SUZUKI

TECHNICAL DEPT

SF SERIES

SUPPLEMENTARY SERVICE MANUAL

USE THIS SUPPLEMENTARTY SERVICE MANUAL WITH MANUALS MENTIONED IN FOREWORD OF THIS MANUAL.

SUZUKI
Caring for Customers
99501-80E10-01E

SUZUKI MOTOR CORPORATION
OVERSEAS SERVICE DEPARTMENT

FOREWORD

This SUPPLEMENTARY SERVICE MANUAL is a supplement to SF SERIES SERVICE MANUALS (refer to next page) and contains those items on the structure, service procedures, etc. that were modified for the applicable model which is mentioned in front of the contents of each section.

When servicing a vehicle with a body number after the numbers that mentioned on the each section, refer to this Supplementary Service Manual first.
If necessary information is not found in this Supplementary Service Manual, refer to Related Service Manuals specified next page.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others. Therefore, note that illustrations may differ from the vehicle being actually serviced. The right is reserved to make changes at any time without notice.

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RELATED SERVICE MANUALS

Service manuals listed below are in the chronological order with the latest one at the top. For the efficient use of manuals, start with one at the top of the list (i.e., the latest one). If desired section, item or description is not found in it, try next one in the list and do the same one by one till what is being searched is found.

MODEL	NO.	RELATED SERVICE MANUAL	APPLICABILITY
SF SERIES	1	SF SERIES SUPPLEMENTARY SERVICE MANUAL (99501-80E00) [Pub. No. G4210GE]	This manual describes the items that are modified for the vehicle produced in and after September 1996.
SF310 (1,000 cc)	2	SF310 SUPPLEMENTARY SERVICE MANUAL (99501-60B00)	This manual describes the items that are updated (modified and added) from the Service Manual (99500-60B01).
	3	SF310 SERVICE MANUAL (99500-60B01)	This manual is the base manual for the above manual.
SF413 (1,300 cc)	2	SF413 SUPPLEMENTARY SERVICE MANUAL (99501-63B30)[Pub. No. G4203GE]	This manual describes the items that are updated (modified and added) from the Service Manual (99500-63B01).
	3	SF413 SUPPLEMENTARY SERVICE MANUAL (99501-63B20)[Pub. No. G4202GE]	This manual describes the items for 4WD model that are updated (modified and added) from the Service Manual (99500-63B01).
	3	SF413 SUPPLEMENTARY SERVICE MANUAL (99501-63B10)	This manual describes the items for SEDAN model that are updated (modified and added) from the Service Manual (99500-63B01).
	4	SF413 SERVICE MANUAL (99500-63B01)[Pub. No. G4200GE]	This manual is the base manual for the above manuals.
SF416 (1,600 cc)	2	SF416 SERVICE MANUAL (99500-71C10)	This manual is the base manual of SF416.
SF SERIES (A/C)	2	AIR CONDITIONING BASIC MANUAL (99520-02130)	This manual is the base manual of A/C system.

SECTION 5

5

BRAKES

Applicable Model (On and after VIN TSMM+++++00320340. However this VIN may be different from actual VIN depending on vehicle production sequence at factory. Therefore, please check actual vehicle parts before servicing.)

Applicable Parts

MODEL	FRONT CALIPER	REAR BRAKE	LSPV
HATCH BACK 2WD	O	X	O
HATCH BACK 2WD ABS	O	X	X
HATCH BACK 4WD	O	O	X
SEDAN 1.0 L	O	O	X
SEDAN 1.3 L	O	O	O
SEDAN 1.3 L ABS	O	O	X
SEDAN 1.6 L	X	O	O

O: Applicable, X: Not Applicable

NOTE:

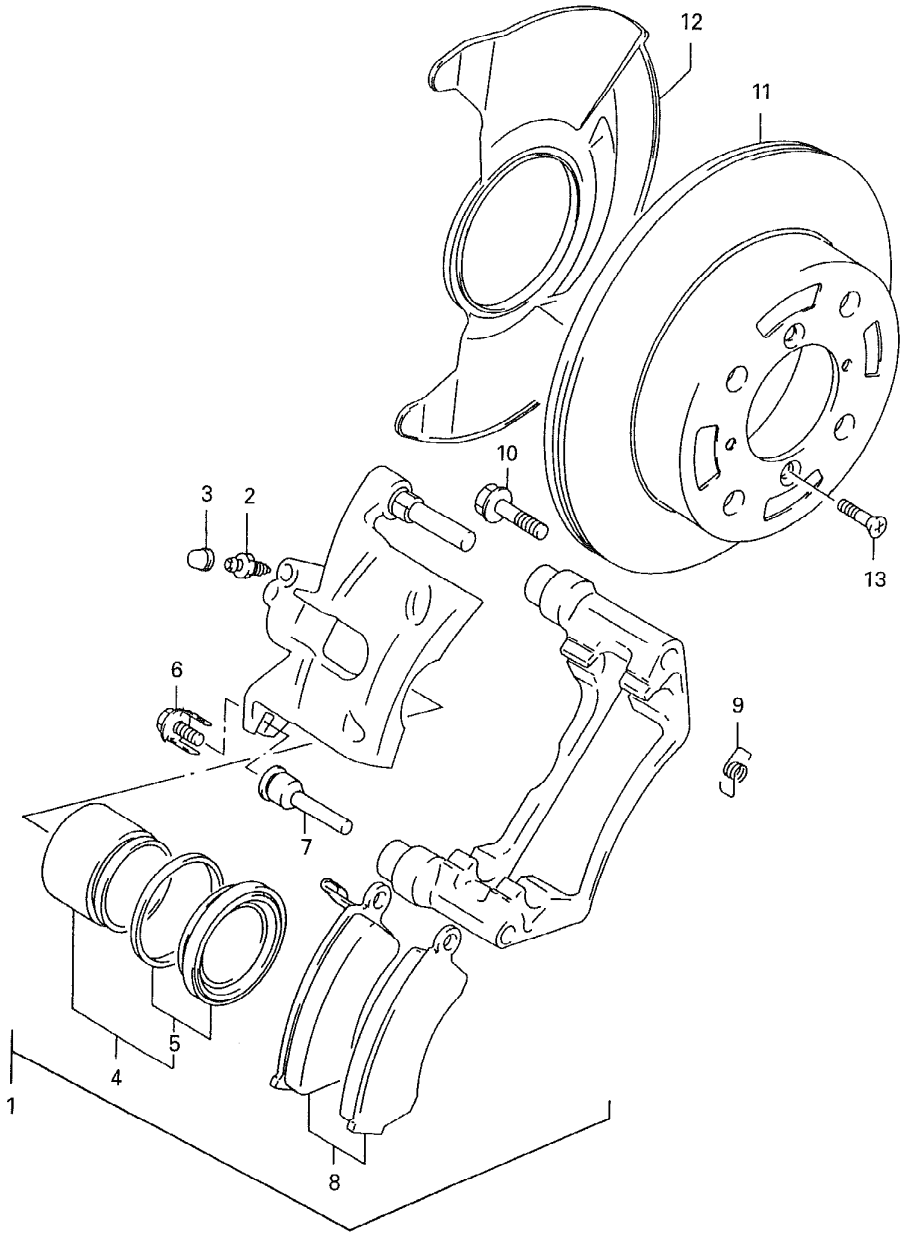
All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

For the descriptions (items) not found in this section, refer to SF Series supplementary service manual.

CONTENTS

DISC BRAKE CALIPER ASSEMBLY

NOTE:
Lubricate parts as specified. Do not use lubricated shop air on brake parts as damage to rubber components may result. If any component is removed or line disconnected, bleed the brake system. Replace pads in axle sets only. The torque values specified are for dry, unlubricated fasteners.



1. Front brake caliper assembly
2. Bleeder plug
3. Cap
4. Piston and seal set
5. Piston seal set
6. Pin bolt
7. Pin set
8. Disc brake pad set
9. Pad spring
10. Bolt
11. Front brake disk
12. Brake disk dust cover
13. Screw

DRUM BRAKE ASSEMBLY

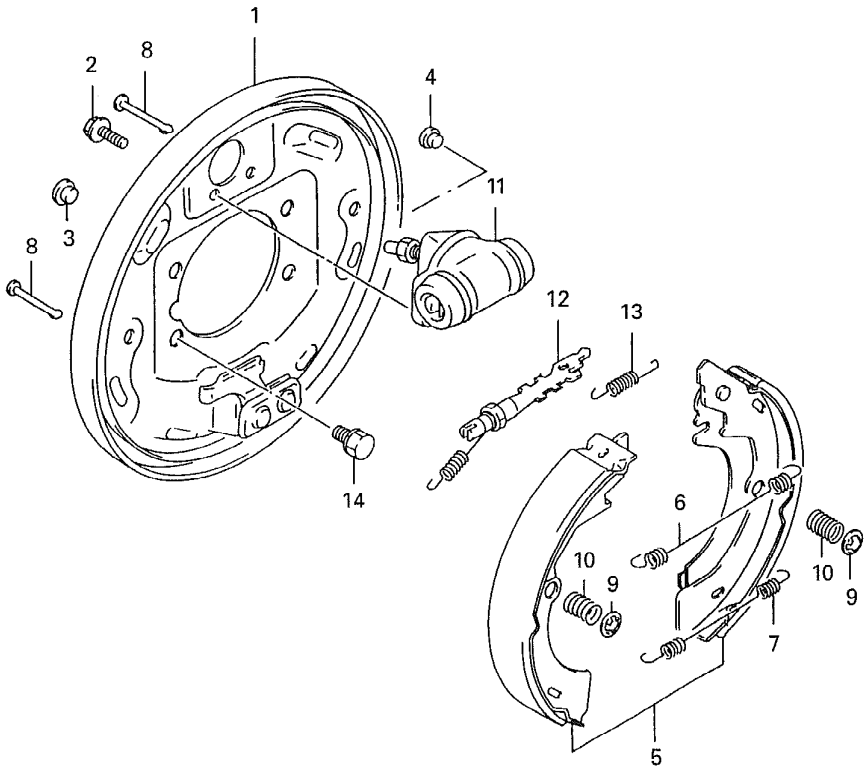
GENERAL DESCRIPTION

The drum brake assembly has a self shoe clearance adjusting system so that drum-to-shoe clearance is maintained appropriate at all times. For details, refer to OPERATION in the next page.

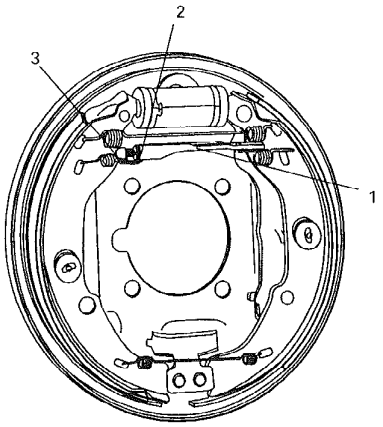
NOTE:

Replace all components included in repair kits to service this drum brake. Lubricate parts as specified.

WARNING:
If any hydraulic component is removed or brake line disconnected, bleed the brake system. The torque values specified are for dry, unlubricated fasteners.



1. Backing plate
2. Rear brake bolt
3. Checking plug
4. Backing plate plug
5. Brake shoe set
6. Shoe return spring
7. Shoe return lower spring
8. Shoe hold down pin
9. Hold down retainer
10. Hold down spring
11. Rear wheel cylinder assembly
12. Brake strut assembly
13. Strut retaining spring
14. Bolt

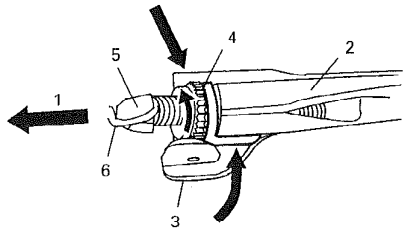


1. Brake strut
2. Adjuster nut
3. Adjuster lever

80E10S-5-4-2

CLEARANCE CORRECTION

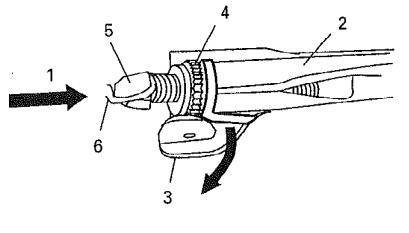
The strut shoe clearance adjusting system consists of brake strut, adjusting lever, adjuster nut, etc.



1. Brake shoe
2. Brake strut
3. Adjusting lever
4. Adjuster nut
5. Adjuster pin
6. Spring

80E10S-5-4-3

During the normal braking the brake shoe pulls out the adjuster pin with nut from the brake strut due to spring force and the adjusting lever starts to turn the adjuster nut on own pin.
When adjuster nut turns, the strut is lengthened and the brake shoe stop position changes.
As a result, the clearance between the shoe and drum reduces.



1. Brake shoe
2. Brake strut
3. Adjusting lever
4. Adjuster nut
5. Adjuster pin
6. Spring

80E10S-5-4-4

When the brake pedal is depressed and the brake shoes move toward the brake drum, they push back the adjuster pin with nut into the brake strut.
During this operation the adjuster lever jumps into new teeth position of the adjuster nut and stays in this position while the clearance between the brake shoes and brake drum is within the standard value.
If the clearance is within standard value during the braking, the adjusting lever does not move so much as to go over teeth of adjuster nut.
Thus, no adjustment is made in this case.

ON-CAR SERVICE

4. REAR BRAKE SHOE INSPECTION

For details, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.

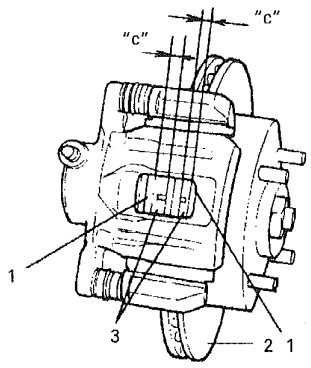
6. REAR DRUM BRAKE SHOE ADJUSTMENT

For details, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.

Adjustment is automatically accomplished by depressing brake pedal 3 to 10 times with approximately 30 kg load after all parts are installed.

9. PAD LINING INSPECTION

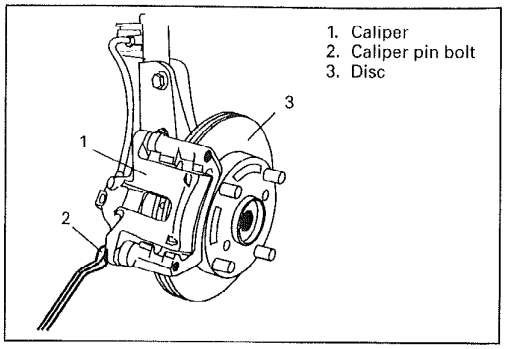
For details, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.



"C" limit = min. 3 mm

1. Pad rim
2. Disc
3. Lining

80E10S–5–5–4



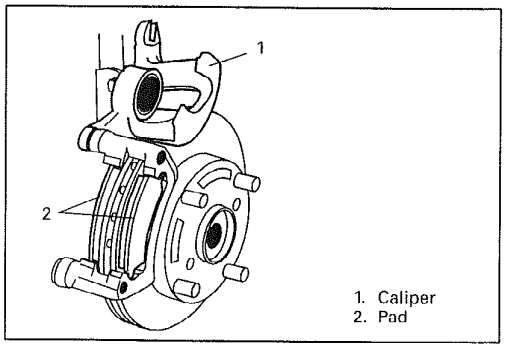
80E10S–5–6–1

FRONT DISC BRAKE R & I

1. REMOVE AND INSTALL PAD (SHOE AND LINING)

REMOVAL

1) Hoist car and remove wheel.
2) Remove caliper pin bolt.



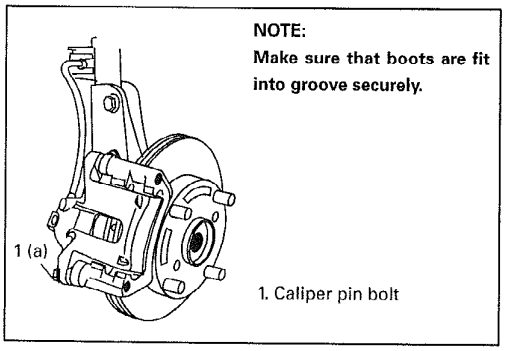
80E10S–5–6–2

3) Turn over caliper on caliper carrier.
4) Remove pads.

INSTALLATION

See note at the beginning of this section.

1) Install pads



80E10S–5–6–4

2) Set caliper and torque caliper pin bolt to specification.
   Tightening torque
   (a) 32 N.m (3.2 kg-m, 23.0 lb-ft)
3) Torque front wheel nuts to specification.
4) Upon completion of installation, perform brake test.

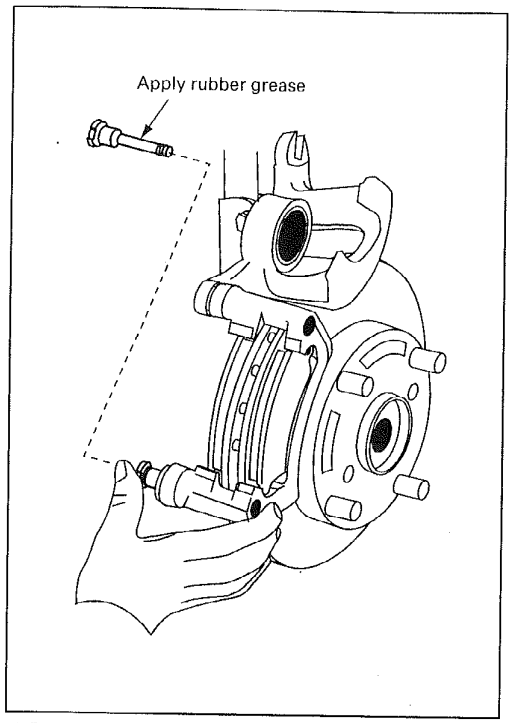
2. REMOVE AND INSTALL CALIPER ASSEMBLY

REMOVAL

1) Hoist car and remove wheel.
2) Remove brake flexible hose mounting bolt from caliper.
   For more details, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.
3) Remove pin caliper pin bolt.
4) Remove caliper from carrier.

INSTALLATION

1) Install caliper to caliper carrier.
   NOTE:
   Apply grease to the pin surface before installing caliper to carrier!
2) Torque caliper pin bolt to specification.
   For more details, refer to the section "REMOVE AND INSTALL PAD (SHOE AND LINING)" of this manual.
3) For completing this procedure, refer to the same section from 3) to 5) of SERVICE MANUAL mentioned in FOREWORD of this manual.



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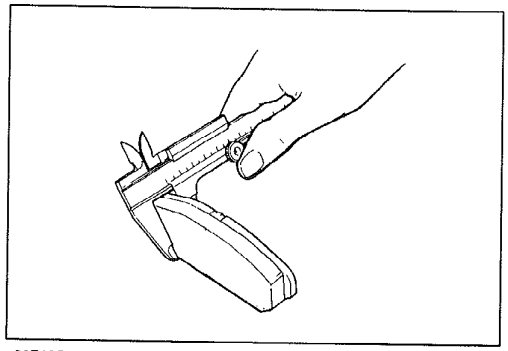


80E10S-5-8-3

3. REMOVE AND INSTALL SEAL, PISTON, DUST BOOT AND BLEEDER SCREW

For details, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.

NOTE:

CALIPER

Before installing caliper (cylinder body) to carrier, check to ensure that guide pin inserted in lower carrier hole can be moved smoothly in thrust direction.

FRONT DISC BRAKE INSPECTION

1. INSPECT BRAKE PAD LINING

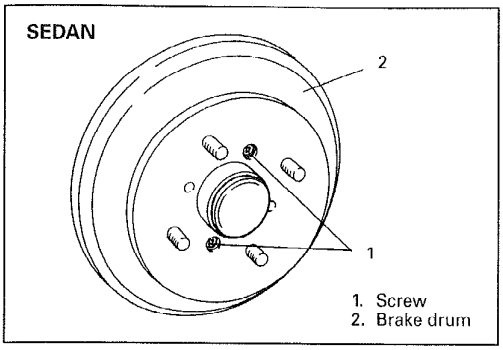
Check pad lining for wear. When wear exceeds limit, replace with a new one.

CAUTION:

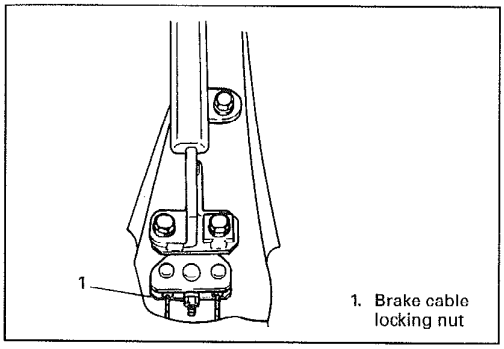
Never polish pad lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage disc. When pad lining requires correction, replace it with a new one.

	Standard	Limit
Pad thickness (lining + pad rim)	15.5 mm (0.610 in.)	9.3 mm (0.366 in.)

For more details, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.



80E10S–5–9–1



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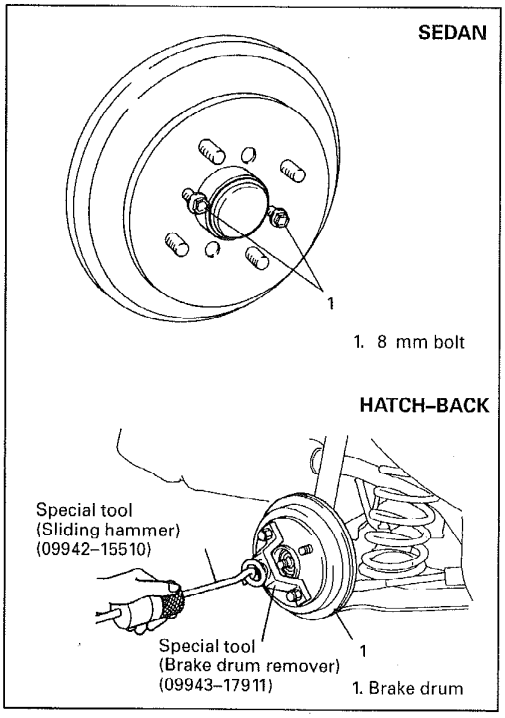


80E10S–5–9–4

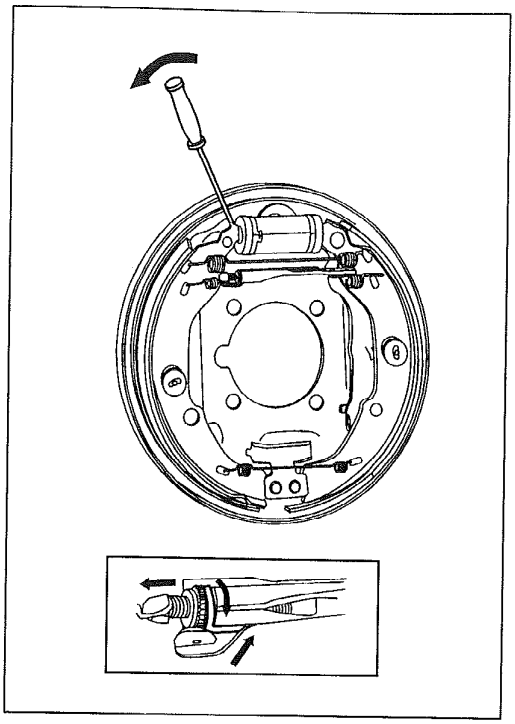
DRUM AND COMPONENTS R & I

1. REMOVE AND INSTALL BRAKE DRUM

REMOVAL

1) Hoist car and remove wheel.
2) Remove brake drum screws (2 pcs) – SEDAN model
   Remove spindle cap (for more detail, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual) – HB model.
3) Release parking brake lever.
4) Loosen parking brake cable locking nut.
5) Pull brake drum off by using 8 mm bolts (2 pcs) – SEDAN model

Pull brake drum off by using special tools – HB model
A: Brake drum remover: 09943–17911
B: Sliding hammer: 09942–15510



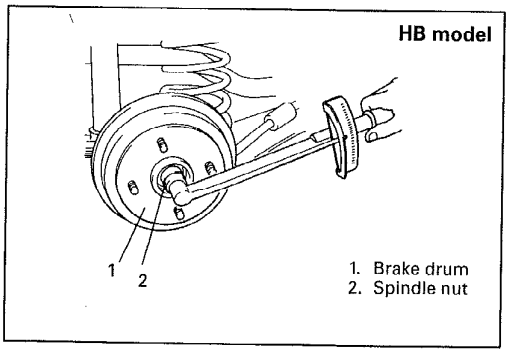
80E10S–5–10–2

INSTALLATION

NOTE:
See NOTE at the beginning of this section.

1) Before installing brake drum, maximize brake shoe-to-drum clearance. For that, by using a screwdriver unload the brake strut and release the adjusting lever by hand. In this position by hand turn off the adjusting nut on its pin to the head.

2) Install brake drum after making sure that inside of brake drum and brake shoes are free from dirt and oil.



80E10S–5–10–4

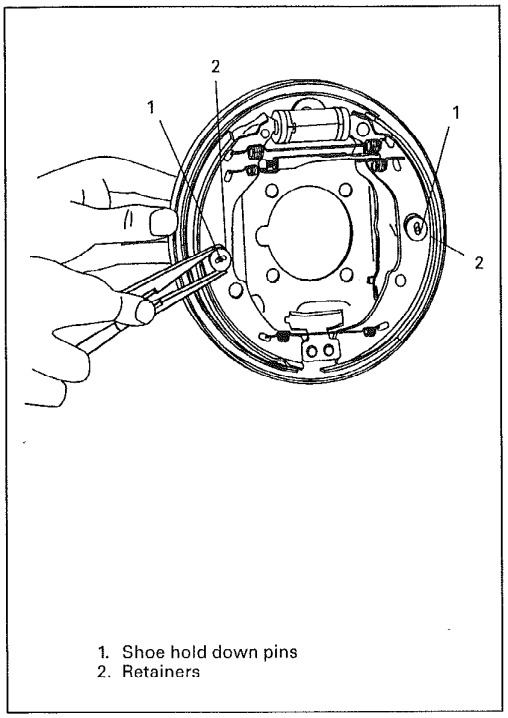
3) Tighten brake drum screws – SEDAN model.
Install washer, a new spindle nut and tighten it to specified torque as shown on figure – HB model.
Tightening Torque:
(a) 100 N.m (10.0 kg-m, 72.5 lb-ft)
NOTE:
Removed spindle nut should be replaced with new one.
4) Upon completion of all jobs, depress brake pedal with about 30 kg load 3 to 10 times so as to obtain proper drum-to-shoe clearance.
Adjust parking brake cable (for adjusting, refer to SERVICE MANUAL mentioned in FOREWORD of this manual).
5) Install wheel and tighten wheel nuts to specified torque.

6) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove car from hoist and perform brake test (foot brake and parking brake).

2. REMOVE AND INSTALL BRAKE SHOE

REMOVAL

1) Perform steps 1) to 5) of BRAKE DRUM REMOVAL.



1. Shoe hold down pins
2. Retainers

80E10S-5-11-3

2) Remove shoe hold down spring by turning and removing its retainer.

3) Disconnect parking brake cable from parking brake shoe lever and remove brake shoes.
4) Remove strut and springs.
5) Remove brake shoes.

INSTALLATION

1) Assemble parts as shown in reverse order of removal.
2) For procedure hereafter, refer to steps 1) to 6) of BRAKE DRUM INSTALLATION.

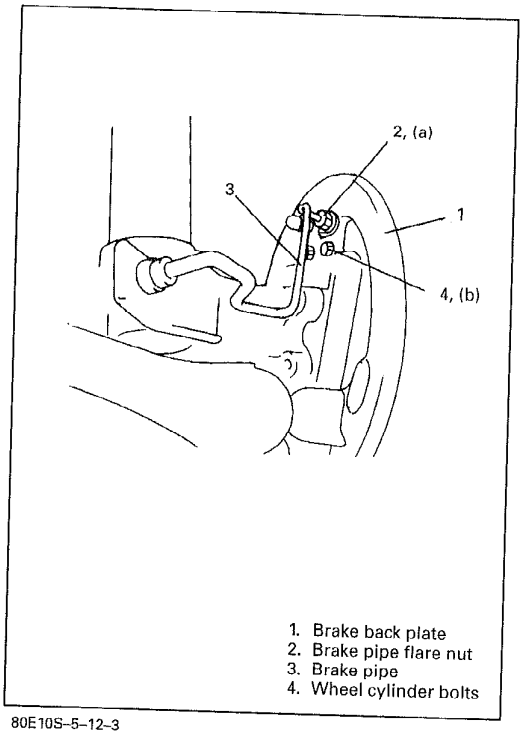
3. REMOVE AND INSTALL WHEEL CYLINDER

REMOVAL

1) Perform steps 1) to 5) of BRAKE SHOE REMOVAL.
2) For more details, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.

INSTALLATION

1) For more details, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.



1. Brake back plate
2. Brake pipe flare nut
3. Brake pipe
4. Wheel cylinder bolts

80E10S-5-12-3

2) Torque each bolt and nut by using specified torque.
Tightening torque
(a) : 16 N.m (1.6 kg-m; 11.5 lb-ft)
(b) : 8 N.m (0.8 kg-m; 6.0 lb-ft)

3) For installation of brake shoes and drum, refer to INSTALLATION OF BRAKE SHOE of this section.
4) Check each installed part for oil leakage.

4. REMOVE AND INSTALL BRAKE BACK PLATE

REMOVAL

1) Perform steps 1) to 5) of BRAKE DRUM REMOVAL of this section.
2) At SEDAN model, remove the wheel hub. For more details, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.
3) To remove the back plate, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.

INSTALLATION

1) For more details, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.
2) For installation of wheel cylinder and brake shoes, refer to the 3) point – REMOVE AND INSTALL WHEEL CYLINDER – of this section.
3) For installation of wheel hub, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.

BRAKE DRUM AND COMPONENTS INSPECTION

1. INSPECT BRAKE DRUM

For more details, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.

2. INSPECT BRAKE SHOE AND LINING

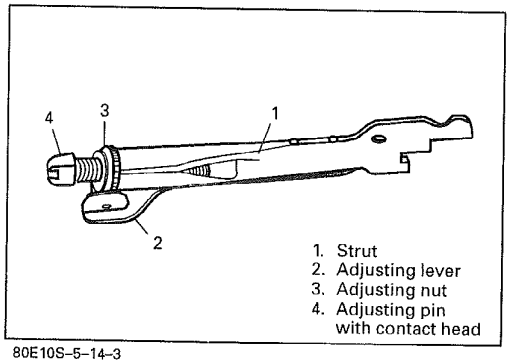
Where lining is worn out beyond service limit, replace shoes.

Brake lining	Standard	Service Limit
Thickness (lining + shoe rim)	6.5 mm (0.26 in.)	3.0 mm 0.12 in.

For more details, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.

3. INSPECT WHEEL CYLINDER

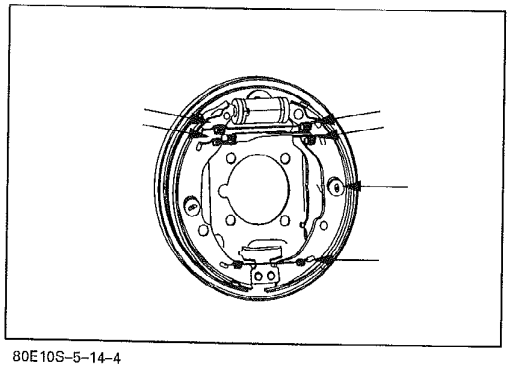
For more details, refer to the same section of SERVICE MANUAL mentioned in FOREWORD of this manual.



80E10S–5–14–3

4. INSPECT BRAKE STRUT

Inspect adjusting nut, pin and lever for wear or damage.



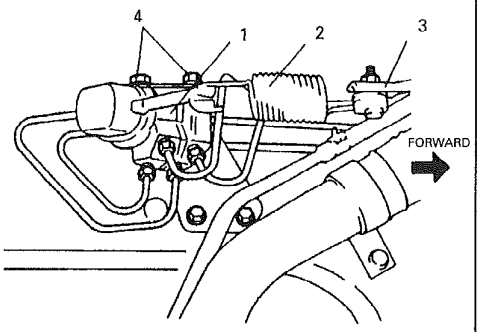
80E10S–5–14–4

5. INSPECT SPRINGS

Inspect for damage or weakening. Inspect each part with arrow for rust. If found defective, replace.

6. INSPECT PARKING SHOE LEVER

Inspect brake shoe lever for free movement against brake shoe web. If defective, correct or replace, with shoe.



1. LSPV assembly
2. LSPV spring
3. LSPV stay
4. Bolt

80E10S–5–15–3

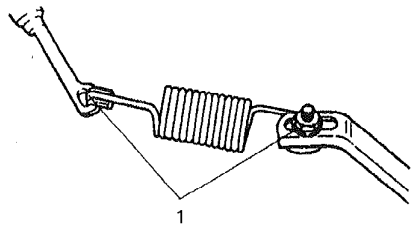
LSPV (Load Sensing Proportioning Valve) R & I

REMOVE AND INSTALL LSPV

REMOVAL

1) Clean around reservoir cap and take out fluid with syringe or such.
2) Hoist vehicle.
3) Disconnect brake pipes from LSPV.
4) Detach LSPV spring from lever.
5) Remove LSPV assembly from vehicle body.
6) Remove spring from lever.

CAUTION:
- **None of left indicated bolt of LSPV assembly should be loosened or tightened.**
- **LSPV assembly must not be disassembled. Replace with new one if found defective.**



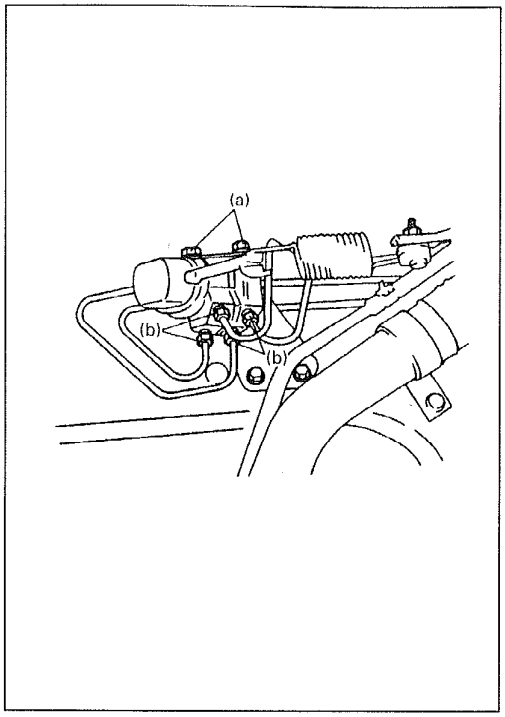
1. Apply grease

80E10S–5–15–5

INSTALLATION

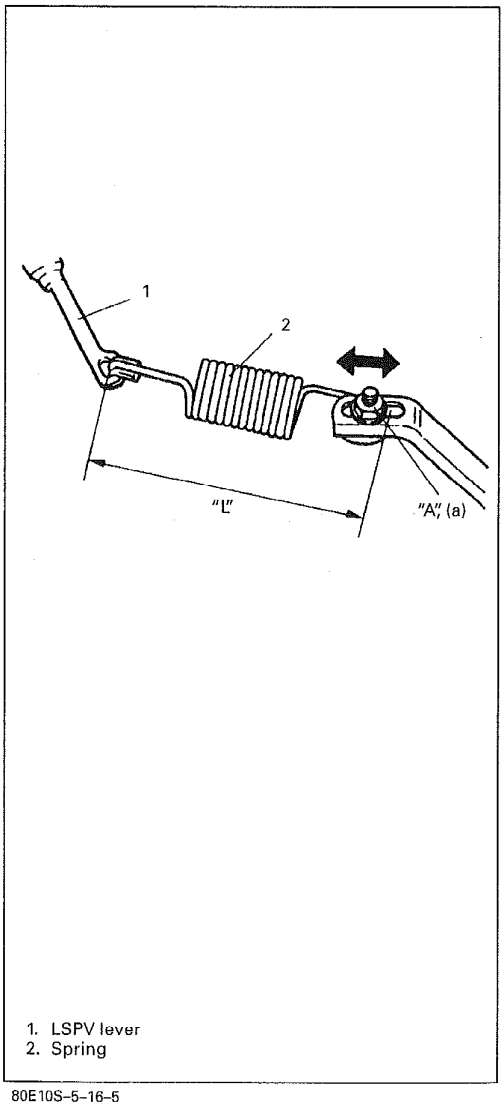
CAUTION:
Refer to above CAUTION.

Install by reversing removal procedure, noting the following.
1) Apply multi–purpose grease to upper and lower joint of coil spring.



80E10S-5-16-2

2) Torque each bolt and nut to specification as indicated respectively in left figure.
Tightening torque
(a) : 23 N.m (2.3 kg-m, 17.0 lb-ft)
(b) : 16 N.m (1.6 kg-m, 11.5 lb-ft)
3) Upon completion of installation, fill reservoir tank with specified fluid and bleed air from brake system.
4) After bleeding air, check that LSPV is installed properly, referring to following INSPECTION & ADJUSTMENT section.



1. LSPV lever
2. Spring

80E10S-5-16-5

AFTER-INSTALLATION INSPECTION & ADJUSTMENT

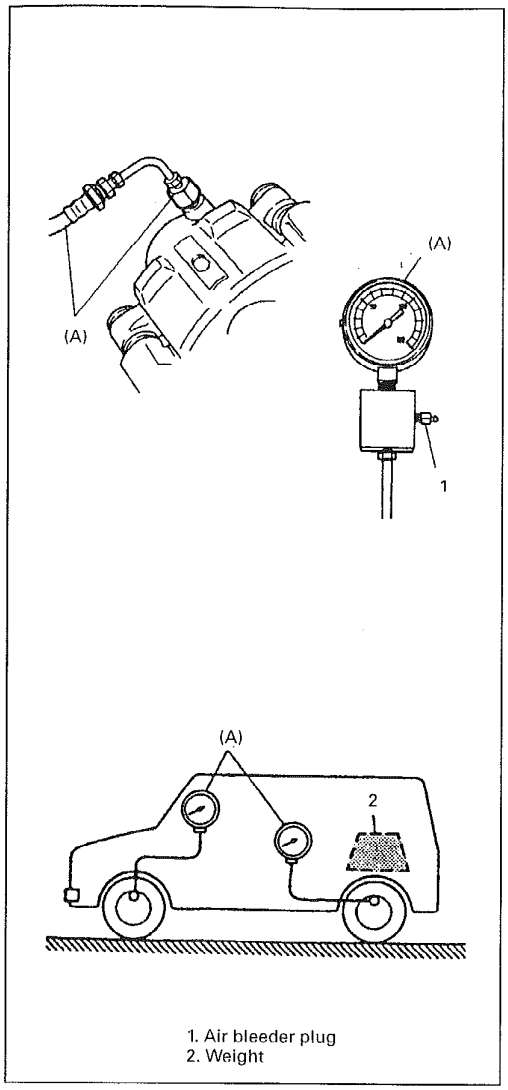
1) Hoist vehicle.
2) Measure length of LSPV spring.
LSPV spring length "L" should be the value specified below.

LSPV spring length "L":
HB 125 mm (4.921 in.)
SEDAN 135 mm (5.197 in.)

3) If it isn't, adjust it to specification by changing bolt "A" tightening positions as shown in left figure. After adjustment, tighten nut to specified torque.
For details, refer to left figure.

Tightening Torque
(a): 23 N.m (2.3 kg-m, 17.0 lb-ft)
NOTE:

Check to make sure that LSPV body and brake pipe joints are free from fluid leakage. Replace defective parts, if any.



1. Air bleeder plug
2. Weight

80E10S–5–17–3

FLUID PRESSURE TEST

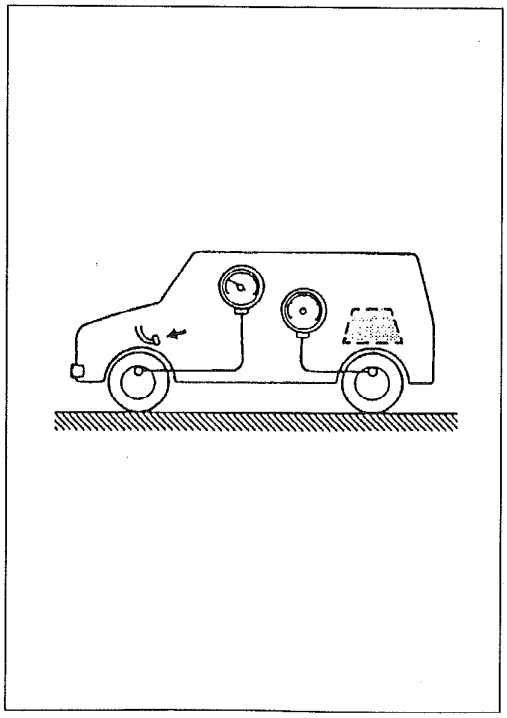
Test procedure for LSPV assembly is as follows.
Before testing, confirm the following.

- Fuel tank is filled with fuel fully.
- Vehicle is equipped with spare tire, tools, jack and jack handle.

1) Place vehicle on level floor and set 100 kg (221 lbs) weight slowly on axle housing center.
2) Install special tool to front and rear brake.

NOTE:
Pressure gauge should be connected to bleeder plug hole of front (left side brake) and rear (right side brake).
After testing front left side and rear right side, test front right side and rear left side in the same way.

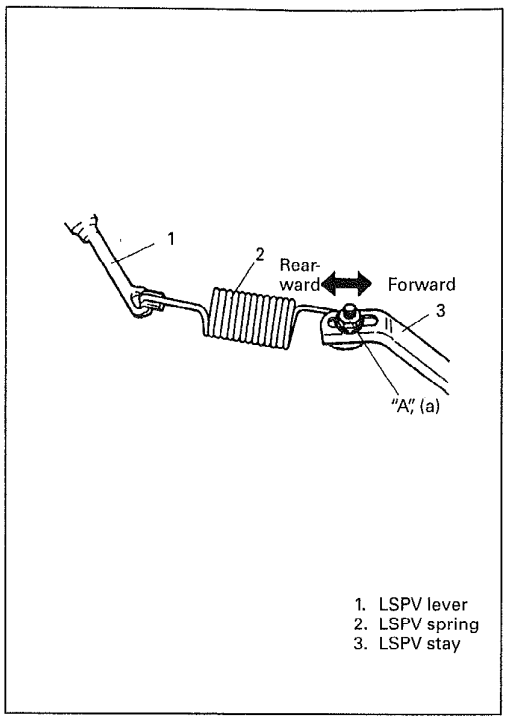
Special Tool
Front brake
(A): 09956–02310
Rear brake
(A): 09956–02310
(B): 09952–36310 (Fluid pressure gauge attachment)
(C): 55473–82030 (Bleeder plug (10 mm) as a spare part)



80E10S–5–17–5

3) Depress brake pedal gradually till fluid pressure of front brake becomes as specified below and check corresponding pressure of rear brake then. It should be within specification given below.

Front brake	Rear brake	
	SEDAN Model	H/B Model
8,000 kPa 80 kg/cm^2 1,138 psi	5,300 – 6,300 kPa 53 – 63 kg/cm^2 754 – 896 psi	About 7,900 kPa About 79 kg/cm^2 About 1,123 psi
9,000 kPa 90 kg/cm^2 1,280 psi	5,700 – 6,700 kPa 57 – 67 kg/cm^2 811 – 952 psi	7,700 – 8,700 kPa 77 – 87 kg/cm^2 1,095 – 1,237 psi
10,000 kPa 100 kg/cm^2 1,422 psi	6,100 – 7,100 kPa 61 – 71 kg/cm^2 868 – 1,009 psi	8,000 – 9,000 kPa 80 – 90 kg/cm^2 1,138 – 1,279 psi



1. LSPV lever
2. LSPV spring
3. LSPV stay

80E10S–5–18–2

4) If rear brake pressure is not within specification, adjust it by changing bolt "A" tightening position as follows.

Tightening Torque
(a): 23 N.m (2.3 kg-m, 17.0 lb-ft)

- If rear brake pressure is higher than specification, move bolt "A" rearward and if it is lower, forward.
- Repeat steps 3) and 4) until rear brake pressure is within specification.
- After adjustment, be sure to torque nut to specification.

5) Upon completion of fluid pressure test, bleed brake system and perform brake test.

TIGHTENING TORQUE SPECIFICATIONS

Fastening parts		Tightening torque		
		N.m	kg-m	lb-ft
Brake caliper pin bolt		32	3.2	23.0
Brake caliper carrier bolt		50	5.0	36.5
Front brake flexible hose bolt		23	2.3	17.0
Rear brake bolt (Brake back plate bolt)		23	2.3	17.0
Master cylinder nut	with ABS	25	2.5	18.0
	without ABS	23	2.3	16.5
Booster nut		13	1.3	9.5
Brake pipe 4–way joint bolt		10	1.0	7.5
5–way joint bolt				
Proportioning valve bolt				
Brake pipe flare nut		16	1.6	11.5
Brake bleeder plug	(Front caliper)	6.5	0.65	4.7
	(Rear cylinder)			
Wheel cylinder bolt		8	0.2	6.0
Parking brake lever bolt		23	2.3	17.0
LSPV stay bolt		23	2.3	17.0

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED PRODUCT	USE
Brake fluid	Indicated on reservoir tank cap or described in owner's manual of vehicle	• To fill master cylinder reservoir. • To clean and apply to inner parts of master cylinder caliper and wheel cylinder when they are disassembled.
Water tight sealant	SEALING COMPOUND 366E 99000–31090	• To apply to mating surfaces of brake back plate and rear knuckle.

SECTION 5B

ANTILOCK BRAKE SYSTEM (ABS)

WARNING:

For vehicles equipped with a Supplemental Inflatable Restraint Air Bag System:

- **Service on or around Air Bag System Components or Wiring must be performed only by an authorized dealer. Please observe all WARNINGS and SERVICE PRECAUTIONS in Section 9J under "On-Vehicle Service" and the Air Bag System Component and Wiring Location View in Section 9J before performing service on or around Air Bag System Components or Wiring. Failure to follow WARNINGS could result in unintended air bag deployment or could render the air bag inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the air bags may be deployed by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:

All brake fasteners are important attaching parts in that they could affect the performance of vital parts and system, and / or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

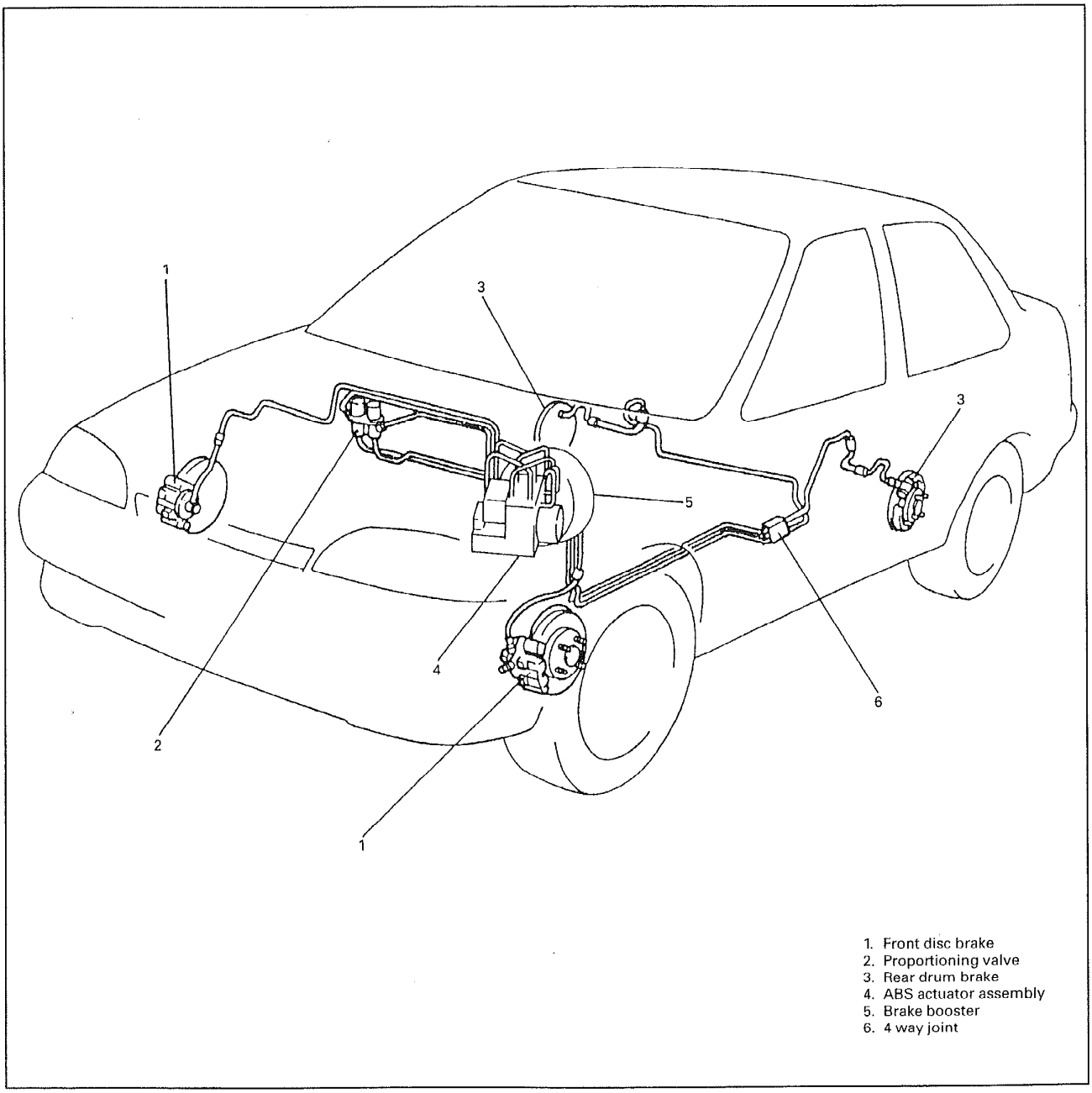
CONTENTS

GENERAL DESCRIPTION

The ABS (Antilock Brake System) controls the fluid pressure applied to the wheel cylinder of each brake from the master cylinder so that each wheel is not locked even when hard braking is applied. This ABS is a 4-wheel type which controls the fluid pressure applied to the wheel cylinder of each of the four brakes to prevent each wheel from getting locked.

The component parts of this ABS includes following parts in addition to those of the conventional brake system.

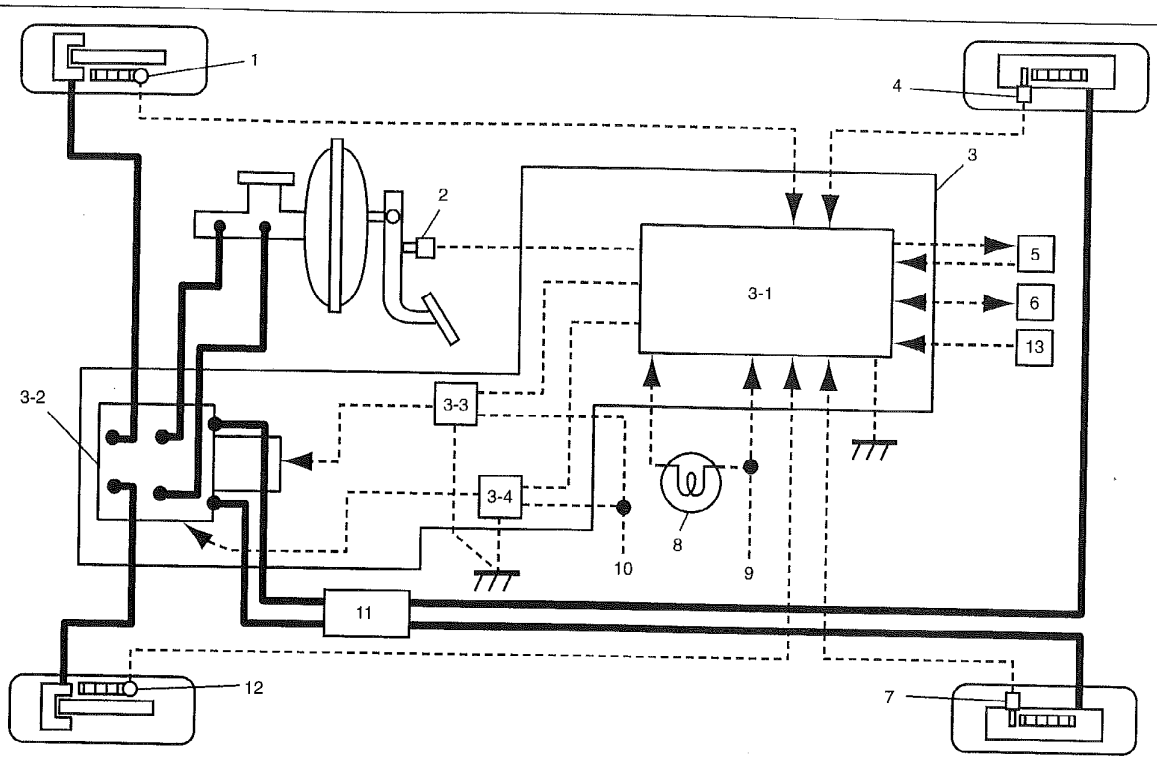
- Wheel speed sensor which senses revolution speed of each wheel and outputs its signal.
- The ABS actuator assembly contains an ECU (Electronic Control Unit), an HU (Hydraulic Unit), a solenoid valve relay and a pump motor relay. It controls the fluid pressure supplied to the wheel cylinder of each of 4 wheels based on the signal from each wheel speed sensor so as to prevent each wheel from being locked.
- "ABS" warning lamp which lights to inform abnormality when system fails to operate properly.
- G sensor which detects body deceleration speed (4WD vehicle only).



1. Front disc brake
2. Proportioning valve
3. Rear drum brake
4. ABS actuator assembly
5. Brake booster
6. 4 way joint

80E10S-5B-3-5

SYSTEM SCHEMATIC

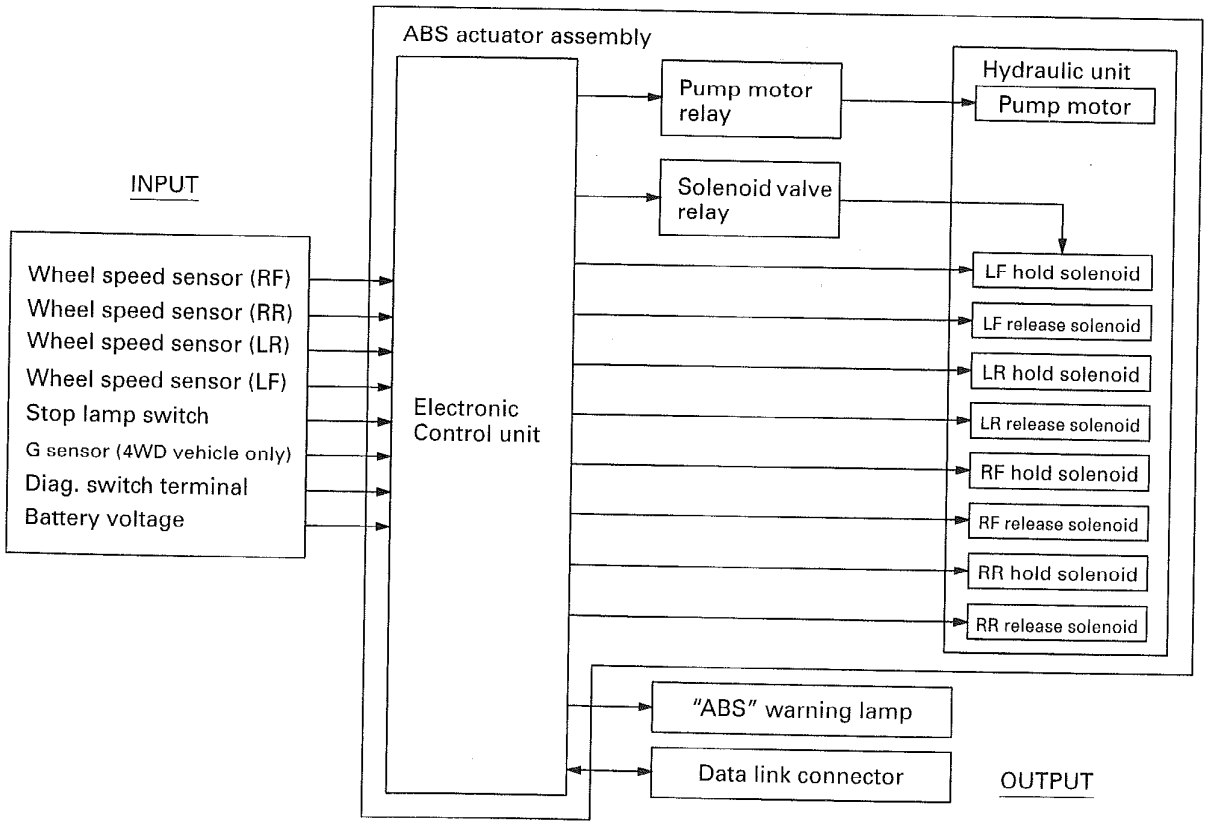


1. Wheel speed sensor (Right-front)
2. Stop lamp switch
3. ABS actuator assembly

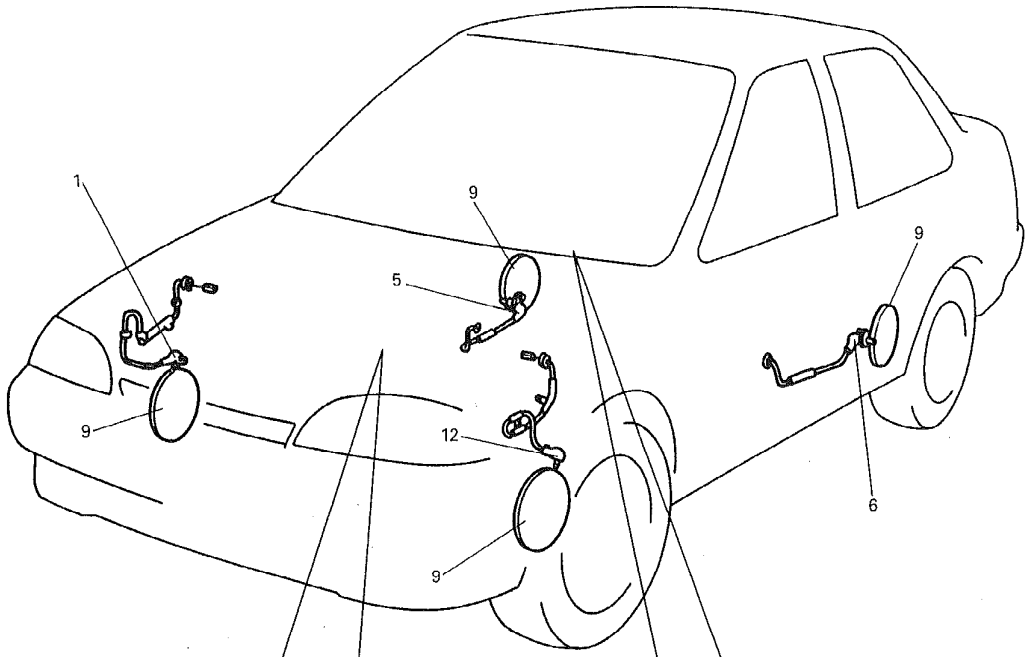
3-1. Electronic control unit
3-2. Hydraulic unit
3-3. Pump motor relay
3-4. Solenoid valve relay

4. Wheel speed sensor (Right-rear)
5. Monitor coupler
6. Data link connector
7. Wheel speed sensor (Left-rear)
8. "ABS" warning lamp

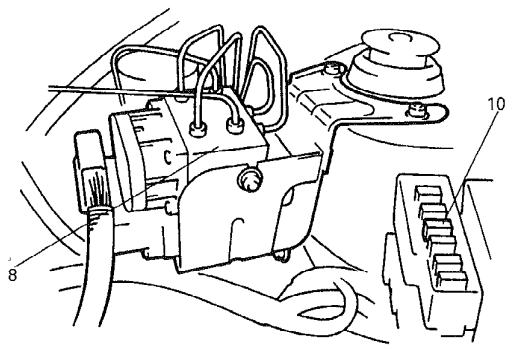
9. To ignition switch
10. To main fuse
11. Proportioning valve
12. Wheel speed sensor (Left-front)
13. G sensor (4WD vehicle only)



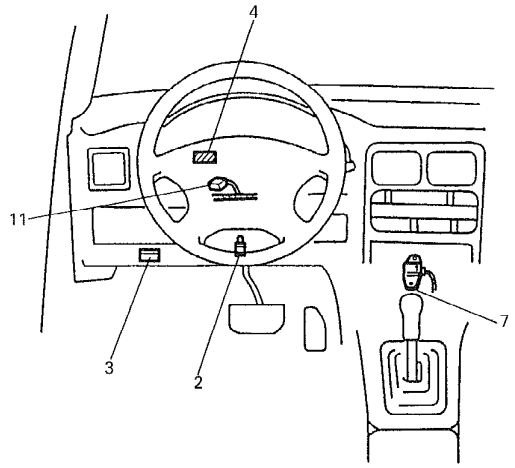
ABS COMPONENT PARTS LOCATION



In engine room

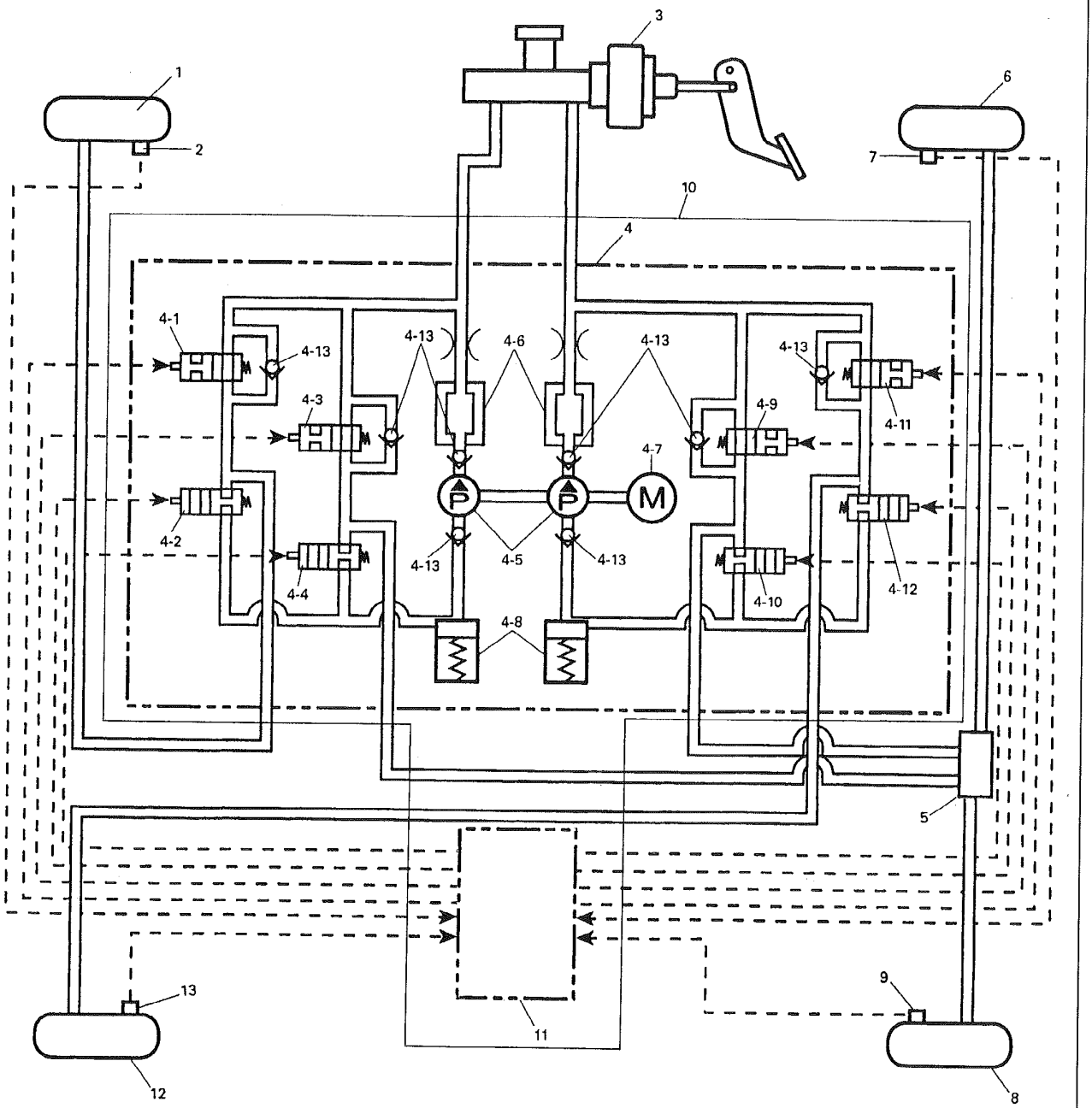


In cabin



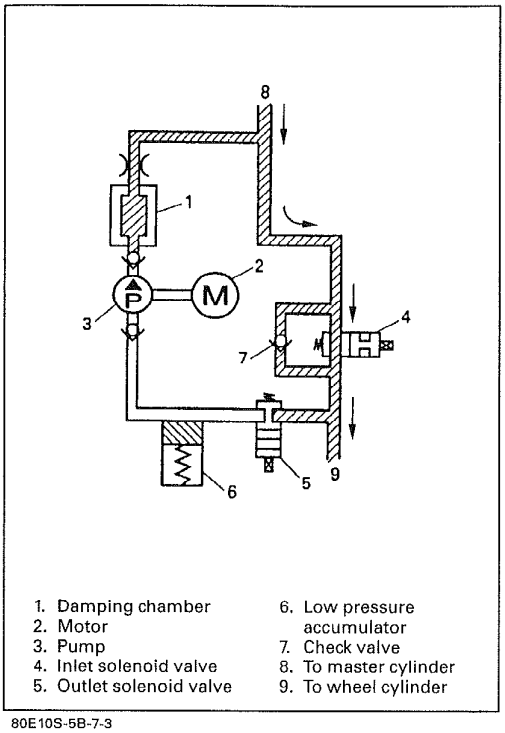
1. Wheel speed sensor (Right-front)
2. Stop lamp switch
3. Data link connector
4. "ABS" warning lamp
5. Wheel speed sensor (Right-rear)
6. Wheel speed sensor (Left-rear)
7. G sensor (4WD vehicle only)
8. ABS actuator assembly
9. Wheel speed sensor rotor (ring)
10. ABS main fuse
11. Monitor coupler
12. Wheel speed sensor (Left-front)

SYSTEM OPERATION



1. Right front wheel
2. Wheel speed sensor (right-front)
3. Master cylinder
4. Hydraulic unit
4-1. Right-front inlet solenoid valve
4-2. Right-front outlet solenoid valve
4-3. Left-rear inlet solenoid valve
4-4. Left-rear outlet solenoid valve
4-5. Pump
4-6. Damping chamber
4-7. Pump motor
4-8. Low pressure accumulator
4-9. Right-rear inlet solenoid valve
4-10. Right-rear outlet solenoid valve
4-11. Left-front inlet solenoid valve
4-12. Left-front outlet solenoid valve
4-13. Check valve
5. Proportioning valve
6. Right rear wheel
7. Wheel speed sensor (right-rear)
8. Left rear wheel
9. Wheel speed sensor (left-rear)
10. ABS actuator assembly
11. Electronic control unit
12. Left front wheel
13. Wheel speed sensor (left-front)

All four wheels, right-front, left-front, right-rear and left-rear, are subject to anti-lock control of this ABS. The following description of operation, however, describes only one of four wheels which are controlled independently and it is applicable to other three wheels.



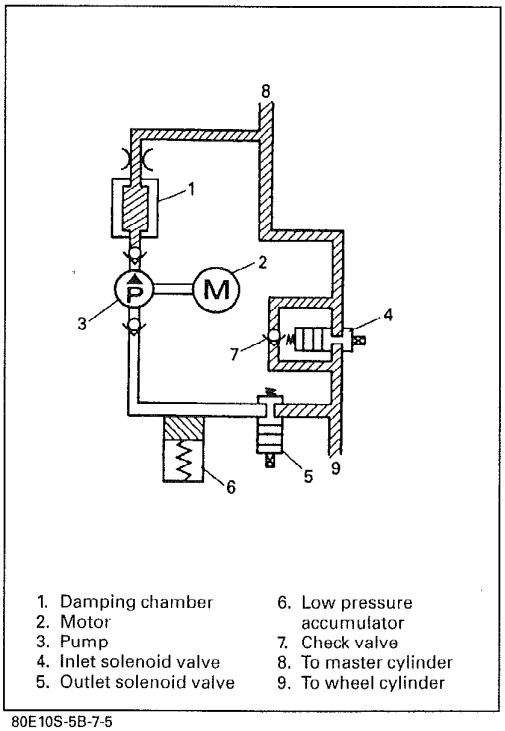
1. Damping chamber
2. Motor
3. Pump
4. Inlet solenoid valve
5. Outlet solenoid valve
6. Low pressure accumulator
7. Check valve
8. To master cylinder
9. To wheel cylinder

80E10S-5B-7-3

When ABS is not operating (Increased pressure mode)

When brake pedal is depressed the brake fluid from master cylinder passes inlet solenoid valve and sent directly to wheel cylinder.

When the force to the brake pedal is reduced, the brake fluid passes inlet solenoid valve and check valve, then returns to the master cylinder.



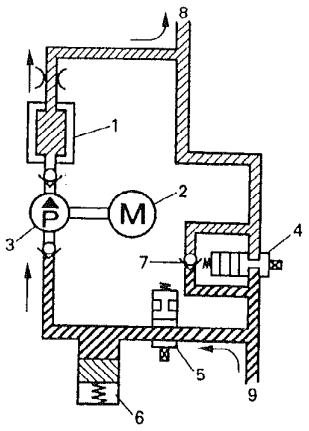
1. Damping chamber
2. Motor
3. Pump
4. Inlet solenoid valve
5. Outlet solenoid valve
6. Low pressure accumulator
7. Check valve
8. To master cylinder
9. To wheel cylinder

80E10S-5B-7-5

When ABS is operating (Hold pressure mode)

When electrical signal is sent to the inlet solenoid valve from ECU, the valve actuates and shuts the oil way to the master cylinder.

Then the pressure in the wheel cylinder is held constant.



1. Damping chamber
2. Motor
3. Pump
4. Inlet solenoid valve
5. Outlet solenoid valve
6. Low pressure accumulator
7. Check valve
8. To master cylinder
9. To wheel cylinder

80E10S-5B-8-2

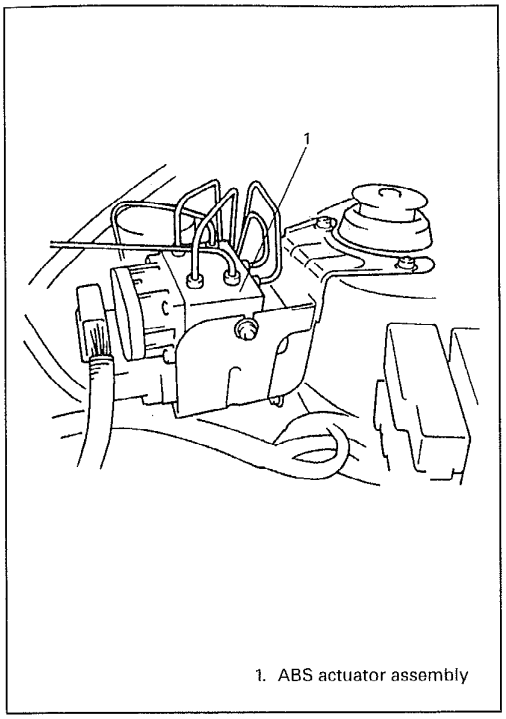
When ABS is operating (Reduced pressure mode)

When an electrical signal is sent to the outlet and inlet solenoid valve from ECU, the valve actuates. The brake fluid in the wheel cylinder is sent to the low pressure accumulator and the pressure in the wheel cylinder goes down, so does the braking force. The pump pumps out the brake fluid in the low pressure accumulator and send high pressured brake fluid to the master cylinder side.

Damping Chamber

During hard braking, the ABS pump sends the brake fluid in low pressure accumulator to master cylinder, the "kick-back" is felt thru the brake pedal.

The damping chamber is to reduce the "kick-back" during reduced pressure mode when hard braking.



1. ABS actuator assembly

80E10S-5B-9-2

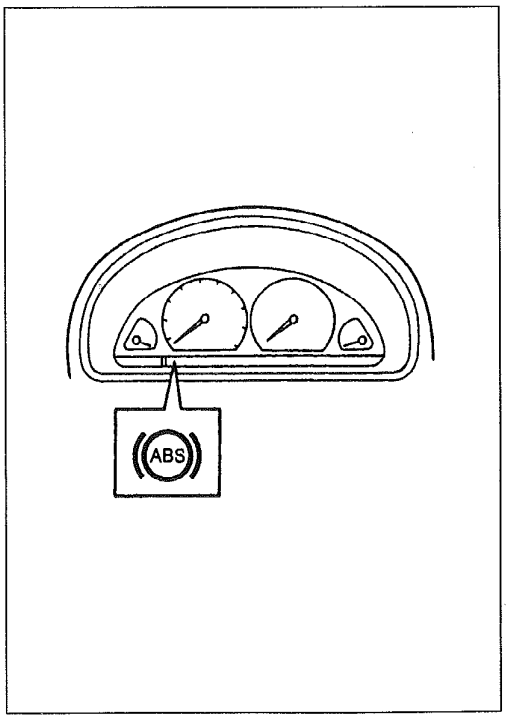
ABS ACTUATOR ASSEMBLY

The ABS actuator assembly contains an ECU (Electronic Control Unit), an HU (Hydraulic Unit), a solenoid valve relay and a pump motor relay.

ECU monitors the speed of each of 4 wheels, deceleration speed of each of 4 wheels and the vehicle deceleration speed through signals from 4 wheel speed sensors and outputs control signal to each solenoid valve of the HU to prevent it from getting locked. Also, it operates the pump motor all the time while the anti-lock control function is working.

ECU (Electronic Control Unit)

Main function of the ECU is to control HU to prevent the wheel from getting locked when braking but it also has a self-diagnosis function and fail-safe function.



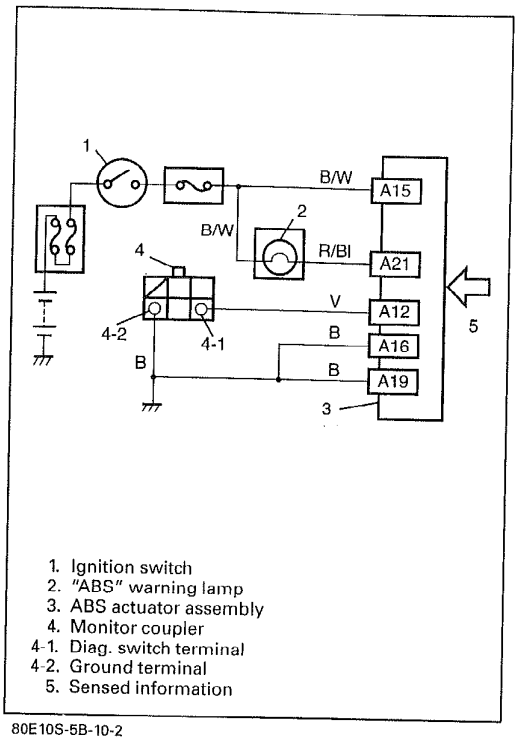
80E10S-5B-9-5

Self-diagnosis function

ECU diagnoses conditions of the ECU and the system component parts (whether or not there is any abnormality) all the time and indicates the results (warning of abnormality occurrence and DTC) through the "ABS" warning lamp.

When ignition switch is turned ON, "ABS" warning lamp lights for 2 seconds to check system, bulb and circuit. When no abnormality has been detected (the system is in good condition), "ABS" warning lamp turns OFF after 2 seconds.

When ECU detects a trouble in the system, it makes malfunction indicator lamp ("ABS" warning lamp) turn ON to warn the driver of such occurrence of trouble and at the same time it stores the trouble area in the memory of ECU.



1. Ignition switch
2. "ABS" warning lamp
3. ABS actuator assembly
4. Monitor coupler

4-1. Diag. switch terminal
4-2. Ground terminal

5. Sensed information

80E10S-5B-10-2

When Diag. switch terminal of monitor coupler is grounded, the abnormal area is output as DTC by turning ON or flashing malfunction indicator lamp ("ABS" warning lamp).

CAUTION:
When checking DTC, be sure to follow instructions under "Diagnostic Trouble Code (DTC) Check" in "Diagnosis", or correct reading of DTC may not be assured.

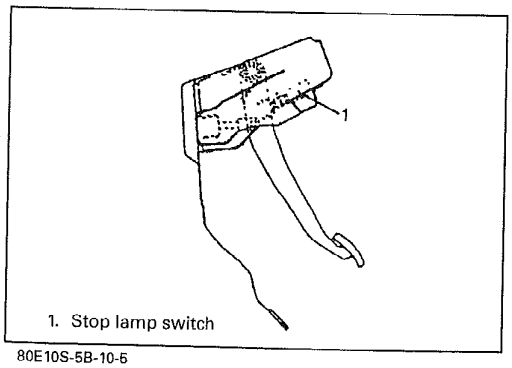
Fail-safe function

When an abnormality occurs (an abnormal DTC is detected), ECU turns OFF the solenoid valve relay which supplies power to solenoid. Thus, with ABS not operating, brakes function just like the brake system of the vehicle not equipped with ABS.

HU (Hydraulic Unit)

The HU consists of solenoid valves, reservoirs, pumps, pump motor, etc.

Based on signals from the ECU, it controls the fluid pressure applied to the wheel cylinder of each brake.

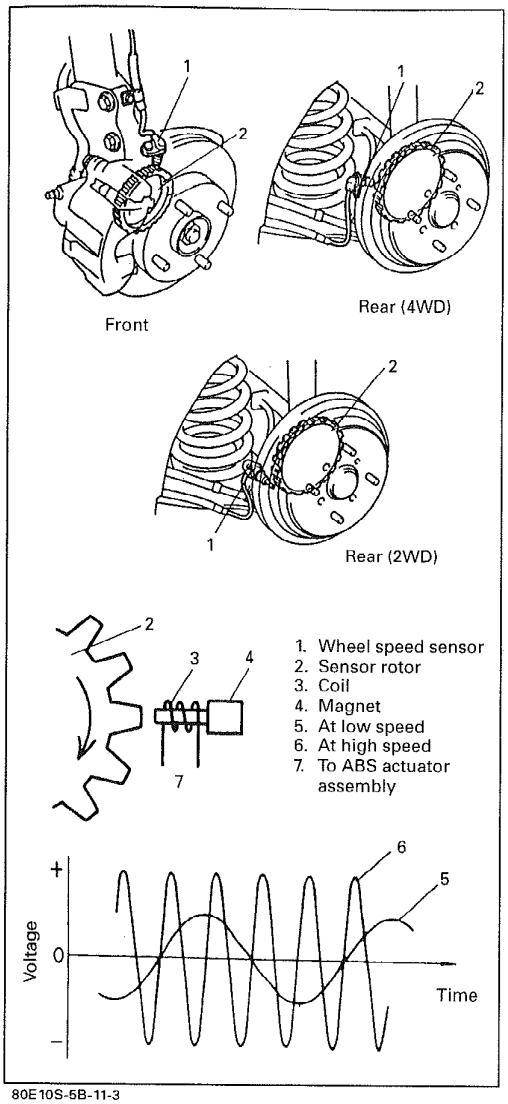


1. Stop lamp switch

80E10S-5B-10-5

STOP LAMP SWITCH

The switch turns ON when the brake pedal is depressed. The ABS actuator assembly uses this signal as one of the signals for ABS hydraulic operation.



80E10S-5B-11-3

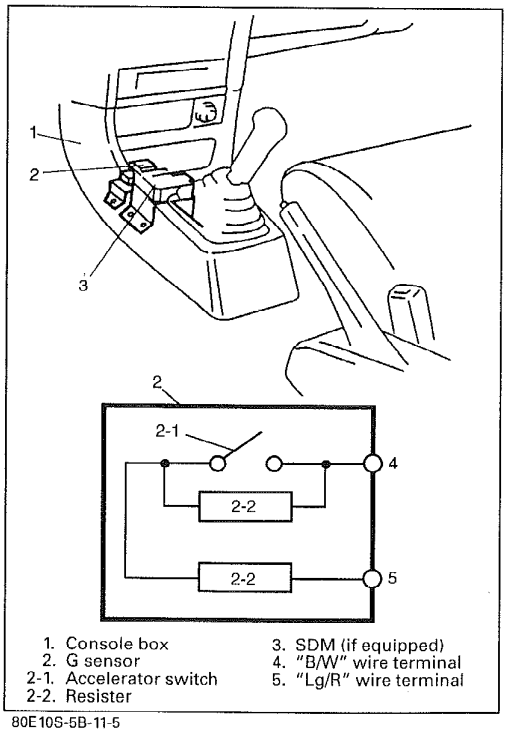
WHEEL SPEED SENSOR AND ROTOR

The wheel speed sensor consisting of a magnet and a coil is installed to each of the knuckles of 4 wheels. The sensor rotor (exciter ring) is installed to each of the right and left drive shaft at its outside joints as well as to the right and left rear wheel hubs. A specified amount of clearance (air gap) is provided between the sensor and rotor for their installation.

When the rotor with serration (tooth) turns, the magnetic flux emitted from the magnet of the speed sensor varies and an alternate current voltage occurs in the coil. As the frequency of this alternate current voltage varies in proportion with the revolution speed of wheels, each wheel speed is detected from it.

NOTE:

- **Clearance between the sensor and the rotor (ring) cannot be adjusted.**
- **Do not remove rotor (ring) from drive shaft joint or rear wheel hub.**



80E10S-5B-11-5

G SENSOR (4WD VEHICLE ONLY)

The G sensor installed to the floor between dash panel and gear shift lever detects the vehicle deceleration speed.

It consists of a accelerator switch and resister.

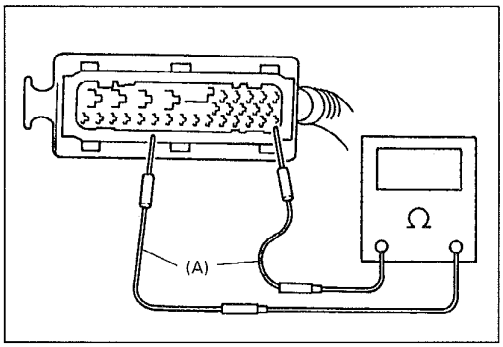
When vehicle speed changes by the value exceeding a certain specified value, the accelerator switch in the G sensor turns on. Then, the output voltage from the G sensor varies and thus ECU can detect that a speed change exceeding a certain specified value has occurred.

DIAGNOSIS

To ensure that the trouble diagnosis is done accurately and smoothly, observe "Precautions in Diagnosing Troubles" and follow "ABS Diagnostic Flow Chart".

PRECAUTION IN DIAGNOSING TROUBLES

- If the vehicle was operated in any of the following ways, "ABS" warning lamp may light momentarily but this does not indicate anything abnormal in ABS.
  - The vehicle was driven with parking pulled.
  - The vehicle was driven with brake dragging.
  - The vehicle was stuck in mud, sand, etc.
  - Wheel spin occurred while driving.
  - Wheel(s) was rotated while the vehicle was jacked up.
- Be sure to read "Precautions for Electronic Circuit Service" in Section 0A before inspection and observe what is written there.
- Be sure to use the trouble diagnosis procedure as described in the flow chart. Failure to follow the flow chart may result in incorrect diagnosis. (Some other diag. trouble code may be stored by mistake in the memory of ECU in ABS actuator assembly during inspection.)



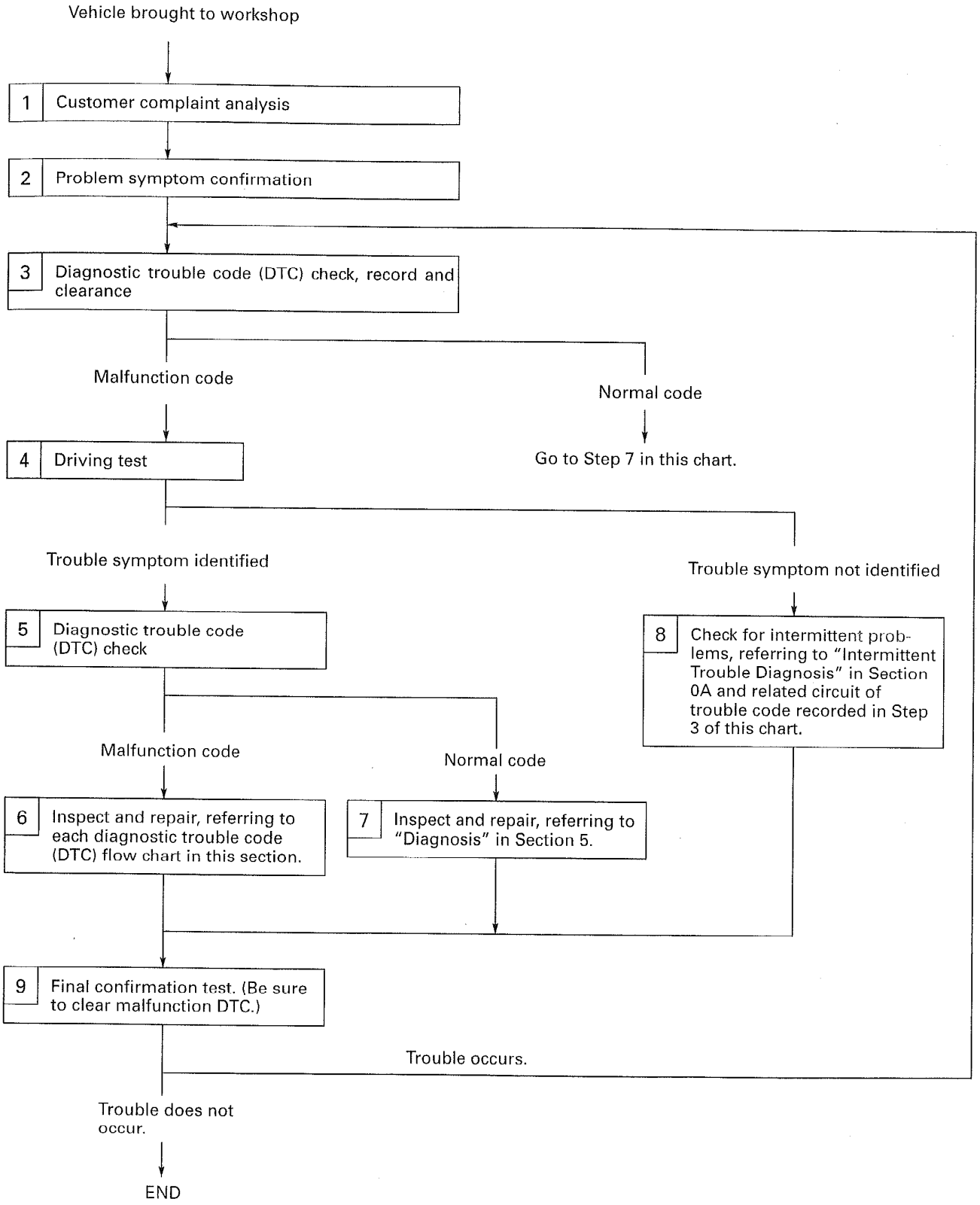
80E10S-5B-12-4

- When connecting a probe of ohmmeter or voltmeter to each terminal of ABS actuator assembly connector, be sure to use special tool. Connecting probe directly to each terminal may cause such damage as spreading and bending to terminal.

Special Tool
(A): 09932-76010

ABS DIAGNOSTIC FLOW CHART

Refer to the following pages for the details of each step.



1. CUSTOMER COMPLAINT ANALYSIS

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such a questionnaire form as shown below will facilitate collecting information to the point required for proper analysis and diagnosis.

CUSTOMER QUESTIONNAIRE (EXAMPLE)

Customer's name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:

Problem symptoms	• "ABS" warning lamp abnormal: fails to turn on/fails to go off/flashes • Abnormal noise while vehicle is running: from motor, from valve, other_____ • Wheel is locked at braking: • Pump motor does not stop (running): • Braking does not work: • Other_____
Frequency of occurrence	• Continuous/Intermittent (times a day, a month)/ other_____
Conditions for occurrence of problem	• Vehicle at stop and ignition switch ON: • When starting: at initial start only/at every start/Other_____ • Vehicle speed: while accelerating/while decelerating/at stop/ while turning/while running at constant speed/ other_____ • Road surface condition: Paved road/rough road/snow-covered road/ other_____ • Chain equipment:
Environmental condition	• Weather: fair/cloudy/snow/other_____ • Temperature: °F (°C)
Diagnostic trouble code	• First check: Normal code/malfunction code ( ) • Second check after test drive: Normal code/malfunction code ( )

2. **PROBLEM SYMPTOM CONFIRMATION**
   Check if what the customer claimed in Step 1 is actually found in the vehicle and if that symptom is found, whether it is identified as a failure. (This step should be shared with the customer if possible.)
   When "ABS" warning lamp is not operated correctly, proceed to "Diagnostic Flow Chart-A, B or C".

3. **DIAGNOSTIC TROUBLE CODE (DTC) CHECK, RECORD AND CLEARANCE**
   Perform "Diagnostic Trouble Code (DTC) Check" in p.5B-16 or 5B-17, record it and then clear it, referring to p.5B-17.
   If the malfunction DTC which was once displayed and then cleared cannot be detected (indicated) again when the ignition switch is turned ON, attempt to diagnose the trouble based on the DTC recorded in this step may mislead the diagnosis or make diagnosing difficult. Proceed to Step 4 to check ABS actuator assembly for proper self-diagnosis function.
   If the malfunction DTC which was once displayed and then cleared can be detected (indicated) again when ignition switch is turned ON, proceed to Step 5.

4. **DRIVING TEST**
   Test drive the vehicle at 40 km/h for more than a minute and check if any trouble symptom (such as abnormal lighting of "ABS" warning lamp) exists.
   If the malfunction DTC is confirmed again at ignition switch ON, driving test as described in above is not necessary. Proceed to Step 5.

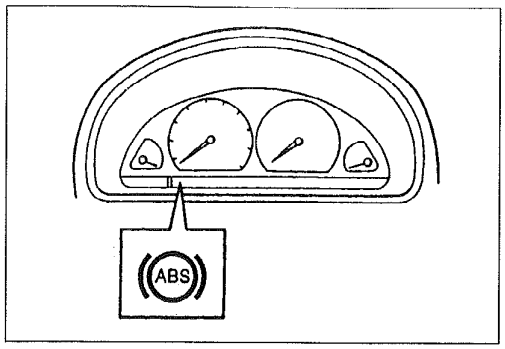
5. **DIAGNOSTIC TROUBLE CODE (DTC) CHECK**
   Recheck diagnostic trouble code, referring to p.5B-18 or p.5B-19.

6. **DIAGNOSTIC TROUBLE CODE FLOW CHART**
   According to Diagnostic flow chart for the diagnostic trouble code confirmed in Step 5, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, HU, ECU or other part and repair or replace faulty parts.

7. **"DIAGNOSIS" IN SECTION 5**
   Check the parts or system suspected as a possible cause, referring to "Diagnosis" in Section 5 and based on symptoms appearing on the vehicle (symptoms obtained through Steps 1, 2 and 4) and repair or replace faulty parts, if any.

8. **CHECK FOR INTERMITTENT PROBLEM**
   Check parts where an intermittent trouble is easy to occur (e. g., wire harness, connector, etc.), referring to "Intermittent Trouble" in Section 0A and related circuit of trouble code recorded in Step 3.

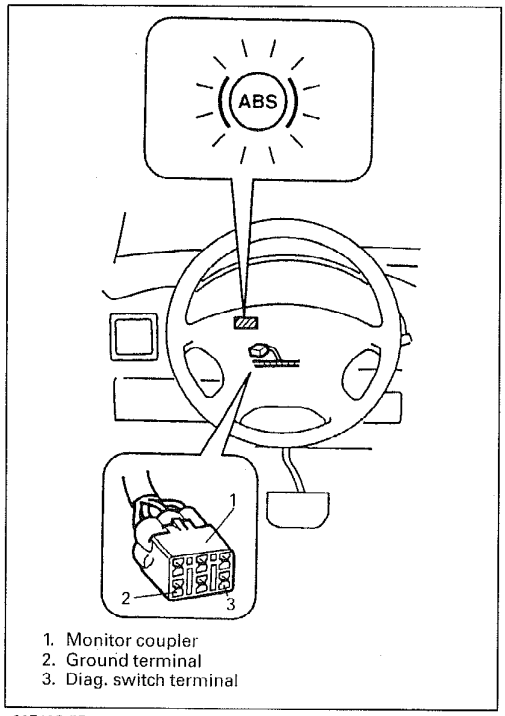
9. **FINAL CONFIRMATION TEST**
   Confirm that the problem symptom has gone and the ABS is free any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once and perform test driving and confirm that a normal code is indicated.



80E10S-5B-16-1

"ABS" WARNING LAMP CHECK

Turn ON the ignition switch and check that "ABS" warning lamp lights for about 2 seconds and then goes OFF.
If anything faulty is found, advance to Diagnostic Flow Chart A, B or C.



1. Monitor coupler
2. Ground terminal
3. Diag. switch terminal

80E10S-5B-16-3

DIAGNOSTIC TROUBLE CODE (DTC) CHECK

NOT USING SCAN TOOL (TECH-1)

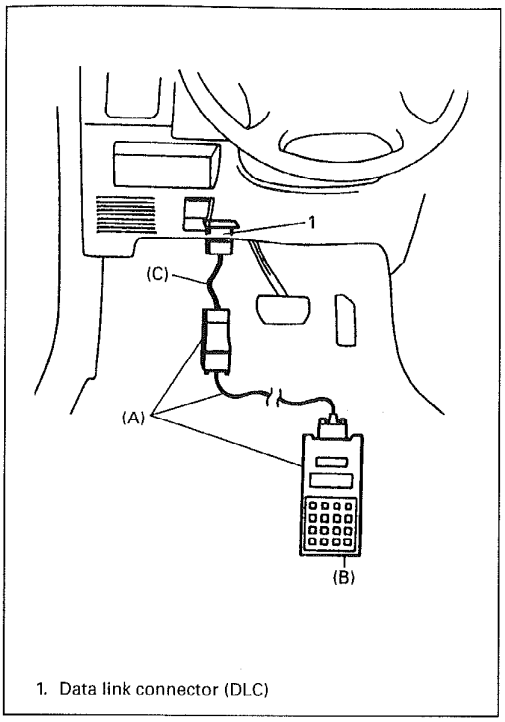
1) Turn ignition switch ON.
2) Drive vehicle between 6.5 and 12.5 mile/h (10 – 20 km/h) and then stop vehicle while engine running.
3) Using service wire, connect diag. switch terminal of monitor coupler to ground.
4) To read DTC, watch "ABS" warning lamp and write it down. (For frequency of code signal, refer to "Diagnostic Trouble Code (DTC) Table" in this section.)
5) After completing the check, turn ignition switch OFF and disconnect service wire from monitor coupler.

NOTE:

- **ECU (in ABS actuator assembly) cannot hold more than 3 DTCs in its memory. Even when troubles involving more than 3 DTCs have occurred, only the latest 3 codes are displayed.**
- **If a code not listed on the table (on p.5B-18 and 5B-19) is displayed, then the ABS actuator assembly is faulty.**
- **Current DTC and history DTC can be identified by lighting and flashing of "ABS" warning lamp as follows.**

	Current DTC is set. (Abnormality exists at present.)	History DTC is set only. (Faulty condition occurred once in the past but normal condition is restored at present.)
"ABS" warning lamp after ignition switch ON	Remains ON.	Light up for 2 seconds and turns off.
"ABS" warning lamp when grounding diag. switch	Current DTC is displayed.	History DTC is displayed.

However, if a multiple number of DTC's are set an even one of them is a current DTC, "ABS" warning lamp remains on after ignition switch is turned ON. Therefore, it is not possible to identify any of them as to whether it is a current one or a history one. (But use of scan tool (Tech-1) will make identification possible.)



1. Data link connector (DLC)

80E10S-5B-17-2

USING SCAN TOOL (TECH-1)

1) After setting cartridge for ABS to Tech-1, connect Tech-1 to data link connector.

   Special Tool
   (A): 09931-76011 (Tech-1, scan tool)
   (B): Cartridge for ABS
   (C): 09931-76030 (16/14 pin DLC adapter)

2) Turn ignition switch ON.
3) Drive vehicle between 6.5 and 12.5 mile/h (10 – 20 km/h), and then stop vehicle while engine running.
4) Read DTC according to instructions displayed on Tech-1 and print it or write it down. Refer to Tech-1 operator's manual for further details.

   NOTE:
   ECU cannot hold more than 3 DTCs in its memory. Even when troubles involving more than 3 DTCs have occurred, only the latest 3 codes are displayed.

5) After completing the check, turn ignition switch off and disconnect Tech-1 from data link connector.

DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE

WARNING:
- **When performing a road test, select a safe place where there is neither any traffic accident possibility and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road to avoid accident.**

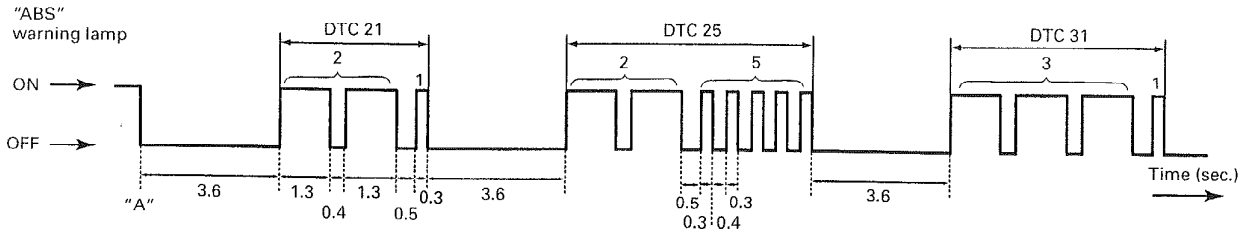
After repair or replace malfunction part(s), clear all DTC's by performing described procedure below.

1) Drive vehicle between 6.5 and 12.5 mile/h (10 – 20 km/h).
2) Stop vehicle and turn ignition switch OFF.
3) Turn ON ignition switch and after checking that "ABS" warning lamp lights up for 2 seconds and turns off, turn it OFF.
4) DTCs will be cleared from the memory by repeating Step 3) 20 times.

NOTE:
DTC can be cleared by using Tech-1, too. For procedure, refer to operator's manual. But at first perform Step 1) above, and the next clear DTC, referring to operator's manual.

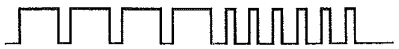
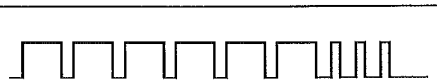
DIAGNOSTIC TROUBLE CODE (DTC) TABLE

Example: DTC 21, DTC 25 and DTC 31 are set

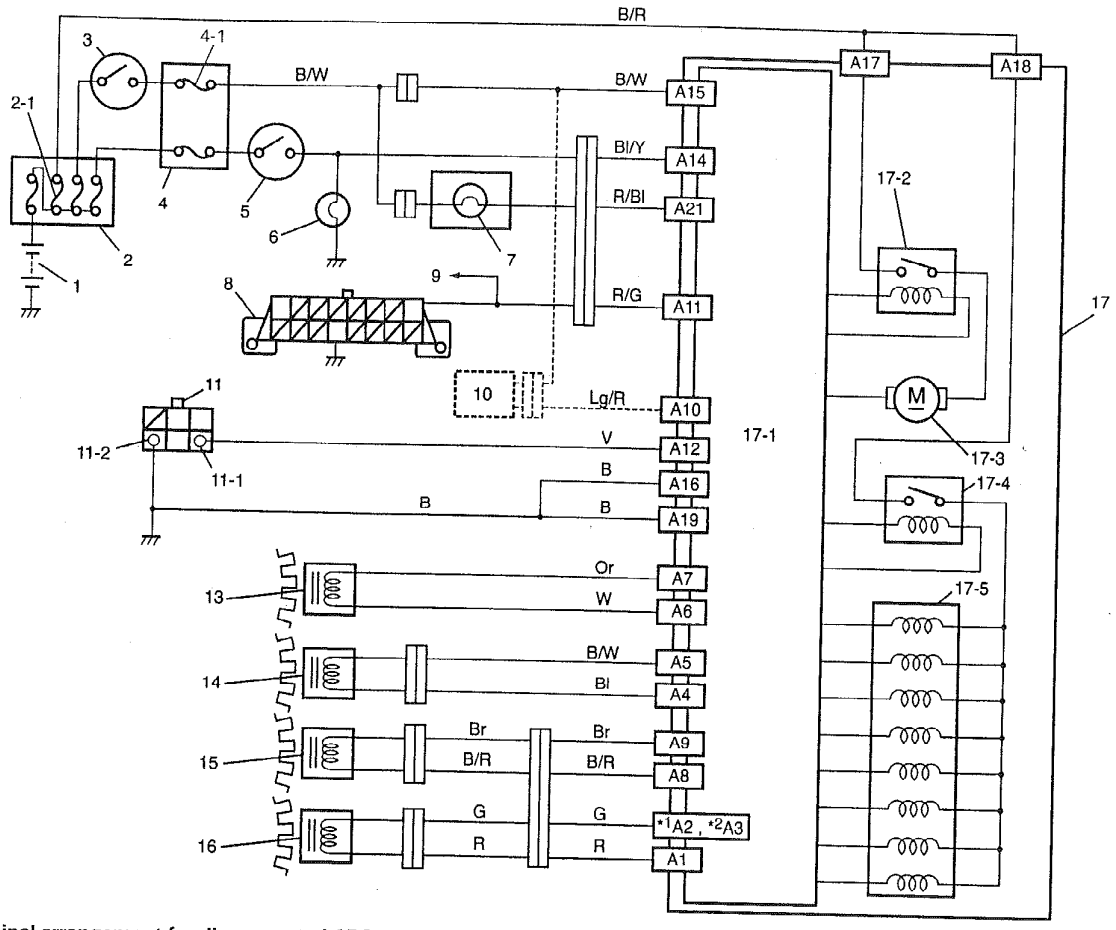


"A": When diag. switch terminal is shorted to ground terminal

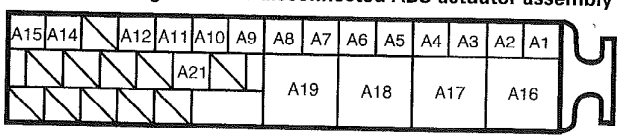
DTC	"ABS" WARNING LAMP FLASHING PATTERN	DIAGNOSTIC AREA	
—		Normal	
15		G sensor (4WD vehicle only)	
18		Wheel speed sensor and/or rotor	
21		Right-front	Wheel speed sensor circuit and rotor
25		Left-front	
31		Right-rear	
35		Left-rear	
22		Right-front	
26		Left-front	
32		Right-rear	
36		Left-rear	
41		Right-front	Hold solenoid (in ABS actuator assembly) circuit
45		Left-front	
51		Right-rear	
55		Left-rear	

DTC	"ABS" WARNING LAMP FLASHING PATTERN	DIAGNOSTIC AREA	
42		Right-front	Release solenoid (in ABS actuator assembly) circuit
46		Left-front	
52		Right-rear	
56		Left-rear	
57		Power circuit	
61		Pump motor relay (in ABS actuator assembly) circuit	
63		Solenoid valve relay (in ABS actuator assembly) circuit	
71		Electronic control unit (in ABS actuator assembly)	

SYSTEM CIRCUIT



Terminal arrangement for disconnected ABS actuator assembly



1. Battery
2. Main fuses
2-1. ABS main fuse
3. Ignition switch
4. Circuit fuses
4-1. "IG-COIL METER" fuse
5. Stop lamp switch
6. Stop lamp
7. "ABS" warning lamp
8. Data link connector
9. To ECM, TCM and etc.
10. G sensor (4WD vehicle only)
11. Monitor coupler
11-1. Diag. switch terminal
11-2. Ground terminal
13. Left-front wheel speed sensor
14. Right-front wheel speed sensor
15. Left-rear wheel speed sensor
16. Right-rear wheel speed sensor
17. ABS actuator assembly
17-1. Electronic control unit
17-2. Pump motor relay
17-3. Pump motor
17-4. Solenoid valve relay
17-5. Solenoid valve

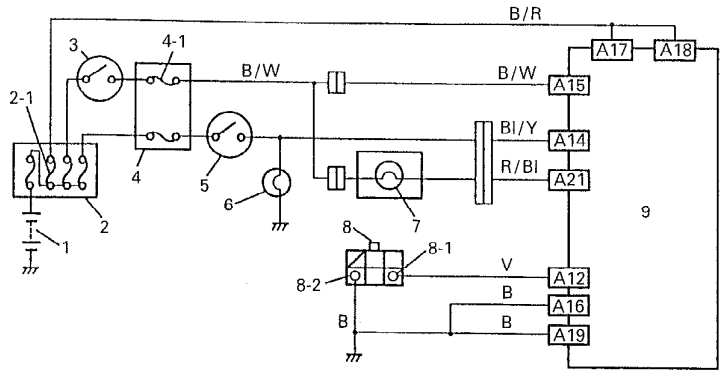
Wire color

B	: Black
B/R	: Black/Red
B/W	: Black/White
Bl	: Blue
Bl/Y	: Blue/Yellow
Br	: Brown
G	: Green
Lg/R	: Lightgreen/Red
Or	: Orange
R	: Red
R/Bl	: Red/Blue
R/G	: Red/Green
V	: Violet
W	: White

*1: For 4WD vehicle
*2: For 2WD vehicle

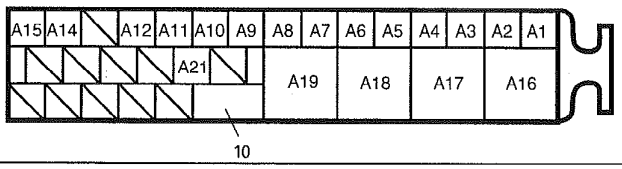
TERMINAL	CIRCUIT
A1	Right-rear wheel speed sensor (–)
A2	*1 Right-rear wheel speed sensor (+)
A3	*2 Right-rear wheel speed sensor (+)
A4	Right-front wheel speed sensor (–)
A5	Right-front wheel speed sensor (+)
A6	Left-front wheel speed sensor (–)
A7	Left-front wheel speed sensor (+)
A8	Left-rear wheel speed sensor (–)
A9	Left-rear wheel speed sensor (+)
A10	G sensor (4WD vehicle only)
A11	Data link connector
A12	Diag. switch
A14	Stop lamp switch
A15	Ignition switch
A16	Ground
A17	Power source for pump motor
A18	Power source for solenoid valve
A19	Ground
A21	"ABS" warning lamp

CHART – A "ABS" WARNING LAMP CIRCUIT (LAMP DOES NOT COME "ON" AT IGNITION SWITCH ON)



1. Battery
2. Main fuses
2-1. ABS main fuse
3. Ignition switch
4. Circuit fuses
4-1. "IG. COIL METER" fuse
5. Stop lamp switch
6. Stop lamp
7. "ABS" warning lamp
8. Monitor coupler
8-1. Diag. switch terminal
8-2. Ground terminal
9. ABS actuator assembly
10. Shorting bar

Terminal arrangement for disconnected ABS actuator assembly



80E10S-5B-21-2

CIRCUIT DESCRIPTION

Operation (ON/OFF) of the "ABS" warning lamp is controlled by the ABS actuator assembly. When the ignition switch is turned ON, the ABS actuator assembly switches the contact point of the lamp driver circuit in itself.

If the Antilock brake system is in good condition, the ABS actuator assembly turns the "ABS" warning lamp ON at the ignition switch ON, keeps it ON for 2 seconds only and then turns it OFF. If an abnormality in the system is detected, the lamp is turned ON by ABS actuator assembly.
Also, it is turned ON by the shorting bar when the connector of the ABS actuator assembly was disconnected.

INSPECTION

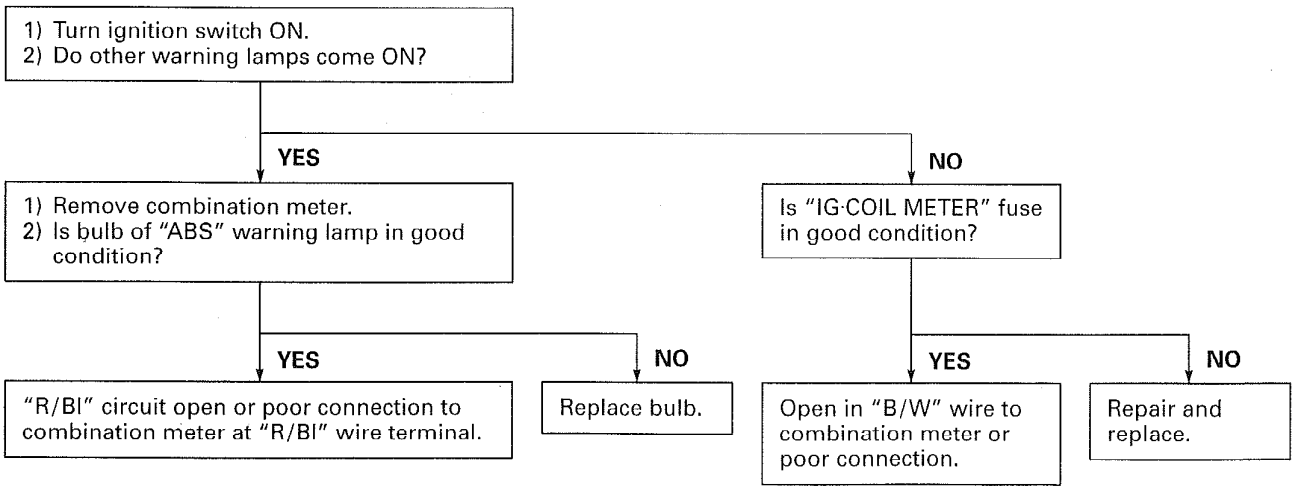


CHART – B "ABS" WARNING LAMP CIRCUIT (LAMP COMES "ON" STEADY OR LAMP FLASHES (Page 1 of 2))

Refer to CHART A for system circuit diagram and circuit description.

INSPECTION

Check DTC by not using scan tool (Tech-1) (flashing "ABS" warning lamp), referring to "Diagnostic Trouble Code (DTC) Check" in this section.

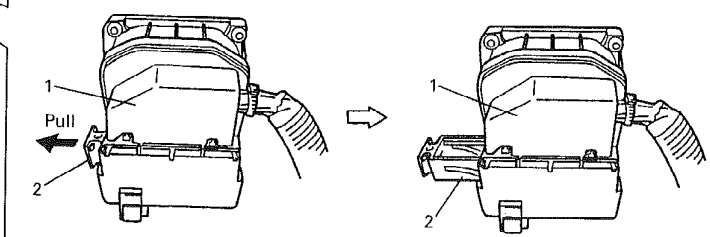
- "ABS" warning lamp comes "ON" steady.
- Malfunction code indicated.
- Normal Code indicated by flashing "ABS" warning lamp.

Malfunction code indicated. → Go to Step 3 of "ABS Diagnostic Flow Chart" under "Diagnosis".

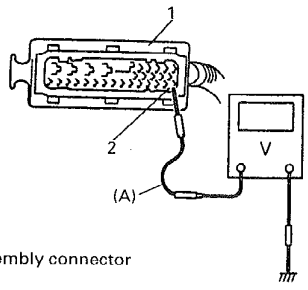
Normal Code indicated by flashing "ABS" warning lamp. → Poor "A21" connection. If connection is OK, substitute a known-good ABS actuator assembly and recheck.

"ABS" warning lamp comes "ON" steady.

1) Ignition switch OFF.
2) Disconnect ABS actuator assembly connector.
3) Check for proper connection to ABS actuator assembly at terminal "A15".
4) Ignition switch "ON".
5) Measure voltage from "A15" terminal to body ground.
6) Is it 10 – 14 V?



1. ABS actuator assembly connector
2. Lock lever



Special Tool
(A): 09932-76010

1. ABS actuator assembly connector
2. "A15" terminal

YES → Go to Chart B (Page 2 of 2).

NO → "B/W" circuit open.

CHART – B "ABS" WARNING LAMP CIRCUIT (LAMP COMES "ON" STEADY OR LAMP FLASHES (Page 2 of 2))

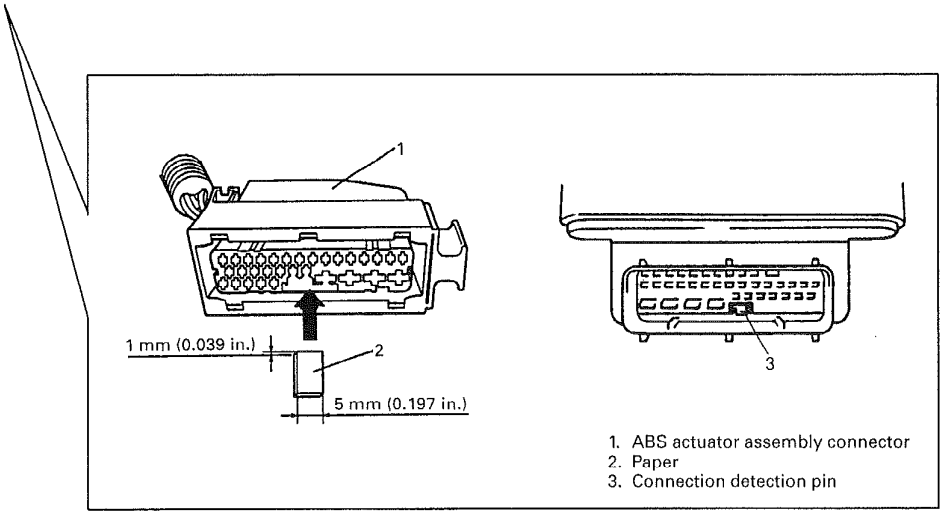
Were you sent here from Chart B (Page 1 of 2)?

YES

1) Ignition switch OFF.
2) Check for proper connection to ABS actuator assembly connector at terminals "A21" and "A19" and for shorting bar and connection detection pin operation.
   NOTE:
   ABS actuator assembly connector has a short mechanism which contacts the "ABS" warning lamp circuit ("A21" terminal circuit) to the ground ("A19" terminal circuit) while the connector is disconnected from ABS actuator assembly.
3) If OK then release shorting bar in ABS actuator assembly connector by inserting a piece of paper, referring to the figure.
4) Does "ABS" warning lamp come ON steady at ignition switch ON?

NO

Go to Chart B (Page 1 of 2)



1. ABS actuator assembly connector
2. Paper
3. Connection detection pin

YES

1) Ignition switch OFF.
2) With ABS actuator assembly connector disconnected, disconnect 10p connector from combination meter.
3) Measure resistance from ABS actuator assembly connector terminal "A21" to body ground.
4) Is it infinite (∞)?

NO

Repair shorting bar and connection detection pin in ABS actuator assembly connector or short from "A21" terminal circuit to "A19" terminal circuit.

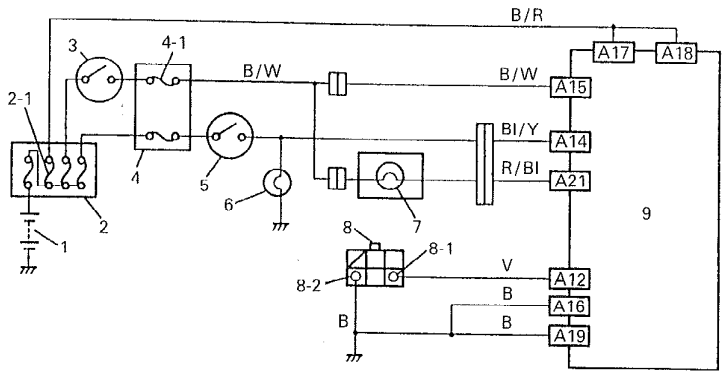
YES

Substitute a known-good ABS actuator assembly and recheck.

NO

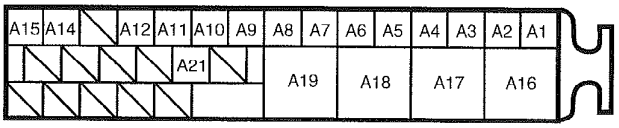
"R/Bl" circuit shorted to ground.

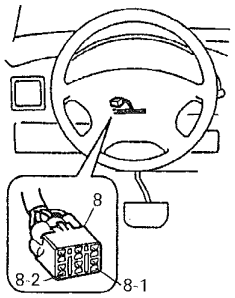
CHART – C "ABS" WARNING LAMP CIRCUIT (WHEN IGNITION SWITCH IS TURNED ON, "ABS" WARNING LAMP LIGHTS FOR 2 SECONDS, TURNS OFF FOR ABOUT 4 SECONDS AND THEN LIGHTS UP AGAIN)



1. Battery
2. Main fuses
2-1. ABS main fuse
3. Ignition switch
4. Circuit fuses
4-1. "IG·COIL METER" fuse
5. Stop lamp switch
6. Stop lamp
7. "ABS" warning lamp
8. Monitor coupler
8-1. Diag. switch terminal
8-2. Ground terminal
9. ABS actuator assembly

Terminal arrangement for disconnected ABS actuator assembly





80E10S-5B-24-2

CIRCUIT DESCRIPTION

When the diag. switch terminal is shorted or connected to the ground with the ignition switch ON, the diag. trouble code (DTC) is indicated by flashing of the "ABS" warning lamp.

INSPECTION

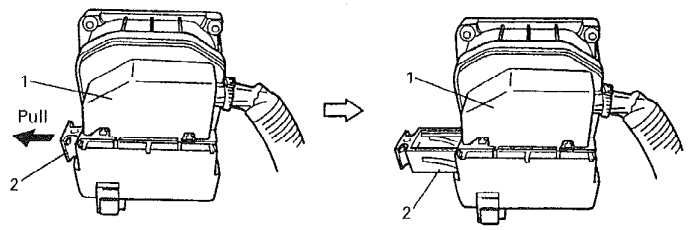
Is diag. switch terminal connected to ground via service wire?

NO

1) Ignition switch OFF.
2) Disconnect ABS actuator assembly connector.
3) Measure resistance between diag. switch terminal and body ground.
4) Is it infinite (∞)?

YES

Disconnect service wire from monitor coupler and recheck.



1. ABS actuator assembly connector
2. Lock lever

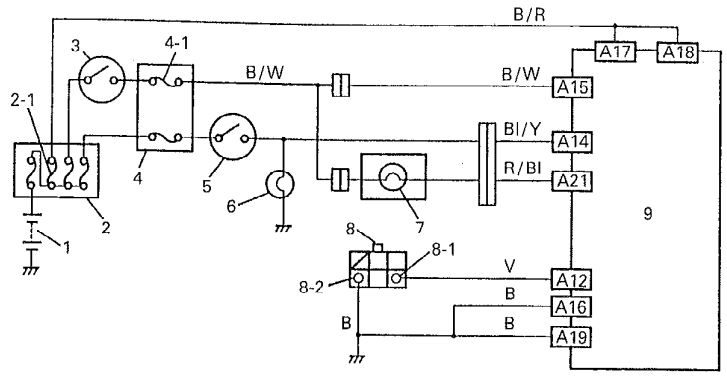
YES

Substitute a known-good ABS control module and recheck.

NO

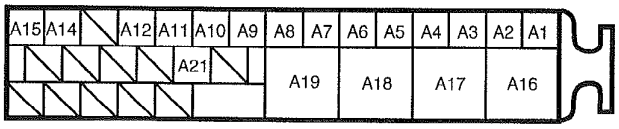
"V" circuit shorted to ground.

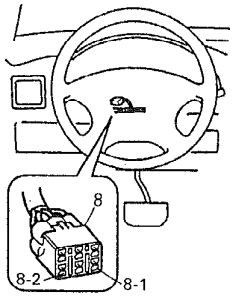
CHART – D DTC IS NOT OUTPUTTED BY FLASHING "ABS" WARNING LAMP EVEN WITH DIAG. SWITCH TERMINAL CONNECTED TO GROUND



1. Battery
2. Main fuses
2-1. ABS main fuse
3. Ignition switch
4. Circuit fuses
4-1. "IG-COIL METER" fuse
5. Stop lamp switch
6. Stop lamp
7. "ABS" warning lamp
8. Monitor coupler
8-1. Diag. switch terminal
8-2. Ground terminal
9. ABS actuator assembly

Terminal arrangement for disconnected ABS actuator assembly





80E10S-5B-25-2

CIRCUIT DESCRIPTION

When the diag. switch terminal is connected to the ground with the ignition switch turned ON, the ABS actuator assembly outputs a diagnostic trouble code by flashing "ABS" warning lamp.

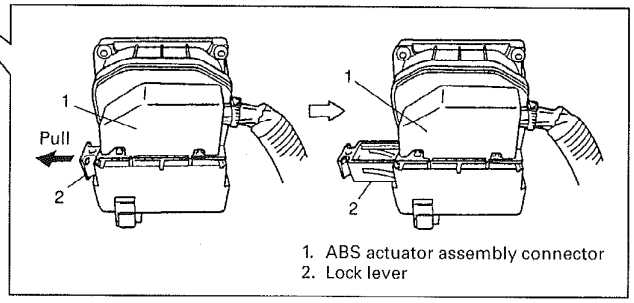
INSPECTION

Is it shorted diag. switch terminal and ground terminal by service wire properly?

NO → Poor connection.

YES →

1) Disconnect service wire.
2) Disconnect ABS actuator assembly connector.
3) Measure resistance between diag. switch terminal and "A12" terminal.
4) Is it infinite (∞)?



1. ABS actuator assembly connector
2. Lock lever

NO →

1) Measure resistance between ground terminal in monitor coupler and body ground.
2) Is continuity indicated?

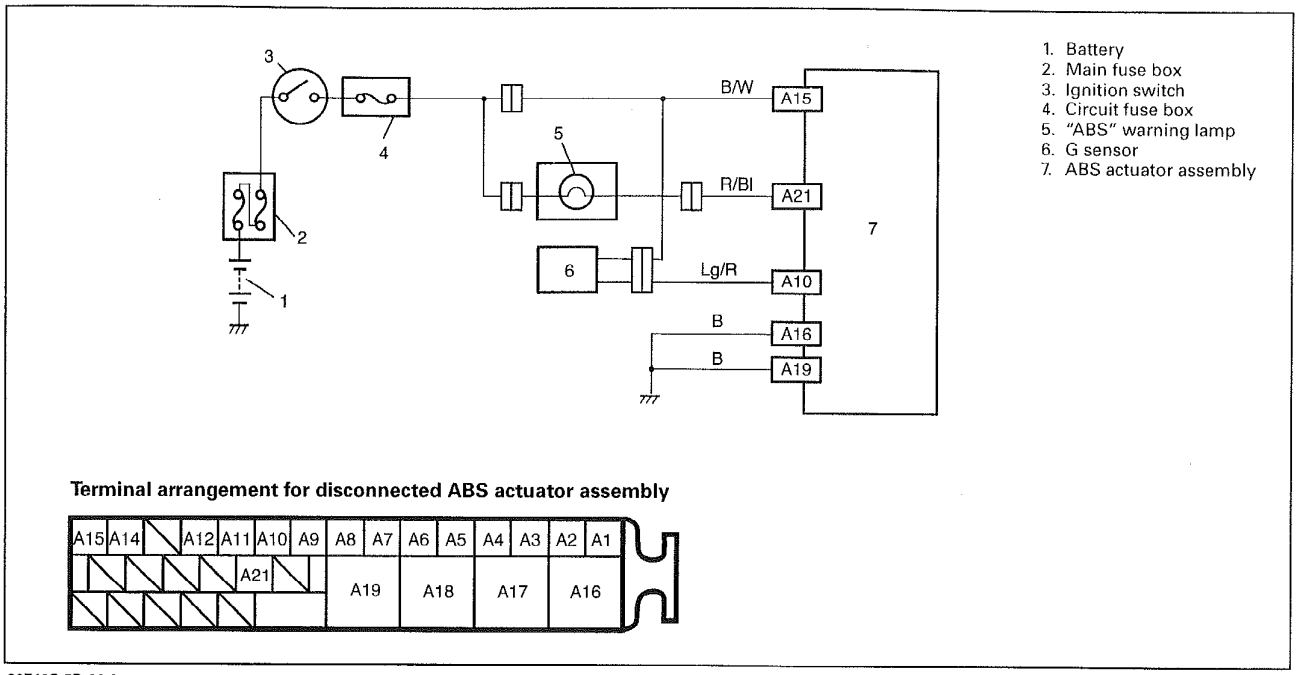
YES → "V" circuit open or poor connection.

YES →

1) Check "A12" and "A19" connection.
2) If connections are OK, check "ABS" warning lamp circuit, referring to Chart A, B and C.
3) If lamp circuit is in good condition substitute a known-good ABS actuator assembly and recheck.

NO → "B" circuit open or poor connection.

DTC 15 – G SENSOR CIRCUIT (4WD VEHICLE ONLY) (Page 1 of 2)



1. Battery
2. Main fuse box
3. Ignition switch
4. Circuit fuse box
5. "ABS" warning lamp
6. G sensor
7. ABS actuator assembly

Terminal arrangement for disconnected ABS actuator assembly

80E10S-5B-26-2

CIRCUIT DESCRIPTION

While a 4WD vehicle is at stop or running, if the voltage at the G sensor terminal "A10" is not within the specified voltage value, or if the signal voltage while at a stop does not vary from that while running, this DTC is set.

Therefore, this DTC may be set when a 4WD vehicle is lifted up and its wheel(s) is turned. In such case, clear the DTC and check again.

INSPECTION

Is G sensor installed to floor securely?

NO

Tighten sensor screws securely.
If not, use new screws.

YES

1) Ignition switch OFF.
2) Remove G sensor referring to "G sensor" under "On-Vehicle Service".
3) Check for proper connections to G sensor.
4) If OK then check G sensor, referring to "G sensor" under "On-Vehicle Service".
5) Is it in good condition?

YES

Go to DTC 15 (Page 2 of 2).

NO

Replace G sensor.

DTC 15 – G SENSOR CIRCUIT (4WD VEHICLE ONLY) (Page 2 of 2)

Were you sent here from DTC 15 (Page 1 of 2)?

YES

1) If OK then turn ignition switch ON and measure voltage between "B/W" terminal of sensor connector and body ground.
2) Is it 10 – 14 V?

NO

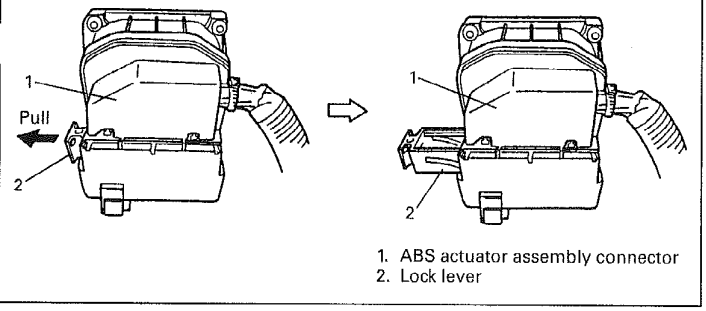
Go to DTC 15 (Page 1 of 2).

YES

1) Ignition switch OFF.
2) Disconnect ABS actuator assembly connector.
3) Measure resistance between "Lg/R" terminal of sensor connector and "A10" terminal.
4) Is it infinite (∞)?

NO

"B/W" circuit open.



1. ABS actuator assembly connector
2. Lock lever

YES

1) With disconnecting ABS actuator assembly connector and G sensor connector, measure resistance between "A10" and "A15" terminals.
2) Is it infinite (∞)?

NO

"Lg/R" circuit open.

YES

1) Measure resistance between "A10" and "A16" or "A19" (ground) terminals.
2) Is it infinite (∞)?

NO

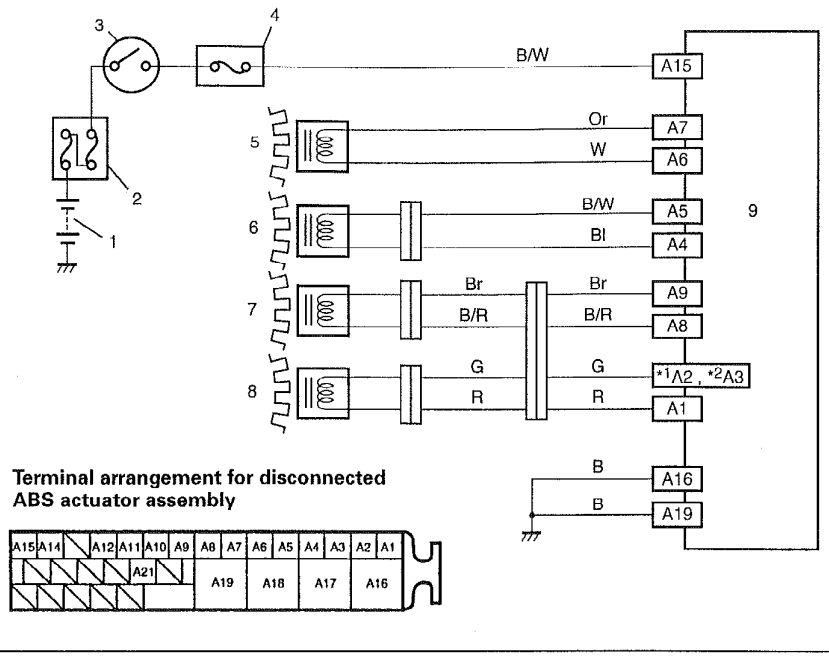
"Lg/R" circuit shorted to power circuit.

1) Check "A10" connection.
2) If connection is OK, substitute a known-good ABS actuator assembly and recheck.

NO

"Lg/R" circuit shorted to ground.

DTC 18 – WHEEL SPEED SENSOR/ROTOR (Page 1 of 2)



1. Battery
2. Main fuse box
3. Ignition switch
4. Circuit fuse box
5. Left-front wheel speed sensor & rotor
6. Right-front wheel speed sensor & rotor
7. Left-rear wheel speed sensor & rotor
8. Right-rear wheel speed sensor & rotor
9. ABS actuator assembly

*1: For 4WD vehicle
*2: For 2WD vehicle

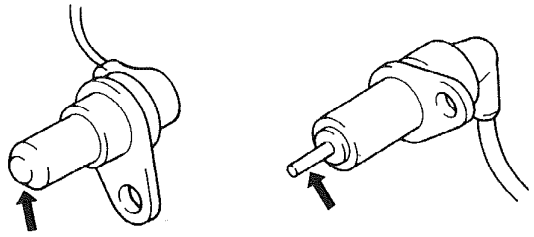
80E10S-5B-28-2

DESCRIPTION

When no other malfunction DTC is detected and ABS control is performed for longer than approx. 1 minute continuously, this DTC will be set.

INSPECTION

1) Remove all wheel speed sensors.
2) Check each sensor for damage or foreign material being attached to it.
3) Are they in good condition?



YES

Go to DTC 18 (Page 2 of 2).

NO

Clean or replace.

DTC 18 – WHEEL SPEED SENSOR/ROTOR (Page 2 of 2)

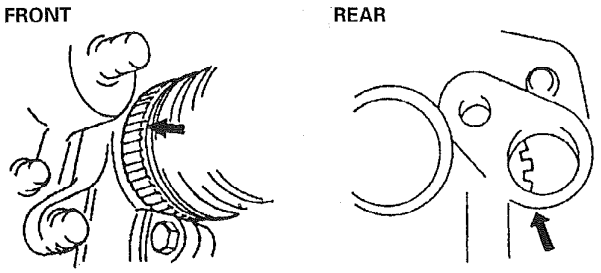
Were you sent here from DTC 18 (Page 1 of 2)?

YES

1) Check visually through each wheel speed sensor installation hole for the following.
   - Rotor serration (teeth) neither missing nor damaged.
   - No foreign material attached.
   - Rotor not being eccentric.
   - Wheel bearing free from excessive play.
2) Are they in good condition?

NO

Go to DTC 18 (Page 1 of 2).

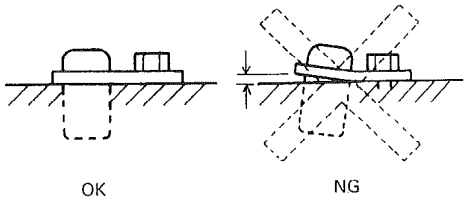


YES

1) Install each speed sensor to each knuckle.
2) Tighten each sensor bolt to specified torque and check that there is not any clearance between sensor and knuckle. Replace sensor, if any.

NO

Clean, repair or replace.



1) Referring to p. 5B-44, check output voltage or waveform of each sensor.
2) Is proper output voltage or waveform available?

YES

1) Check system operation, referring to "Operation Check" in "ABS Actuator Assembly" under "On-Vehicle Service".
2) Is it in good condition?

NO

Replace sensor and recheck.

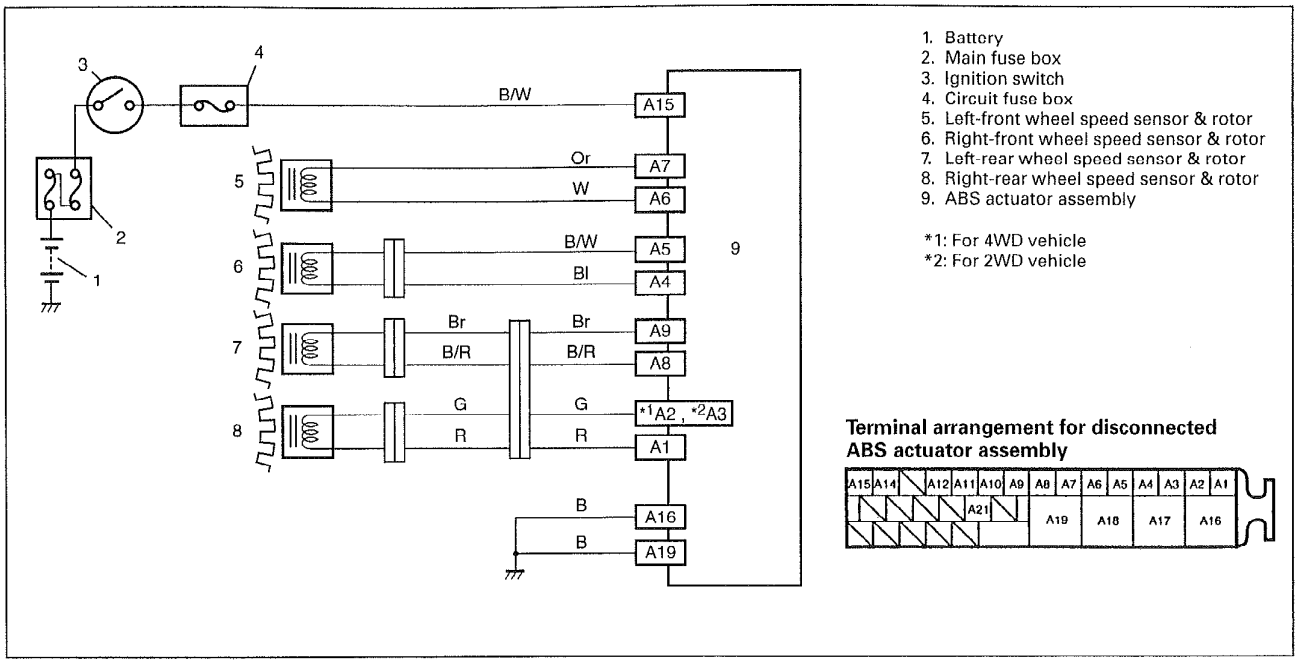
YES

Substitute a known-good ABS actuator assembly and recheck.

NO

Repair or replace malfunction part.

DTC 21, 22 – RIGHT-FRONT WHEEL SPEED SENSOR CIRCUIT
25, 26 – LEFT-FRONT WHEEL SPEED SENSOR CIRCUIT
31, 32 – RIGHT-REAR WHEEL SPEED SENSOR CIRCUIT
35, 36 – LEFT-REAR WHEEL SPEED SENSOR CIRCUIT (Page 1 of 3)



DESCRIPTION

The ABS actuator assembly monitors the voltage at the positive (+) terminal of each sensor while the ignition switch is ON. When the voltage is not within the specified range, an applicable DTC will be set. Also, when no sensor signal is inputted at starting or while running, an applicable DTC will be set.

NOTE:

When the vehicle was operated in any of the following ways, one of these DTC's may be set even when the sensor is in good condition. If such possibility is suspected, repair the trouble (dragging of brake, etc.) of the vehicle, clear DTC once and then after performing the driving test as described in Step 4 of "ABS Diagnostic Flow Chart", check whether or not any abnormality exists.

- **The vehicle was driven with parking brake pulled.**
- **The vehicle was driven brake dragging.**
- **Wheel spin occurred while driving.**
- **Wheel(s) was turned while the vehicle was jacked up.**
- **The vehicle was stuck.**

DTC 21, 22, 25, 26, 31, 32, 35 OR 36 (Page 2 of 3)

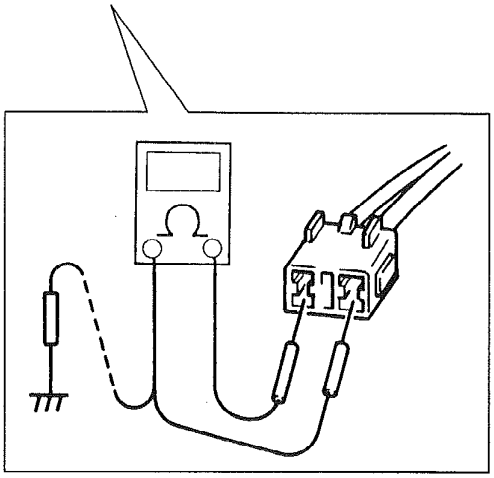
INSPECTION

1) Disconnect the applicable sensor connector with ignition switch OFF.
2) Check wheel speed sensor, referring to "Sensor Inspection" in "Front Wheel Speed Sensor" and "Rear Wheel Speed Sensor" under "On-Vehicle Service".
3) Is it in good condition?

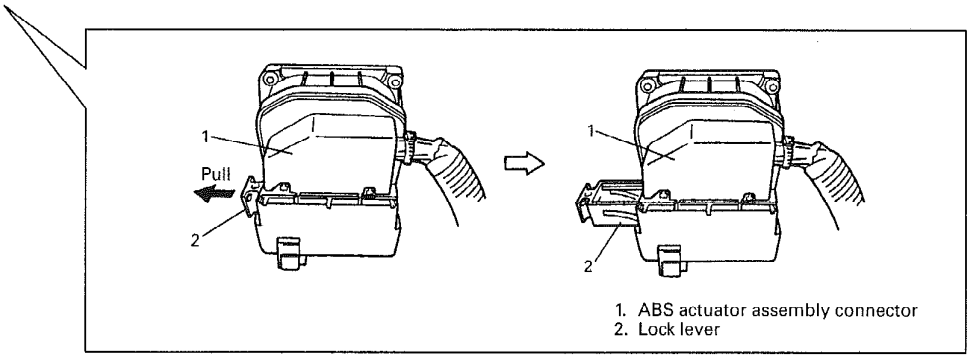
YES

NO

Replace sensor.



1) Ignition switch OFF.
2) Disconnect connector from ABS actuator assembly.
3) Check for proper connection to ABS actuator assembly at each sensor terminal.
4) If OK then turn ignition switch "ON" and measure voltage between sensor positive terminal of ABS actuator assembly connector and body ground.
5) Is it 0 V?



1. ABS actuator assembly connector
2. Lock lever

YES

NO

Sensor positive circuit shorted to power circuit.

1) Ignition switch OFF.
2) Connect connector to sensor.
3) Measure resistance between sensor terminals at actuator connector.
4) Measure resistance between sensor positive terminal and negative terminal of actuator connector, between positive terminal and body ground.
5) Are measured resistance values within each specified range described in "Sensor Inspection" in "Front Wheel Speed Sensor" and "Rear Wheel Speed Sensor" under "On-Vehicle Service".

YES

NO

Go to this DTC (Page 2 of 3).

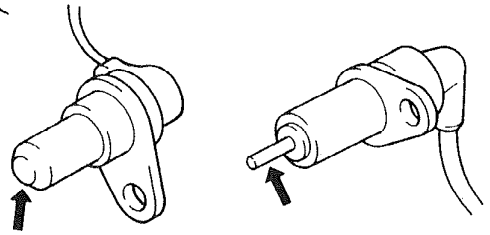
Circuit open or shorted to ground.

DTC 21, 22, 25, 26, 31, 32, 35 OR 36 (Page 3 of 3)

Were you sent here from this DTC (Page 2 of 3)?

YES

1) Remove wheel speed sensor.
2) Check sensor for damage or foreign material being attached.
3) Is it in good condition?



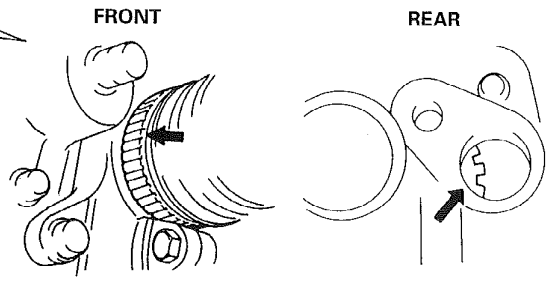
NO

Go to this DTC (Page 2 of 3).

YES

Check visually through wheel speed sensor installation hole for the following.
- Rotor serration (teeth) neither missing nor damaged.
- No foreign material being attached.
- Rotor not being eccentric.
- Wheel bearing free from excessive play.

Are they in good condition?

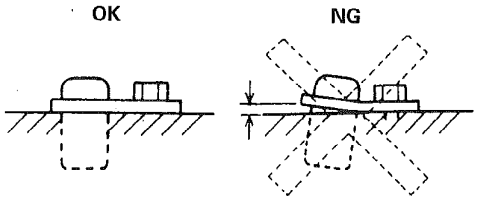


NO

Clean or replace sensor.

YES

1) Install sensor to knuckle.
2) Tighten sensor bolt to specified torque and check that there is not any clearance between sensor and knuckle.
   Replace sensor, if any.



NO

Clean, repair or replace.

YES

Referring to p. 5B-44, check output voltage or waveform of sensor.
Is proper output voltage or waveform obtained?

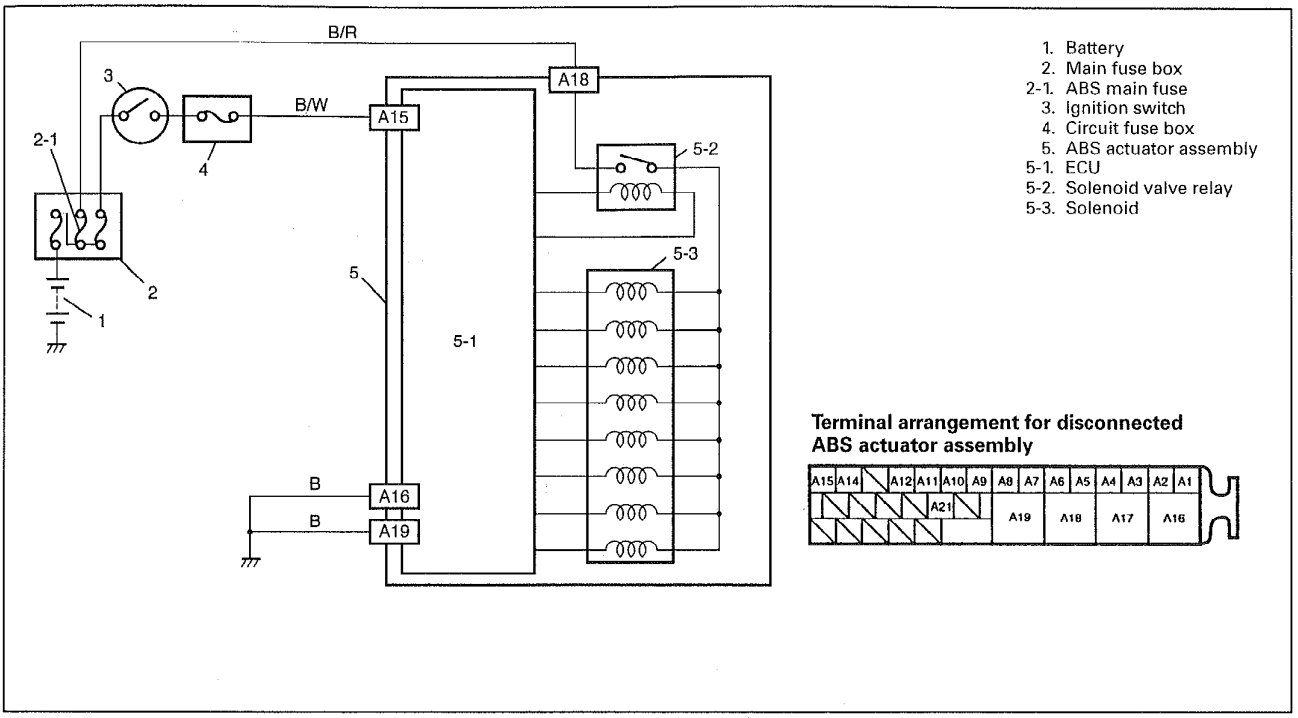
YES

Substitute a known-good ABS actuator assembly and recheck.

NO

Replace sensor and recheck.

DTC 41 – RIGHT-FRONT HOLD SOLENOID CIRCUIT
45 – LEFT-FRONT HOLD SOLENOID CIRCUIT
51 – RIGHT-REAR HOLD SOLENOID CIRCUIT
55 – LEFT-REAR HOLD SOLENOID CIRCUIT
42 – RIGHT-FRONT RELEASE SOLENOID CIRCUIT
46 – LEFT-FRONT RELEASE SOLENOID CIRCUIT
52 – RIGHT-REAR RELEASE SOLENOID CIRCUIT
56 – LEFT-REAR RELEASE SOLENOID CIRCUIT (Page 1 of 2)



DESCRIPTION

The ABS actuator assembly monitors the voltage at the terminal of the solenoid circuit constantly with the ignition switch turned ON. It sets this DTC when the terminal voltage at the monitor terminal does not become low/high for the ON/OFF command to the solenoid (does not follow these commands).

INSPECTION

1) Check solenoid valve relay and solenoid, referring to "Operation Check" in "ABS Actuator Assembly" under "On-Vehicle Service".
2) Is it in good condition?

NO

Go to DTC 41, 42, 45, 46, 51, 52, 55 OR 56 (Page 2 of 2)

YES

Check "A18" connection.
If connection is OK, substitute a known-good ABS actuator assembly and recheck.

DTC 41, 42, 45, 46, 51, 52, 55 OR 56 – SOLENOID CIRCUIT (Page 2 of 2)

Were you sent here from this DTC (Page 1 of 2)?

YES

1) Ignition switch OFF.
2) Check ABS main fuse.
3) Is it in good condition?

NO

Go to this DTC (Page 1 of 2).

NO

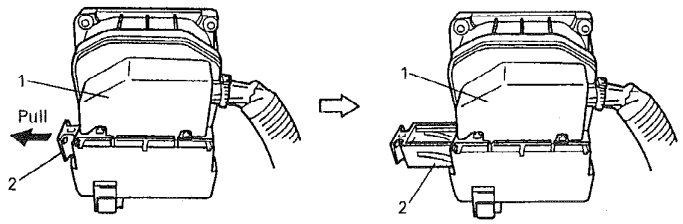
1) Disconnect ABS actuator assembly connector.
2) Measure resistance between "A18" terminal and body ground.
3) Is it infinite (∞)?

NO

"B/W" circuit shorted to ground.
Repair or replace "B/W" circuit and replace fuse.

YES

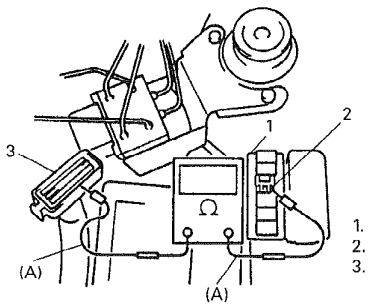
Replace fuse.



1. ABS actuator assembly connector
2. Lock lever

YES

1) Disconnect ABS actuator assembly connector.
2) Measure resistance between "A18" terminal and "B/R" terminal in main fuse box.
3) Is it infinite (∞)?



Special Tool
(A): 09932-76010

1. Main fuse box
2. "B/R" wire terminal
3. Disconnected actuator connector

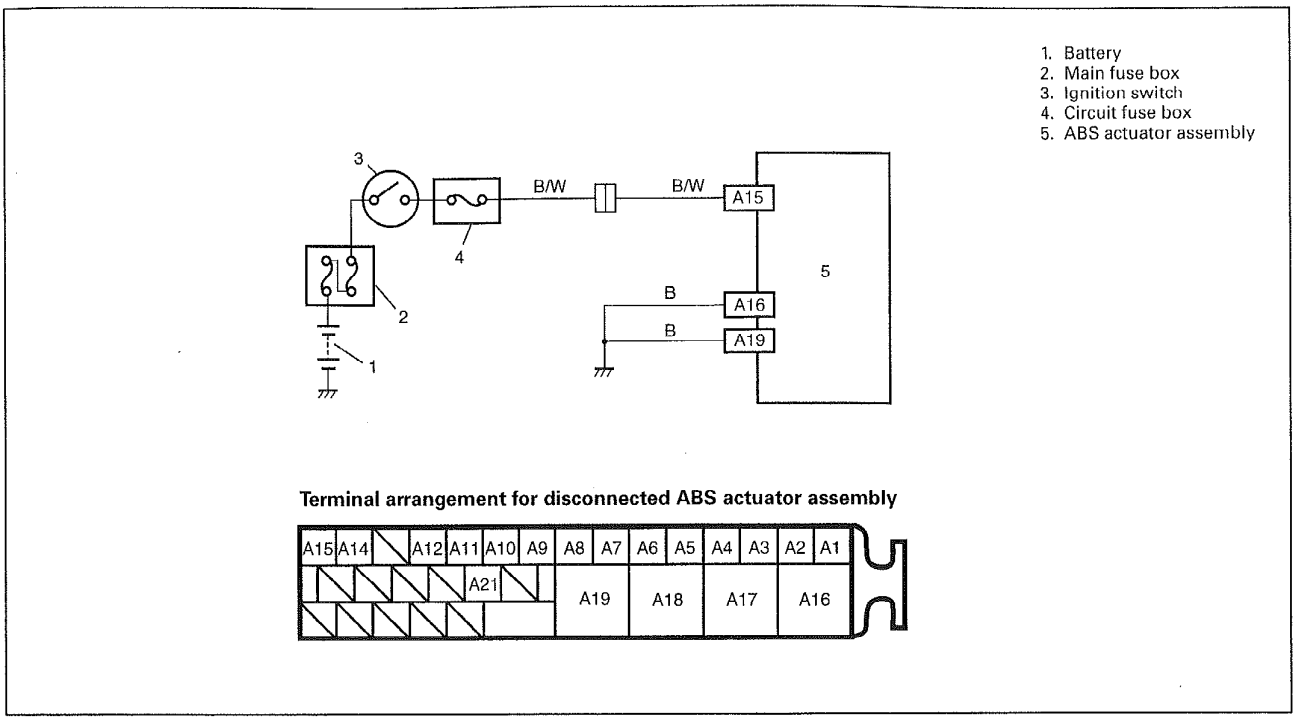
NO

Check "A18" connection.
If connection is OK, substitute a known-good ABS actuator assembly and recheck.

YES

"B/W" circuit open.

DTC 57 – POWER SOURCE CIRCUIT



80E10S-5B-35-2

DESCRIPTION

When the ignition voltage at terminal "A15" is below an approx. 9 V or above an approx. 17 V for specified time, this DTC will be set.

INSPECTION

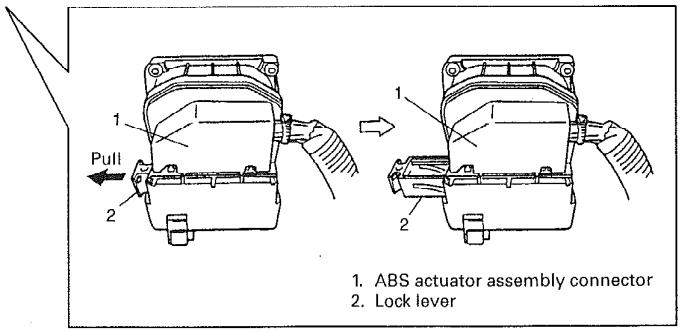
1) Check battery voltage.
2) Is it about 11 – 14 V?

YES

1) Disconnect ABS actuator assembly connector.
2) Check for proper connection to ABS actuator assembly at terminal "A15".
3) If OK then ignition switch ON and then measure voltage from ABS actuator assembly connector terminal "A15" to terminal "A16" or "A19" (body ground).
4) Is voltage 10 – 16 V?

NO

Check charging system, referring to SECTION 6H.



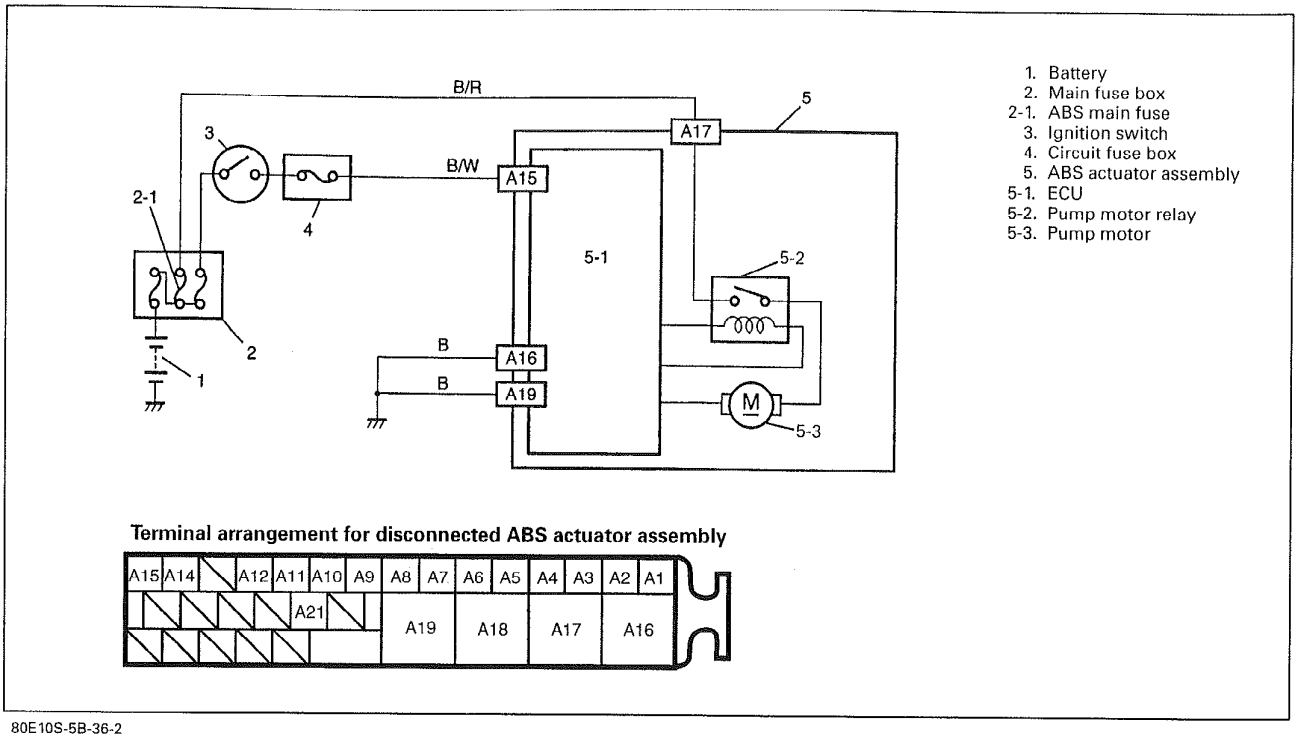
YES

Poor "A15", "A16" or "A19" connection.
If connections are OK, substitute a known-good ABS actuator assembly and recheck.

NO

Faulty "B/W" and/or "B" wire circuit.

DTC 61 – PUMP MOTOR RELAY CIRCUIT (Page 1 of 2)



80E10S-5B-36-2

DESCRIPTION

The electronic control module monitors the voltage at the monitor terminal of the pump motor circuit constantly with the ignition switch turned ON. It sets this DTC when the voltage at the monitor terminal does not become high/low according to ON/OFF commands to the pump motor relay in the ABS actuator assembly (does not follow these commands).

INSPECTION

1) Check pump motor relay, referring to "Pump Motor Inspection" in "ABS Actuator Assembly" under "On-Vehicle Service".
2) Is it in good condition?

NO

1) Ignition switch OFF.
2) Check ABS main fuse.
3) Is it in good condition?

YES

Go to DTC 61 (A) (Page 2 of 2).

YES

Check "A17" connection.
If connection is OK, substitute a known-good ABS actuator assembly and recheck.

NO

Go to DTC 61 (B) (Page 2 of 2).

DTC 61 – PUMP MOTOR RELAY CIRCUIT (Page 2 of 2)

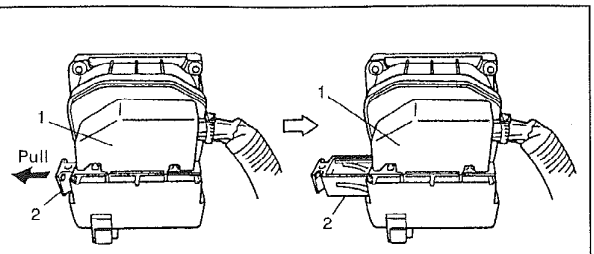
Were you sent here from DTC 61 (A) (Page 1 of 2)?

YES

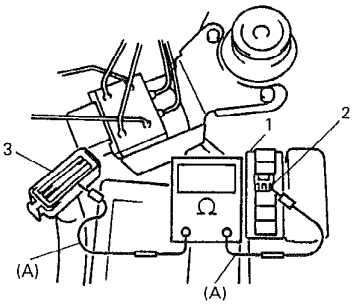
1) Disconnect ABS actuator assembly connector.
2) Measure resistance between "A17" terminal and "B/R" terminal in main fuse box.
3) Is it infinite (∞)?

NO

Go to DTC 61 (Page 1 of 2).



1. ABS actuator assembly connector
2. Lock lever



Special Tool
(A): 09932-76010

1. Main fuse box
2. "B/R" wire terminal
3. Disconnected actuator connector

NO

Check "A17" connection.
If connection is OK, substitute a known-good ABS actuator assembly and recheck.

YES

"B/W" circuit open.

Were you sent here from DTC 61 (B) (Page 1 of 2)?

NO

Go to DTC 61 (Page 1 of 2).

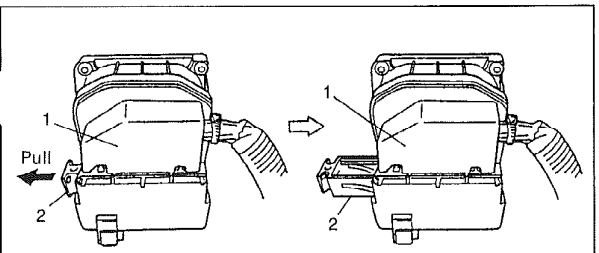
1) Disconnect ABS actuator assembly connector.
2) Measure resistance between "A17" terminal and body ground.
3) Is it infinite (∞)?

NO

"B/W" circuit shorted to ground.
Repair or replace "B/W" circuit and replace fuse.

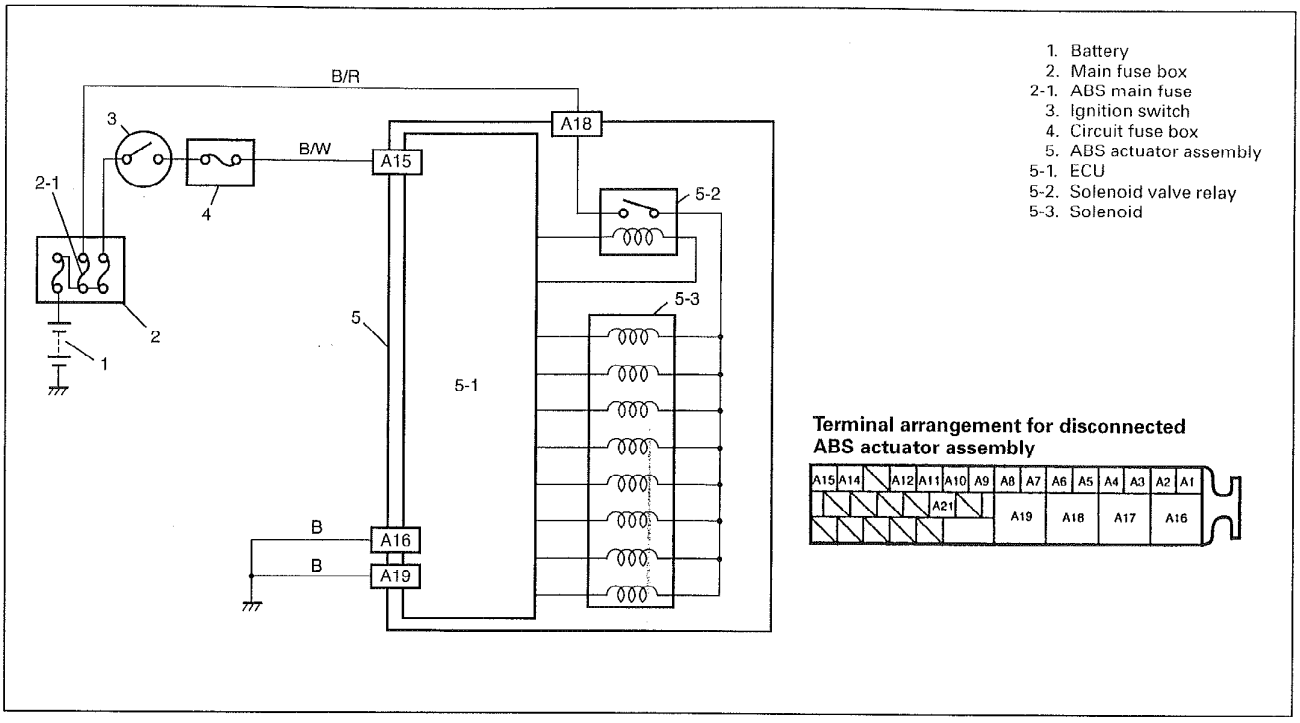
YES

Replace fuse.



1. ABS actuator assembly connector
2. Lock lever

DTC 63 – SOLENOID VALVE RELAY CIRCUIT (Page 1 of 2)



DESCRIPTION

The ABS actuator assembly monitors the voltage at the terminal of the solenoid circuit constantly with the ignition switch turned ON. It sets this DTC when the terminal voltage at the monitor terminal does not become low/high for the ON/OFF command to the solenoid valve relay (does not follow these commands).

INSPECTION

1) Check solenoid valve relay and solenoid, referring to "Operation Check" in "ABS Actuator Assembly" under "On-Vehicle Service".
2) Is it in good condition?

NO

Go to DTC 63 (Page 2 of 2).

YES

Check "A18" connection.
If connection is OK, substitute a known-good ABS actuator assembly and recheck.

DTC 63 – SOLENOID VALVE RELAY CIRCUIT (Page 2 of 2)

Were you sent here from DTC 63 (Page 1 of 2)?

YES

1) Ignition switch OFF.
2) Check ABS main fuse.
3) Is it in good condition?

NO

Go to DTC 63 (Page 1 of 2).

NO

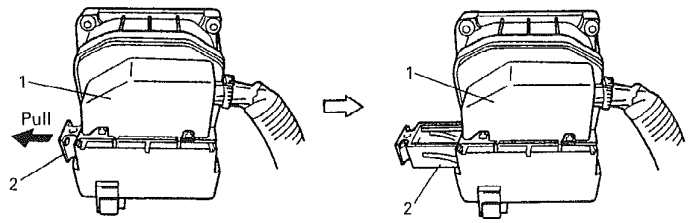
1) Disconnect ABS actuator assembly connector.
2) Measure resistance between "A18" terminal and body ground.
3) Is it infinite (∞)?

NO

"B/W" circuit shorted to ground.
Repair or replace "B/W" circuit and replace fuse.

YES

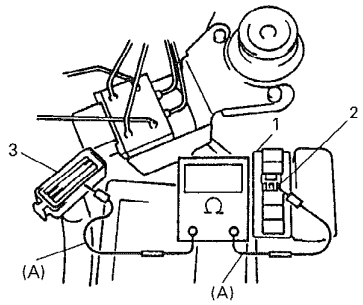
Replace fuse.



1. ABS actuator assembly connector
2. Lock lever

YES

1) Disconnect ABS actuator assembly connector.
2) Measure resistance between "A18" terminal and "B/R" terminal in main fuse box.
3) Is it infinite (∞)?



Special Tool
(A): 09932-76010

1. Main fuse box
2. "B/R" wire terminal
3. Disconnected actuator connector

NO

Check "A18" connection.
If connection is OK, substitute a known-good ABS actuator assembly and recheck.

YES

"B/W" circuit open.

DTC 71 – ELECTRONIC CONTROL UNIT (IN ABS ACTUATOR ASSEMBLY)

DESCRIPTION

This DTC will be set when an internal fault is detected the electronic control unit (in the ABS actuator assembly).

INSPECTION

1) Ignition switch OFF.
2) Disconnect connectors from ABS actuator assembly.
3) Check for proper connection to ABS actuator assembly at all terminals.
4) Are they in good condition?

YES → Substitute a known-good ABS actuator assembly and recheck.

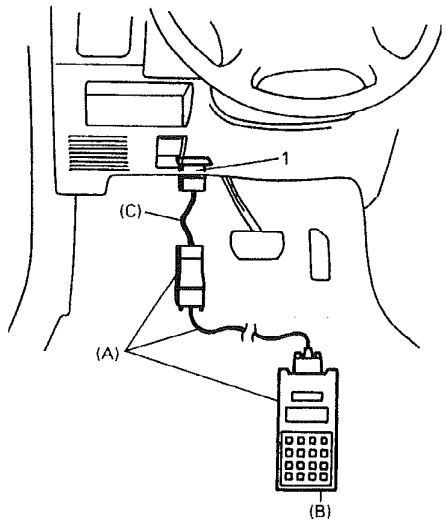
NO → Repair or replace.

ON-VEHICLE SERVICE

PRECAUTION

CAUTION:
- **Never disassemble ABS actuator assembly, loosen blind plug or remove motor. Performing any of these prohibited services will affect original performance of ABS actuator assembly.**
- **As ABS actuator assembly consists of precision parts, be careful not to expose it to excessive shock.**

When connector is connected to ABS actuator assembly, do not disconnect connectors of sensors and turn ignition switch ON. Then DTC will be set in ABS actuator assembly.



1. Data link connector (DLC)

80E10S-5B-41-4

ABS ACTUATOR ASSEMBLY

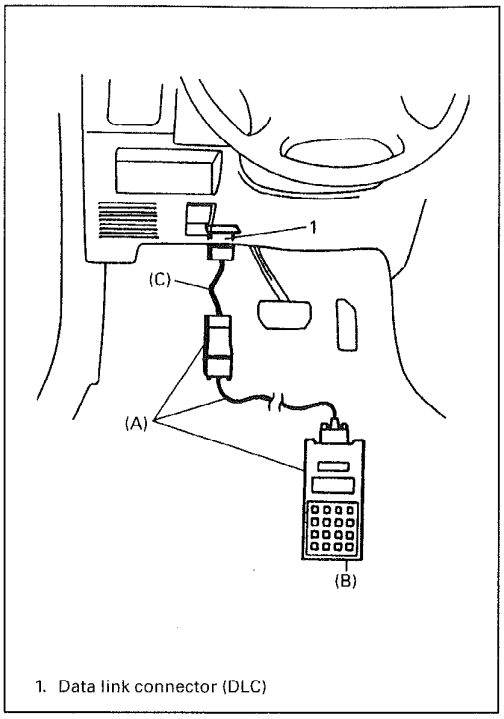
OPERATION CHECK

1) Connect scan tool (Tech-1) to DLC with ignition switch OFF.
2) Turn ignition switch ON and check actuator operation by using "ABS Hydraulic Control Test" under miscellaneous test mode of scan tool (Tech-1).

Special Tool
(A): 09931-76011 (Tech-1)
(B): Cartridge for ABS
(C): 09931-76030 (16/14 pin DLC adapter)

HYDRAULIC UNIT INSPECTION

Check hydraulic unit for fluid leakage.
If any, repair or replace.



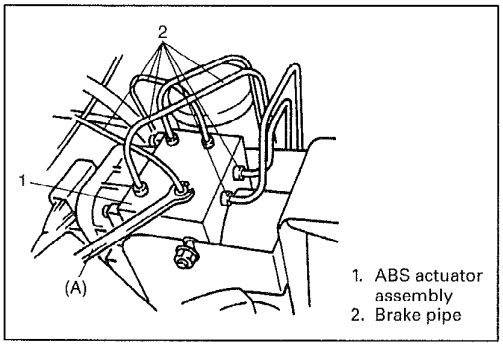
1. Data link connector (DLC)

80E10S-5B-42-2

PUMP MOTOR INSPECTION

1) Connect scan tool (Tech-1) to DLC with ignition switch OFF.
2) Turn ignition switch ON and check pump motor operation by using "Pump Motor Control" under miscellaneous test mode of scan tool (Tech-1).

Special Tool
(A): 09931-76011 (Tech-1)
(B): Cartridge for ABS
(C): 09931-76030 (16/14 pin DLC adapter)



1. ABS actuator assembly
2. Brake pipe

80E10S-5B-42-3

REMOVAL

1) Disconnect negative cable from battery.
2) Using special tool, disconnect brake pipes from ABS actuator assembly.

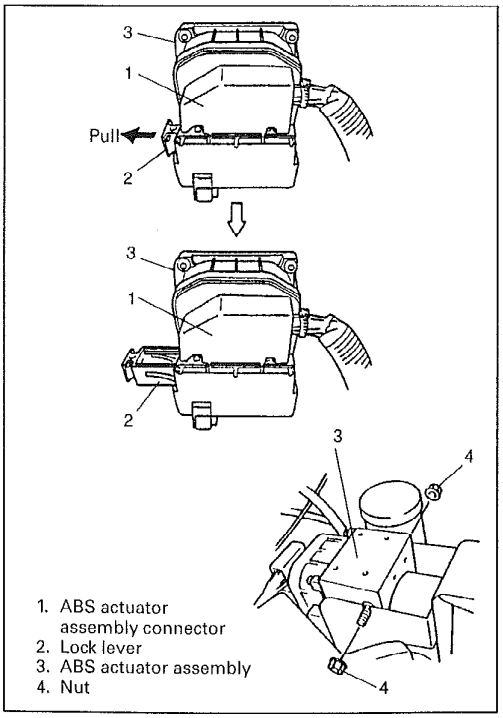
Special Tool
(A): 09950-78220

NOTE:
Put bleeder plug cap onto pipe to prevent fluid from spilling. Do not allow brake fluid to get on painted surfaces.

3) Disconnect ABS actuator assembly connector.

NOTE:
Remove connector by drawing out the lock lever.

4) Remove 2 nuts and take out ABS actuator assembly from bracket.

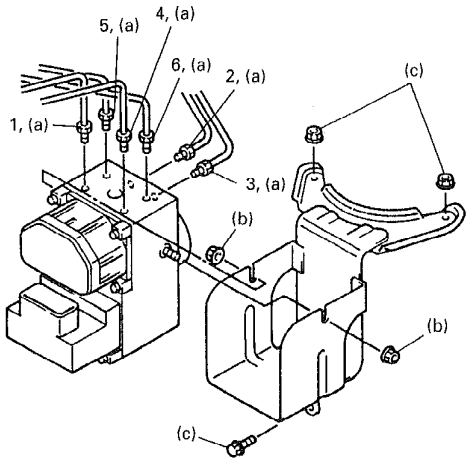


1. ABS actuator assembly connector
2. Lock lever
3. ABS actuator assembly
4. Nut

80E10S-5B-42-5

CAUTION:
- **Do not give an impact to actuator assembly.**
- **Use care not to allow dust to enter actuator assembly.**
- **Do not place actuator assembly on its side or upside down.**

Handling it in inappropriate way will affect it original performance.



1. To right-front
2. To left-rear
3. To right-rear
4. To left-front
5. From master cylinder (secondary)
6. From master cylinder (primary)

80E10S-5B-43-3

INSTALLATION

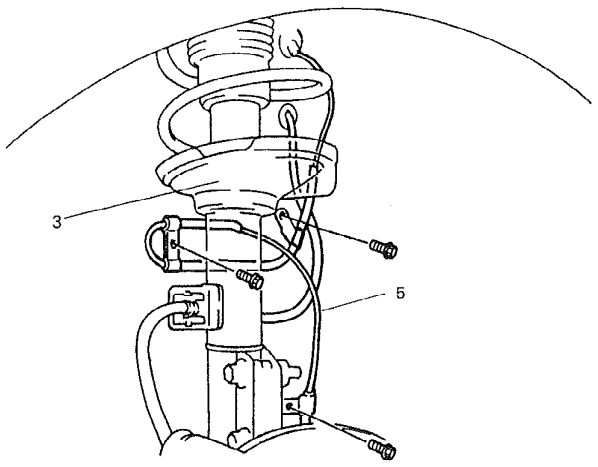
1) Install ABS actuator assembly by reversing removal procedure.

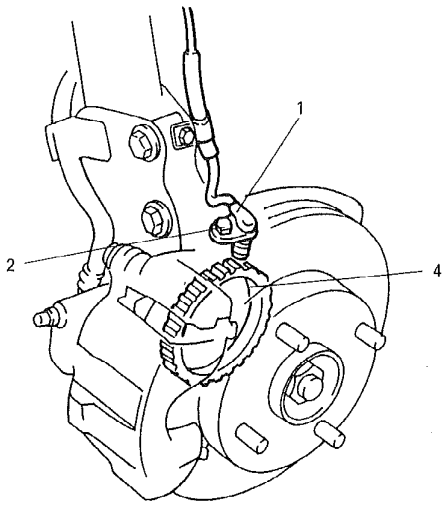
Tightening Torque

(a): 14 N·m (1.4 kg-m, 11.5 lb-ft)
(b): 11 N·m (1.1 kg-m, 8.0 lb-ft)
(c): 23 N·m (2.3 kg-m, 17.0 lb-ft)

2) Bleed air from brake system referring to SECTION 5.
3) Check each installed part for fluid leakage and perform system operation check, referring to "Operation Check" in "ABS Actuator Assembly".

FRONT WHEEL SPEED SENSOR

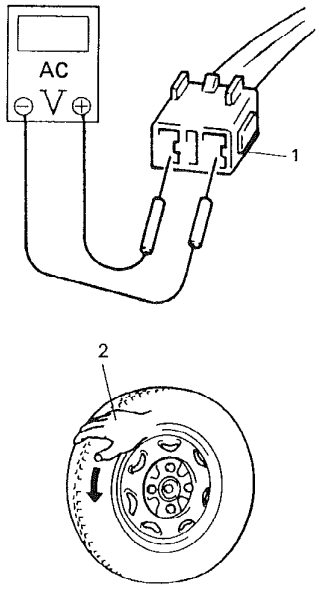




NOTE:
Never remove sensor rotor from drive shaft outside joint.
Refer to SECTION 4 for replacement procedure of joint with sensor.

1. Left front wheel speed sensor
2. Wheel speed sensor bolt
3. Left front strut
4. Sensor rotor
5. Sensor harness

80E10S-5B-44-2



1. Wheel speed sensor connector
2. Rotate by hand

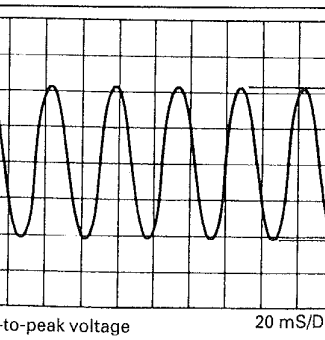
80E10S-5B-44-4

OUTPUT VOLTAGE INSPECTION

1) Turn ignition switch OFF.
2) Hoist vehicle a little.
3) Disconnect connector of wheel speed sensor.
4) Connect voltmeter between connector terminals.
5) While turning wheel at a speed of approximately 2/3 to 1 full rotation per second, check AC voltage of sensor.

Output AC voltage at 2/3 to one rotation per second (29–44 Hz): 135 mV or more

If measured voltage is not as specified, check sensor, rotor and their installation conditions.



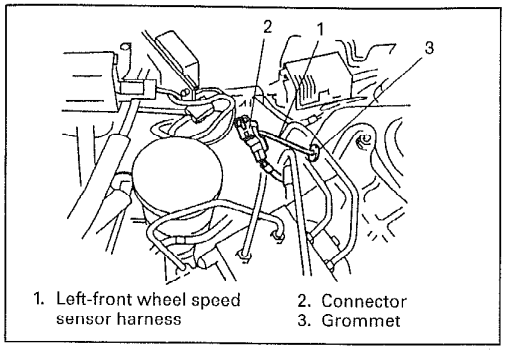
1. Peak-to-peak voltage

80E10S-5B-44-5

Reference

When using oscilloscope for this check, check if peak-to-peak voltage meets specification and waveform is complete.

Peak-to-peak voltage at 2/3 to one rotation per second (29–44 Hz): 190 mV or more



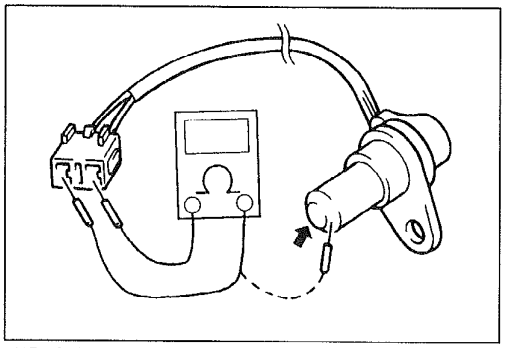
1. Left-front wheel speed sensor harness
2. Connector
3. Grommet

80E10S-5B-45-1

REMOVAL

1) Disconnect negative cable from battery.
2) Hoist vehicle and remove wheel.
3) Disconnect front wheel speed sensor connector.
4) Push out grommet of harness from engine room to outside of vehicle.
5) Remove harness clamp bolts and remove front wheel speed sensor from knuckle.

CAUTION:
- **Do not pull wire harness when removing front wheel speed sensor.**
- **Do not cause damage to surface of front wheel speed sensor and do not allow dust, etc. to enter its installation hole.**



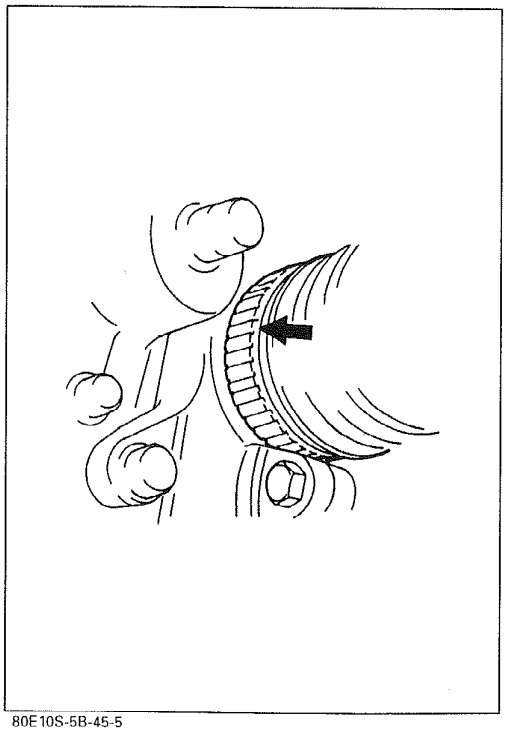
80E10S-5B-45-3

SENSOR INSPECTION

- Check sensor for damage.
- Check sensor for resistance.

Resistance between terminals:
1.2–1.6 kΩ at 20°C (68°F)
Resistance between terminal and sensor body:
1 MΩ or more

If any faulty is found, replace.

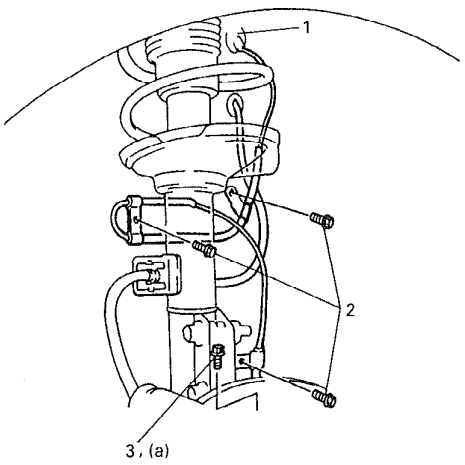


80E10S-5B-45-5

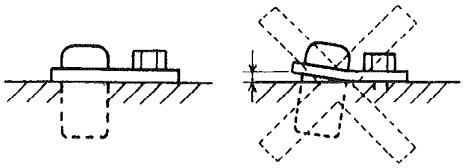
SENSOR ROTOR INSPECTION

- Check rotor serration (teeth) for being missing, damaged or deformed.
- Turn drive shaft and check if rotor rotation is free from eccentricity and looseness.
- Check that no foreign material is attached.

If any faulty is found, or replace.



1. Grommet
2. Clamp bolt
3. Sensor bolt



OK NG

80E10S-5B-46-3

INSTALLATION

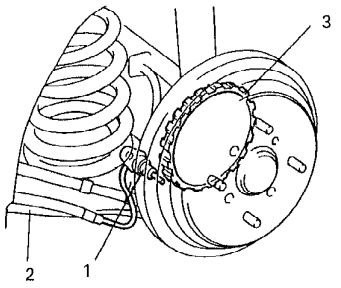
1) Check that no foreign material is attached to sensor and rotor.
2) Install it by reversing removal procedure.

Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

CAUTION:
- **Do not pull wire harness or twist more than necessary when installing front wheel speed sensor.**
- **Fit harness grommet to inner fender securely.**

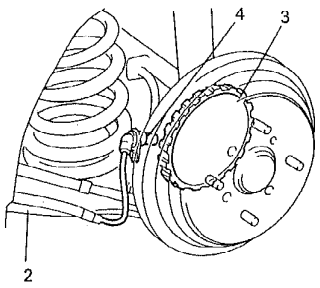
3) Check that there is no clearance between sensor and knuckle.

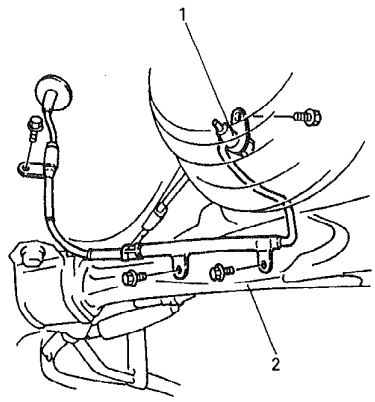
REAR WHEEL SPEED SENSOR



2WD

4WD





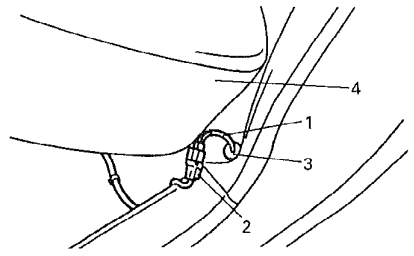
NOTE:
Never remove sensor rotor from wheel hub or drive shaft outside joint. Refer to SECTION 3E for replacement procedure of wheel hub with rotor and SECTION 4C for replacement procedure of drive shaft outside joint with rotor.

1. Left rear wheel speed sensor (2WD)
2. Suspension arm
3. Sensor rotor
4. Left rear wheel speed sensor (4WD)

80E10S-5B-47-2

OUTPUT VOLTAGE INSPECTION

Check in the same procedure as that used of front wheel speed sensor check.



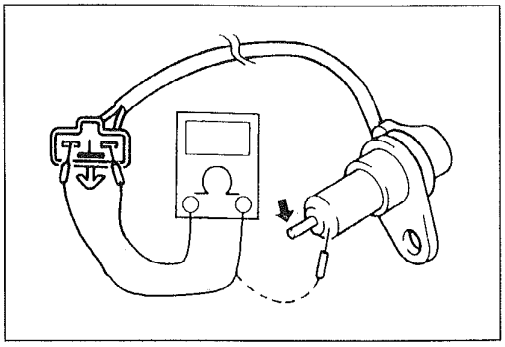
1. Rear wheel speed sensor harness
2. Connector
3. Grommet
4. Rear seat

80E10S-5B-47-4

REMOVAL

1) Disconnect negative cable from battery.
2) Hoist vehicle.
3) Disconnect rear wheel speed sensor connector under rear seat.
4) Push out grommet of harness from cabin to outside of vehicle.
5) Remove harness clamp bolts and remove rear wheel speed sensor from knuckle.

CAUTION:
- **Do not pull wire harness when removing rear wheel speed sensor.**
- **Do not cause damage to surface of rear wheel speed sensor or pole piece and do not allow dust, etc. to enter its installation hole.**



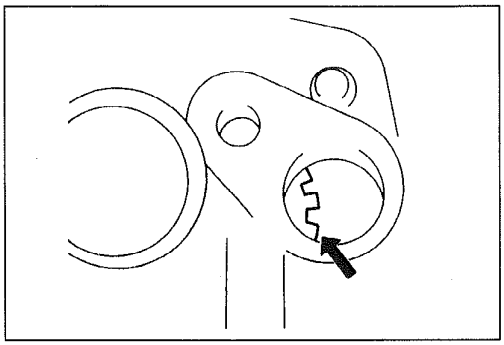
80E10S-5B-48-1

SENSOR INSPECTION

- Check sensor (pole piece) for damage or bent.
- Check sensor for resistance.

Resistance between terminals:
1.2–1.6 kΩ at 20°C (68°F)
Resistance between terminal and sensor body:
1 MΩ more

If any faulty is found, replace.

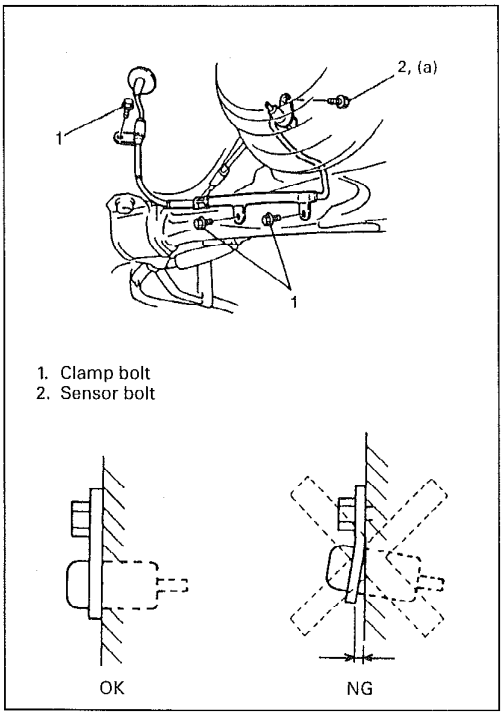


80E10S-5B-48-2

SENSOR ROTOR INSPECTION

- Check rotor serration (teeth) for being missing, damaged or deformed.
- Turn wheel and check if rotor rotation is free from eccentricity and looseness.
- Check that no foreign material is attached.

If any faulty is found, repair or replace.



1. Clamp bolt
2. Sensor bolt

80E10S-5B-48-4

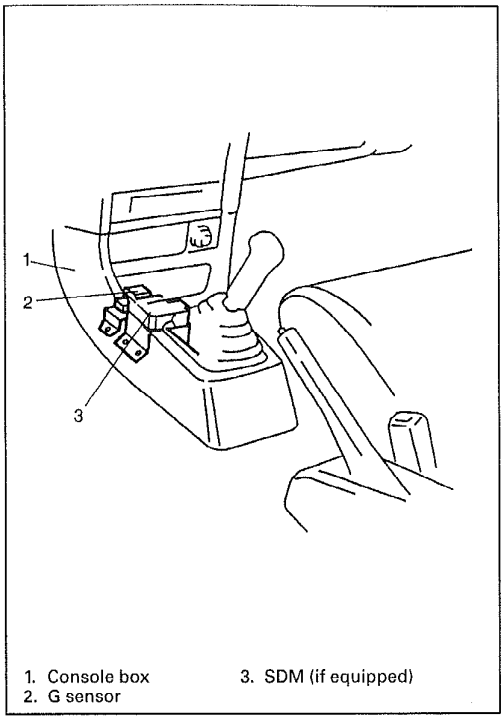
INSTALLATION

1) Check that no foreign material is attached to sensor and rotor.
2) Install it by reversing removal procedure.

Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

> **CAUTION:**
> **Do not pull wire harness or twist more than necessary when installing rear wheel speed sensor.**

3) Check that there is no clearance between sensor and knuckle.



1. Console box
2. G sensor
3. SDM (if equipped)

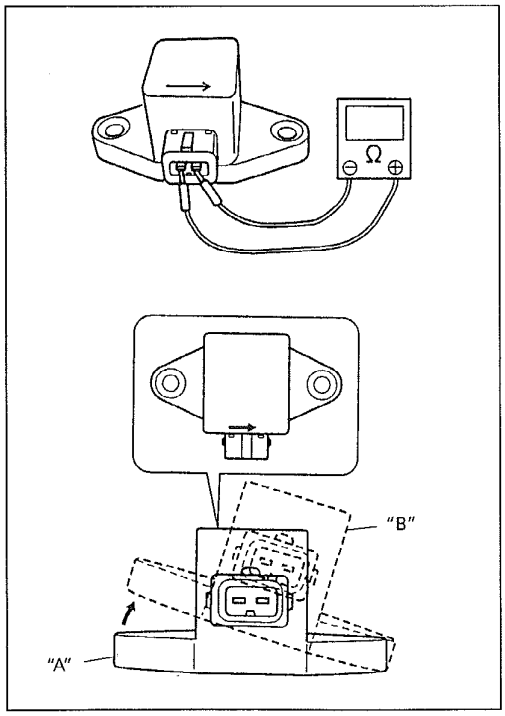
80E10S-5B-49-2

G SENSOR (4WD VEHICLE ONLY)

REMOVAL

1) Turn ignition switch OFF.
2) Remove console box.
3) Disconnect connector from sensor.
4) Remove sensor bracket with sensor from floor.
5) Remove sensor from sensor bracket.

CAUTION:
Sensor must not be dropped or shocked. It will affect its original performance.



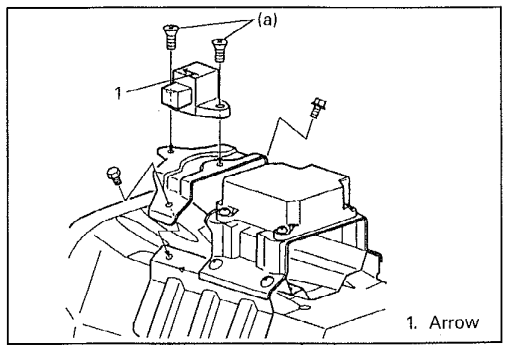
80E10S-5B-49-4

INSPECTION

1) Connect ohmmeter to G sensor terminal.
2) Check resistance in following states.

When in level state "A": 1.43 – 1.58 kΩ
When inclined in arrow direction "B": 4.8 – 5.4 kΩ

If measured values are not as specified, replace sensor.



1. Arrow

80E10S-5B-49-5

INSTALLATION

1) Install sensor onto sensor bracket so that arrow mark directs vehicle forward.

Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

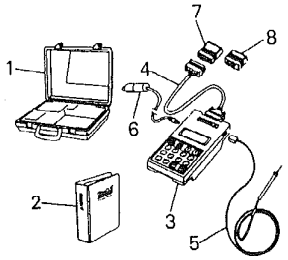
2) Install sensor bracket with sensor to floor.
3) Connect connector to sensor securely.
4) Install console box.

TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Brake pipe flare nut	14	1.4	11.5
ABS actuator assembly nut	11	1.1	8.0
ABS actuator assembly bracket bolt and nut	23	2.3	17.0
Wheel speed sensor bolt (Front and rear)			
G sensor screw (4WD vehicle only)	5.5	0.55	4.0

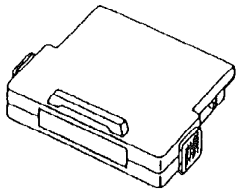
SPECIAL TOOLS

09950-78220
Flare nut wrench
(10 mm)

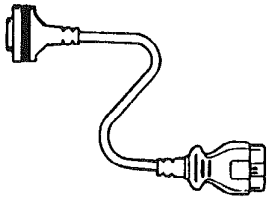


1. Storage case
2. Operator's manual
3. Tech-1 A
4. DLC cable
5. Test lead/probe
6. Power source cable
7. DLC cable adapter
8. Self-test adapter

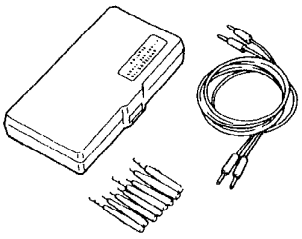
09931-76011
Tech-1 (scan tool) kit



Tech-1 cartridge for ABS



09931-76030
16/14 pin DLC adapter



09932-76010
Connector test adapter kit

SECTION 8

BODY ELECTRICAL SYSTEM

WARNING:
For vehicles equipped with a Supplemental Inflatable Restraint Air Bag System:

- **Service on or around Air Bag System Components or Wiring must be performed only by an authorized dealer. Please observe all WARNINGS and SERVICE PRECAUTIONS in Section 9J under "On-Vehicle Service" and the Air Bag System Component and Wiring Location view in Section 9J before performing service on or around Air Bag System Components or Wiring Failure to follow WARNINGS could result in unintended air bag deployment or could render the air inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the air bags may be deployed by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:

- **For the descriptions (items) not found in this section, refer to the same section of service manual mentioned in FOREWORD of this manual.**
- **When the text says "If equipped", the subject vehicle may or may not be equipped with that system depending on models or statutory regulations.**

CONTENTS

ON-VEHICLE SERVICE

KEYLESS ENTRY SYSTEM (if equipped)

GENERAL DESCRIPTION

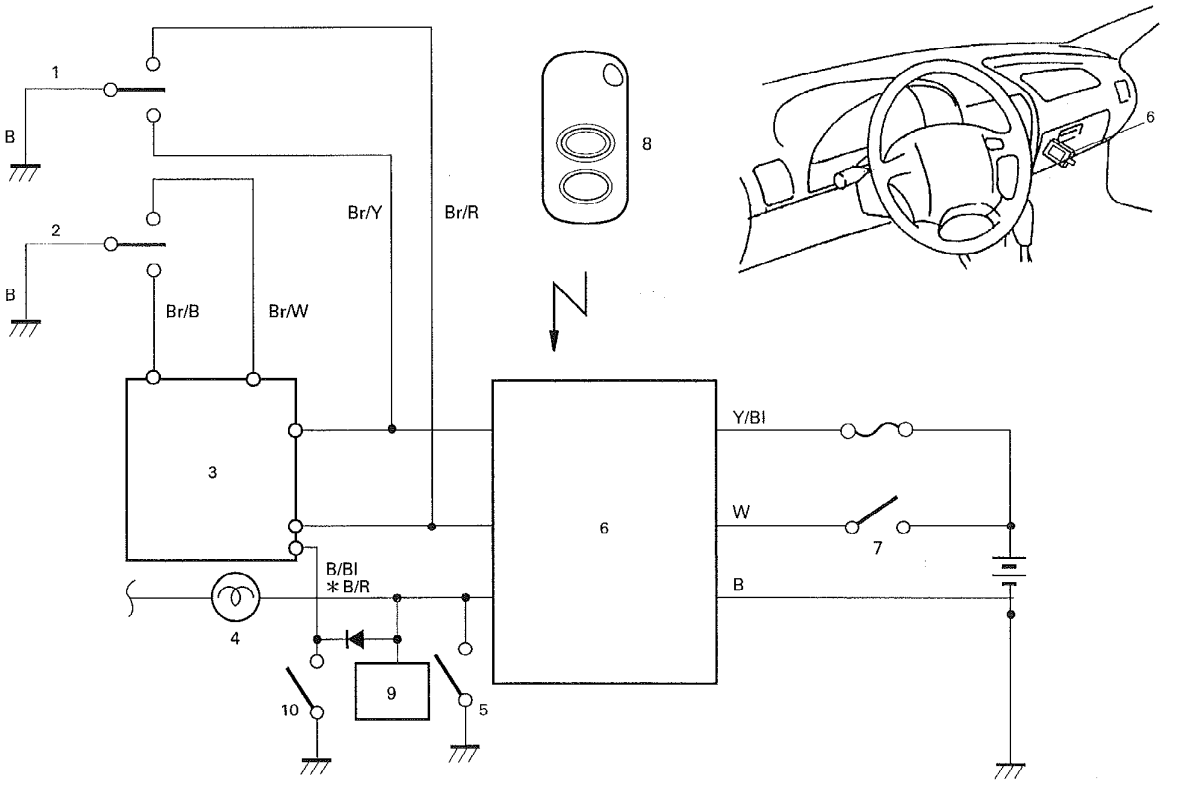
The keyless entry system uses radio wave. When the button on the transmitter is pressed, a signal is transmitted in the form of radio wave to the receiver. Then the signal causes the door lock controller to lock and unlock the door.
IF UNLOCKED WITH REMOTE - CAN RELOCK IF NO IGN AFTER 30 SECS.

OPERATION

The door locks can not operated with the transmitter when either of following conditions applies.

- for 2 seconds after the ignition switch is turned from ON to OFF position.
- the ignition switch is at ON or START position.
- any door is open.

WIRING CIRCUIT



1. Key cylinder switch (driver side) / knob switch
2. Key cylinder switch (passenger side)
3. Power door lock controller
4. Room lamp
5. Door switch (except driver's)
6. Receiver (Keyless controller)
7. Ignition switch
8. Transmitter
9. Buzzer
10. Door switch (driver side)

* RH vehicle

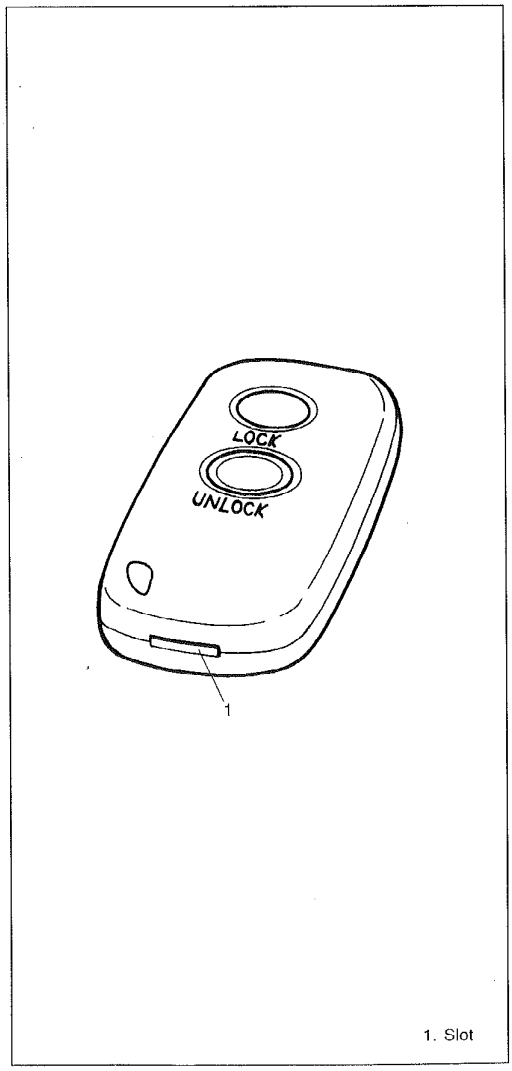
80E10S-8-2-5

TROUBLE DIAGNOSIS

Condition	Possible Cause	Correction
The power door lock function is available but the keyless entry function is not.	• Fuse blown • Code registration error • Transmitter battery dead • Wiring or grounding faulty • Receiver faulty • Transmitter faulty	Replace fuse to check for short. Register code. Replace battery. Repair as necessary. Replace. Replace.
Only one power door lock does not operate.	• Wiring or coupler faulty • Actuator (door lock motor) faulty	Repair as necessary. Replace.
Operation distance unstable.	• Transmitter battery dead • Transmitter faulty	Replace battery. Replace.

NOTE:

- **If power door lock does not operate, refer to POWER DOOR LOCK SYSTEM DIAGNOSIS of the same section.**
- **The operation distance of this system varies depending on the position where the transmitter is operated, at the front side, the rear side or the lateral side. The distance can be affected by radio noises from a TV station, a power plant, a broadcasting station and so forth.**



1. Slot

80E10S-8-3-5

TRANSMITTER

REPLACEMENT OF THE BATTERY

If the transmitter becomes unreliable, replace the battery.
As the battery power is consumed, the operation distance will be shorter.

1) Put the edge of a coin or a flat blade screw driver in the slot of the transmitter and pry it open.
2) Replace the battery (lithium disc-type CR2025 or equivalent) so its ⊕ terminal faces the " + " mark of the transmitter.

> **CAUTION:**
> **Use care not to allow grease or dirt to be attached on the printed circuit board and the battery.**

3) Close the transmitter firmly.
4) Make sure the door locks can be operated with the transmitter.

NOTE:

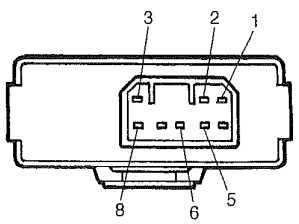
- **To prevent theft, be sure to break the transmitter before discording it.**
- **Dispose of the used battery properly according to applicable rules or regulations. Do not dispose of lithium batteries with ordinary household trash.**

CODE REGISTRATION PROCEDURE

1) Start of code registration
   (Initial conditions: IG switch OFF, all doors closed)
2) Open the door and then turn ON the IG switch within 10 seconds.
3) Turn OFF the IG switch within 10 seconds after it is turned ON.
4) Turn the door switch ON and OFF 3 times within 20 seconds after the IG switch is turned OFF.
5) Within 10 seconds after the door switch is turned ~~OFF~~ ON, turn ON the IG switch and then OFF within next 10 seconds.
6) After LOCK and UNLOCK operation once, the registration mode is set.
7) Press the UNLOCK button of the transmitter once within 60 seconds after the registration mode is set.
8) LOCK and UNLOCK operation once again completes the registration procedure.

NOTE:

- **Perform the above procedure to register a code.**
- **Two codes can be registered.**
- **When a new code is registered, the oldest one will be cleared.**



1. To door lock controller (unlock signal)
2. To door lock controller (lock signal)
3. To IG switch
5. To door switch
6. To ground
8. To battery

80E10S-8-4-5

RECEIVER

INSPECTION

Using a tester, check for continuity and voltage between each terminal of the connector connected to the receiver and the body ground under following specified condition.

Terminal	Check for	Condition	Standard value
1	Continuity	Unlock the driver's seat side door by using the key.	No continuity →continuity
2	Continuity	Lock the driver's seat side door by using the key.	No continuity →continuity
3	Voltage	Insert the ignition key and turn ON the ignition switch.	0V→10 – 14V
5	Voltage	Open any one of all closed doors.	10 – 14V→0V
6	Continuity	Anytime	Continuity
8	Voltage	Anytime	10 – 14V

SECTION 9J

AIR BAG SYSTEM

WARNING:
This vehicle is equipped with a Supplemental Inflatable Restraint Air Bag System. Service on or around Air Bag System Components or Wiring must be performed only by an authorized dealer. Please observe all WARNINGS, CAUTIONS, SERVICE PRECAUTIONS, HANDLING PRECAUTIONS and DISPOSAL PRECAUTIONS in this section under "On-Vehicle Service" and the Air Bag System Component and Wiring Location View in this section before performing service on or around Air Bag System Components or Wiring. Failure to follow WARNING could result in unintended air bag deployment or could render the air bag inoperative. Either of these two conditions may result in severe injury.

CAUTION:
When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

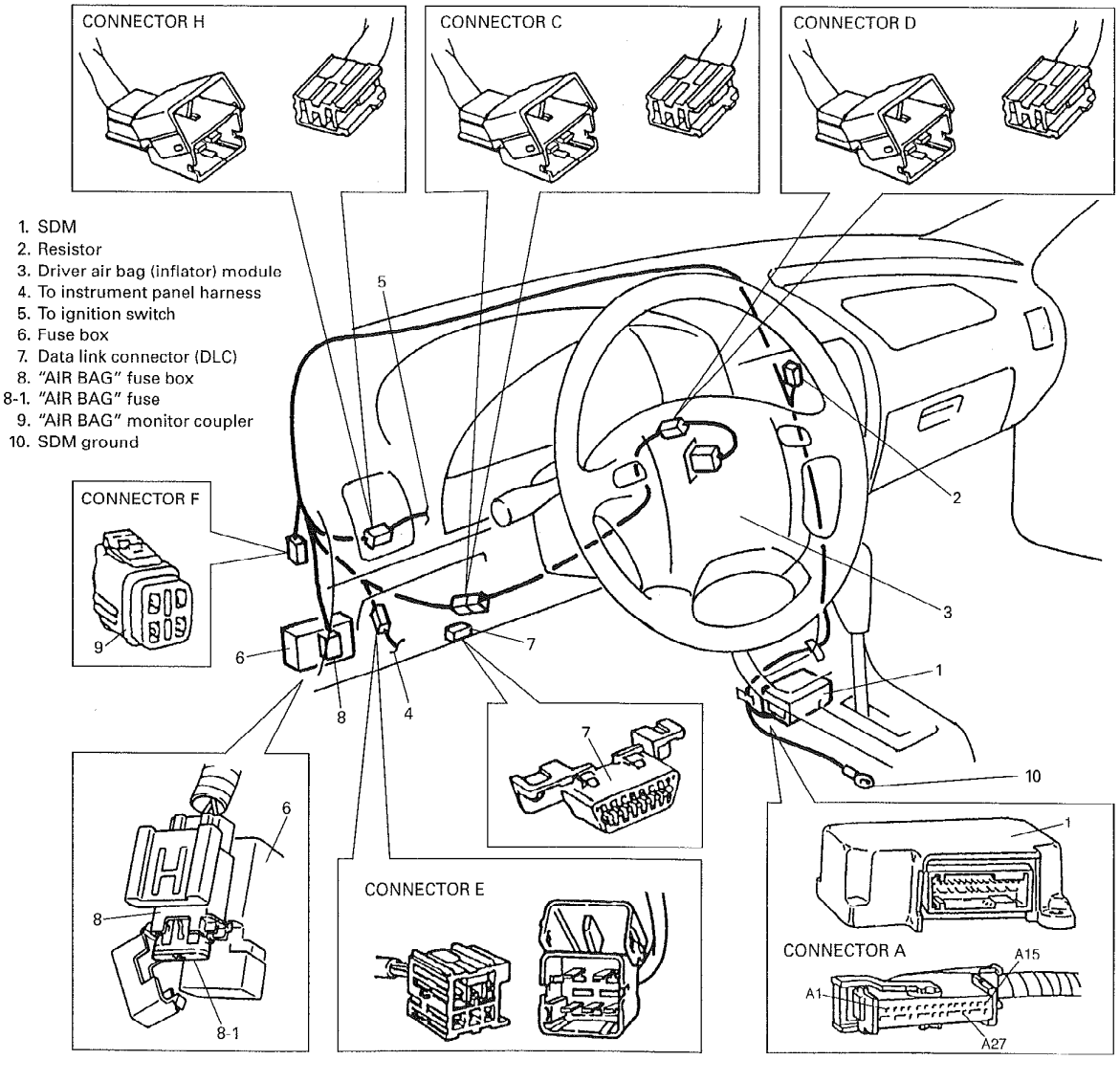
NOTE:
For the descriptions (items) not found in this section of this manual, refer to the same section of Service Manual mentioned in FOREWORD of this manual.

CONTENTS

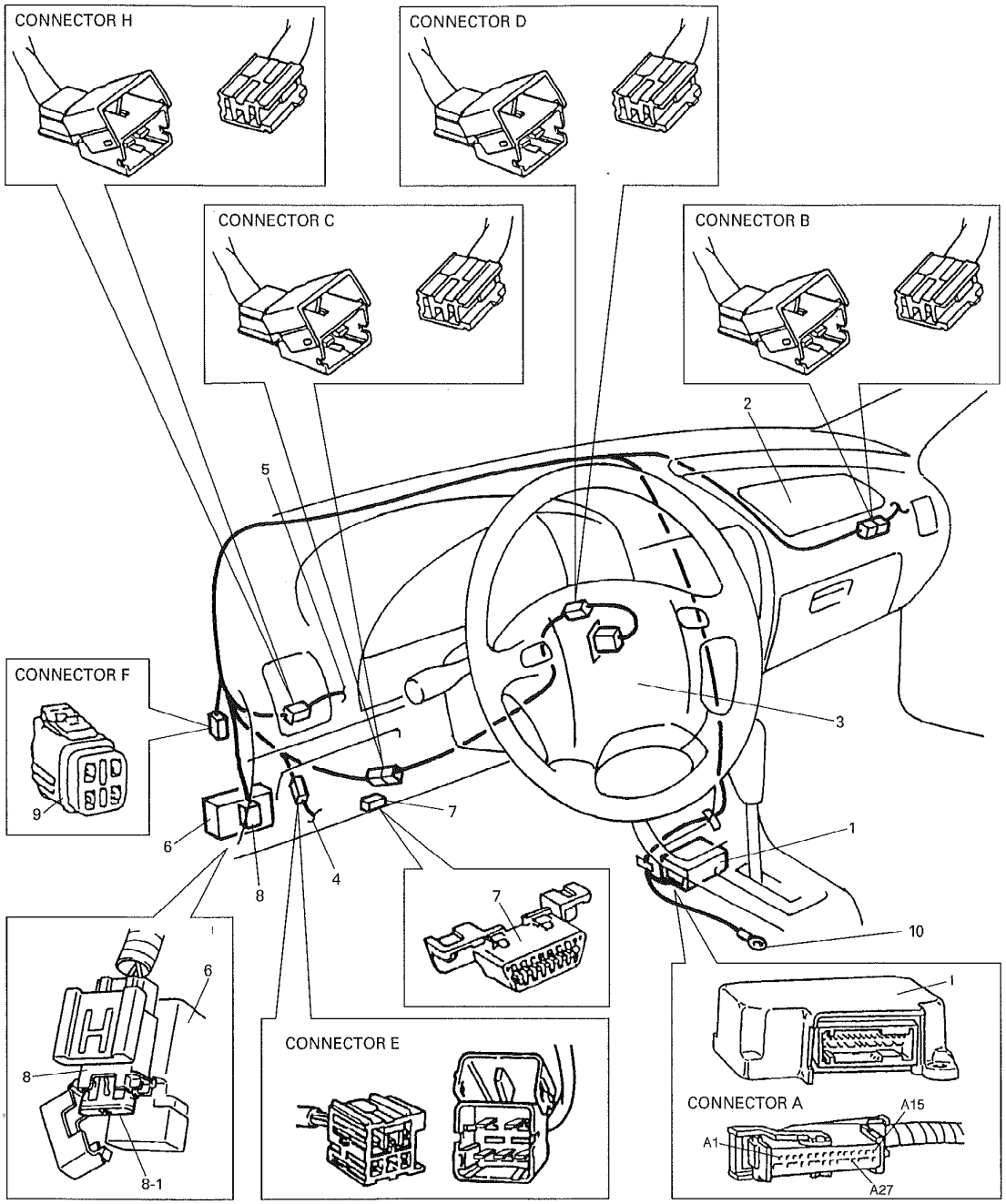
GENERAL DESCRIPTION

SYSTEM WIRING LOCATION VIEW AND CONNECTORS

For vehicle with driver air bag only



For vehicle with driver and passenger air bags

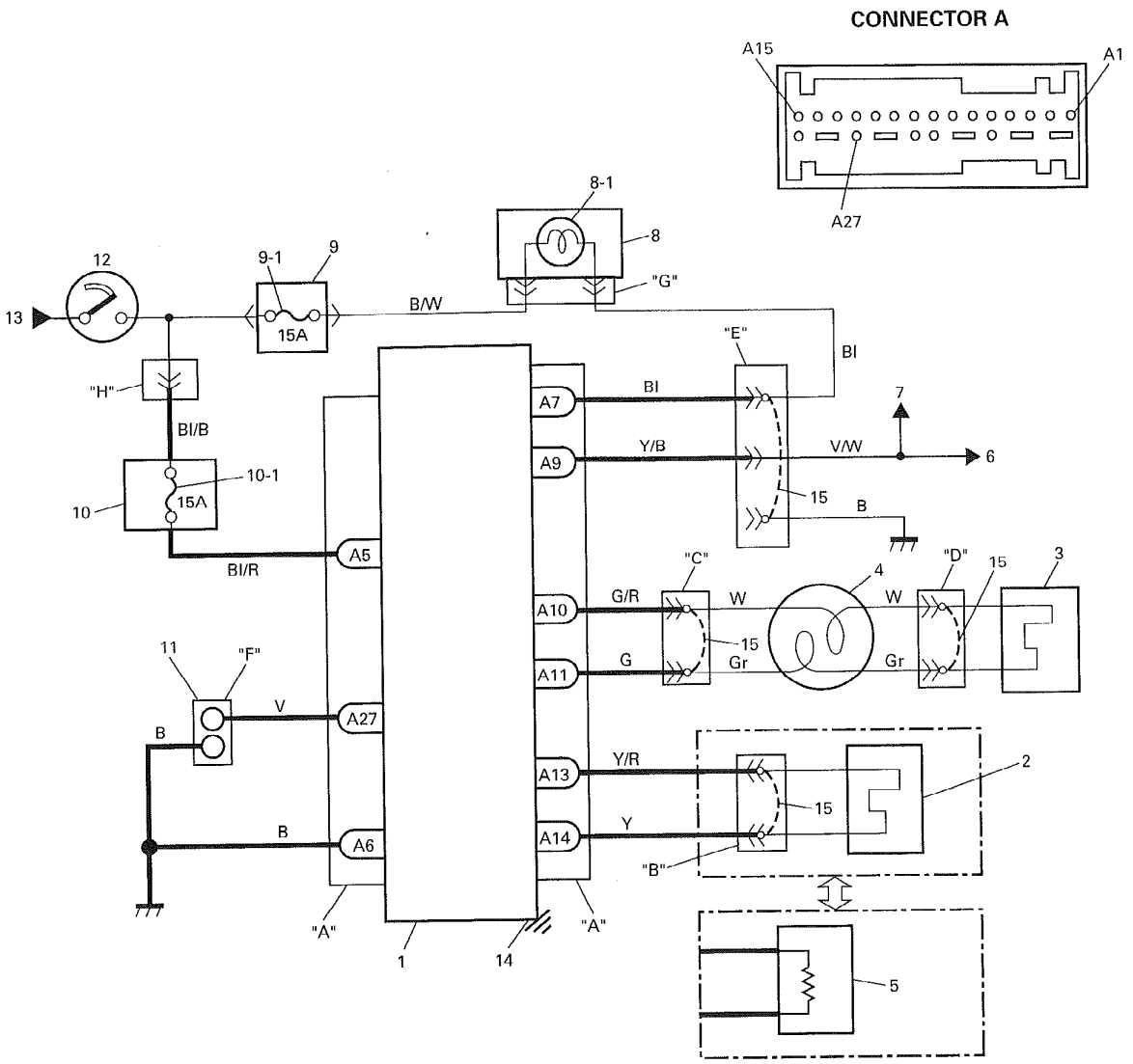


1. SDM
2. Passenger air bag (inflator) module
3. Driver air bag (inflator) module
4. To instrument panel harness
5. To ignition switch
6. Fuse box
7. Data link connector (DLC)
8. "AIR BAG" fuse box

8-1. "AIR BAG" fuse

9. "AIR BAG" monitor coupler
10. SDM ground

SYSTEM WIRING DIAGRAM



"A – "H" : Connector
——— : Air Bag Harness (covered with YELLOW tube)

1. SDM
2. Passenger air bag (inflator) module
3. Driver air bag (inflator) module
4. Contact Coil
5. Resistor (without passenger air bag)
6. To data link connector (DLC)
7. To ECM, TCM (if equipped), ICM (if equipped) and ABS controller (if equipped)
8. Combination meter

8-1. "AIR BAG" warning lamp

9. Fuse box

9-1. "IG COIL METER" fuse

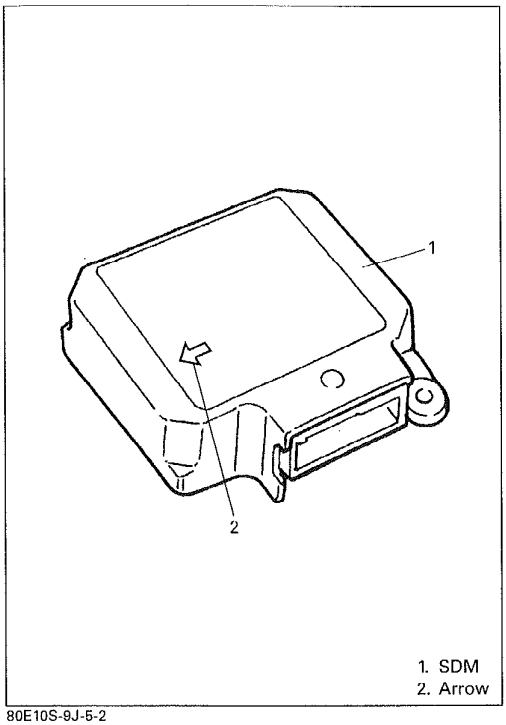
10. "AIR BAG" fuse box

10-1. "AIR BAG" fuse

11. "AIR BAG" monitor coupler
12. Ignition switch
13. To battery positive voltage

CONNECTOR A

PIN NO.	CIRCUIT	
A5	IGNITION VOLTAGE	
A6	GROUND	
A7	WARNING LAMP	
A9	SERIAL DATA	
A10	DRIVER INFLATOR	HIGH
A11		LOW
A13	PASSENGER INFLATOR	HIGH
A14		LOW
A27	DIAGNOSIS SWITCH	



1. SDM
2. Arrow

80E10S-9J-5-2

COMPONENTS DESCRIPTION

SDM (SENSING AND DIAGNOSTIC MODULE)

WARNING:

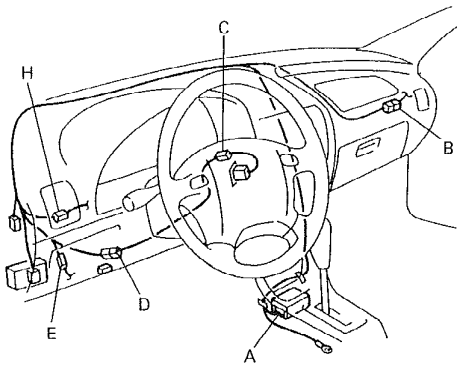
- **During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM).**
- **Be sure to read "SERVICE PRECAUTIONS" and "HANDLING PRECAUTIONS" before starting to work and observe every precaution during work. Neglecting them may result in personal injury or un-deployment of the air bag when necessary.**

CAUTION:

After detecting one time of such collision as to meet deployment condition, the SDM must not be used. Replace with new one.

The Sensing and Diagnostic Module (SDM) is designed to perform the following functions in the air bag system:

- Energy Reserve
  - The SDM maintains a Reserve energy supply to provide deployment energy after ignition voltage is lost in a frontal crash.
- Frontal Crash Detection
  - The SDM monitors vehicle velocity changes to detect frontal crashes which are severe enough to warrant deployment.
- Air Bag Deployment
  - When a frontal crash of sufficient force is detected, the SDM will cause enough current to flow through the air bag (inflator) module(s) to deploy the air bag(s).
- Malfunction Detection
  - The SDM performs diagnostic monitoring of the air bag system electrical components and sets a diagnostic trouble code (DTC) when a malfunction is detected.
- Malfunction Diagnosis
  - The SDM displays air bag diagnostic trouble codes (DTCs) and system status information through the use of special tool (Tech-1, scan tool).
  - The SDM with on-board diagnostic function provides air bag diagnostic trouble codes by flashing "AIR BAG" warning lamp when on-board diagnosis function is used.
- "AIR BAG" Warning Lamp Control
  - The light is turned "ON" to warn the driver of occurrence of a trouble and made to flash to check the burned bulb of "AIR BAG" warning lamp.
- Communication with Tech-1
  - DTC display or DTC clear.
  - In response to the output request from Tech-1, DTC recorded in the memory, each initiator circuit resistance and ignition voltage as recognized by SDM at time of the output request are provided.



A: SDM connector
B: Passenger air bag connector
C: Driver air bag connector
D: Contact coil connector
E: Lamp, DLC connector
H: Ignition connector

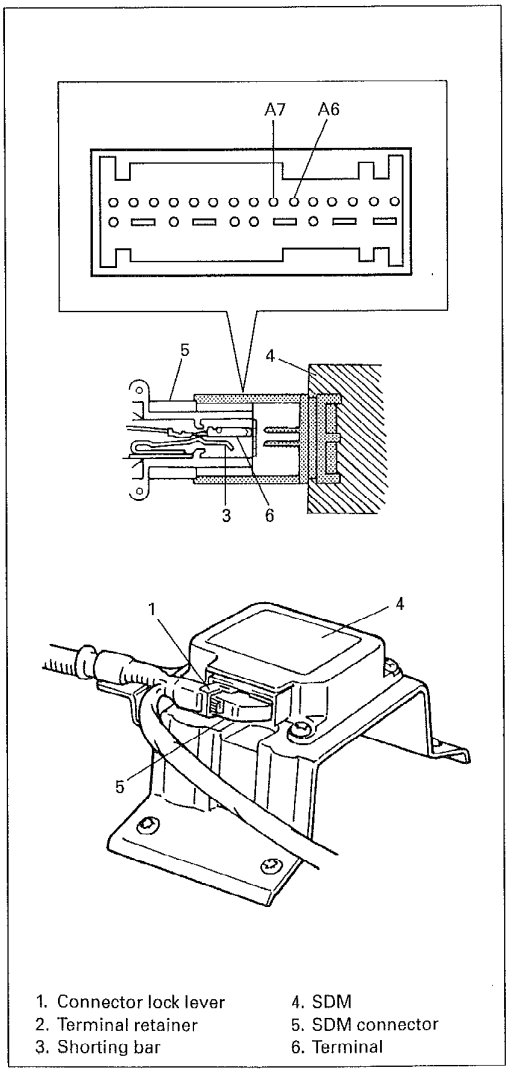
80E10S-9J-6-2

AIR BAG WIRE HARNESS AND CONNECTORS

CAUTION:
When an open in wire harness, damaged wire harness, connector or terminals is found, replace wire harness, connectors and terminals as an assembly.

The air bag wire harness can be identified easily as it is covered with a yellow protection tube. Be very careful when handling it.

Each connector has a terminal lock mechanism (operated by the terminal retainer) and a connector lock mechanism (operated by connector lock lever). Also, connectors "A", "B", "C", "D" and "E" have a short mechanism (operated by shorting bar).



1. Connector lock lever
2. Terminal retainer
3. Shorting bar
4. SDM
5. SDM connector
6. Terminal

80E10S-9J-6-5

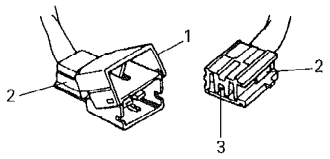
A. SDM Connector

Connector lock lever:
The purpose of the connector lock lever is to assure the connector halves are securely connected and they cannot vibrate apart.

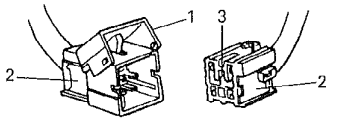
Shorting bar:
Connector "A" has a short mechanism which connects the "AIR BAG" lamp circuit to the ground while the connector is disconnected from SDM. When connected to SDM securely, it is automatically cancelled.

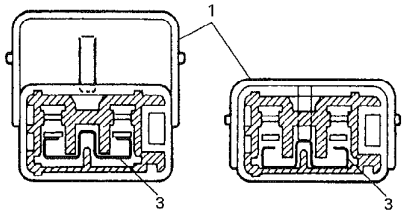
Terminal retainer (Terminal position assurance: TPA):
The function of the TPA is to keep the terminal securely seated in the connector body. The TPA is not to be removed from the connector body.

B, C, D, H connector



E connector





Short state (Improperly fitted or disconnected)

Short cancelled state (Properly fitted)

1. Connector lock lever
2. Terminal retainer
3. Shorting bar

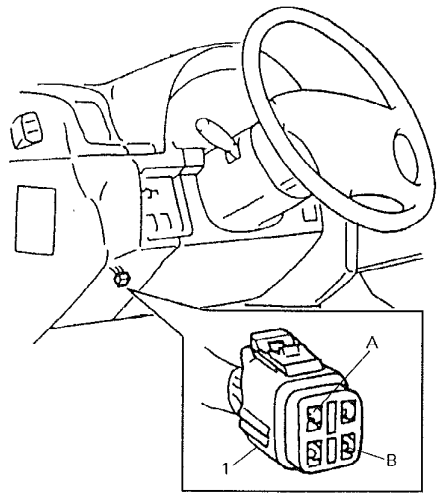
80E10S-9J-7-3

B. Passenger Air Bag (Inflator) Module Connector
C. Driver Air Bag (Inflator) Module Connector
D. Contact Coil Connector
E. Lamp, DLC Connector
H. Ignition Connector

Connector lock lever:
Functions of the connector lock lever are: to connect connectors securely, to cancel shorts and to lock connectors against disconnection.

Shorting bar:
Function of the shorting bar is to short circuit the "HI" and "LO" terminals of the initiator circuit on its module side when the connector is disconnected. This prevents potential difference from occurring between both terminals to avoid malfunction.

Terminal retainer (Terminal position assurance: TAP):
The function of the TPA is to keep the terminal securely seated in the connector body. The TPA is not to be removed from the connector body.



1. "AIR BAG" monitor coupler

A: Dig. switch terminal
B: Ground terminal

80E10S-9J-7-5

"AIR BAG" MONITOR COUPLER

"AIR BAG" monitor coupler has a diagnosis switch terminal and a ground terminal.
With these terminals being shorted, the "AIR BAG" warning lamp flashes to indicate the diagnostic trouble code.
(For details of diagnostic trouble code, refer to 9J-10.)

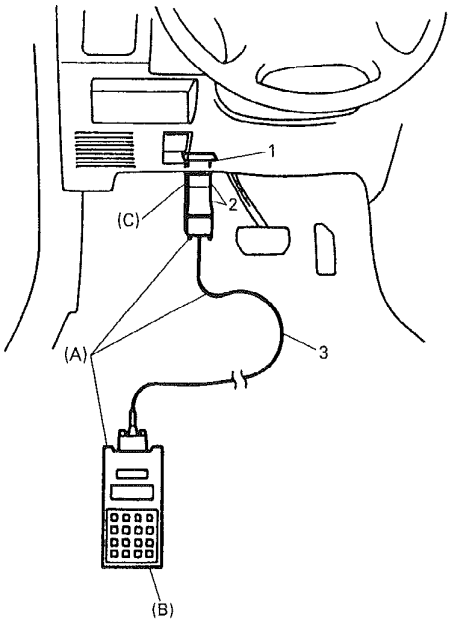
DIAGNOSIS

WARNING:
To avoid deployment when troubleshooting the air bag system, do not use electrical test equipment such as a battery powered or AC powered voltmeter, ohmmeter, etc., or any type of electrical equipment other than that specified in Section 9J.
Do not use a non-powered probe type tester. Instructions in Section 9J must be followed carefully, otherwise personal injury may result.

DIAGNOSTIC TROUBLE CODES (DTC)

The "Air Bag Diagnostic System Check" must always be the starting point of any air bag system diagnosis. The "Air Bag Diagnostic System Check" checks for proper "AIR BAG" warning lamp operation and checks for air bag diagnostic trouble codes using the Tech-1 (scan tool) or on-board diagnostic function.

- Current diagnostic trouble codes – Malfunctions that are presently being detected
- History diagnostic trouble codes – All malfunctions detected since the last time the history memory was cleared



1. Data link connector
2. DLC cable adapter
3. DLC cable

80E10S-9J-8-5

TECH-1 (SCAN TOOL) DIAGNOSTICS

The Tech-1 (scan tool) is used for following purposes.

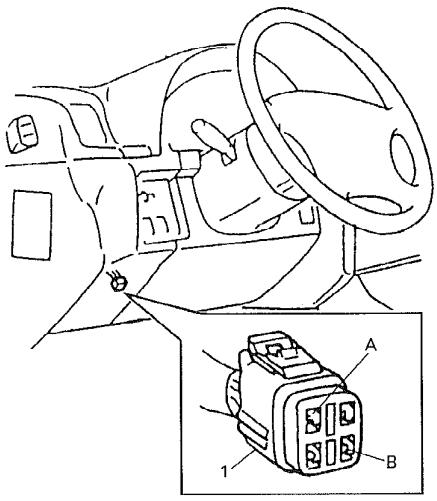
- To read current and history diagnostic trouble codes.
- To clear all diagnostic trouble codes after a repair is completed.
- To read "voltage of ignition power" and "driver and passenger side resistance" recognized by SDM when the output command by using Tech-1 was inputted.

NOTE:

- **The Tech-1 must be updated to communicate with the air bag system through a replaceable cartridge before it can be used for air bag system diagnostics.**
- **To use the Tech-1, change cartridge first, then connect it to the data link connector and turn the ignition switch "ON".**

Refer to the Tech-1 Operator's Manual for specific information on how to use the Tech-1.

Special Tool
(A): 09931-76011 (Tech-1, scan tool)
(B): Tech-1 cartridge for air bag
(C): 09931-96020 16/12 pin DLC adapter



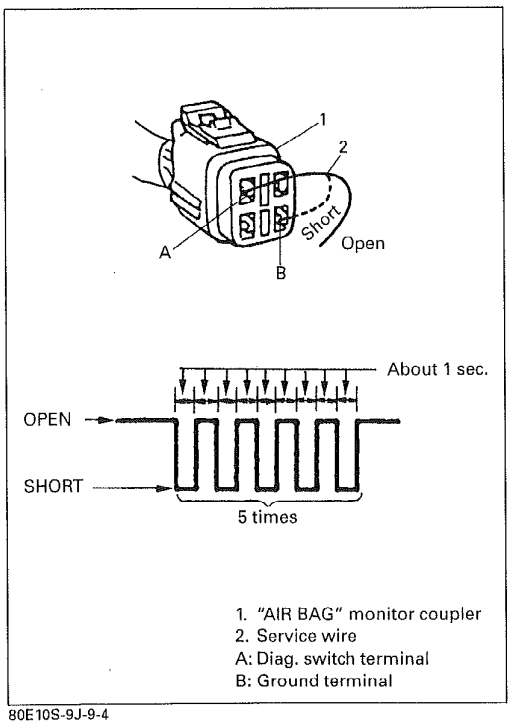
1. "AIR BAG" monitor coupler
A: Dig. switch terminal
B: Ground terminal

80E10S-9J-9-2

DTC CHECK USING "AIR BAG" WARNING LAMP

1) Turn "ON" ignition switch and wait about 20 seconds.
2) By using service wire, connect diag. switch and ground terminals on "AIR BAG" monitor coupler.
3) To read diagnostic trouble code, watch "AIR BAG" warning lamp. (For frequency of code signal, refer to page 9J-10.)
   If diagnostic trouble code is not indicated, check diagnosis switch circuit according to "Chart F" in p. 9J-23.

NOTE:
When there are 2 or more diagnostic trouble codes, all applicable code will be indicated from smaller number to large number in order.



1. "AIR BAG" monitor coupler
2. Service wire
A: Diag. switch terminal
B: Ground terminal

80E10S-9J-9-4

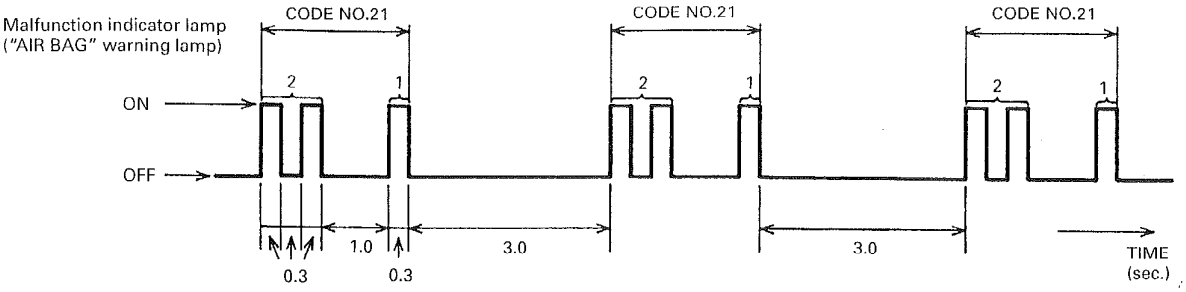
DTC CLEARANCE USING "AIR BAG" MONITOR COUPLER

1) Turn "ON" ignition switch and wait about 20 seconds.
2) Using a service wire, repeat shorting and opening between diag. switch terminal and ground terminal on "AIR BAG" monitor coupler 5 at about 1 second intervals.
3) Perform "DTC check" and confirm that normal DTC (DTC 12) is displayed and not malfunction DTC.

NOTE:
If DTC51 or DTC71 is stored in SDM, it is not possible to clear DTC.

DIAGNOSTIC TROUBLE CODE TABLE

EXAMPLE: DRIVER INITIATOR CIRCUIT RESISTANCE HIGH (CODE NO.21)



DIAGNOSTIC TROUBLE CODE NO.	DIAGNOSTIC TROUBLE CODE MODE	DIAGNOSTIC AREA	DIAGNOSIS
12	1 2	Normal	This code appears when none of the other codes (below codes) are identified. **NOTE: "NO CODES" message appears on Tech-1 and not DTC 12.**
15	1 5	Passenger initiator circuit	Diagnose trouble according to "DIAGNOSTIC FLOW CHART" corresponding to each code No.
16	1 6		
21	2 1	Driver initiator circuit	
22	2 2		
24	2 4		
25	2 5		
31	3 1	Ignition circuit	
32	3 2		
51	5 1	Frontal crash detected	
61	6 1	"AIR BAG" warning lamp circuit	
71	7 1	SDM	SDM failure

AIR BAG DIAGNOSTIC SYSTEM CHECK

WARNING:
To avoid deployment when troubleshooting the air bag system, do not use electrical test equipment such as a battery powered or AC powered voltmeter, ohmmeter, etc., or any type of electrical equipment other than that specified in Section 9J. Do not use a non-powered probe type tester. Instructions in Section 9J must be followed carefully, otherwise personal injury may result.

CAUTION:
The order in which diagnostic trouble codes are diagnosed is very important. Failure to diagnose the diagnostic trouble codes in the order specified may result in extended diagnostic time, incorrect diagnosis and incorrect parts replacement.

The diagnostic procedures used in this section are designed to find and repair air bag system malfunctions. To get the best results, it is important to use the diagnostic charts and follow the sequence listed below.

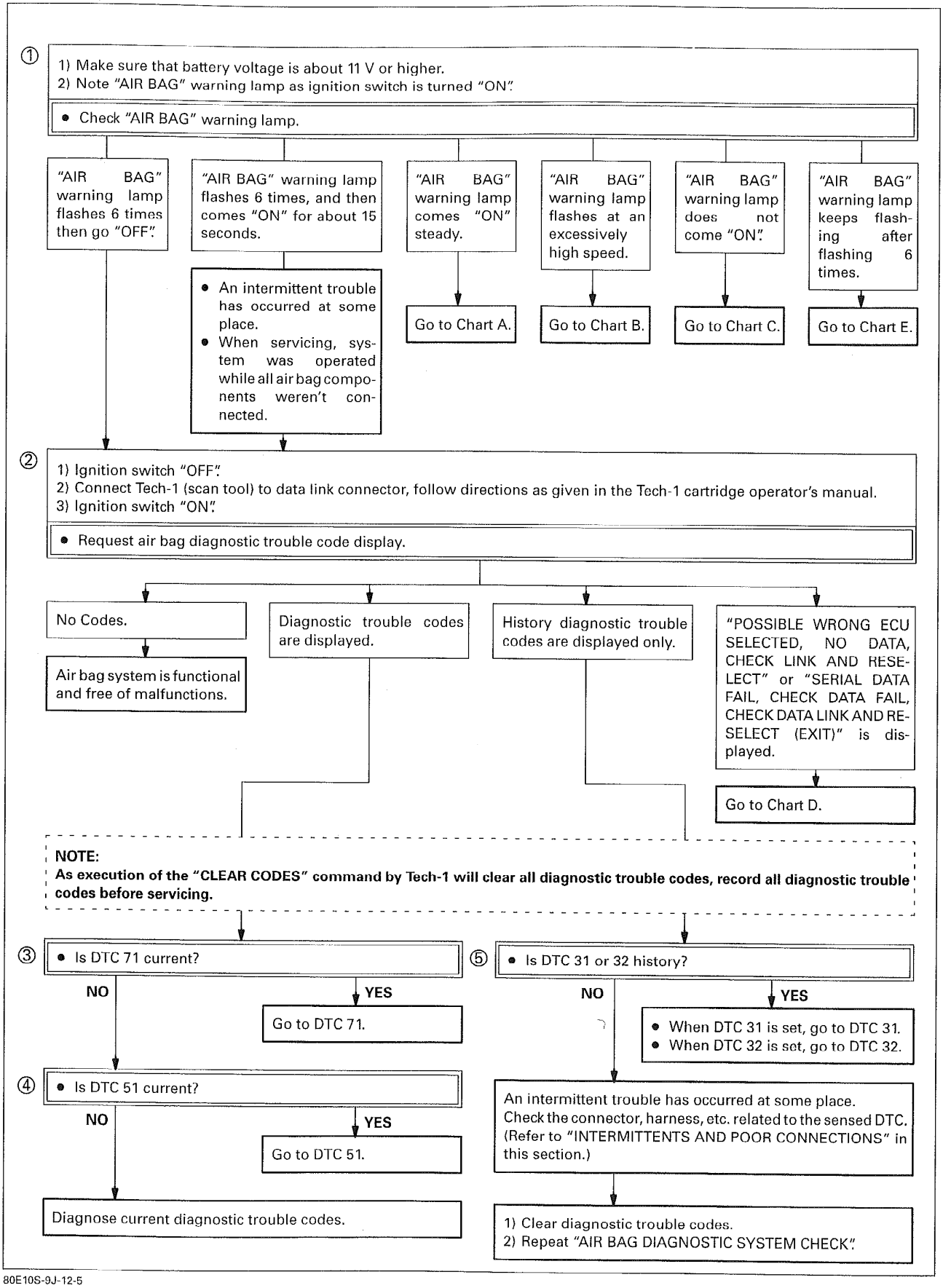
A. PERFORM THE "AIR BAG DIAGNOSTIC SYSTEM CHECK".
The "Air Bag Diagnostic System Check" must be the starting point of any air bag system diagnostics. The "Air Bag Diagnostic System Check" checks for proper "AIR BAG" warning lamp operation, the ability of the SDM to communicate through the "Serial Data" line and whether air bag diagnostic trouble codes exist.

B. REFER TO THE PROPER DIAGNOSTIC CHART AS DIRECTED BY THE "AIR BAG DIAGNOSTIC SYSTEM CHECK".
The "Air Bag Diagnostic System Check" will lead you to the correct chart to diagnose any air bag system malfunctions. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis and incorrect parts replacement.

C. REPEAT THE "AIR BAG DIAGNOSTIC SYSTEM CHECK" AFTER ANY REPAIR OR DIAGNOSTIC PROCEDURES HAVE BEEN PERFORMED.
Performing the "Air Bag Diagnostic System Check" after all repair or diagnostic procedures will ensure that the repair has been made correctly and that no other malfunctions exist.

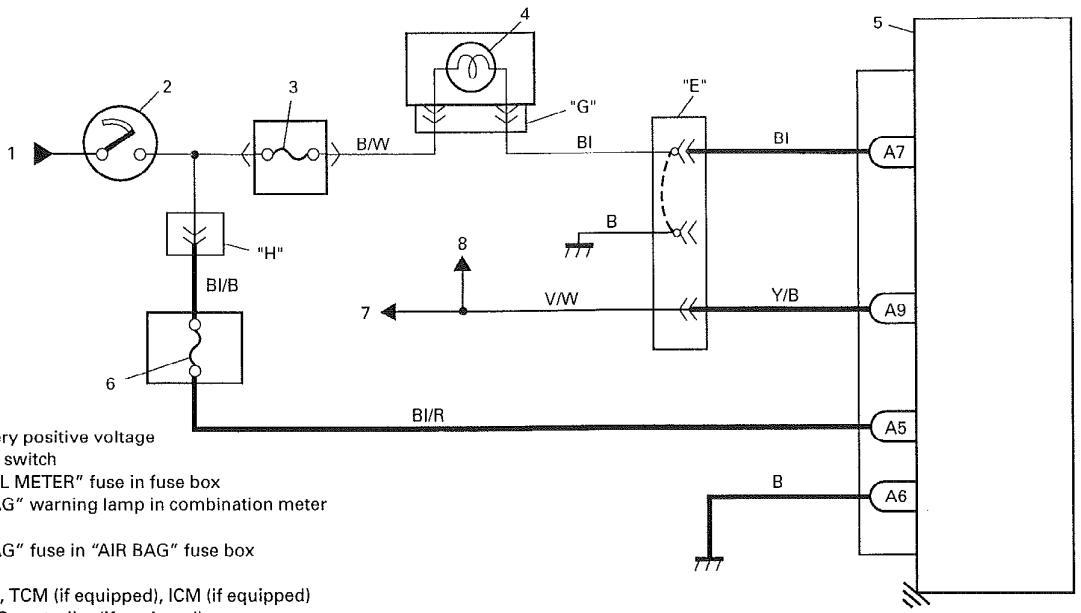
NOTES ON SYSTEM CHECK CHART:
Number(s) below refer to circled number(s) on the Air Bag Diagnostic System Check Chart.
1) This test checks whether the "AIR BAG" warning lamp should flash six times after ignition is first turned "ON".
2) This test checks for the content of the Tech-1 display.
3) This test checks whether DTC 71 is current.
4) This test checks whether DTC 51 is current.
5) This test checks whether DTC 31 or 32 is history.

AIR BAG DIAGNOSTIC SYSTEM CHECK



80E10S-9J-12-5

CHART A – "AIR BAG" WARNING LAMP COMES "ON" STEADY



1. To battery positive voltage
2. Ignition switch
3. "IG COIL METER" fuse in fuse box
4. "AIR BAG" warning lamp in combination meter
5. SDM
6. "AIR BAG" fuse in "AIR BAG" fuse box
7. To DLC
8. To ECM, TCM (if equipped), ICM (if equipped) and ABS controller (if equipped)

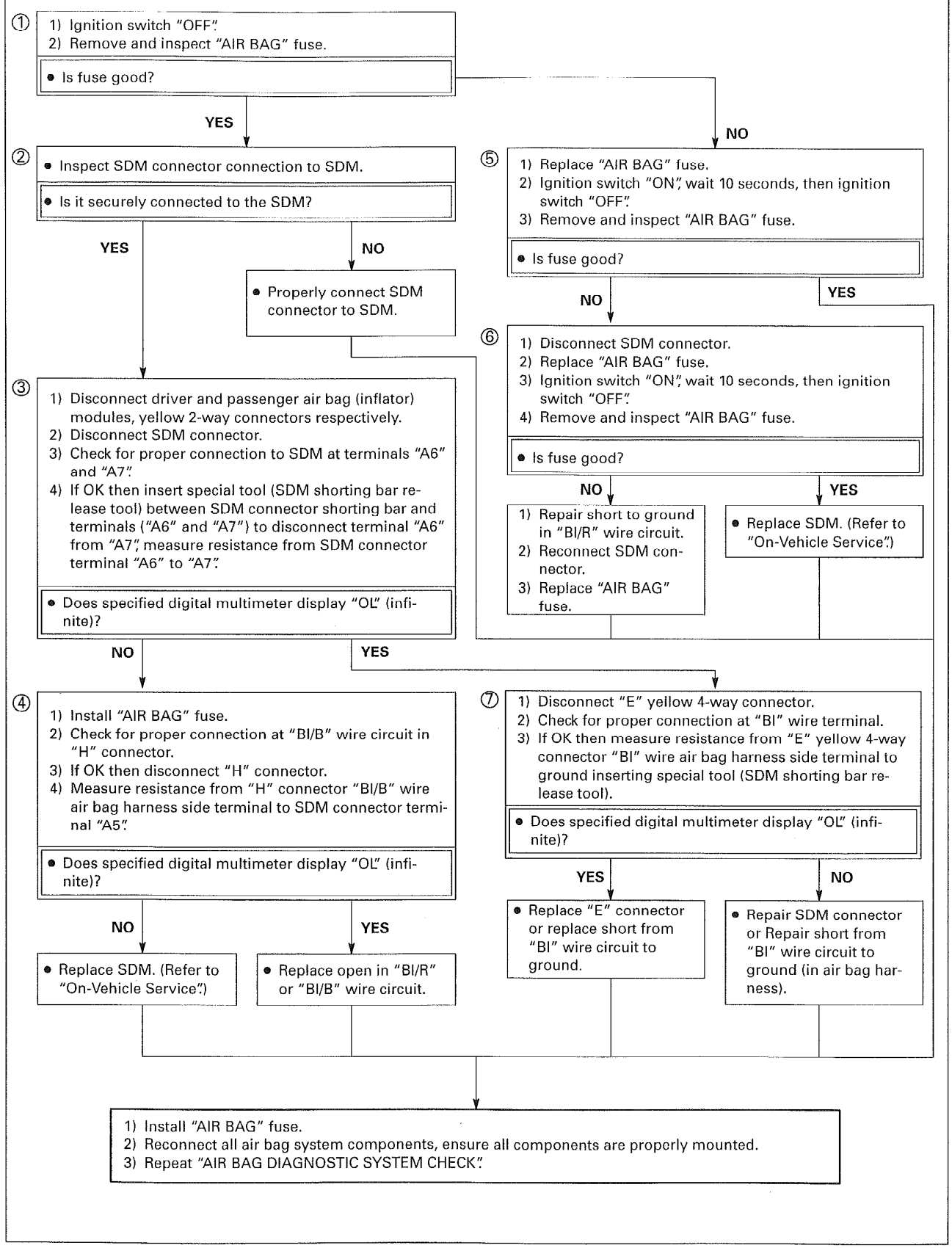
CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

1) An open "AIR BAG" fuse would cause the "AIR BAG" warning lamp to come "ON" steady.
2) A disconnected SDM harness connector will cause the "AIR BAG" warning lamp to come "ON" steady via the shorting bar from terminal "A7" to terminal "A6" (ground).
3) This test checks for a short from the "AIR BAG" warning lamp circuit to ground.
4) This test checks for an open in the ignition circuit to the SDM.
5) This test checks whether an open caused the "AIR BAG" fuse to open.
6) This test determines whether the short to ground is due to a short in the air bag harness.
7) This test checks for a short from the "AIR BAG" warning lamp circuit in air bag harness to ground.

CHART A – "AIR BAG" WARNING LAMP COMES "ON" STEADY



80E10S-9J-14-5

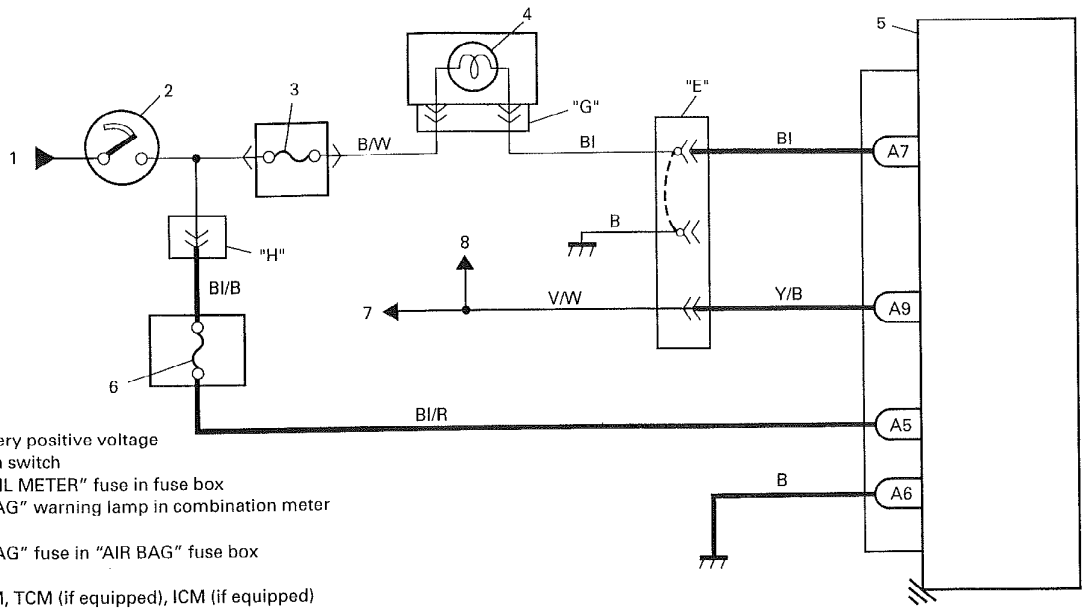
CHART B – "AIR BAG" WARNING LAMP FLASHES AT AN EXCESSIVELY HIGH SPEED

CHART B – "AIR BAG" WARNING LAMP FLASHES AT AN EXCESSIVELY HIGH SPEED

If the "AIR BAG" warning lamp fails to work properly (Normal operation: flashing once per second and 6 times after the ignition switch was turned ON) and keeps flashing at a nearly abnormal (3 to 4 times per second) speed, DTC will not be displayed because the circuit diagnosing a trouble inside of SDM has failed but SDM must be replaced.

- Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".

CHART C – "AIR BAG" WARNING LAMP DOES NOT COME "ON"



1. To battery positive voltage
2. Ignition switch
3. "IG COIL METER" fuse in fuse box
4. "AIR BAG" warning lamp in combination meter
5. SDM
6. "AIR BAG" fuse in "AIR BAG" fuse box
7. To DLC
8. To ECM, TCM (if equipped), ICM (if equipped) and ABS controller (if equipped)

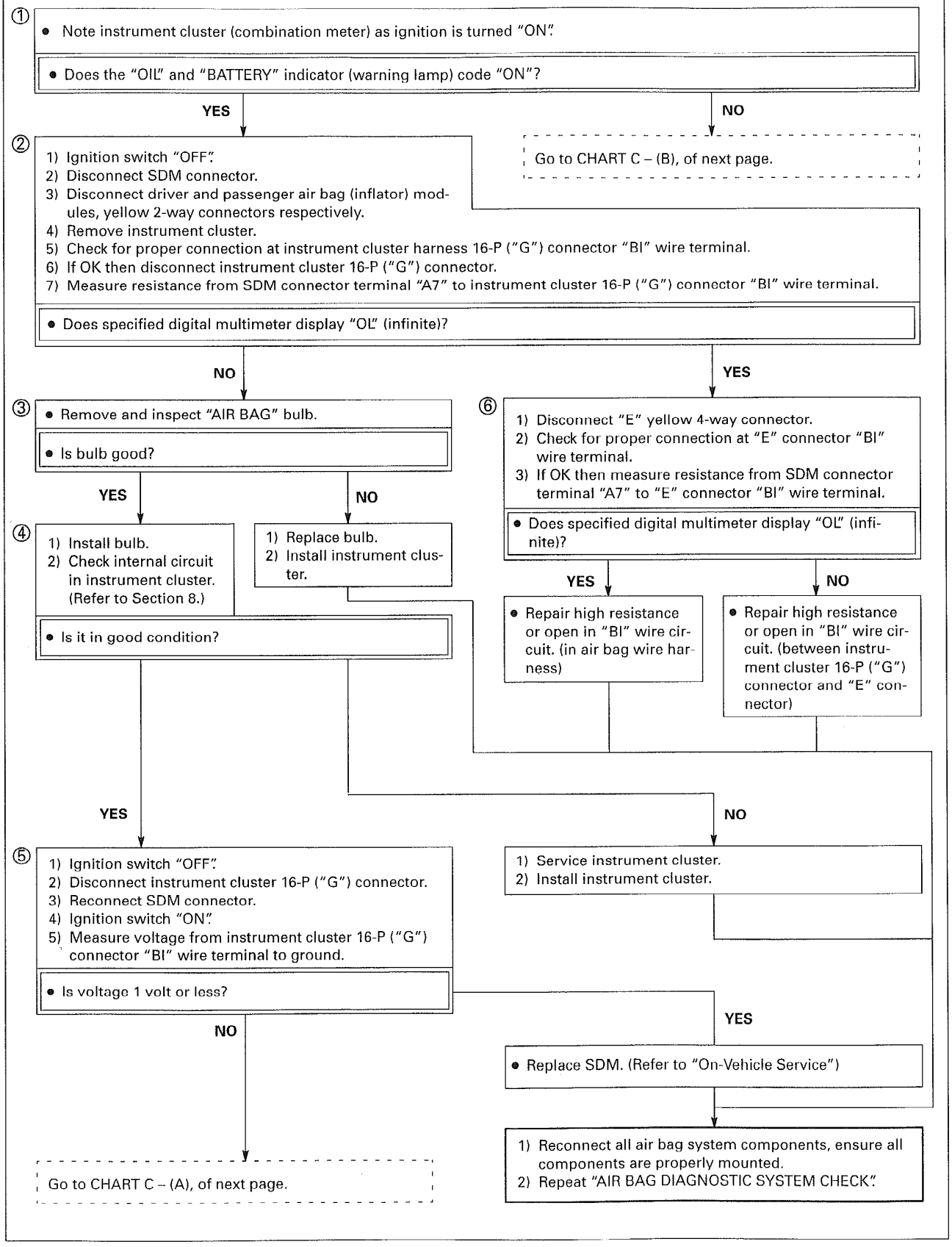
CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

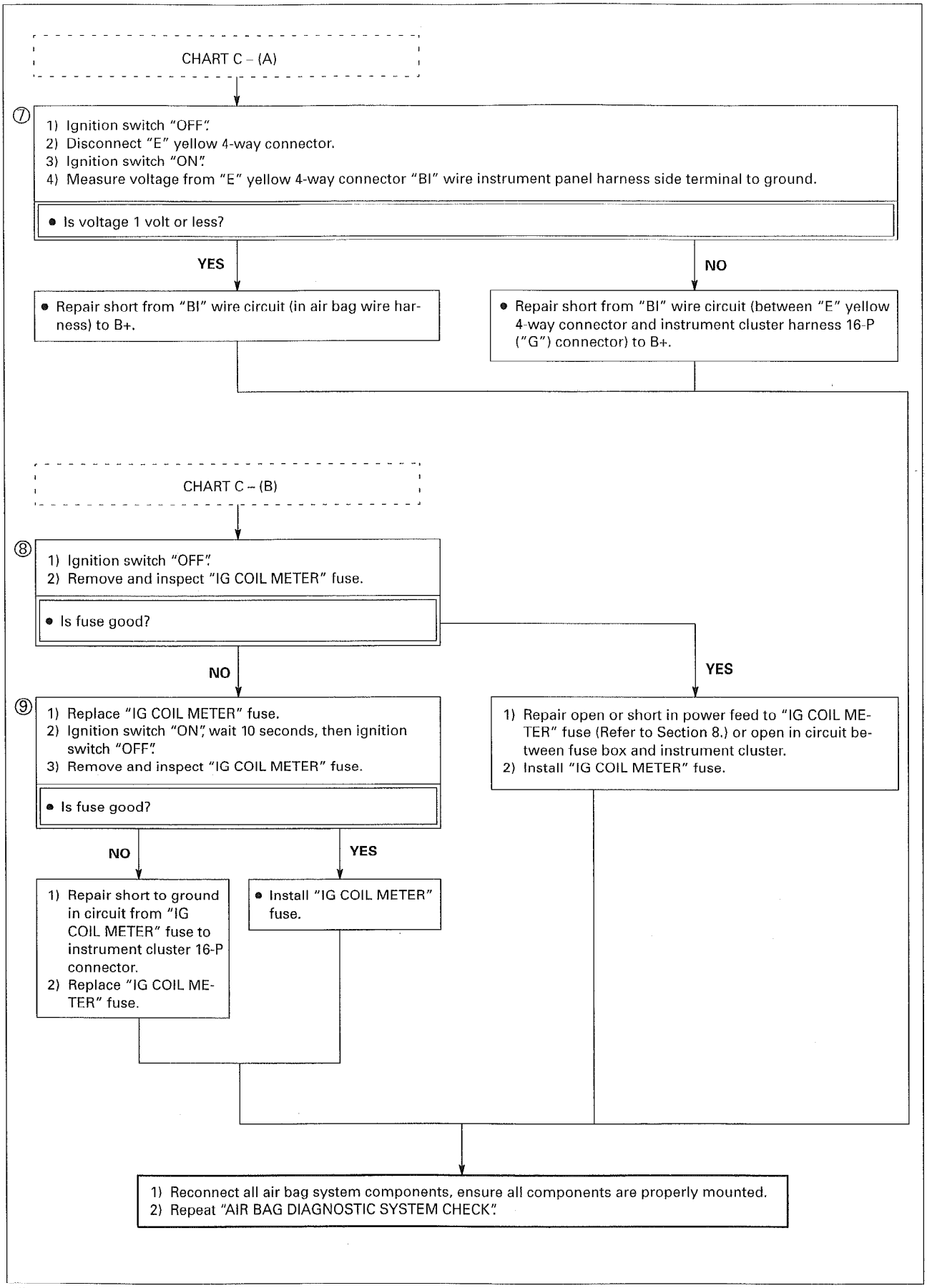
CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

1) This test determines whether the malfunction is in the"AIR BAG" warning lamp circuitry or in the instrument cluster power feed circuitry.
2) This test checks for an open between instrument cluster and SDM in the "AIR BAG" warning lamp circuitry.
3) This test checks whether the open is due to a bad bulb.
4) This test checks an open in the instrument cluster.
5) This test determines whether the malfunction is due to a short from the "AIR BAG" warning lamp circuit to B+.
6) This test checks for an open in the air bag harness.
7) This test checks for a short to B+ in air bag harness.
8) This test checks whether "IG" fuse is an open.
9) An open "IG" fuse would cause the lamps of instrument cluster to come "OFF".

CHART C – "AIR BAG" WARNING LAMP DOSE NOT COME "ON"

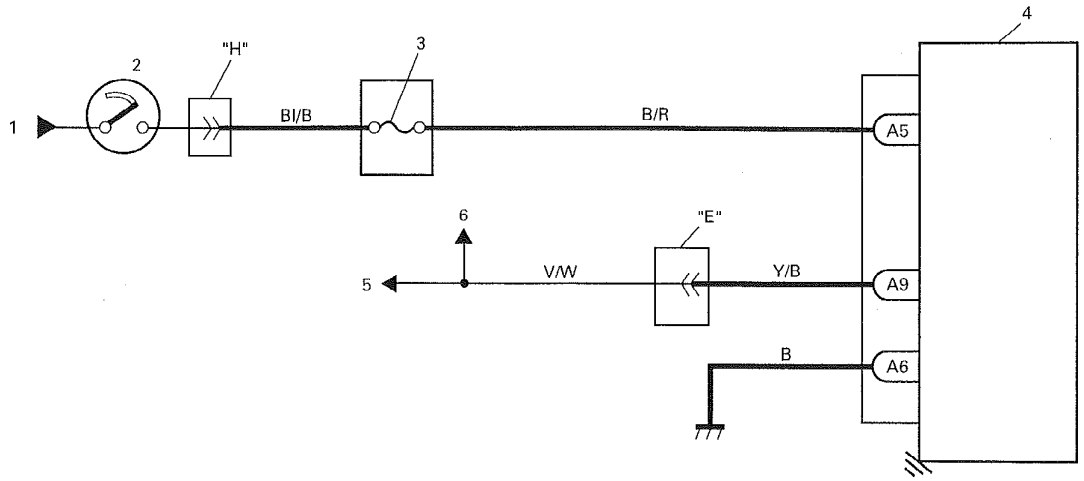


80E10S-9J-17-5



80E10S-9J-18-5

CHART D – SDM CANNOT COMMUNICATE THROUGH THE SERIAL DATA CIRCUIT



1. To battery positive voltage
2. Ignition switch
3. "AIR BAG" fuse in "AIR BAG" fuse box
4. SDM
5. To DLC
6. To ECM, TCM (if equipped), ICM (if equipped) and ABS controller (if equipped)

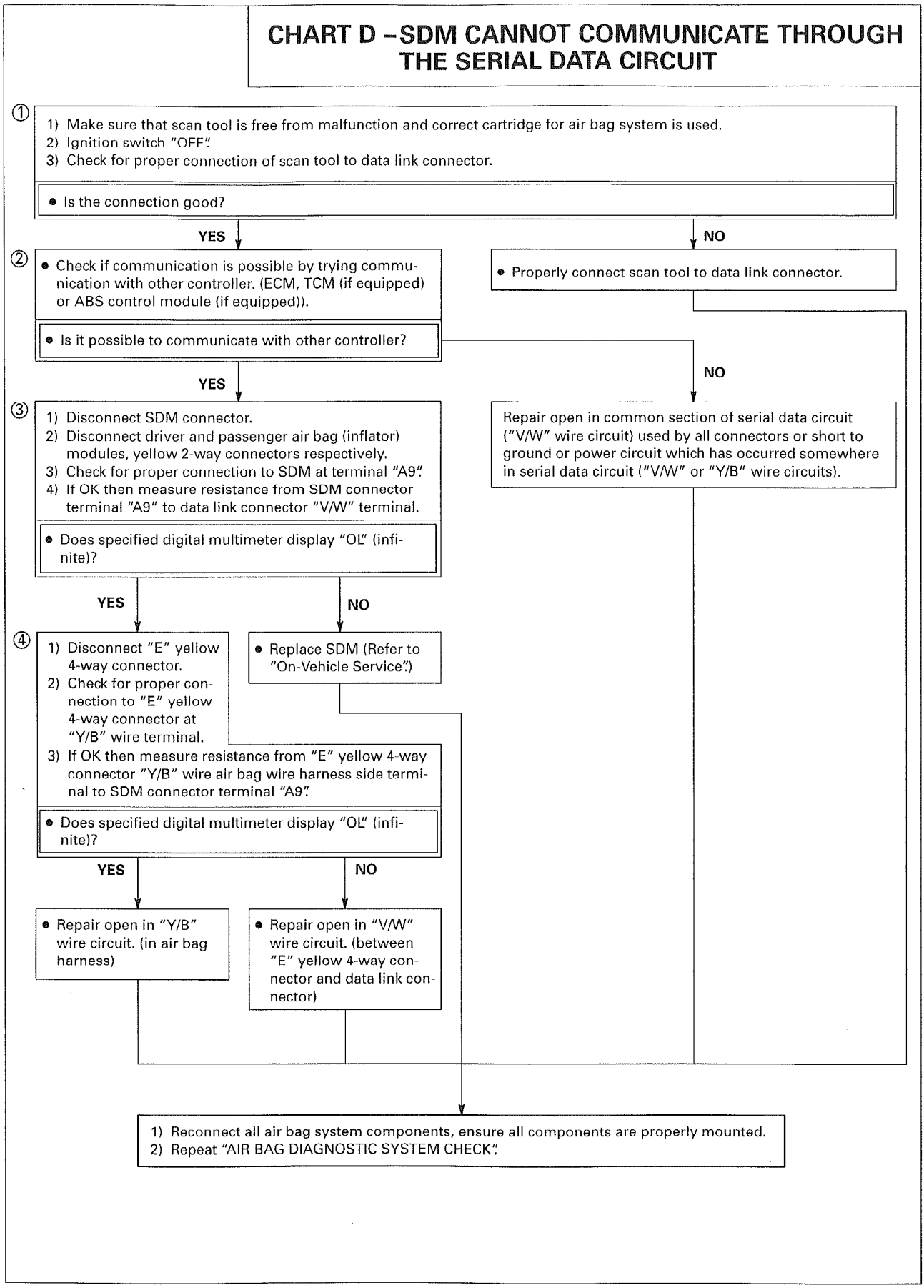
CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

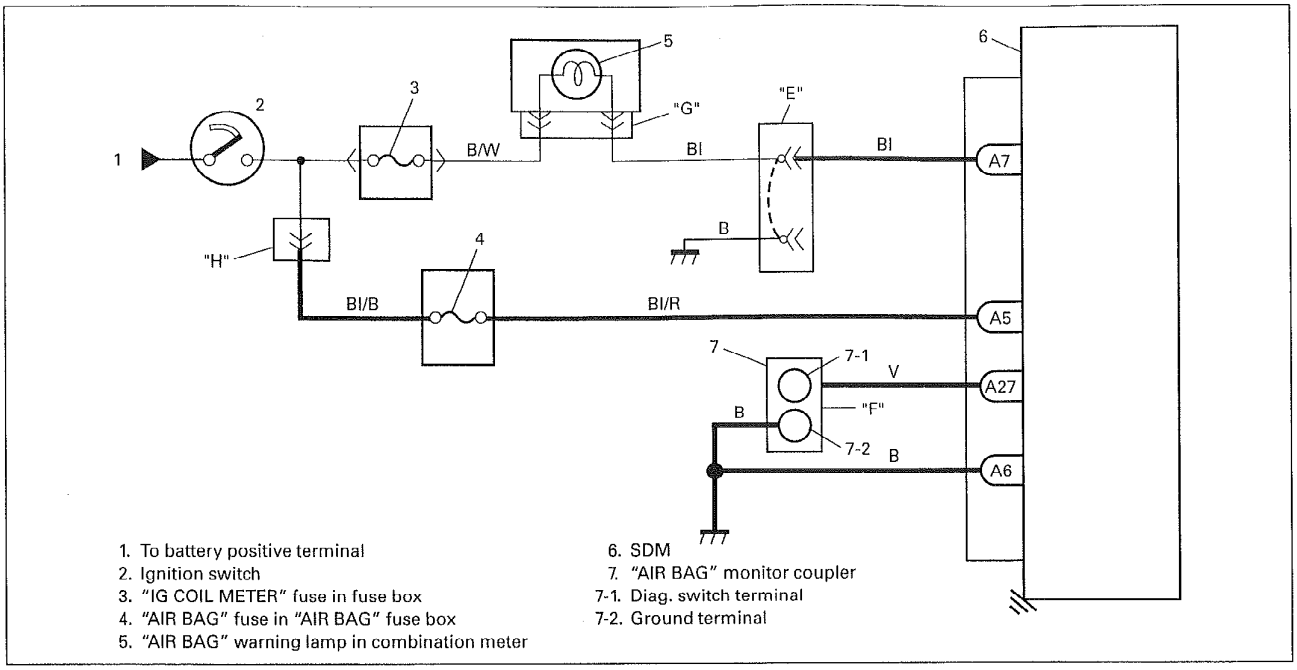
1) An improper connection to the data link connector will prevent communications from being established.
2) This test checks whether it is possible to communicate with other controller.
3) This test checks for an open in serial data circuit used by SDM.
4) This test checks for an open in "Y/B" wire circuit (in air bag harness).

CHART D – SDM CANNOT COMMUNICATE THROUGH THE SERIAL DATA CIRCUIT



80E10S-9J-20-5

CHART E – "AIR BAG" WARNING LAMP KEEPS FLASHING (INDICATING DTC)



1. To battery positive terminal
2. Ignition switch
3. "IG COIL METER" fuse in fuse box
4. "AIR BAG" fuse in "AIR BAG" fuse box
5. "AIR BAG" warning lamp in combination meter
6. SDM
7. "AIR BAG" monitor coupler
7-1. Diag. switch terminal
7-2. Ground terminal

80E10S-9J-21-2

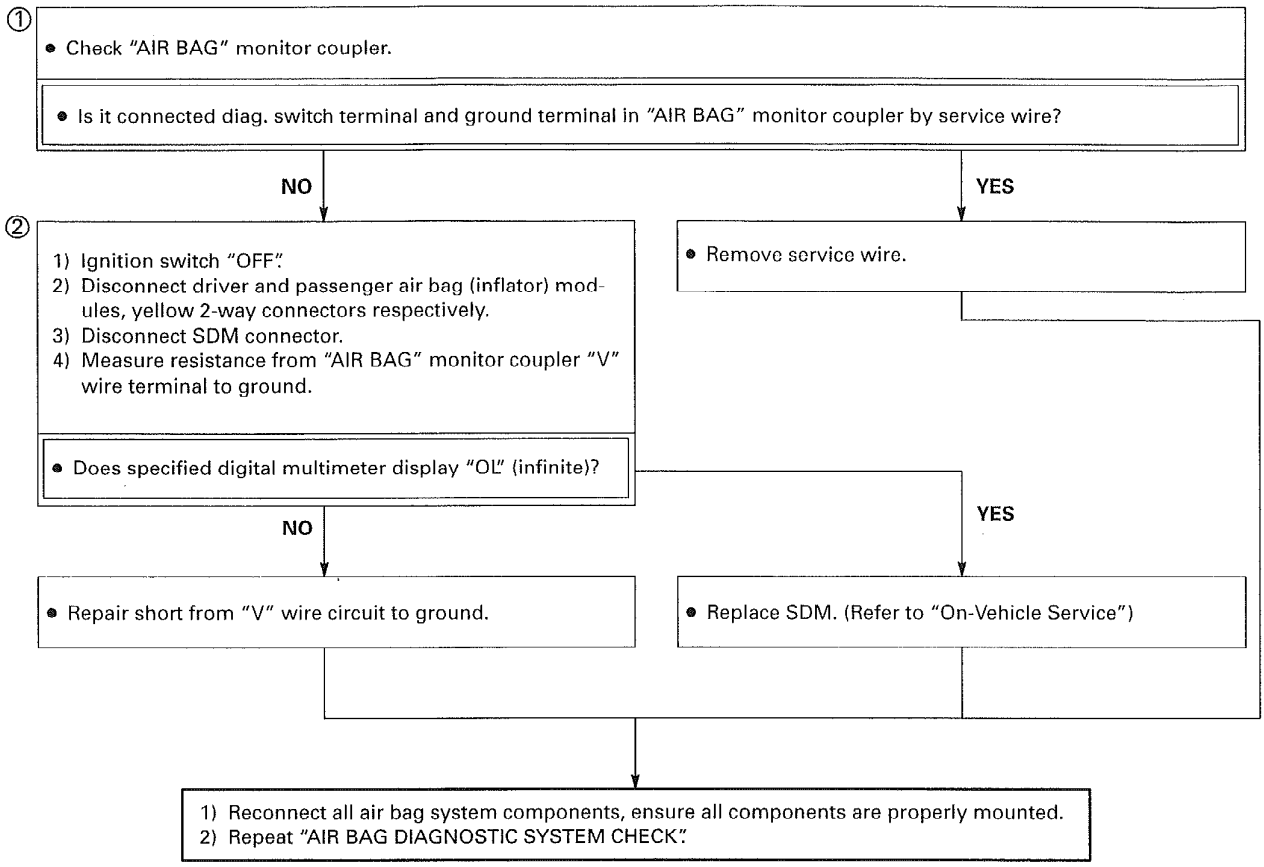
CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

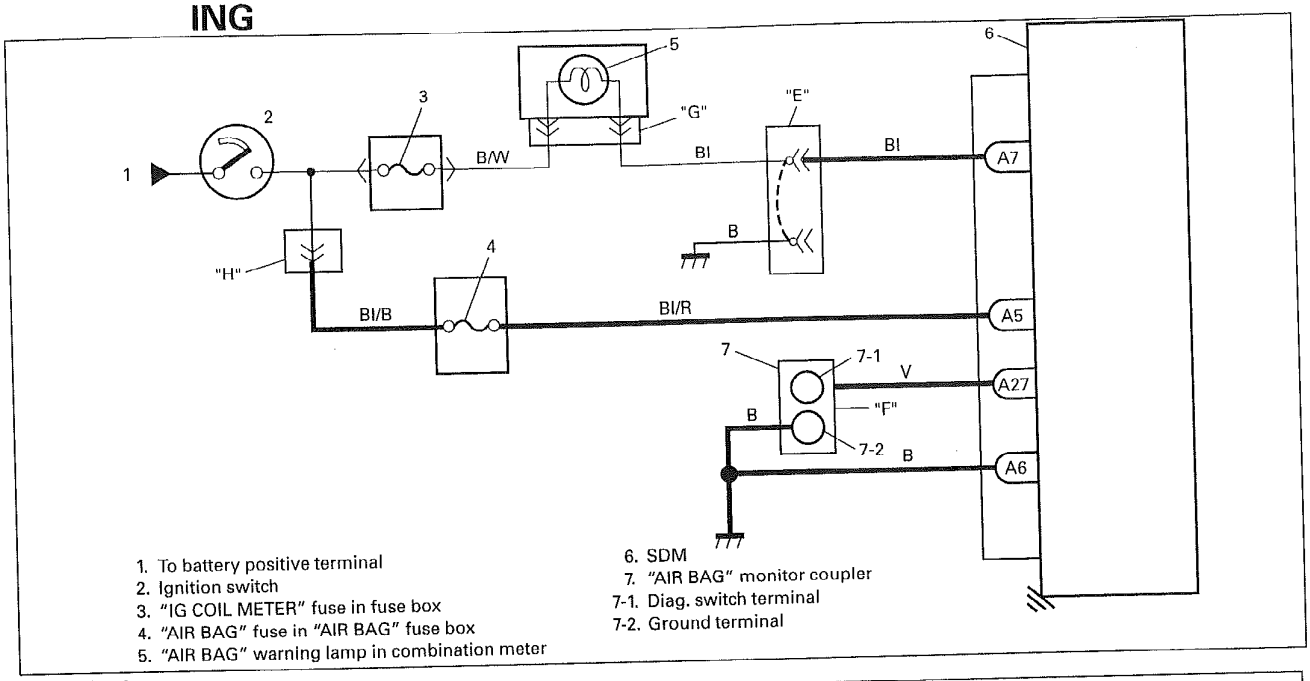
1) This test checks for a short between Diag. switch and ground terminals in "AIR BAG" monitor coupler by service wire.
2) This test checks for a short from the Diag. switch circuit to ground.

CHART E – "AIR BAG" WARNING LAMP KEEPS FLASHES (INDICATING DTC)



80E10S-9J-22-5

CHART F – "AIR BAG" WARNING LAMP CANNOT INDICATE DTC BY FLASHING



1. To battery positive terminal
2. Ignition switch
3. "IG COIL METER" fuse in fuse box
4. "AIR BAG" fuse in "AIR BAG" fuse box
5. "AIR BAG" warning lamp in combination meter
6. SDM
7. "AIR BAG" monitor coupler
7-1. Diag. switch terminal
7-2. Ground terminal

80E10S-9J-23-2

CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

1) The "AIR BAG" warning lamp should flash 6 times after ignition is first turned "ON".

1) This test checks for an open in "V" wire circuit.

2) This test checks for an open in "B" wire circuit.

CHART F – "AIR BAG" WARNING LAMP CANNOT INDICATE DTC BY FLASHING

①
1) Disconnect SDM connector.
2) Check for proper connection at "V" wire terminal in "AIR BAG" monitor coupler and SDM connector terminal "A27".
3) If OK then measure resistance from "V" wire terminal in "AIR BAG" monitor coupler to SDM connector terminal "A27".

- Does specified digital multimeter display "OL" (infinite)?

NO ↓

②
1) Check for proper connection at "B" wire terminal in "AIR BAG" monitor coupler.
2) If OK then measure resistance from "B" wire terminal in "AIR BAG" monitor coupler to ground.

- Does specified digital multimeter display "OL" (infinite)?

NO ↓

- Replace SDM. (Refer to "On-Vehicle Service")

YES ↓

- Repair open in "B" wire circuit.

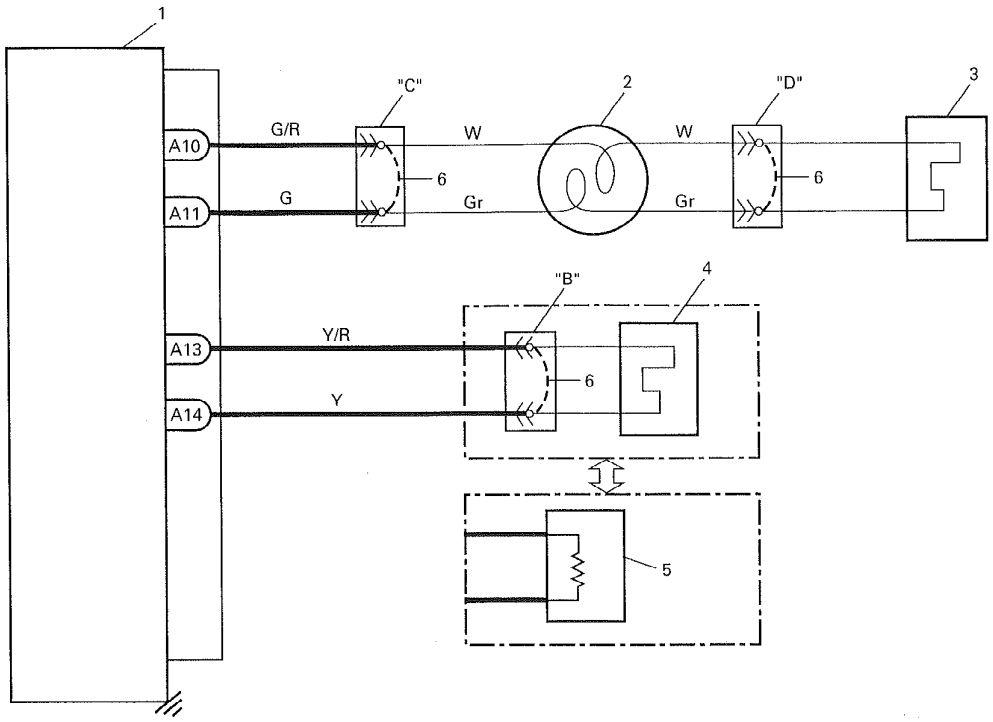
YES ↓

- Replace open in "V" wire circuit.

1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

80E10S-9J-23-5

DTC 15 – PASSENGER INITIATOR CIRCUIT RESISTANCE HIGH



1. SDM
2. Contact coil
3. Driver air bag (inflator) module
4. Passenger air bag (inflator) module
5. Resistor (without passenger air bag)
6. Shorting bar

CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The combined resistance of the passenger air bag (inflator) module, harness wiring and connector terminal contact is above a specified value for specified time.

DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

1) This test determines whether the malfunction is in the passenger air bag (inflator) module circuitry or in the SDM wiring harness circuitry.
2) This test checks whether the malfunction is due to high resistance in "Y/R" wire circuit.
3) This test checks whether the malfunction is due to high resistance in "Y" wire circuit.

DTC 15 – PASSENGER INITIATOR CIRCUIT RESISTANCE HIGH

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

①
1) Ignition switch "OFF".
2) Disconnect driver air bag (inflator) module, yellow 2-way ("C") connector located near the base of the steering column, and passenger air bag (inflator) module, yellow 2-way ("B") connector behind the glove box.
3) Check for proper connection at passenger air bag (inflator) module ("B") connector.
4) If OK then connect special tool (driver/passenger load tool) to driver and passenger air bag (inflator) module ("B" and "C") connectors disconnected at the above step respectively.
5) Ignition switch "ON".

- Is DTC 15 current?

YES

②
1) Ignition switch "OFF".
2) Disconnect driver/passenger load tool.
3) Disconnect SDM connector.
4) Check for proper connection to SDM at terminals "A13" and "A14".
5) If OK then measure resistance from SDM connector terminal "A13" to "Y/R" wire terminal in passenger air bag (inflator) module ("B") connector.

- Is resistance 2.0 Ω or less?

YES

③
- Measure resistance from SDM connector terminal "A14" to "Y" wire terminal in passenger air bag (inflator) module ("B") connector.

- Is resistance 2.0 Ω or less?

YES

- Replace SDM. (Refer to "On-Vehicle Service")

NO

- Repair high resistance or open in "Y" wire circuit.

NO

- Repair high resistance or open in "Y/R" wire circuit.

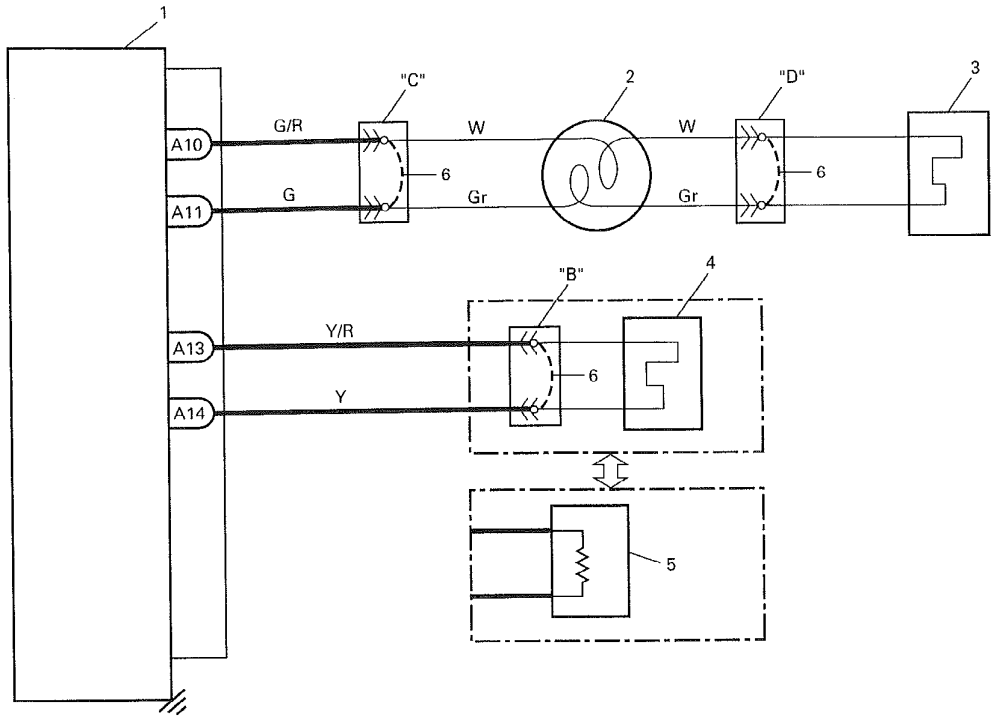
NO

1) Ignition switch "OFF".
2) Replace passenger air bag (inflator) module. (Refer to "On-Vehicle Service")

1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes, if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".

80E10S-9J-25-5

DTC 16 – PASSENGER INITIATOR CIRCUIT RESISTANCE LOW



1. SDM
2. Contact coil
3. Driver air bag (inflator) module
4. Passenger air bag (inflator) module
5. Resistor (without passenger air bag)
6. Shorting bar

CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The combined resistance of the passenger air bag (inflator) module, harness wiring and connector terminal contact is below a specified value for specified time.

DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

1) DTC 16 and 22 will set simultaneously when the "G/R" wire circuit is shorted to the "Y/R" wire circuit due to parallel current paths.
2) This test determines whether the malfunction is in the passenger air bag (inflator) module circuitry or in the SDM wiring harness circuitry.
3) This test checks for a short from the "Y/R" wire circuit to the "Y" wire circuit.
4) This test checks for a short from the "Y/R" wire circuit to the "G" wire circuit.

DTC 16 – PASSENGER INITIATOR CIRCUIT RESISTANCE LOW

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

① • Is DTC 22 also current?

YES

1) Ignition switch "OFF".
2) Disconnect driver air bag (inflator) module, yellow 2-way ("C") connector located near the base of the steering column, and passenger air bag (inflator) module, yellow 2-way ("B") connector behind the glove box.
3) Repair short from "G/R" wire circuit to "Y/R" wire circuit.

NO

② 1) Ignition switch "OFF".
2) Disconnect driver air bag (inflator) module, yellow 2-way ("C") connector located near the base of the steering column and passenger air bag (inflator) module, yellow 2-way ("B") connector behind the glove box.
3) Check the passenger air bag (inflator) module ("B") connector lock lever and shorting bar for short cancelling function.
4) If OK then connect special tool (driver/passenger load tool) to driver and passenger air bag (inflator) module ("B" and "C") connectors disconnected at the above step respectively.
5) Ignition switch "ON".

• Is DTC 16 current?

YES

③ 1) Ignition switch "OFF".
2) Disconnect driver/passenger load tool.
3) Disconnect SDM connector.
4) Measure resistance on SDM connector from terminal "A13" to terminal "A14".

• Does specified digital multimeter display "OL" (Infinite)?

NO

1) Ignition switch "OFF".
2) Replace passenger air bag (inflator) module. (Refer to "On-Vehicle Service")

YES

④ • Measure resistance on SDM harness connector from terminal "A11" to terminal "A13".

• Does specified digital multimeter display "OL" (Infinite)?

NO

• Repair short from "Y/R" wire circuit to "Y" wire circuit.

YES

• Replace SDM. (Refer to "On-Vehicle Service")

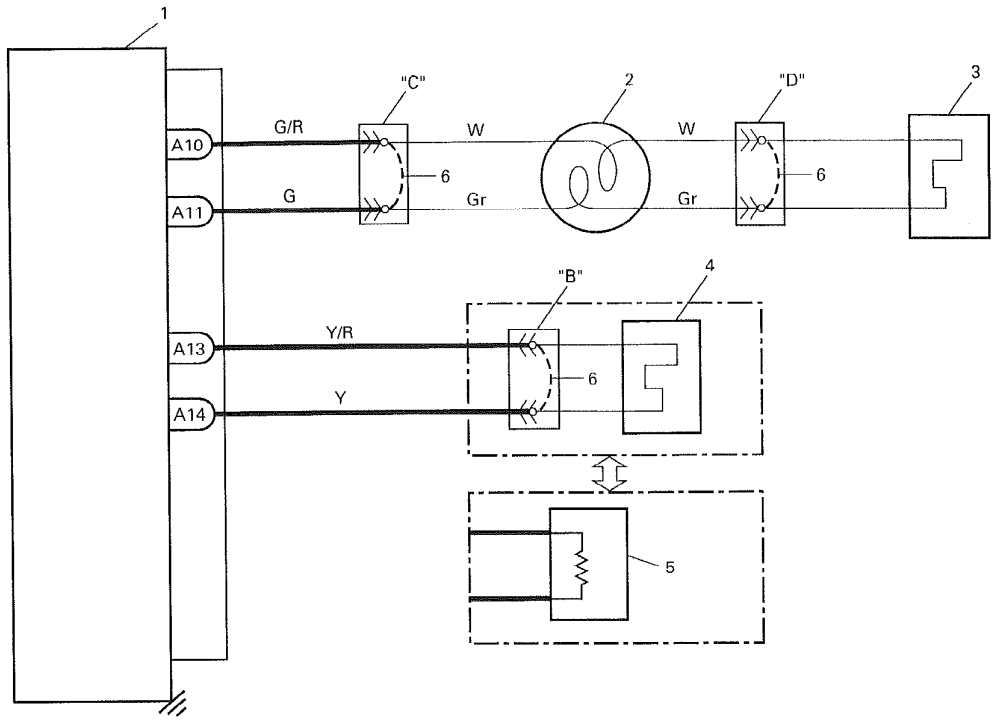
NO

• Repair short from "Y/R" wire circuit to "G" wire circuit.

1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes, if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".

80E10S-9J-27-5

DTC 21 – DRIVER INITIATOR CIRCUIT RESISTANCE HIGH



1. SDM
2. Contact coil
3. Driver air bag (inflator) module
4. Passenger air bag (inflator) module
5. Resistor (without passenger air bag)
6. Shorting bar

CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The combined resistance of the driver air bag (inflator) module, contact coil assembly, harness wiring and connector terminal contact is above a specified value for specified time.

DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

1) This test determines whether the malfunction is in the driver air bag (inflator) module circuitry or in the SDM wiring harness circuitry.
2) This test checks whether the malfunction is due to high resistance in "G" wire circuit.
3) This test checks whether the malfunction is due to high resistance in "G/R" wire circuit.
4) This test determines whether the malfunction is in the driver air bag (inflator) module or the contact coil assembly.

DTC 21 – DRIVER INITIATOR CIRCUIT RESISTANCE HIGH

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

①
1) Ignition switch "OFF".
2) Disconnect driver air bag (inflator) module, yellow 2-way ("C") connector located near the base of the steering column, and passenger air bag (inflator) module, yellow 2-way ("B") connector behind the glove box.
3) Check for proper connection at contact coil assembly ("C") connector.
4) If OK then connect special tool (driver/passenger load tool) to driver and passenger air bag (inflator) module ("B" and "C") connectors disconnected at the above step respectively.
5) Ignition switch "ON".

- Is DTC 21 current?

YES

②
1) Ignition switch "OFF".
2) Disconnect driver/passenger load tool.
3) Disconnect SDM connector.
4) Check for proper connection to SDM at terminals "A10" and "A11".
5) If OK then measure resistance from SDM connector terminal "A11" to "G" wire terminal in contact coil assembly ("C") connector.

- Is resistance 2.0 Ω or less?

YES

③
- Measure resistance from SDM harness connector terminal "A10" to "G/R" wire terminal in contact coil assembly ("C") connector.

- Is resistance 2.0 Ω or less?

YES

- Replace SDM. (Refer to "On-Vehicle Service")

NO

- Repair high resistance or open in "G/R" wire circuit.

NO

- Repair high resistance or open in "G" wire circuit.

NO

④
1) Ignition switch "OFF".
2) Disconnect driver/passenger load tool from contact coil assembly ("C") connector.
3) Remove air bag (inflator) module from steering wheel. (Refer to Section 3C1)
4) Connect driver/passenger load tool to driver air bag (inflator) module ("D") connector on steering column.
5) Reconnect contact coil assembly ("C") connector at the base of the steering column.
6) Ignition switch "ON".

- Is DTC 21 current?

YES

1) Ignition switch "OFF".
2) Replace contact coil assembly. (Refer to Section 3C1)

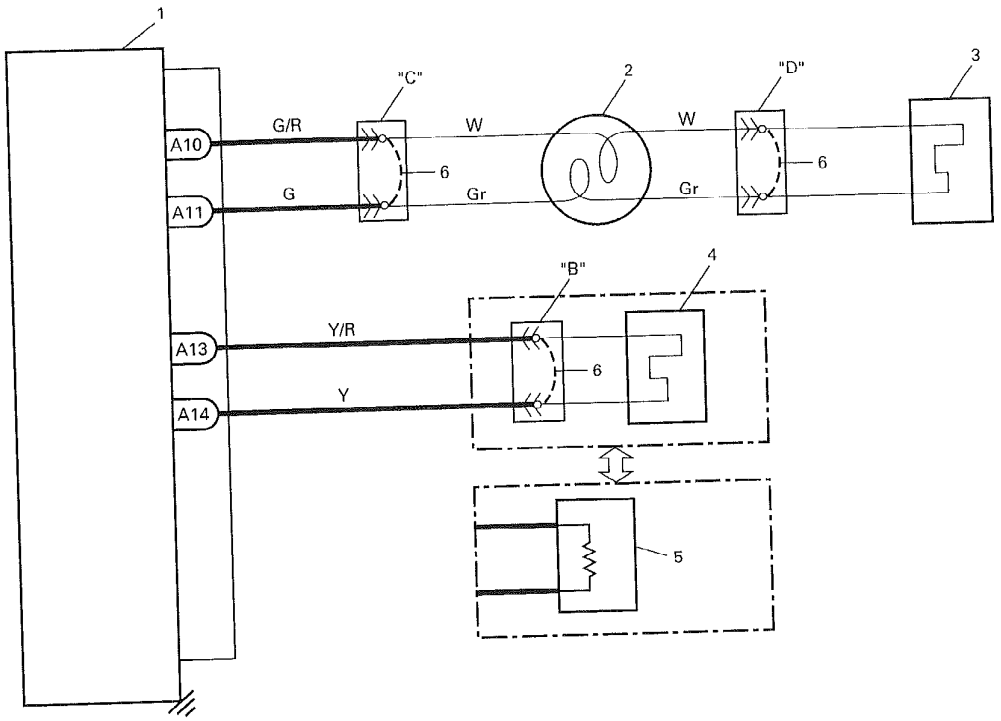
NO

1) Ignition switch "OFF".
2) Replace driver air bag (inflator) module. (Refer to Section 3C1)

1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes, if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".

80E10S-9J-29-5

DTC 22 – DRIVER INITIATOR CIRCUIT RESISTANCE LOW



1. SDM
2. Contact coil
3. Driver air bag (inflator) module
4. Passenger air bag (inflator) module
5. Resistor (without passenger air bag)
6. Shorting bar

CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The combined resistance of the driver air bag (inflator) module, contact coil assembly, harness wiring and connector terminal contact is below a specified value for specified time.

DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

1) DTC 16 and 22 will set simultaneously when the "G/R" wire circuit is shorted to the "Y/R" wire circuit due to parallel current paths.
2) This test determines whether the malfunction is in the driver air bag (inflator) module circuitry or in the SDM wiring harness circuitry.
3) This test checks for a short from the "G/R" wire circuit to the "G" wire circuit.
4) This test checks for a short from the "G/R" wire circuit to the "Y" wire circuit.
5) This test determines whether the malfunction is in the driver air bag (inflator) module or the contact coil assembly.

DTC 22 – DRIVER INITIATOR CIRCUIT RESISTANCE LOW

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

① • Is DTC 16 also current?

YES

1) Ignition switch "OFF".
2) Disconnect driver air bag (inflator) module, yellow 2-way ("C") connector located near the base of the steering column, and passenger air bag (inflator) module, yellow 2-way ("B") connector behind the glove box.
3) Repair short from "G/R" wire circuit to "Y/R" wire circuit.

NO

② 1) Ignition switch "OFF".
2) Disconnect driver air bag (inflator) module, yellow 2-way ("C") connector located near the base of the steering column, and passenger air bag (inflator) module, yellow 2-way ("B") connector behind the glove box.
3) Check the 2-way ("C") connector lock lever and shorting bar for short cancelling function.
4) If OK then connect special tool (driver/passenger load tool) to driver and passenger air bag (inflator) module ("B" and "C") connectors disconnected at the above step respectively.
5) Ignition switch "ON".

• Is DTC 22 current?

YES

③ 1) Ignition switch "OFF".
2) Disconnect driver/passenger load tool.
3) Disconnect SDM connector.
4) Measure resistance on SDM harness connector from terminal "A10" to terminal "A11".

• Does specified digital multimeter display "OL" (infinite)?

YES

④ • Measure resistance on SDM connector from terminal "A10" to terminal "A14".

• Does specified digital multimeter display "OL" (infinite)?

YES

• Replace SDM. (Refer to "On-Vehicle Service")

NO

• Repair short from "G/R" wire circuit to "Y" wire circuit.

NO

• Repair short form "G/R" wire circuit to "G" wire circuit.

NO

⑤ 1) Ignition switch "OFF".
2) Disconnect driver/passenger load tool from contact coil assembly ("C") connector.
3) Remove driver air bag (inflator) module from steering wheel. (Refer to Section 3C1)
4) Check the 2-way ("D") connector lock lever and shorting bar for short cancelling function.
5) If OK then connect driver/passenger load tool to driver air bag (inflator) module ("D") connector on the steering column.
6) Reconnect contact coil assembly ("C") connector at the base of the steering column.
7) Ignition switch "ON".

• Is DTC 22 current?

YES

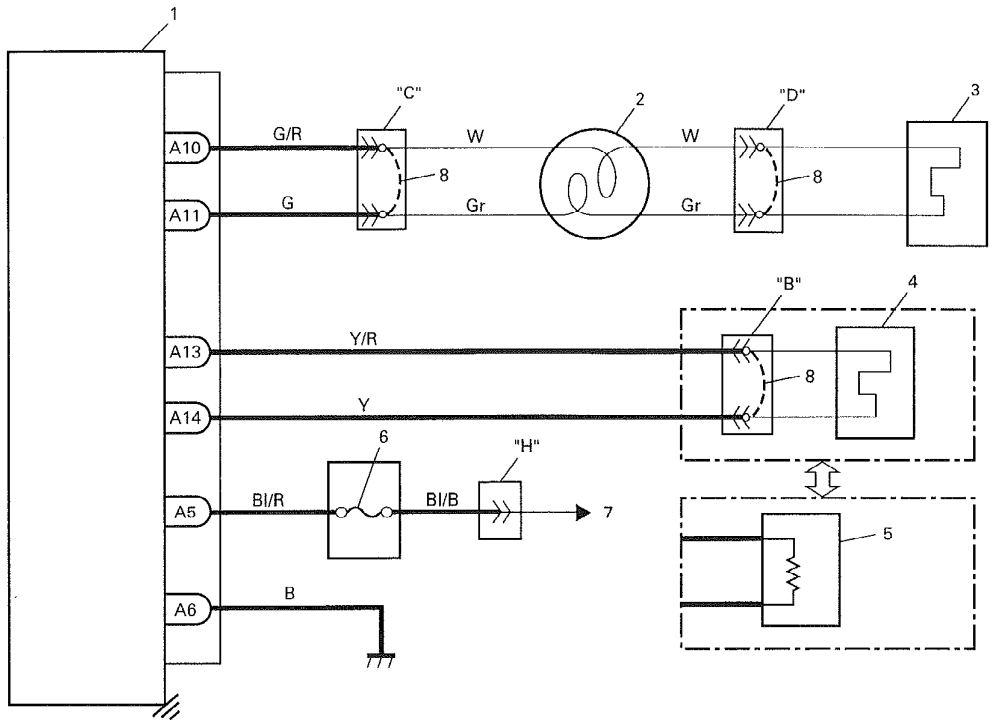
1) Ignition switch "OFF".
2) Replace contact coil assembly. (Refer to Section 3C1)

NO

1) Ignition switch "OFF".
2) Replace driver air bag (inflator) module. (Refer to Section 3C1)

1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes, if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".

DTC 24 – INITIATOR CIRCUIT SHORT TO GROUND



1. SDM
2. Contact coil
3. Driver air bag (inflator) module
4. Passenger air bag (inflator) module
5. Resistor (without passenger air bag)
6. "AIR BAG" fuse in "AIR BAG" fuse box
7. To ignition switch
8. Shorting bar

CAUTION:
- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:
The voltage measured at driver initiator circuit or passenger initiator circuit is below a specified value for specified time.

DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.
1) This test determines whether the malfunction is occurring in the driver air bag (inflator) module circuitry.
2) This test determines whether the malfunction is occurring in the passenger air bag (inflator) module circuitry.
3) This test determines whether the malfunction is in the driver air bag (inflator) module or the contact coil assembly.
4) This test checks for a short from "G" wire circuit to ground.
5) This test checks for a short from "G/R" wire circuit to ground.
6) This test checks for a short from "Y" wire circuit to ground.
7) This test checks for a short from "Y/R" wire circuit to ground.

DTC 24 – INITIATOR CIRCUIT SHORT TO GROUND

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

① 1) Ignition switch "OFF".
2) Disconnect driver air bag (inflator) module, yellow 2-way ("C") connector located near the base of the steering column, leave passenger air bag (inflator) module connected.
3) Connect special tool (driver/passenger load tool) to driver air bag (inflator) module harness ("C") connector disconnected at the above step.
4) Ignition switch "ON".

- Is DTC 24 current?

YES ↓ / NO ↓

② 1) Ignition switch "OFF".
2) Disconnect passenger air bag (inflator) module, yellow 2-way ("B") connector located behind the glove box.
3) Connect driver/passenger load tool to passenger air bag (inflator) module ("B") connector, leave driver air bag (inflator) module ("C") connector connected to load tool.
4) Ignition switch "ON".

- Is DTC 24 current?

YES ↓ / NO ↓

③ 1) Ignition switch "OFF".
2) Disconnect driver/passenger load tool from driver air bag (inflator) module ("C") connector.
3) Remove driver air bag (inflator) module from steering wheel. (Refer to Section 3C1)
4) Connect driver/passenger load tool to driver air bag (inflator) module ("D") connector on steering column.
5) Reconnect driver air bag (inflator) module connector at the base of the steering column.
6) Ignition switch "ON".

- Is DTC 24 current?

YES ↓ / NO ↓

④ 1) Ignition switch "OFF".
2) Disconnect driver/passenger load tool.
3) Disconnect SDM connector.
4) Measure resistance on SDM connector from terminal "A11" to terminal "A6" (ground).

- Does specified digital multimeter display "OL" (infinite)?

YES ↓ / NO →

1) Ignition switch "OFF".
2) If wire harness is damaged, repair its cause. Replace passenger air bag (inflator) module. (Refer to "On-Vehicle Service")

YES ↓ / NO →

1) Ignition switch "OFF".
2) If wire harness is damaged, repair its cause. Replace contact coil assembly. (Refer to Section 3C1)

NO →

1) Ignition switch "OFF".
2) If wire harness is damaged, repair its cause. Replace driver air bag (inflator) module. (Refer to Section 3C1)

YES ↓ / NO →

⑤ • Measure resistance on SDM connector from terminal "A10" to terminal "A6" (ground).

- Does specified digital multimeter display "OL" (infinite)?

YES ↓ / NO →

⑥ • Measure resistance on SDM harness connector from terminal "A14" to terminal "A6" (ground).

- Does specified digital multimeter display "OL" (infinite)?

YES ↓ / NO →

⑦ • Measure resistance on SDM harness connector from terminal "A13" to terminal "A6" (ground).

- Does specified digital multimeter display "OL" (infinite)?

YES ↓ / NO →

- Replace SDM. (Refer to "On-Vehicle Service")

NO →

- Repair short from "G" wire circuit to ground.
- Repair short from "G/R" wire circuit to ground.
- Repair short from "Y" wire circuit to ground.
- Repair short from "Y/R" wire circuit to ground.

1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes, if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".

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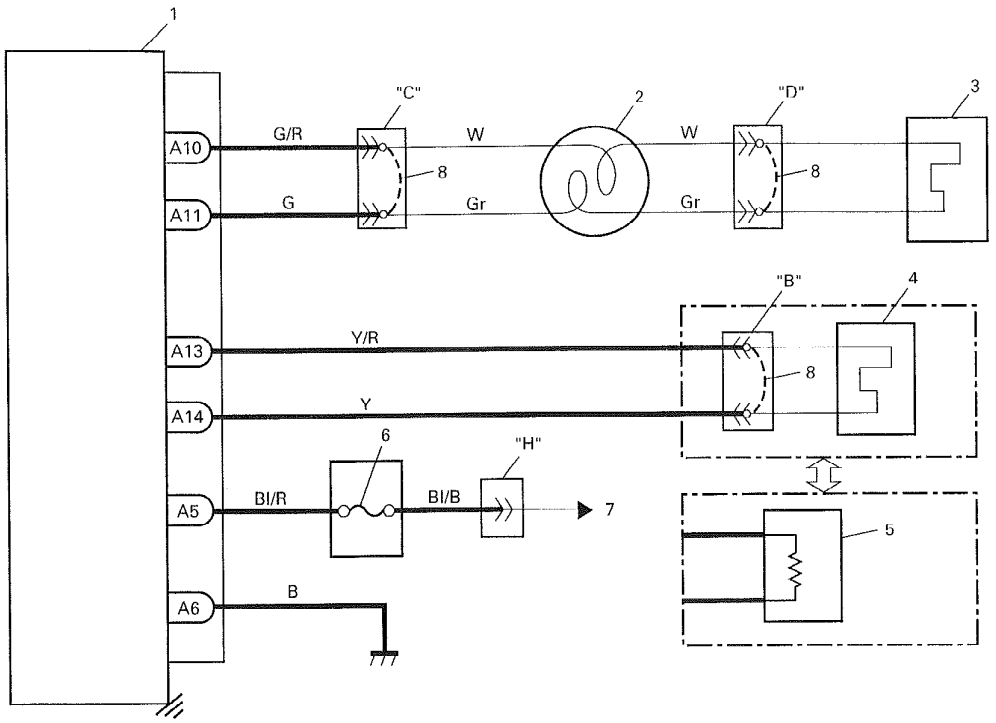
DTC 25 – INITIATOR CIRCUIT SHORT TO IGNITION



1. SDM
2. Contact coil
3. Driver air bag (inflator) module
4. Passenger air bag (inflator) module
5. Resistor (without passenger air bag)
6. "AIR BAG" fuse in "AIR BAG" fuse box
7. To ignition switch
8. Shorting bar

CAUTION:
- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:
The voltage measured at "G" wire circuit and "Y" wire circuit is above a specified value for specified time.

DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.
1) This test determines whether the malfunction is occurring in the driver air bag (inflator) module circuitry.
2) This test determines whether the malfunction is occurring in the passenger air bag (inflator) module circuitry.
3) This test determines whether the malfunction is in the driver air bag (inflator) module or the contact coil assembly.
4) This test checks for a short from "G" wire circuit to B+.
5) This test checks for a short from "G/R" wire circuit to B+.
6) This test checks for a short from "Y" wire circuit to B+.
7) This test checks for a short from "Y/R" wire circuit to B+.

DTC 25 – INITIATOR CIRCUIT SHORT TO IGNITION

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

① 1) Ignition switch "OFF".
2) Disconnect driver air bag (inflator) module, yellow 2-way ("C") connector located near the base of the steering column, leave passenger air bag (inflator) module connected.
3) Connect special tool (driver/passenger load tool) to driver air bag (inflator) module ("C") connector disconnected at the above step.
4) Ignition switch "ON".

- Is DTC 25 current?

YES ↓ / NO ↓

② 1) Ignition switch "OFF".
2) Disconnect passenger air bag (inflator) module, yellow 2-way ("B") connector located behind the glove box.
3) Connect driver/passenger load tool to passenger air bag (inflator) module ("B") connector, leave driver air bag (inflator) module ("C") connector connected to load tool.
4) Ignition switch "ON".

- Is DTC 25 current?

YES ↓ / NO →

④ 1) Ignition switch "OFF".
2) Disconnect driver/passenger load tool.
3) Disconnect SDM connector.
4) Ignition switch "ON".
5) Measure voltage on SDM connector from terminal "A11" to terminal "A6" (ground).

- Is voltage 1 volt or less?

YES ↓ / NO →

1) Ignition switch "OFF".
2) If wire harness is damaged, repair its cause. Replace passenger air bag (inflator) module. (Refer to "On-Vehicle Service")

③ 1) Ignition switch "OFF".
2) Disconnect driver/passenger load tool from driver air bag (inflator) module ("C") connector.
3) Remove driver air bag (inflator) module from steering wheel. (Refer to Section 3C1)
4) Connect driver/passenger load tool to driver air bag (inflator) module ("D") connector on steering column.
5) Reconnect driver air bag (inflator) module ("C") connector at the base of the steering column.
6) Ignition switch "ON".

- Is DTC 25 current?

YES ↓ / NO ↓

1) Ignition switch "OFF".
2) If wire harness is damaged, repair its cause. Replace contact coil assembly. (Refer to Section 3C1)

1) Ignition switch "OFF".
2) If wire harness is damaged, repair its cause. Replace driver air bag (inflator) module. (Refer to Section 3C1)

⑤ • Measure voltage on SDM harness connector from terminal "A10" to terminal "A6" (ground).

- Is voltage 1 volt or less?

YES ↓ / NO →

1) Ignition switch "OFF".
2) Repair short from "G" wire circuit to B+.

⑥ • Measure voltage on SDM harness connector from terminal "A14" to terminal "A6" (ground).

- Is voltage 1 volt or less?

YES ↓ / NO →

1) Ignition switch "OFF".
2) Repair short from "G/R" wire circuit to B+.

⑦ • Measure voltage on SDM harness connector from terminal "A13" to terminal "A6" (ground).

- Is voltage 1 volt or less?

YES ↓ / NO →

1) Ignition switch "OFF".
2) Repair short from "Y" wire circuit to B+.

- Replace SDM. (Refer to "On-Vehicle Service")

1) Ignition switch "OFF".
2) Repair short from "Y/R" wire circuit to B+.

1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes, if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".

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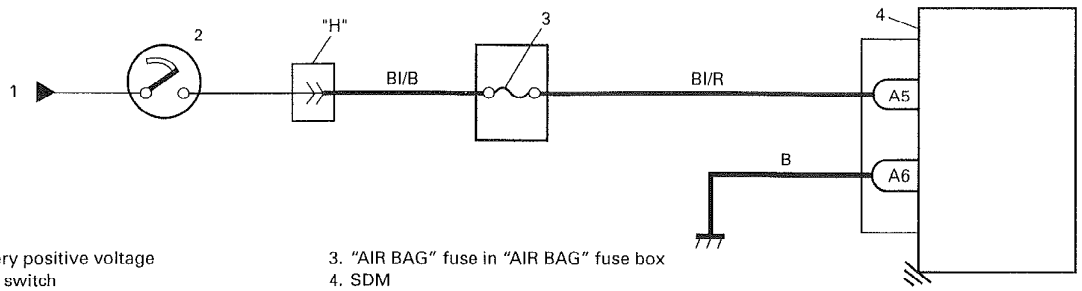
DTC 31 – IGNITION VOLTAGE TOO HIGH



1. To battery positive voltage
2. Ignition switch
3. "AIR BAG" fuse in "AIR BAG" fuse box
4. SDM

DTC WILL SET WHEN:

The ignition voltage at SDM terminal "A5" is above a specified value for specified time.

DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

1) This test checks if voltage applied to the SDM harness connector is within the normal range.
2) This test checks if the trouble of DTC 31 still exists.

DTC 31 – IGNITION VOLTAGE TOO HIGH

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

① 1) Ignition switch "OFF".
2) Disconnect SDM connector.
3) Check for proper connection to SDM at terminal "A5".
4) If OK then ignition switch "ON", and then measure voltage on SDM connector from terminal "A5" to terminal "A6" (ground).

- Is voltage 14 V or less?

YES

② • Is DTC 31 current?

YES

- Replace SDM. (Refer to "On-Vehicle Service")

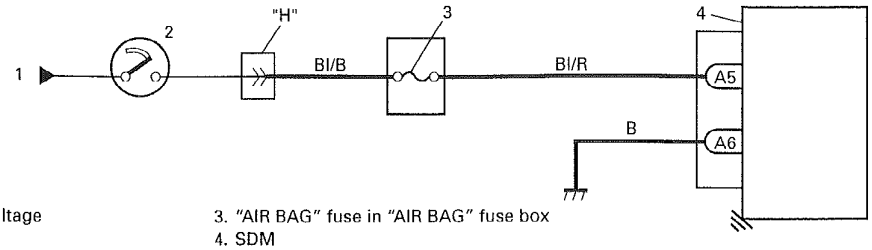
NO

- Check the charging system and repair as necessary. (Refer to Section 6H "CHARGING SYSTEM")

1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes, if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".

80E10S-9J-36-5

DTC 32 – IGNITION VOLTAGE TOO LOW



1. To battery positive voltage
2. Ignition switch
3. "AIR BAG" fuse in "AIR BAG" fuse box
4. SDM

DTC WILL SET WHEN:

The ignition voltage at SDM terminal "A5" is below an approx. 9 (v) for specified time.

DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

1) This test checks if the battery voltage is within the normal range.
2) This test checks for a short to ground between SDM ignition terminal ("A5") and battery.
3) This test checks for a short to ground in the air bag harness.
4) This test checks if there is a high resistance point in the air bag harness.
5) This test checks if a voltage drop takes place before the ignition ("H") connector in air bag harness.

DTC 32 – IGNITION VOLTAGE TOO LOW

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

① • Measure voltage on battery.
• Is voltage 11 V or higher?
NO → • Check the charging system and repair as necessary. (Refer to Section 6H "CHARGING SYSTEM")
YES ↓

② 1) Ignition switch "OFF".
2) Disconnect SDM connector.
3) Check for proper connection to SDM at terminal "A5".
4) If OK then measure resistance on SDM connector from terminal "A5" to terminal "A6" (ground).
• Does specified digital multimeter display "OL" (infinite)?

NO ↓

③ 1) Disconnect 2-way yellow ("H") connector.
2) Measure resistance from "Bl/B" wire terminal in 2-way yellow ("H") connector to ground.
• Does specified digital multimeter display "OL" (infinite)?

NO ↓
• Repair short from "Bl/B" wire, "Bl/R" wire or inside "AIR BAG" fuse box to ground.

YES ↓
1) Ignition switch "OFF".
2) Possibly faulty points are as follows. Check each of them and repair as necessary.
• Circuit before 2-way yellow ("H") connector
• Charging system (Refer to Section 6H "CHARGING SYSTEM")

YES ↓

④ 1) Disconnect 2-way yellow ("H") connector.
2) Measure resistance from "Bl/B" wire terminal in 2-way yellow ("H") connector to SDM connector terminal "A5".
• Is resistance 5.0 Ω or less?

YES ↓

⑤ 1) Ignition switch "ON".
2) Measure voltage from "Bl/B" wire terminal in 2-way yellow ("H") connector to ground.
• Is voltage 10 V or higher?

NO ↓
1) Ignition switch "OFF".
2) Possibly faulty points are as follows. Check each of them and repair as necessary.
• Circuit before 2-way yellow ("H") connector
• Charging system (Refer to Section 6H "CHARGING SYSTEM")

YES ↓
1) Ignition switch "OFF".
2) Replace SDM. (Refer to "On-Vehicle Service")

NO ↓
• Repair high resistance in "Bl/B" wire, "Bl/R" wire or inside "AIR BAG" fuse box.

1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes, if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".

80E10S-9J-37-5

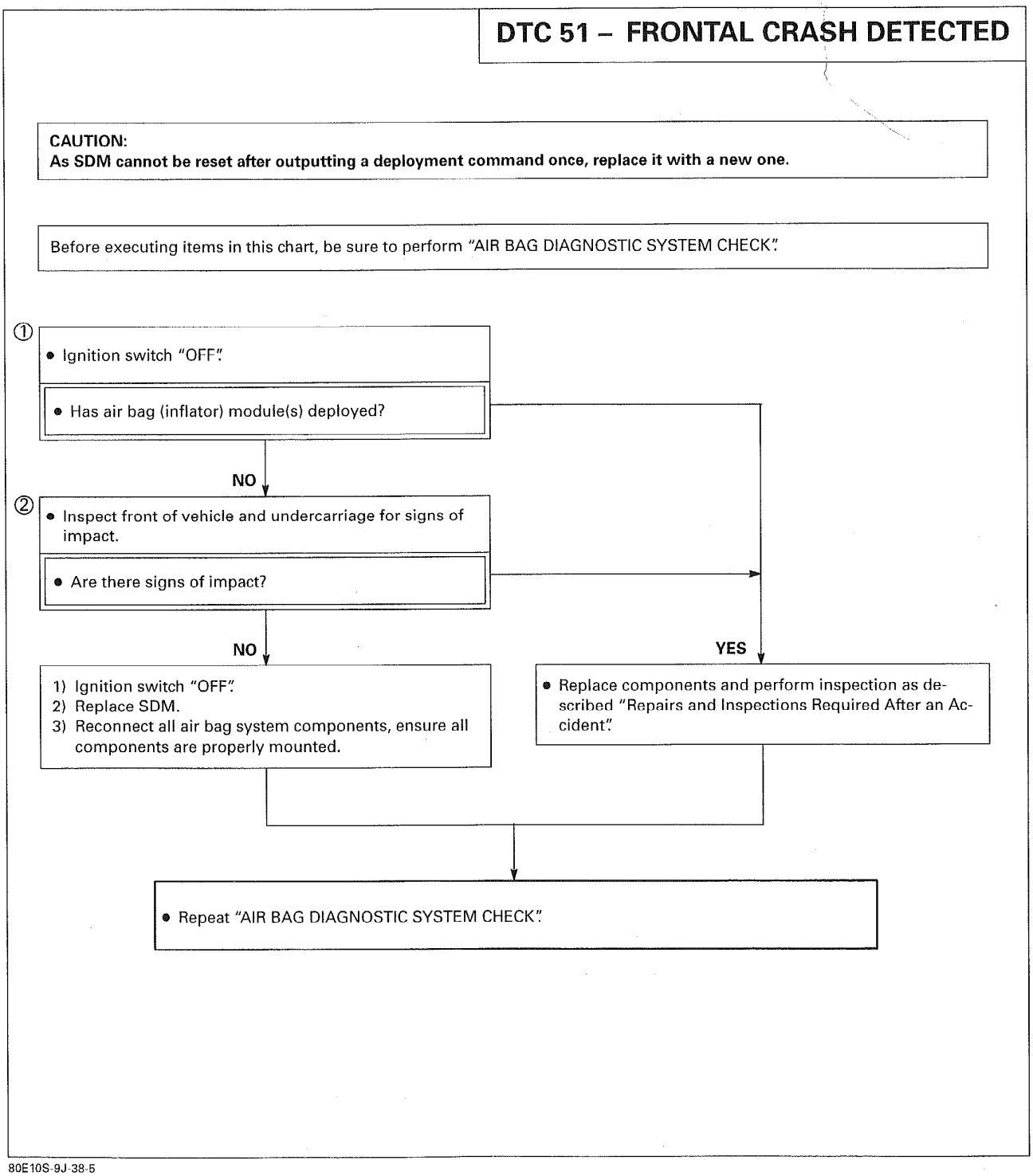
DTC 51 – FRONTAL CRASH DETECTED (DEPLOYMENT COMMAND OUTPUTTED)

DTC WILL SET WHEN:

The SDM detects a frontal crash of sufficient force to warrant deployment of the air bag(s). (SDM outputs a deployment command.)

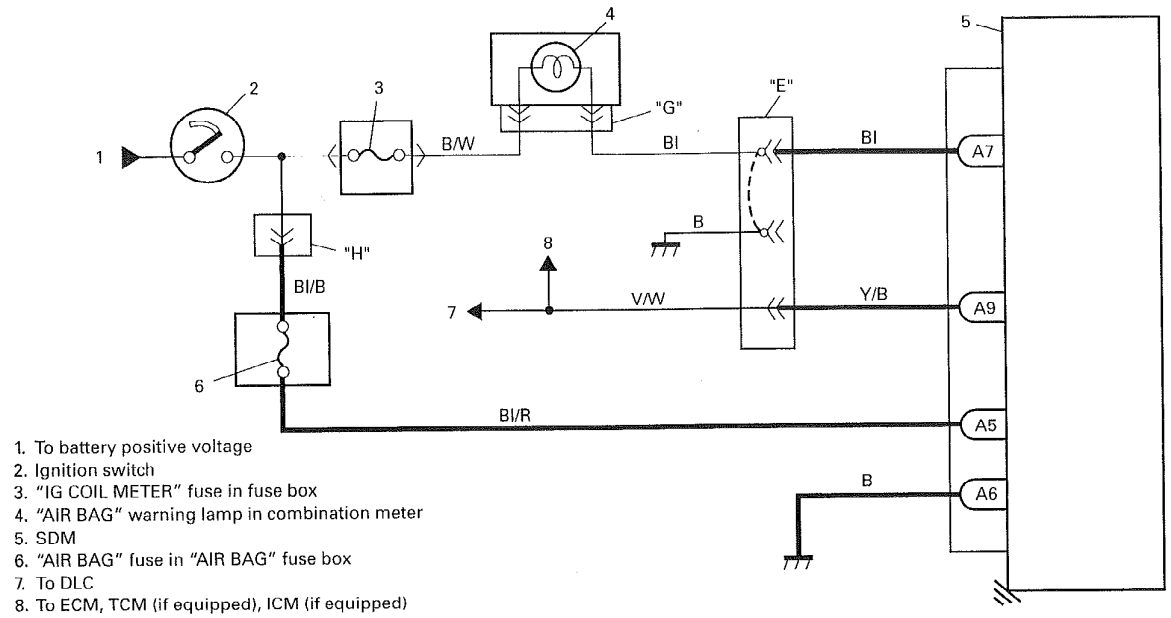
DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

1) If air bag (inflator) module(s) has not deployment, DTC 51 may have set falsely.
2) If DTC 51 has set with no signs of frontal impact, the diagnostic trouble code has set falsely.



80E10S-9J-38-5

DTC 61 – AIR BAG WARNING LAMP CIRCUIT FAILURE



1. To battery positive voltage
2. Ignition switch
3. "IG COIL METER" fuse in fuse box
4. "AIR BAG" warning lamp in combination meter
5. SDM
6. "AIR BAG" fuse in "AIR BAG" fuse box
7. To DLC
8. To ECM, TCM (if equipped), ICM (if equipped) and ABS controller (if equipped)

CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The output voltage at the "AIR BAG" warning lamp circuit terminal "A7" does not match the commanded state of the warning lamp driver for specified time.

DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

1) This test rechecks whether an abnormality is in SDM or in "AIR BAG" warning lamp circuitry.

DTC 61 – AIR BAG WARNING LAMP CIRCUIT FAILURE

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

① 1) Malfunctions within the "AIR BAG" warning lamp circuitry will set this diagnostic trouble code.
These malfunctions are addressed in the "AIR BAG DIAGNOSTIC SYSTEM CHECK" via Chart A and Chart C.
Failure to properly perform the "AIR BAG DIAGNOSTIC SYSTEM CHECK" may result in misdiagnosis.
2) Ignition switch "ON".
3) Clear diagnostic trouble codes.

- Is DTC 61 set?

YES

- Replace SDM. (Refer to "On-Vehicle Service")

NO

- Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".

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DTC 71 – INTERNAL SDM FAULT

DTC WILL SET WHEN:

An internal SDM fault is detected by the SDM.

NOTE:

DTC 71 can never be cleared once it has been set.

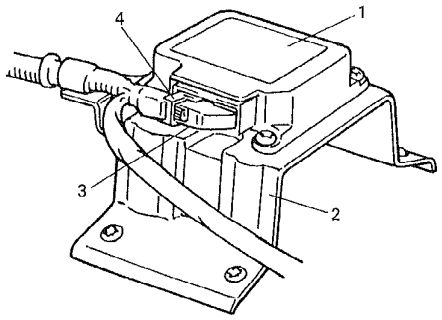
DTC 71 – INTERNAL SDM FAULT

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

1) Ignition switch "OFF".
2) Replace SDM.

↓

• Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".



1. SDM
2. SDM bracket
3. SDM connector
4. Connector lock lever

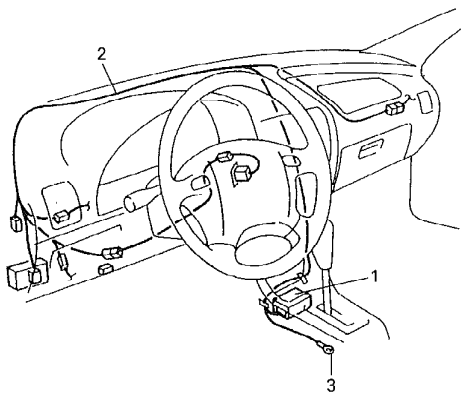
80E10S-9J-41-3

REPAIR AND INSPECTIONS REQUIRED AFTER AN ACCIDENT

ACCIDENT WITH OR WITHOUT DEPLOYMENT – COMPONENT INSPECTIONS

- SDM and SDM bracket.
  - Check for external damage such as deformation, scratch, crack, peeled paint, etc..
  - Check whether SDM can installed properly due to cause in itself. (There is a gap between SDM and its mounting part of vehicle body, or it cannot be fixed securely.)
  - Check whether connector or lead wire of SDM has a scorching, melting or damage.
  - Check whether connector can be connected securely or locked.
  - Check SDM connector and terminals for tightness.
  - Check SDM sets a diagnostic trouble code and the diagnostic chart leads to a malfunctioning SDM.

  If any faulty condition is found in above checks, replace.

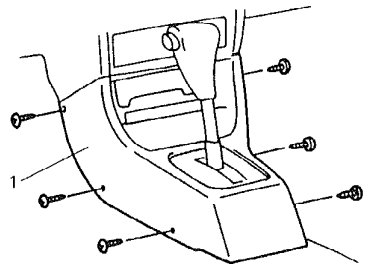


1. Air bag wire harness
2. Ground
3. SDM case ground

80E10S-9J-41-5

- Air bag wire harness and connections.
  - Check for damages, deformities or poor connections. (Refer to "Intermittents and Poor Connections" in this section.)
  - Check wire harness clamps for tightness.

  If any faulty condition is found, correct or replace.



1. Front console box

80E10S-9J-42-2

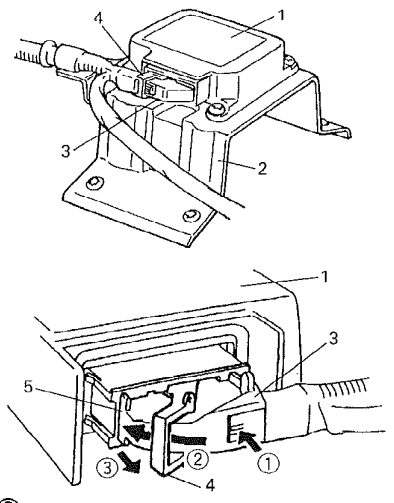
ON-VEHICLE SERVICE

SDM

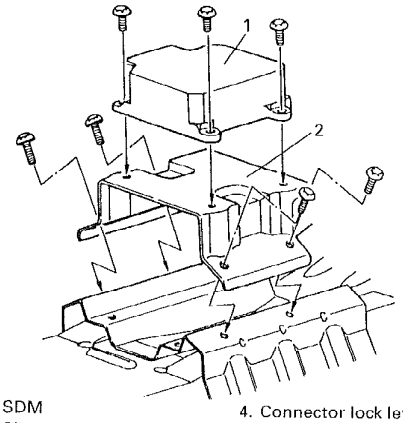
WARNING:
During service procedure be very careful when handling Sensing and Diagnostic Module (SDM).
Be sure to read "SERVICE PRECAUTIONS" and "HANDLING PRECAUTIONS" before starting to work and observe every precaution during work. Neglecting them may result in personal injury or undeployment of the air bag when necessary.

REMOVAL

1) Disconnect negative cable at battery.
2) Disable air bag system. Refer to "Disabling Air Bag System".
3) Remove rear console box first and then front console box by removing screws and clips.



①, ② : Release locking of lock lever.
③ : After unlocked disconnect connector.



1. SDM
2. SDM bracket
3. SDM connector
4. Connector lock lever
5. Stopper

80E10S-9J-42-5

4) Disconnect SDM connector from SDM.

CAUTION:
As this connector has a connector lock lever, refer to the left figure for its removal procedure.

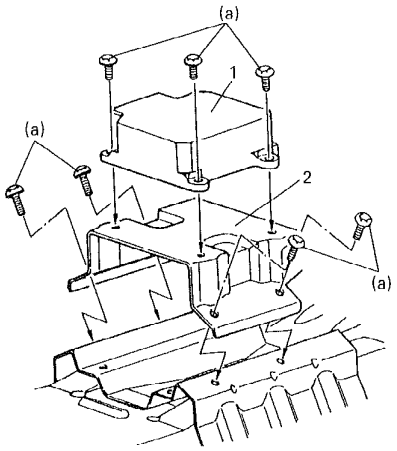
5) Remove SDM and SDM bracket from vehicle.

INSPECTION

CAUTION:
- **Do not connect a tester whatever type it may be.**
- **Never repair or disassembles SDM.**
- **If SDM was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced.**

- Check SDM and SDM bracket for dents, cracks or deformation.
- Check SDM connector for damage cracks or lock mechanism.
- Check SDM terminal for bend, corrosion or rust.

If any faulty condition is found in above checks, replace.



1. SDM
2. SDM bracket

80E10S-9J-43-2

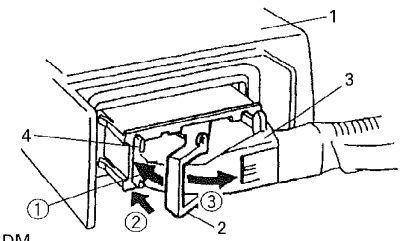
INSTALLATION

1) Check the none of following faulty conditions exists.
   - Bend, scratch, deformity in vehicle body mounted on SDM bracket.
   - Foreign matter or rust on mating surface of vehicle body mounted on SDM bracket.
   - Loosened GND bolt.
2) Install SDM bracket and SDM to vehicle.

CAUTION:
Ensure that arrow on the SDM is pointing toward the front of the vehicle.

3) Tighten SDM and SDM bracket bolt to specified torque.

Tightening torque
(a): 6 N·m (0.6 kg-m, 4.5 lb-ft)



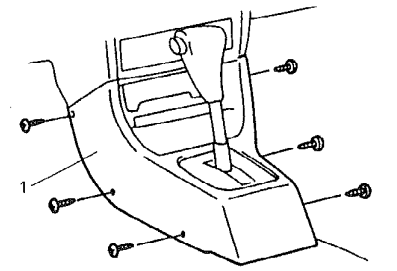
1. SDM
2. SDM connector
3. Connector lock lever
4. Stopper

① : Turn lever to stopper.
② : Connect connector.
③ : Turn lever to lock.

80E10S-9J-43-3

4) Connect SDM connector to SDM and be sure to lock each connector with lock lever.

CAUTION:
As this connector has a connector lock lever, refer to the left figure for its installation procedure.



1. Front console box

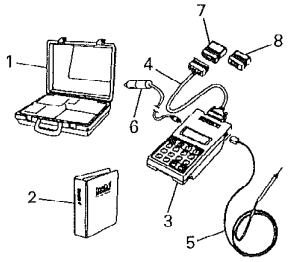
80E10S-9J-43-5

5) Install front and rear console boxes by installing screws and clips.
6) Connect negative cable to battery.
7) Enable air bag system. Refer to "Enabling Air Bag System".

TIGHTENING TORQUE SPECIFICATIONS

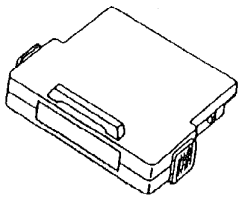
Fastening Parts	Tightening Torque		
	N·m	kg-m	lb-ft
• SDM bolt • SDM bracket bolt • GND bolt	6	0.6	4.5

SPECIAL TOOLS

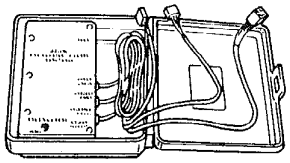


1. Storage case
2. Operator's manual
3. Tech 1A
4. DLC cable
5. Test lead/probe
6. Power source cable
7. DLC cable adapter
8. Self-test adapter

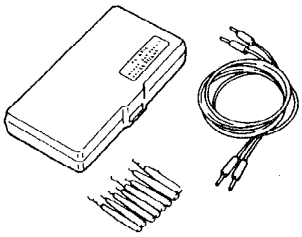
09931-76011
Tech-1 (scan tool) kit



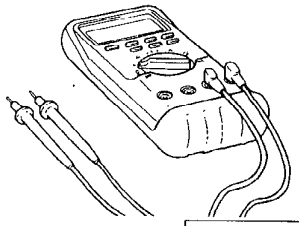
Tech-1 cartridge for air bag
09932-66021-001 (with English Manual)
09932-66021-003 (with German Manual)
09932-66021-004 (with French Manual)
09932-66021-005 (with Spanish Manual)



09932-75010
Air bag driver/passenger load tool

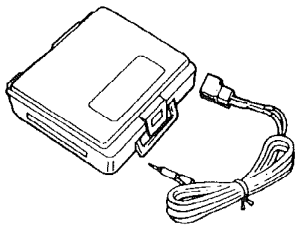


09932-76010
Connector test adapter kit

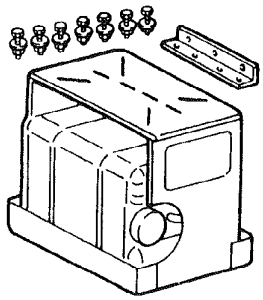


Digital multimeter for which the maximum test current is 10 mA or less at the minimum range of resistance measurement

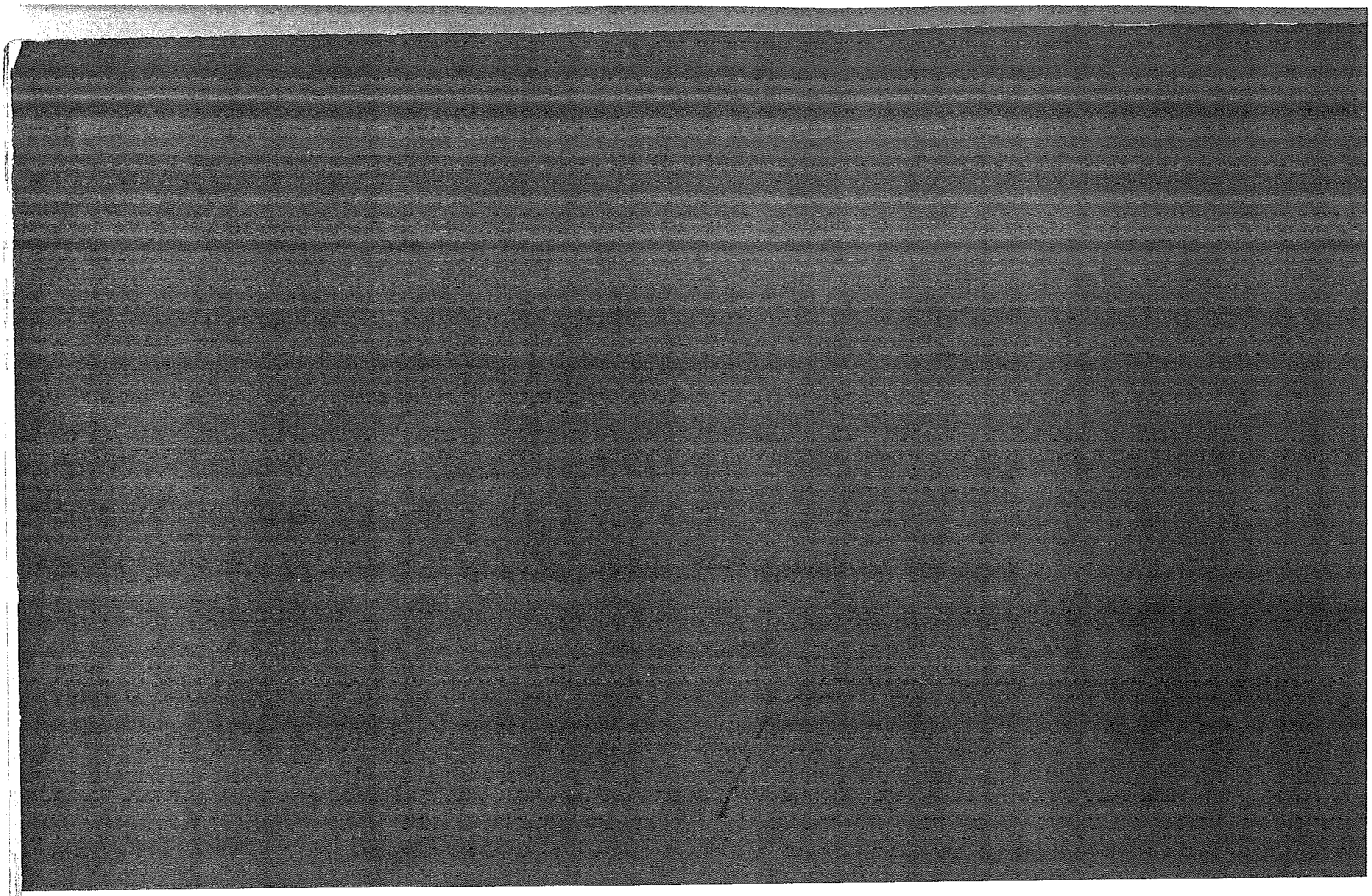
WARNING:
Be sure to use the specified digital multimeter. Otherwise, air bag deployment or personal injury may result.



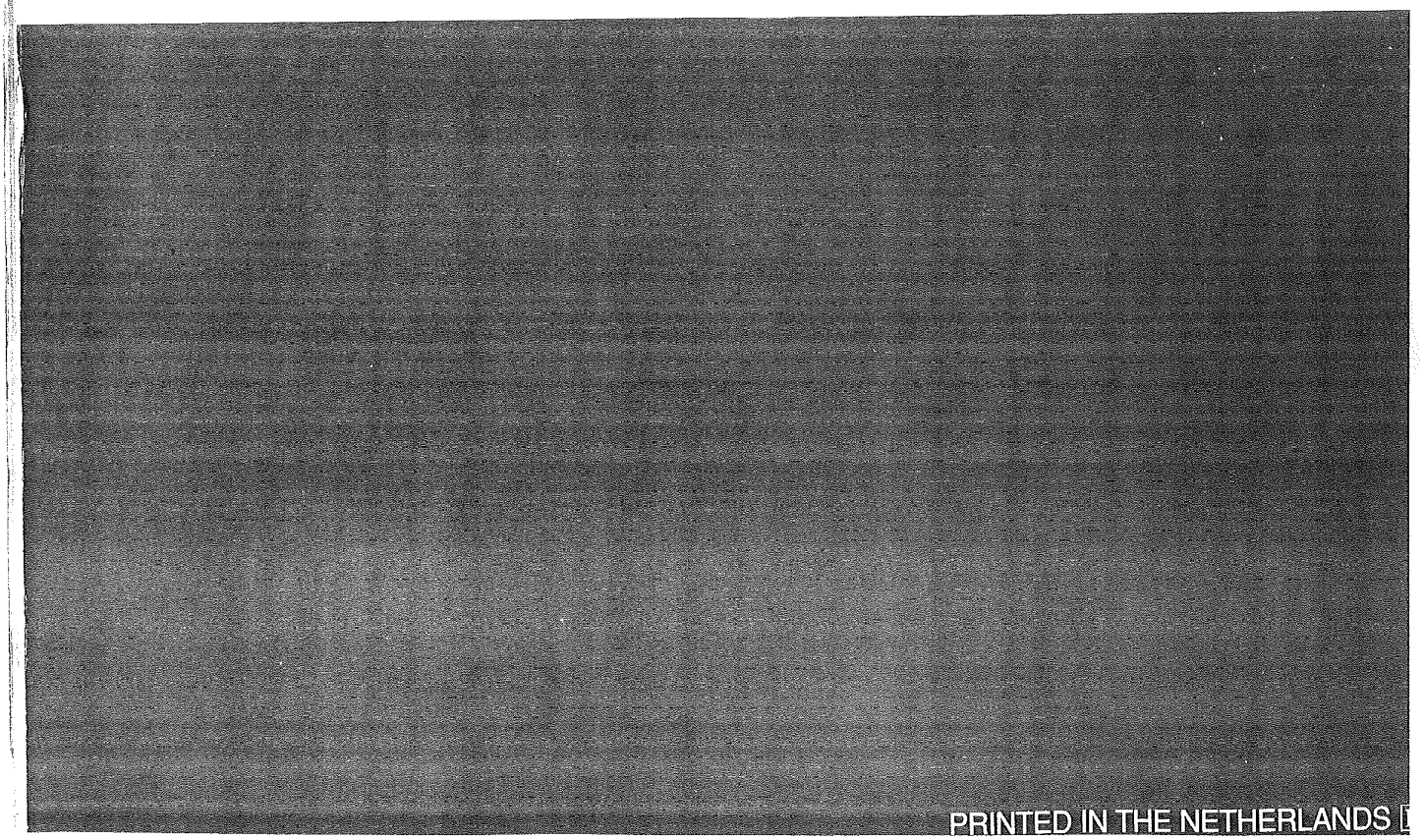
09932-75030
Air bag deployment harness



09932-75040
Passenger air bag (inflator) module deployment fixture



SUZUKI MOTOR CORPORATION



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