

C-Type
Single & Double Acting Telescopic Cylinder
Maintenance

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INTRODUCTION



This manual was created to provide you with the necessary information to perform general disassembly and assembly of the C-series Single and Double Acting telescopic cylinder, manufactured by Mailhot Industries Inc.

Please be sure to closely follow the recommendations given. We believe this manual can be a useful tool for you and is intended to further enhance the quality of service provided by Mailhot Industries Inc.

GENERAL INFORMATION

Before starting work on any hydraulic cylinder, be sure the work area is clean, and offers enough space to extend the cylinder to its full stroke. Work area obstructions or lack of space could make the cylinder difficult to handle increasing the risk for injury or potential damage to the cylinder.

WARNING

It is strongly recommended to take all necessary precautions to avoid an accident during the disassembly and assembly process. During removal of the cylinder, it is recommended that the safety prop(s) and a secondary support be used to keep the truck body in the open position at all times.

NOTICE

Before starting any work on the C-series single or Double Acting telescopic cylinder it is important to verify the warranty status of the product. Unauthorized service of a cylinder within the warranty period without the consent of Mailhot Industries Inc. may void the warranty. Please contact the customer service department in your region to obtain an R.G.A. and further instructions.

St-Jacques, Quebec, Canada	(450) 839-3663	or (800) 563-3663
Guelph, Ontario, Canada	(519) 763-6116	or (800) 668-6810
Edmonton, Alberta, Canada	(780) 482-2121	or (888) 988-2121
Hudson, New Hampshire, USA	(603) 880-9380	or (800) 624-5468
Mailhot, Mexico	(011) 5255-586-4583	

DISCLAIMER

This maintenance manual is intended to provide general guidance when servicing your C-CS series Single or Double Acting telescopic cylinder manufactured by Mailhot Industries Inc. All illustrations and photos should only be used as reference for disassembling and assembling the hydraulic cylinder. Mailhot Industries Inc. will not be liable and is not responsible for damages due to inadequate tools, incorrect procedures, incorrect and/or aftermarket components used and for any other damages. Please contact the Mailhot Industries Inc. customer service department in your region for further information.

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C-CS Series Single and Double Acting Telescopic Cylinder



Internal Configuration

All cylinders are the same! False! Our new generation of C-CS series telescopic cylinders has a unique design that uses 40% less parts than comparable models. This simplified concept improves performance and makes assembly and disassembly a more manageable task. All gland nuts are removable using a minimal set of basic tools.

Figure 1

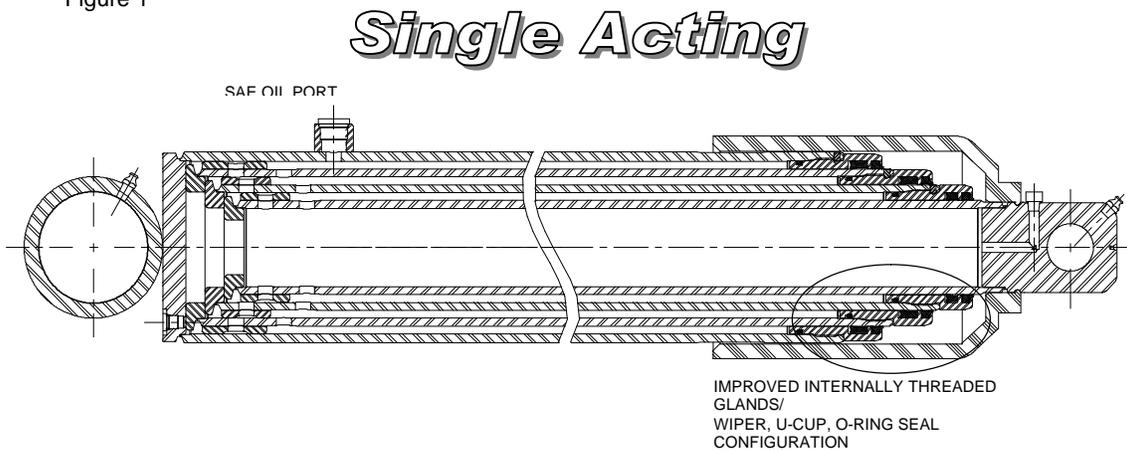


Figure 2

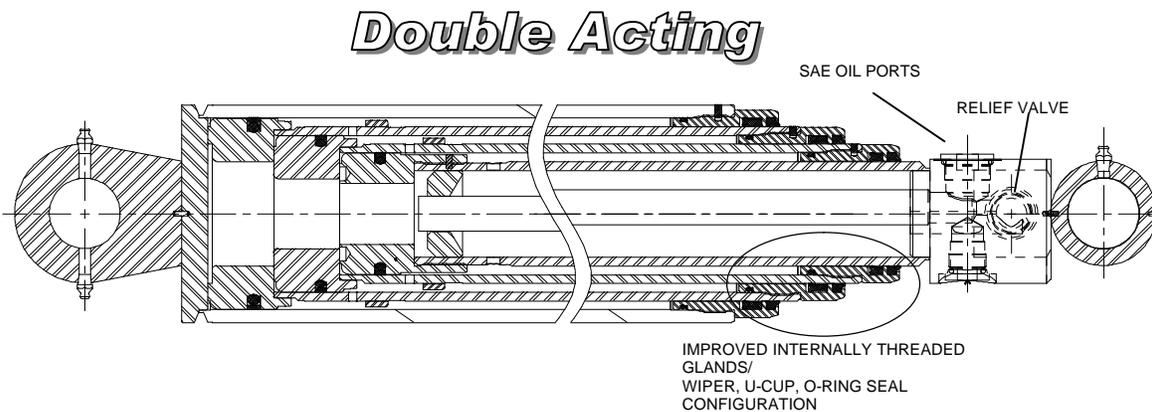
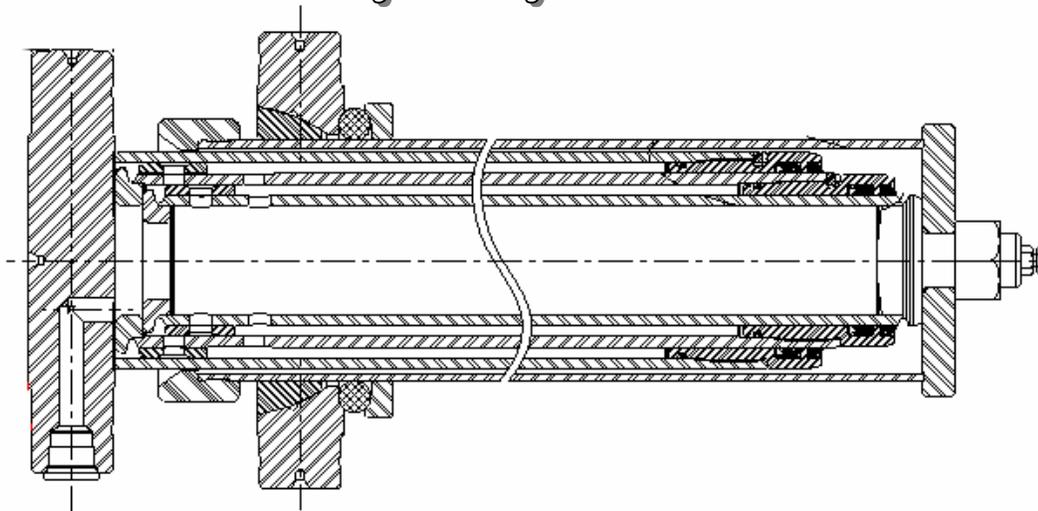
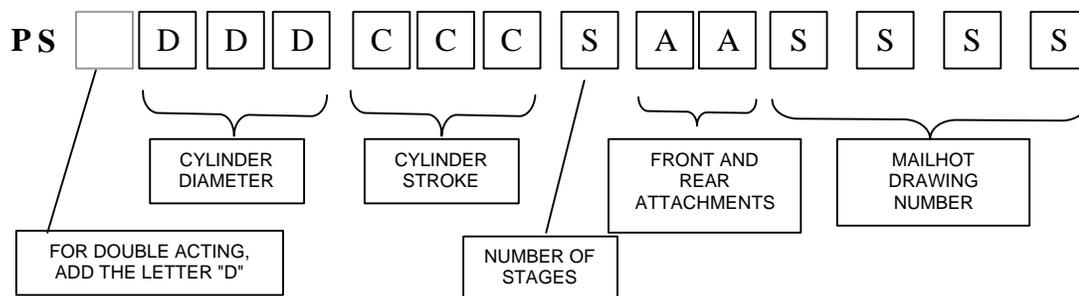


Figure 3

CS-Single Acting with Cover



When you want to order or repair your new generation C-CS series Single or Double Acting telescopic cylinder, we strongly recommend you contact the Mailhot Industries Inc. representative in your region for instructions. Below you will find the coding method that will help you to understand the part number terminology.



Identifying the Correct Cylinder for Your Needs

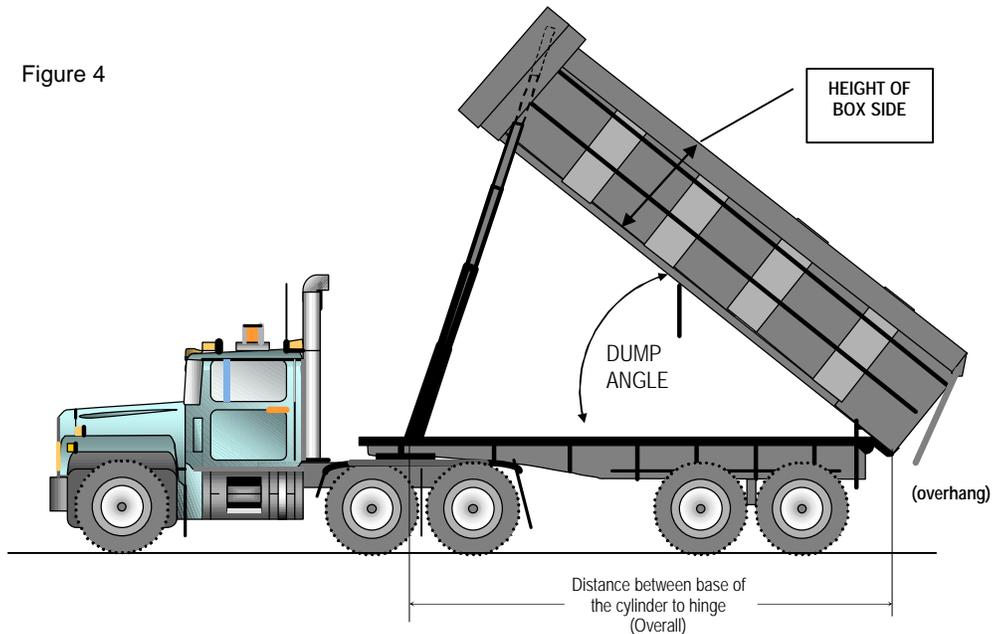


Mailhot Industries Inc. manufactures a variety of cylinder sizes to accommodate different body lengths and capacity requirements. If provided with the correct information, we can determine, based on experience and with the use of application software the C-series telescopic cylinder that is best for your specific application.

When contacting a Mailhot Industries Inc. representative to select a cylinder, please have the following information available;

Overall box length:	Total length of dump body from end to end.
Overhang:	Distance from the center of rear hinge pin to the back of the dump body.
Height of box sides :	Distance from the bottom of the box side to the highest point, in the middle of the side.
Working pressure:	Working pressure per square inch (P.S.I.) applied to cylinder.

Figure 4



With this data in hand, your representative will be able to exactly determine the cylinder type you need for your intended use.



Suggestions and Recommendations for the Safety Aspects of Your Cylinder

VISUAL INSPECTION

Inspect the cylinder in the non-extended position, the entire hydraulic system and cylinder during extension.

- Inspect for leakage at the pump, cylinder and hoses.
- Inspect tank for leakage and correct oil level.
- Verify with the cylinder extended that all gland nuts are tight (not partially unscrewed or show any other signs of damage)

HANDLING

When it is necessary to remove the cylinder, it is important to handle it with great care to prevent potential injury or damage to the cylinder. Any hard contact to the outer wall of the cylinder can cause serious damage. It is important to inspect the cylinder for any scoring, imperfections or dents that prevent the cylinder from working correctly. If leakage is visible or the cylinder does not stage correctly rendering the cylinder unusable, please contact the Mailhot Industries Inc. customer service department in your region for instructions. A damaged cylinder installed on a vehicle could lead to serious personal injury or even death.

STORAGE

If a cylinder must be stored for any period of time, it should be protected from poor weather conditions, direct sunlight and extreme temperature variation. Oil ports must be sealed with an appropriate plug to prevent dust, water, humidity or any other contaminant from entering the cylinder. Adding oil inside the cylinder will prevent potential corrosion, especially if cylinder is stored outside. Depending on the length of time the cylinder will be in storage, some additional precautions should be taken.

- 6 months of storage or less, no special precautions other than those stated above are required.
- 6-12 months, cylinders should be stored vertically.
- 12-24 months of storage, cylinder should be pressure tested before installation to ensure seals are functioning properly.
- 24 months or more of storage, all seals should be replaced.

If the cylinder must be stored outside with little or no protection from the weather, the cylinder should be at least stored vertically and filled with oil.

HYDRAULIC OIL

For optimum performance from your hydraulic system Mailhot Industries Inc. recommends using oil specifically designed to be used in hydraulic systems with a viscosity grade between 32 cSt (150 SUS) and 68 cSt (315 SUS) with anti-friction additives.

It is important to verify that the hydraulic oil used is compatible with all the components that comprise your hydraulic system. Due to a wide variety of applications with varying climatic conditions, it is important to consult with a hydraulic oil supplier to determine the appropriate hydraulic oil that will help to prolong the life of your hydraulic system.



PRESSURE IN THE CYLINDER

When the cylinder is under pressure, a small leak could allow oil to escape at more than 2000 P.S.I. causing serious injury. Loose clothing, safety goggles and work gloves are always suggested when working around a pressured system requiring service.

When disassembling a cylinder, great care must be taken because there is always residual pressure that remains in the cylinder. Pressure can remain in a cylinder even after it has been removed and in storage for some time. When stages are moved, even without an oil supply, pressure can built up between the stages, especially if an oil port is clogged or blocked. A sudden unclogging, removal of blockage, or leak in a seal can generate enough pressure to cause serious injury.



Warnings:

- A cylinder is a lifting device only. A cylinder is not a structural component of the truck/box assembly. A cylinder is not and should not be considered a stabilization device.
- A cylinder should be allowed to complete its stroke without any obstacle. There should be nothing in the path of the cylinder that could interfere with its natural movement during extension and retraction.
- Cylinder installation should only be performed by trained and/or qualified personnel, otherwise, serious damage and/or injury is possible.
- When operating a cylinder, equipment should be on level ground and all axles should be in alignment (trailers and end-dump trailers should never be unloaded in a jack-knifed position.)
- Never unload if the ground is not level, too soft or strong winds are present, causing the vehicle to tilt. Lateral movements will result in damage to the cylinder, misalignment of the cylinder stages and could lead to a possible rollover of the vehicle.
- Never unload if equipment or people are in the unloading area.
- The operator of the equipment should always stay at the controls. If the vehicle starts to tilt, it should be lowered immediately. Always be careful not to lower the body too fast and try to lower in a steady motion. Sudden stopping or jerking can cause a sudden peak in pressure within the cylinder and could cause damage.
- Never overload the trailer. The load should be evenly distributed in the body in a horizontal and vertical manner. A load that sticks to the body increases the risk of tilting or potential rollover. The operator should lower the body to assess the situation.
- Never jerk the body to release a stuck load. This can cause damage to the body, hydraulic system, and the vehicle itself. It is preferable to lower the body and to use a manual or mechanical means to free the material. Do not move the truck and/or use sudden stops with the cylinder extended to free a stuck load.
- Over pressurization of the cylinder must be avoided. This could cause serious damage to the cylinder, serious injuries or even death. **Do not operate a cylinder with pressures above 2000 P.S.I. without a written notice and approval of Mailhot Industries Inc.**
- Maintenance is essential to keep the vehicle working safely and to prolong the useful life of the vehicle. An inspection of the vehicle should be part of the operator's daily routine; this will increase safety and helps to detect problems before damage occurs.
- Hydraulic oil changes are very important. Periodic changing of the oil will greatly increase the performance of the hydraulic system.
- Never extend the trailer cylinder in the presence of high voltage electrical lines.

Installation of the Cylinder



To ensure an efficient installation of all the hydraulic circuitry components (pump, tank and hoses) it is necessary to do the following:

Oil Tank and Pump

Oil tank should be installed higher than the pump to ensure a positive flow to the oil port. It is important to fill the tank with new and clean hydraulic oil. Oil should also be selected according to temperature and application uses and specifications mentioned in this manual.

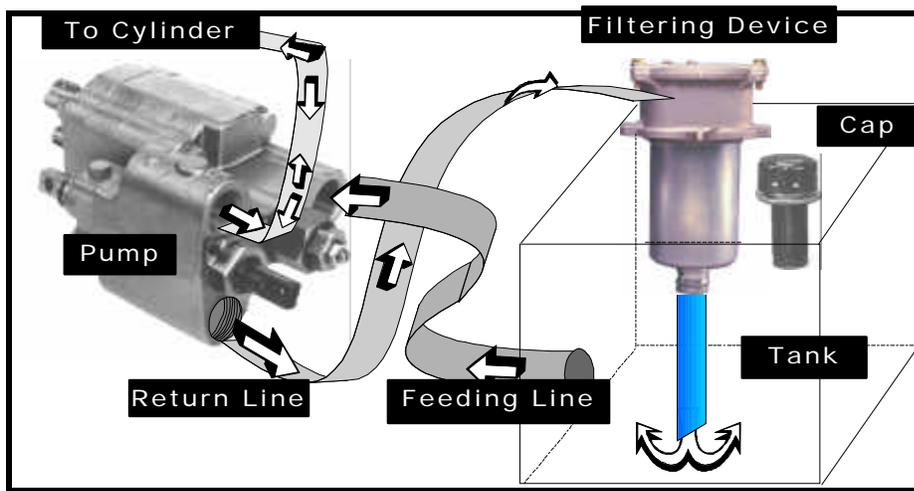
Starting

When pump and oil tank are installed, pump must be primed by hand before connecting it to the P.T.O. Rotate the shaft manually until the pump is filled with hydraulic oil. **WARNING:** never engage an empty pump.

Filtering Device

We **highly recommended** installing a filtering device on the oil return line of the hydraulic circuitry. This will protect all the components against contaminants and impurities that could be present in the circuit. The ideal dimension of the filtering element should be between 20 microns (700 mesh) and 35 microns (400 mesh). To address the potential problems surrounding the installation and removal of the filtering element, we have designed a tank-filter assembly (below) that permits easy servicing of replaceable parts. We also recommend changing the hydraulic oil at least once a year.

Figure 5



It is important that the cylinder is aligned correctly with the truck/trailer frame when installed. The cylinder should be exactly centered in both the vertical axis and the horizontal axis in relation with the truck/trailer frame. Vertically, the cylinder should be perpendicular (90° angle) or should tilt forward. Correct installation is critical to the overall performance of the cylinder. It is recommended to periodically check the alignment between the cylinder, truck/trailer frame, body and rear hinge. (See figure A & B)

When installing the cylinder, Mailhot Industries Inc. recommends placing the cylinder in its intended location and then add a minimum of 1/2" of cylinder extension before installing the upper mounting pin. This will prevent the cylinder from bottoming out when in the closed position.

Mailhot Industries Inc. recommends the use of a stroke limiter to avoid hard collisions at end of stroke. One of the most popular methods is a pump disengagement cable. This device automatically stops the pump just before the end of the cylinder stroke.

Another useful device is a body stabilizer. This device allows the body to rise in a parallel axis to the truck, preventing side loading of the cylinder when the truck is on an unlevelled surface or has an uneven load.

IMPORTANT: Ensure that none of the devices described above are in any way altering neither the movement of the cylinder nor the parallelism of body with the truck/trailer frame. Damage could result due to improper installation. Please consult your truck/trailer body manufacturer to obtain restrictions and recommendations for the installation of such devices.

Figure 6

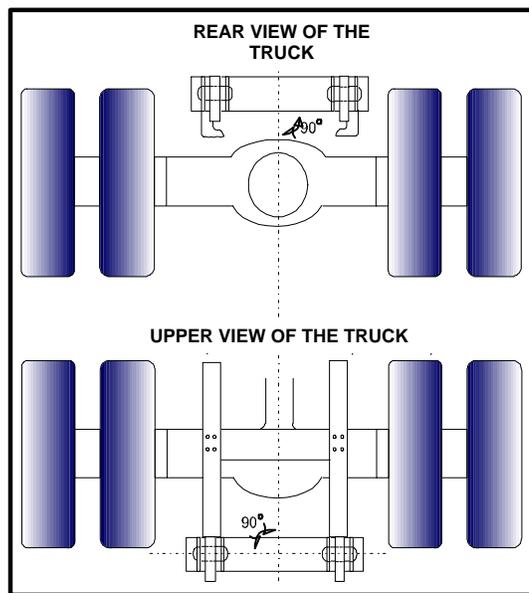
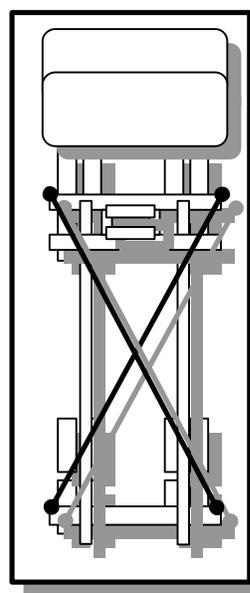


Figure 7



Tools to Service Your Telescopic Cylinder



When the cylinder is removed from the truck, it is suggested to use the following tools to disassemble and assemble it.

- ✓ Figure 8: Metal brush
- ✓ Figure 9: Mechanic type hammer
- ✓ Figure 10: ViseGrip™ chain wrench
- ✓ Figure 11: Seal hook
- ✓ Figure 12: Drill and drill bits
- ✓ Figure 13: Electrical contact cleaner
- Figure 14: Screwdriver with a flat rounded tip
- Figure 15: Mailhot key (wrench)
- Figure 16: 3/16" pointed punch
- Figure 17: 3/16" flatted punch
- ✓ Non-illustrated: Thread sealant (Loctite™ 565) and Bond glue (Loctite™ 222)



Figure 8



Figure 9



Figure 10



Figure 11



Figure 12



Figure 13



Figure 14

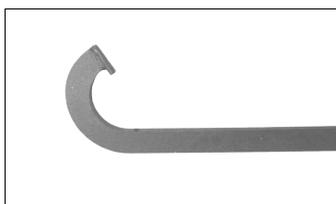


Figure 15

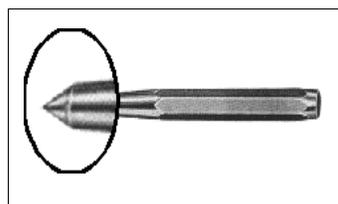


Figure 16

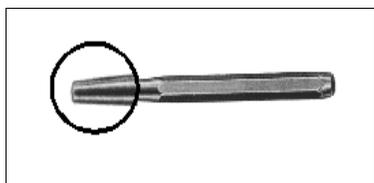


Figure 17

Disassembly, Assembly, Test and Bleeding Procedure



Step 1:

WARNING: Before starting to remove the cylinder from the truck/trailer, take all necessary safety precautions and be sure to install a blocking device to prevent the box from coming down.

Stop the box in open position. Remove the upper mounting pin. Retract the cylinder. Support the cylinder and remove the lower mounting pin at the base and remove the cylinder from the truck/trailer.

WARNING: Be careful when removing oil hoses, residual pressure can be present in the cylinder or in the hydraulic system.

After the cylinder has been removed from the truck/trailer, place the cylinder where it will be able to reach full extension without any obstacle. **Caution:** the stand or bench where the cylinder will be serviced must be capable of holding the weight. If you have a hydraulic bench, be sure that the jaws or any other object will not damage the stages of the cylinder.

Step 2:

Verify that the cylinder does not contain any oil pressure and all oil ports are clear, the air bleeder (if equipped) as well as the grease nipple on the upper attachment must be removed.

The single acting model is equipped with a sleeve over the upper stages. This has to be removed. Run a metal ring of adequate diameter on the cylinder, from the base until it reaches the sleeve. Using a hammer (plastic is recommended) hit the ring all around in order to remove the sleeve.

NOTE: Because all of the stages are to be pulled apart from the cylinder, it is important to leave adequate space on the extension side of the cylinder to avoid an accident.

There are dowel pins located on the tube near each gland nut. To find them, look for punch marks (2 marks).

Turn each stage (using the chain pliers) to align punch marks.

Using the drill and a 3/16" drill bit, drill the center of each dowel pin, but take care not to drill too deep that will only result in damage to the cylinder. Each dowel pin is about 1/16" deeper than the tube thickness. (Figure 18)

Figure 18



Step 3:

Using the chain wrench, unscrew the smallest gland nut counterclockwise (see image on the right) If the next stage tube is rotating at the same time (this is normal), use chain pliers as close as possible to the gland nut to hold it while unscrewing the gland nut. Take every precaution not to damage the tube. If it still does not unscrew, it will be probably necessary to slightly heat the gland nut with an acetylene torch. **DO NOT OVERHEAT.**

Completely unscrew the gland nut and remove it from the tube, sliding it toward the upper part of the tube, attachment side.

Repeat the above procedure for each and every stage of the cylinder.

Note: If you encounter any resistance when unscrewing a gland nut, verify that there is nothing left of the dowel pins. Also, you can use a second set of chain pliers.



Figure 19

Place every disassembled tube on a clean (soft cloth or shop towels) and level surface, to avoid scoring or scratches.

Step 4:

Inspect each tube carefully looking for damage. All tubes must be exempt from scores, scratches, flat spots, or cracks.

If any damage is found, it is highly recommended to contact Mailhot Industries Inc. or an authorized representative to obtain an evaluation of the cylinder and/or possible solutions to correct any damage if possible or to replace defective parts.

Also inspect gland nuts and tube threads to make sure everything is in working order.

If parts are required, replacement kits and parts are readily available. Upon receipt of new parts, be sure to verify that replacement parts are 100% correct and correspond to the cylinder that you are servicing (contact your representative if necessary).

Step 5:

To remove the wiper, take a flat screwdriver and insert the tip between the outer lip and the edge of the gland nut (Figure 20) and insert the seal hook to pull off the wiper.

Repeat the same operation with the seal hook and the screwdriver to remove the u-cup from the gland nut. (Figure 21)

Normally, these parts should be removed by hand but it is possible that one or more parts are jammed in the head or the gland nut so the seal would be sturdy. If this is the case, use a flat screwdriver with a rounded tip to get under each of these parts. **WARNING:** Be careful not to score the seal groove when removing the seals.

Replace the u-cup with a new one. Finally replace the wiper making sure the lip is facing out of the gland nut (upper side).

Turn the gland nut upside down and take off the O-ring and the backup ring as well (Figure 22). Replace with new ones. (Complete seal kit should be changed (Figure 23))

Repeat this step for each gland nut of the cylinder.

Figure 20



Figure 21



Figure 22



Figure 23



Step 6:

To put the cylinder back together, install the base tube in the jaw of the hydraulic bench (if you have one) otherwise, secure the tube in a sturdy device to hold it in place. **DO NOT** squeeze the tube too much; this could make the tube out of round.

Thoroughly inspect the inside of the tube, particularly where the dowel pin was when the cylinder was taken apart. Remove any metal residue from drilling or metal filings as well. Apply grease at the very end of the threads. (Figure 24)

Figure 24



Insert the first section (next tube) in the base section and push it in approximately half way. Be sure to keep the section inserted as parallel as possible.



Figure 25



Install a sleeve (if available) on the threads of the section newly installed (Figure 25). Take the gland nut corresponding to the section that was just inserted and apply grease to it, specifically where the seal assembly is. Hydraulic oil soluble grease is strongly recommended.

Insert the gland nut, keeping it as parallel to the tube as possible. Threads must be inserted first. After insertion, place the palm of your hands on each outer front side of the nut and slightly rotate, push in the nut until the threads can be engaged on the bigger tube. If too tight, a plastic hammer can be used (Figure 26).

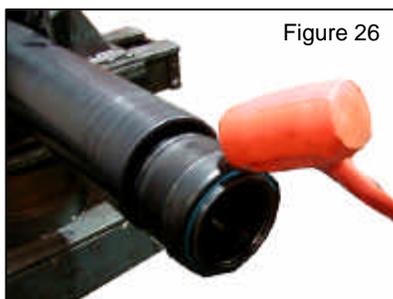


Figure 26

Also, if the gland is too hard to move easily on the tube, install the chain pliers on it. This will give you the grip to move it along the tube.

Step 7:

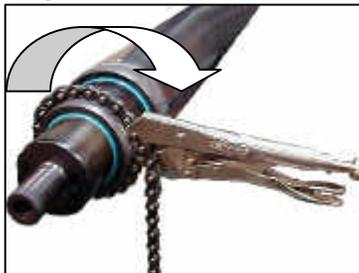
Before starting to screw the nut, clean it with an electrical cleaner spray or with a cleaner that evaporates after cleaning. If necessary, use a metal brush to remove any particles from the threads.

Begin threading with chain pliers and then apply thread sealant (Loctite™565), approximately 3 inch long patch (Figure 27). Tighten the gland nut with chain pliers (Figure 28).

Figure 27



Figure 28



For stages equipped with a dowel pin, drill a 3/16" diameter hole in the tube at 180 degrees from the previous dowel pin (Image C), the depth should be only 1/16" into the gland nut. Put a drop of bond glue (Loctite™ 222) in the newly made hole. Insert a new dowel pin and hammer the dowel pin until it is flat with the tube surface (Be careful not to damage the tube. Using the pointed punch, push some metal toward the dowel pin on each side (Figure 29).

Figure 29



Figure 30



Repeat steps 5, 6 and 7 for all stages of the cylinder.



Step 8:

Install the sleeve over the upper stages and secure it in place using a plastic hammer. The sleeve head must rest in the groove. If too loose or badly damaged, this part should be replaced. Contact your Mailhot Industries representative.

Finally, install and tighten the air bleeder (if equipped).

Install the cylinder on the truck.

Connect the cylinder to the hose(s).

If equipped with an air bleeder: The last step is to bleed any air that could be trapped in the cylinder. Fully extend the cylinder (dump body/trailer should be empty) for the first time. Then lower the cylinder to within a foot of the frame. Turn the bleeder in a counterclockwise direction, this opens the valve and will allow air to escape. When a steady flow of oil comes from the bleeder, turn the valve clockwise until the valve is closed.

Troubleshooting



Before using this section, be sure to review the procedures outlined in the INSTALLATION-RECOMMENDATIONS section of this manual.

PROBLEMS	PROBABLE CAUSES	SOLUTION
Pressure loss	<ul style="list-style-type: none"> • Safety valve is stuck in open position • Pump is broken 	<ul style="list-style-type: none"> • Clean or replace the safety valve • Change worn-out parts
Noisy pump	<ul style="list-style-type: none"> • Air is entering the hydraulic circuitry • Pump is running too fast • Pump is misaligned with the P.T.O. • Pump is broken 	<ul style="list-style-type: none"> • Look for infiltration and repair • Verify manufacturer's specifications and adjust • Correct alignment • Change worn-out parts
One or more stages of the cylinder stay open	<ul style="list-style-type: none"> • Pump flow is too high, plungers and gland nuts are jamming. • Pump is running too fast. 	<ul style="list-style-type: none"> • Verify if the pump is the one recommended for the type of cylinder used. • Use a lower P.T.O. coupling. • Install a limiting device
Cylinder is leaking oil	<ul style="list-style-type: none"> • Misalignment of the cylinder cradle or back hinge. • Seals are worn 	<ul style="list-style-type: none"> • Verify and correct alignment. • Change worn-out parts.
Stage or stages are scored.	<ul style="list-style-type: none"> • Misalignment of the cylinder cradle or back hinge. 	<ul style="list-style-type: none"> • Verify and rectify the alignment.
Cylinder opens and closes without smooth operation	<ul style="list-style-type: none"> • Oil tank is too small for the cylinder capacity. • Internal parts of the cylinder are worn. 	<ul style="list-style-type: none"> • Call your Mailhot Industries representative to obtain a tank size recommendation • Verify worn-out parts and replace them.
One of the stages does not work properly	<ul style="list-style-type: none"> • One of the plunger or gland nuts is swollen or not sliding smoothly. • Pressure from the pump is too low. • Air trapped inside cylinder 	<ul style="list-style-type: none"> • Verify and replace worn-out parts. • Verify and adjust pump pressure. • Bleed cylinder

The above table is only a general guide for troubleshooting. If you suspect a more serious problem, it is strongly recommended you contact the Mailhot Industries Inc. customer service representative in your region for assistance.

Warranty



A) DURATION

Mailhot Industries Inc. warranty starts at the date of invoice:

1. Non-nitrided cylinders and components, Mailhot branded hydraulic components and nitrided cylinder's components are covered with a one (1) year period against manufacturing defects or raw material defect.
2. Nitrided cylinders are covered for a two (2) year period against all manufacturing or material defects.

B) COVERAGE

1. Warranty mentioned in paragraph A applies to defective parts only and actual work done on those parts by Mailhot Industries Inc. employees, at a designated and authorized Mailhot Industries service center, or by a third party, provided there is an agreement between Mailhot Industries Inc. and the buyer. In all these cases, a Return Goods Authorization (R.G.A.) number must be issued by Mailhot Industries Inc. or its authorized representative. Notwithstanding the above, Mailhot Industries Inc. reserves the right to replace, in all or in part, or to credit product covered by this warranty.
2. Costs and expenditures caused by the removal and reinstallation of the defective product from "Mailhot Industries Inc" are at the buyer's expense. If the product is defective and this defectiveness is covered by the present warranty, Mailhot Industries Inc. will reimburse to the buyer costs according to the agreement negotiated when the Return Goods Authorization number was issued.
3. This warranty is ruled with a maximal workmanship allowance according to the case and region. You must call Mailhot Industries Inc. to get all details.
4. All product must be returned to Mailhot Industries Inc. or its authorized representative using ground transportation and prepaid. If the product is defective and this defectiveness is covered with the present warranty, Mailhot Industries Inc will reimburse to the buyer costs of transport as agreed when the Returned Merchandise Authorization number was issued.

C) NON COVERAGE (EXCLUSIONS)

This Mailhot Industries Inc. warranty does not apply to:

1. Modification on Mailhot hydraulic components, cylinder and/or it's components;
2. Bad maintenance on Mailhot hydraulic components, cylinder and/or it's components;
3. Abusive use of Mailhot hydraulic components, cylinder and/or it's components;
4. Installation or use not according to instructions supplied in maintenance manual for the purchased product;
5. Use of Mailhot hydraulic components and/or cylinder and/or components after a defect has been found, a functional defect or any defect that would interfere with the normal use;
6. Any non-authorized repair of a Mailhot component and/or cylinder and/or it's components;
7. Any damage or defect caused by an impact or accident on the vehicle or the equipment where the Mailhot component and/or cylinder and/or it's component was installed;
8. Any Mailhot hydraulic components, cylinder and/or it's components working under excessive working pressure specified by Mailhot Industries Inc.;
9. Any Mailhot hydraulic components, cylinder and/or it's components within an hydraulic system not equipped with a filtering system as described in the maintenance manual;
10. Any traveling fees from the buyer to verify a related problem to the Mailhot hydraulic components, cylinder and/or it's components;
11. Any expenses for lubricant or workshop expenditures



12. Any expenses for repainting a Mailhot hydraulic components, cylinder and/or it's components
13. Failing to report within 30 days to Mailhot Industries Inc. or it's authorized representative about the knowledge of a defect or breakage of a Mailhot hydraulic components, cylinder and/or it's components;
14. Normal wear of seals or wear caused by contamination.
15. Inadequate warehousing of the product (refer to the maintenance manual)

D) RESPONSIBILITY EXCLUSION

Mailhot Industries Inc. will not be liable for the consequential damages or contingent liabilities, including, but not limited to, loss of life, personal injury, loss of business income, downtime costs and trade, or other commercial loss arising out of the failure of Mailhot cylinder or hydraulic component covered by present warranty.

E) ELECTED PLACE OF RESIDENCE

Mailhot Industries Inc. and the buyer agree, for any and all claims, or lawsuit for any reason whatsoever, in relation with present agreement, to choose the law district of Joliette, province of Quebec, Canada, as the proper place of auditions of claims or lawsuits to the exclusion of any other law district that could have jurisdiction on such claims or lawsuit, as prescribed by the law.