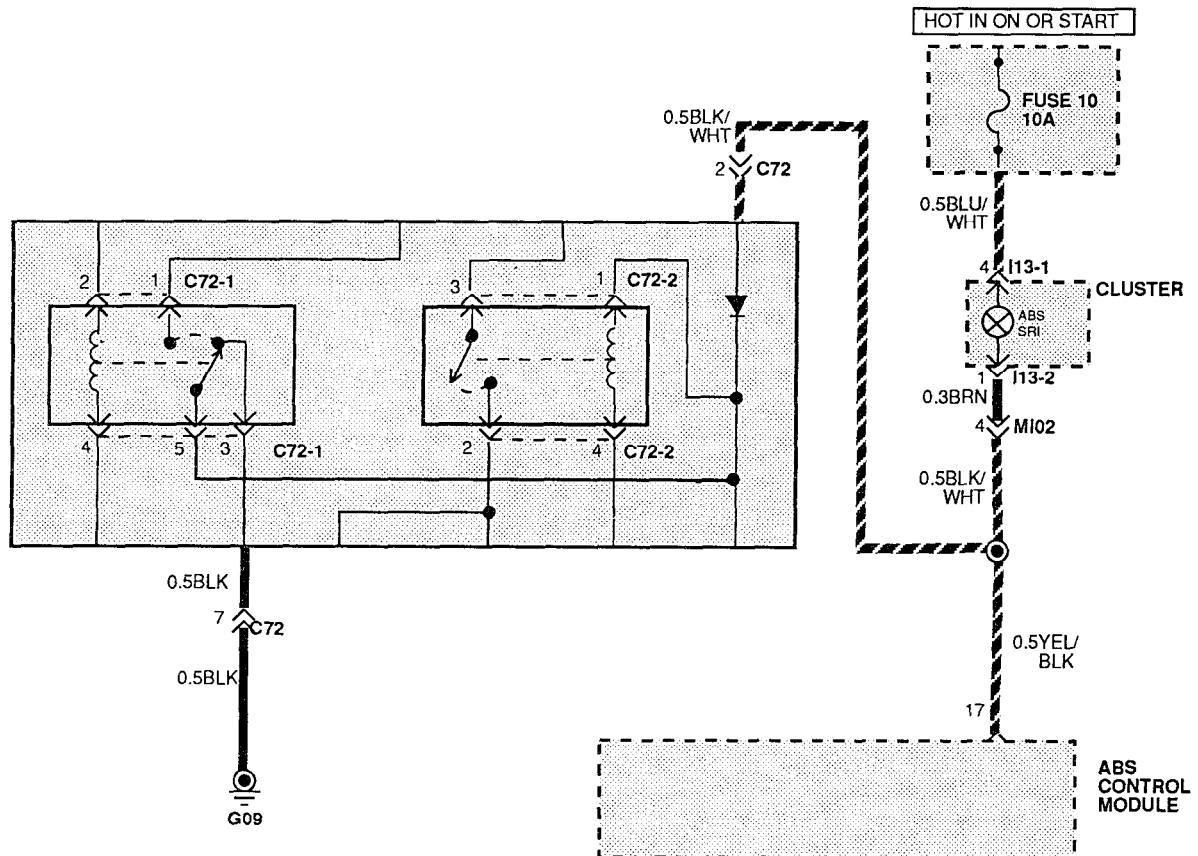


Code No.	Scan tool Display	Symptom	Possible Cause
44	ABS SRI-GND	Service Reminder Indicator short to ground	Service Reminder Indicator Box (Fail safe Relay) Fuse
45	ABS SRI-DIODE	Service Reminder Indicator diode not OK	
54	ABS SRI-BATT	Service Reminder Indicator short to 12V	
55	ABS SRI-OPEN	Service Reminder Indicator open circuit	

Trouble shooting

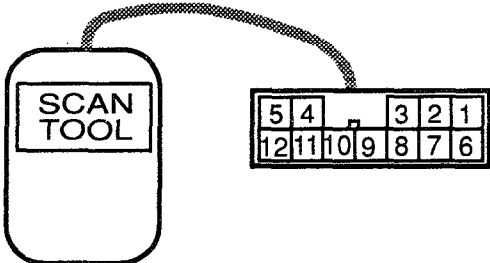
ABS Service Reminder Indicator ON	Go to procedure 1
ABS Service Reminder Indicator OFF	Go to procedure 6

WIRING DIAGRAM

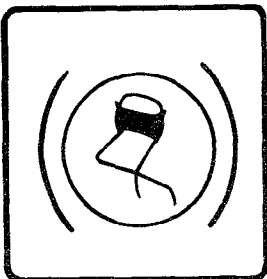


INSPECTION PROCEDURE

1. Check the diagnostic code

	<ol style="list-style-type: none"> 1. Perform the MUT diagnostic check 2. Only display diagnostic code about SRI(Service Reminder Indicator) circuit.
OK→ 2	NG→ Repair system indicated by the Scan tool trouble.

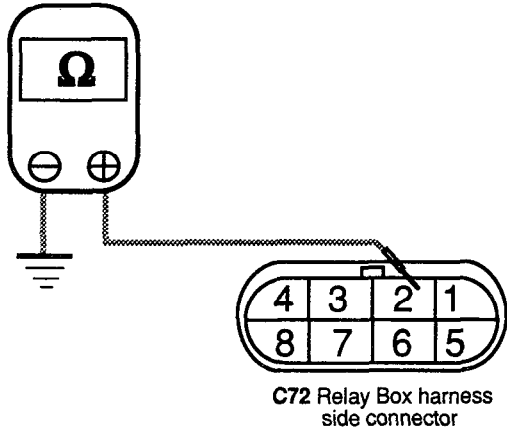
2. Check the ABS Service Reminder Indicator circuit without Relay-Box

 <p>LAMP OFF</p>	<ol style="list-style-type: none"> 1. Disconnect the battery negative terminal 2. Disconnect the ABSCM connector 3. Remove the ABS Relay-Box connector, while ignition switch "LOCK". 4. Connect the battery negative (-) terminal 5. Turn ignition switch to ON position 6. Check the SRI condition. <p>LIMIT Lamp OFF</p>
OK→ 3	NG→ Goto step 4

3. Check the ABS Relay-Box

	Refer to page 26-Procedure 8
OK→ 5	NG→ Replace the Fail safe Relay

4. Check the ABS Relay-Box harness



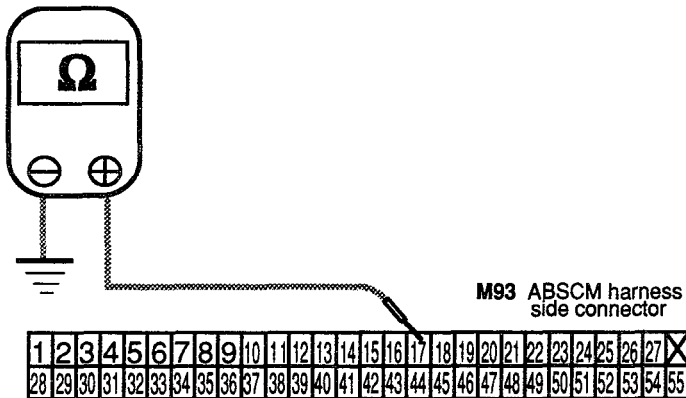
1. Turn ignition switch to "LOCK" position.
2. Disconnect the Relay Box connector.
3. Check the continuity between the Relay-Box harness terminal 3 and body ground.

LIMIT No continuity

OK → **5**

NG → Repair the harness

5. Check the ABSCM connector harness



1. Disconnect the battery negative terminal.
2. Disconnect the ABSCM connector.
3. Check the continuity between ABSCM connector harness pin No.17 and body ground.

LIMIT No continuity

OK → Re-connect the ABSCM and recheck

NG → Repair the harness

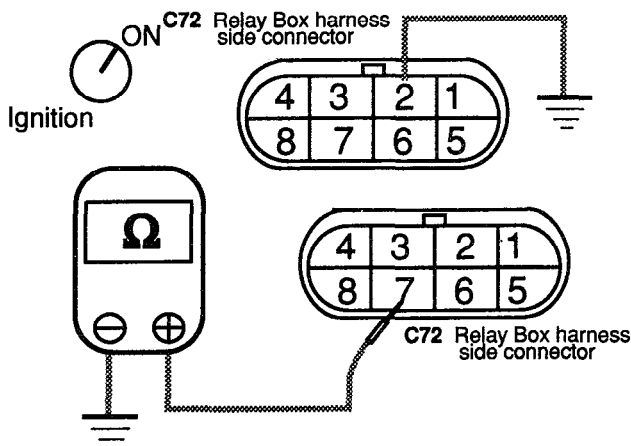
6: Check the fuse

Inspect the fuse No.16 located in the Dash Fuse Box

OK → **7**

NG → Replace the fuse.

7. Check the ABS SRI Circuit



1. Turn ignition switch to "LOCK" position.
2. Remove the ABS Relay box connector and the ABSCM connector.
3. Ground Relay box terminal 2 and turn the ignition ON.

LIMIT SRI ON

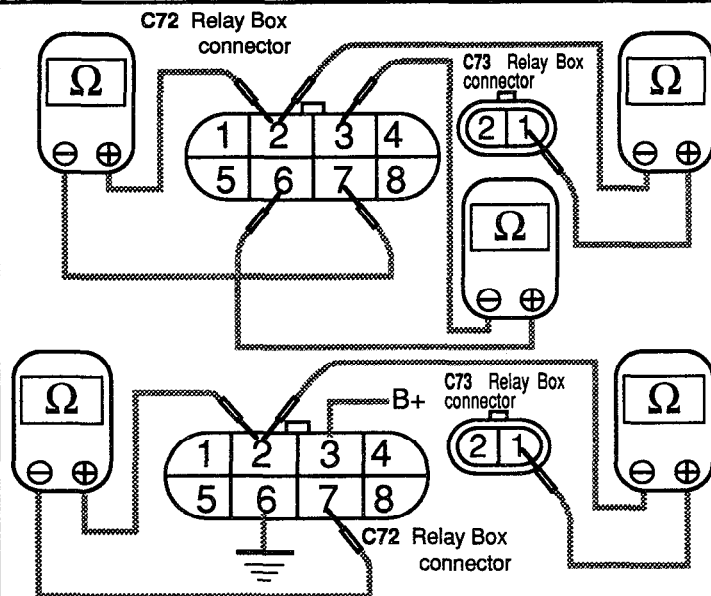
4. Turn ignition switch to "LOCK" position
5. Check the continuity between terminal 7 and body ground.

LIMIT Continuity

OK → **8**

NG → Repair the harness

6. Check the ABS-Relay Box(Fail safe relay)



1. Turn ignition switch to "LOCK" position.
2. Remove the ABS Relay Box connector.
3. Check continuity between each terminal of the Relay box.

LIMIT

Terminals 3, 6	Continuity
Terminals 2, 7	Continuity
Terminals C72-2, C73-1	No continuity

3. Apply battery voltage between terminals 3 and 6.

Caution

Never attempt to continue 2 sec. or more

4. Check for continuity.

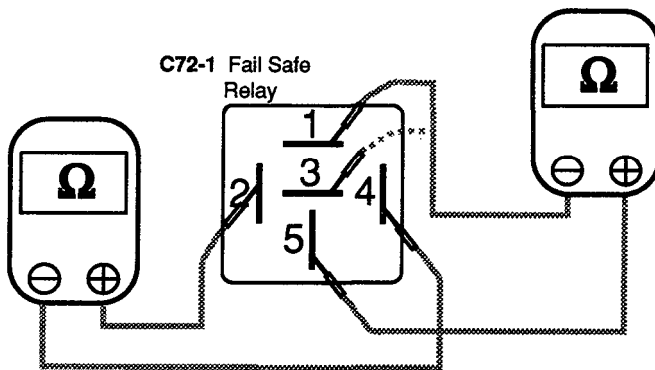
LIMIT

Terminals 2, 7	No continuity
Terminals C72-2, C73-1	Continuity

OK → Re-connect the ABSCM

NG → **9**

9. Check the Fail safe relay



1. Turn ignition switch to "LOCK" position.
2. Remove the Relay-box cover.
3. Remove the Fail-safe relay.
4. Check continuity between terminals as follows.

LIMIT

Terminals 2 and 4	Continuity
Terminals 1 and 5	No continuity
Terminals 3 and 5	Continuity

5. Apply battery voltage between terminals 2 and 4.

Caution

Never attempt to continue 2 sec. or more

5. Check continuity between terminals as follows.

LIMIT

Terminals 1 and 5	Continuity
Terminals 3 and 5	No continuity

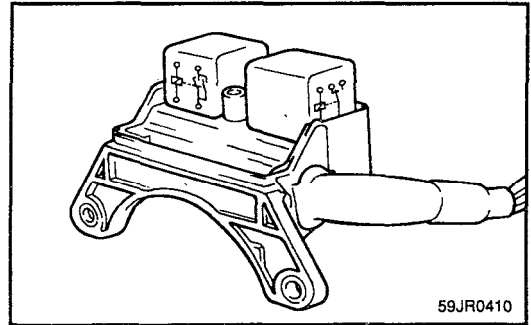
OK → Re-connect the ABS-Relay

NG → Replace the Fail safe relay

ABS RELAY BOX CIRCUIT (FAIL SAFE RELAY)

Fail safe relay supplies battery voltage to the modulator. After the ignition switch is turned ON position, the relay goes on, if the initial check is good.

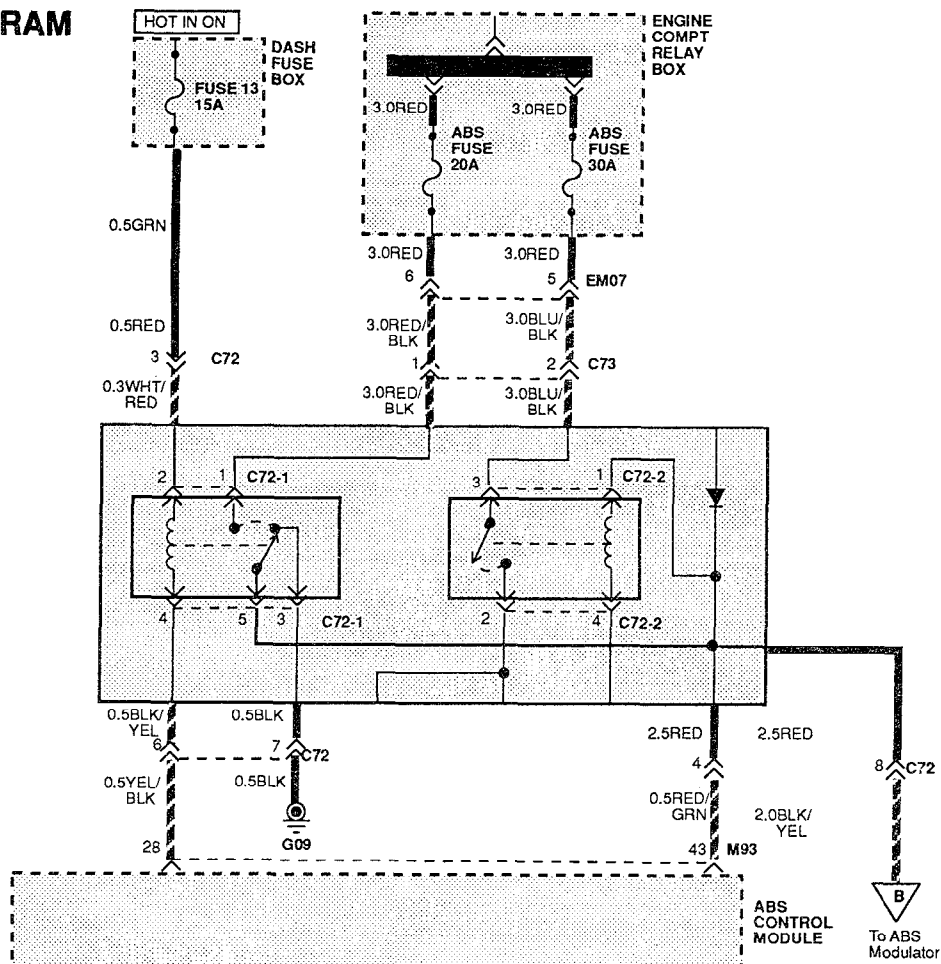
If a problem occurs in the ABS system, the ABSCM disables the relay and the ABS is disabled.



59JR0410

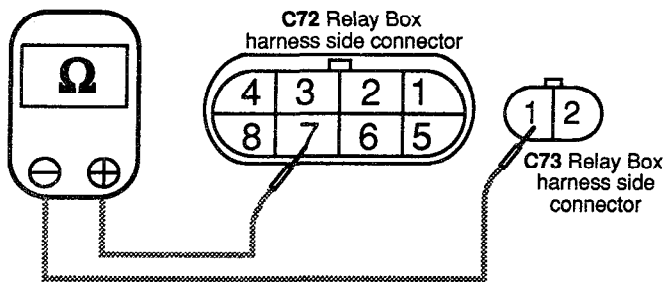
Code No.	Scan tool Display	Symptom	Possible Cause
41	FAIL RLY-SHRT	Fail safe relay not set active contact signal stay close	<ul style="list-style-type: none"> o Fail safe relay o Harness between Relay box and ABSCM o ABSCM
42	FAIL RLY-OPEN	Fail safe relay set active contact signal stay not closed	<ul style="list-style-type: none"> o Fail safe Relay o Harness between Relay box and Power source
43	FAIL COIL	Fail safe relay coil not OK	<ul style="list-style-type: none"> o Harness between Relay box and ABSCM o ABSCM

WIRING DIAGRAM



INSPECTION PROCEDURE

1. Check ABS power supply.



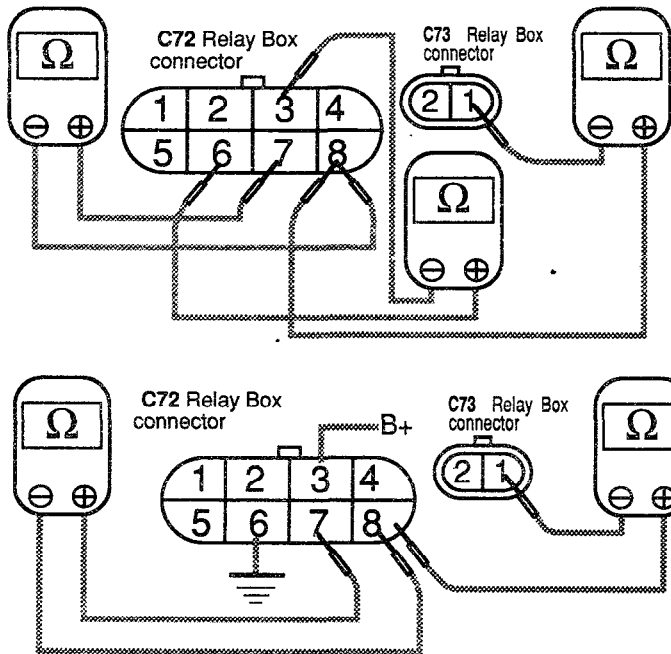
1. Turn ignition switch to "LOCK" position.
2. Disconnect the ABS Relay Box connector
3. Measure the voltage between terminal C72-6 and C73-1 at harness side connector

LIMIT Between 9.5-14.2V

OK → **1**

NG → Repair the harness and connector from Battery Voltage, Relay box and body ground

2. Check the ABS Relay Box (Fail safe Relay)



1. Turn ignition switch to "LOCK" position.
2. Disconnect the ABS Relay Box connector.
3. Check for continuity between as follows.

LIMIT

Terminal 7, 8	Continuity
Terminal C72-8, C73-1	No continuity
Terminal 3, 6	Continuity

4. Apply battery voltage between terminal 3 and 6.

Caution

Never attempt to continue 2 sec. or more

5. Check for continuity as follows.

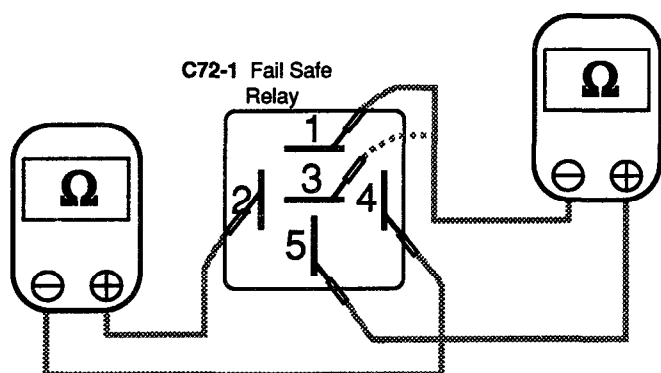
LIMIT

Terminal 7, 8	No continuity
Terminal C72-8, C73-1	Continuity

OK → **4**

NG → **3**

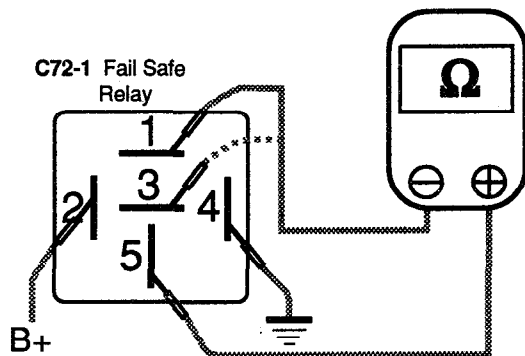
3. Check the Fail safe relay



1. Turn ignition switch to "LOCK" position.
2. Remove the Relay-box cover.
3. Remove the Fail-safe relay.
4. Check for continuity between terminals as follows.

LIMIT

Terminals 2 and 4	Continuity
Terminals 1 and 5	Noncontinuity
Terminals 3 and 5	Continuity



5. Apply battery voltage between terminals 2 and 4.

Caution

Never attempt to continue 2 sec. or more.

6. Check for continuity between terminals as follows.

LIMIT

Terminals 1 and 5	Continuity
Terminals 3 and 5	No continuity

OK → Re-connect fail-safe relay

NG → Replace the Fail safe relay

4. Check the ABSCM harness

M93 ABSCM harness
side connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	X
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55

M93 ABSCM harness
side connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	X
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55

M93 ABSCM harness
side connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	X
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55



1. Turn ignition switch to "LOCK" position.
2. Connect the fail safe relay.
3. Disconnect the ABSCM connector.
4. Measure the resistance between terminals 43 and 27.

LIMIT

1.0 Ω or below

5. Measure the resistance between terminals 28 and 50.

LIMIT

20-28 Ω

6. Ground terminal 28.
7. Turn ignition switch to "ON" position.

Caution**Never attempt to continue 2 sec. or more.**

8. Measure the voltage between terminal 43 and 27.

LIMIT

9.0-14.2V

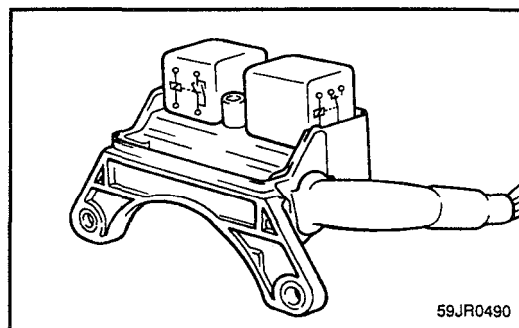


Re-connect the ABSCM



Repair the harness

Motor pump relay supplies battery voltage to the motor pump. The ABSCM switches the motor relay ON and operates the ABS motor pump. If a problem occurs in the ABS system, the ABSCM disables the motor pump relay.



Code No.	Scan tool Display	Symptom	Possible Cause
35	MOTOR PUMP	Motor pump does not operate.	<ul style="list-style-type: none"> o Motor pump o Motor pump relay o Harness between the ABS modulator and Relay Box o Harness between power supply
37	MP RLY-SHRT	Motor pump relay circuit short to battery	<ul style="list-style-type: none"> o Motor pump relay o ABSCM o Harness between the Relay Box and the ABSCM
38	MP BATT-SHRT	Motor pump short to 12Volt or circuit open	<ul style="list-style-type: none"> o Motor pump relay o Harness between the ABS modulator and the Relay Box. o Harness between the power supply and Relay Box. o Motor pump

INSPECTION PROCEDURE

1. Check for voltage between the Relay Box terminal C80 and BODY GND. Check motor pump.

C80 motor pump harness side connector

C80 motor pump connector

1. Turn ignition switch to "LOCK" position.
2. Disconnect the Relay Box connector.
3. Measure for voltage between terminals 2 and body ground.

LIMIT 9.0-14.2V

4. Disconnect the motor pump connector.
5. Apply battery voltage between terminals 1 and 2.

Note: Do not apply power for more than 2 seconds.

LIMIT Motor running

OK → **2**

NG →

1. Check ground connection for corrosion and loosing.
2. Replace the ABS Modulator.

2. Check ABS-Relay Box (Motor pump relay)

C72 Relay Box connector

C73 Relay Box connector

1. Turn ignition switch to "LOCK" position.
2. Disconnect the Relay Box connector
3. Check for continuity between the terminals as follows.

Terminal 4 and 5	Continuity
Terminal C72-1 and C73-2	No continuity

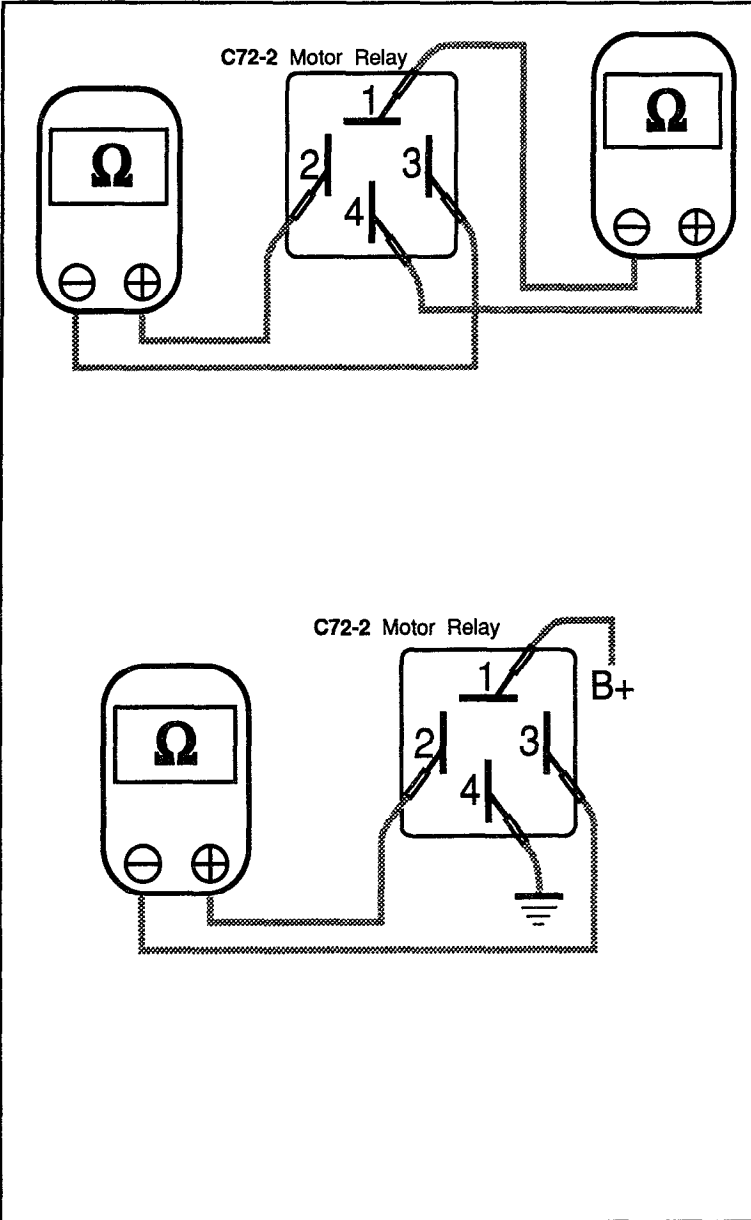
4. Apply battery voltage between terminals 4 and 5.
5. Check for continuity between terminals C72-1 and C73-2.

LIMIT Continuity

OK → **4**

NG → **3**

3. Check Motor pump relay



- 1. Turn ignition switch to "LOCK" position.
- 2. Remove the Relay-box cover.
- 3. Remove the Motor pump relay.
- 4. Check for continuity terminals between as follows.

LIMIT

Terminals 1 and 4	Continuity
Terminals 2 and 3	No continuity

- 5. Apply battery voltage between terminals 1 and 4.
- 6. Check for continuity between terminals 2 and 3.

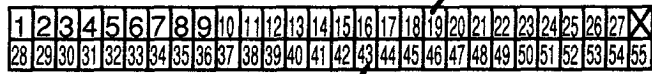
LIMIT

Continuity

OK→ Reconnect motor pump relay

NG→ Replace the Motor pump relay

4. Check resistance between each terminal of ABSCM connector

M93 ABSCM harness
side connector

1. Turn ignition switch to "LOCK" position.
2. Disconnect the ABSCM connector.
3. Check for resistance between terminals 19 and 43.

LIMIT 50-60 Ω

M93 ABSCM harness
side connector

4. Turn ignition switch to "ON" position.
5. Measure the voltage between terminals as follows.

LIMIT

Terminals 42 and 27	0V
Terminals 19 and 27	0V

M93 ABSCM harness
side connector

6. Turn ignition switch "LOCK" position.
7. Ground terminal 19 and 28.
8. Turn ignition switch "ON" position.

LIMIT Motor running

NOTE

Do not apply power for more than 2 seconds.

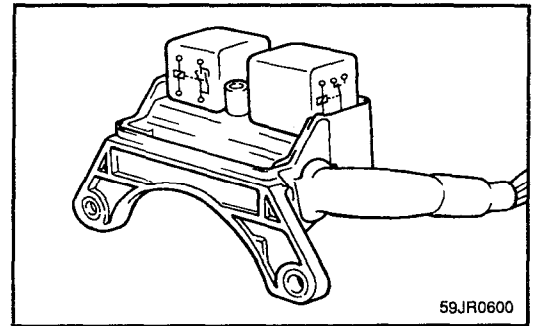
OK → Reconnect the ABSCM

NG → Repair the Harness

ABS RELAY BOX CIRCUIT (MOTOR PUMP RELAY, SHORT GND)

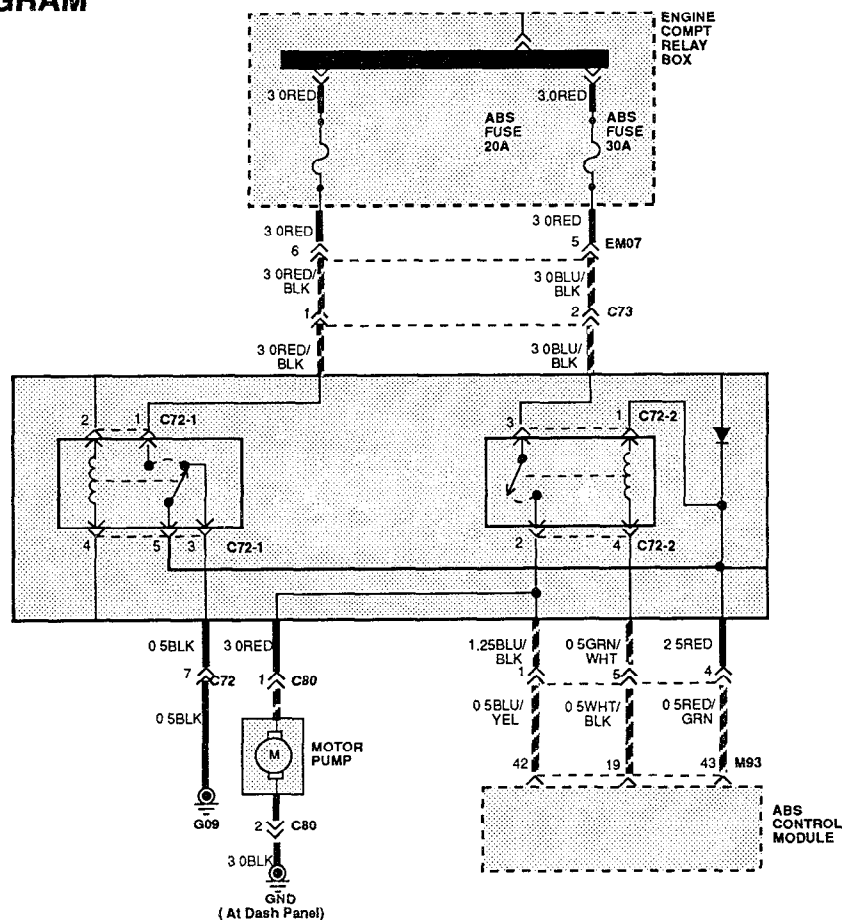
Motor pump relay supplies battery voltage to the motor pump. The ABSCM switches the motor relay ON and operates the ABS motor pump.

If a problem occurs in the ABS system, the ABSCM disables the motor pump relay.



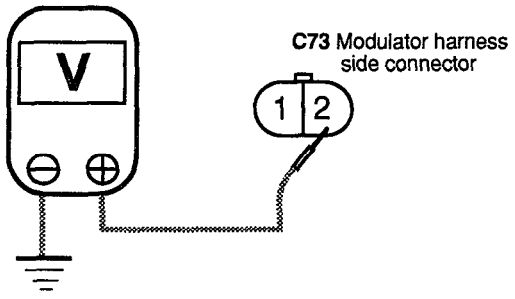
Code No.	Scan tool Display	Symptom	Possible Cause
36	MP RLY-OPEN	Motor pump relay circuit open or short to ground	<ul style="list-style-type: none"> o Motor pump relay o ABSCM o Harness between the Relay Box and the ABSCM o Harness between the power supply and the relay box
39	MP GND-SHRT	Motor pump short to ground	<ul style="list-style-type: none"> o Motor pump relay o Harness between the ABS modulator and Relay Box. o Harness between the power supply and Relay Box. o Motor pump

WIRING DIAGRAM



INSPECTION PROCEDURE

1. Check for voltage between the Relay Box terminal C73 and BODY GND.



C73 Modulator harness side connector

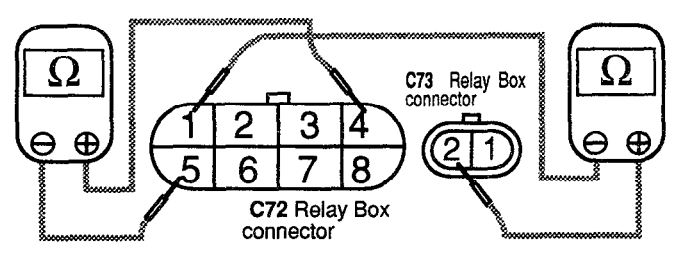
1. Turn ignition switch to "LOCK" position.
2. Disconnect the Relay Box connector.
3. Measure the voltage between terminals 2 and body ground.

LIMIT 9.0-14.2V

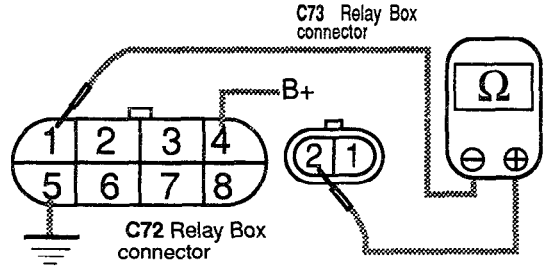
OK → **2**

NG → Repair the Motor harness

2. Check the ABS Relay Box (Motor pump relay).



C72 Relay Box connector



C72 Relay Box connector

1. Turn ignition switch to "LOCK" position.
2. Disconnect the Relay Box connector.
3. Check for continuity between the terminals as follows.

LIMIT	
Terminal 4 and 5	Continuity
Terminal C72-1 and C73-2	No continuity

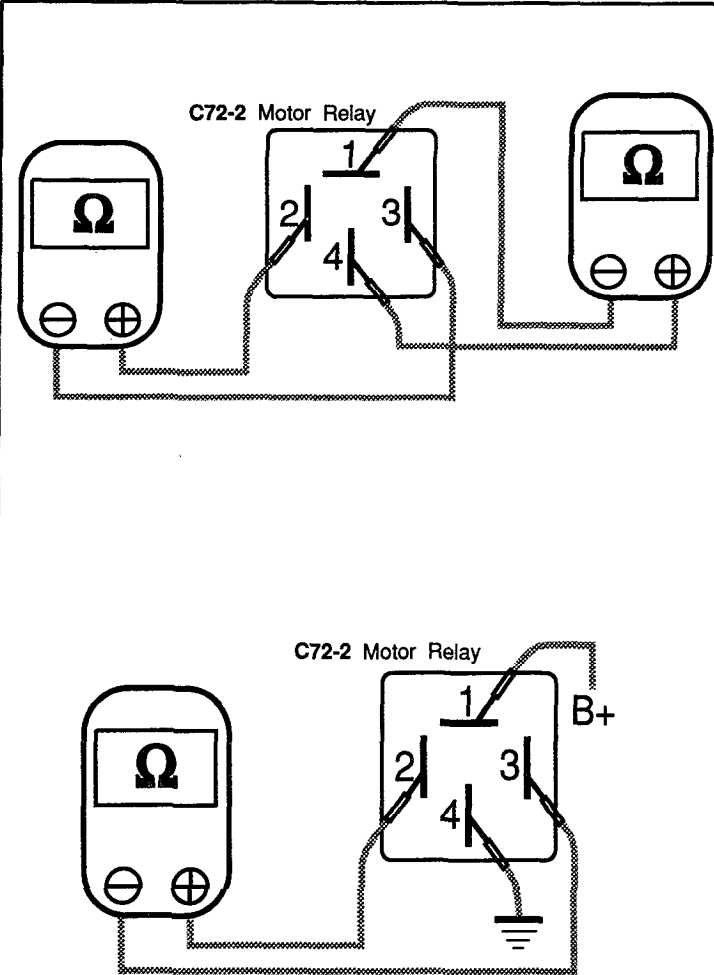
4. Apply battery voltage between terminals 4 and 5.
5. Check for continuity between terminals C72-1 and C73-2.

LIMIT Continuity

OK → **4**

NG → **3**

3. Check the Motor pump relay



- 1. Turn ignition switch to "LOCK" position.
- 2. Remove the Relay-box cover.
- 3. Remove the Motor pump relay.
- 4. Check for continuity terminals between as follows.

LIMIT

Terminals 1 and 4	Continuity
Terminals 2 and 3	No continuity

- 5. Apply battery voltage between terminals 1 and 4.
- 6. Check for continuity between terminals 2 and 3.

LIMIT

Continuity

OK → Reconnect motor relay.

NG → Replace the Motor pump relay

3. Check for resistance between each terminal of the ABSCM connector

M93 ABSCM harness
side connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	X
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55



1. Turn ignition switch to "LOCK" position.
2. Disconnect the ABSCM connector.
3. Check for resistance between terminals 19 and 42.

LIMIT 50-60 Ω

M93 ABSCM harness
side connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	X
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55

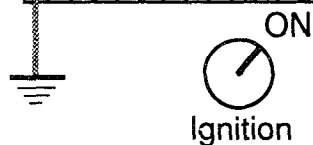


4. Turn ignition switch to "LOCK" position.
5. Check the continuity between terminals 42 and 27.

LIMIT 0.9 Ω or below

M93 ABSCM harness
side connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	X
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55



6. Turn ignition switch to "LOCK" position..
7. Ground terminal 19 and 28.
8. Turn ignition switch to "ON" position.

LIMIT Motor running

NOTE

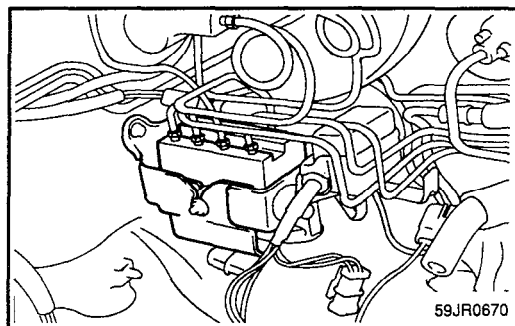
Do not apply power for more than 2 seconds

OK → Reconnect the ABSCM.

NG → Repair the Harness.

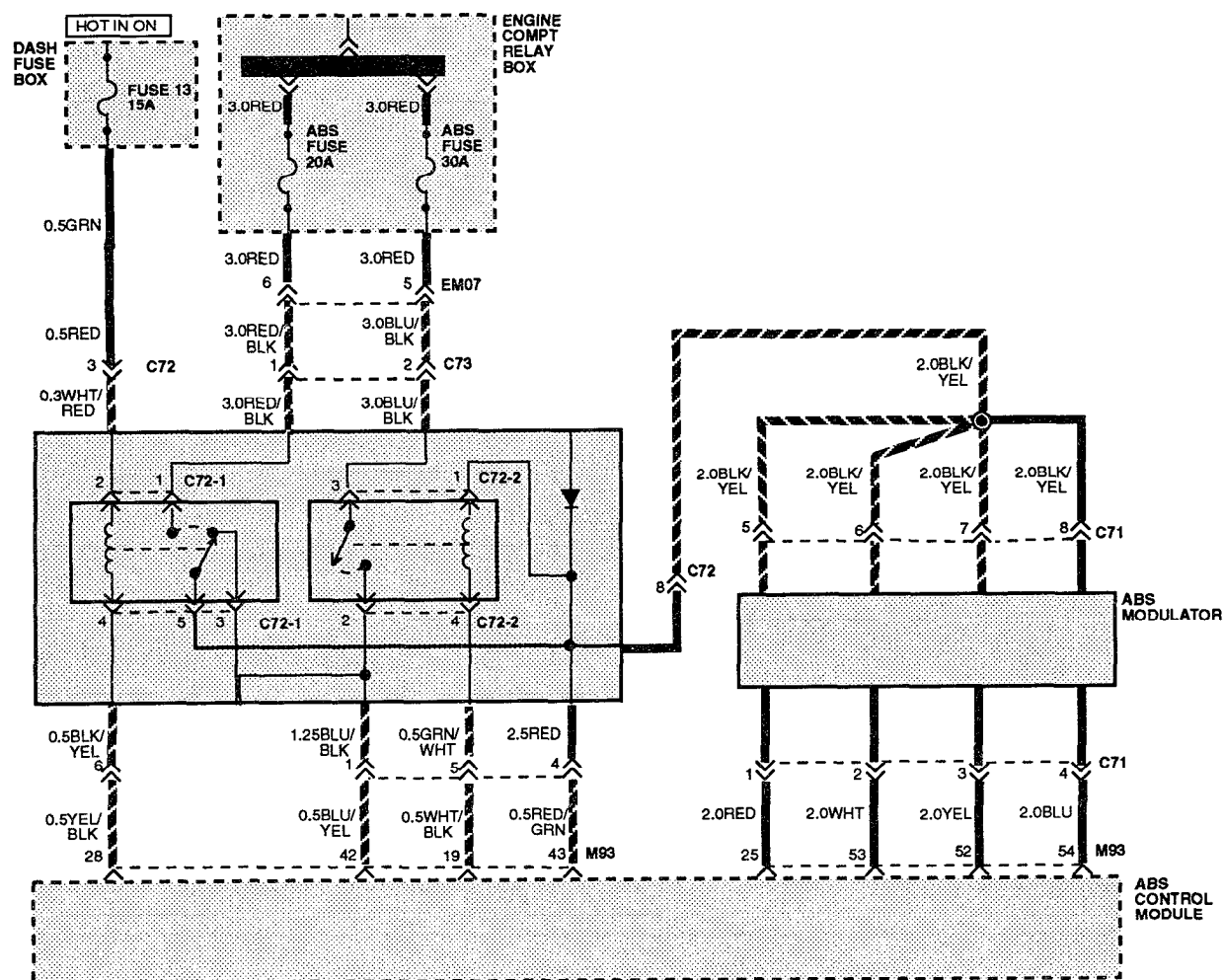
ABS MODULATOR CIRCUIT (SHORT B+)

The modulator consists of four solenoid valves, one expander chamber per brake circuit and a hydraulic pump. The ABSCM activates the solenoid valves and controls the pressure to the wheel calipers.



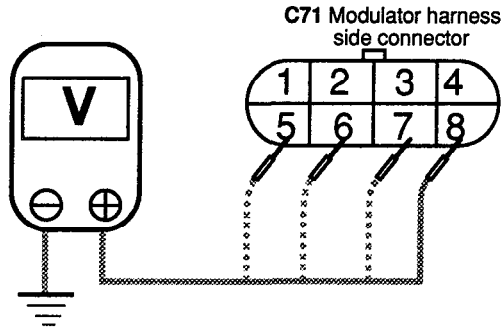
Code No.	Scan tool Display	Symptom	Possible cause
21	SOL. LF-SHRT	LF solenoid valve short-circuit to 12V	<ul style="list-style-type: none"> o ABS Modulator o ABS Relay-Box o Harness or connector between ABSCM and modulator
23	SOL. RF-SHRT	RF solenoid valve short-circuit to 12V	
25	SOL. LR-SHRT	LR solenoid valve short-circuit to 12V	
27	SOL. RR-SHRT	RR solenoid valve short-circuit to 12V	

WIRING DIAGRAM



INSPECTION PROCEDURE

1. Check for voltage between each terminal of the ABS modulator harness



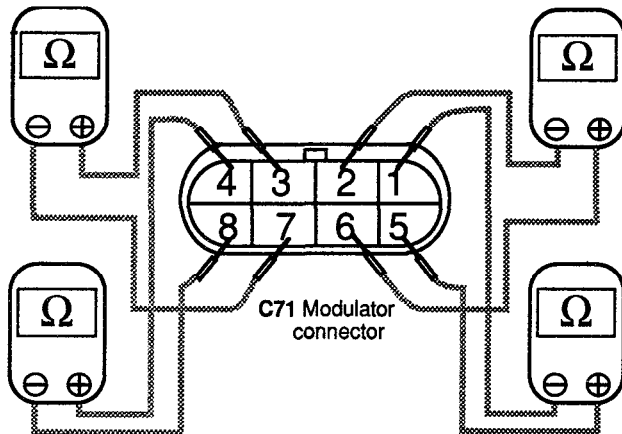
1. Disconnect the battery negative (-) terminal.
2. Disconnect the ABS modulator connector and ABS/CM connector.
3. Connect the battery negative terminal and ignition ON.
4. Measure the voltage between terminals and body ground as follows:

LIMIT

SOL. RR	Terminal 5 and ground	0V
SOL. LR	Terminal 6 and ground	0V
SOL. RF	Terminal 7 and ground	0V
SOL. LF	Terminal 8 and ground	0V

OK → **2****NG** → Check and repair harness between terminal 5, 6, 7, 8 and relay box ground.

2. Check the ABS-Modulator



1. Turn ignition switch to "LOCK" position.
2. Disconnect the ABS modulator connector.
3. Check the resistance between terminals as follows.

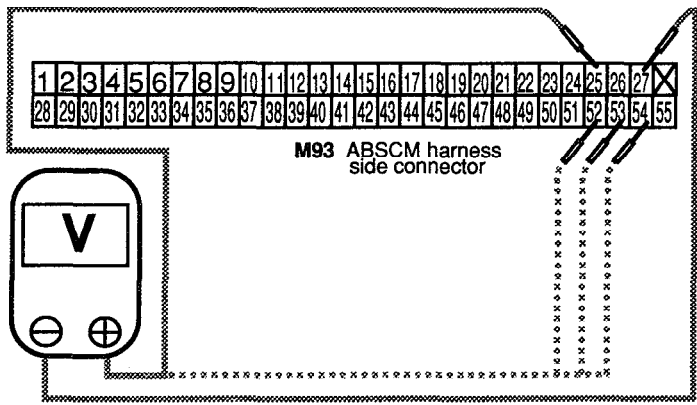
LIMIT

SOL. RR	Terminal 1 and 5	3.10-3.34 Ω
SOL. LR	Terminal 2 and 6	3.10-3.34 Ω
SOL. RF	Terminal 3 and 7	3.10-3.34 Ω
SOL. LF	Terminal 4 and 8	3.10-3.34 Ω

OK → **3****NG** → Replace the ABS modulator.

SOL. : Solenoid

3. Check the ABSCM harness



M93 ABSCM harness
side connector

1. Disconnect the battery negative (-) terminal.
2. Disconnect ABSCM connector.
3. Connect the battery negative (-) terminal.
4. Turn ignition switch to "ON" position
5. Measure the voltage between terminals and ground as follows.

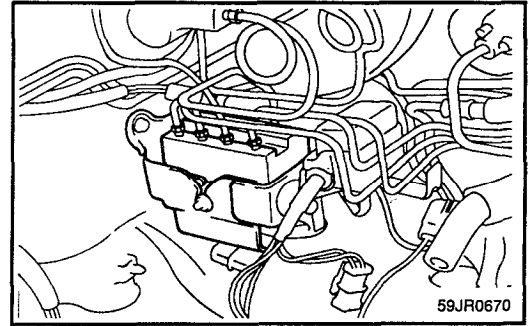
SOL. RR	Terminal 25 and 27	0 V
SOL. LF	Terminal 54 and 27	0 V
SOL. LR	Terminal 53 and 27	0 V
SOL. RF	Terminal 52 and 27	0 V

OK → Reconnect the ABSCM

NG → Repair the harness

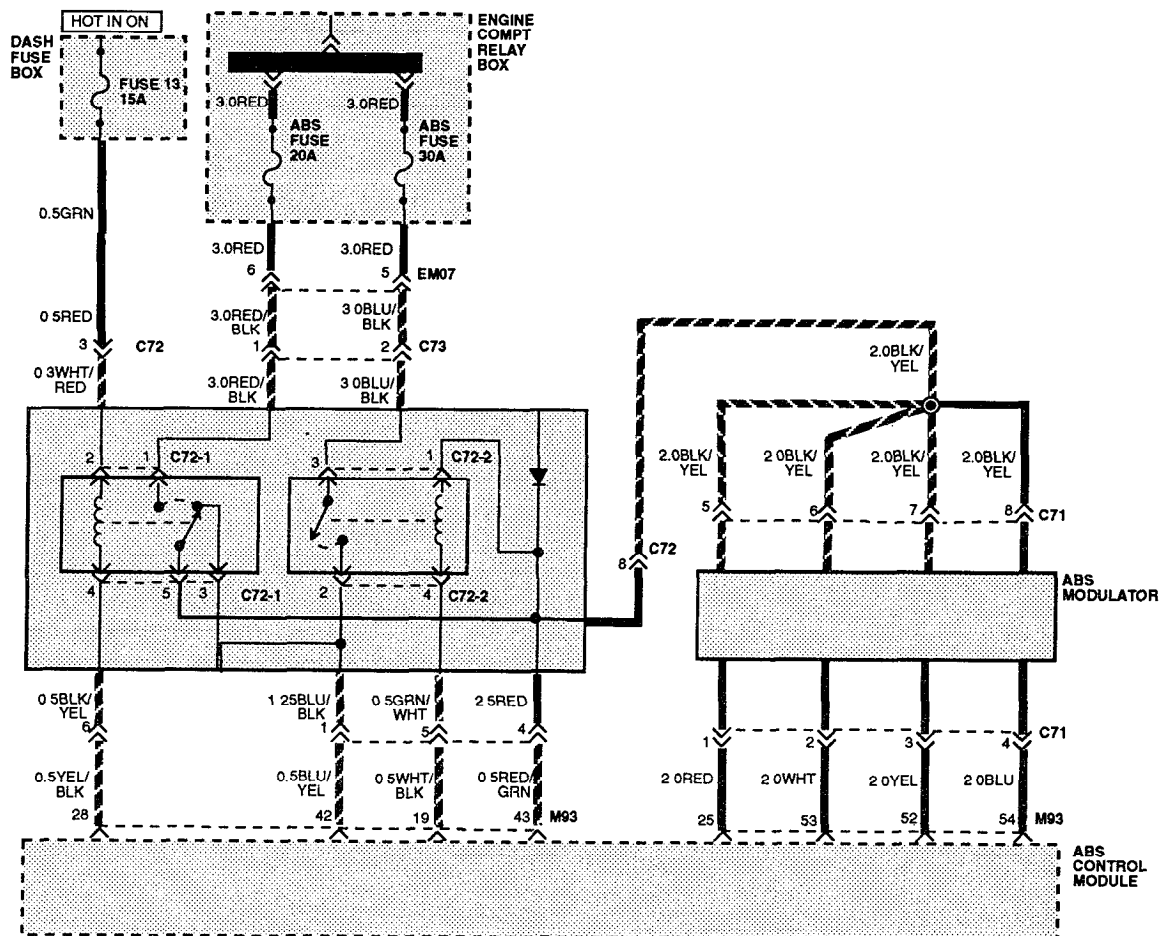
ABS MODULATOR CIRCUIT (SHORT GND)

The modulator consists of four solenoid valves, one expander chamber per brake circuit and a hydraulic pump. The ABSM activates the solenoid valves and controls the pressure to the wheel calipers.



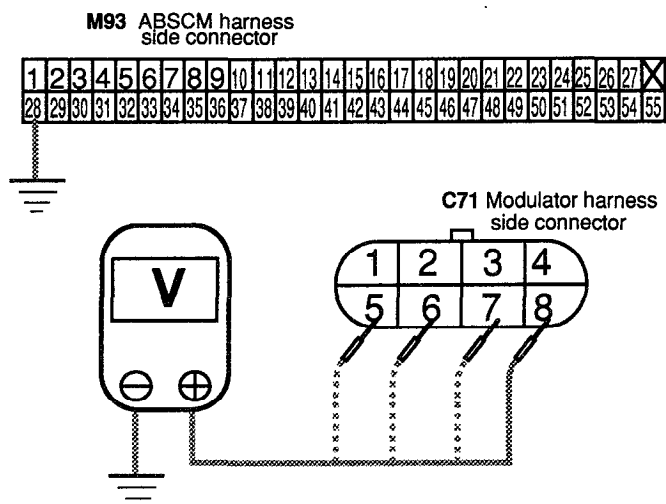
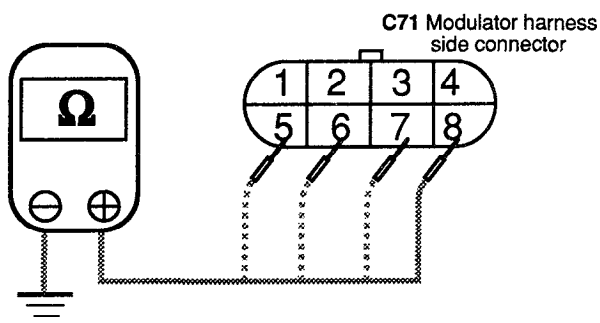
Code No.	Scan tool Display	Symptom	Possible cause
22	SOL. LF-OPEN	LF solenoid valve open or short-circuit to ground	<ul style="list-style-type: none"> o ABS Modulator o ABS Relay-Box o Harness or connector between the ABSM and modulator
24	SOL. RF-OPEN	RF solenoid valve open or short-circuit to ground	
26	SOL. LR-OPEN	LR solenoid valve open or short-circuit to ground	
28	SOL. RR-OPEN	RR solenoid valve open or short-circuit to ground	

WIRING DIAGRAM



INSPECTION PROCEDURE

1. Check for continuity between each terminal of the ABS modulator harness



1. Disconnect the battery negative (-) terminal.
2. Disconnect the ABS modulator connector and ABSCM connector.
3. Check for continuity between the terminals and body ground as follows.

LIMIT

SOL. RR	Terminal 5 and ground	Continuity
SOL. RL	Terminal 6 and ground	Continuity
SOL. FR	Terminal 7 and ground	Continuity
SOL. FL	Terminal 8 and ground	Continuity

4. Disconnect the ABSCM connector.
5. Ground ABSCM connector terminal 28.
6. Connect the battery negative terminal
7. Turn ignition switch to "ON" position.
8. Measure voltage between terminals and body ground as follows.

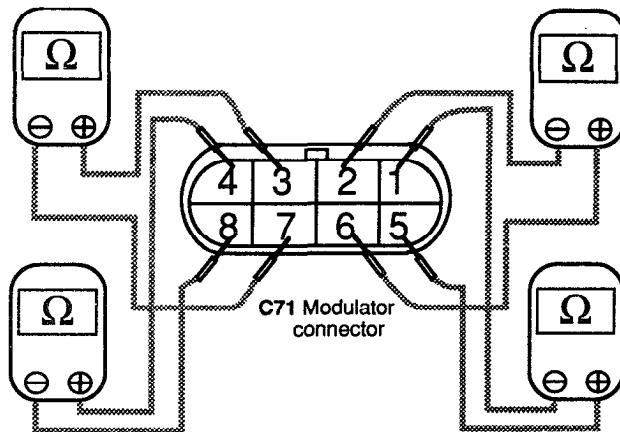
LIMIT

SOL. RR	Terminal 5 and ground	9.0-14.2 V
SOL. RL	Terminal 6 and ground	9.0-14.2 V
SOL. FR	Terminal 7 and ground	9.0-14.2 V
SOL. FL	Terminal 8 and ground	9.0-14.2 V

OK → **2****NG** → Check and repair the harness between terminal 5, 6, 7, 8 and relay box ground.

SOL. : SOLENOID

2. Check ABS-Modulator



1. Turn ignition switch to "LOCK" position.
2. Disconnect the ABS modulator connector.
3. Check the resistance between the terminals as follows.

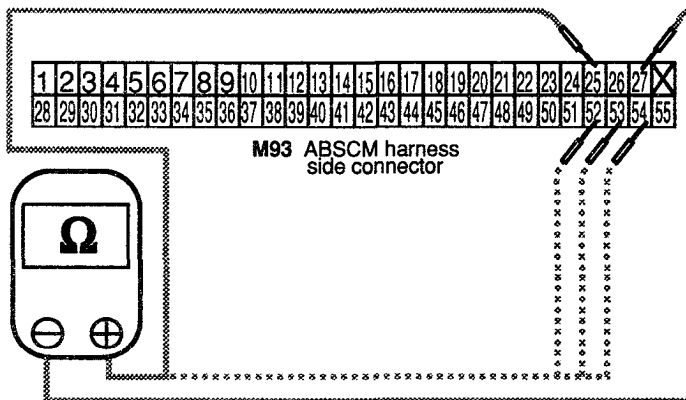
LIMIT

SOL. RR	Terminal 1 and 5	3.10-3.34 Ω
SOL. RL	Terminal 2 and 6	3.10-3.34 Ω
SOL. FR	Terminal 3 and 7	3.10-3.34 Ω
SOL. FL	Terminal 4 and 8	3.10-3.34 Ω

OK → **3**

NG → Replace ABS modulator.

3. Check ABSCM harness



1. Disconnect the battery negative (-) terminal.
2. Disconnect the ABSCM connector.
3. Connect the modulator connector.
4. Measure the voltage between terminals and ground as follows.

SOL. RR	Terminal 25 and 27	3.0-3.8 Ω
SOL. FL	Terminal 54 and 27	3.0-3.8 Ω
SOL. RL	Terminal 53 and 27	3.0-3.8 Ω
SOL. FR	Terminal 52 and 27	3.0-3.8 Ω

OK → Reconnect the ABSCM.

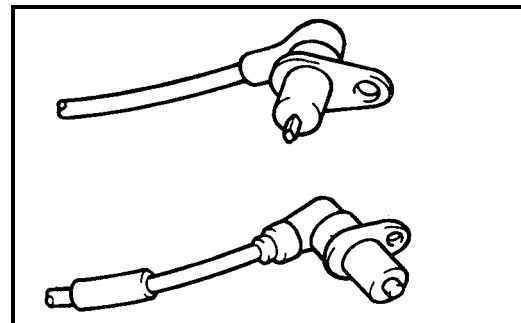
NG → Repair harness

SPEED SENSOR CIRCUIT (Short to B+)

At each wheel hub there is a tone wheel and an inductive sensor which supplies wheel speed information to the ABSCM. The sensor comprises a magnet and a pole piece surrounded by a coil. When the tone wheel rotates adjacent to the sensor pole piece an alternating current signal is generated in the coil with a frequency proportioned to wheel speed.

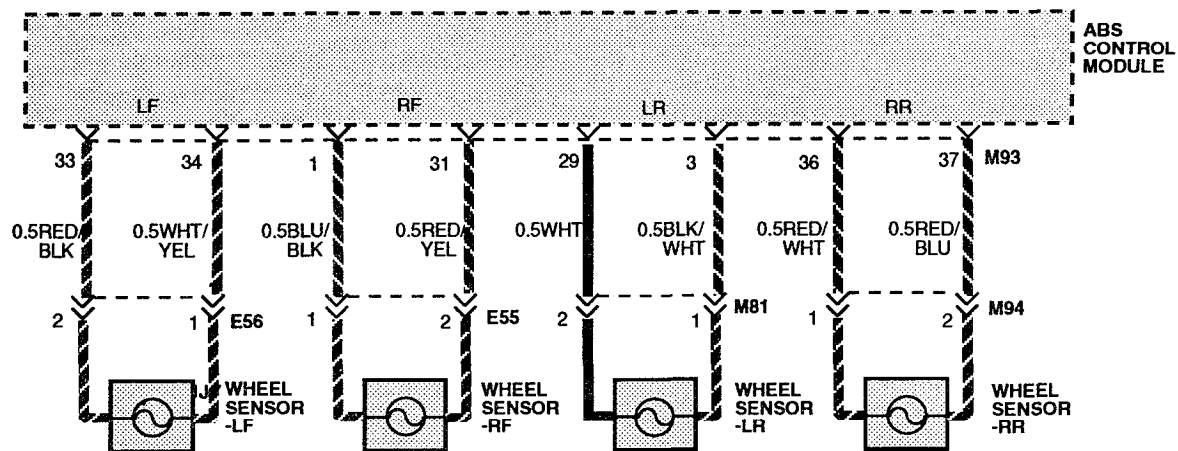
A special integrated circuit in the ABSCM translates the generated AC signal to a square wave.

This square wave is used by the microprocessor to operate the ABS.



Code No.	Scan tool Display	Symptom	Possible cause
62	SNSR. LF-OPEN	Sensor LF circuit open or short to 12Volt	<ul style="list-style-type: none"> o Wheel speed sensor o Harness or connector between the wheel speed sensor and ABSCM o ABSCM
63	SNSR. RF-OPEN	Sensor RF circuit open or short to 1.2Volt	
64	SNSR. LR-OPEN	Sensor LR circuit open or short to 12Volt	
65	SNSR. RR-OPEN	Sensor RR circuit open or short to 12Volt	

WIRING DIAGRAM



INSPECTION PROCEDURE

1. Check Wheel Speed Sensor

E56 LF WHEEL SENSOR
E55 RF WHEEL SENSOR
M81 LR WHEEL SENSOR
M94 RR WHEEL SENSOR

E56 LF WHEEL SENSOR
E55 RF WHEEL SENSOR
M81 LR WHEEL SENSOR
M94 RR WHEEL SENSOR

1. Disconnect the wheel speed sensor.
2. Measure the resistance between terminals 1 and 2 of the wheel speed sensor connector.

LIMIT Front : 1275-1495 Ω
Rear : 1260-1540 Ω

3. Measure voltage between wheel speed sensor connector terminals 1, 2 and body ground.

LIMIT 0 V

OK → 2

NG → Replace wheel speed sensor

2. Check the harness and to connector between the ABSM and each wheel speed sensor

M93 ABSM harness side connector

M93 ABSM harness side connector

1. Turn ignition switch to "LOCK" position
2. Disconnect the ABSM connector harness
3. Turn ignition switch to "ON" position.
4. Measure the resistance between the terminals as follows.

LIMIT

SNSR.LF	Terminals 32 and 34	1275-1495 Ω
SNSR.RF	Terminals 1 and 31	1275-1495 Ω
SNSR.LR	Terminals 29 and 3	1260-1540 Ω
SNSR.RR	Terminals 36 and 37	1260-1540 Ω

5. Measure the voltage between sensor terminals and body ground terminals as follows.

LIMIT

SNSR.FL	Terminals 32 and 27	0 V
SNSR.FR	Terminals 1 and 27	0 V
SNSR.RL	Terminals 29 and 27	0 V
SNSR.RR	Terminals 36 and 27	0 V

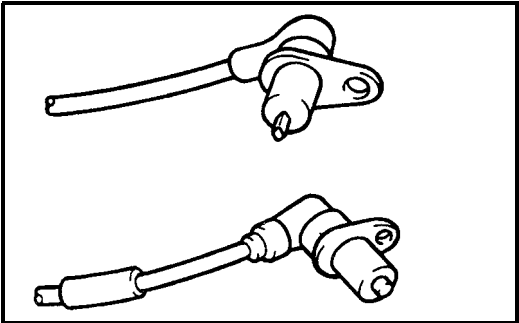
OK → Re-connect the ABSM and re-check

NG → Repair the harness

SNSR.: SENSOR

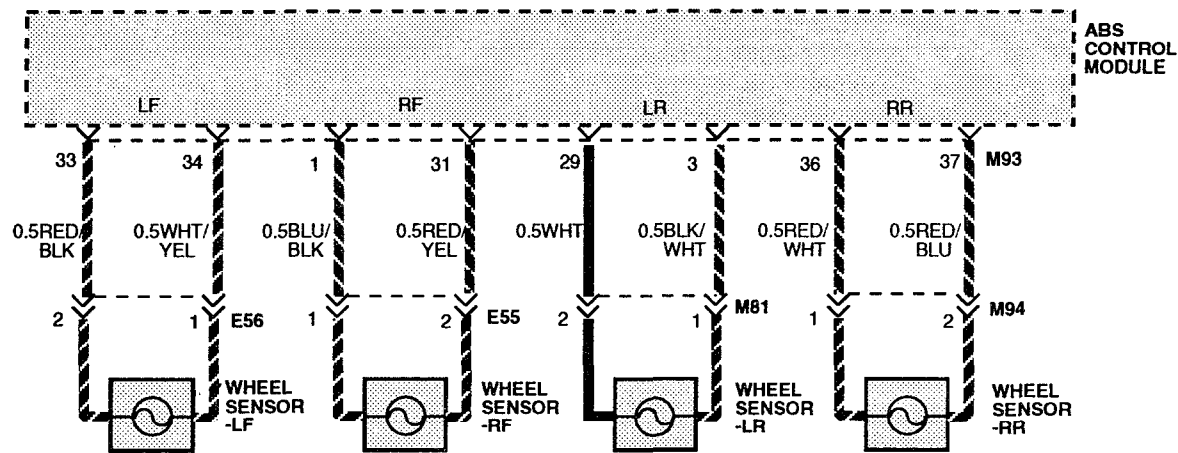
SPEED SENSOR CIRCUIT (SHORT GND)

At each wheel hub there is a tone wheel and an inductive sensor which supplies the wheel speed information to the ABSCM The sensor comprises a magnet and a pole piece surrounded by a coil. When the tone wheel rotates adjacent to the sensor pole piece an alternating current signal is generated in the coil with a frequency proportioned to wheel speed. A special integrated circuit in the ABSCM translates the generated AC signal to a square wave. This square wave is used by the microprocessor to operate the ABS.



Code No.	Scan tool Display	Symptom	
66	SNSR. LF-SHRT	Sensor LF circuit short to ground	o Wheel speed sensor o Harness or connector between the wheel speed sensor and the ABSCM o ABSCM
67	SNSR. RF-SHRT	Sensor RF circuit short to ground	
68	SNSR. LR-SHRT	Sensor LR circuit short to ground	
69	SNSR. RR-SHRT	Sensor RR circuit short to ground	

WIRING DIAGRAM



INSPECTION PROCEDURE

1. Check Wheel Speed Sensor

E56 LF WHEEL SENSOR
E55 RF WHEEL SENSOR
M81 LR WHEEL SENSOR
M94 RR WHEEL SENSOR

E56 LF WHEEL SENSOR
E55 RF WHEEL SENSOR
M81 LR WHEEL SENSOR
M94 RR WHEEL SENSOR

1. Disconnect the wheel speed sensor.
2. Measure the resistance between terminals 1 and 2 of wheel speed sensor connector.

LIMIT Front : 1275-1495 Ω
Rear : 1260-1540 Ω

3. Check the continuity between wheel speed sensor connector terminals 1, 2 and body ground.

LIMIT No continuity

OK → **2**

NG → Replace the wheel speed sensor

2. Check the harness and the connector between the ABSCM and each wheel speed sensor

M93 ABSCM harness side connector

M93 ABSCM harness side connector

1. Disconnect the battery negative terminal.
2. Disconnect the ABSCM connector harness.
3. Measure the resistance between terminals as follows.

LIMIT

SNSR.LF	Terminals 32 and 34	1275-1495 Ω
SNSR.RF	Terminals 1 and 31	1275-1495 Ω
SNSR.LR	Terminals 29 and 3	1260-1540 Ω
SNSR.RR	Terminals 36 and 37	1260-1540 Ω

4. Check the continuity between sensor terminals and body ground terminals as follows.

LIMIT

SNSR.LF	Terminal 32 and 27	No continuity
SNSR.RF	Terminal 1 and 27	No continuity
SNSR.LR	Terminal 29 and 27	No continuity
SNSR.RR	Terminal 36 and 27	No continuity

SNSR.: SENSOR

OK → Re-connect the ABSCM and re-check

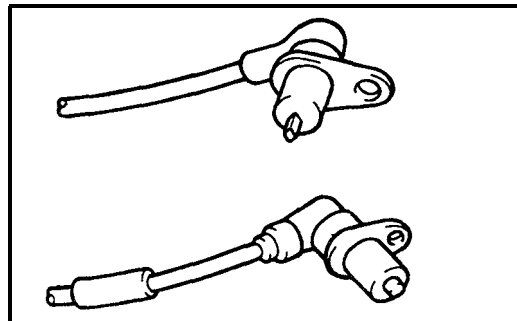
NG → Repair the harness

SPEED SENSOR CIRCUIT

At each wheel hub there is a tone wheel and an inductive sensor which supplies the wheel speed information to the ABSCM. The sensor comprises a magnet and a pole piece surrounded by a coil. When the tone wheel rotates adjacent to the sensor pole piece an alternating current signal is generated in the coil with a frequency proportioned to wheel speed.

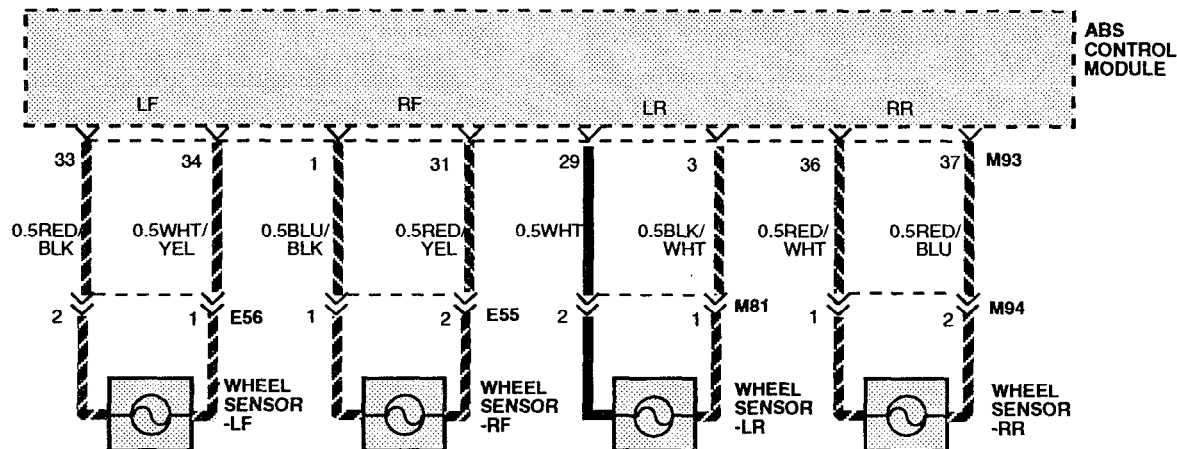
A special integrated circuit in the ABSCM translates the generated AC signal to a square wave.

This square wave is used by the microprocessor to operate the ABS.



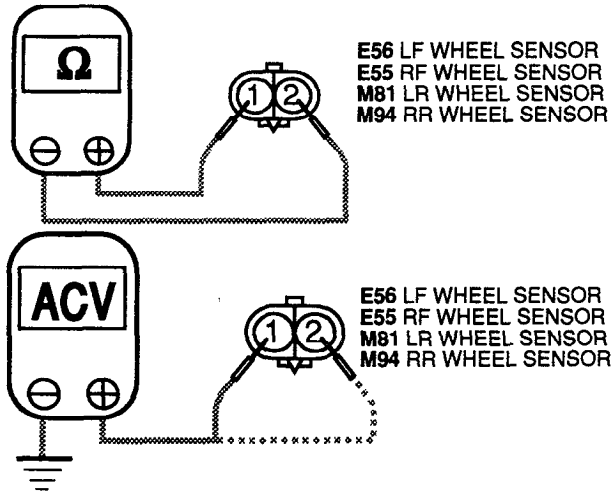
Code No.	Scan tool Display	Symptom	Possible cause
31	SNSR. LF-GAP	Air gap ON sensor LF incorrect	<ul style="list-style-type: none"> o Wheel speed sensor air gap o Wheel speed sensor o Harness or connector between the wheel speed sensor and ABSCM o ABSCM
32	SNSR. RF-GAP	Air gap ON sensor RF incorrect	
33	SNSR. LR-GAP	Air gap ON sensor LR incorrect	
34	SNSR. RR-GAP	Air gap ON sensor RR incorrect	

WIRING DIAGRAM

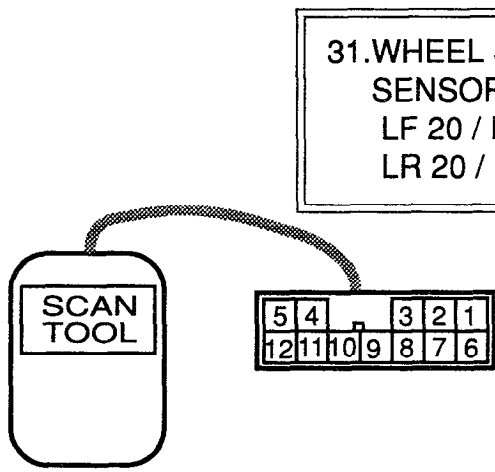


INSPECTION PROCEDURE

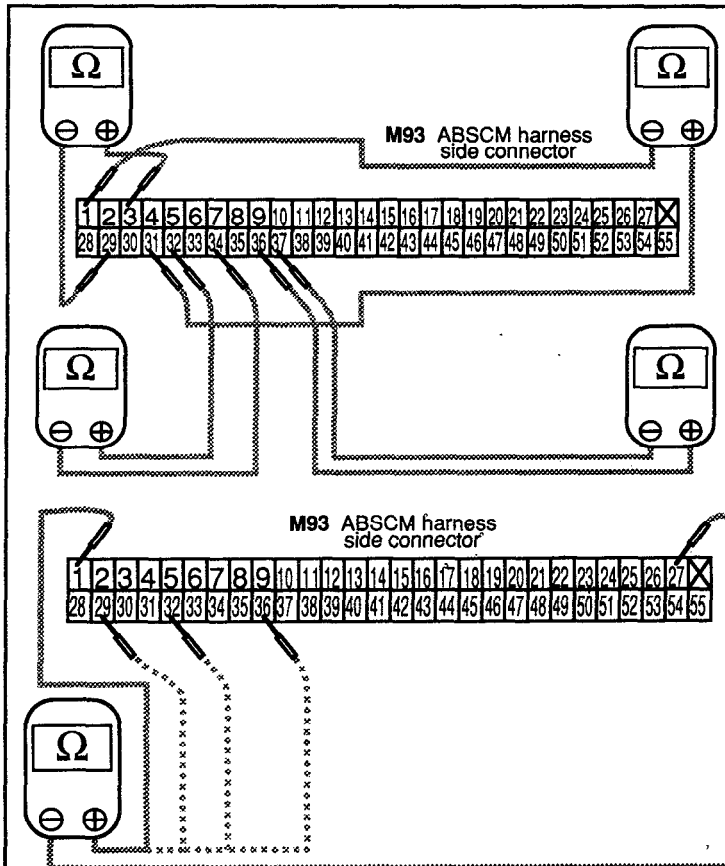
1. Check Wheel Speed Sensor

 <p>E56 LF WHEEL SENSOR E55 RF WHEEL SENSOR M81 LR WHEEL SENSOR M94 RR WHEEL SENSOR</p> <p>E56 LF WHEEL SENSOR E55 RF WHEEL SENSOR M81 LR WHEEL SENSOR M94 RR WHEEL SENSOR</p>	<ol style="list-style-type: none"> 1. Disconnect the wheel speed sensor. 2. Measure the resistance between terminals 1 and 2 of wheel speed sensor connector. <p>LIMIT Front : 1275-1495 Ω Rear : 1260-1540 Ω</p> <ol style="list-style-type: none"> 3. Check the continuity between wheel speed sensor connector terminals 1, 2 and body ground. <p>LIMIT No continuity</p>
<p>OK → 2</p>	<p>NG → Replace the wheel speed sensor</p>

2. Check wheel speed sensor with scan tool

 <p>31.WHEEL SPEED SENSOR(KPH) LF 20 / RF 20 LR 20 / RR 20</p> <p>SCAN TOOL</p>	<ol style="list-style-type: none"> 1. Connect scan tool carry out service data 31 WHEEL SPEED SENSOR test by using scan tool. 2. Drive the car about 20 kPh (12.5 mph) <p>LIMIT 18 kPh (11.25 mph) or more.</p>
<p>OK → 3</p>	<p>NG → 3</p>

3. Check the harness and the connector between the ABSCM and each wheel speed sensor



1. Ignition off.
2. Disconnect the ABSCM connector harness.
3. Ignition ON.
4. Measure the resistance between terminals as follows.

LIMIT

SNSR.LF	Terminals 32 and 34	1275-1495 Ω
SNSR.RF	Terminals 1 and 31	1275-1495 Ω
SNSR.LR	Terminals 29 and 3	1260-1540 Ω
SNSR.RR	Terminals 36 and 37	1260-1540 Ω

5. Measure the voltage between sensor terminals and body ground terminals as follows.

LIMIT

SNSR.LF	Terminal 32 and 27	No continuity
SNSR.RF	Terminal 1 and 27	No continuity
SNSR.LR	Terminal 29 and 27	No continuity
SNSR.RR	Terminal 36 and 27	No continuity

SNSR.: SENSOR

OK → Re-connect the ABSCM and re-check

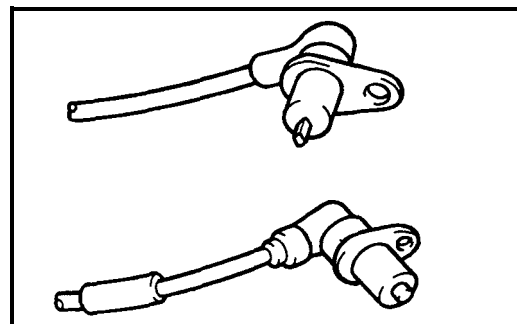
NG → Repair the harness

SPEED SENSOR CIRCUIT

At each wheel hub there is a tone wheel and an inductive sensor which supplies the wheel speed information to the ABSCM. The sensor comprises a magnet and a pole piece surrounded by a coil. When the tone wheel rotates adjacent to the sensor pole piece an alternating current signal is generated in the coil with a frequency proportioned to wheel speed.

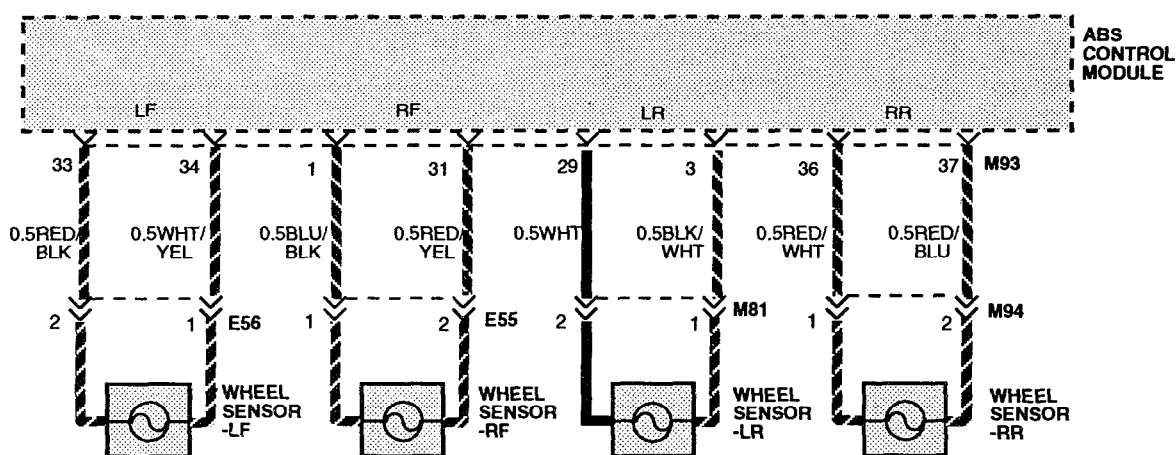
A special integrated circuit in the ABSCM translates the generated AC signal to a square wave.

This square wave is used by the microprocessor to operate the ABS.



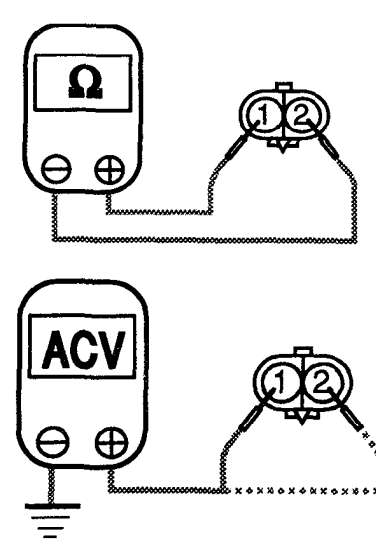
Code No.	Scan tool Display	Symptom	Possible cause
71	SNSR. LF-S.JMP	Speed jump on the exciter wheel FL	<ul style="list-style-type: none"> o Tone wheel o Wheel speed sensor o Harness or connector between the wheel speed sensor and the ABSCM o ABSCM
72	SNSR. RF-S.JMP	Speed jump on the exciter wheel FR	
73	SNSR. LR-S.JMP	Speed jump on the exciter wheel RL	
74	SNSR. RR-S.JMP	Speed jump on the exciter wheel RR	
19	TO NE WHEEL	Check the tone wheels	<ul style="list-style-type: none"> o Tone wheel o Wheel speed sensor and harness

WIRING DIAGRAM



INSPECTION PROCEDURE

1. Check Wheel Speed Sensor



E56 LF WHEEL SENSOR
E55 RF WHEEL SENSOR
M81 LR WHEEL SENSOR
M94 RR WHEEL SENSOR

1. Disconnect the wheel speed sensor
2. Measure the resistance between terminals 1 and 2 of wheel speed sensor connector

LIMIT Front : 1275-1495 Ω
Rear : 1260-1540 Ω

3. Connect a voltmeter between the wheel speed sensor terminals, and measure the voltmeter by turning the wheel.

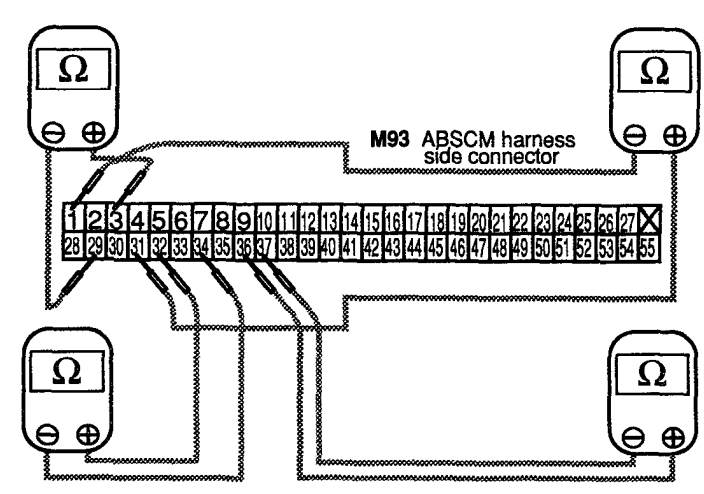
NOTE
Set the voltmeter to measure AC voltage.

LIMIT AC Voltage detected

OK → 2

NG → Replace wheel speed sensor

2. Check the harness and the connector between the ABSCM and each wheel speed sensor



M93 ABSCM harness side connector

1. Disconnect the battery negative terminal.
2. Disconnect the ABSCM connector harness
3. Measure the resistance between the terminals as follows :

LIMIT

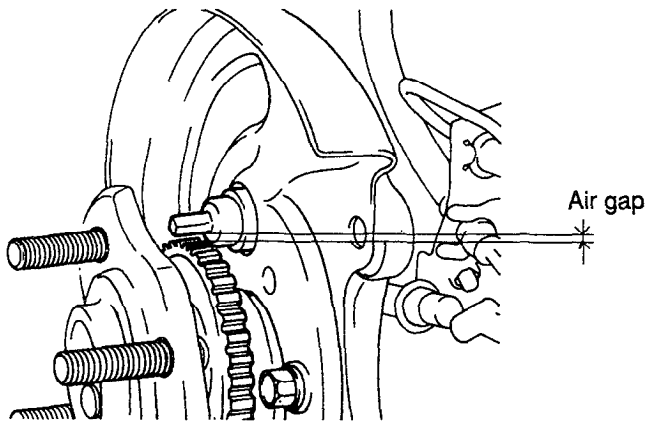
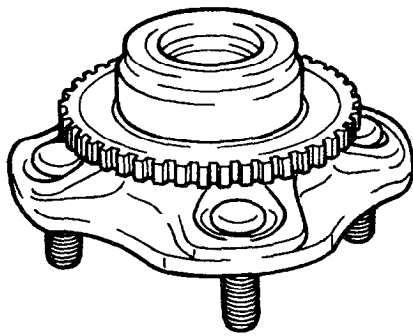
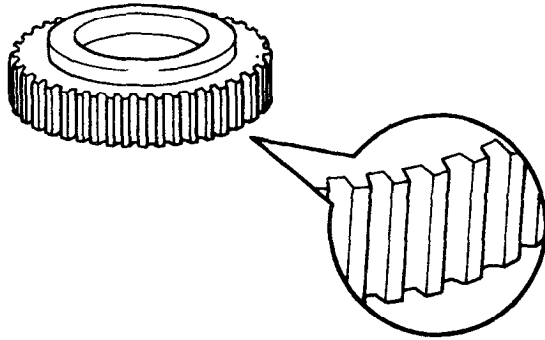
SNSR.LF	Terminals 32 and 34	1275-1495 Ω
SNSR.RF	Terminals 1 and 31	1275-1495 Ω
SNSR.LR	Terminals 29 and 3	1260-1540 Ω
SNSR.RR	Terminals 36 and 37	1260-1540 Ω

OK → Re-connect the ABSCM and re-check

NG → Replace wheel speed sensor

SNSR. : SENSOR

3. Check tone wheel and sensor installation

**Front**

- o Remove the front tone wheel
- o Check the tone wheel teeth for missing or scratches.

LIMIT Tone wheel OK

Rear

- o Check the tone wheel teeth for missing or scratches.

LIMIT Tone wheel OK

ALL

- o Check the air gap between the wheel speed sensors and the tone wheel teeth.

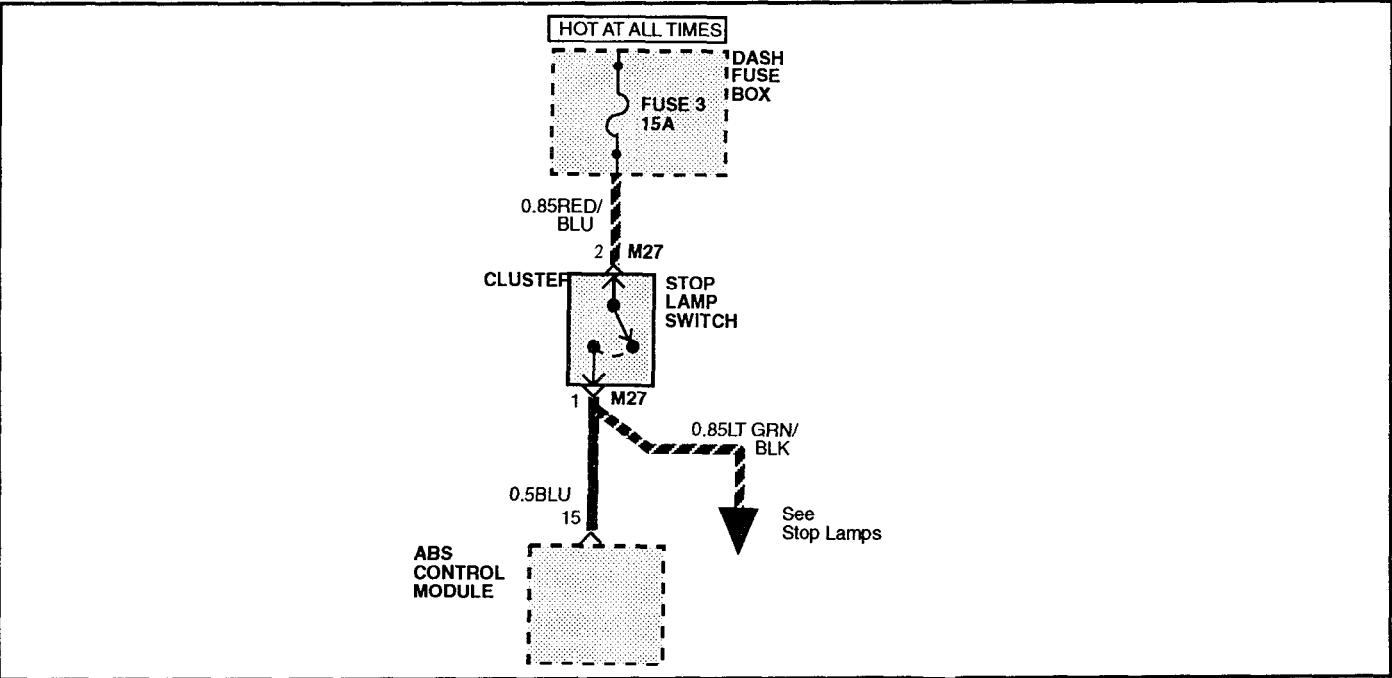
LIMIT FRONT : 0.2-1.1 mm(0.008-0.043in.)
REAR : 0.2-1.0 mm(0.008-0.039in.)

OK → Re-connect the ABSCM and re-check

NG → Replace the components.

STOP LAMP SWITCH CIRCUIT

The stop lamp switch senses whether the brake pedal is depressed or released, and sends the signal to the ABSCM



INSPECTION PROCEDURE

1. Check the stop light switch circuit

1. Disconnect the ABSCM connector.
2. Turn ignition switch to "ON" position.
3. Measure the voltage between terminals 15 and 27.

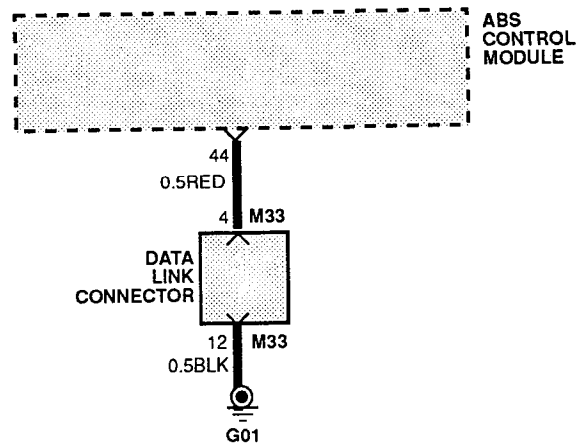
LIMIT 9.5-14.2 V

OK → Re-connect the ABSCM and re-check

NG → Repair the harness

DATA-LINK CIRCUIT

When a fault is detected by the ABSCM, a code is stored in the ABSCM memory. The MUT can be used to read the codes in the ABSCM memory.



INSPECTION PROCEDURE

1. Check for voltage supply of ABSCM

M93 ABSCM harness side connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	X
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55



1. Turn ignition switch to "LOCK" position.
2. Disconnect the ABSCM connector.
3. Turn ignition switch to "ON" position
4. Check for voltage between terminal 5 and body ground

LIMIT

9.5 -14.2V

OK → **2**

NG → Refer to page 58A-20
Power source voltage

2. Check continuity between the ABSCM connector GND and Body GND

M93 ABSCM harness side connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	X
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55

1. Turn the ignition switch to the "LOCK" position.
2. Measure the ground connection between terminal 27 and body ground, terminal 26 and body ground, terminals 51 and body ground.

LIMIT 0.5Ω or below

OK → Check for an open between the harness and the connector between the ABSCM and the battery

NG →

1. Check ground connection for corrosion and loosing
2. Repair harness or connector.

3. Check for continuity between the data-link connector and the ABSCM connector

M93 ABSCM harness side connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	X
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55

1. Turn ignition switch to "LOCK" position.
2. Disconnect the ABSCM connector.
3. Ground the data link connector terminal 4.
4. Check for continuity between terminal 44 and body ground.

LIMIT Continuity

M93 ABSCM harness side connector

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	X
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55

4. Isolate the data link connector terminal 4 from body ground.
5. Check for continuity between terminal 44 and 27.

LIMIT No continuity

OK → Re-connect the ABSCM and re-check

NG → Repair the harness

ABSCM (ABS Control Module)

If a diagnostic trouble code is 77, replace the ABSCM.

Code No.	Scan tool display	Symptom	Possible cause
77	ABSCM-FAIL		o ABSCM

Inspection Procedure

1. Replace the ABSCM (ABS Control Module)