

# SERVICE MANUAL

## KIA CARENS since 2000



- Engine
- Brake system
- Fuel system
- Restraint

MOTO  
RIST



## FUNDAMENTAL PROCEDURES

There are six primary symbols used to complement illustrations. These symbols indicate the areas to apply such materials during service.

Symbol	Meaning	Type
	Apply oil	New engine oil or gear oil as appropriate
	Apply brake fluid	Only brake fluid
	Apply automatic transmission fluid (ATF)	Only ATF
	Apply grease	Appropriate grease
	Apply sealant	Appropriate sealant
	Apply petroleum jelly	Appropriate petroleum jelly

### NOTICE

Whenever special oil or grease is required, it will be shown in the illustration.

## NOTICES, CAUTIONS, AND WARNINGS

As you read through the various procedures, you will encounter Notices, Cautions and Warnings. Each one is there for a specific purpose. Notices give you added information that will assist you in completing a particular procedure. Cautions

present you from making an error that could damaged the vehicle. Warnings remind you to be especially careful in specific areas where carelessness can cause personal injury.

The following items contain general procedures you should always follow when working on a vehicle :

## PROTECTION OF THE VEHICLE

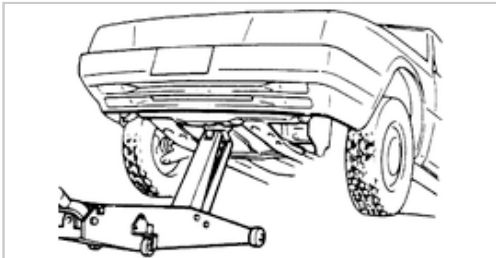
- Always cover fenders, seats, and floor areas before starting work.  
Operate the engine only in a well-ventilated area to avoid carbon monoxide poisoning.



## A WORD ABOUT SAFETY

The following precautions must be followed when jacking up the vehicle:

1. Block the wheels.
2. Use only the specified jacking positions.
3. Support the vehicle with safety stands.



The engine compartment must be clear of tools and people before starting the engine.

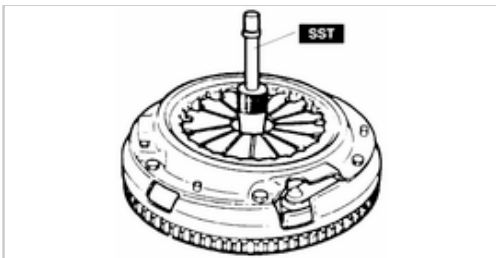
## PREPARATION OF TOOLS AND MEASURING EQUIPMENT

1. All necessary tools and measuring equipment should be available before starting any work.



## SPECLAL SERVICE TOOLS (SST'S)

1. Use special service tools when they are required. SST's can be found under "preparation" prior to any procedure requiring them.

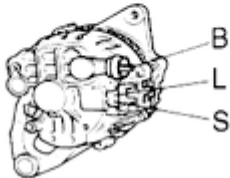
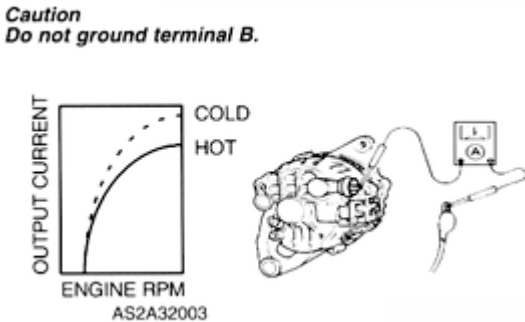


## REMOVAL OF PARTS

1. Begin work only after first learning which parts and subassemblies must be removed and disassembled for replacement for repair.



## DIAGNOSTIC CHART

Step	Inspection	Action													
1	Check battery voltage Specification : Above 12.4V	Yes	Go to next step.												
		No	Check battery												
2	Start engine and check if generator warning light goes out	Yes	Go to step 4.												
		No	Go to next step.												
3	Check if voltage at generator terminals are correct  <b>Specification</b> <table><tr><th>Terminal</th><th>Ign: On (V)</th><th>Idle (V)</th></tr><tr><td>B</td><td>Approx. 12</td><td>14.1~14.7</td></tr><tr><td>L</td><td>Approx. 1</td><td>14.1~14.7</td></tr><tr><td>S</td><td>Approx. 12</td><td>14.1~14.7</td></tr></table> 	Terminal	Ign: On (V)	Idle (V)	B	Approx. 12	14.1~14.7	L	Approx. 1	14.1~14.7	S	Approx. 12	14.1~14.7	Yes	Check wiring harness between battery and terminal B.
		Terminal	Ign: On (V)	Idle (V)											
B	Approx. 12	14.1~14.7													
L	Approx. 1	14.1~14.7													
S	Approx. 12	14.1~14.7													
No	<ul style="list-style-type: none"><li>• Check wiring harness.</li><li>• Replace generator.</li></ul>														
4	1.Connect an ammeter (80A minimum) between terminal B and terminal B harness connector. 2.Start engine. 3.Turn all electrical loads ON and depress brake pedal. 4.Check if output current is 65A or more at 2,500~3,000 rpm.  <b>Caution</b> Do not ground terminal B.  	Yes	Charging system normal.												
		No	Go to next step.												
5	Check drive belt tension OK?	Yes	Replace generator.												
		No	Adjust drive belt tension.												

	Excessive belt tension	Remove tensioner spring and inspect Replace if necessary
Oil or coolant is on the belt	Poor oil sealing	Inspect front oil seals Replace if necessary
	Coolant leak at water pump	Inspect water pump Replace if necessary
	Poor belt cover sealing	Remove timing belt cover and inspect Replace if necessary

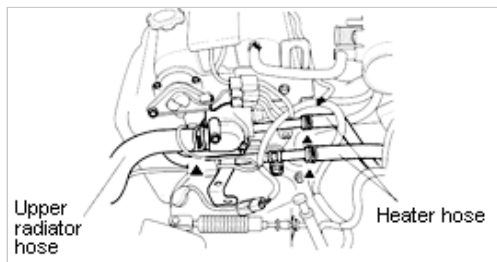
#### HLA (Hydraulic lash adjuster)

Problem	Possible cause	Action
1. Noise when engine is started immediately after oil is changed 2. Noise when engine is started after setting approx. one day	Oil leakage in Oil passage	Run engine at 2,000~3,000rpm If noise stops after 2 seconds- 10 minutes*, HLA is normal If not, replace HLA
3. Noise when engine is started after cranking for 3 seconds or more 4. Noise when engine is started after new HLA installed.	Oil leakage in HLA	*Time required for engine oil to circulate with in engine includes tolerance for engine oil condition and ambient temperature.
5. Noise continues more than 10 minutes	Insufficient oil pressure	Check oil pressure. If lower than specification, check for cause. Oil pressure : 313.9~490.5kPa (3.2~5.0kg/cm <sup>2</sup> , 45.5~71.1psi)-3,000rpm
	Faulty HLA	Press down HLA by hand. If it does not move, HLA is normal. If it moves, replace HLA. Measure valve clearance If more than 0mm (0in), replace HLA
6 Noise during idle after high-speed running	Incorrect oil amount	Check oil level. Drain or add oil as necessary
	Deteriorated Oil	Check oil quality If deteriorated, replace with specified type and amount oil

#### Cooling system

Problem	Possible Cause	Action
Overheating	Coolant level insufficient Coolant leakage Radiator fins clogged Radiator cap malfunction Fan motor malfunction Thermostat malfunction Water passage clogged Water pump malfunction	Add Repair Clean Replace Replace Replace Clean Repalce
Corrosion	Impurities in coolatn	Replace

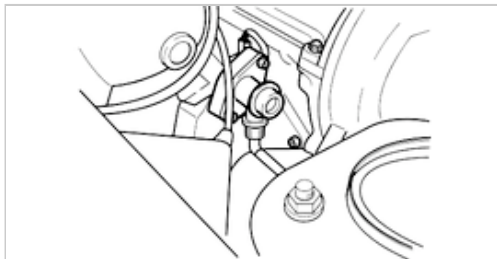
#### Lubrication system



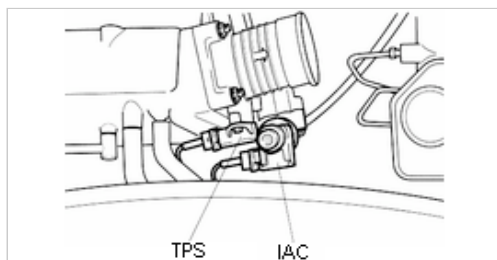
13. Remove heater hoses.
14. Disconnect fuel hose from injector rail.

**WARNING**

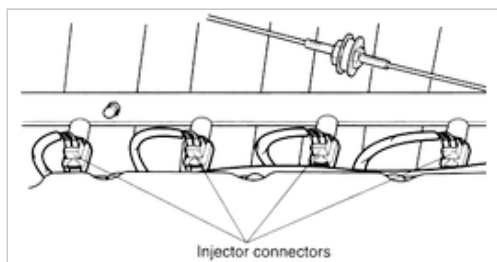
KEEP OPEN FLAMES AND SPARKS AWAY FROM OPEN FUEL LINES OR A FIRE OR EXPLOSION MAY RESULT.



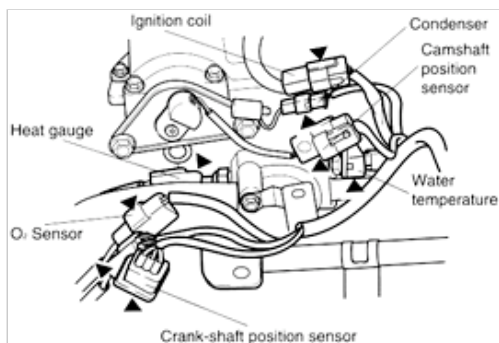
15. Disconnect IAC and throttle position sensor TPS connectors.



16. Disconnect injector connectors.



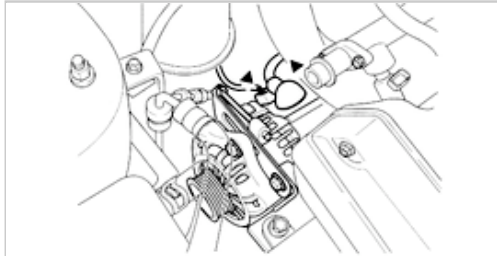
17. Disconnect electric connectors remove bracket and reinstall engine hanger.



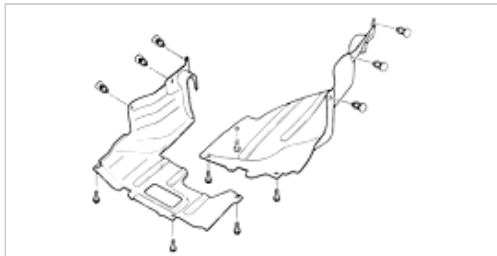
18. Disconnect engine ground strap.



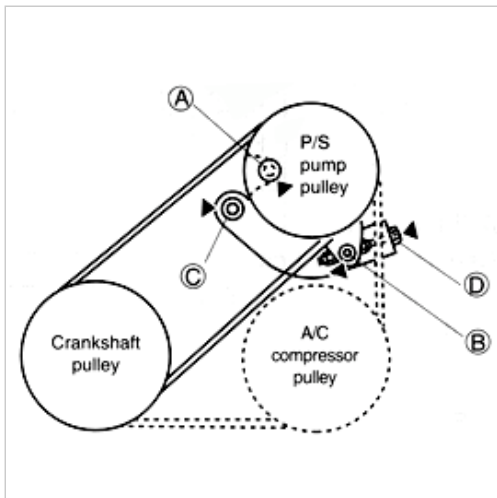
19. Disconnect generator B-terminal connector and C121 from generator.



20. Remove both right and left splash with three bolts and three fasteners each.



21. Loosen power steering pump lock bolt (A), nut (B), (C) and remove tension from power steering (P/S) pump and/or air conditioning (A/C) compressor drive belt by turn adjusting bolt(D).

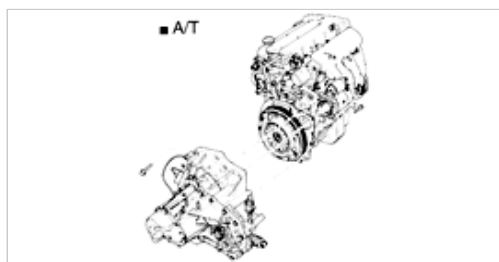


22. Remove P/S pump and/or A/C compressor drive belt.

23. Remove P/S pump lock bolt (A), nut (C) and remove P/S pump.

24. Position P/S pump away from engine and affix it with wire.

25. Disconnect lower radiator hose.



## INSTALLATION

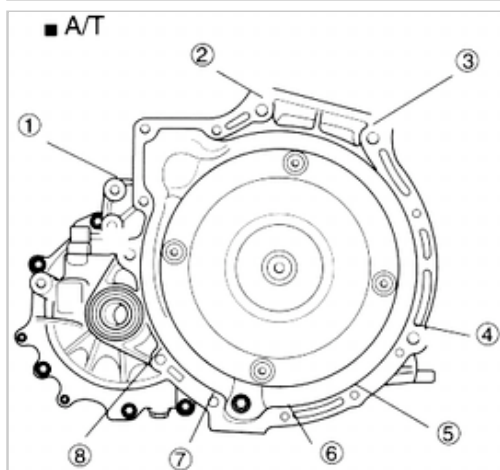
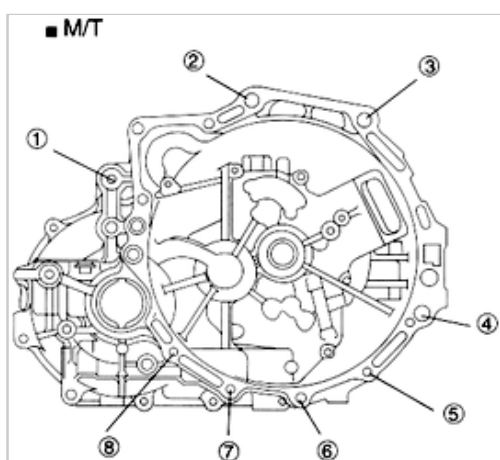
### Engine

1. Install transaxle to engine.

Tightening torque :

4 Upper bolts (1, 2, 3, 4) : 65.8~86.1lb·ft (89~116N·m, 9.1~11.9kg-m)

4 Lower bolts (5, 6, 7, 8) : 27.5~38.3lb·ft (37~52N·m, 3.8~5.3kg-m)



2. Install starter.

Tightening torque : 27~38lb·ft (37~52N·m, 3.7~5.8kg-m)

3. Install four drive plate-to-torque converter mounting nuts then install access cover. Rotate engine at crank pulley to gain access to all four nuts (A/T).

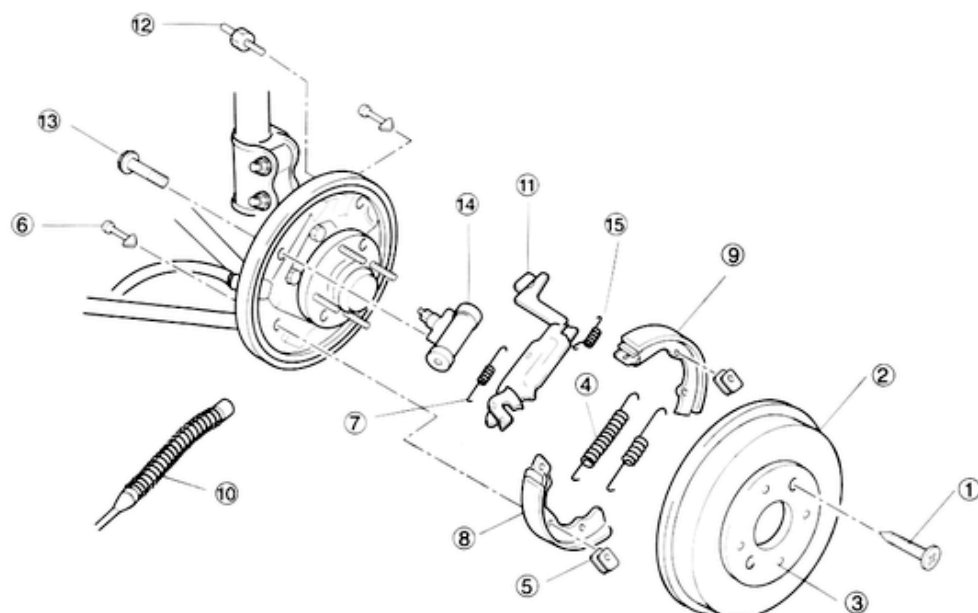
Tightening torque : 25~36lb·ft (34~49N·m, 3.5~5.0kg-m)





## Component

### Rear drum brake



- (1) Mounting screws
- (2) Brake drum
- (3) Drum pulling threads
- (4) Return springs
- (5) Spring clips
- (6) Hold down pins
- (7) Adjuster spring
- (8) Brake shoe-leading

- (9) Brake shoe-trailing
- (10) Parking brake cable
- (11) Operating lever assembly
- (12) Brake line
- (13) Bolts
- (14) Wheel cylinder assembly
- (15) Anti-rattle spring

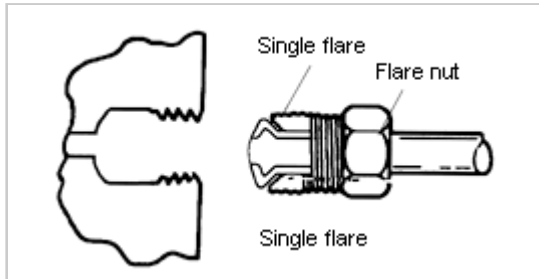
## Wheel cylinder



## Inspection

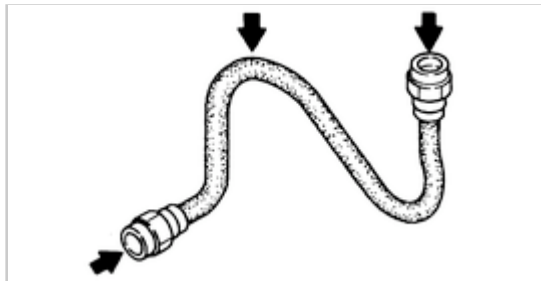
### Brake pipe

1. Check for cracks, damage, and corrosion of brake pipe.  
Replace pipe or flare nut(s) if necessary.



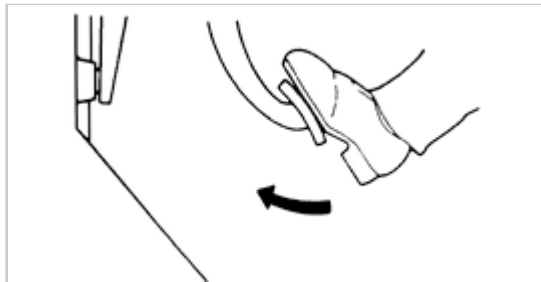
### Flexible hose

1. Check for scars, cracks, and swelling of flexible hose.  
Replace hose if necessary.



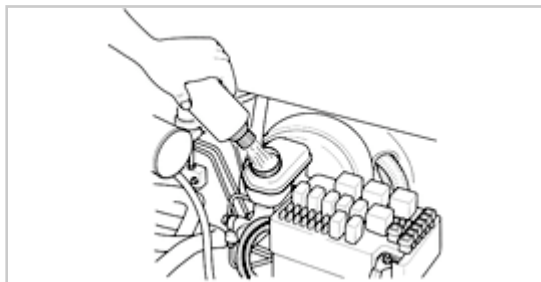
### Brake fluid (Leakage inspection)

1. Depress brake pedal several times and inspect for leakage in brake line system.



### Brake fluid level (Leakage check)

1. Verify that fluid level in reservoir is between Max and Min lines on reservoir.  
Add fluid if it is below Min.



### Power brake unit function check (simple method)

Connect a pressure gauge, vacuum gauge, and pedal depression force gauge as shown in figure below. After bleeding air from pressure gauge, conduct test as described in next 3 steps.

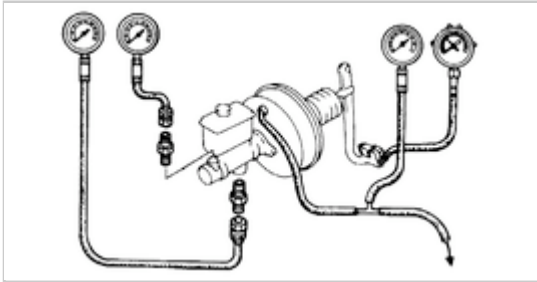
#### NOTICE

Use commercially available gauges and pedal depression force gauge.

### 1. Checking for vacuum loss

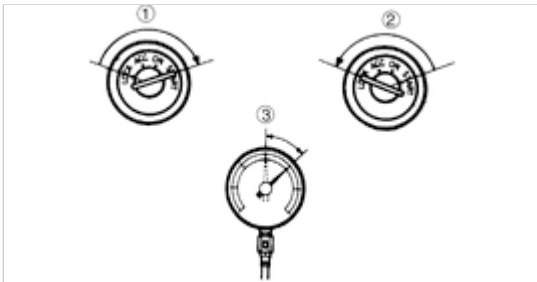
#### (1) Unloaded condition

##### A. Start engine.



##### B. Stop engine when vacuum gauge reading reaches 19.7 inHg (500 mmHg).

##### C. Observe vacuum gauge for 15 seconds. If gauge shows 18.7~19.7 inHg (475~500 mmHg) unit is operating.



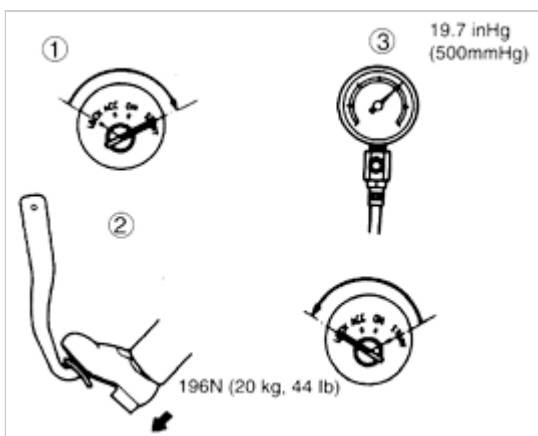
#### (2) Loaded condition

##### A. Start engine.

##### B. Depress brake pedal with a force of 44 lb-ft (196 N-m, 20 kg-m).

##### C. With brake pedal depressed, stop engine when vacuum gauge reaches 19.7 inHg (500 mmHg).

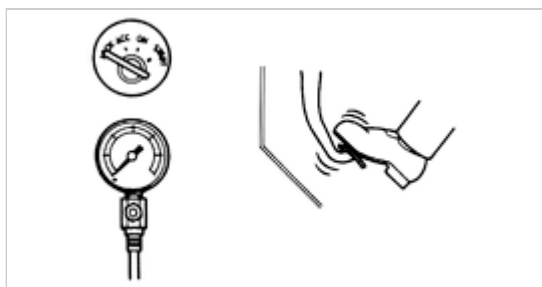
##### D. Observe vacuum gauge for 15 seconds. If gauge shows 18.7~19.7 inHg (475~500 mmHg) unit is operating.



### 2. Checking for hydraulic pressure

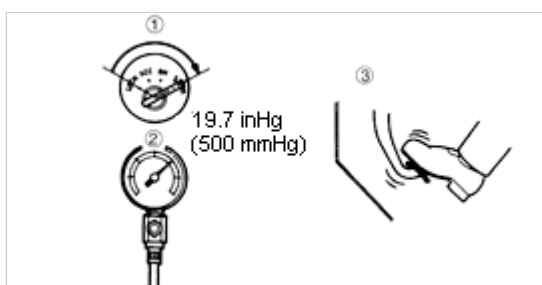
#### (1) If fluid pressure is within specification(vacuum 0mmHg). When engine is off, the unit is operating properly.

Pedal force	Fluid pressure
44 lb(196 N, 20 kg)	171 psi(1.177 kPa, 12 kg/cm <sup>2</sup> ) Min



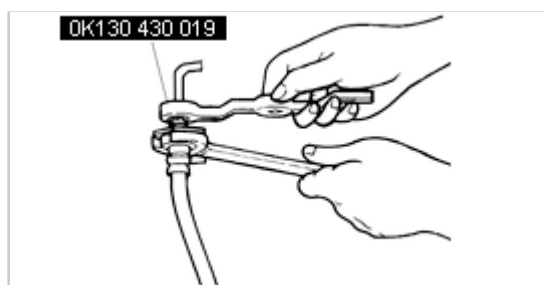
- (2) Start engine. Depress brake pedal when vacuum reaches 19.7 inHg (500 mmHg). If fluid pressure is within specification, unit is operating.

Pedal force	Fluid pressure
44 lb(196 N, 20 kg)	171 psi(1.177 kPa, 12 kg/cm <sup>2</sup> ) Min



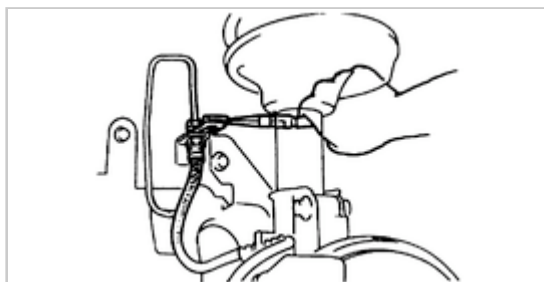
## Removal

1. Remove brake pipe with SST(0K 130 430 019).
2. Disconnect clip and removal flexible hose from bracket.



## Installation

1. Place flexible hose in bracket and connect it to clip to it.



2. Connect flexible hose to brake pipe and tighten flare nut with SST (0K130 430 019).

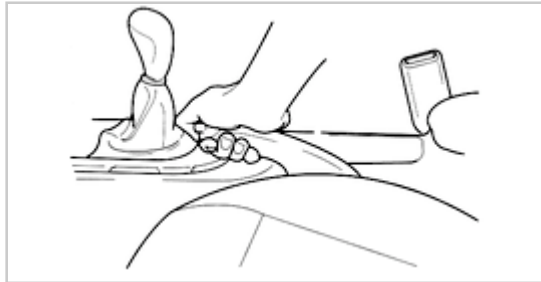


## Inspection

### Parking brake (Lever type)

1. Check that stroke is within specification when parking brake lever is pulled with a force of 22 lb-ft(98 N-m, 10 kg-m).

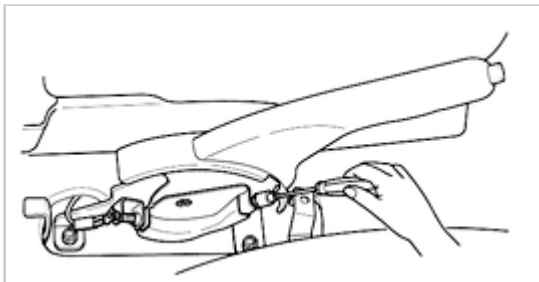
Stroke : 5~7 notches

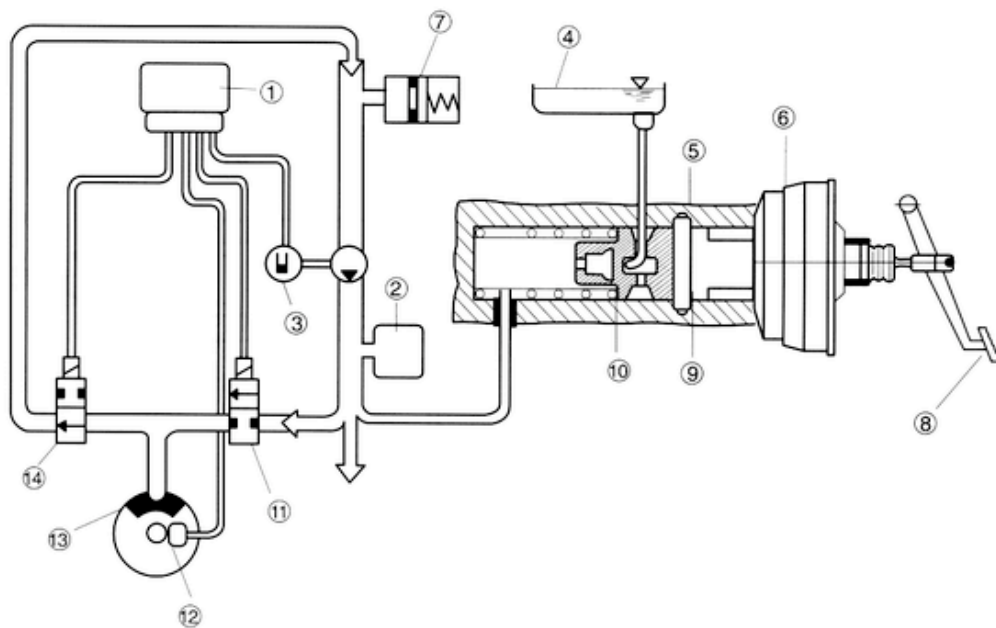


## Adjustment

### Parking brake (Lever type)

1. Before adjustment, start engine and depress brake pedal several times while vehicle is moving in reverse.
2. Stop engine.
3. Remove console.
4. Turn adjusting nut at the front of parking cable.
5. After adjustment, check following items:
  - A. Turn ignition switch ON, pull parking brake lever back one notch, and check that parking brake warning lamp illuminates.
  - B. Verify that rear brakes do not drag.



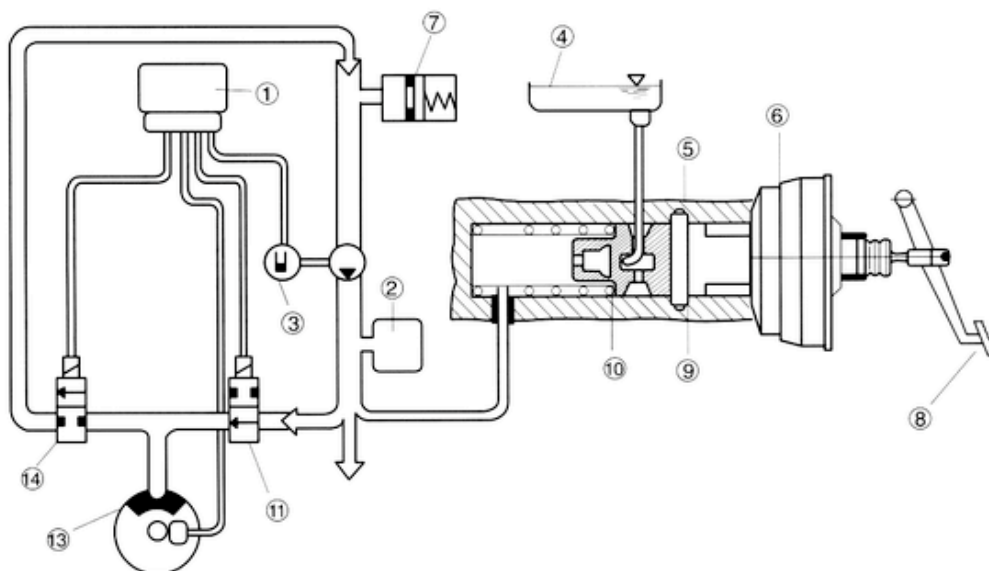


- (1) ABS control unit
- (2) Damping chamber
- (3) Motor pump unit
- (4) Brake reserve tank
- (5) Master cylinder
- (6) Master vacuum
- (7) Pressure accumulator

- (8) Brake pedal
- (9) Primary piston
- (10) Central valve
- (11) Inlet valve
- (12) Wheel speed sensor
- (13) Caliper
- (14) Outlet valve

If lock wheel continues, the ABS control unit opens the corresponding outlet valve so that brake fluids flow to the pressure accumulator. This reduces pressure only for wheels that are locked.

### ABS braking (2.3 Increasing pressure)

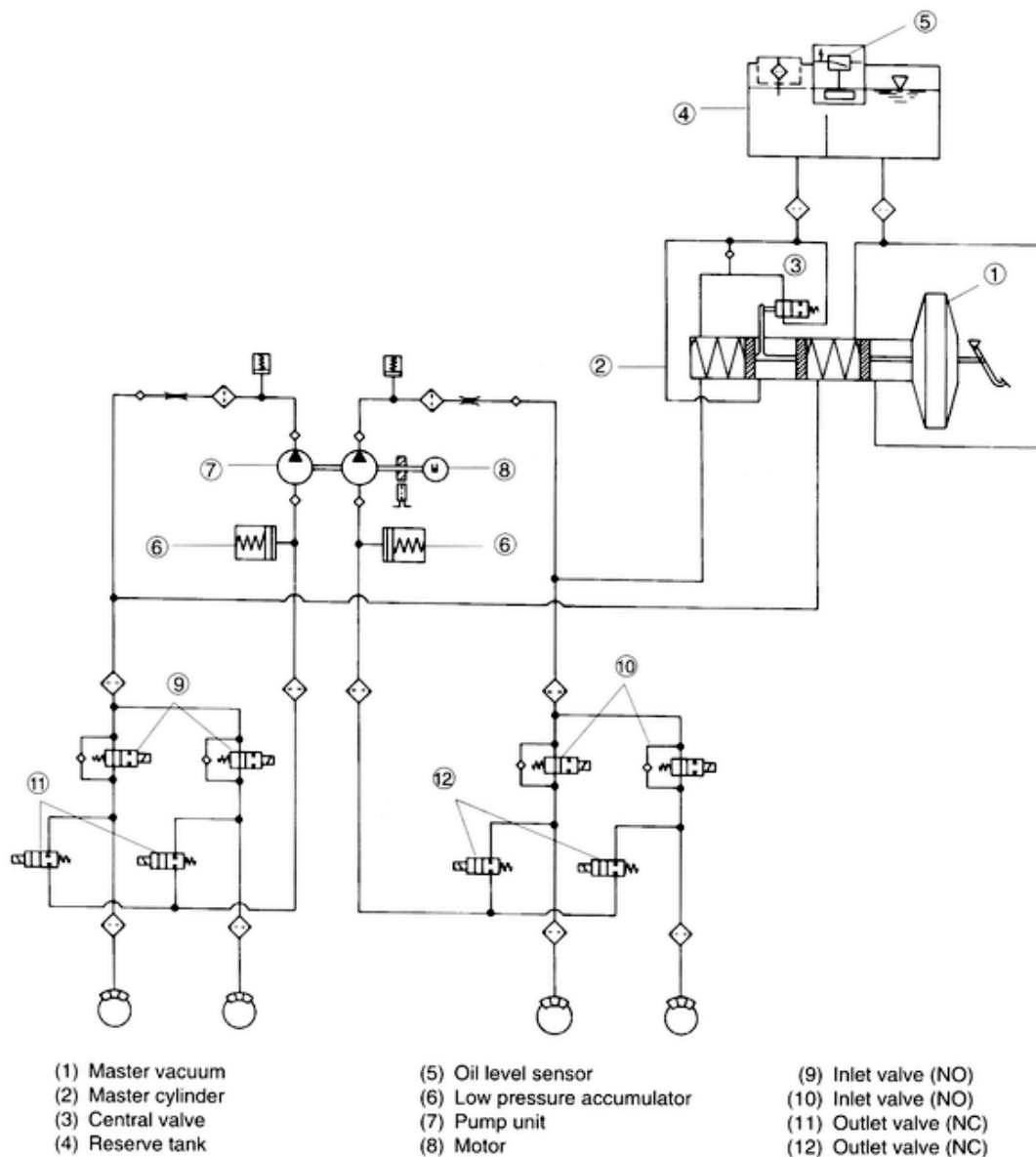


- (1) ABS control unit
- (2) Damping chamber
- (3) Motor pump unit
- (4) Brake reserve tank
- (5) Master cylinder
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- (7) Pressure accumulator

- (8) Brake pedal
- (9) Primary piston
- (10) Central valve
- (11) Inlet valve
- (12) Wheel speed sensor
- (13) Caliper
- (14) Outlet valve

When wheels have been returned to normal speed from locking, the ABS control unit stops operating the solenoid valve and returns to standard braking operation.

## Hydraulic circuits

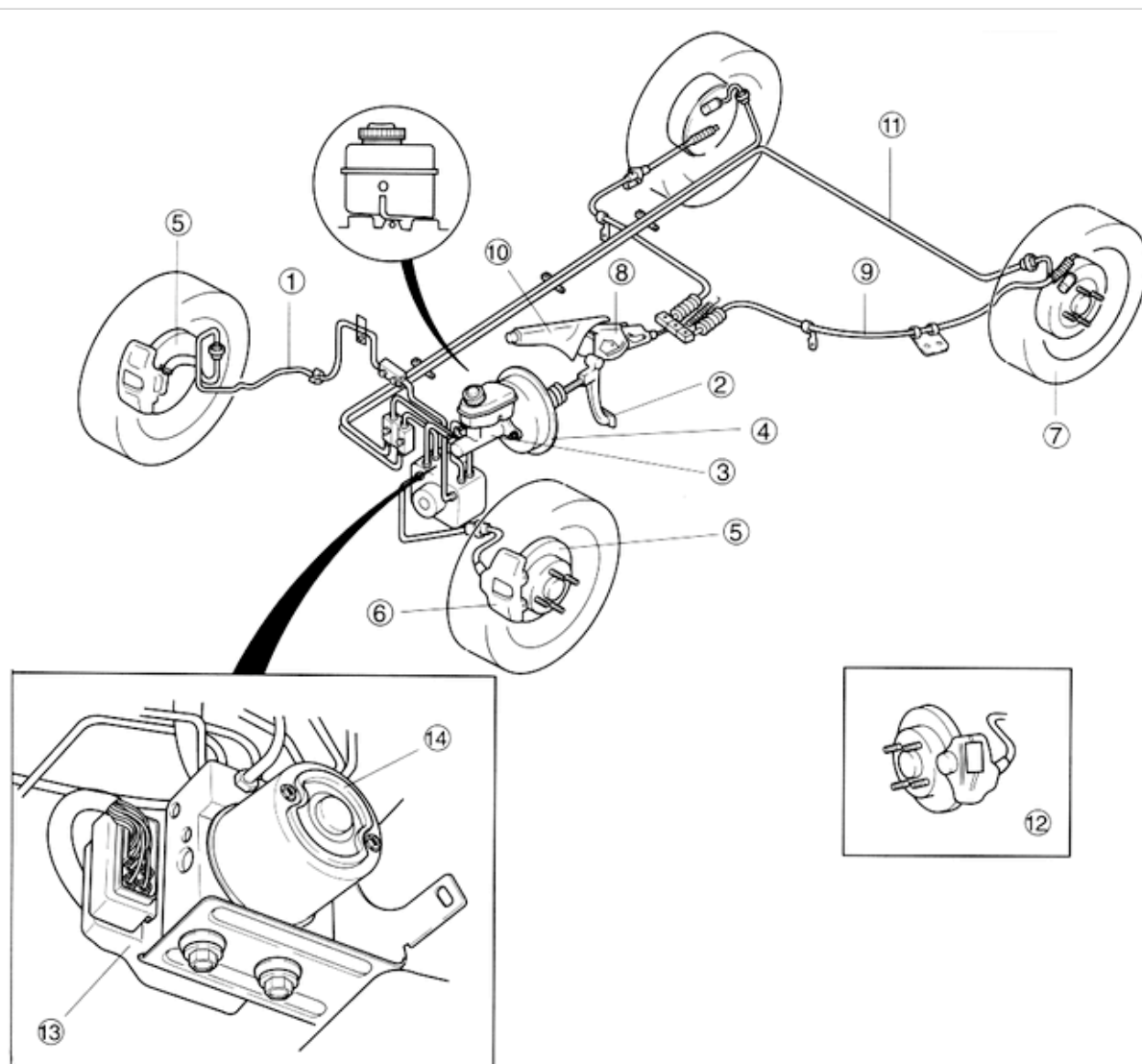


## Operation

Since teeth of sensor rotor change magnetic field of sensor, it generates alternative voltage. This Voltage is proportional to rotating speed and its period can be changed. If can sense speed of wheel by detecting period.



## Component



- (1) Brake hydraulic line
- (2) Brake pedal
- (3) Master cylinder
- (4) Power brake unit
- (5) Front disc brake
- (6) Caliper
- (7) Rear drum brake

- (8) Parking brake
- (9) Parking brake cable
- (10) Parking brake lever
- (11) Brake hose
- (12) Rear disc brake (ABS)
- (13) ABS control unit (ABS)
- (14) HCU (ABS)