

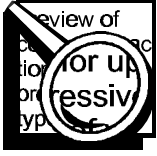
R-02

MAINTENANCE MECHANIC TRAINING

SKILL DEVELOPMENT GUIDE

Duty R: Machine Shocks
R-02: Rebuild Machine Shocks

Issued 01/01/99



Task Preview

Rebuild Machine Shocks

A Maintenance Mechanic rebuilds a machine shock when shock absorbing is inadequate, the shock sticks, fails to extend or is leaking.

The machine shock is rebuilt in the repair shop.

You will verify the availability of parts that may be necessary to rebuild the machine shock. You will drain and disassemble it, inspect the components, install new seals, O-rings and other parts. Finally, you will reassemble the machine shock in reverse order.

How your skills will be checked

The Skill Check will require you to rebuild a machine shock. All tools, materials, and resources will be available. The Evaluator will verify that your demonstration meets the skill objective by observing or measuring each task standard. You must demonstrate safe work practices during the Skill Check. Contact your Evaluator when you are ready for the Skill Check.



Skill Objective

Given a request to rebuild a machine shock, rebuild the machine shock.

Task Standards

1. The inner surface of the cylinder must not show signs of scoring, ridges, or wear.
2. The piston rod must not be bent, rough or scored.
3. The piston ring must not be broke or show signs of wear or scoring.
4. All seals in the rebuild kit (Piston rod seal and wiper and all O-rings) must be replaced.
5. The inner tube lock pin must be in its respective hole to lock the inner tube (cylinder) to the body and prevent rotation.
6. The adjusting ring pin must be in its respective hole to connect the adjusting ring to the outer tube (sleeve) and passes through an annular slot in the body.
7. Loctite 242 must be applied to the button retaining screw.
8. All required safe practices must be demonstrated.

What You Will Need

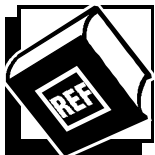
This section contains the safety information, tools, and resources you will need before rebuilding a machine shock.



- Follow all Caterpillar facility safety standards when performing this task.



- internal snap ring pliers
- brass rod and hammer
- screwdriver (flat blade)
- Allen wrenches
- air impact wrench with Allen insert for button cap screw
- Arbor press
- air hose and fitting for machine shock
- wiping rags, paper towels
- Loctite 242



- Manufacturer's parts list, instructions, and drawings
- Work Order printout
- Repair Ticket
- Crib parts printout



Task Steps

Rebuild Machine Shocks

1. Identify the machine shock.
 - Check the IBM number on the Repair Tag.
 - Look for the Work Order number on the bottom of the Repair Tag.
 - Look up the Work Order in the Work Order book, or on the computer screen, and verify that it refers to the specific machine shock to be rebuilt.
 - Locate and retrieve the binder (including the manufacturer's rebuild manual, parts lists and drawings) that covers the machine shock to be rebuilt.
 - Verify that the number in the binder matches the number for the machine shock on the Repair Tag.
2. At the computer terminal, type in the IBM number to access a printout of all parts for the machine shock to be rebuilt.
3. Check the status of the parts you may need (in crib, out of stock/can be ordered, not stocked).
 - Make sure that you have all the required parts to rebuild the shock.
4. Compare the part numbers on the printout to the corresponding numbers in the manufacturer's parts list/drawing.
5. Read the manufacturer's rebuild instructions.
6. Drain oil from the machine shock.
 - Tilt the machine shock on its side with the hose connection port facing down.

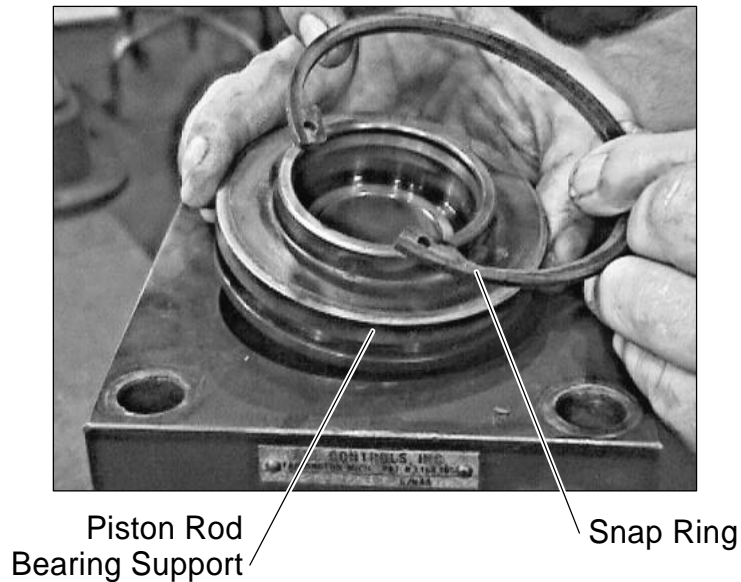
- Stroke the piston rod to empty the cylinder faster, if possible.
- After the oil is drained, stand the machine shock vertically with the piston rod up. See the figure below.



Machine Shock Ready for Disassembly

7. Remove the piston rod assembly.

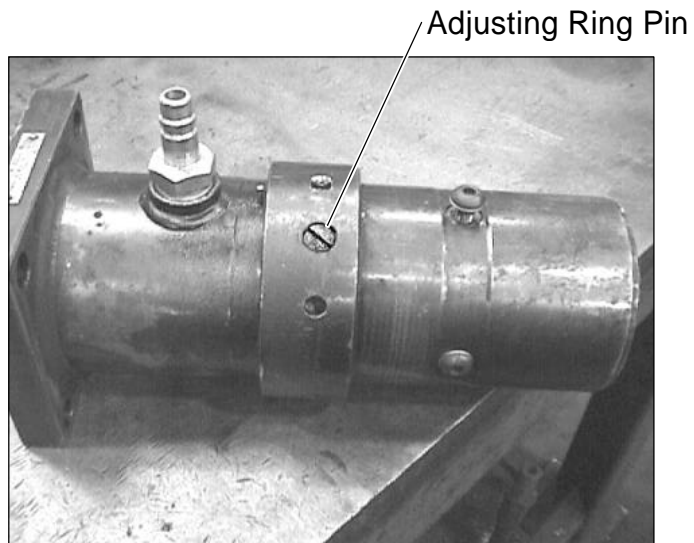
- ❑ Remove the snap ring that retains the piston rod bearing support using internal snap ring pliers. See the figure below.



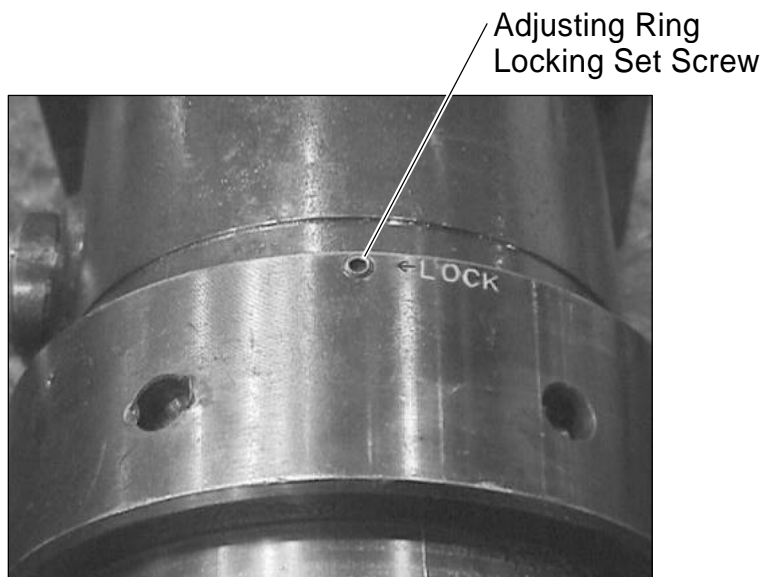
- ❑ Use a screwdriver to loosen the snap ring or tap the side of the pliers, with a hammer, to pull the compressed snap ring from its groove.
- ❑ Screw an air hose adapter into the hose connection port.
- ❑ Connect an air hose to the air adapter and increase the pressure to about 10 psi or until the piston rod bearing support pops out.
- ❑ Withdraw the piston rod, piston and bearing support from the machine shock.

8. Remove the adjusting tube/cylinder assembly.

- Unscrew and remove the adjusting ring pin. See the figure below.

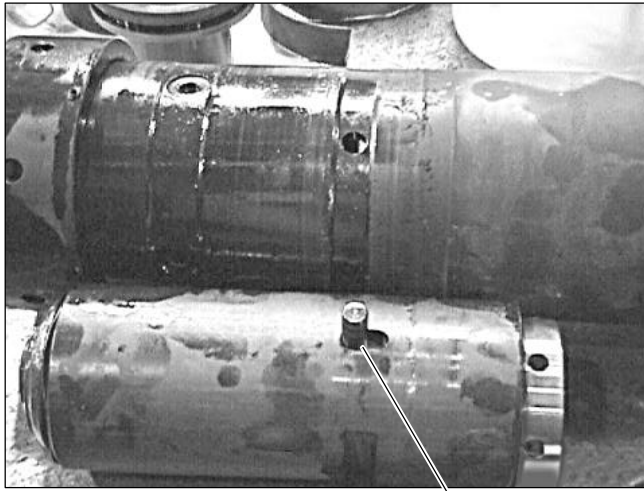


- Loosen the adjusting ring locking set screw. See the figure below.



- Knock the adjusting ring down the machine shock body far enough to uncover the inner tube lock pin using a brass rod and hammer.

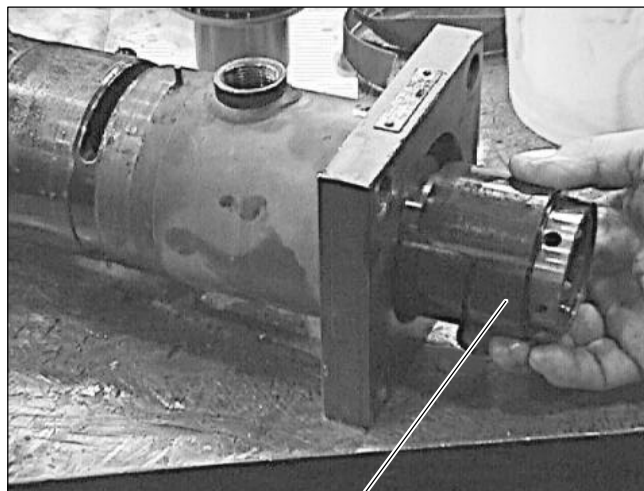
- Turn the machine shock body on its side to let the inner tube lock pin fall out. See the figure below.



Inner Tube Locking Pin

Note: Reach in the open end of the body and wiggle the tube if necessary.

- Pull the tube/cylinder out of the body. See the figure below.



Tube/Cylinder

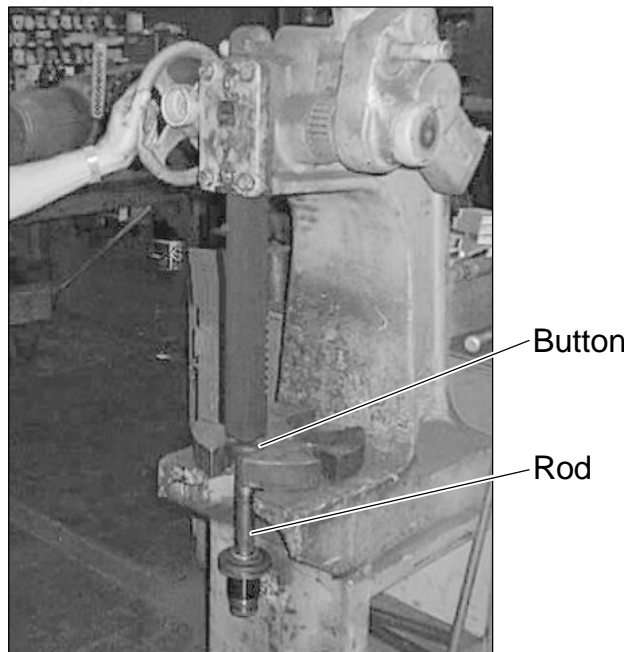
9. Remove the piston rod button.

- Clamp the piston rod in a vise using a brass or other non-marring vise jaw covers.
- Use an impact driver to break loose and unscrew the button retaining screw. Do not completely remove the screw. See the figure below.



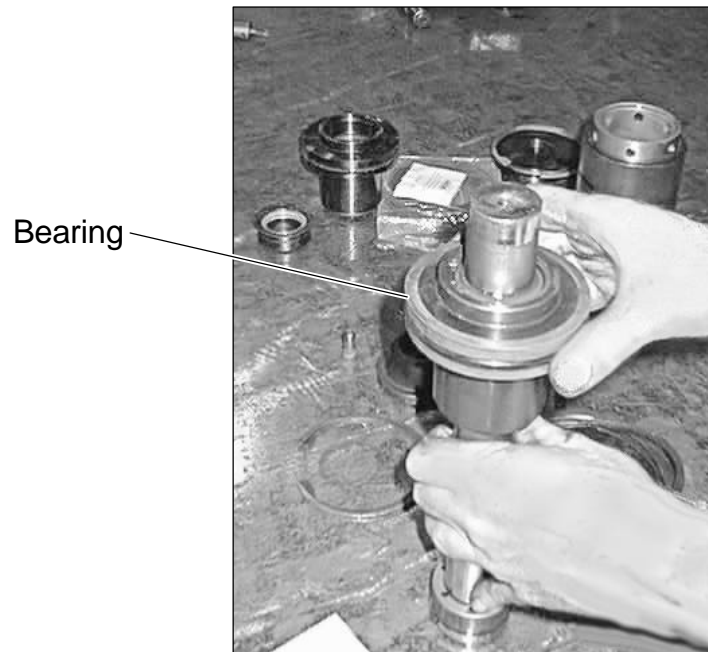
Retaining Screw

- Press the button off the piston rod using an arbor press. Tap the arbor against the screw or press if necessary. Use caution to be sure that the rod threads are not damaged. See the figure below.

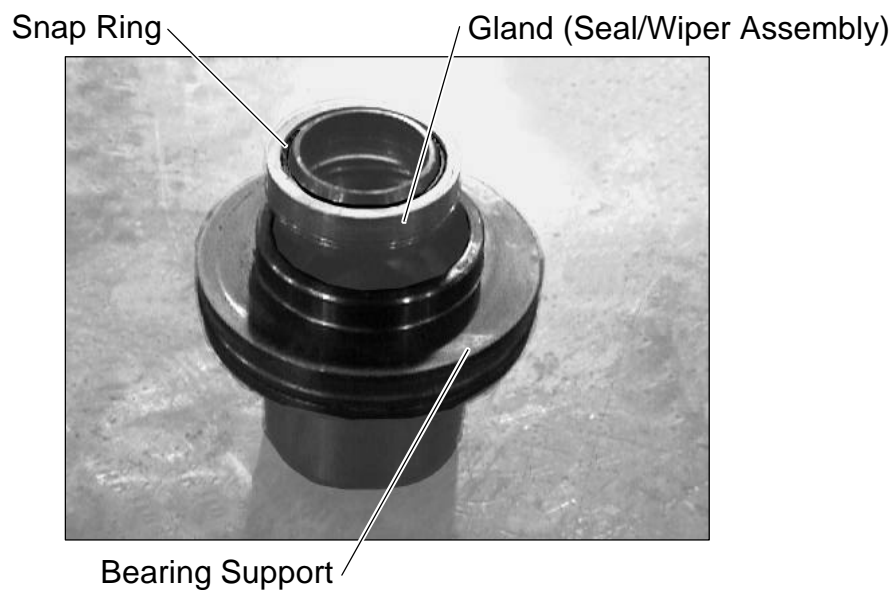


10. Disassemble piston rod assembly.

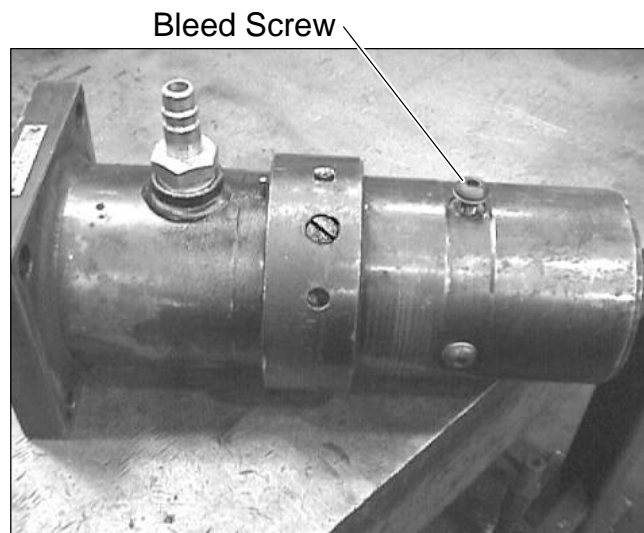
- Slide the bearing support off the piston rod. See the figure below.



- Remove the snap ring that retains the gland (seal/wiper assembly) in the bearing support.

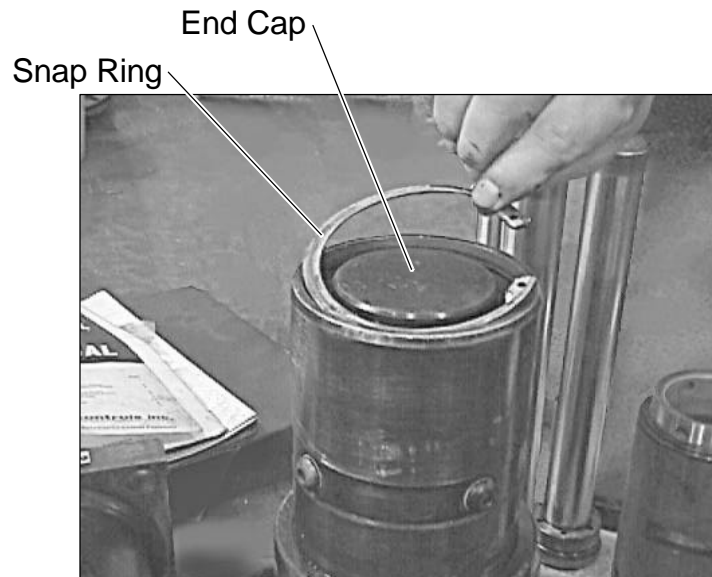


- Remove the gland, knock it out with a brass rod and hammer, if necessary.
 - Pick the seal (inner ring) and wiper (outer ring) from the gland.
11. Disassemble the machine shock body.
- Unscrew the bleed screws.



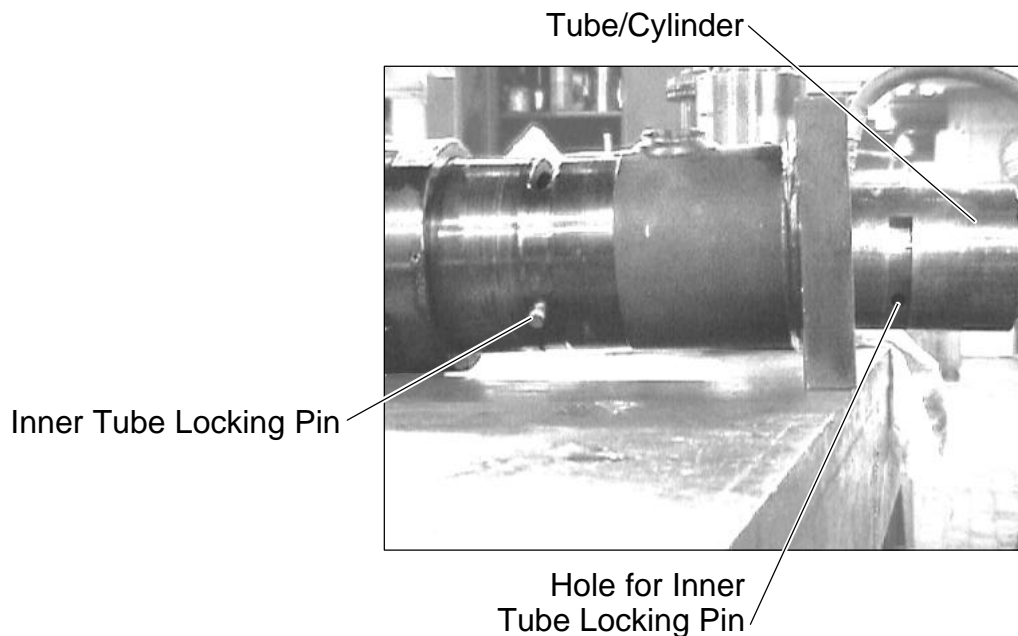
- Knock the adjusting ring completely off the body with a brass rod and hammer.

- Remove the end cap snap ring and end cap, if it is leaking. A brass rod and hammer may be required to remove the end cap. Use caution not to cock the end cap while removing it. See the figure below.



12. Determine which components to replace and the associated costs.
 - Inspect the inner surface of the cylinder for scoring, ridges, and wear.
 - Inspect for a bent, rough, or scored piston rod.
 - Inspect the piston ring for breakage, wear, scoring, or lack of spring tension.
 - Check the fit of the piston rod in the bearing.
 - Compare with the fit of new components, if possible.
 - Check the parts printout for the percentage cost of each major component compared to the cost of a new shock.
 - Take into account the criticality of the machine shock to the production process, and the time required to obtain replacement major components.
 - Order and replace those major components that will be most cost effective in terms of restoring production, preventing unscheduled breakdowns, and extending shock life.

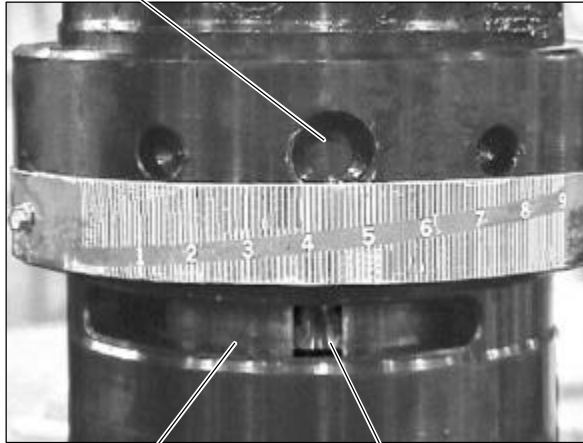
13. Replace all seals (piston rod seal and wiper and all O-rings) provided in the rebuild seal kit according to the manufacturer's rebuild instruction.
 - Be sure to use hydraulic oil to lubricate all seals, wipers, and O-rings as they are installed.
14. Reassemble the shock.
 - Install the end cap and cap snap ring, if removed.
 - Using a brass rod and hammer, tap the adjusting ring on the body.
 - Position the tube/cylinder with the hole for the inner tube locking pin.
 - Slide the tube/cylinder into the body until the both holes for the inner tube locking pin are aligned. See the figure below.



Note: The inner tube lock pin locks the inner tube (cylinder) to the body and prevents rotation.

- Position the adjusting ring over the annular slot. Make sure that the adjusting ring pin goes in its respective hole. See the figure below.

Hole for Adjusting Ring Pin



Outer Tube

Annular Slot

Note: The adjusting ring pin connects the adjusting ring to the outer tube (sleeve) and passes through an annular slot in the body.

- Reassemble the piston rod.
- Slide the piston rod and bearing into the cylinder. See the figure below.

Piston Rod

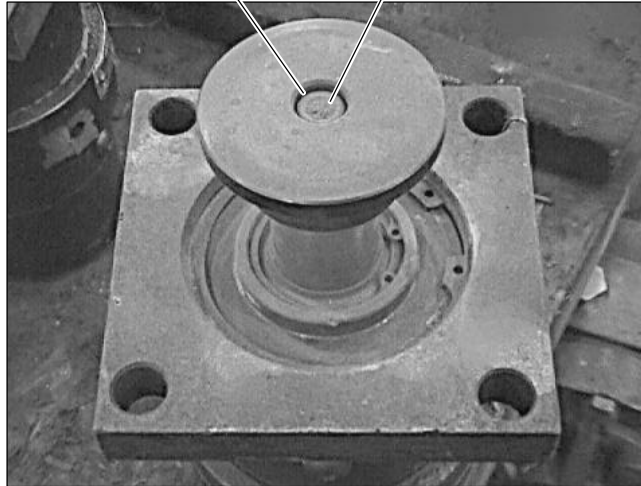


Bearing

- Tap the button on the end of the piston rod with a hammer.
- Apply Loctite 242 to the button retaining screw. See the figure below.

Apply Loctite® 242 Here

Button Retaining Screw



15. Complete the paperwork on the machine shock rebuild.



Concept Check

Rebuild Machine Shocks

Answer the following questions to check your understanding of rebuilding a machine shock. Circle the correct answer in each question. Then compare your responses with the answers at the bottom of this page. Some of the questions may have more than one correct answer. If you have difficulty answering a question, review the Skill Development Guide or ask your Trainer for assistance.

1. The inner surface of the cylinder is inspected for:
 - a. scoring.
 - b. rough.
 - c. ridges.
 - d. wear.

2. The inner tube lock pin:
 - a. prevents rotation.
 - b. passes through an annular slot in the body.
 - c. connects the adjusting ring to the outer tube.

3. The purpose for using Loctite 242 is to secure:
 - a. the bleed screws.
 - b. adjusting ring locking set screw.
 - c. the button retaining screw.
 - d. the snap ring.

Answers: (1. a, c, d 2. a 3. c)

Next Step

If you are ready to demonstrate the task now, ask your Evaluator or Trainer to schedule the Skill Check. However, if you need to practice some of the steps first, continue to the next section.



Practice

The following practice will help prepare you for the Skill Check. Ask your Trainer to set up the practice for you. After you complete a practice, ask your Trainer to check your work.

Practice

Your Trainer will designate a machine shock for the rebuild activity. You will be asked to select the required repair kit. During the practice you will:

- Disassemble the machine shock.
- Inspect major components and determine which should be replaced.
- Install all required parts supplied in the rebuild kit (some kits have extra parts for various types of shocks).
- Reassemble the machine shock with rebuild kit parts.

Your Trainer will observe you as you reassemble the machine shock to ensure that the machine shock is assembled properly. You are required to follow all the recommended safe practices.

Practice Objective

The major components will be serviceable. The inner surface of the cylinder must not show signs of scoring, ridges or wear. The piston rod must not be bent, rough or scored. The piston ring must not be broke or show signs of wear or scoring. All seals in the rebuild kit (Piston rod seal and wiper and all O-rings) must be replaced. The inner tube lock pin must be its respective hole to lock the inner tube (cylinder) to the body and prevent rotation. The adjusting ring pin must be its respective hole to connect the adjusting ring to the outer tube (sleeve) and passes through an annular slot in the body. Loctite 242 must be applied to the button retaining screw. All safe practices must be demonstrated.

Next Step

Continue to practice until you are ready for the Skill Check. When you are ready to demonstrate the task, ask your Evaluator or Trainer to schedule the Skill Check.