VEHICLE SERVICING AND REPAIRING

BASED ON

ETHIOPIAN OCCUPATIONAL STANDARD (EOS)

Learning Guide -24

Unit of Competence: -Remove, Disassemble and Install Vehicle System Assemblies

Module Title: -Removing, Disassembling and Installing Vehicle System Assemblies

LG Code: EIS VSR2 M07 0919 LON-LG - 24

TTLM Code: EIS VSR2 TTLM 0919v1

LO3: Disassemble system assemblies

Instruction Sheet	Learning Guide -24

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Prepare for work
- Remove system assemblies and maintain equipment
- Disassemble system assemblies
- Replace/reassemble
- Clean-up work area

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, **you will be able to –**

- Remove vehicle system assembly according to workplace procedures and manufacturer and component supplier specifications and without causing damage to components or systems

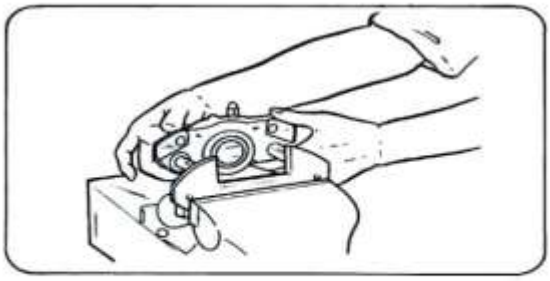
Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 20.
3. Read the information written in the "Information Sheets 1". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the "Self-check 1" **in page -.**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to "Information Sheet 2". However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

Operation Sheet-1	Wheel cylinder disassembly

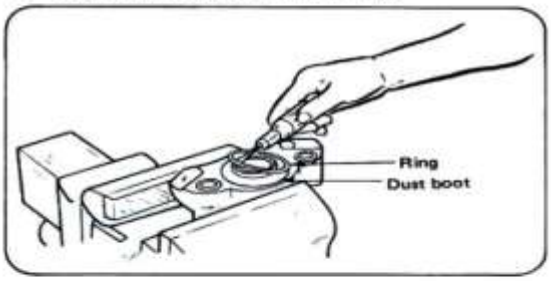
1.1. Disassemble wheel cylinder

Disassembly is the process of systematic removal of desirable constituent parts from an assembly while ensuring that there is no impairment of the parts due to the process. There are both economic and environmentally sound reasons for disassembly. Wheel cylinder Disassembly procedures:



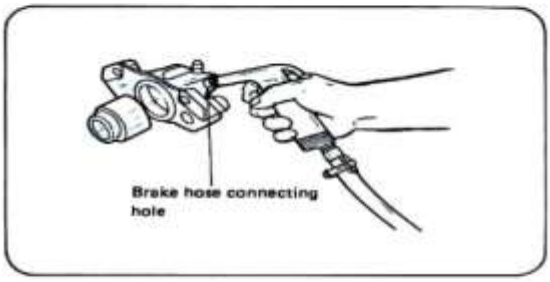
(3) Remove the torque plate from the cylinder body.

4. Disassemble the cylinder body.

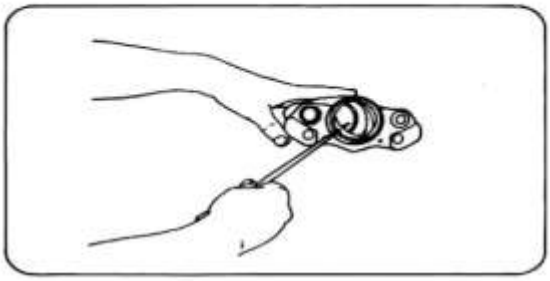


(1) Remove the ring.

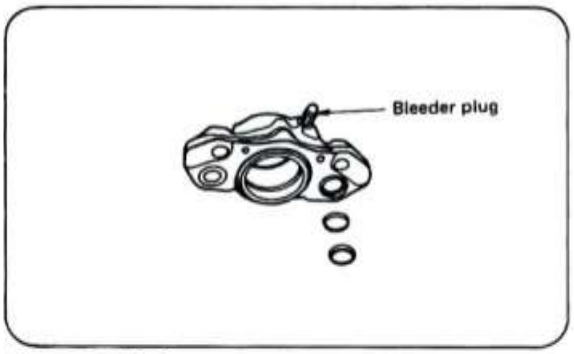
(2) Remove the dust boot from the piston.



(3) Push out the piston.
a. Use compressed air.



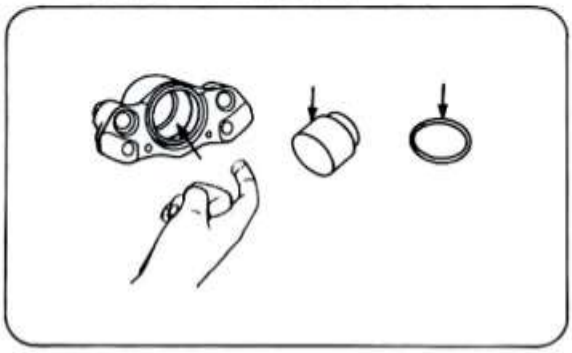
(4) Remove the piston seal.



(5) Remove the following parts from the cylinder body.
   a. Dust seal retainer and dust seal
   b. Bleeder plug

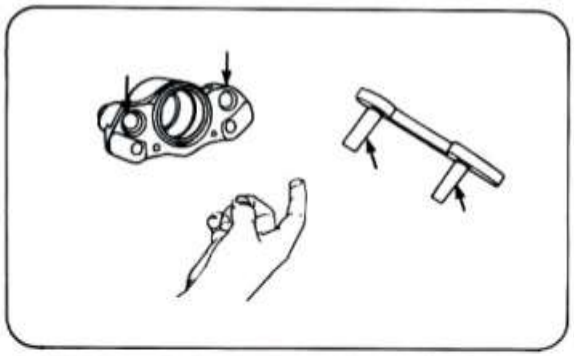
[Reassembly]

5. Reassemble the disc brake.

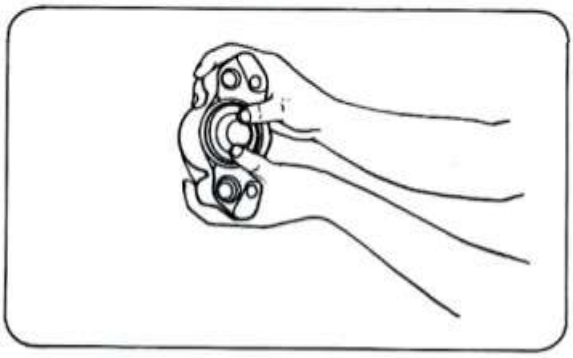


(1) To reassemble, reverse the disassembly procedure.

(2) Pay attention to the following points:
   a. Ensure the proper position, direction and installing sequence of parts.
   b. Apply a thin coat of the specified grease (or brake fluid) to the inside of the cylinder and to the sliding surfaces of the piston and piston seal.



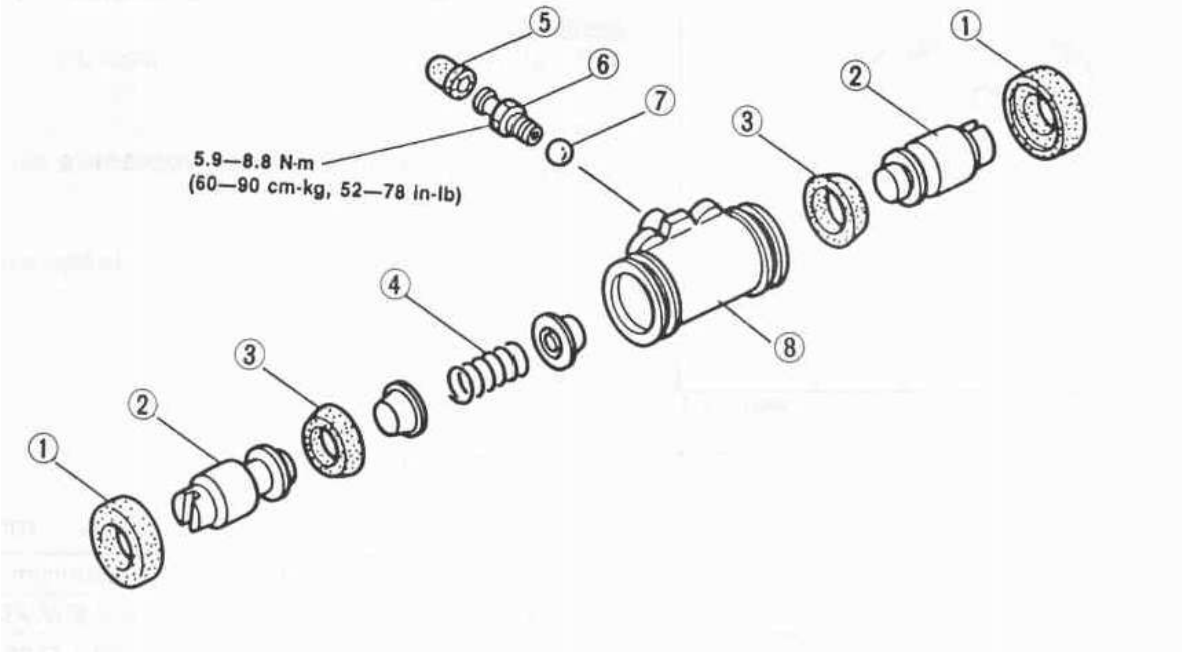
   c. Apply a thin coat of the specified grease to the torque plate pins and their mating surfaces.
   d. Replace the dust seal retainer with a new one.
   e. Replace the piston seal, cylinder boot and pad as necessary.



   f. Insert the piston into the cylinder by rotating.
   g. Tighten the bridge bolts to the specified torque.
   h. Ensure smooth movement of the assembled parts.

7. Bleed air from the brake line.

(1) Follow the procedure described in "Air Bleeding of Brake Line."



1. Dust boot	4. Spring	7. Steel ball
2. Piston	5. Rubber cap	8. Wheel cylinder body
3. Piston cup	6. Bleeder screw	

Fig 3.1. Disassembled components of wheel cylinder

Operation Sheet - 2	Master cylinder disassembly

1.2. Disassemble master cylinder

Procedure:

1. Remove reservoir
   a. Remove the set screw and pull out the reservoir.
   b. Remove the cap and strainer from the reservoir.
2. Remove two grommets
3. Place cylinder in vise
4. Remove piston stopper bolt using a screwdriver, push the pistons in all the way and remove the piston stopper bolt and gasket. Hint: tape the screwdriver tip before use.
5. remove two pistons and springs
   a. Push in the piston with a screwdriver and remove the snap ring with snap ring pliers.
   b. Remove the no.1 piston and spring by hand, pulling straight out, not at an angle.
      Notice: if pulled out at an angle, there is possibility of damaging the cylinder bore.
   c. Place a rag and two wooden blocks on the work table, and lightly tap the cylinder flange against the block edges until the no.2 piston drops out of cylinder.
      Hint: make sure the distance (a) from the rag to the top of blocks is at least 100 mm (3.94 in.).

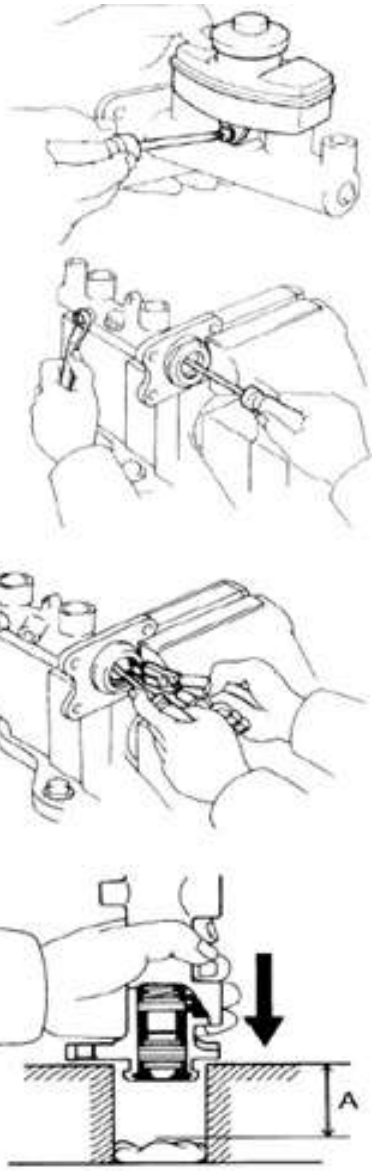
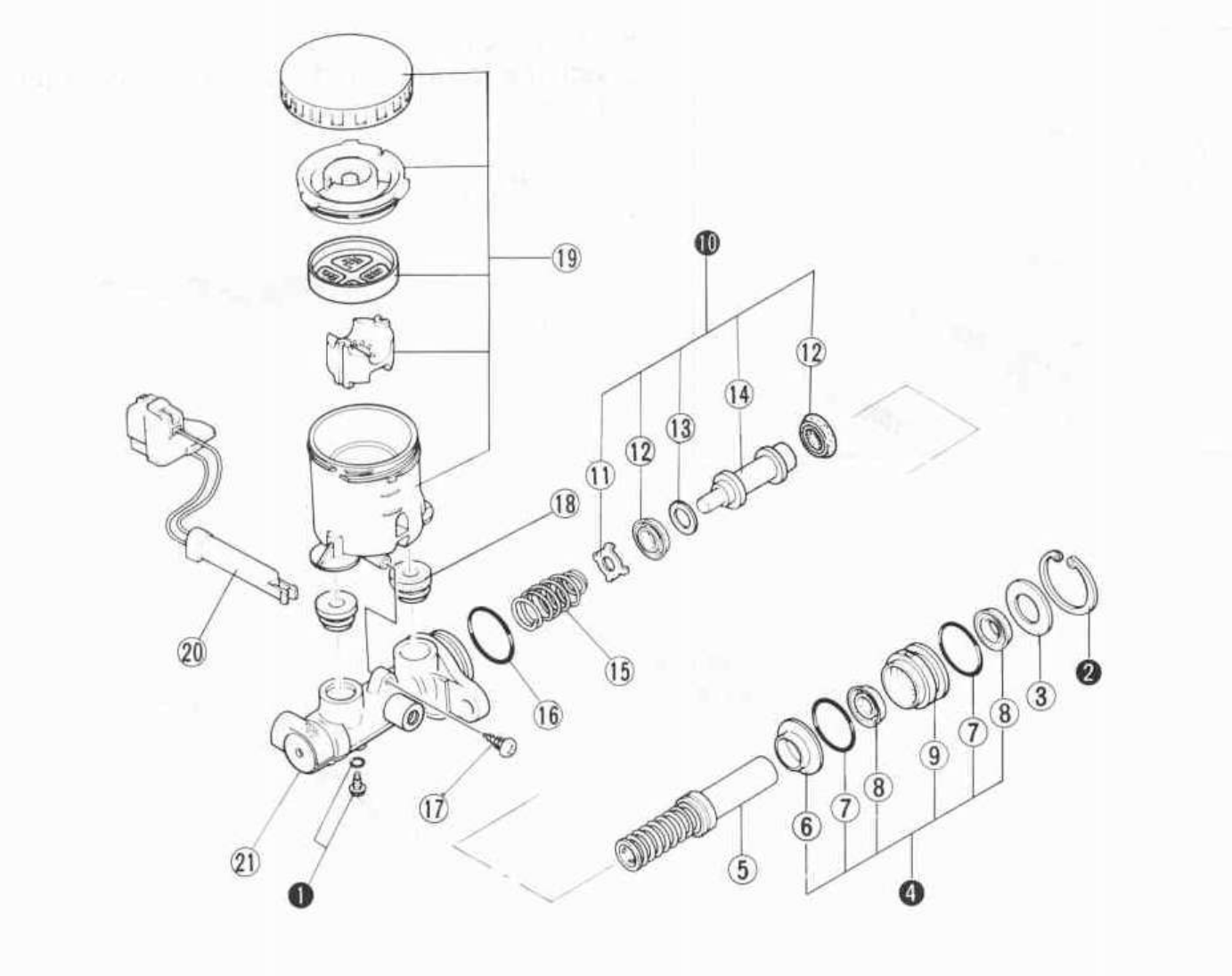


Fig 3.2. Master cylinder Disassembly order



1. Stopper screw and O-ring
2. Snap ring
3. Spacer
4. Piston guide assembly
5. Primary piston assembly
6. Stopper
7. O-ring
8. Piston guide cup
9. Piston guide
10. Secondary piston assembly
11. Stopper
12. Piston cup
13. Washer
14. Secondary piston
15. Spring
16. O-ring
17. Screw
18. Bushing
19. Reservoir assembly
20. Fluid level sensor
21. Master cylinder body

Fig 3.3. Disassembled components of master cylinder

Operation Sheet - 3	Disassemble brake caliper

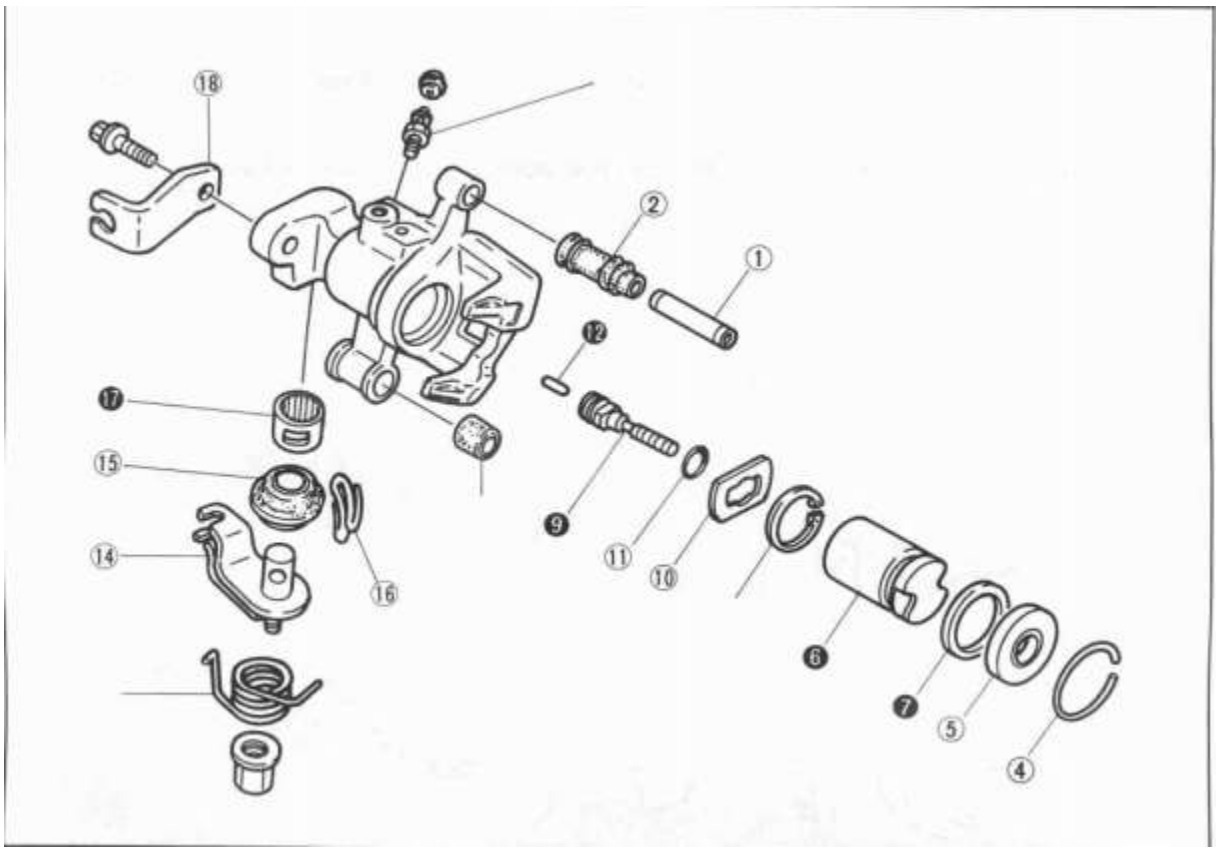
1.3. **Disassemble brake caliper**

Procedures:

1. Remove bridge bolts.
2. Remove the outer body from the cylinder.

DISASSEMBLY AND ASSEMBLY

1. Disassemble the caliper in the sequence shown in the figure, referring to disassembly note for specially marked parts.
2. Inspect all parts, referring to inspection note.
3. Assemble in the reverse order of disassembly, referring to assembly note for specially marked parts.



1. Guide pin	7. Piston seal	13. Return spring
2. Pin boot	8. Snap ring	14. Operating lever
3. Bushing	9. Adjuster spindle	15. Boot
4. Retaining ring	10. Stopper	16. Boot clip
5. Dust seal	11. O-ring	17. Needle bearing
6. Piston	12. Connecting link	18. Cable braket

Fig 3.4. Disassembled components of **brake caliper**

Operation Sheet - 4	Disassembling of suspension system

1.4. Disassemble Shock absorber

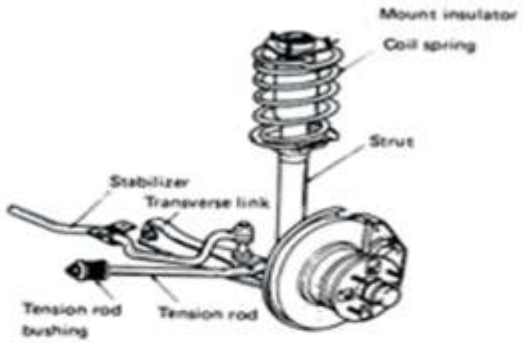
Disassembly procedures:

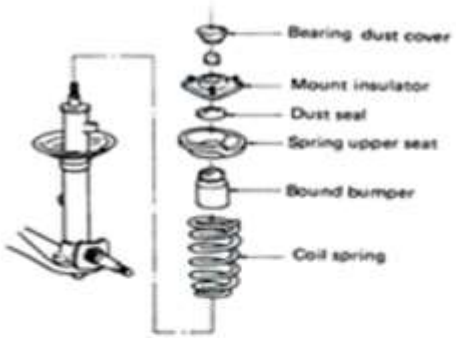
1. Fix front shock absorber with coil spring
   i. Install 2 nuts and a bolt to the bracket at the lower side of the shock absorber assy front LH and secure it in a vise.
2. Remove shock absorber assy front lh
   i. Remove the front suspension support dust cover LH from the front suspension support sub–assy LH.
   ii. Using SST, compress the front coil spring LH. SST 09727–30021
   NOTICE: Do not use an impact wrench. It will damage the SST.
   iii. Using SST to hold the front coil spring seat upper LH, remove the nut. SST 09729–22031
   iv. Remove the front suspension support sub– assy LH, front suspension support LH dust seal, front coil spring seat upper LH, front coil spring insulator upper LH, front coil spring LH, front spring bumper LH and front coil spring insulator lower LH.

Objectives : Learning to remove, inspect and install the spring (strut type) shock absorber

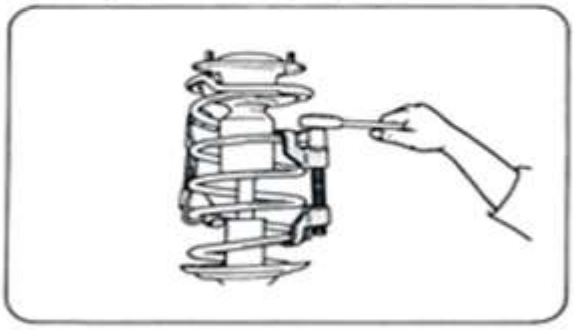
Materials : Strut-type shock absorber

Equipment and tools : 1. Spring compressor





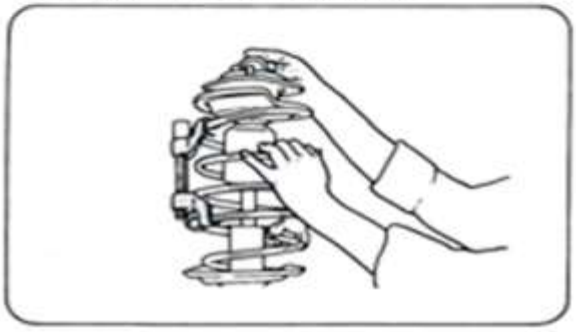
1. Compress the coil spring.



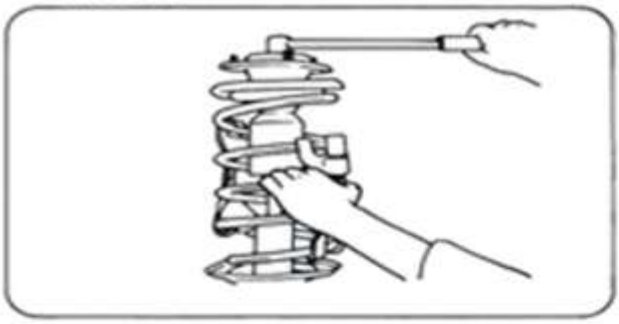
(1) Compress the spring fully, using the spring compressor.

(2) Do not allow the spring compressor to come off during operation.

2. Remove the bearing dust cover.



3. **Remove the nut from the top of the shock absorber.**

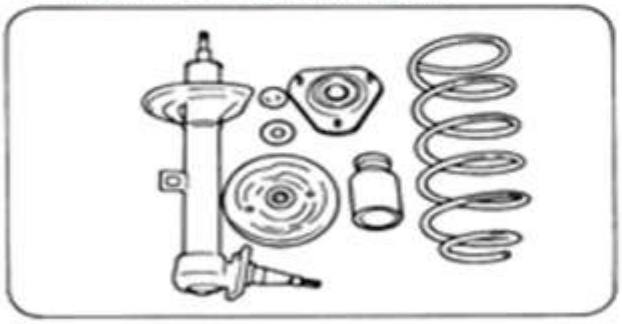


(1) Loosen the nut several turns while fixing the mount insulator.

4. **Remove the mount insulator and coil spring.**

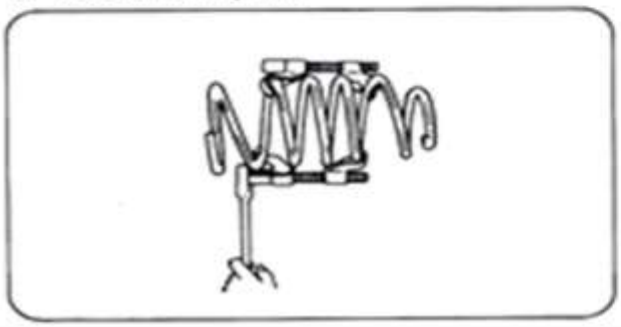
(1) Gradually loosen the spring compressor.
   a. Be careful not to damage the plated portion of the piston rod.

5. **Inspect the disassembled parts.**



(1) Inspect the following points:
   a. Shock absorber for oil leak, damage or improper operation.
   b. Coil spring for fatigue
   c. Bearing for wear or noise
   d. Spring seat for deformation or cracks
   e. Bound bumper for deterioration

6. **Assemble the parts.**



(1) To assemble, reverse the removal procedure.

(2) Pay attention to the following items:
   a. Compress the coil spring, using the spring compressor.
   b. Correctly align the spring end and the spring seat.

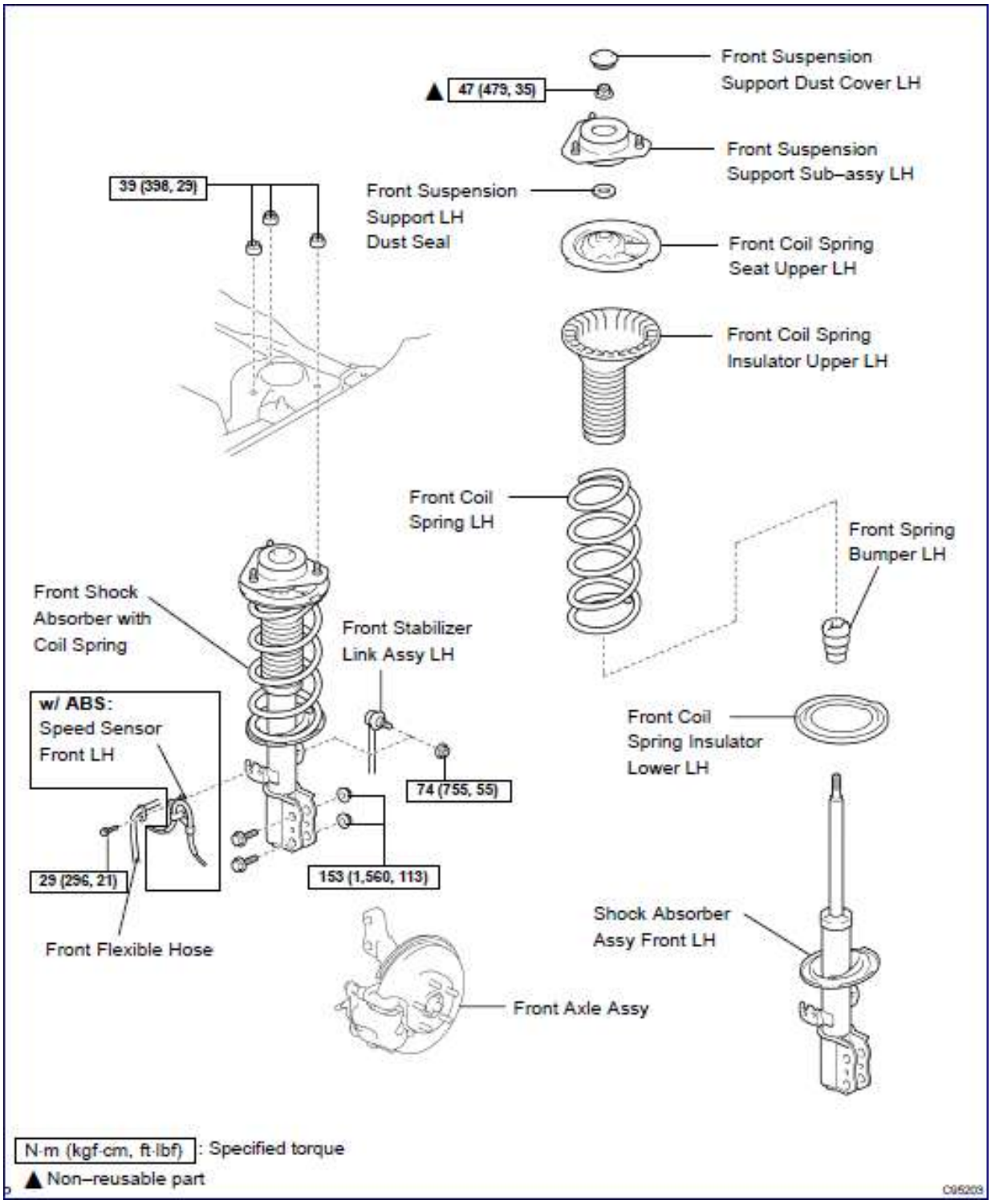


Fig 3.5. Disassembled components of Shock absorber assembly

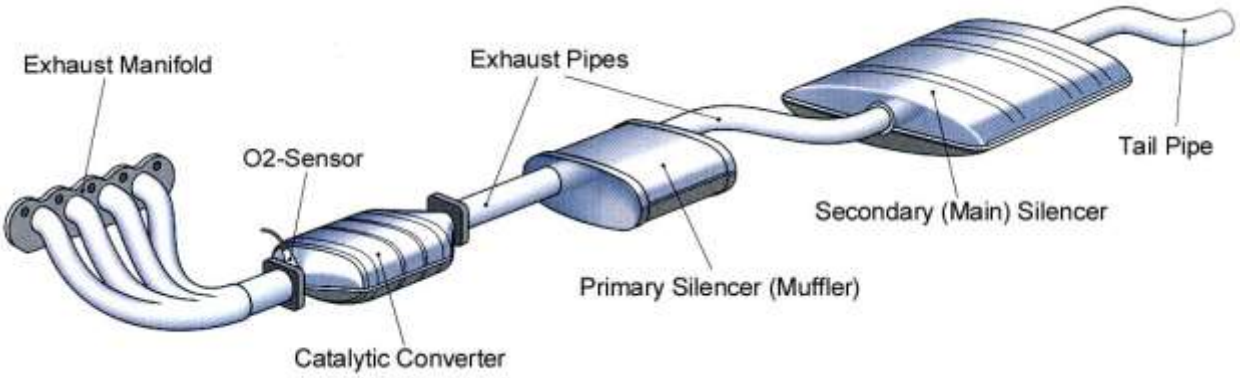
Operation Sheet-5	Disassembling of exhaust system

1.5. Disassemble exhaust system

Steps/procedures

1. Disconnect and remove oxygen probes (oxygen sensor) if required.
2. Unbolt or cut:
   i. 2a front hosepipe (*Front exhaust pipe).*
   ii. 2b catalytic converter
   iii. 2c resonator
   iv. 2d intermediate pipe (Rear exhaust pipe)
   v. 2e muffler (*Tailpipe., Auxiliary muffler)*
   vi. 2f tailpipe (*Exhaust pipe or outlet pipe).*

Fig 3.6. Exhaust pipe/tail


Exhaust Manifold
O2-Sensor
Exhaust Pipes
Tail Pipe
Secondary (Main) Silencer
Primary Silencer (Muffler)
Catalytic Converter

LAP Test 2	Practical Demonstration 3

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within --- hour.

Task 1. Adjust parking brake lever travel by using manufacturer specification?

Task 2. Disassemble master cylinder?

Task 3. Disassemble suspension system?

Task 4. Disassemble wheel cylinder?