Brake System

GENERAL ..... BR -2

BRAKE SYSTEM ..... BR -9

PARKING BRAKE SYSTEM ..... BR -27

ABS (ANTI-LOCK BRAKE SYSTEM) ..... BR -29

GENERAL

SPECIFICATIONS EJNC0010

Master cylinder	
Type	Tandem type
I.D. mm(in.)	23.81 (0.937)
Fluid level warning sensor	Provided
Brake booster	
Type	Vacuum
Effective dia.mm(in.)	Tandem type with 7+8 in.
Boosting ratio	7.0 : 1
Proportioning valve	
Cut-in pressure (Split point)	2.6 MPa (26.52 kg/cm², 377 psi)
Decompression ratio	0.27 : 1
Front brake	
Type	Floating type with ventilated disc
Disc O.D.	257 mm (10.12 in.)
Disc thickness	24 mm (0.94 in.)
Pad thickness	11 mm (0.43 in.)
Cylinder I.D.	54 mm (2.13 in.)
Rear brake (Drum)	
Type	Leading trailing drum
Drum I.D.	203.2 mm (8 in.)
Drum thickness	9.4 mm (0.37 in.)
Brake lining thickness	4.5 mm (0.177 in.)
Clearance adjustment	Automatic
Parking brake	
Actuation	Mechanical brake acting on rear wheels
Type	Lever
Cable arrangement	V type

O.D = Outer Diameter
I.D = Inner Diameter

SPECIFICATION (ABS) EJDA0010

Part	Item	Standard value	Remarks
ABSCM	Operating voltage	10V - 16V	ABS, EBD Integrated control unit
	Operating temp	-40° - 110°C	
Warning Lamp ABS BRAKE (EBD)	Operating voltage Consumption current	12V 80mA	BRAKE : Parking, Brake oil, EBD fail
Wheel Speed Sensor	Internal resistance	1275 ± 1495Ω	Ambient temperature
	Output range	15 - 2000Hz	
	Air gap	0.2 mm -1.2 mm	Min. sensor Volt :150mV
HECU (Hydraulic and Electronic Control Unit)	Weight	2.5 kg	NO : Normal Open
	Motor	12V, 30A	NC : Normal Close
	Motor power	180W	LPA : Low Pressure Accumulator
	Pump capacity	5.5cc/sec	HPA : High Pressure Accumulator
	Accumulator amount	LPA:2.1cc, HPA : 6cc	
	Valve NO NC	Operating voltage : 12V	

SERVICE STANDARD EJNC0020

	Standard value	Service limit
Brake pedal height	178.8 mm (7.04 in.)	
Brake pedal stroke	135 mm (5.31 in.)	
Stop lamp switch outer case to pedal stopper clearance	0.5-1.0 mm (0.02-0.04 in.)	
Brake pedal free play	3-8 mm (0.11-0.31in.)	
Booster push rod to master cylinder piston clearance	0 (at 500 mmHg vacuum)	
Parking brake lever stroke when lever assembly is pulled with 196N (20kg, 44lb force)	7-8 clicks	
Front disc brake pad thickness	11 mm (0.43 in.)	2 mm (0.08 in.)
Front disc thickness (minimum)	24 mm (0.95 in.)	22.4 mm (0.88 in.)
Drum brake lining thickness	4.5 mm (0.177 in.)	1.5 mm (0.06 in.)
Brake drum I.D. (maximum)	203.2 mm (8 in.)	205.2 mm (8.08 in.)

TIGHTENING TORQUE EJNC0030

	Nm	Kg·cm	lb·ft
Master cylinder to booster mounting nut	8-12	80-120	6-9
Brake booster mounting nut	13-16	130-160	10-12
Brake booster vacuum hose fitting to surge tank	15-18	150-180	11-13
Proportioning valve mounting	3.5-5.5	35-55	3-4
Bleeder screw	7-13	70-130	5-12
Brake tube flare nut, brake hose	13-17	130-170	10-12
Caliper guide rod bolt	22-32	220-320	16-24
Caliper assembly to knuckle	65-75	650-750	48-55
Brake hose to front caliper	25-30	250-300	18-22

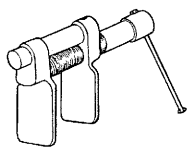
⚠ ***CAUTION***

Replace self-locking nuts with new ones after removal.

TIGHTENING TORQUE (ABS) EJDA0020

	Nm	kg·cm	lb·ft
Wheel speed sensor mounting bolt on the brake plate			
Front	8-9.5	80-95	5.6-6.7
Rear	15.5-16.5	155-165	11-12
Hydraulic & electronic control unit mounting bolt	8-10	80-100	5.6-6.9
Hydraulic & electronic control unit mounting bracket bolt	9-10	90-100	6.2-6.9
Six brake tubes on the Hydraulic Unit	16	160	12

SPECIAL TOOLS EJNC0040

Tool (Number and Name)	Illustration	Use
09581 - 11000 Piston expander	 EJDA043A	Spreading the front brake piston

TROUBLESHOOTING EJDA0440

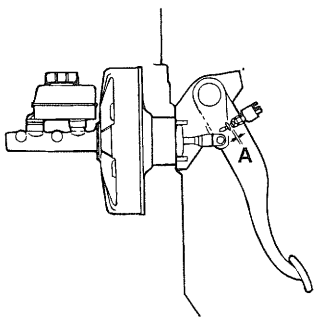
Symptom	Probable cause	Remedy
Noise or vibration when brakes are applied	Backing plate or caliper improperly mounted	Correct
	Loose backing plate or caliper mounting bolts	Retighten
	Unevenly worn or cracked brake drum or brake disc	Replace
	Foreign material in brake drum	Clean
	Seized pad or lining contact surface	Replace
	Excessive caliper to pad assembly clearance	Correct
	Uneven pad contact	Correct
	Lack of lubrication in sliding parts	Lubricate
	Loose suspension parts	Retighten
Vehicle pulls to one side when brakes are applied	Difference in left and right tire inflation pressure	Adjust
	Improper front wheel alignment	Adjust
	Inadequate contact of pad or lining	Correct
	Grease or oil on pad or lining surface	Replace
	Drum warpage or uneven wear	Replace
	Incorrect wheel cylinder installation	Correct
	Auto adjuster malfunction	Correct
Insufficient braking power	Low or deteriorated brake fluid	Refill or change
	Air in the brake system	Bleed the system
	Brake booster malfunction	Correct
	Inadequate contact of pad or lining	Correct
	Grease or oil on pad or lining surface	Replace
	Auto adjuster malfunction	Correct
	Overheated brake rotor due to dragging of pad or lining	Correct
	Restricted brake line	Replace
	Proportioning valve malfunction	Replace
Increased pedal stroke required (Reduced pedal to floorboard clearance)	Air in the system	Bleed the system
	Brake fluid leaks	Correct
	Auto adjuster malfunction	Correct
	Excessive push rod to master cylinder clearance	Adjust

Symptom	Probable cause	Remedy
Brake drag	Incomplete release of parking brake	Adjust
	Incorrect parking brake adjustment	Adjust
	Worn brake pedal return spring	Replace
	Restricted master cylinder return port	Correct
	Broken rear drum brake shoe return spring	Replace
	Lack of lubrication in sliding parts	Lubricate
	Defective master cylinder check valve or piston return spring	Replace
	Insufficient push rod to master cylinder clearance	Replace
Insufficient parking brake function	Worn brake lining or pad	Replace
	Grease or oil on lining or pad surface	Replace
	Parking brake cable sticking	Replace
	Auto adjuster malfunction	Adjust
	Excessive parking brake lever stroke	Adjust the parking brake lever stroke or check the parking brake cable routing

SERVICE BRAKE PEDAL INSPECTION AND ADJUSTMENT EJKB0050

1. Turn the stop lamp switch until the clearance between the stop lamp switch outer case and pedal arm reaches the standard value, and secure the stop lamp switch with the lock nut.

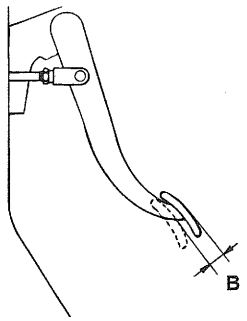
Clearance between pedal and stop lamp switch A :
0.5-1.0 mm (0.02-0.039 in.)



EJDA020A

2. Free play of brake pedal.

Brake pedal free play B :
3-8 mm (0.117-0.312 in.)



EJDA020B

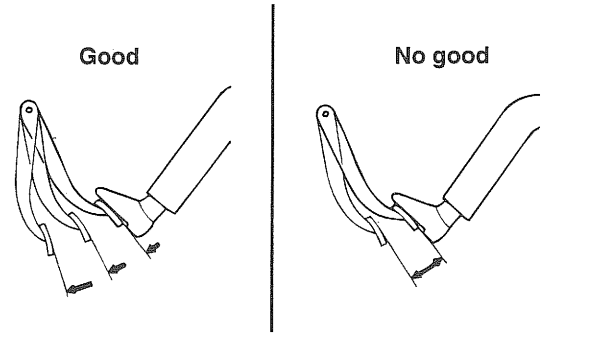
BRAKE BOOSTER OPERATION TEST WITHOUT A TESTER EJKB0060

For a simple check of brake booster operation, perform the following tests.

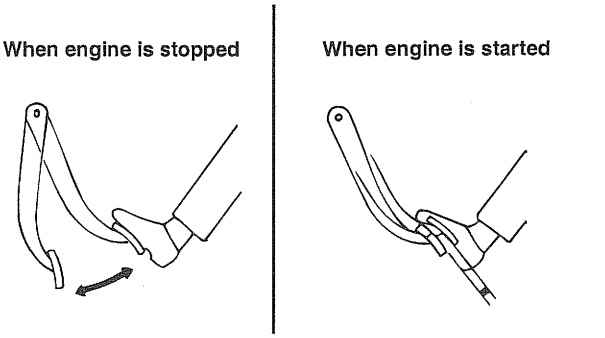
1. Run the engine for one minute or two minutes, and then shut it off. Depress the brake pedal several times at normal foot pressure. If the pedal goes down further first but rises gradually after the second or third time, the brake booster is functioning properly. If the pedal height doesn't change, the booster is damaged.

2. With the engine stopped, depress the brake pedal several times and check the pedal height changes. After that, with the pedal depressed, start the engine. If the pedal goes down slightly, the booster is in good condition. If the pedal height doesn't change, the booster is damaged.

3. With the engine running, depress the brake pedal and then stop the engine. Hold the pedal depressed for 30 seconds. If the pedal height does not change, the booster is in good condition. if the pedal goes up, the booster is damaged.
   If one of the above three tests is not okay, check the vacuum hoses and the brake booster and make any necessary corrections. If all tests are OK, the booster is good.



EJDA021A



EJDA022A

BLEEDING THE BRAKE SYSTEM EJNC0070

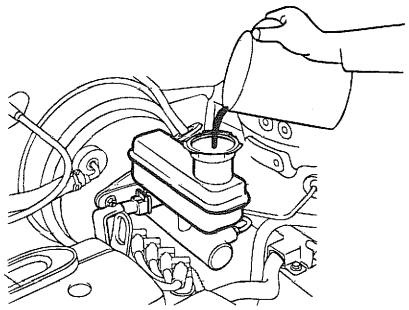
1. Remove the reservoir cap and fill the brake reservoir with brake fluid.

   ⚠ ***CAUTION***

   If there is any brake fluid on any painted surface, wash it off immediately.

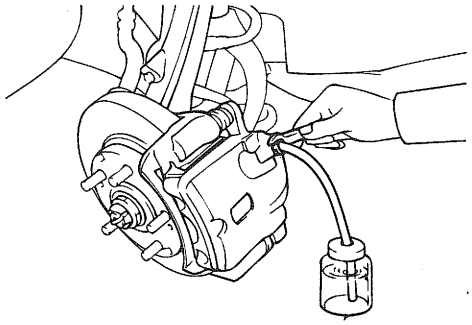
   NOTE

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



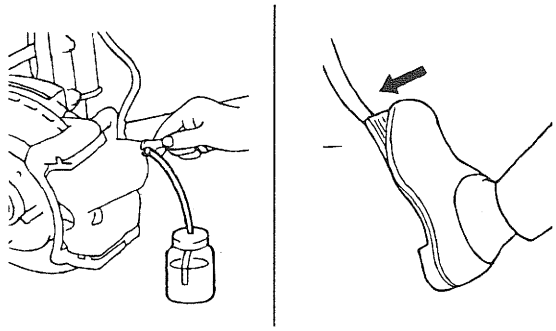
KFCBR01A

2. Connect a vinyl tube to the wheel cylinder bleeder plug, and insert the other end of tube in the container of brake fluid.



EJKB007A

3. Depress the brake pedal several times.
4. While depressing the brake pedal fully, loosen the bleeder plug until the fluid starts to run out. Then close the bleeder plug.

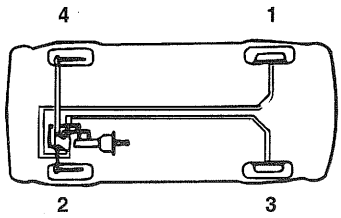


EAHA014B

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

Bleeder screw tightening torque :
7-13 Nm (70-130 kgf·cm, 5-10 lb·ft)

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



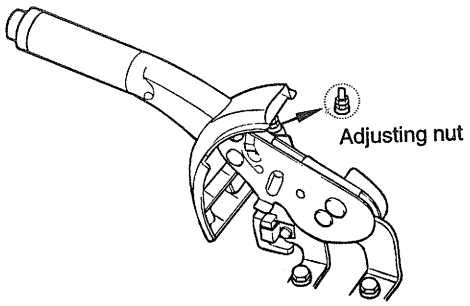
EJDA047B

ADJUSTMENT OF PARKING BRAKE STROKE EJNC0080

1. Pull the brake lever with a force of approx. 196 N (20 kg, 44 lbs.) and check the number of clicks.

Parking brake lever stroke (Standard value) : 7-8 clicks

2. If the number of notches is not the standard value, adjust the cable length with the adjusting nut on the equalizer.



KFCBR02A

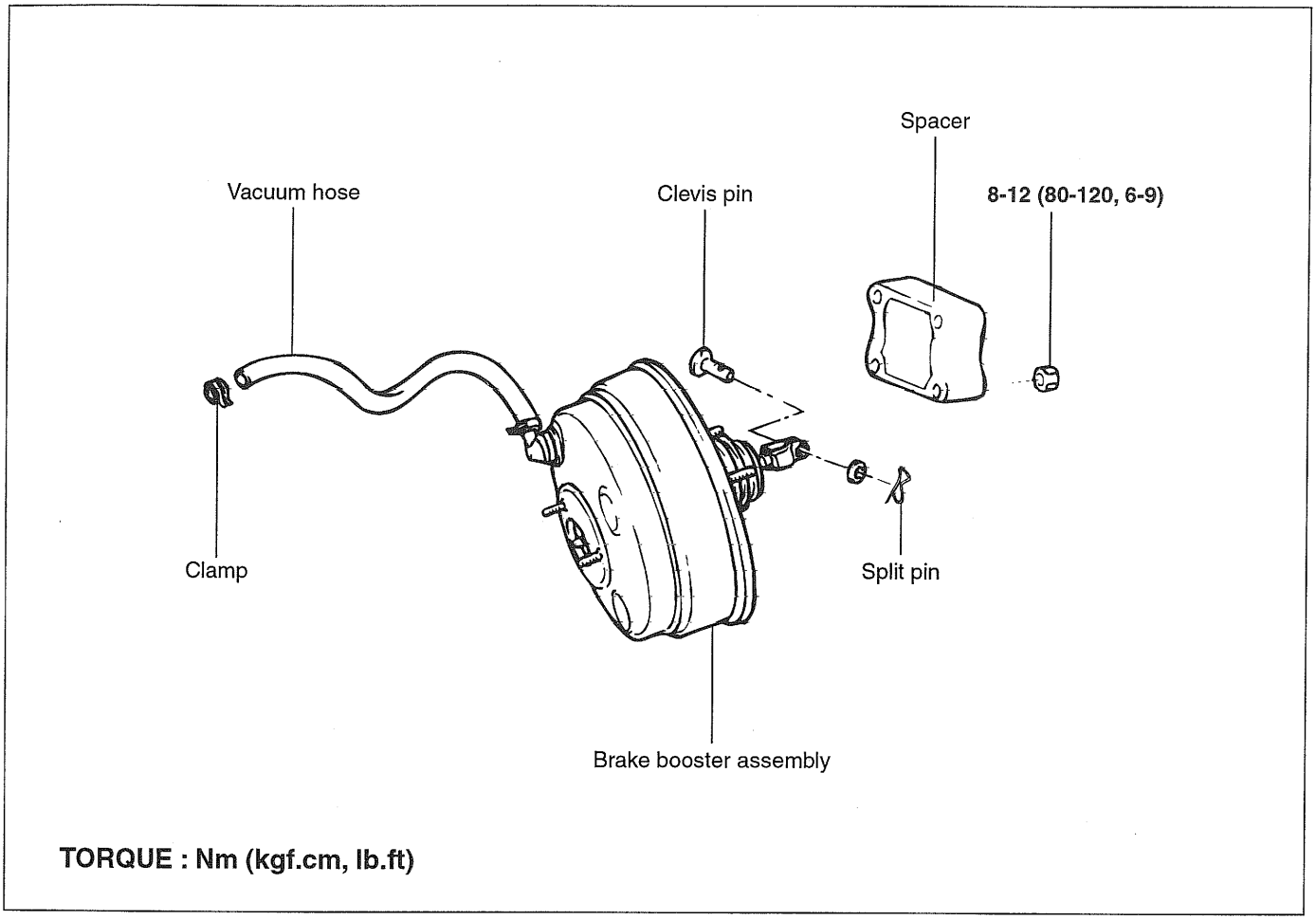
3. The indicator light will go out when the brake lever is fully released, and will light up with the lever pulled one notch. If it does not operate properly, replace it.

4. After the adjustment, check that the rear brakes do not drag with the parking brake lever released.

BRAKE SYSTEM

BRAKE BOOSTER

COMPONENTS EJNC0100

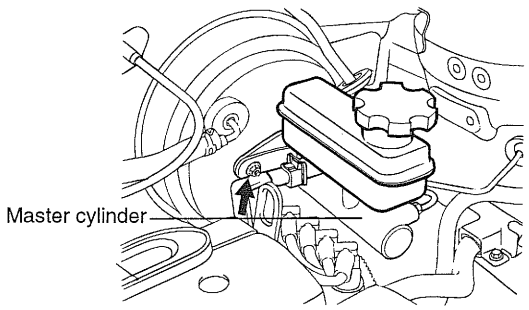


EJNC010A

REMOVAL EJNC0110

1. Disconnect the brake tube from the master cylinder.
2. Remove the master cylinder.

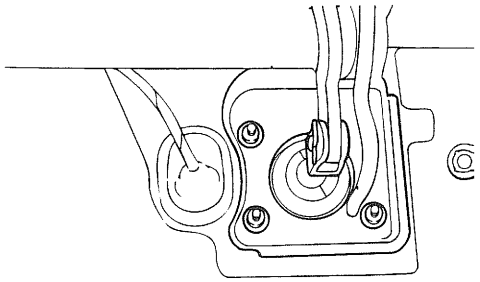
> ⚠ ***CAUTION***
>
> ***If there is any brake fluid on any painted surface, wash it off immediately.***



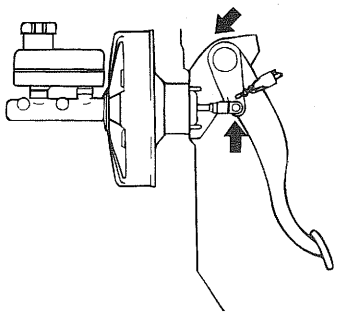
EFCBR03A

3. Disconnect the vacuum hose from the booster.
4. Remove the operating rod from the brake pedal.
5. Loosen the booster mounting nuts.

6. Lift out the booster assembly.



EJDA025A



KFCBR04A

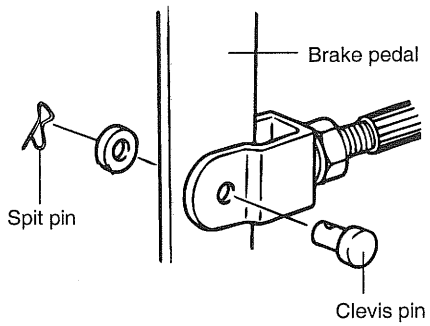
INSTALLATION EJNC0120

1. When the booster assembly is installed, replace the packing at each end of the booster mounting holder, if necessary.
2. Install the brake booster and tighten the mounting nuts.

Tightening torque :

13-16 Nm (130-160 kgf.cm, 10-12 lb.ft)

3. Apply sufficient grease inside the brake pedal hole.
4. Connect the clevis to the brake pedal with the clevis pin and install the split pin to the clevis pin.



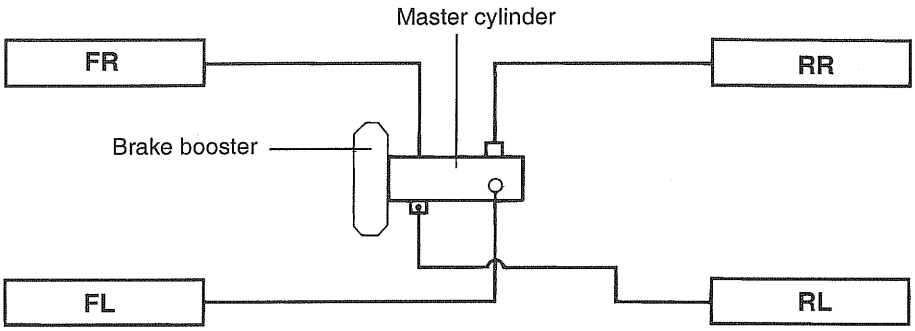
KSRBR05B

5. Install the master cylinder and connect the brake tube to the master cylinder.
6. Connect the vacuum hose to the brake booster.
7. Fill the brake reservoir with brake fluid and bleed the system.
8. Check for fluid leakage.
9. Check and adjust the brake pedal.
10. After installation, apply sufficient grease to contact points of the clevis and brake pedal.

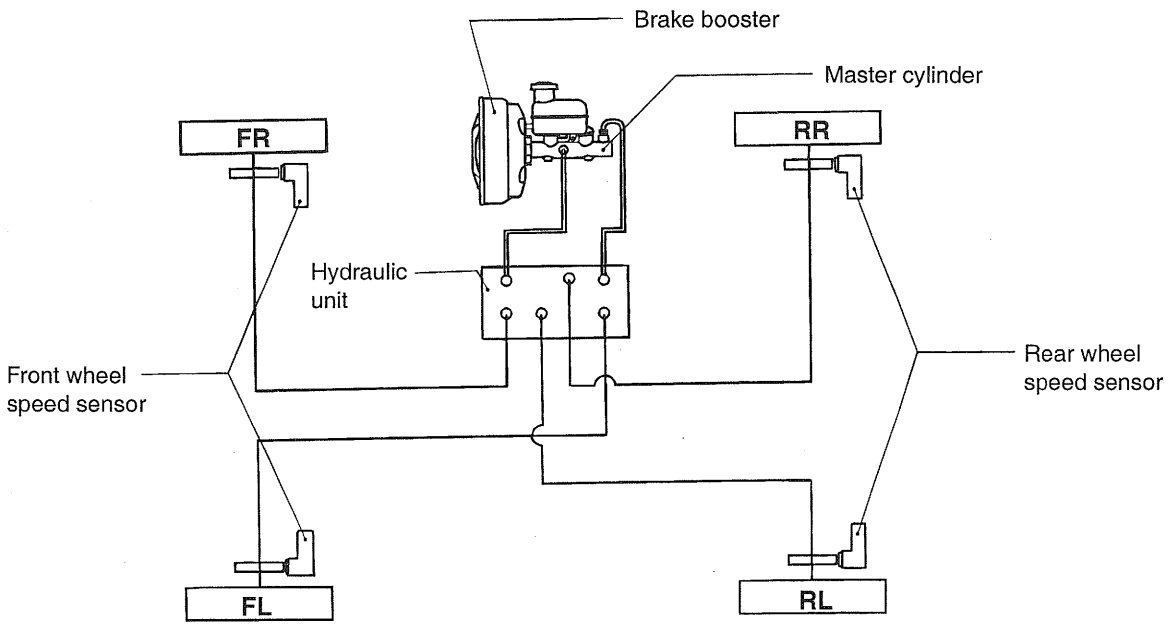
BRAKE LINE

COMPONENTS EJKB0210

[CBS]



[ABS]



AXDBR04B

INSPECTION EJDA0630

1. Check the brake tubes for cracks, crimps and corrosion.
2. Check the brake hoses for cracks, damage and leakage.
3. Check the brake tube flare nuts for damage and leakage.

INSTALLATION EJNC0150

1. Install the brake hoses so as they do not twist.
2. The brake tubes should be installed away from edges, weld beads or moving parts.
3. Tighten the connections to the specified torque.

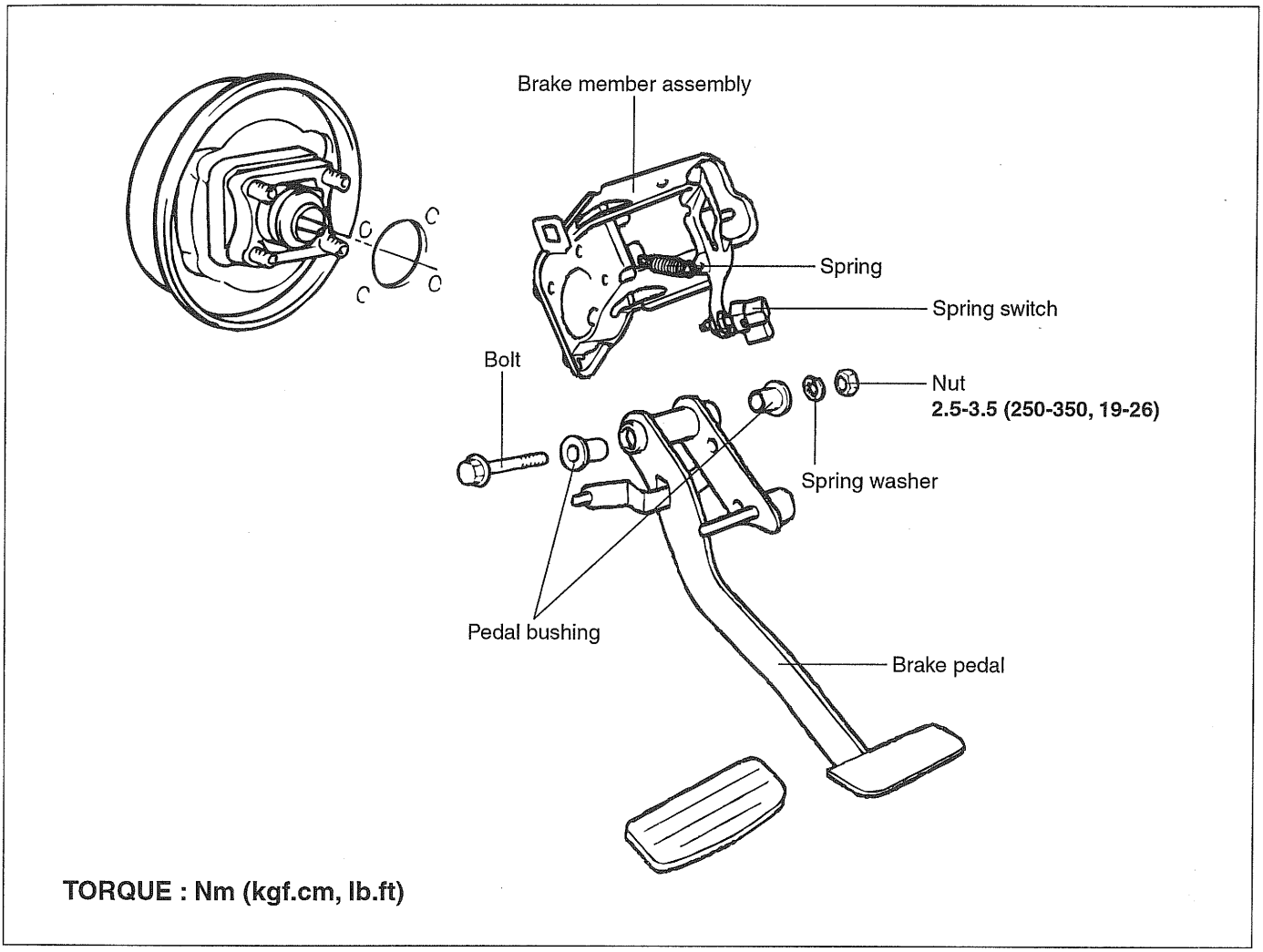
Flare nuts : 13-17 Nm (130-170 kgf·cm, 10-12 lb·ft)

Brake hose to front caliper :

25-30 Nm (250-300 kgf·cm, 18-22 lb·ft)

BRAKE PEDAL

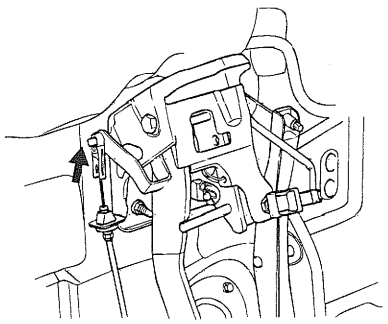
COMPONENTS EJNC0160



EJNC016A

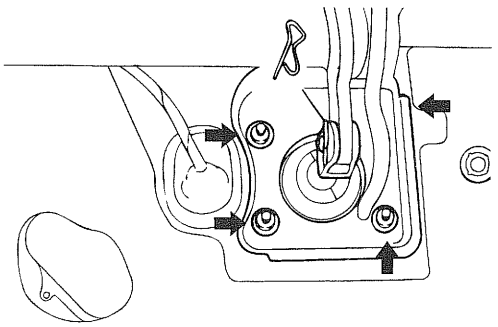
REMOVAL EJNC0170

1. Remove the stop lamp switch.
2. Remove the shift lock cable (ABS).



KFCBR20A

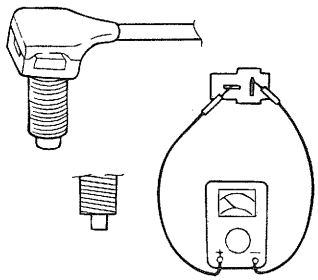
3. Remove the split pin and clevis pin.
4. Remove the flange nuts of the brake mounting bracket.
5. Remove the brake pedal assembly.



EJKB010A

INSPECTION EJDA0510

1. Check the bushing for wear.
2. Check the brake pedal for distortion.
3. Check the brake pedal return spring for damage.
4. Check the stop lamp switch
   1) With an ohmmeter connected to the stop lamp switch terminals, check for continuity.
   2) If there is no continuity when the plunger is depressed and there is continuity when the plunger is released, the stop lamp switch is normal.



Brake switch check

EJDA026A

INSTALLATION EJNC0190

1. Installation is the reverse of removal.

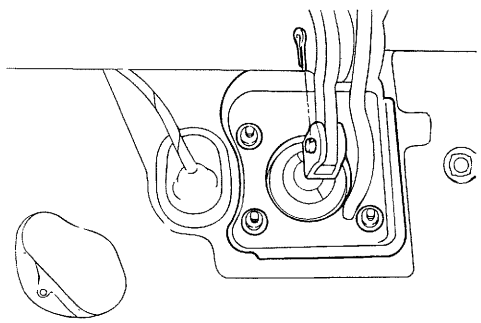
   NOTE

   Be sure to install the split pin on the operating rod clevis pin.

2. Install the brake pedal assembly and tighten the flange nuts (booster mounting nuts) and bolt.

Tightening torque :

9-14 Nm (90-140 kgf.cm, 7-10 lb.ft

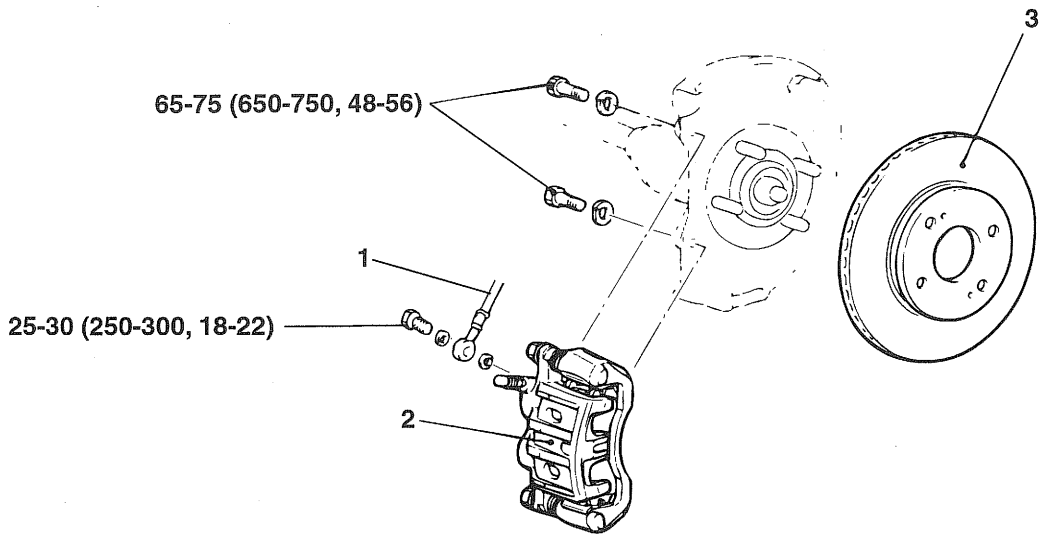


EJDA025B

3. Adjust the brake pedal height and free play.
4. Install the stop lamp switch.

FRONT DISC BRAKE

COMPONENTS EJNC0200



Removal order
1. Connecting tube
   (Brake hose and brake tube)
2. Front brake assembly
3. Brake disc

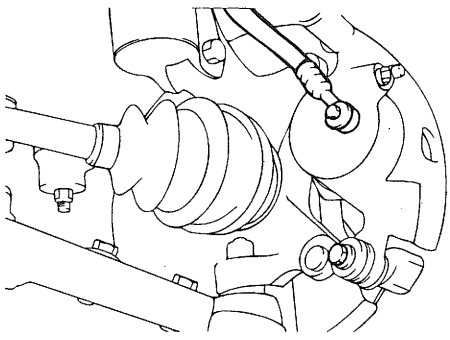
TORQUE : Nm (kgf.cm, lb.ft)

EJNC020A

BRAKE PAD EJKB0240

REMOVAL

1. Remove the lower bolt and lift the caliper assembly up and secure it with a wire or some other retaining method.
2. Remove the pads.



EJDA032A

⚠ ***CAUTION***

Do not depress the brake pedal while disassembling the pads.

INSPECTION EJKB0250

1. Check the pads for wear or oil contamination and replace, if necessary.

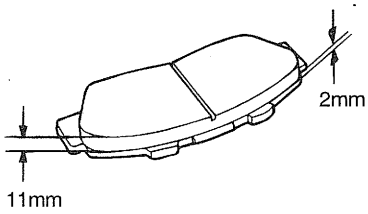
> ⚠ ***CAUTION***
>
> - ***The pads for the right and left wheels should be replaced at the same time. Never "drop" or intermix brake pad sets.***
> - ***All four pads must be replaced as a complete set.***
> - ***When replacing the brake pad, check for deformation. When replacing the guide spring, use a new one or the used one after cleaning away foreign material.***

2. Check the pad for damage or deformation.

Brake pad thickness :

Standard value : 11mm (0.433 in.)

Service limited value : 2mm (0.0788 in.)

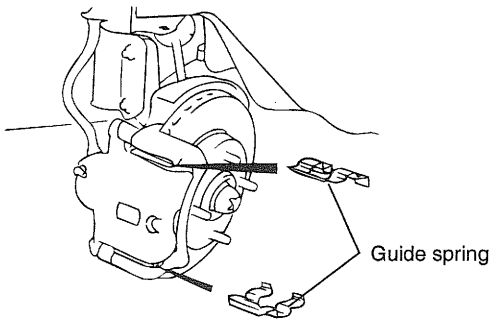


KXDBR04A

INSTALLATION EJNC0230

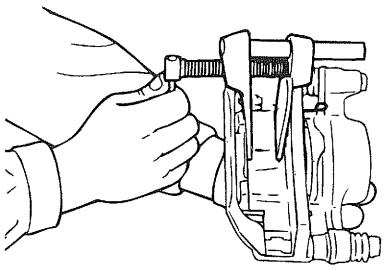
1. Install the pad clips.
2. Install the pads onto each pad clip.

> 📖 ***NOTE***
>
> *Position the pad with its pad wear indicator upward on the piston side.*



EJDA033A

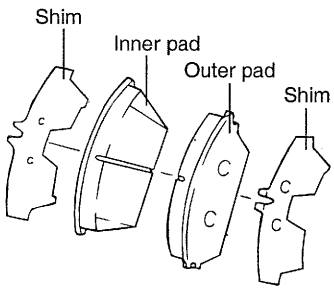
3. Insert the piston in the cylinder using the Special Tool (09581-11000).



EJDA033B

4. Install the new pads. The shims are attached to the each pad as illustrated.

> ⚠ ***CAUTION***
>
> ***Be careful so that the disc or pad isn't contaminated by grease.***

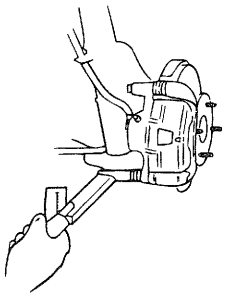


EJDA033C

5. Install the bolt and tighten to the specified value.

Tightening torque

Guide rod bolt : 22-32 Nm (220-320 kgf·cm, 16-24 lb·ft)

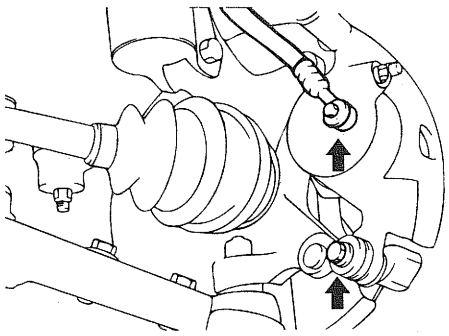


EJDA033D

CALIPER ASSEMBLY EJKB0270

REMOVAL

1. Remove the wheel and tire.
2. Disconnect the brake hose.
3. Remove the cylinder mounting bolt.
4. Remove cylinder and pads.
5. Remove the caliper mounting bolts (2EA) from the knuckle.
6. Remove the caliper.

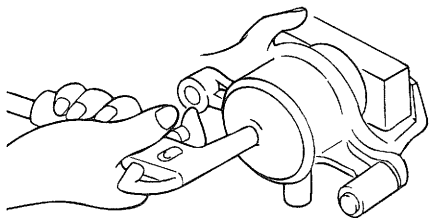


EJKB027A

DISASSEMBLY EJKB0280

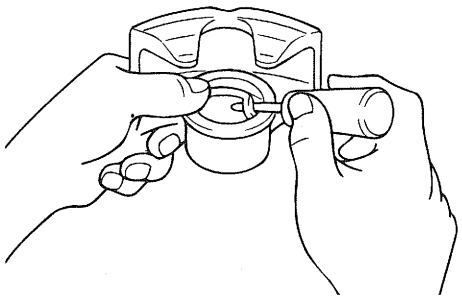
1. Remove the piston boot.
2. Remove the piston using compressed air.

> **NOTE**
> 1. *Do not put your fingers in front of the piston when using compressed air.*
> 2. *Be careful not to splatter the brake fluid.*



EJDA034A

3. Remove the piston seal from the caliper by using a screwdriver.



EJDA034B

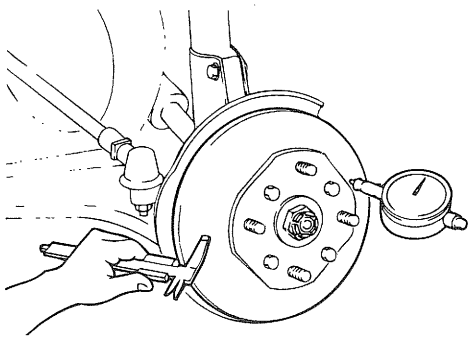
INSPECTION EJKB0290

1. Check the caliper for wear, damage, cracks and dust.
2. Check the piston for dust, damage, cracks and wear on the outer surface.
3. Check the sleeve and pin for damage and dust.
4. Check the pad spring and boots for damage.
5. Check the carrier for damage, dust, wear and cracks.

> **CAUTION**
> 1. ***Do not use sand paper on the piston surface.***
> 2. ***All rubber parts must be replaced with new parts.***

6. Inspect the disc by using a calipers and a dial gauge.

Thickness of disc mm (in.)
Standard value : 24 (0.95)
Service limit : 22.4 (0.88)
Runout of the disc mm (in.) : 0.08 (0.003)
Difference of thickness : 0.01mm (0.0004 in.)



EJKB029A

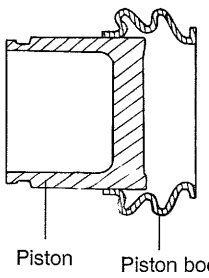
NOTE

1. *Using a micrometer, measure the disc thickness at eight positions approximately 10mm from the outer edge of the disc and at 45° intervals.*
   If you substract the minimum of measurements from the maximum, you get the difference of the disc thickness.
2. *When measuring the disc runout, fix a dial gauge approximately 5mm from the outer edge of the disc, and rotate the disc 360°.*
   At this time, if you subtract the minimum of measurements from the maximum, you get the disc runout.

7. If necessary, replace the brake disc.

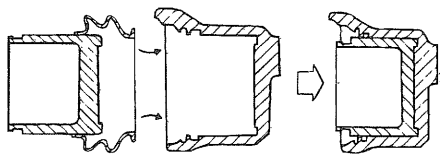
REASSEMBLY EJNC0250

1. Clean all components except the pads and shims with isopropyl alcohol.
2. Apply rubber grease on the piston seal and install the piston seal in the cylinder.



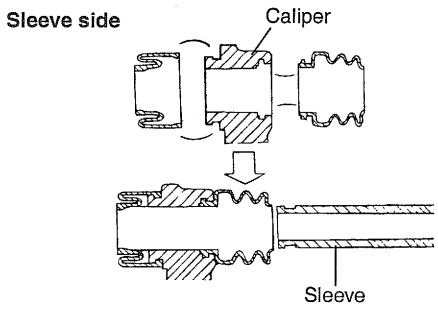
EJDA035A

3. Assemble the piston and piston boots according to the following procedure.
   1) Apply rubber grease to the caliper bore, the outside surface of the piston and the piston boot.
   2) Install the piston boot on the piston as illustrated.
   3) Insert the piston boot in the inner groove of the caliper and push the piston into the caliper.

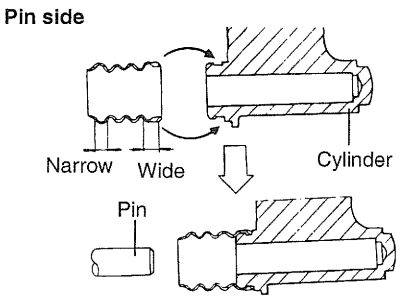


EJDA035B

4. Assemble the sliding parts according to the following procedure.
   1) Apply rubber grease to the outside surface of the sleeve and pin, pin and sleeve bore of the caliper, pin boot and sleeve boot.
   2) Insert the boot into the groove of the caliper.



EJDA035C

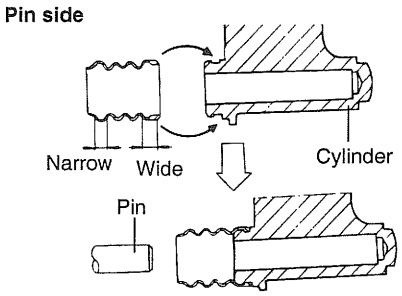


EJDA035D

5. Install the pads.

NOTE

Be careful so that the disc or pad is contaminated by grease



EJDA035D

6. Tighten the brake hose connecting bolt.

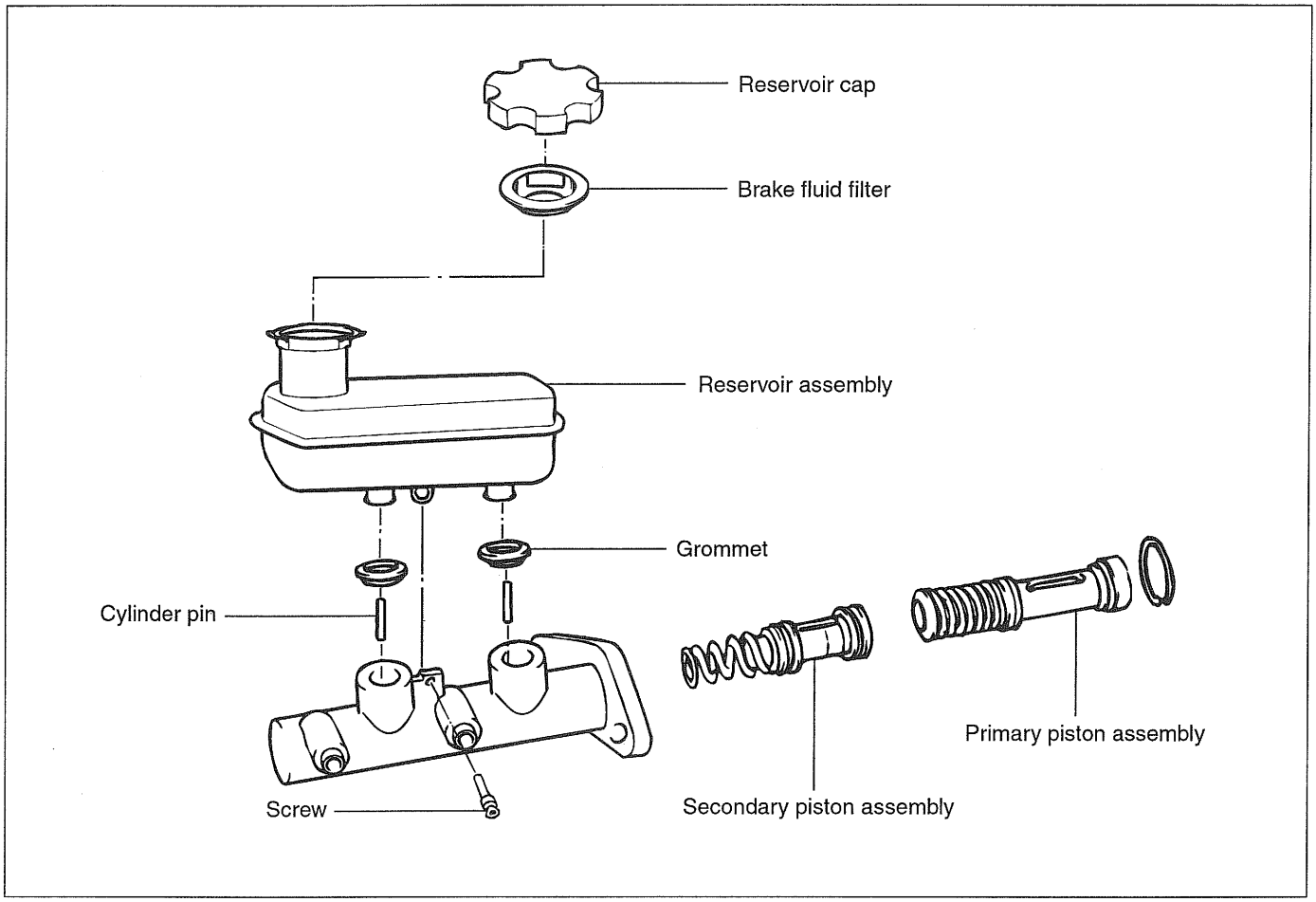
Tightening torque	Nm (kgf.cm, lb.ft)
Sliding pin	34-44 (350-450, 26-33)
Sliding bolt	22-31 (220-320, 16-23)
Carrier mounting bolt	65-75 (650-750, 48-54)
Brake hose mounting bolt	25-30 (250-300, 18-22)

NOTE

1. *Check that the surface of the pin and bolts is not damaged before tightening.*
2. *Bleed the system. Depress the pedal several times and check for fluid leakage from all connecting parts.*

MASTER CYLINDER

COMPONENTS EJNC0260



EFCBR08A

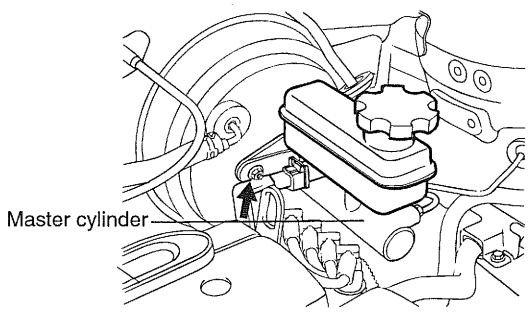
REMOVAL EJNC0270

1. Remove the fluid level warning device connector.
2. Detach the brake tubes from the master cylinder, and then install the plug.

   ⚠ ***CAUTION***

   Painted on the surface, wash it off immediately. If there is brake fluid.

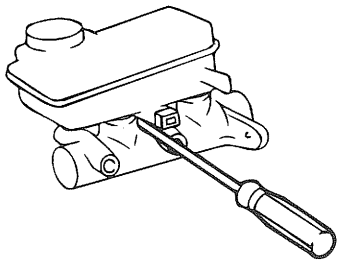
3. Remove master cylinder mounting nuts and then lift out the master cylinder.



EFCBR03A

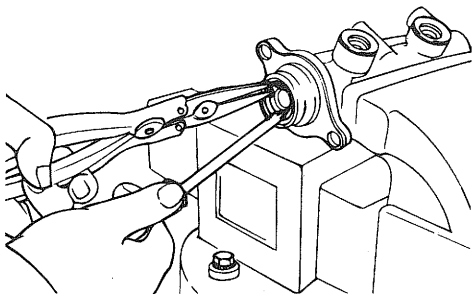
DISASSEMBLY EJNC0280

1. Remove the reservoir cap and drain the brake fluid into a suitable container.
2. After disconnecting the mounting screws, pry the reservoir free from the master cylinder.



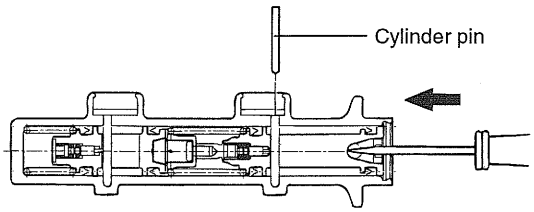
KFCBR09A

3. Using snap ring pliers, remove the retainer ring.



X58-012C

4. Remove the primary cylinder pin, pushing the primary piston with a screwdriver and remove the primary piston assembly.

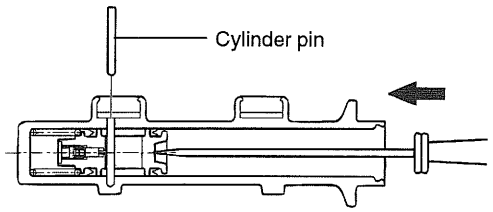


EFCBR40A

5. Remove the secondary cylinder pin. Push the secondary piston with a screwdriver and remove the secondary piston assembly.

NOTE

Do not disassemble the primary and secondary piston assembly.



EFCBR41A

INSPECTION EJJB0140

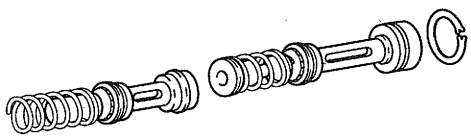
1. Check the master cylinder bore for rust or scoring.
2. Check the master cylinder for wear or damage. If necessary, clean or replace the cylinder.

NOTE

1. *If the cylinder bore is damaged, replace the master cylinder assembly.*
2. *Wash the parts in alchohol.*

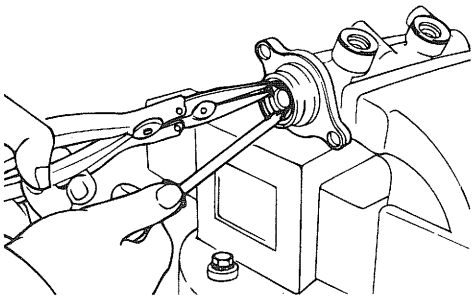
REASSEMBLY EJNC0300

1. Apply genuine brake fluid to the rubber parts of the cylinder kit and grommets.



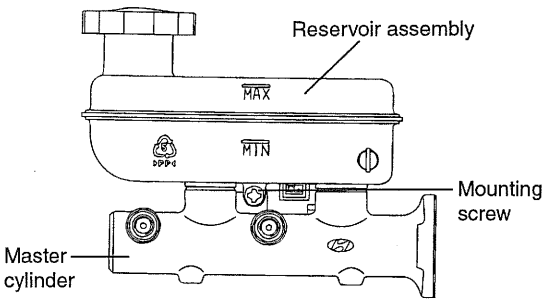
KFW8016A

2. Carefully insert the springs and pistons in the proper direction.
3. Press against the pistons with a screwdriver and install the retainer ring.



X58-012C

4. With the piston pushed completely by a screwdriver, install the cylinder pin.
5. Mount two grommets.
6. Install the reservoir on the cylinder.



EFCBR10A

INSTALLATION EJJB0160

1. Install the master cylinder to the brake booster.
2. Install the booster and master cylinder to the dash panel.
3. Connect the brake tubes to the master cylinder.
4. Install the vacuum hose tightly.
5. Connect the operating rod to the brake pedal.
6. After filling the brake reservoir with the brake fluid, bleed the system.

⚠ ***CAUTION***

Don't disassemble the brake booster.

PROPORTIONING VALVE

PROPORTIONING VALVE EJNC0320

The proportioning valve distributes the proper fluid pressure to the front and rear wheels to obtain greater braking efficiency and prevents premature rear wheel lock-up. You should not disassemble it because the performance of the valve is closely connected with the mounting tension of the spring.

PROPORTIONING VALVE FUNCTION TEST

1. Remove the proportioning valve from the master cylinder.
2. Connect two pressure gauges; one to the input side, and one to the output side.

   NOTE

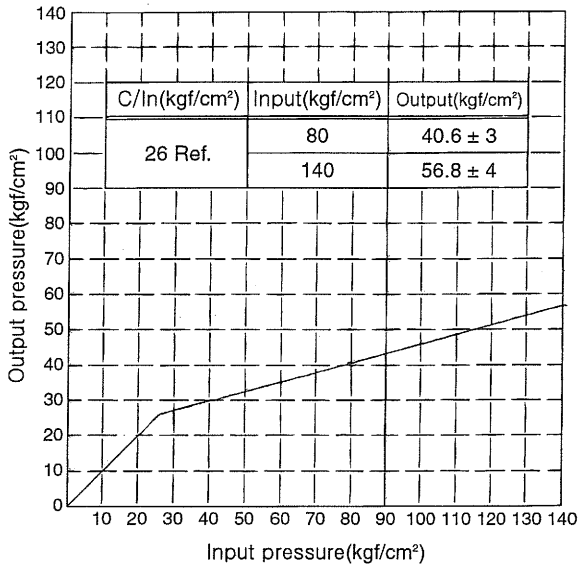
   Be sure to bleed the system after connecting the pressure gauges.

3. With the brakes applied, measure the input pressure and the output pressure. If the measured pressures are within the specified range as illustrated, the proportioning valve is good.
4. Reconnect the brake lines in their original positions and bleed the system.

   NOTE

   This figure shows characteristics of the proportioning valve as the pressure incrases.

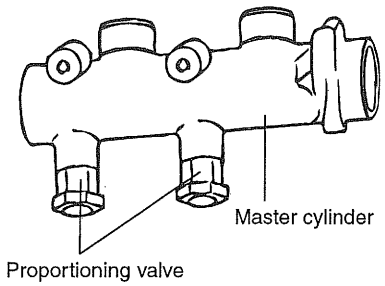
ITEMS	STANDARD VALUE
A (80 kgf/cm²)	A′ (40.6 ± 3 kgf/cm²)
B (140 kgf/cm²)	B′ (56.8 ± 4 kgf/cm²)



EFCBR80A

INSTALLATION OF PROPORTIONING VALVE EJNC0330

1. Install the master cylinder according to the illustration.



EFCB001A

2. Tighten the flare nuts and bleed the system.

Tightening torque

Brake tube flare nut :

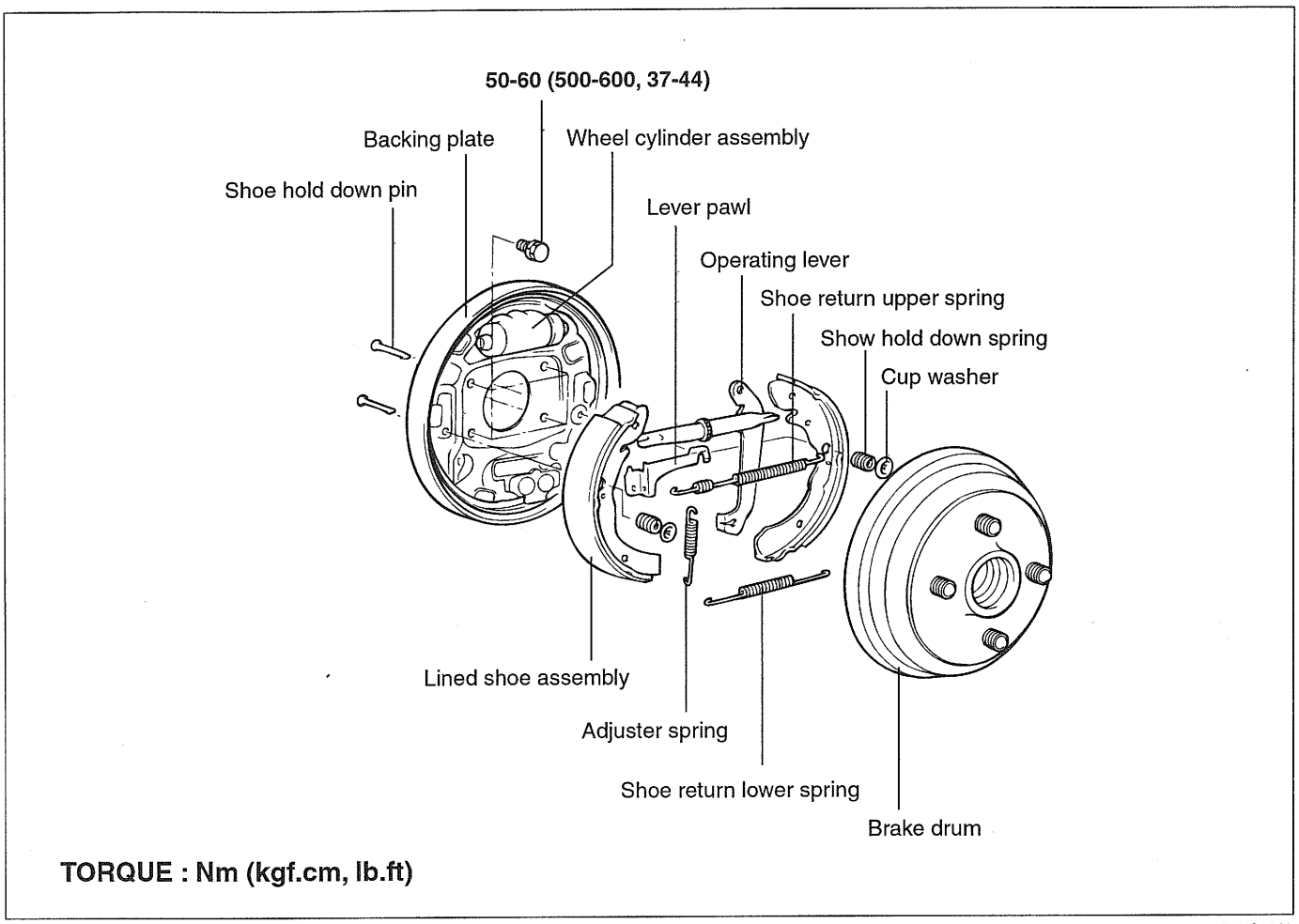
13-17 Nm (130-170 kgf.cm, 9-12 lb.ft)

Proportioning valve mounting nut :

35-55 Nm (350-550 kgf.cm, 30-40 lb.ft)

REAR DRUM BRAKE

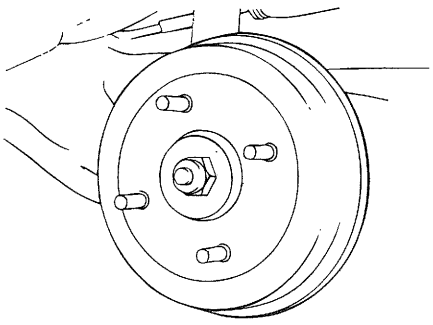
COMPONENTS EJNC0340



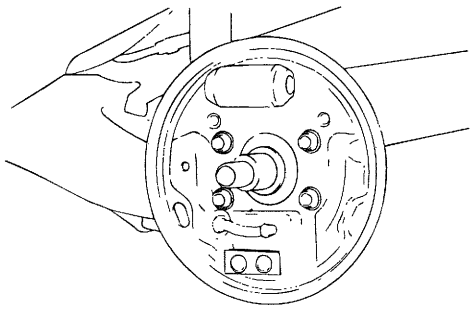
EJNC034A

REMOVAL EJNC0350

1. After removing the wheel, remove the brake drum.



KFCBR90A



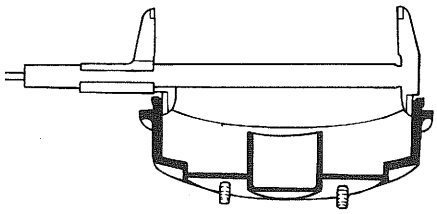
KFCBR91A

2. Remove the shoe return lower spring and shoe hold down spring.
3. Remove the shoes and adjuster as an assembly.

INSPECTION EJKB0320

1. Measure the inside diameter of the brake drum. Check the runout of the brake drum by using a dial indicator.

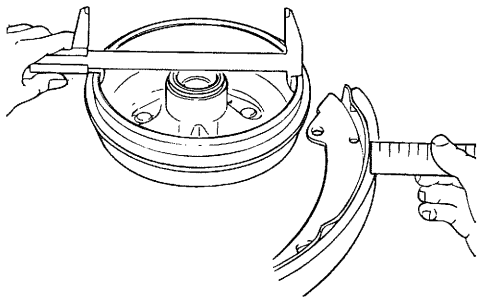
	Standard value	Service limit
Inside diameter mm (in.)	203.2 (8)	205.2 (8.079)
Out-of-round (brake drum) mm (in.)	-	0.05 (0.002)



EJDA038A

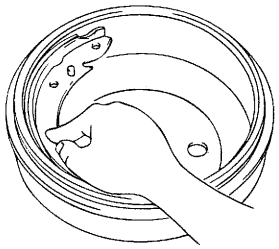
2. Measure the brake shoe lining thickness.

	Standard value	Service limit
Lining thickness mm (in.)	4.5 (0.177)	1.5 (0.059)



EJDA038B

3. Inspect the brake lining and drum for proper contact.
4. Inspect the wheel cylinder outside for excessive wear and damage.
5. Inspect the backing plate for wear or damage.



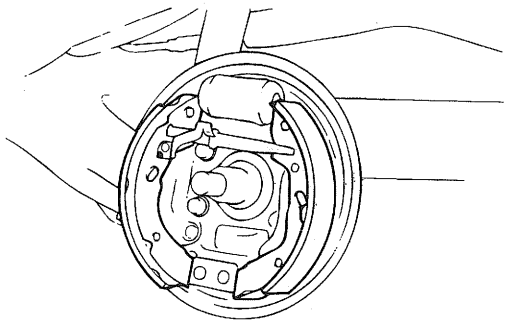
EJDA038C

INSTALLATION EJNC0370

1. Apply the specified grease to the locations indicated in the illustration and to each component.
   - Shoe and backing plate contact surfaces.
   - Shoe and anchor plate contact surfaces.

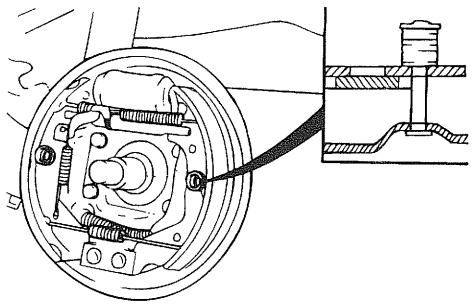
Recommended grease :

Multipurpose grease SAE J310, NLGI No.2



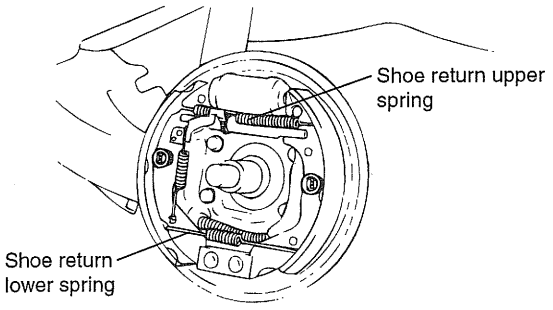
KFCBR92A

2. Install the shoe hold-down pin.



KFCBR93A

3. Assemble the return spring by pressing the push rod.



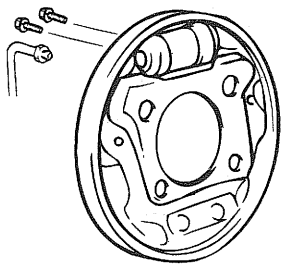
EFCBR94A

4. After assembling the drum and components, pull and release the parking brake lever several times.

REPLACEMENT OF WHEEL CYLINDER

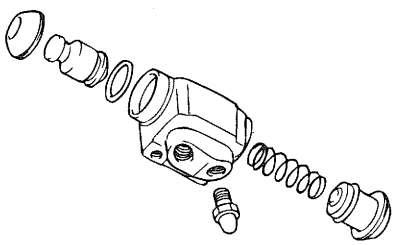
EJKB0340

1. Remove the brake shoe.
2. Disconnect the brake tube.
3. Remove the wheel cylinder assembly.



EXDBR44B

4. Remove the dust boot.
5. Remove the piston and piston cup.
6. Remove the return spring.



EJDA039B

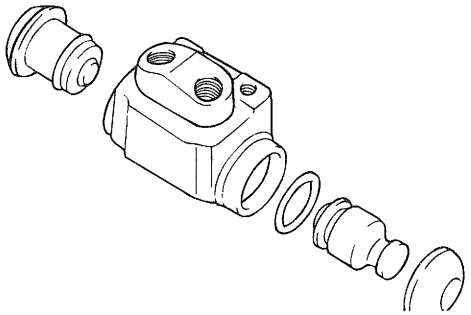
7. Before assembling the wheel cylinder, inspect the following.
   1) Check the cylinder and piston for wear, damage and dust.
   2) Check the cylinder body for damage and cracks.
   3) Check the contact surface of the piston and shoes for wear.
   4) Check the piston spring for looseness.
8. Assembly is the reverse of removal.

NOTE

1. Clean the cylinder with isopropyl alcohol before assembly.
2. Apply enough brake fluid to the piston cups and cylinder.
3. Be sure to use new piston cups and dust boots.

CAUTION

Be careful not to lose the steel ball in the bleeder.

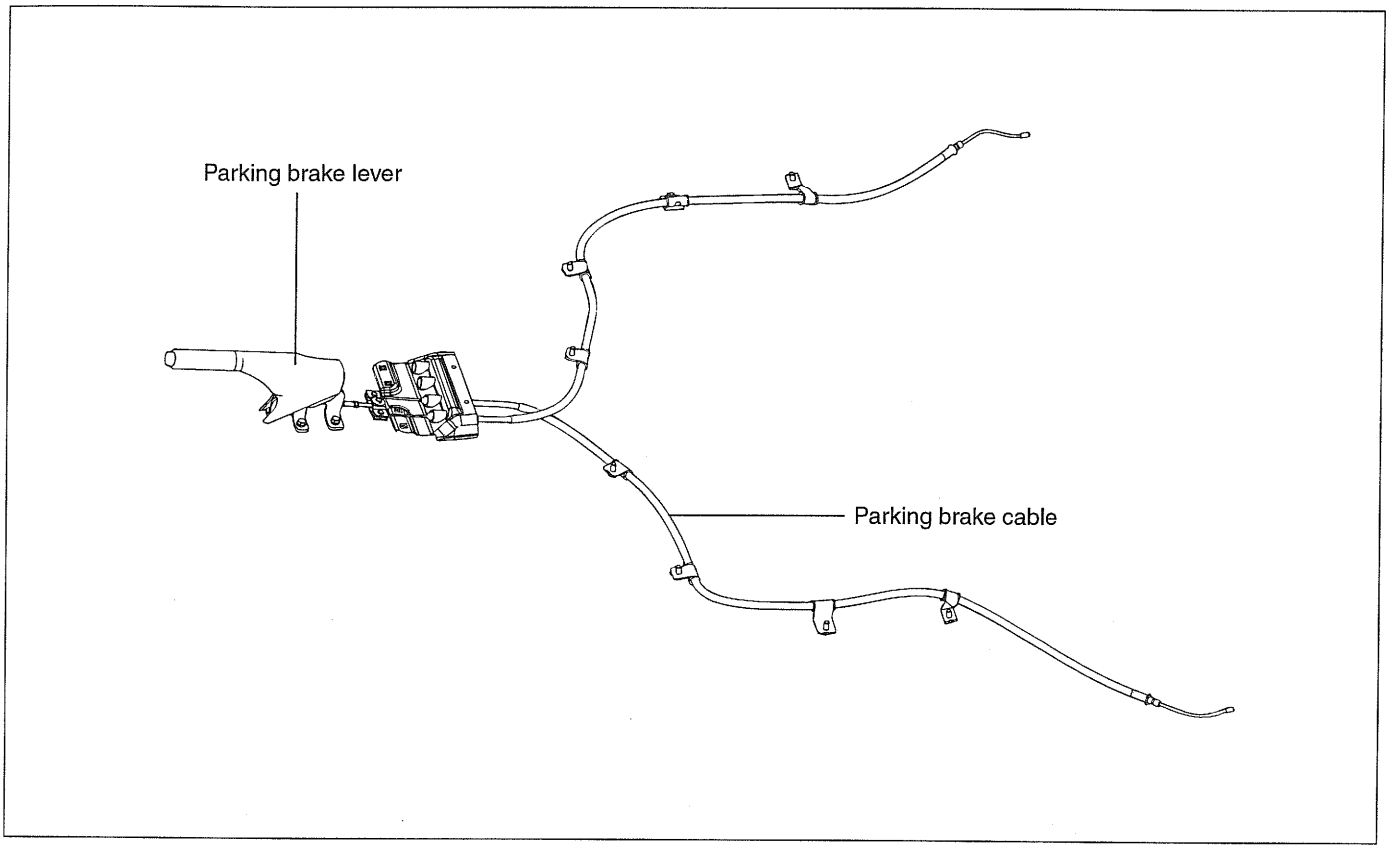


EJDA039C

PARKING BRAKE SYSTEM

PARKING BRAKE

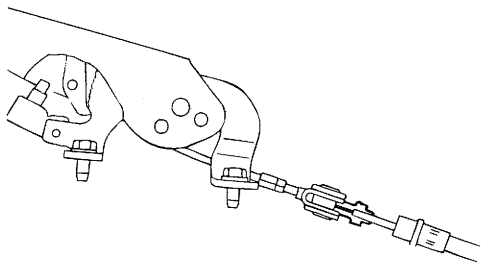
PARKING BRAKE EJNC0390



EJNC039A

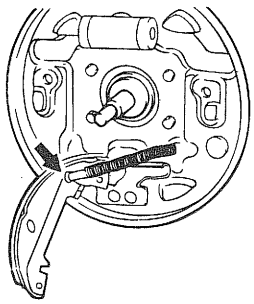
REMOVAL EJNC0400

1. Remove the rear console.
2. Loosen the adjusting nut and detach the parking brake cable.
3. Detach the parking brake switch assembly.
4. Remove the parking brake lever assembly.



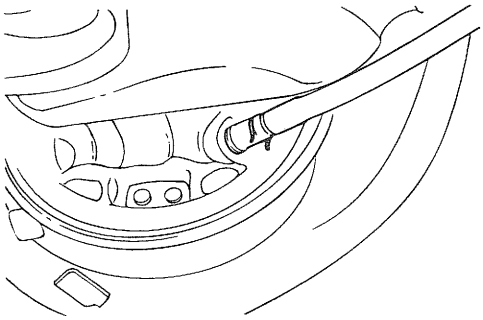
KFCBR13A

5. Remove the rear wheel.
6. Remove the brake drum.
7. Detach the parking brake cable from the brake shoe.



EJDA041B

8. Remove the parking brake cable retaining ring in the rear of the backing plate.



EJDA041C

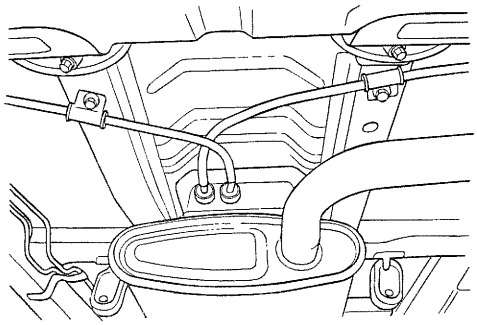
9. Loosen the parking brake cable clamp and remove the parking brake cable assembly.

INSPECTION EJKB0400

1. Check the parking brake switch operation.
2. Check the parking brake lever ratchet for wear.
3. Check the parking brake cable for wear or damage.

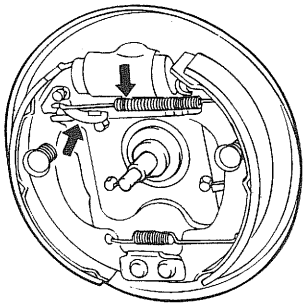
INSTALLATION EJNC0440

1. Check the parking brake cables for left and right and install accordingly.



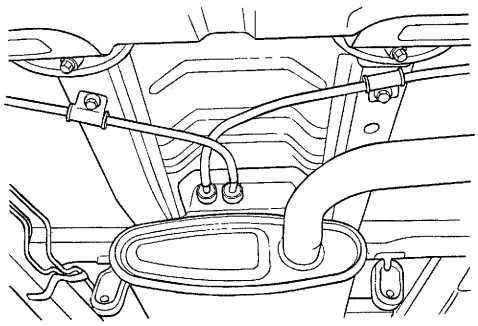
KFCBR30A

2. Move the adjusting lever back when installing the shoe return spring.



EJDA042A

3. Install the parking brake cable in the direction shown in the illustration.



KFCBR30A

4. Apply the specified grease to the moving parts of the ratchet plate and ratchet pawl.

Specified grease :

Multipurpose grease SAE J310, NLGI No.2

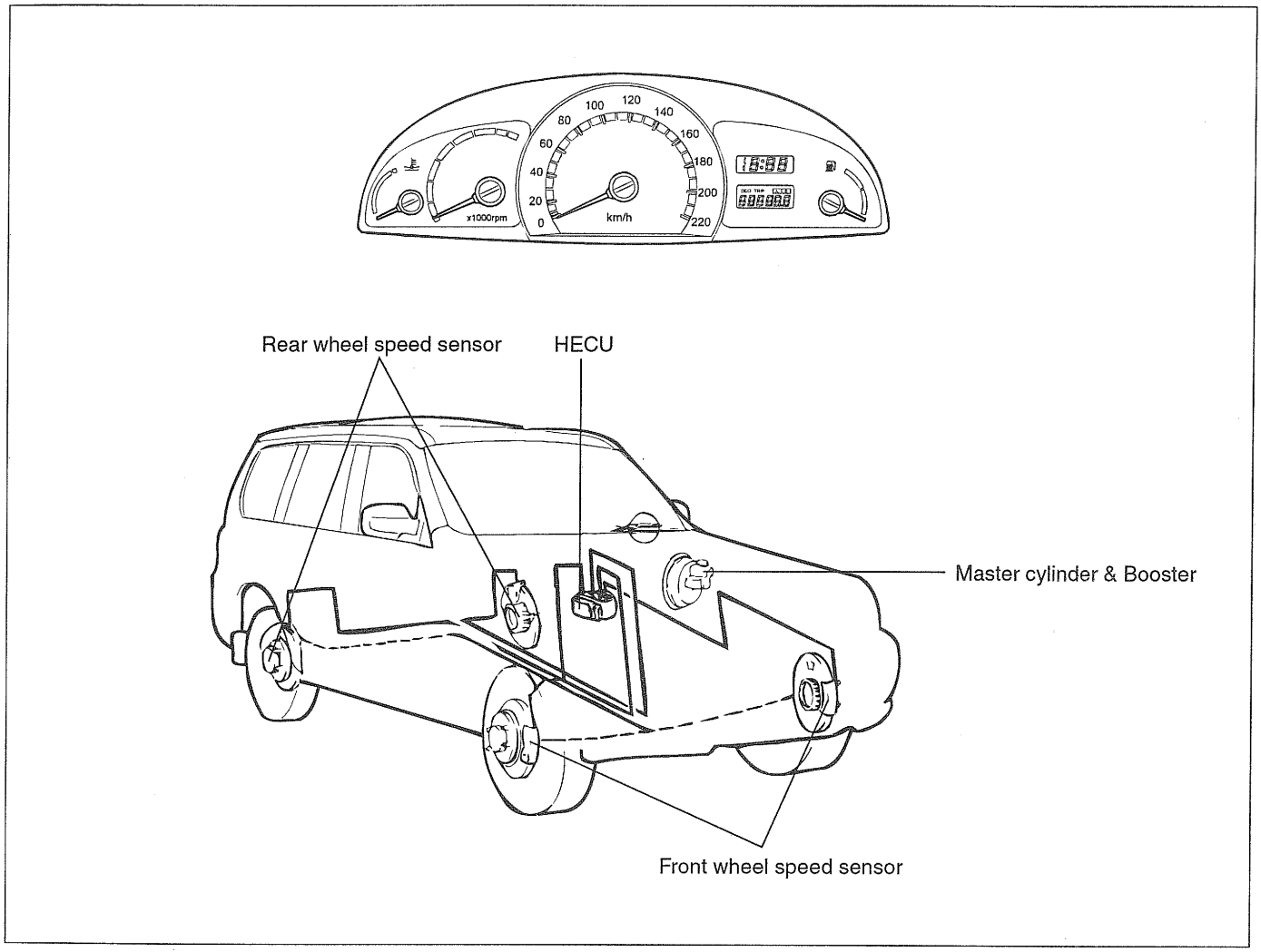
5. After installing the cable adjuster, adjust the parking brake lever stroke.

NOTE

When pulling up the point where is at a distance of 40mm from the end of the lever, adjust the adjusting nut to the lever assembly so that the lever is fixed to 7-8 notches.

ABS (ANTI-LOCK BRAKE SYSTEM)

SYSTEM COMPONENT EJNC5000



EJNC500A

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

1. Enables steering around obstacles with a greater degree of certainty, even during emergency braking.
2. Enables stopping during emergency braking while keeping stability and steerability even on curves.

If a malfunction occurs, a diagnosis function and fail-safe system are included for serviceability.

The Hydraulic and Electronic Control Unit (HECU) receives signals about the vehicle's speed, direction and road conditions from sensors at the wheels.

Based on these signals, the control unit will determine the optimum amount of wheel spin.

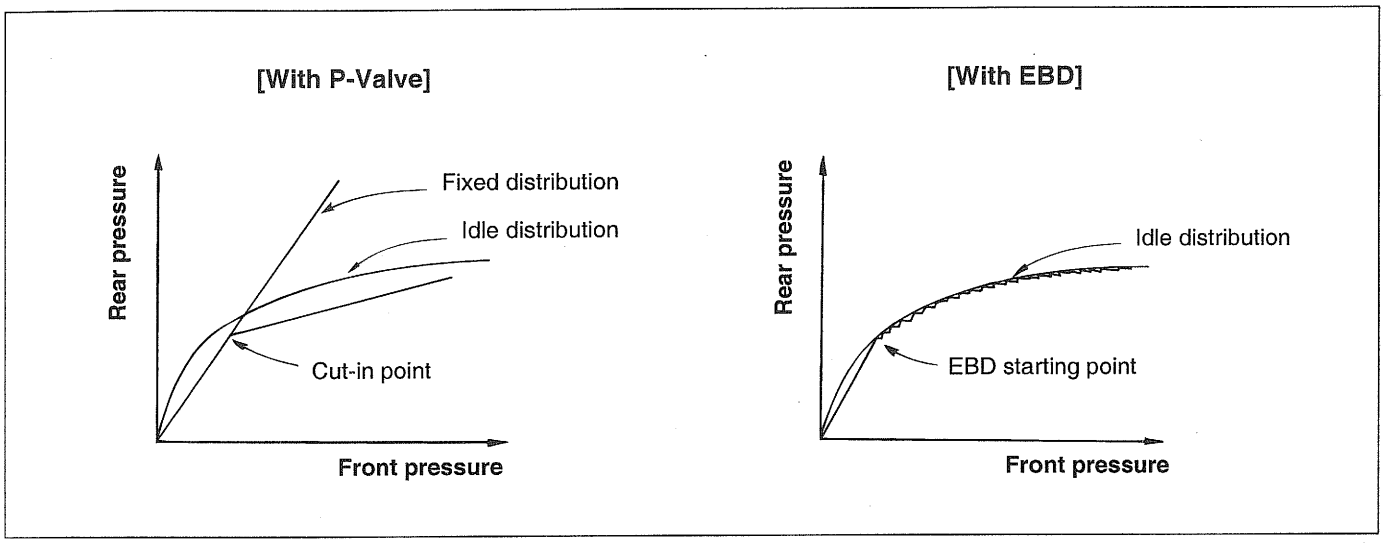
EBD (ELECTRONIC BRAKE-FORCE DISTRIBUTION) EJKB0510

EBD, instead of the proportioning valve, delivers ideal distribution of hydraulic pressure to the front and rear brakes. This prevents rear wheel lock up and provides higher brake efficiency within the range of brake application.

ADVANTAGES

- Functional improvement of the basic-brake system
- Compensation for different friction coefficients
- Elimination of the proportioning valve
- Failure notification by warning lamp

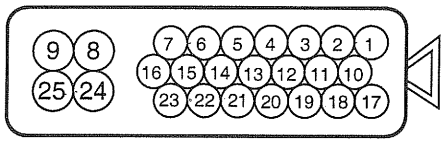
COMPARISON BETWEEN PROPORTIONING VALVE AND EBD



EJA0032A

INSPECTION AT HECU TERMINALS EJKB0520

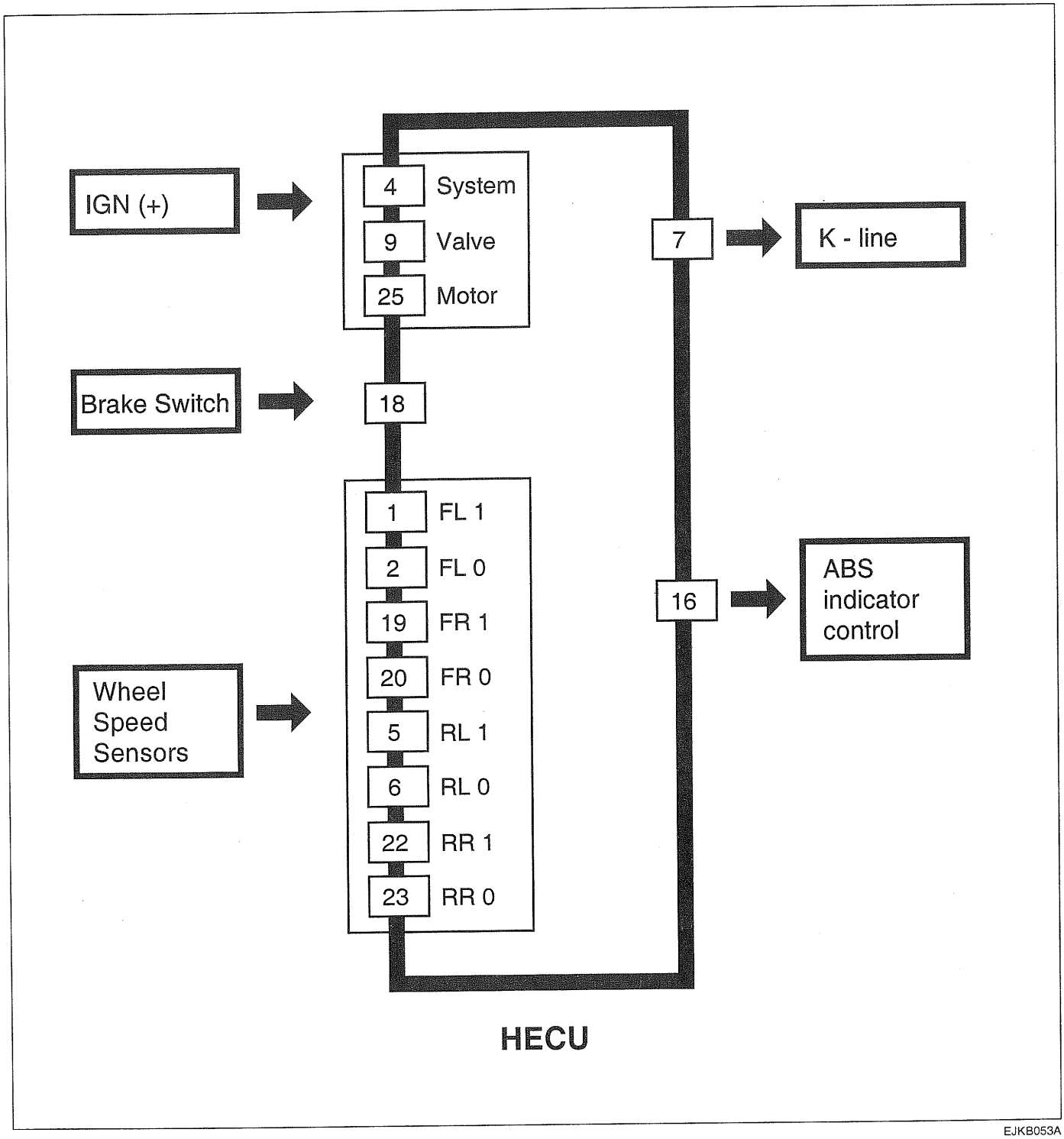
TERMINAL VOLTAGE CHART



EJKB052A

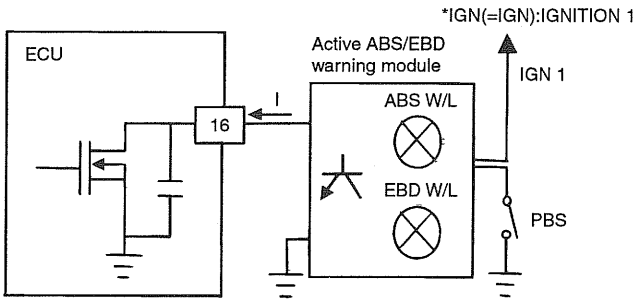
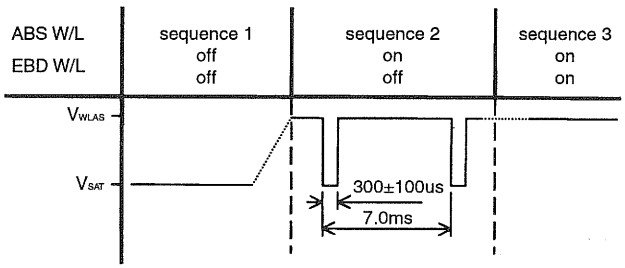
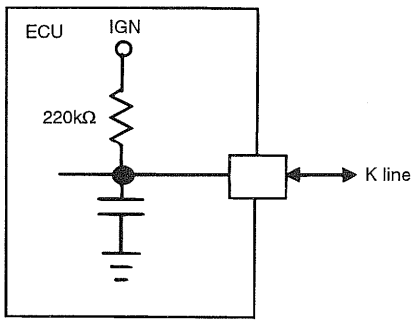
Terminal No.	Description	Condition	Output
9	• Battery power source 1 • Solenoid valve power source	Always	System voltage
8	Ground	Always - In ABS control	
7	Diagnosis interface terminal (K-Line)	Data to the Hi-Scan (Pro)	
6	Wheel speed sensor (Left rear)		Resistance R=1275-1495 Ω
2	Wheel speed sensor (Left front)		
20	Wheel speed sensor (Right front)		
23	Wheel speed sensor (Right rear)		
5	Wheel speed sensor (Left rear)		
1	Wheel speed sensor (Left front)		
19	Wheel speed sensor (Right front)		
22	Wheel speed sensor (Right rear)		
4	Power input via ignition 2 switch	Ignition 2 condition*	High voltage detection : 16 - 20V Suspend voltage detection : 6.5 - 10 V
25	• Battery power source 2 • Motor power source	Always	• System voltage • Max. current < 100A (time < 100 msec) • Rated current < 30A (time > 100 msec)
24	Ground - 2 (Motor)	G17	
16	ABS indicator control	Energized ABS relay	Max. current < 200 mA Max. voltage < 40 V
18	Brake lamp switch input terminal		Input voltage threshold 1.0 - 2.75V 5.0 - 16.0V
17	TCS warning lamp		Max. current < 200mA
13	TCS switch "ON"		Input voltage -1.0 - 16.0V
3	Vehicle speed signal		Max. current < 10mA External resistance : 10kΩ or more

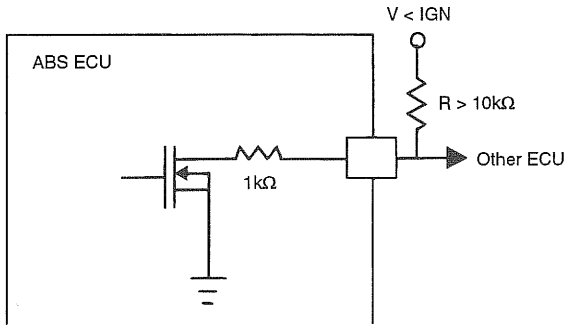
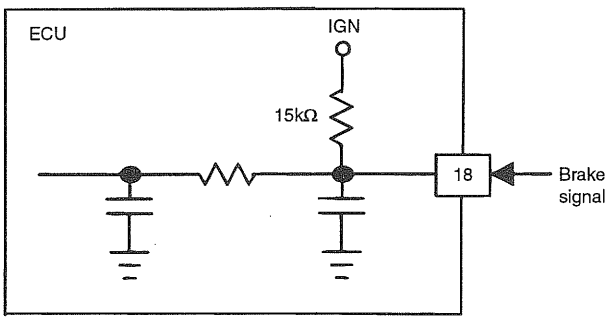
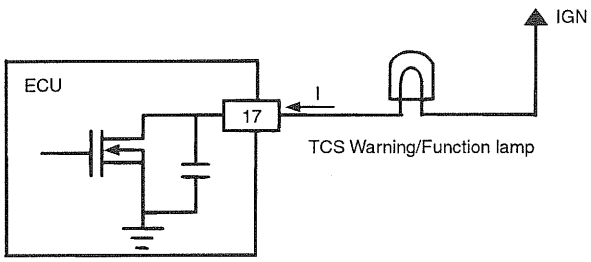
DIAGRAM OF INPUT/OUTPUT FOR HECU EJKB0530



EJKB053A

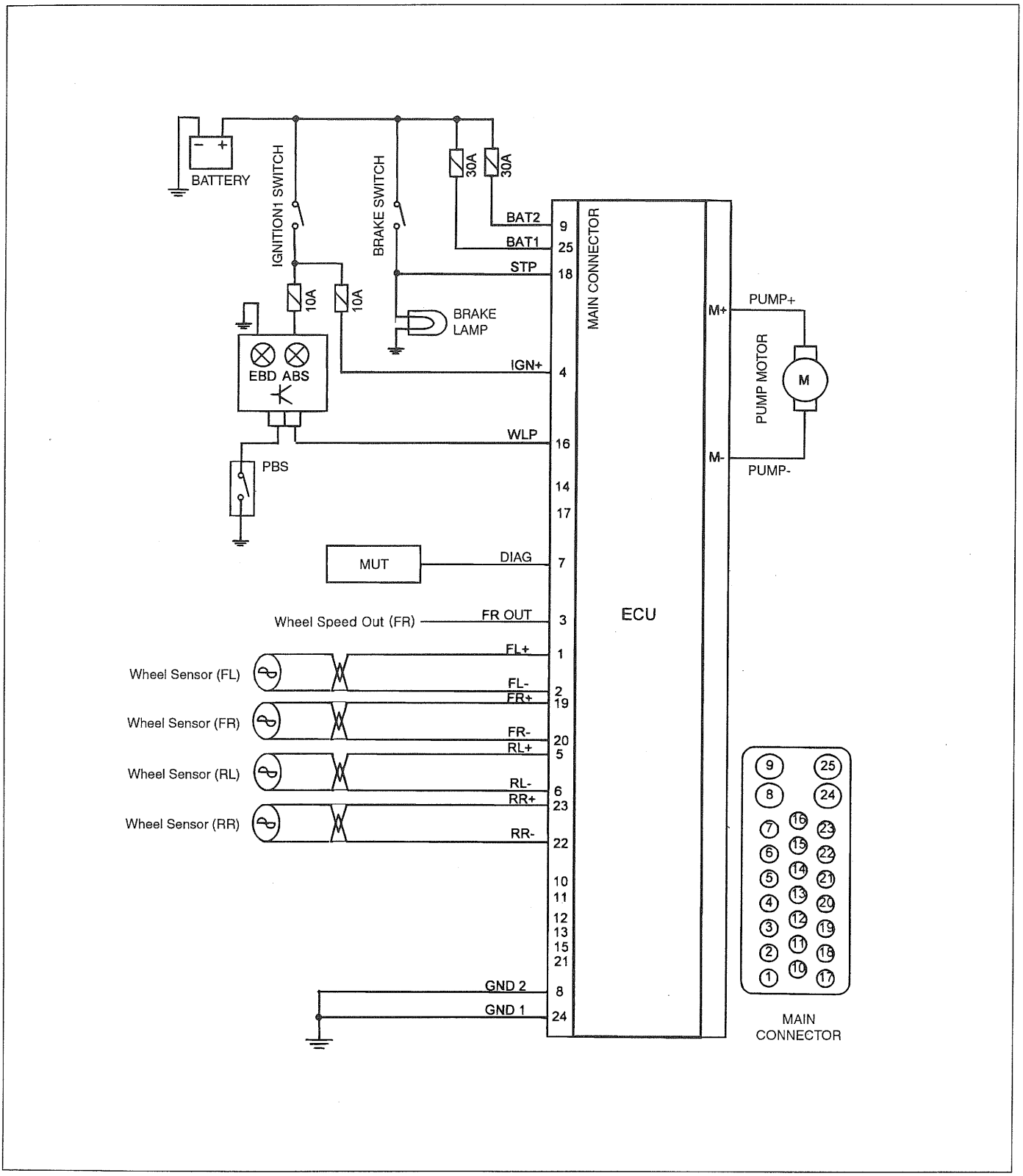
COMPONENT SPECIFICATION EJNC5040

Item	Content
Wheel sensor	Type : Electromagnetic induction type Resistance : 1100Ω ± 50% Output range : 30 - 2000Hz Inductance : 0.7H ± 50%
ABS/EBD Warning lamp circuit	Type : Active ABS and EBD warning module Max. Current : I < 200mA  EJNC504A Timing diagram for driving the ABS and EBD warning lamp module  VWLAS, VSAT : Voltage of ECU side EJNC504B
Diagnosis tester	Communication type : HMC Specification ES 95620-01 Pulled up in ignition voltage by 220kΩ  EJNB053E

Item	Content
Wheel speed output	Max. current : I < 10mA Output voltage : V < IGN External resistor : Must use resistance above 10kΩ.  EJNC504C
Brake lamp switch	Type : Contact type (Normal open) Pulled up in ignition voltage by 15kΩ  EJNC504D
TCS Warning/Function lamp circuit (Only TCS (BTCS or FTCS) system)	Max. current : I < 200mA  EJNC504E

EXTERNAL WIRING DIAGRAM

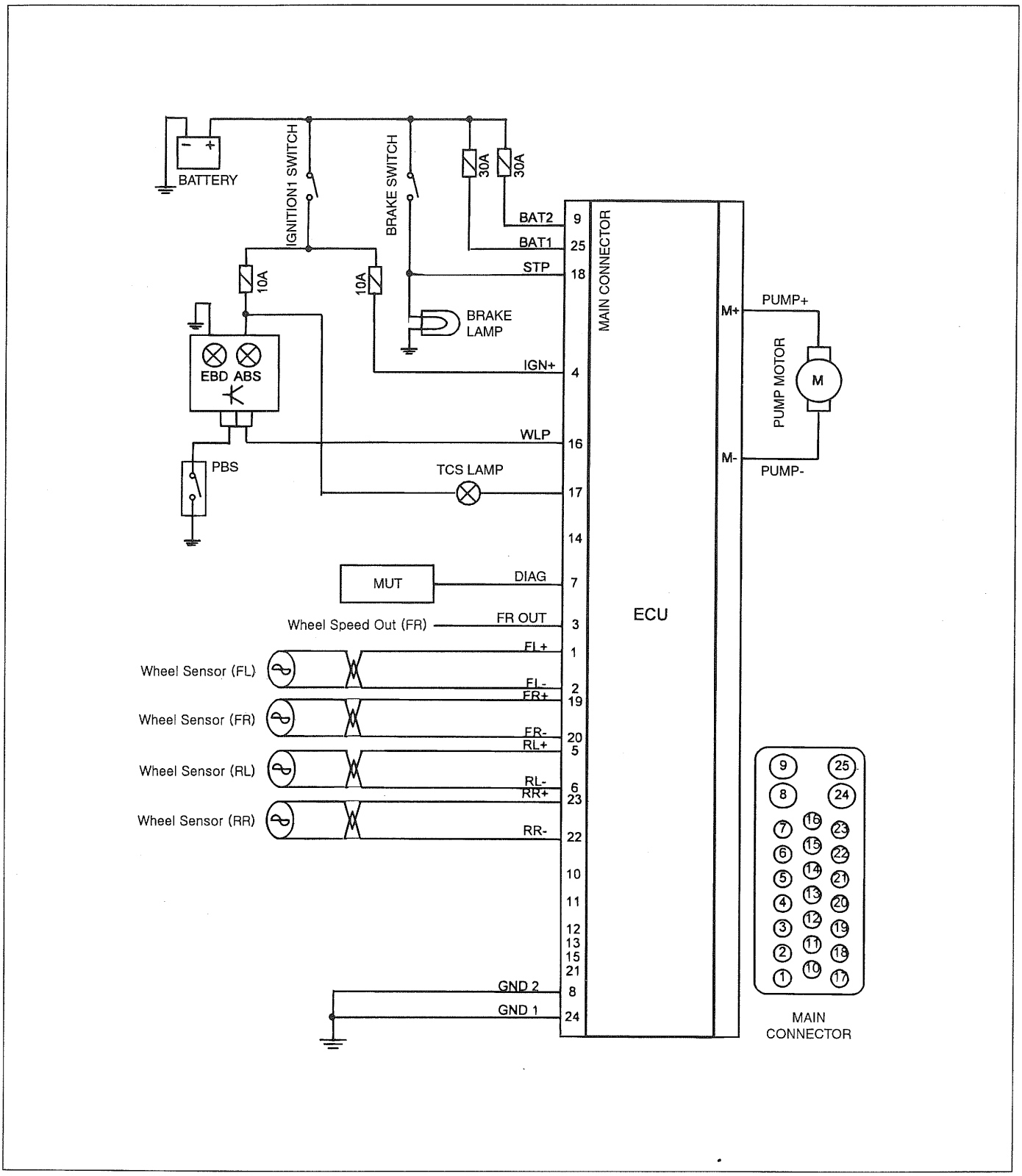
(ABS) EJNC5050



EJNC505A

EXTERNAL WIRING DIAGRAM

(BTCS) EJNC5060



EJNC506A

INPUT/OUTPUT SPECIFICATION EJNC5070

Connector terminal			Specification	Note
No.	Mark	Terminal name		
4	IGN+	Power source via ignition switch terminal	Over voltage range : 16.5 ± 0.5V < V < 20V Operating voltage range : 9.5 ± 0.5V <V < 16.5 ± 0.5V Low voltage range : 8.0V < V < 9.5 ± 0.5V System down range : V < 7.5 ± 0.5V Max. current : I < 300mA	
8 24	GND1 GND2	Ground terminal	Max. current (Total of 2 terminals) : I < 60A	In ABS control
18	BRAKE	Brake lamp switch input terminal	Input voltage (Low) : -1.00 < V_{IL} < 2.00V Input voltage (High) : -7.00 < V_{IH} < 16.00V	
1 19 5 23 2 20 6 22	FL+ FR+ RL+ RR+ FL- FR- RL- RR-	Wheel sensor input terminal	Min. sensor voltage : V_S > 130mV_{PP} Resistance : 1100Ω ± 50% Input range : 30 - 2000Hz Inductance : 0.7H ± 50% Permissible offset voltage range : 2.15V < V_{offset} < 3.5V	
16	WLP	ABS and EBD warning lamp output terminal	Max. current : I < 200mA Saturation voltage, at I = 200mA : V_{sat} < 1.5V	
7	Diag.	Diagnosis interface terminal	Input voltage : V_{IL} < 0.3V_BV, V_{IH}> 0.7V_BV Output voltage : V_{OL} < 0.2V_BV, V_{OH}> 0.8V_BV	V_B : Ignition voltage
3	FR-out	Wheel speed output terminal	Max. current : I < 10mA External pull up resistance : above 10kΩ (Open collector type)	
25	Batt 1	Battery power Source 1 terminal (Valve power source)	Max. current (Inside control) : I <30A Max. current (Outside control) : I < 20mA	
9	Batt 2	Battery power Source 2 terminal (Motor power source)	In ABS control Max. rush current : I < 100A (t < 100 msec) Max. current : I < 30A (t > 100 msec) At IGN off Dark current : I < 0.5mA	t : The running time of motor

BTCS/INPUT OUTPUT SPECIFICATION

(BTCS) EJNC5080

Connector terminal			Specification	Note
No.	Mark	Terminal name		
4	IGN+	Power source via ignition switch terminal	Over voltage range : 16.5 ± 0.5V < V < 20V Operating voltage range : 9.5 ± 0.5V <V < 16.5 ± 0.5V Low voltage range : 8.0V < V < 9.5 ± 0.5V System down range : V < 7.5 ± 0.5V Max. current : I < 300mA	
8 24	GND1 GND2	Ground terminal	Max. current (Total of 2 terminals) : I < 60A	In ABS control
18	BRAKE	Brake lamp switch input terminal	Input voltage (Low) : -1.00 < V_{IL} < 2.00V Input voltage (High) : -7.00 < V_{IH} < 16.00V	
1 19 5 23 2 20 6 22	FL+ FR+ RL+ RR+ FL- FR- RL- RR-	Wheel sensor input terminal	Min. sensor voltage : V_S > 130mV_{PP} Resistance : 1100Ω ± 50% Input range : 30 - 2000Hz Inductance : 0.7H ± 50% Permissible offset voltage range : 2.15V < V_{offset} < 3.5V	
16	WLP	ABS and EBD warning lamp output terminal	Max. current : I < 200mA Saturation voltage, at I = 200mA : V_{sat} < 1.5V	
7	Diag.	Diagnosis interface terminal	Input voltage : V_{IL} < 0.3V_BV, V_{IH}> 0.7V_BV Output voltage : V_{OL} < 0.2V_BV, V_{OH}> 0.8V_BV	V_B : Ignition voltage
3	FR-out	Wheel speed output terminal	Max. current : I < 10mA External pull up resistance : above 10kΩ (Open collector type)	
25	Batt 1	Battery power Source 1 terminal (Valve power source)	Max. current (Inside control) : I <30A Max. current (Outside control) : I < 20mA	
9	Batt 2	Battery power Source 2 terminal (Motor power source)	In ABS control Max. rush current : I < 100A (t < 100 msec) Max. current : I < 30A (t > 100 msec) At IGN off Dark current : I < 0.5mA	t : The running time of motor
17	TCS lamp	TCS Warning/Function lamp output	Max. current : I < 200mA	

BLEEDING OF BRAKE SYSTEM EJKB0540

This procedure should be followed to ensure adequate bleeding of air and filling of the ABS unit, brake lines and master cylinder with brake fluid.

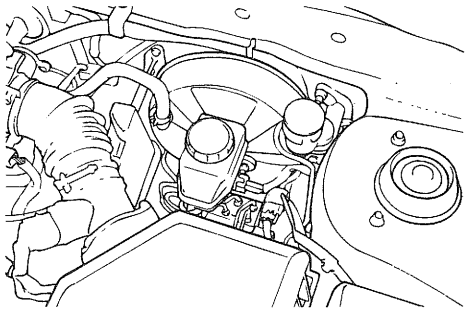
1. Remove the reservoir cap and fill the brake reservoir with brake fluid.

CAUTION

If there is any brake fluid on any painted surface, wash it off immediately.

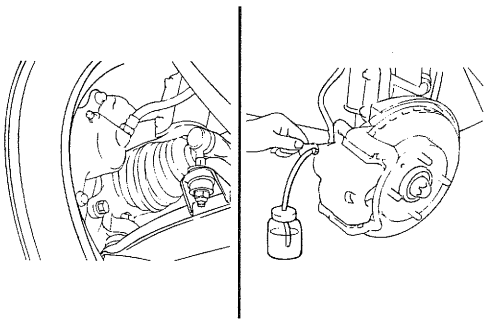
NOTE

When pressure bleeding, do not depress the brake pedal.
Recommended fluid ..... DOT3 or equivalent



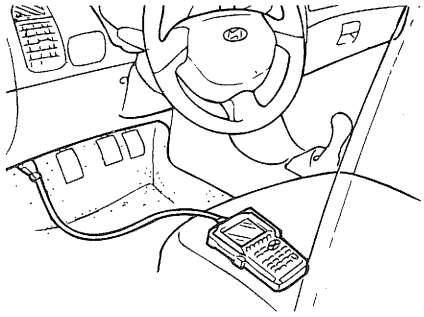
EJDA014A

2. Connect a clear plastic tube to the wheel cylinder bleeder plug and insert the other end of the tube into a half filled clear plastic bottle.



EJDA014I

3. Connect the Hi-Scan (Pro) to the Data Link Connector located underneath the dash panel.



ERDA010A

4. Select and operate according to the instructions on the Hi-Scan (Pro) screen.

CAUTION

You must obey the maximum operating time of the ABS motor with the Hi-Scan (Pro) to prevent the motor pump from burning.

1) Select hyundai vehicle diagnosis.

0. INITIAL SCREEN
01. HYUNDAI VEHICLE DIAGNOSIS
02. TOOL BOX
03. CARB OBD-II DIAGNOSIS
04. FLIGHT RECORD REVIEW
05. SYSTEM SETUP

EJDA014C

2) Select vehicle name.

3) Select Anti-Lock Brake system.

4) Select air bleeding mode.

5) Press 'YES' to operate motor pump and solenoid valve.

1.6 AIR BLEEDING MODE	
ABS AIR BLEEDING STATUS	
01. SOLENOID VALVE STATUS	CLOSE
02. MOTOR PUMP STATUS	OFF
DO YOU WANT TO START ?	
(PRESS [YES] KEY)	

EJDA014F

6) Wait 60 sec. before operating the air bleeding. (If not, you may damage the motor).

1.6 AIR BLEEDING MODE	
ABS AIR BLEEDING STATUS	
01. SOLENOID VALVE STATUS	OPEN
02. MOTOR PUMP STATUS	ON
TIME : AUTOMATIC COUNT (1-60 SEC.)	

EJDA014G

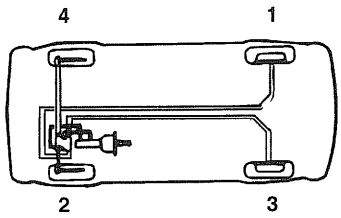
5. Pump the brake pedal several times, and then loosen the bleeder screw until fluid starts to run out without bubbles. Then close the bleeder screw.

6. Repeat step 5 until there are no more bubbles in the fluid for each wheel.

7. Tighten the bleeder screw.

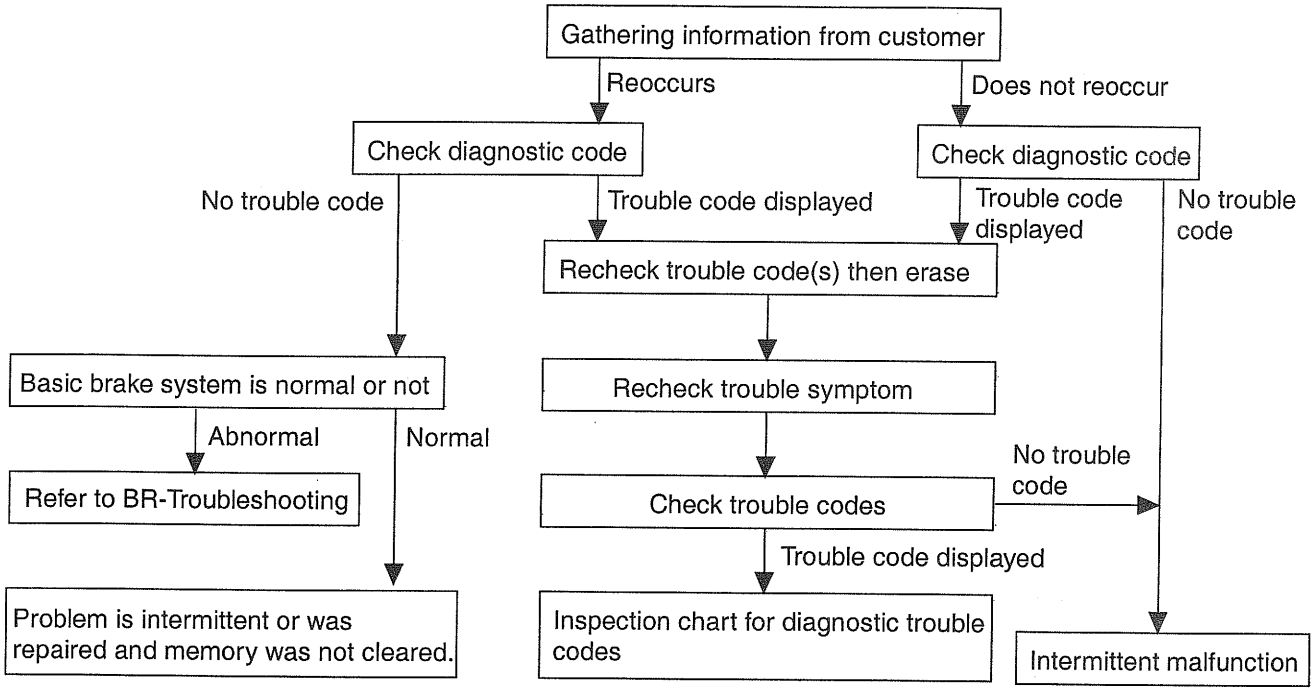
Bleeder screw tightening torque :

7-9 Nm (70-90 kg·cm, 5-6.6 lb·ft)



EJDA014H

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING EJKB0550



EJKB055A

*** Using the customer problem analysis check sheet for reference, ask the customer as much detail as possible about the problem.**

NOTES WITH REGARD TO DIAGNOSIS EJKB0560

The phenomena listed in the following table are not abnormal.

Phenomenon	Explanation
System check sound	When starting the engine, a thudding sound can sometimes be heard coming from inside the engine compartment. This is because the system operation check is being performed.
ABS operation sound	1. Sound of the motor inside the ABS hydraulic unit operation (whine). 2. Sound is generated along with vibration of the brake pedal (scraping). 3. When ABS operates, sound is generated from the vehicle chassis due to repeated brake application and release (Thump : suspension; squeak: tires)
ABS operation (Long braking distance)	For road surfaces such as snow-covered and gravel roads, the braking distance for vehicles with ABS can sometimes be longer than that for other vehicles. Accordingly, advise the customer to drive safely on such roads by lowering the vehicle speed.
Pedal kick back	Pedal kick back is normal operation.
Diagnosis detection conditions can vary depending on the diagnosis code. When checking the trouble symptom after the diagnosis code has been erased, ensure that the requirements listed in "Comment" are met.	

ABS CHECK SHEET EJDA0170

ABS Check Sheet

Inspector's Name _____

Customer's Name		**Registration No.**	
		Registration Year	/ /
		VIN.	
Date Vehicle Brought In	/ /	**Odometer**	Km Miles

Date the Problem First Occurred	/ /
Frequency of Occurence of Problem	☐ Continuous ☐ Intermittent (times a day)

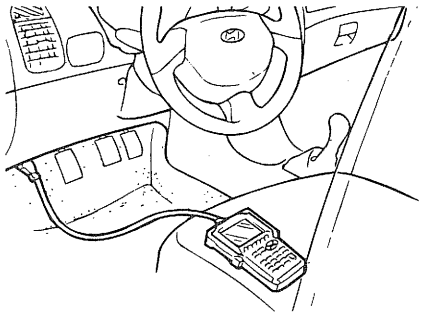
Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	☐ Intermittent (times a day)
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not light up

Diagnostic Trouble Code Check	**1st Time**	☐ Normal Code	☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code	☐ Malfunction Code (Code)

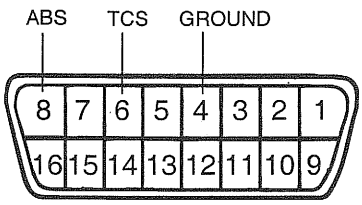
EJDA017A

HI-SCAN (PRO) CHECK EJKB0570

1. Turn the ignition OFF.
2. Connect the Hi-Scan (Pro) to the Data Link Connector located underneath the lower crash pad panel.
3. Turn the ignition ON.
4. Use the Hi-Scan (Pro) to check for diagnostic trouble codes.
5. After completion of the repair or correction of the problem, erase the stored fault codes using the clear key on the Hi-Scan (Pro).
6. Disconnect the Hi-Scan (Pro).



ERDA010A



DATA LINK CONNECTOR

EJKB057A

CONNECTOR CHECK EJDA0190

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

NOTE

When you check the terminals, be sure to use a small enough pin so as to not damage the connector terminals.

INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODES EJDA0200

Inspect according to the inspection chart that is appropriate for the malfunction code.

DTC on Hi-Scan (Pro)	Failure Location	Failure Cause	Condition for Detection	Management/Detect Mode				
				A	B	C	D	E
FL : C1200 FR : C1203 RL : C1206 RR : C1209	SENSOR (wiring, harness, exciter, ABSCM)	Short to GND, Short to BATT, Open	The wheel velocity is below 7km/h and the offset voltage of the sensor is outside the permitted range (2.15-3.5V). If this condition continues for more than 140msec.	+3) +3) +3) +3)	+3) +3) +3) +3)	+4) +4) +4) +4)	+3) +3) +3) +3)	+3) +3) +3) +3)
FL : C1201 FR : C1204 RL : C1207 RR : C1210		Speed Jump	The wheel deceleration of -100g[-25km/h) for 7ms] causes the controller to start monitoring this failure and to compare the wheel velocity with the vehicle velocity from the next cycle. When this decelaration of -100g is continued for more than 140msec, the controller recongnizes the failure.	- - - -	+3) +3) +3) +3)	+4) +4) +4) +4)	+3) +3) +3) +3)	+3) +3) +3) +3)
FL : C1202 FR : C1205 RL : C1208 RR : C1211		Large Air-Gap	This monitoring is performed for the period that the minimum velocity rises from 2km/h to 10km/h. 1. When the minimum wheel velocity is 2km/h and the velocity of other wheels exceeds 10km/h with an acceleration >0.4g, the controller starts comparing the velocity of the other wheels with each other. If their difference is below 4km/h and continues for 140msec. 2. Except case 1, when the min. wheel velocity is 2km/h and the max. wheel velocity exceeds 10km/h, the condition continues for 20 sec.	- - - -	+3) +3) +3) +3)	- - - -	+3) +3) +3) +3)	+3) +3) +3) +3)
FL : C1201 FR : C1204 RL : C1207 RR : C1210		Wrong exciter	1. Max. wheel velocity exceeds 20km/h and the wheel velocity is 40% of max. wheel velocity. If this condition lasts for 1 min. 2. Max. wheel velocity exceeds 40km/h and the wheel velocity is 60% of max. wheel velocity. If this condition lasts for 30sec.	- - - -	+3) +3) +3) +3)	+4) +4) +4) +4)	+3) +3) +3) +3)	+3) +3) +3) +3)

EJDA020E

DTC on Hi-Scan (Pro)	Failure Location	Failure Cause	Condition for Detection	Management/Detect Mode				
				A	B	C	D	E
FL : C1202 FR : C1205 RL : C1208 RR : C1211	SENSOR (wiring, harness, exciter, ABSCM)	Long term ABS mode	1. During the ABS control cycle, if a wheel velocity of 2km/h lasts for more than 12 sec. 2. If the ABS control cycle continues for more than 36sec.	- - - -	- - - -	+4) +4) +4) +4)	- - - -	- - - -
C2112	Valve Relay (ABSCM, wiring harness)	Open	When the valve relay is switched on, the reference voltage of the valve relay is outside the permitted range, and this continues for 56msec.	+1)	+1)	+1)	+1)	-
		Short	When the valve relay is switched off, the reference voltage of the valve relay is over the criterion, and this continues for 56msec.	+1)	-	-	-	+1)
C1604	Solenoid Valve (ABSCM, wiring harness)	Open, Short, Leakage Current	1. When the valve relay is switched off, the drain voltage of the solenoid drive MOSFET is over the criterion, and this continues for 56msec. 2. When the valve relay is switch on and the solenoid off, the drain voltage of the solenoid drive MOSFET is under the criterion, and this continues for 56msec. 3. When the valve relay and a solenoid are switched on, the drain voltage of the solenoid drive MOSFET is over the criterion, and this continues for 56msec.	+1)	+1)	+1)	+1)	+1)
C2402	Motor Relay Motor (ABSCM, wiring harness)	Motor Relay or Fuse Open, Motor Short to GND	When the motor relay is switched on, the reference voltage of the motor is under the criterion, and this continues for 49msec.	-	+2)	+2)	+2)	-
		Motor Lock	The controller starts monitoring the motor voltage for 84msec from the time when the motor relay is switched off. If the motor voltage is under the criterion for 49msec, after 1.8sec from driving the motor off, the motor is reactivated for 1sec and the above check is performed again. In second check, when the motor voltage is under the criterion for 49msec, the controller recognizes the failure.	-	+2)	+2)	+2)	-

DTC on Hi-Scan (Pro)	Failure Location	Failure Cause	Condition for Detection	Management/Detect Mode				
				A	B	C	D	E
C2402	Motor Relay Motor (ABSCM, wiring harness)	Motor Short to BATT	The controller starts monitoring the motor after 1.8sec from the time when the motor relay is switched off. If the motor voltage is over the criterion for 200msec.	+2)	+2)	-	+2)	+2)
		Motor Open	The controller starts monitoring the motor after 1.8sec from the time when the motor relay is switched off. If the motor voltage is outside the permitted range for 200msec.	+2)	+2)	-	+2)	+2)
C1102	Power Supply	Low Voltage	1. When Vign<9.4V continues for 500msec. 2. If the voltage reaches more than 9.6V, the control recovers to normal state.	+5)	+5)	+5)	+5)	+5)
			3. When Vign<7.2V is detected during stat 1. 4. If the voltage reaches to more than 7.5V, the controller recovers to state 1.	+1)	+1)	+1)	+1)	+1)
C1101		Over Voltage	1. When Vign>16V continues for 500msec, or when Vign>18V continues for 49msec. 2. If the voltage recovers its normal operating range, the controller is reset.	+1)	+1)	+1)	+1)	+1)
C1604	ABSCM	EEPROM Failure	After the master processor writes the pre-defined data to the EEPROM the data is read, compared, and must not differ.	+1)	+1)	+1)	+1)	+1)
		ECU Failure	If the master/slave processor detects abnormal operation in RAM, status register, interrupt, timer, A/D converter or cycle time.	+1)	+1)	+1)	+1)	+1)

NOTE
The Vign means ignition voltage.

DETECT MODE

A : Intial check

B : Outside the ABS control cycle

C : Inside the ABS control cycle

D : Diagnosis mode

E : Failure mode

THE ABILITY TO DETECT A FAILURE

+ : Detect the failure

– : Not detect the failure

THE MANAGEMENT OF FAILURE DETECTION

1. System down. Both the ABS and the EBD function are inhibited and the ABS and the EBD warning lamps are activated.
   If this happens, the valve relay and all solenoids are prevented from being switched on.

2. Only the ABS function is inhibited. The ABS warning lamp is activated and the EBD warning lamp is not activated.

3. Sensor failure outside the ABS control cycle.

   1) Only one sensor fails : take the same action as management 2.

   2) More than two sensors fail : take the same action as in management 1.

4. Sensor failure inside the ABS control cycle.

   1) One front sensor fails : inhibit the ABS control of the failed-wheel and maintain ABS control of the normal wheels.
      After the controller completes the ABS control, take the same action as in management 2.

   2) One rear sensor fails : inhibit ABS control of both front wheels and the pressure of both rear wheels is decreased.
      After the controller completes the ABS control, take the same action as in management 2.

   3) More than two sensor fail : take the same action as in management 1.

5. Low operating voltage

   1) Outside the ABS control cycle : inhibit the ABS control of front wheels and allow ABS control of rear wheels, deactivating the motor. The ABS warning lamp is directly switched on.
      When the voltage recovers to the normal operating range, enable the ABS function and the ABS warning lamp is switched off and erases the error code of low voltage.

   2) Inside the ABS control cycle : inhibit the ABS control of the front wheels and allow the the ABS control of rear wheels, deactivating the motor. The ABS warning lamp is directly switched on and remains on. The error code is always stored.

6. Inhibit the ABS control of the front wheels and allow the ABS control of rear wheels, while deactivating the motor. (Only in motor failure).
   After the controller completes the ABS control, take the same action as in management 2.

ACTUATOR DRIVING EJKB0580

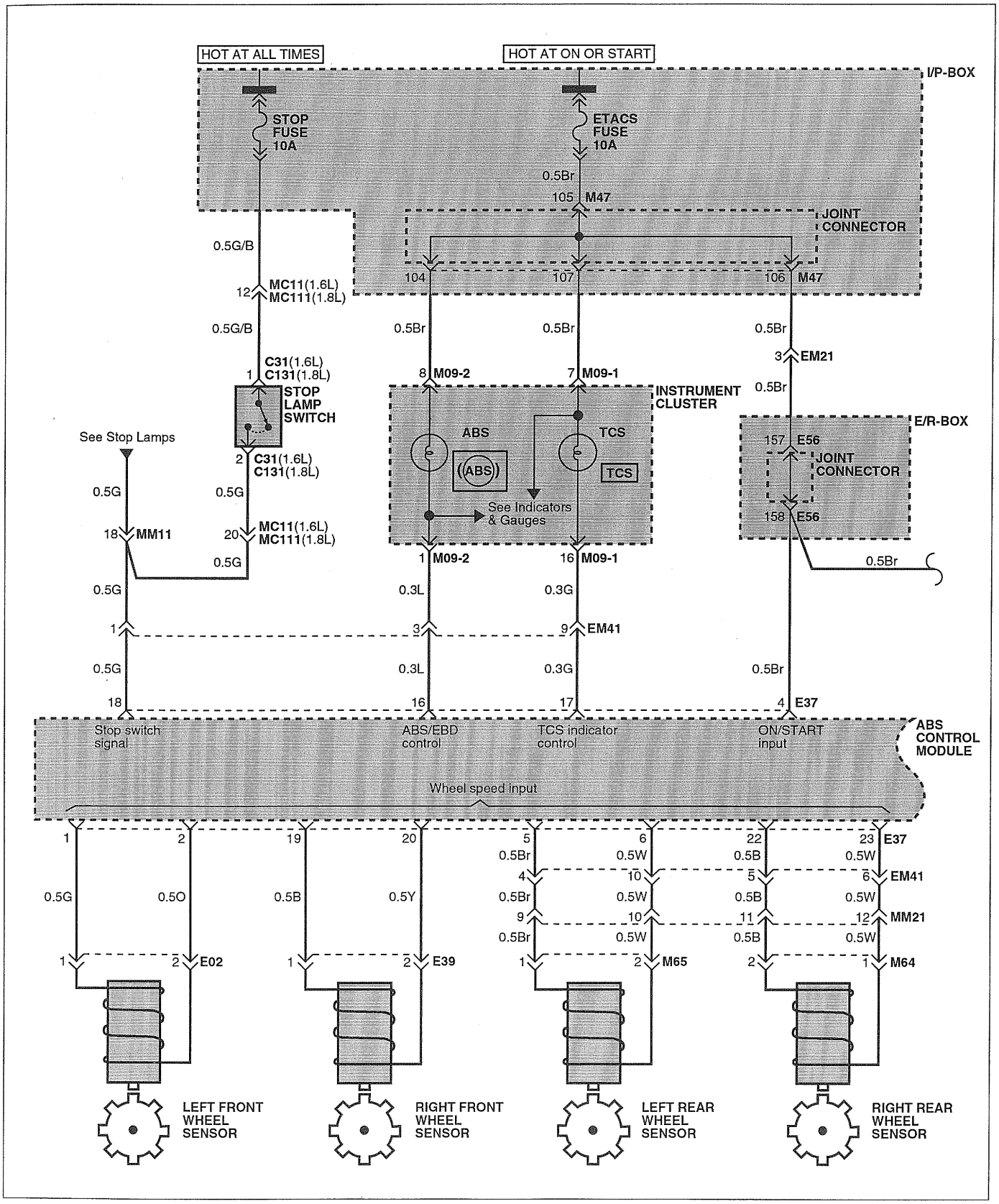
No.	Description	Condition	Recognition	Time
01	Motor	KEY ON ENG. OFF	Motor pump relay operation (Click sounds)	2 seconds
02	Front left valve (In)		Front left solenoid valve operation (Click sounds)	
03	Front right valve (In)		Front right solenoid valve operation (Click sounds)	
04	Rear left valve (In)		Rear left solenoid valve operation (Click sounds)	
05	Rear right valve (In)		Rear right solenoid valve operation (Click sounds)	
06	Front left valve (Out)		Front left solenoid valve operation (Click sounds)	
07	Front right valve (Out)		Front right solenoid valve operation (Click sounds)	
08	Rear left valve (Out)		Rear left solenoid valve operation (Click sounds)	
09	Rear right valve (Out)		Rear right solenoid valve operation (Click sounds)	

CURRENT DATA EJDA0220

No.	Description	Recognition	Unit
1	Battery	Battery	Voltage
2	FL wheel speed SNSR	Front left wheel speed sensor	km/h
3	FR wheel speed SNSR	Front right wheel speed sensor	
4	RL wheel speed SNSR	Rear left wheel speed sensor	
5	RR wheel speed SNSR	Rear right wheel speed sensor	
6	ABS SRI status	Warning lamp	ON/OFF
7	Brake SW	Brake switch	
8	Motor pump relay	Motor relay	
9	Valve relay	Valve relay	
10	Motor pump status	Motor	
11	FL valve (In)	Front left valve (In)	
12	FR valve (In)	Front right valve (In)	
13	RL valve (In)	Rear left valve (In)	
14	RR valve (In)	Rear right valve (In)	
15	FL valve (Out)	Front left valve (Out)	
16	FR valve (Out)	Front right valve (Out)	
17	RL valve (Out)	Rear left valve (Out)	
18	RR valve (Out)	Rear right valve (Out)	

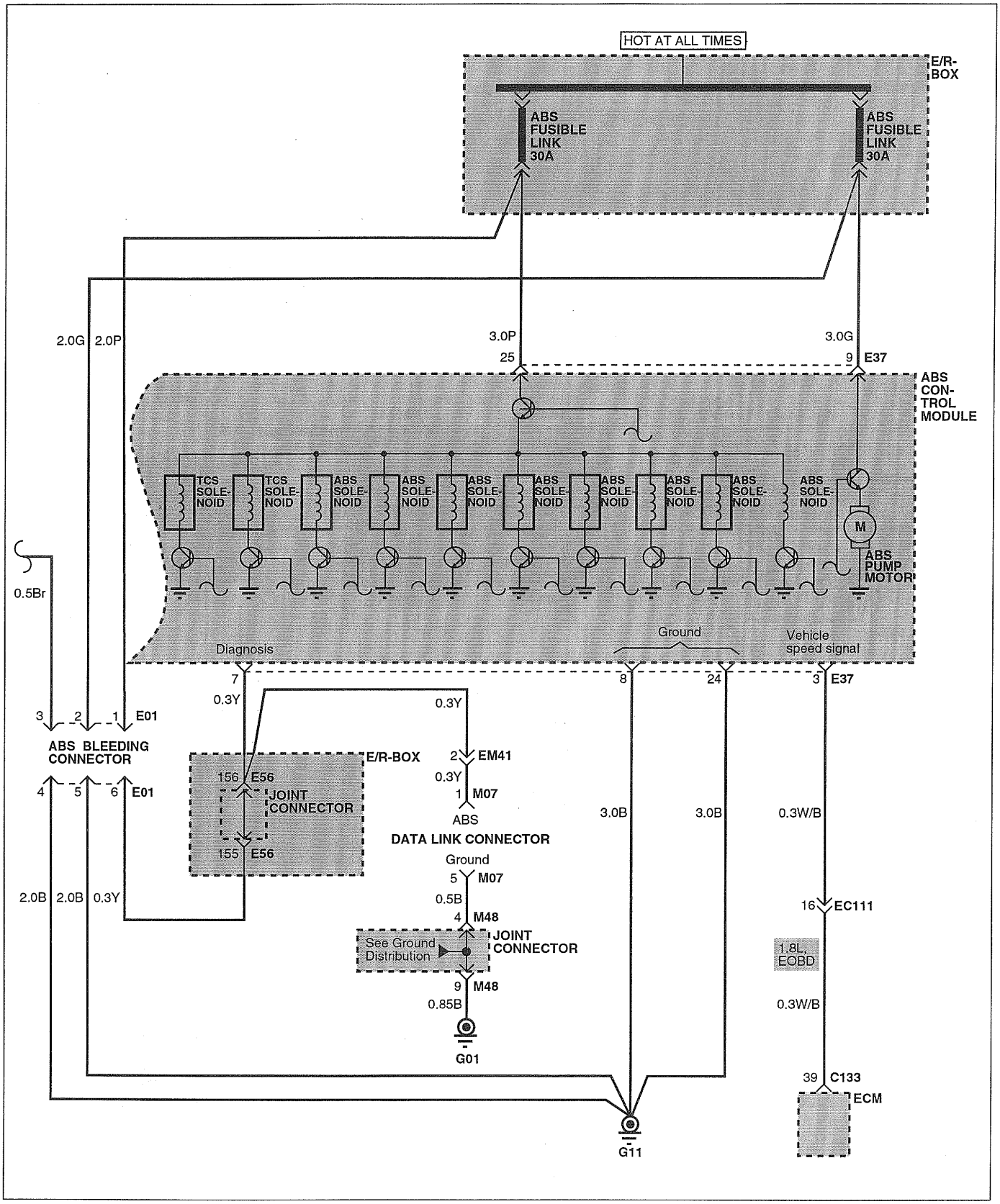
ANTI-LOCK BRAKE SYSTEM EJNC5200

SCHEMATIC DIAGRAM (1)



E2FC016A

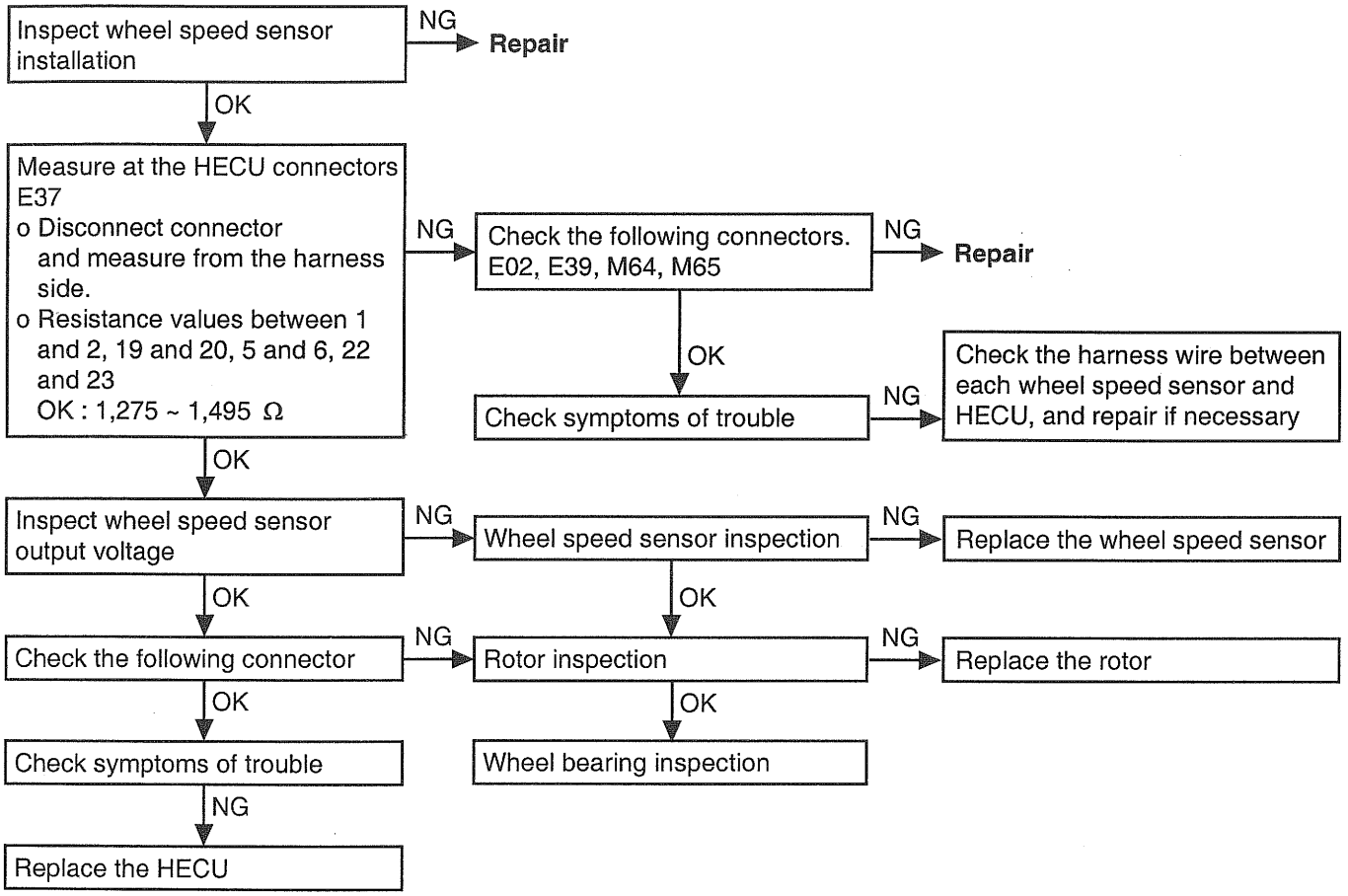
SCHEMATIC DIAGRAM (2)



E2FC016B

INSPECTION PROCEDURE FOR DIAGNOSTIC TROUBLE CODES EJKB0600

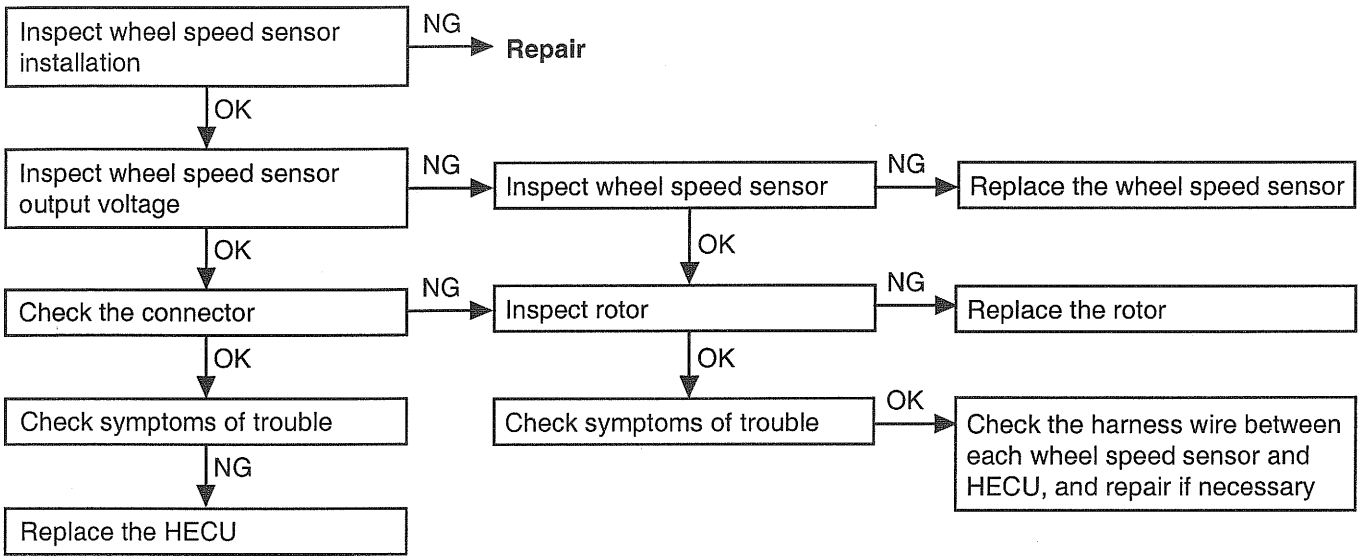
DTC No. C1200, C1203, C1206, C1209 Wheel speed sensor open or short to GND circuit	Probable cause
The HECU determines that an open or short circuit has occured in more than one wire of a wheel speed sensor.	• Malfunction of wheel speed sensor • Malfunction of wiring harness or connector • Malfunction of HECU



EJKB060A

EJKB0610

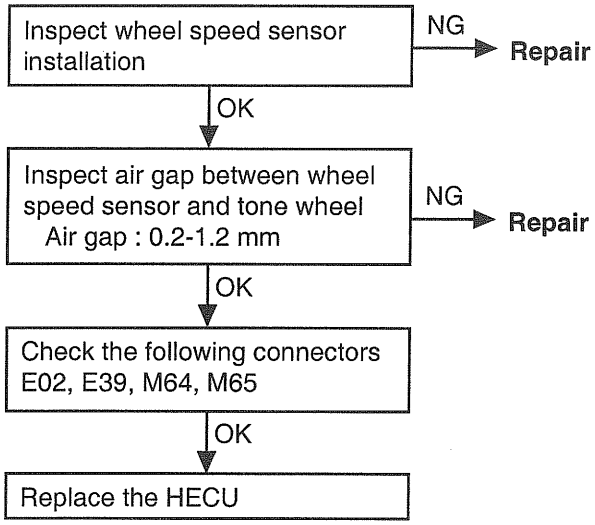
DTC No. C1201, C1204, C1207, C1210 (Speed jump or wrong exciter)	Probable cause
Abnormal output signal from a wheel speed sensor other than an open or short circuit.	• Improper installation of wheel speed sensor • Malfunction of wheel speed sensor • Malfunction of rotor • Malfunction of wheel bearing • Malfunction of wiring harness or connector • Malfunction of HECU



EJKB061A

EJKB0620

DTC No. C1202, C1205, C1208, C1211 (Large air gap)	Probable cause
No wheel speed sensor output signal.	• Malfunction of wheel speed sensor • Improper installation of wheel speed sensor • Malfunction of rotor (excitor) • Malfunction of wiring harness or connector • Malfunction of HECU



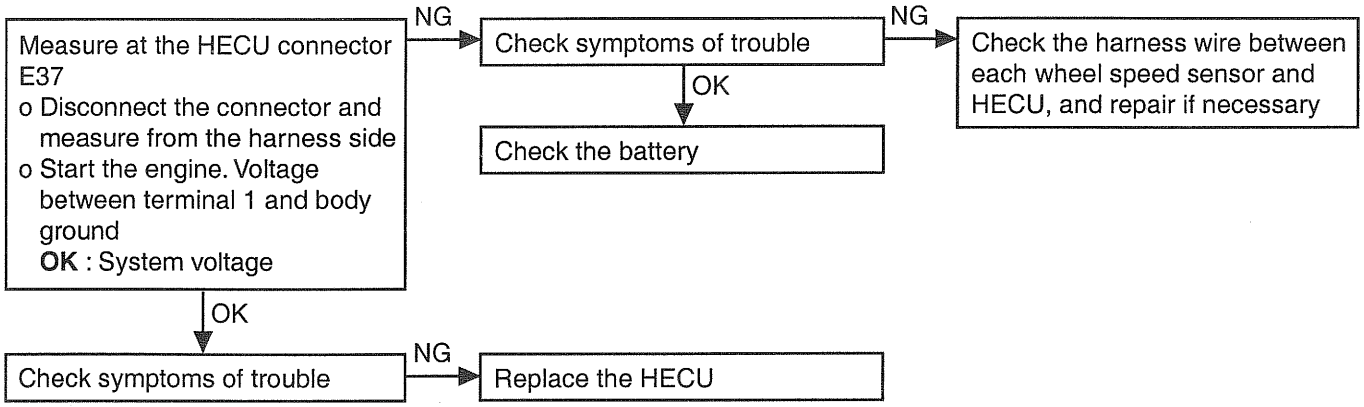
EJKB062A

EJKB0630

DTC No. C1101, C1102 Voltage out of range (Low and over voltage)	Probable cause
The voltage of the HECU power supply drops lower than or rises higher than the specified value. If the voltage returns to the specified value, this code is no longer output.	• Malfunction of wiring harness or connector • Malfunction of HECU.

⚠ ***CAUTION***

If battery voltage drops or rises during inspection, this code will be output as well. If the voltage returns to the standard value, the code is no longer output. Before carrying out the following inspection, check the battery level, and refill if necessary.



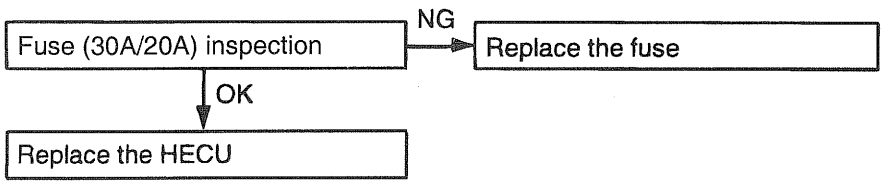
EJKB063A

EJKB0640

DTC No. C1604 ECU Hardware (EEPROM and ECU failure)	Probable cause
The HECU always monitors the solenoid valve drive circuit. It determines that there is an open or short-circuit in the solenoid coil or in a harness even if no current flows in the solenoid or through the HECU.	• Malfunction of wiring harness • Malfunction of hydraulic unit • Malfunction of HECU

EJKB0650

DTC No. C2112 Valve relay (Including fuse failure)	Probable cause
When the ignition switch is turned ON, the HECU switches the valve relay on and off during its initial check. During this time, voltage sent to the valve relay is compared to the voltage in the valve power monitor line. If no current is detected in the valve power monitor line, the HECU determines that there is an open circuit and DTC C2112 is recorded.	• Malfunction of wiring harness or connector • Malfunction of HECU



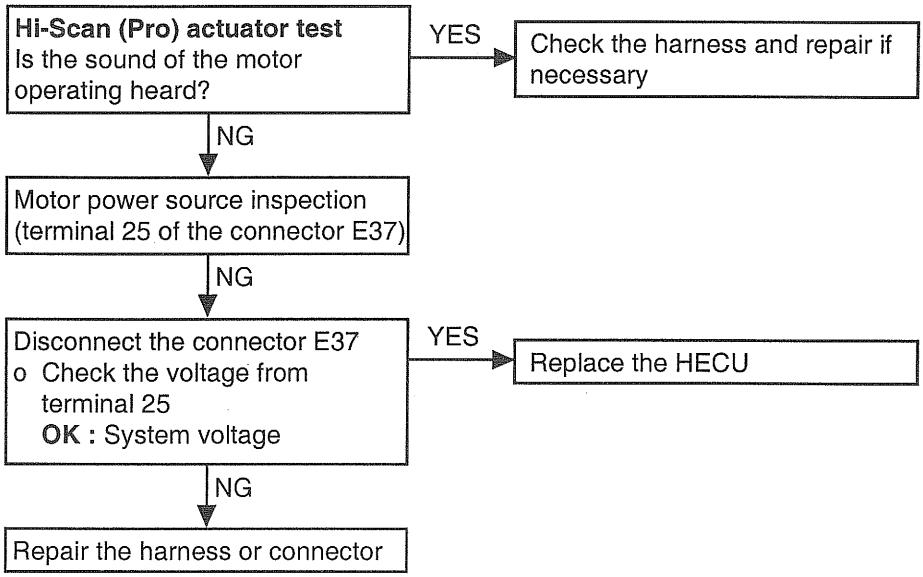
EJDA029B

EJKB0660

DTC No. C2402 Electrical (Motor relay, motor)	Probable cause
When the motor power line is normal but no signal is in detected in the motor monitor line.	• Malfunction of hydraulic unit • Malfunction of HECU

⚠ ***CAUTION***

Powering the motor with the Hi-Scan (Pro) will discharge the battery. Start and run the engine for a while after testing is complete.



EJKB066A

INSPECTION CHART FOR TROUBLE SYMPTOMS EJKB0670

Find out the symptom and check according to the inspection procedure chart.

Trouble system		Inspection procedure No.
Communication with Hi-Scan (Pro) is not possible	Communication with any system is not possible.	1
	Communication with ABS only is not possible.	2
When the ignition key is turned to "ON" (engine OFF), the ABS warning lamp does not illuminate.		3
After the engine starts, the lamp remains illuminated.		4
Faulty ABS operation	Unequal braking power on both sides	5
	Insufficient braking power	
	ABS operates under normal braking conditions	
	ABS operates before vehicle stops under normal braking conditions	
	Large brake pedal vibration (See Caution)	-

⚠ *CAUTION*

During ABS operation, the brake pedal may vibrate or may not be able to be depressed. Such phenomena are due to intermittent changes in hydraulic pressure inside the brake line to prevent the wheels from locking and is not an abnormality.

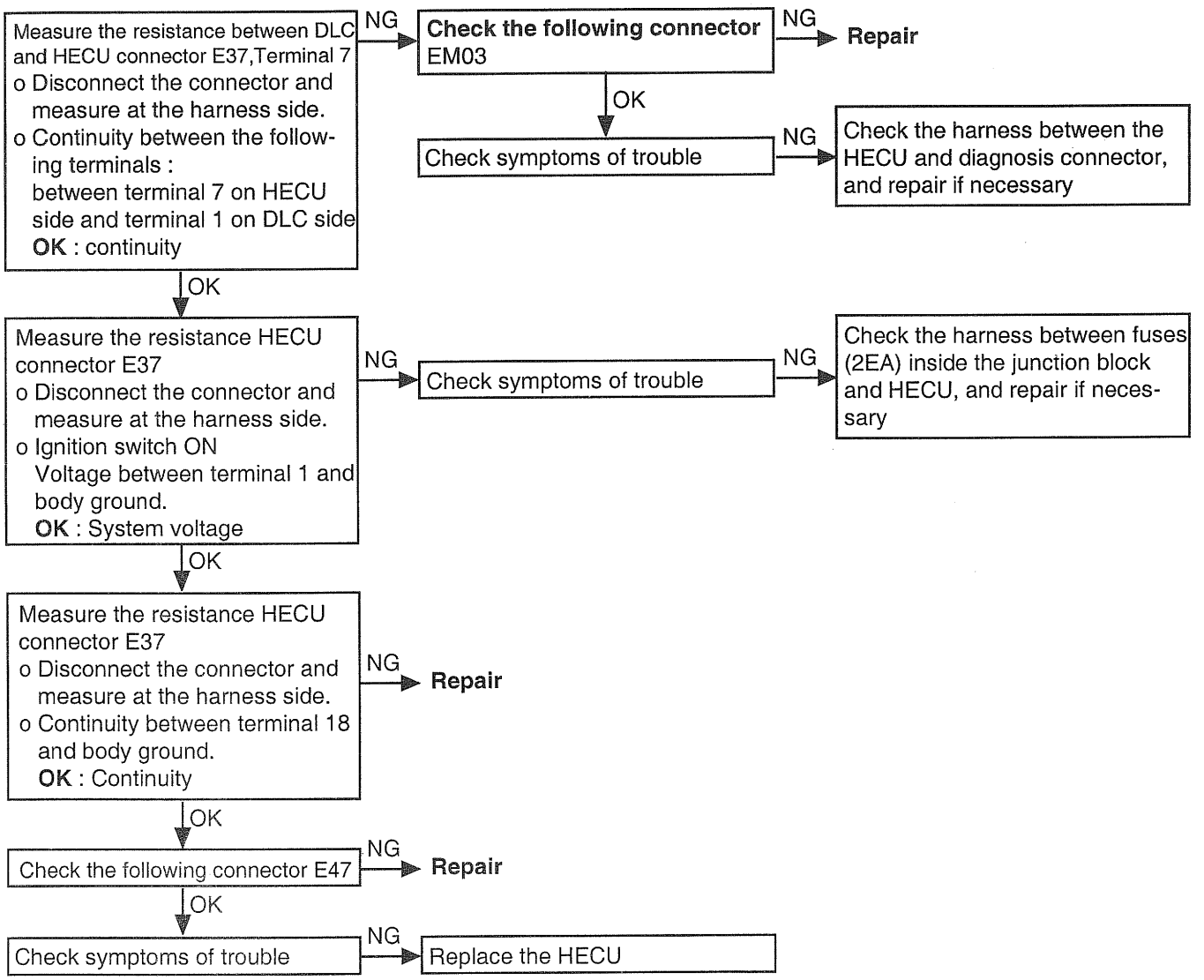
INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS EJKB0680

INSPECTION PROCEDURE 1

Communication with Hi-Scan (Pro) is not possible. (Communication with all systems is not possible.)	Probable cause
Possible defect in the power supply system (including ground) for the diagnosis line.	• Malfunction of connector • Malfunction of wiring harness

INSPECTION PROCEDURE 2

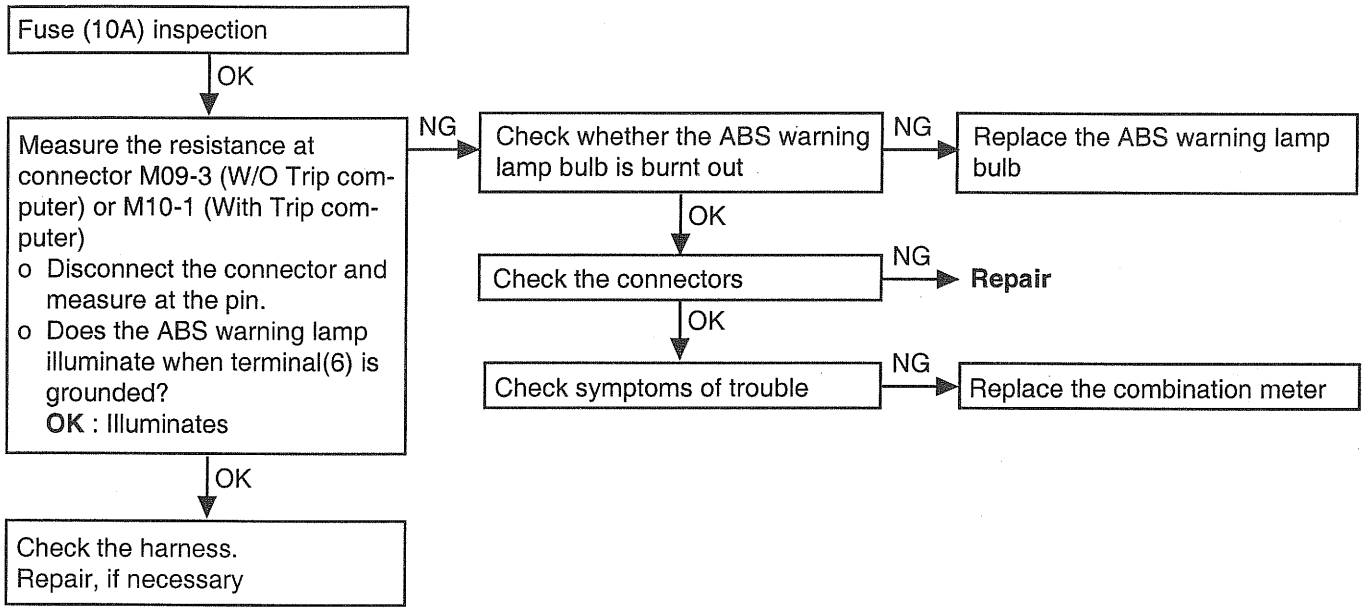
Communication with Hi-Scan (Pro) is not possible. (Communication with ABS only is not possible.)	Probable cause
When communication with Hi-Scan (Pro) is not possible, the cause may be probably an open circuit in the HECU power circuit or an open circuit in the diagnosis output circuit.	• Blown fuse • Malfunction of wiring harness or connector • Malfunction of HECU



EJKB068A

INSPECTION PROCEDURE 3

When ignition key is turned "ON" (engine OFF), the ABS warning lamp does not illuminate	Probable cause
When current flows in the HECU, the ABS relay turns from on to off as the initial check. The ABS warning lamp will illuminate when the ABS relay is off even if there is a problem with the circuit between the ABS warning lamp and the HECU. Therefore, if the lamp does not illuminate, the cause may be an open circuit in the lamp power supply circuit, a blown bulb, an open circuit in both the circuits between the ABS warning lamp and the HECU, and in the circuit between the ABS warning lamp and the ABS relay.	• Blown fuse • Burnt out ABS warning lamp bulb • Malfunction of wiring harness or connector

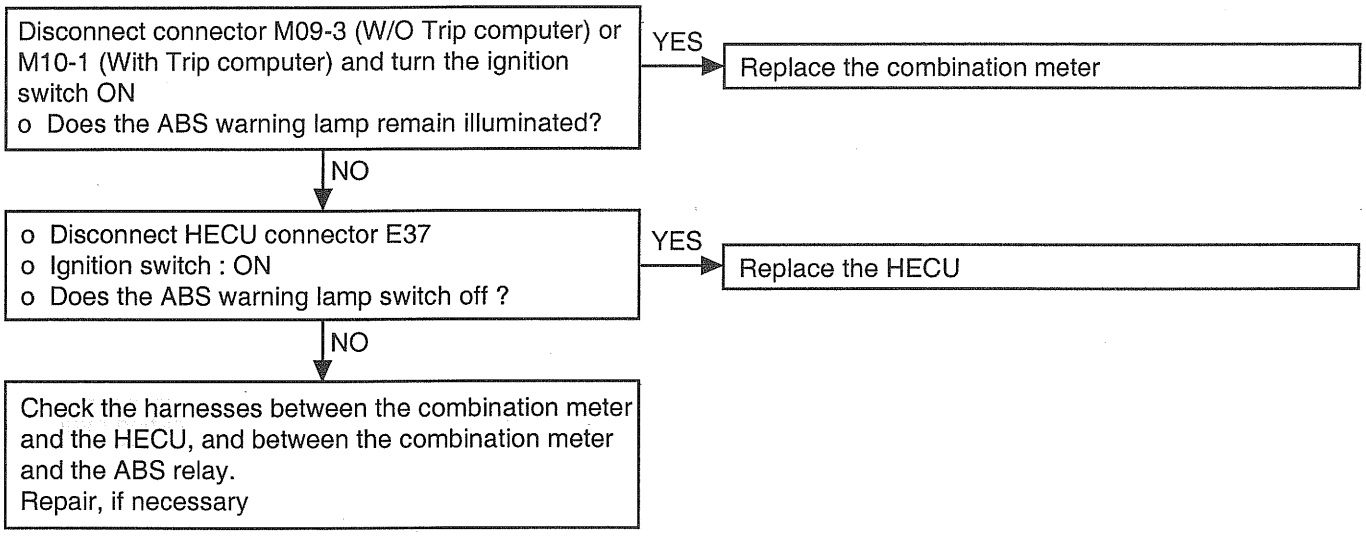


EJKB068B

INSPECTION PROCEDURE 4

Even after the engine is started, the ABS warning lamp remains illuminated	Probable cause
A possible short-circuit in the ABS warning lamp illumination circuit	• Malfunction of combination meter • Malfunction of HECU • Malfunction of wiring harness

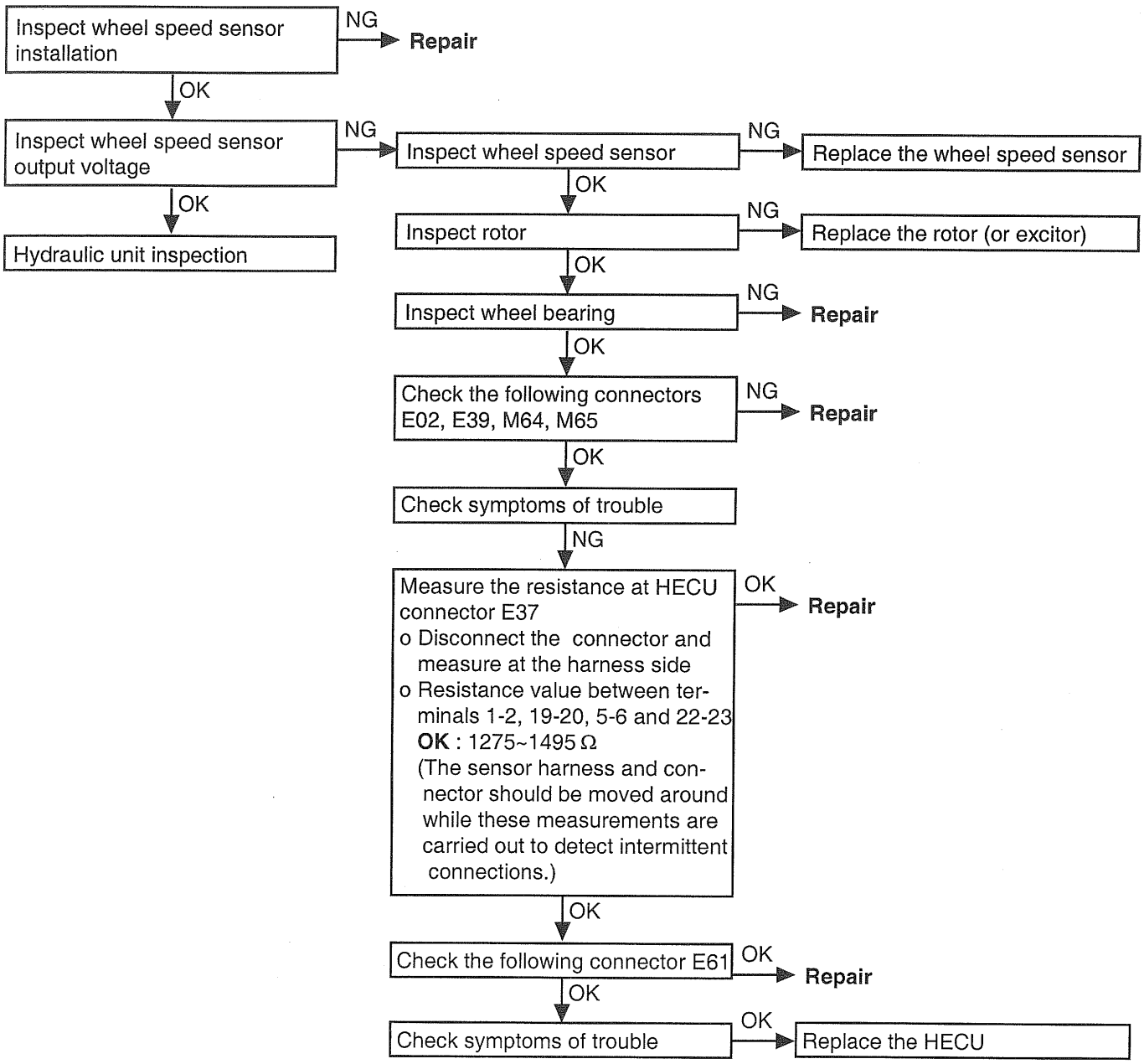
This trouble symptom is limited to cases where communication with the Hi-Scan (Pro) is possible (HECU power supply is normal) and DTC is normal.



EJKB068C

INSPECTION PROCEDURE 5

Brake operation is abnormal	Probable cause
Brake operation varies depending on driving conditions and road surface conditions, so diagnosis can be difficult. However, if a normal DTC is displayed, carry out the following inspection.	• Improper installation of wheel speed sensor • Incorrect sensor harness contact • Foreign material on wheel speed sensor • Malfunction of wheel speed sensor • Malfunction of rotor • Malfunction of wheel bearing • Malfunction of hydraulic unit • Malfunction of HECU



EJKB068D

ABS OPERATION CHECK EJDA0340

WHEEL SPEED SENSOR OUTPUT VOLTAGE CHECK

1. Raise the vehicle and release the parking brake.
2. Disconnect the HECU harness connector's and measure from the harness side connector.

   ⚠ *CAUTION*

   Be sure to remove the connector's double lock and insert the probe into the harness side (back-probe). Inserting it into the terminal side may result in a bad connection.

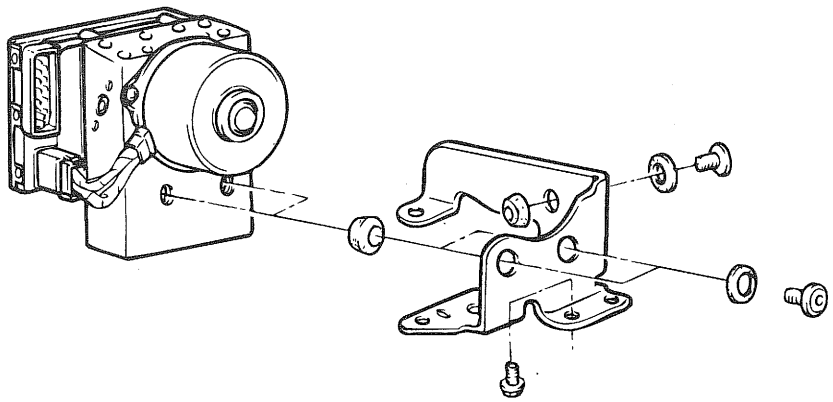
3. Rotate the wheel to be measured approximately 1/2 to 1 rotation per second, and check the output voltage using a circuit tester or an oscilloscope.

Wheel speed sensor	Front left	Front right	Rear left	Rear right
Terminal	8	22	4	19
	9	23	5	20

Output voltage :
When measuring with an oscilloscope : 100mV peak-to-peak or more

ANTI-LOCK BRAKING SYSTEM CONTROL MODULE

COMPONENTS EJA05090

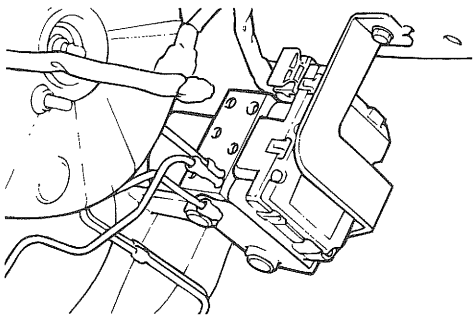


TORQUE : Nm (kg·cm, lb·ft)

EJA0028A

REMOVAL EJDA0080

1. Disconnect the brake tubes from the HECU.

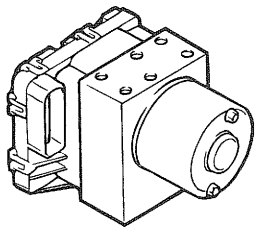


EJDA008A

2. Remove the HECU bracket mounting bolt and remove the HECU.

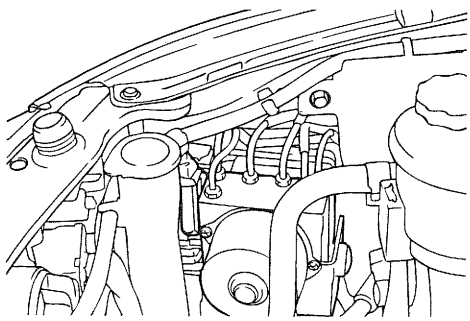
⚠ ***CAUTION***

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



EJDA008B

3. Disconnect the HECU (Hydraulic and Electronic Control Unit) and motor connector.



EJDA008C

INSTALLATION EJDA0090

1. Installation is the reverse of removal.
2. Tighten the modulator mounting bolts and brake tube nuts to the specified torque.

Tightening toque

HECU mounting bolt :

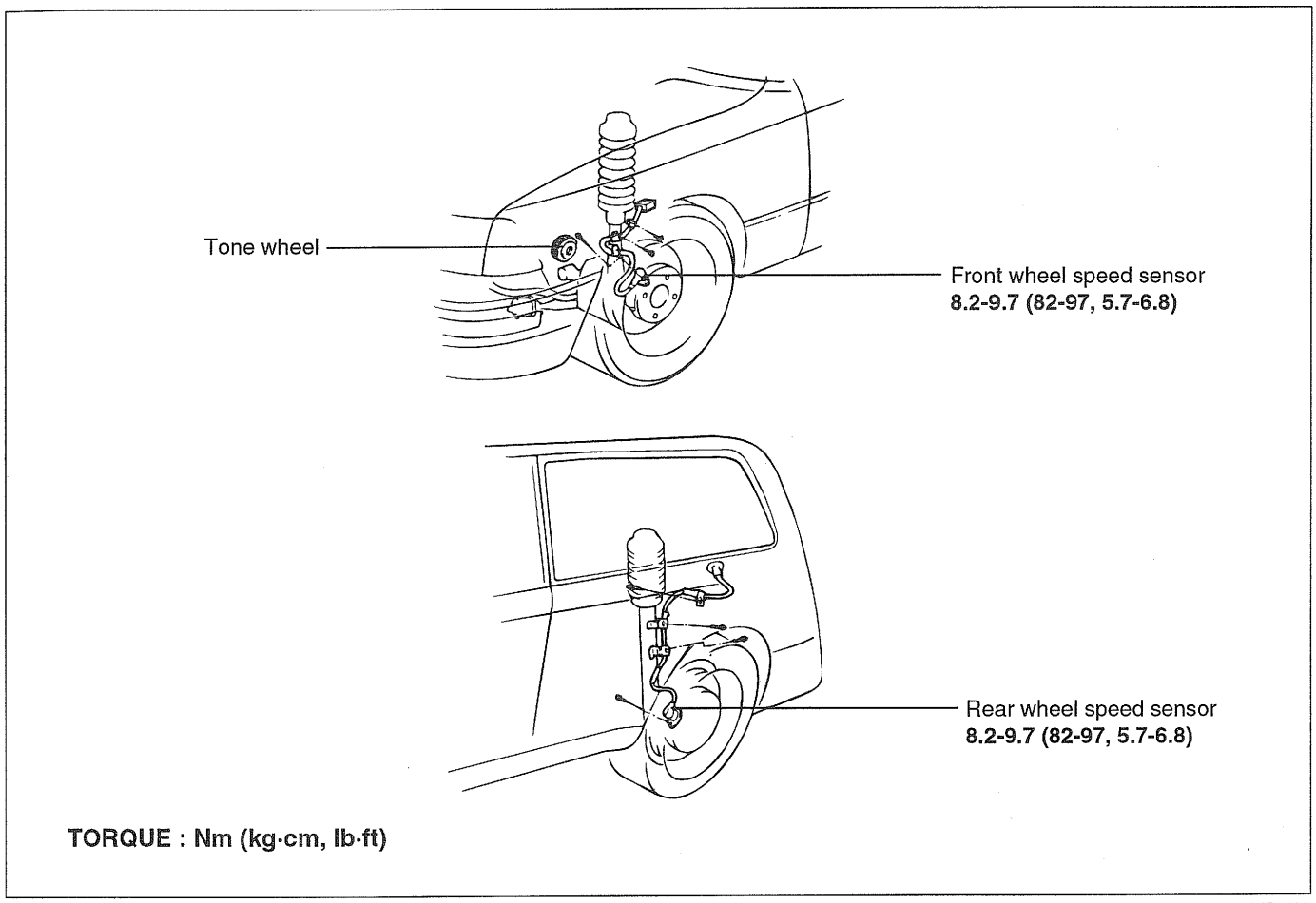
8-10 Nm (80-100 kg·cm, 5.6-6.9 lb·ft)

Brake tube nut :

13-17 Nm (130-170 kg·cm, 9-12 lb·ft)

ANTI-LOCK BRAKING SYSTEM
WHEEL SPEED SENSOR

COMPONENTS EJNC5400

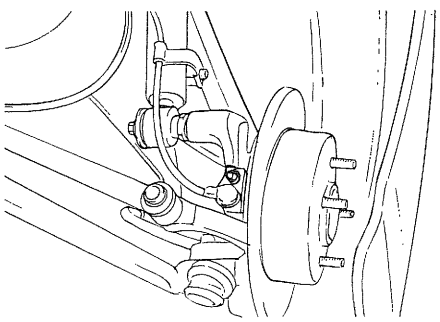


EJNC540A

REMOVAL EJKB0700

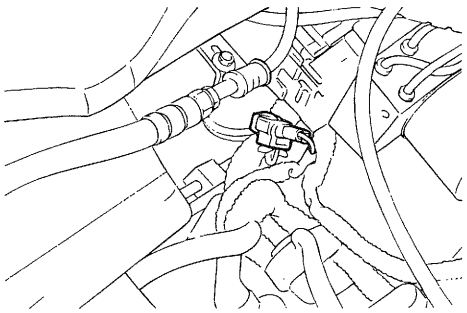
FRONT WHEEL SPEED SENSOR

1. Remove the front wheel speed sensor mounting bolt.



EJA9031A

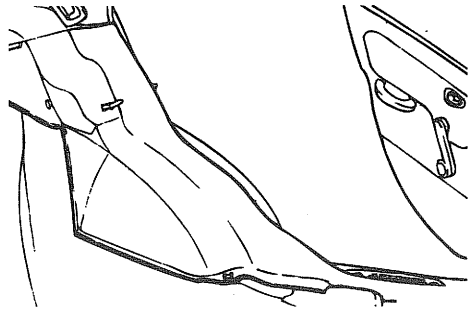
2. Remove the front wheel speed sensor after disconnecting the wheel speed sensor connector.



EJA9031B

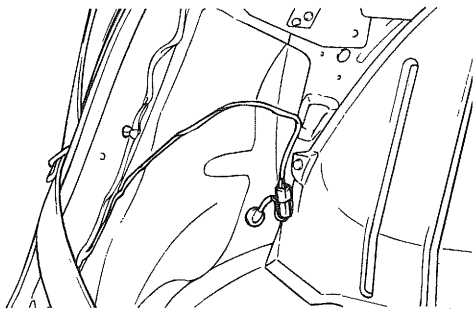
REAR WHEEL SPEED SENSOR

1. Remove the rear seat cushion.
2. Remove the rear pillar trim assembly.
3. Remove the tire assembly.



EJA9031C

4. Remove the rear wheel speed sensor after disconnection the wheel speed sensor connector.



EJA9031D

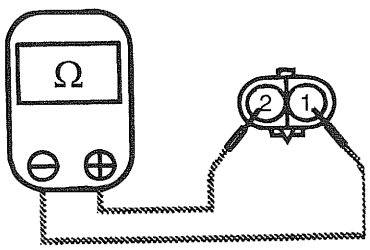
INSPECTION EJKB0710

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

Service standard

Front : 1275 - 1495Ω

Rear : 1275 - 1495Ω

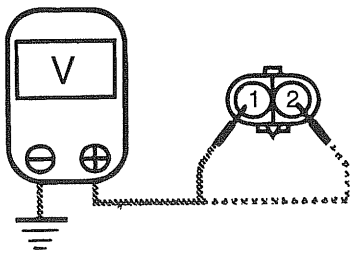


EJKB071A

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

NOTE

Set the voltmeter to measure AC voltage.
Service standard : AC voltage detected.



EJKB071B