

04-13 ANTILOCK BRAKE SYSTEM

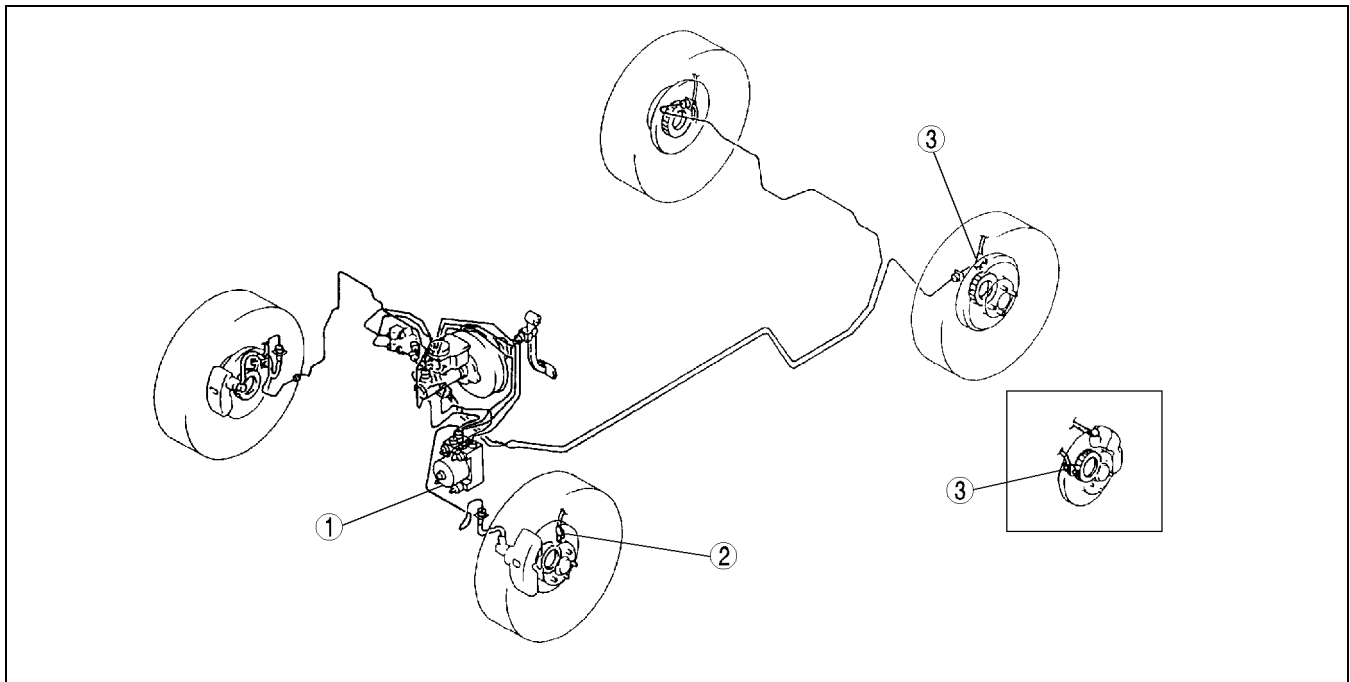
ABS LOCATION INDEX 04-13-1
 ABS SYSTEM DIAGRAM 04-13-2
 ABS HYDRAULIC UNIT (HU)/
 CONTROL MODULE (CM)
 SYSTEM INSPECTION 04-13-3
 System Inspection 04-13-3
 Using the SSTs 04-13-3
 Without using the SSTs 04-13-4
 ABS HYDRAULIC UNIT (HU)/
 CONTROL MODULE (CM)
 REMOVAL/INSTALLATION 04-13-5
 Connector Removal Note..... 04-13-6
 ABS HU/CM Removal/Installation Note 04-13-6
 Connector Installation Note 04-13-6
 ABS HYDRAULIC UNIT (HU)/
 CONTROL MODULE (CM)
 INSPECTION 04-13-6

Terminal Voltage Table (Reference) . . . 04-13-6
 Inspection Using An Oscilloscope
 (Reference) 04-13-8
 FRONT ABS WHEEL-SPEED SENSOR
 REMOVAL/INSTALLATION..... 04-13-9
 FRONT/REAR ABS WHEEL-SPEED
 SENSOR INSPECTION 04-13-9
 Visual Inspection 04-13-9
 Clearance Inspection 04-13-9
 Resistance Inspection..... 04-13-9
 Voltage Inspection..... 04-13-10
 Voltage Pattern Inspection 04-13-10
 REAR ABS WHEEL-SPEED SENSOR
 REMOVAL/INSTALLATION..... 04-13-10

04-13

ABS LOCATION INDEX

A3U041343000W01



Z3U0413W101

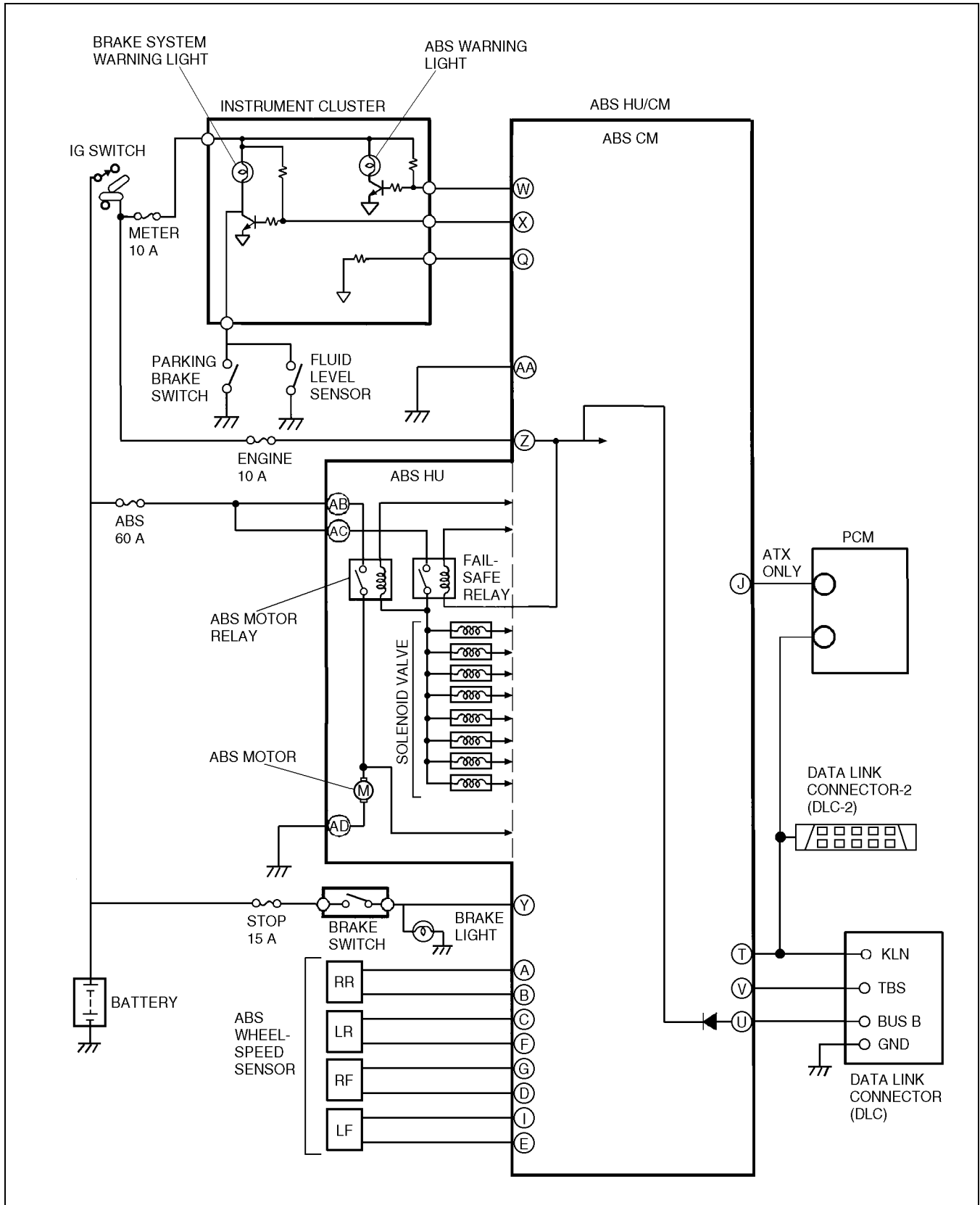
1	ABS HU/CM (See 04-13-3 ABS HYDRAULIC UNIT (HU)/ CONTROL MODULE (CM) SYSTEM INSPECTION) (See 04-13-5 ABS HYDRAULIC UNIT (HU)/ CONTROL MODULE (CM) REMOVAL/ INSTALLATION) (See 04-13-6 ABS HYDRAULIC UNIT (HU)/ CONTROL MODULE (CM) INSPECTION)
---	--

2	ABS wheel-speed sensor (front) (See 04-13-9 FRONT ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION) (See 04-13-9 FRONT/REAR ABS WHEEL-SPEED SENSOR INSPECTION)
3	ABS wheel-speed sensor (rear) (See 04-13-10 REAR ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION) (See 04-13-9 FRONT/REAR ABS WHEEL-SPEED SENSOR INSPECTION)

ANTILOCK BRAKE SYSTEM

ABS SYSTEM DIAGRAM

A3U04134300W02



A3U0402W001

ANTILOCK BRAKE SYSTEM

ABS HYDRAULIC UNIT (HU)/CONTROL MODULE (CM) SYSTEM INSPECTION

A3U041343780W01

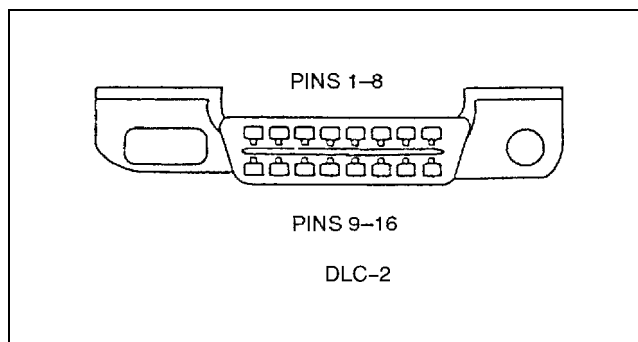
System Inspection

Preparation

1. Verify that the battery is fully charged. With the ignition switch on, verify that the ABS and BRAKE system warning lights goes out after **3 seconds**.
2. If the lights stays on after **3 seconds**, the ABS HU/CM detects a failure. Follow the troubleshooting procedures.
3. Turn the ignition switch off.
4. On level ground, jack up the vehicle and support it evenly on safety stands. Shift the transaxle to N position.
5. Release the parking brake.
6. Rotate the wheels by hand, and inspect for brake drag.

Using the SSTs

1. Perform the "Preparation."
2. Connect the **SSTs** (WDS or equivalent) to the data link connector-2 (DLC-2).
3. Set up an active command mode inspection according to the combination of commands below. (See 04-02-3 ABS ON-BOARD DIAGNOSTIC.)



X3U101WA1

04-13

OPERATION	COMMAND NAME				COMMAND TYPE
	PMP_MOTOR	RF_OUTLET	RF_INLET	ABS_POWER	
Pressure retention	OFF	OFF	ON	ON	Manual
Pressure reduction	ON	ON	ON	ON	

The chart above shows an example of a right wheel inspection.

Note

- When working with two people, one should press on the brake pedal, the other should attempt to rotate the wheel being inspected.

4. Send the command while pressing on the brake pedal and attempting to rotate the wheel being inspected.
5. When pressure is being maintained, and click sound indicating the solenoid is operating comes from the ABS HU/CM, confirm that the wheel does not rotate. When pressure is being reduced, and click sound indicating the solenoid is operating comes from the ABS HU/CM, confirm that the wheel rotates, even though the brake pedal is being depressed.

Note

- To protect the ABS HU/CM, the solenoid valve used for simulations and the ABS motor stay on for **10 seconds** each time they are switched on.
- Performing the inspections above determines the following.
 - The ABS HU/CM brake lines are normal.
 - The ABS HU/CM hydraulic system is not significantly abnormal.
 - The ABS HU/CM wiring is normal.
- However, the following items cannot be checked.
 - ABS HU/CM input system harness and parts
 - Extremely small leaks in the ABS HU/CM internal hydraulic system
 - Unusual intermittent occurrences in the above items

ANTILOCK BRAKE SYSTEM

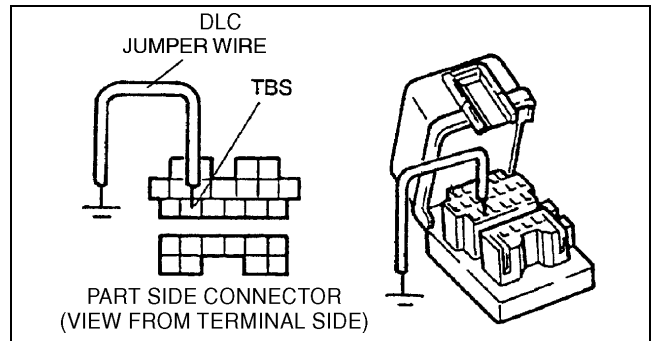
Without using the SSTs

1. Perform the "Preparation."

Caution

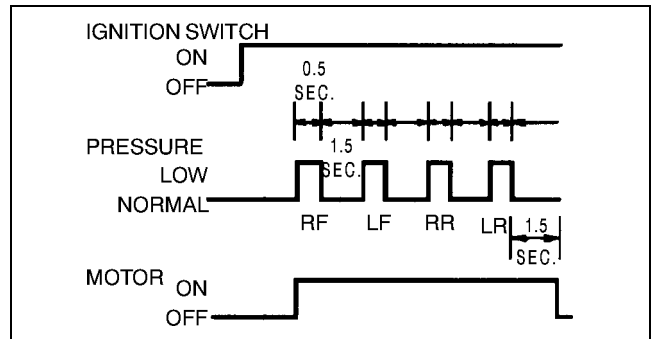
- Connecting the wrong data link connector (DLC) terminal may possibly cause a malfunction. Carefully connect the specified terminal only.

2. Use a jumper wire to short terminal TBS of the DLC to body GND.
3. Depress the brake pedal, and have an assistant verify that the right front wheel does not turn.
4. With the brake pedal still depressed, turn the ignition switch on and verify that the brake is released momentarily (**approx. 0.5 sec.**) and that the wheel turns when pressure-reduction operates.
5. Inspect the operation of the remaining wheels in order: right front, left front, right rear, left rear.
 - Replace the ABS HU/CM if wheels do not rotate.
 - Inspect brake piping to ABS HU/CM if operation of the remaining wheel order is not within specified.



Note

- If Steps 4 and 5 show correct operation, the following systems are okay:
 - Brake piping to ABS HU/CM
 - Braking system, including ABS HU/CM
 - Electrical system in ABS HU/CM (solenoid, ABS motor, etc.)
- The following are not inspected with above steps:
 - Input system and harness of ABS HU/CM
 - Intermittent failure
 - Fluid leakage from brake including the ABS HU/CM and master cylinder



6. Turn the ignition switch off and remove the jumper wire.

ANTILOCK BRAKE SYSTEM

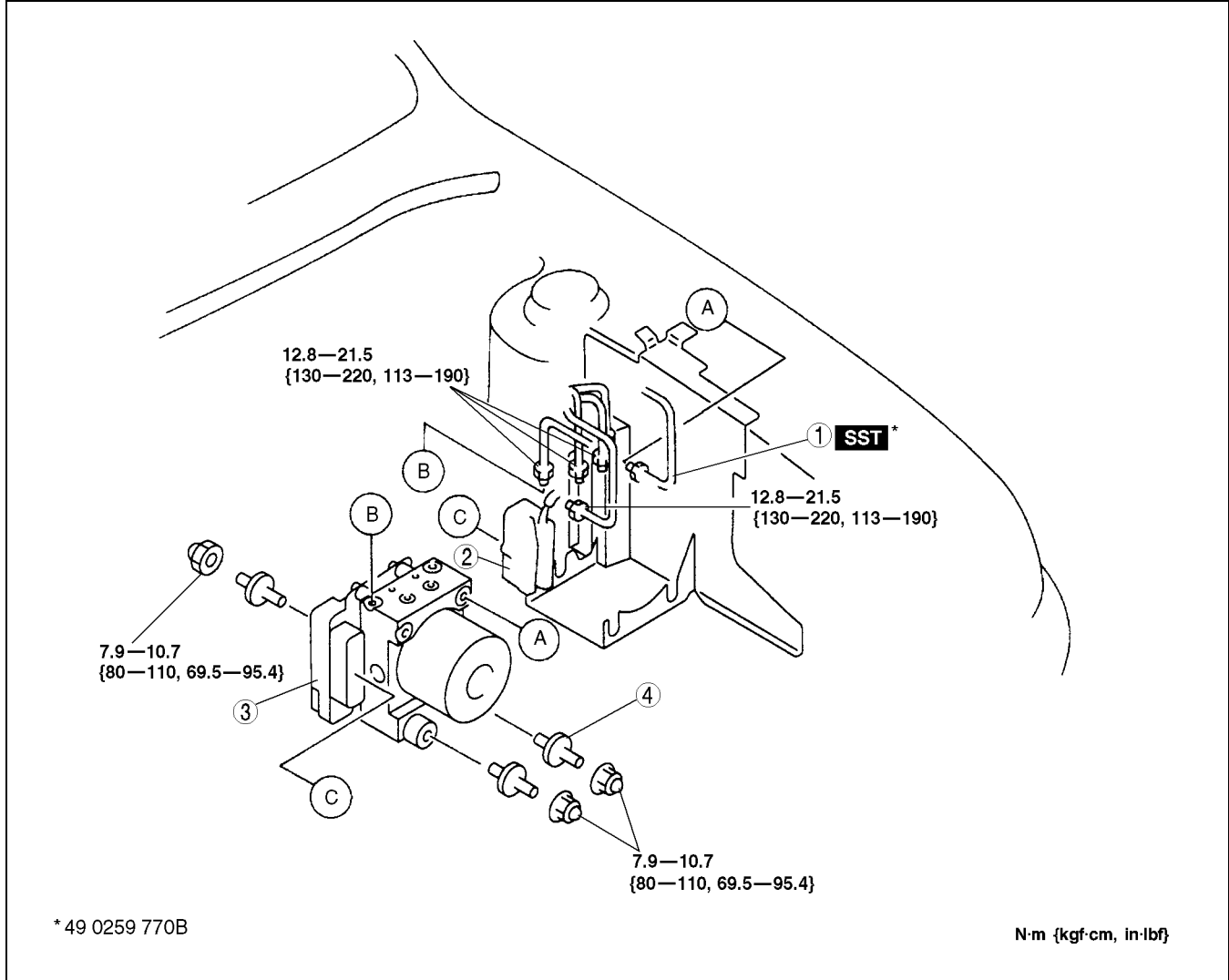
ABS HYDRAULIC UNIT (HU)/CONTROL MODULE (CM) REMOVAL/INSTALLATION

A3U041343700W01

Caution

- Do not drop the ABS hydraulic unit (HU) /control module (CM). Replace it if it is subjected to an impact.

- Remove the battery and battery tray.
- Remove in the order indicated in the table.
- Install in the reverse order of removal.



04-13

1	Brake pipe
2	Connector (See 04-13-6 Connector Removal Note) (See 04-13-6 Connector Installation Note)

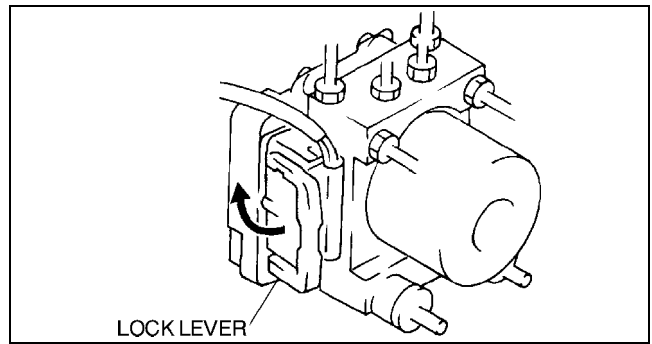
3	ABS HU/CM (See 04-13-6 ABS HU/CM Removal/Installation Note)
4	stud

A3U0413W101

ANTILOCK BRAKE SYSTEM

Connector Removal Note

1. Pull the lock lever up and make it unlock.
2. Remove the connector.



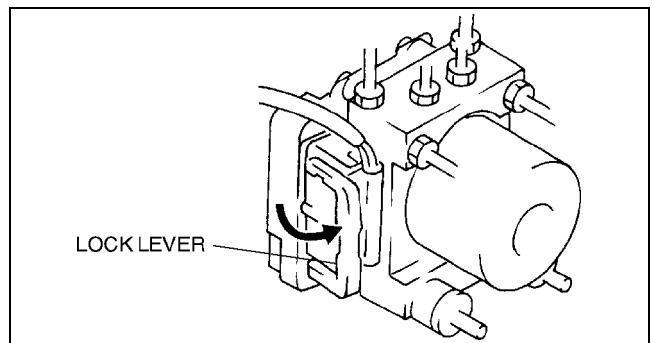
YMU413WC8

ABS HU/CM Removal/Installation Note

1. When removing/installing the ABS HU/CM from/to the vehicle, attach a strip of protective tape on the ABS HU/CM connector to prevent brake fluid from entering.

Connector Installation Note

1. Verify that the lock lever of the harness connector is completely pulled up.

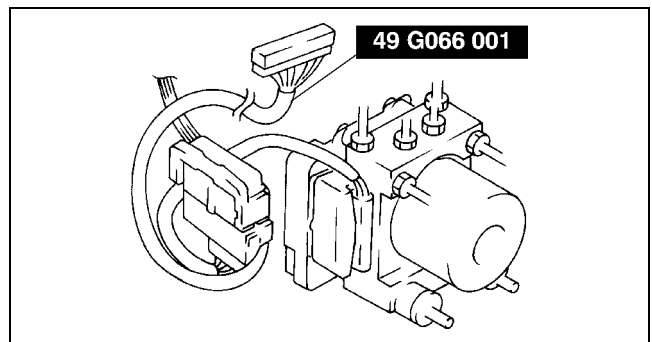


YMU413WC9

ABS HYDRAULIC UNIT (HU)/CONTROL MODULE (CM) INSPECTION

A3U041367650W01

1. Disconnect the negative battery cable.
2. Connect the **SST** between the ABS HU/CM and harness connector with the ignition switch off.
3. Attach the tester leads to the **SST** and inspect voltage referring the table below.



YMU413WA3

Terminal Voltage Table (Reference)

(Engine is idling, and connector is connected unless otherwise indicated)

ABS HU/CM													SST (49 G066 001) CONNECTOR													
A	D	G	J	M	P	S	V	Y					AA	AC												
B	E	H						Q	T	W			P	O	M	L	J	I	H	G	F	E	D	C	B	A
C	F	I	L	O	R	U	X	Z																		

HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

(VIEW FROM TERMINAL SIDE)

Y3U402WA8

ANTILOCK BRAKE SYSTEM

Terminal	Signal	Connected to	Test condition	Voltage (V)	Action				
A B	RR wheel-speed	RR wheel-speed sensor	Vehicle is stopped	0 (AC)	<ul style="list-style-type: none"> Inspect related harness Inspect ABS wheel-speed sensor 				
			<ul style="list-style-type: none"> Inspect by using the wave profile. (See 04-13-8 Inspection Using An Oscilloscope (Reference)) 						
C F	LR wheel-speed	LR wheel-speed sensor	Vehicle is stopped	0 (AC)		<ul style="list-style-type: none"> Inspect related harness Inspect ABS wheel-speed sensor 			
			<ul style="list-style-type: none"> Inspect by using the wave profile. (See 04-13-8 Inspection Using An Oscilloscope (Reference)) 						
D G	RF wheel-speed	RF wheel-speed sensor	Vehicle is stopped	0 (AC)			<ul style="list-style-type: none"> Inspect related harness Inspect ABS wheel-speed sensor 		
			<ul style="list-style-type: none"> Inspect by using the wave profile. (See 04-13-8 Inspection Using An Oscilloscope (Reference)) 						
E I	LF wheel-speed	LF wheel-speed sensor	Vehicle is stopped	0 (AC)				<ul style="list-style-type: none"> Inspect related harness Inspect ABS wheel-speed sensor 	
			<ul style="list-style-type: none"> Inspect by using the wave profile. (See 04-13-8 Inspection Using An Oscilloscope (Reference)) 						
H	—	—	—	—					—
J*1	Vehicle speed output	PCM	Vehicle is stopped	0					<ul style="list-style-type: none"> Inspect related harness Inspect ABS wheel-speed sensor
			<ul style="list-style-type: none"> Inspect by using the wave profile. (See 04-13-8 Inspection Using An Oscilloscope (Reference)) 						
L	—	—	—	—	—				
M	—	—	—	—	—				
O	—	—	—	—	—				
P	—	—	—	—	—				
Q	Vehicle speed output	Instrument cluster	Vehicle is stopped	0	<ul style="list-style-type: none"> Inspect related harness Inspect ABS wheel-speed sensor 				
			<ul style="list-style-type: none"> Inspect by using the wave profile. (See 04-13-8 Inspection Using An Oscilloscope (Reference)) 						
R	—	—	—	—		—			
S	—	—	—	—		—			
T	On-board diagnosis	KLN terminal of DLC and DLC-2	—	No need to check		—			
U*2	—	DLC	—	No need to check		—			
V	On-board diagnosis	TBS terminal of DLC	—	10—14		<ul style="list-style-type: none"> Inspect related harness 			
W	ABS warning light	ABS warning light	Illuminated	Below 0.5		<ul style="list-style-type: none"> Inspect related harness 			
			Not illuminated	Above 1.5					
X	Brake system warning light	Brake system warning light	Illuminated	Below 0.5		<ul style="list-style-type: none"> Inspect related harness 			
			Not illuminated	Above 1.5					
Y	Brake switch	Brake switch	Brake pedal is depressed	10—14	<ul style="list-style-type: none"> Inspect related harness 				
			Brake pedal is released	Below 0.5					
Z	Power supply	Ignition switch	—	B+	<ul style="list-style-type: none"> Inspect related harness 				
AA	Ground	Ground	—	0	<ul style="list-style-type: none"> Inspect related harness 				
AB	Power supply (ABS motor)	Battery	—	B+	<ul style="list-style-type: none"> Inspect related harness 				
AC	Power supply (Solenoid valve)	Battery	—	B+					
AD	Ground	Ground	—	0	<ul style="list-style-type: none"> Inspect related harness 				

*1 : ATX only

*2 : Use this terminal at factory only, not used for inspection and repair at field

ANTILOCK BRAKE SYSTEM

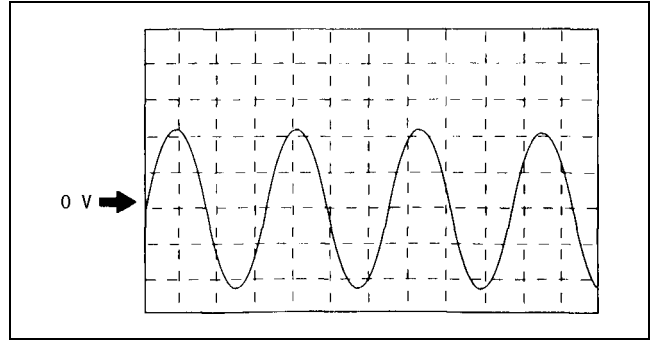
Inspection Using An Oscilloscope (Reference)

Wheel speed

- ABS HU/CM terminal:
RR : A (+) — B (-)
LR : C (+) — F (-)
RF : D (+) — G (-)
LF : E (+) — I (-)
- Oscilloscope setting:
1 V/DIV (Y), 2 ms/DIV (X), AC range
- Vehicle condition: Driving 30 km/h (18.6 mph)

Note

- As vehicle speed increases, period of wave shortens.
- If there is malfunctioning in the sensor rotor, wave profile warps.



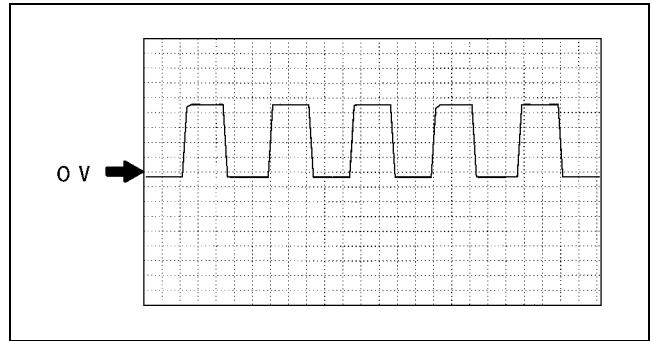
Z3U0413W201

Vehicle speed output (to PCM) (ATX only)

- ABS HU/CM terminal: J (+) — AA (-)
- Oscilloscope setting:
1 V/DIV (Y), 5 ms/DIV (X), DC range
- Vehicle condition: Driving 30 km/h (18.6 mph)

Note

- As vehicle speed increases, period of wave shortens.



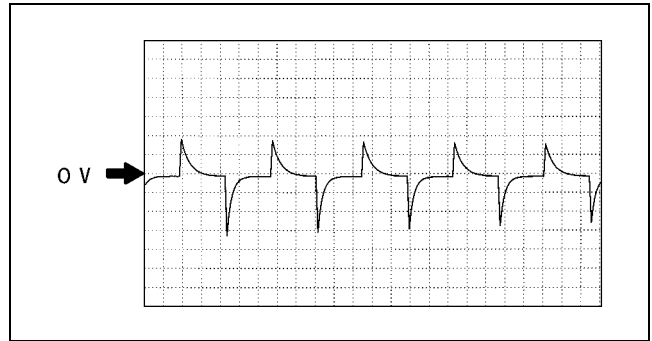
Z3U0413W202

Vehicle speed output (to instrument cluster)

- ABS HU/CM terminal: Q (+) — AA (-)
- Oscilloscope setting:
1 V/DIV (Y), 5 ms/DIV (X), DC range
- Vehicle condition: Driving 30 km/h (18.6 mph)

Note

- As vehicle speed increases, period of wave shortens.



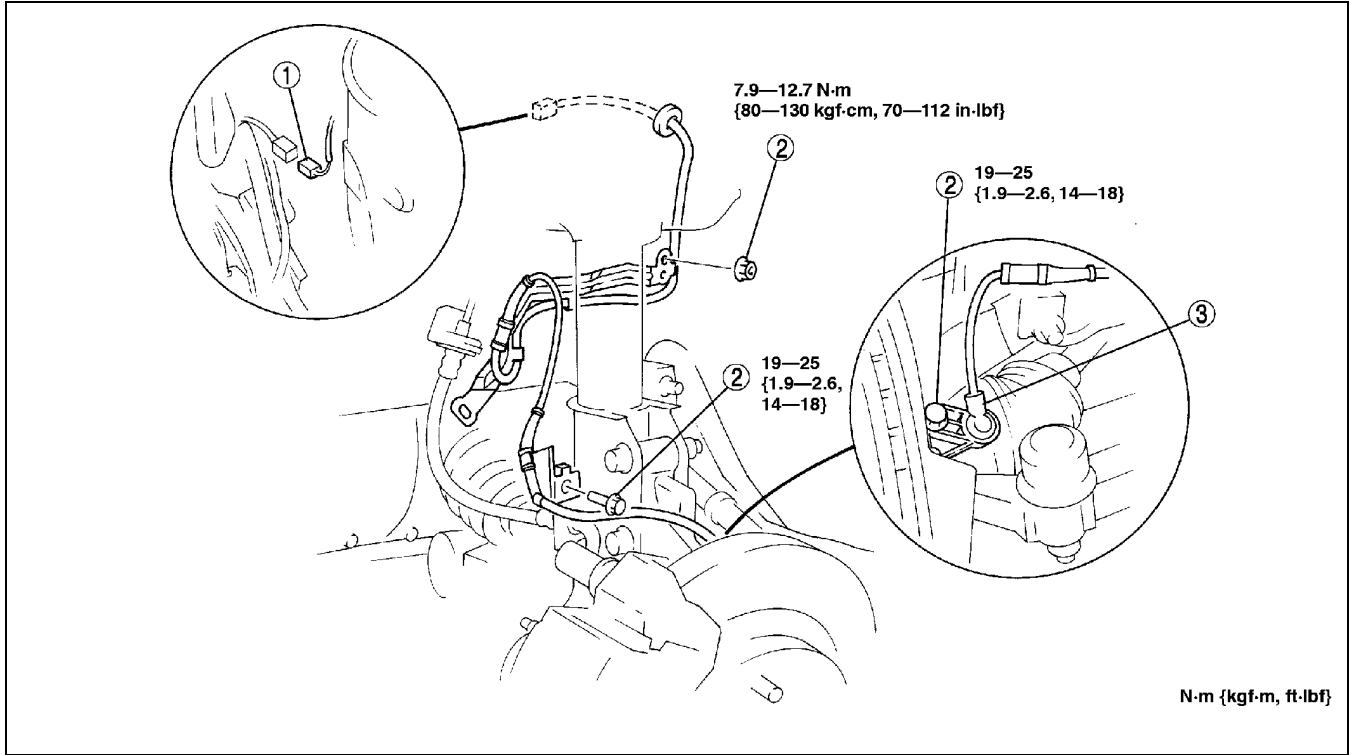
Z3U0413W203

ANTILOCK BRAKE SYSTEM

FRONT ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION

A3U041343720W01

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



X3U413WAB

1	Connector
2	Bolt, nut

3	Front ABS wheel-speed sensor
---	------------------------------

FRONT/REAR ABS WHEEL-SPEED SENSOR INSPECTION

A3U041343720W02

Visual Inspection

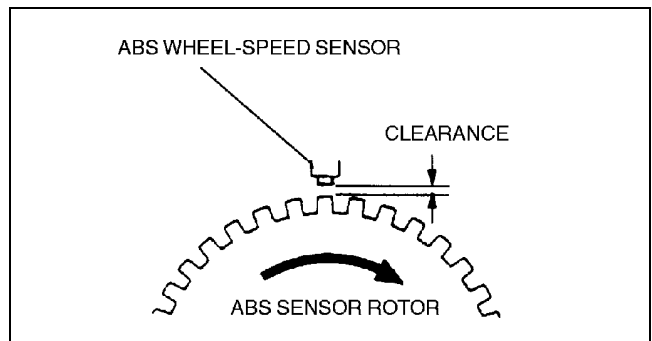
1. Remove the wheel and tire, and inspect the sensor for looseness and damage. Replace the sensor if necessary.

Clearance Inspection

1. Inspect the clearance between the wheel-speed sensor and the sensor rotor.

Clearance

0.3—1.1 mm {0.012—0.043 in}



X3U413WAC

Resistance Inspection

1. Disconnect the ABS wheel-speed sensor connector.
2. Inspect the resistance at the ABS wheel-speed sensor.
 - If not as specified, replace the ABS wheel-speed sensor.

Resistance

1.3—1.7 kilohm

ANTILOCK BRAKE SYSTEM

Voltage Inspection

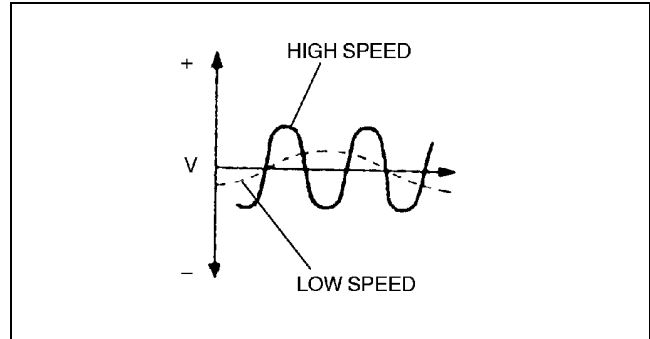
1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Disconnect the ABS wheel-speed sensor connector.
3. Inspect each sensor by rotating each wheel one revolution per second.
 - If not as specified, replace the ABS wheel-speed sensor.

Voltage

0.25—1.2 V (AC)

Voltage Pattern Inspection

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Disconnect the ABS wheel-speed sensor connector.
3. Using an oscilloscope, inspect voltage pattern for distortion and noise by rotating each wheel.
 - If there is distortion or noise, inspect the ABS sensor rotor.

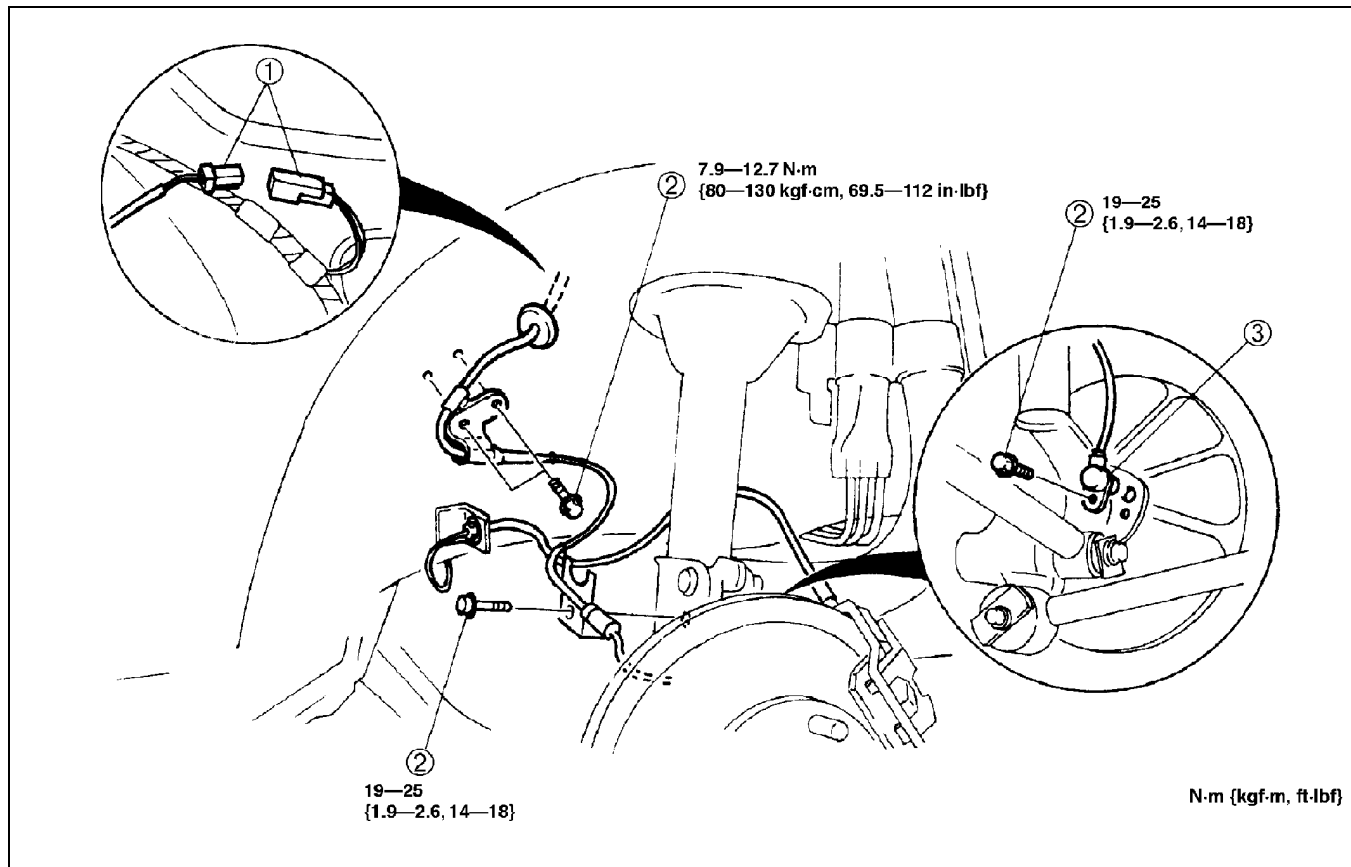


X3U413WAD

REAR ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION

A3U041343710W01

1. For 4SD, remove the rear seat back. (See 09-13-5 REAR SEAT REMOVAL/INSTALLATION.)
For 5HB, remove the trunk side trim. (See 09-17-15 5HB.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



X3U413WAE

1	Connector
2	Bolt

3	Rear ABS wheel-speed sensor
---	-----------------------------