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1.1 Introduction
This manual provides the Periodic Maintenance, Troubleshooting, Service and Specifications for C-Series Integral Sideshifters.

In any communication about the attachment, refer to the product catalog and serial numbers stamped on the nameplate. If the nameplate is missing, the numbers can be found stamped on the right front surface of the carriage.

**NOTE:** All specifications are shown in US and (Metric) units where applicable. All fasteners have a torque value range of ±10% of stated value.

**IMPORTANT:** Cylinder ports are #6 SAE O-Ring (.5625 in. diameter, 18 UNF-2B) on all Integral Sideshifters.

1.2 Special Definitions
The statements shown appear throughout this Manual where special emphasis is required. Read all WARNINGS and CAUTIONS before proceeding with any work. Statements labeled IMPORTANT and NOTE are provided as additional information of special significance or to make your job easier.

**WARNING** - A statement preceded by WARNING is information that should be acted upon to prevent bodily injury. A WARNING is always inside a ruled box.

**CAUTION** - A statement preceded by CAUTION is information that should be acted upon to prevent machine damage.

**IMPORTANT** - A statement preceded by IMPORTANT is information that possesses special significance.

**NOTE** - A statement preceded by NOTE is information that is handy to know and may make your job easier.
2.1 Daily

Check items shown each day. Report problems to your supervisor. Refer to Troubleshooting and Service sections for troubleshooting, maintenance and repair procedures.

**NOTE:** Carriage should be maintained per OEM service specifications.

**IMPORTANT:** Visually check wear on lower hook and capscrew conditions.

- Check for loose or missing bolts, worn or damaged hoses, hydraulic leaks and damaged or missing fork stops.
- Check decals and nameplate for legibility.

2.2 1000-Hour

Every time the lift truck is serviced or every 1000 hours of truck operation, whichever comes first, complete the following maintenance procedures:

- Tighten backrest capscrews (Cascade) to 145 ft.-lbs. (195 Nm). For truck manufacturer’s backrest, refer to truck service manual.
- Inspect lower hooks for wear and proper clearance. Adjust if necessary, refer to profile lower hook illustration in Section 4.1. Tighten lower hook capscrews to 120 ft.-lbs (165 Nm).
- Lubricate Sideshifter upper and lower bearings with general-purpose chassis grease.
- Inspect upper and lower bearings for wear. If any bearing is worn to less than 3/32 in. (2.5 mm) thickness, replace the entire bearing set. Refer to Section 4.2-2 for replacement procedure.

2.3 2000-Hour

After 2000 hours of truck operation, in addition to the 1000-hour maintenance, forks in use shall be inspected at intervals of not more than 12 months (for single shift operations) or whenever any defect or permanent deformation is detected. Severe applications will require more frequent inspection.

Fork inspection shall be carried out by trained personnel to detect any damage that might impair safe use. Any fork that is defective shall be removed from service. Reference ANSI B56.1-2005.

Inspect for the following defects:

- Surface cracks
- Straightness of blade and shank
- Fork angle
- Difference in height of fork tips
- Positioning lock
- Wear on fork blade and shank
- Wear on fork hooks
- Legibility of marking

**NOTE:** Fork Safety Kit 3014162 contains wear calipers, inspection sheets and safety poster. Also available is fork hook & carriage wear gauge 209560 (Class II) and 209561 (Class III).

**WARNING:** If the fork locking pin is not fully engaged, the fork could become disengaged from the carriage.

**WARNING:** After completing any service procedure, always test the Integral Sideshifter through five complete cycles. First test with no load, then test with a load to make sure the sideshifter operate correctly before returning it to the job.
### 3.1 General Procedures

#### 3.1-1 Truck System Requirements

- Truck hydraulic pressure should be within the range shown in Specifications, Section 5.1. **PRESSURE TO THE SIDESHIFTER MUST NOT EXCEED 3500 psi (245 bar).**
- Truck hydraulic flow should be within the volume range shown in Specifications, Section 5.1.
- Hydraulic fluid supplied to the sideshifter must meet the requirements shown in Specifications, Section 5.1.

#### 3.1-2 Tools Required

In addition to a normal selection of hand tools, the following are required:

- Inline Flow Meter Kit:
  20 GPM (80 L/min.) - Cascade part no. 671477
- Pressure Gauge Kit:
  3000 psi (200 bar) - Cascade part no. 671212
- Assorted fittings, lines, drain hoses and quick-couplers as required.

#### 3.1-3 Troubleshooting Chart

**WARNING:** Before servicing any hydraulic component, relieve pressure in the system. Turn the truck off and move the truck auxiliary control valves several times in both directions.

After completing any service procedure, test the attachment through several cycles. First test the attachment empty to bleed any air trapped in the system to the truck tank. Then test the attachment with a load to be sure it operates correctly before returning to the job.

Stay clear of the load while testing. Do not raise the load more than 4 in. (10 cm) off the floor while testing.

---

### Flow Meter Kit 671477

- No. 8-12 JIC/O-Ring Flow Meter
- No. 6-8 JIC Reducer

### Pressure Gauge Kit 671212

- No. 6-6 Hose
- No. 6 and No. 8 JIC Swivel Tee
- No. 4, No. 6, and No. 8 JIC/O-Ring

### Diagnostic Quick-Disconnects

- Male Straight Thread O-Ring Coupler:
  - No. 4 (Part No. 212282)*
  - No. 5 (Part No. 210378)
  - No. 6 (Part No. 678592)

- Female JIC Thread QD Coupler:
  - No. 4 (Part No. 210385)*
  - No. 6 (Part No. 678591)

* Included in Diagnostics Kit 394382

---

**Determine All The Facts** – It is important that all the facts regarding the problem are gathered before beginning service procedures. The first step is to talk to the equipment operator. Ask for a complete description of the malfunction. The following guidelines can then be used as a starting point to begin troubleshooting procedures:

**Sideshift Circuit**

- Frame will not sideshift.
- Frame sideshifts slowly.

To correct these problems, see Section 3.3.
3.2  Plumbing

3.2-1  Hosing Diagram

SIDESHIFT LEFT
PRESSURE
green
RETURN
red

NOTE: For SIDESHIFT RIGHT, reverse the colors shown.

3.2-2  Hydraulic Schematic
3.3 Sideshift Function

There are five potential problems that could affect the sideshifting function:

- Inadequate upper bearing lubrication or worn bearings. Refer to Section 4.2
- Incorrect hydraulic pressure or flow from lift truck.
- Lower mounting hooks installed with incorrect clearance. Refer to Section 4.1, Step 4.
- External leaks due to worn or defective cylinder seals. Refer to Section 4.3.
- Cylinder fittings or flow restrictors plugged, incorrect type, or not installed properly. Refer to Section 4.3.

3.3-2 Supply Circuit Test

1. Check the pressure supplied by the truck at the carriage hose terminals. Pressure must be within the range shown in Specifications, Section 5.1. **PRESSURE TO THE SIDESHIFTER MUST NOT EXCEED 3500 psi (245 bar).**

2. Check the flow volume at the carriage hose terminal. Flow must be within the range shown in Specifications, Section 5.1.

3. Fully sideshift to the left. Hold the lever in the SIDESHIFT LEFT position for a few seconds. Release the lever and check the external leaks at fittings, hoses and cylinder rod ends.

3.3-3 Sideshift Circuit Test

1. Fully sideshift to the left. Turn the truck off. Relieve the attachment system pressure. Disconnect the SIDESHIFT RIGHT supply hose from the truck hose terminal and route to a drain bucket. Cap the supply fitting.

2. Start the truck and actuate the SIDESHIFT LEFT lever for 5 seconds:
   - If there is **substantial hydraulic flow** out of the drain hose, the sideshift cylinder is faulty and requires replacement. Refer to Section 4.3.
   - If there is **no hydraulic flow** out of the hose, check for plugged or incorrectly installed flow restrictor washers and fittings. If there is still no hydraulic flow, the problem is not hydraulic. Refer to Section 3.3.

**WARNING:** Before disconnecting hoses, relieve pressure in the attachment hydraulic system. Turn the truck off and move the truck auxiliary control handle several times in both directions.
4.1 Sideshifter Removal

NOTE: The following procedure describes removal of the sideshifting frame only. To remove the cylinder, see Section 4.3. To remove the integral sideshifting carriage from the mast, refer to OEM Service Manual procedures.

1. Remove the forks and backrest from the sideshifter frame. For Cascade backrest reassembly, tighten the capscrews to 145 ft.-lbs. (195 Nm).

2. Remove the lower mounting hooks and inspect for wear. For reassembly, adjust hooks as shown below and tighten to 120 ft.-lbs. (162 Nm).

3. Install an M12 lifting eye in the center threaded hole in the frame’s top bar. Use a 1000 lb. (450 kg) capacity overhead hoist and lift the frame away from the truck carriage.

NOTE: Bearings and cylinder will remain on the integral carriage bars.

4. For installation, reverse the above procedures with the following exceptions:
   - Clean and inspect carriage bars for damage and smoothness. Make sure that bars are parallel and that ends are flush.
   - Clean all bearing areas of built-up dirt and grease.
   - Inspect sideshifter bearings for wear and replace as necessary. Refer to Section 4.2-2.
   - Install and adjust lower hooks as shown below.
   **CAUTION:** Lower hook clearance must be adjusted as shown for proper sideshifter operation.
   - Lubricate both upper and lower sideshifter bearings with general-purpose chassis grease.
4.2 Bearings

4.2-1 Bearing Lubrication

Lubricate both the upper and lower sideshifter bearings with chassis grease every 1000 hours or 13 weeks of operation, whichever occurs first. In contaminated environments lubricate every week or as required.

4.2-2 Bearing Service

1. Remove the sideshifter frame from the truck carriage as described in Section 4.1.

2. Remove the upper bearings and check thickness as shown. Replace all the upper bearings if any bearing is worn to less than:
   - A – .10 in. (2.5 mm)
   - B – .08 in. (2.0 mm)

   **IMPORTANT:** Make sure that new upper bearings are properly seated in upper integral carriage bar, as shown. Lower hook clearance will not be correct if upper bearings are installed incorrectly.

3. Remove the lower bearings by prying them from the lower integral carriage bar. If any bearing is worn to less than 3/32 in. (2.5 mm) thickness, replace all the lower bearings.

4. Clean integral carriage bars with solvent and inspect for damage.

5. For reassembly, reverse the above procedures with the following exceptions:
   - Grease upper and lower bearings with general-purpose chassis grease.

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![Diagram of Bearing Service](SS0443.eps, SS0445.eps, SS0446.eps)

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![Diagram of Bearing Check](SS0446.eps, SS1079.eps)

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![Diagram of Lower Bearing Grease Areas](SS0443.eps)
4.3 Cylinders
4.3-1 Removal, Inspection and Replacement

**WARNING:** Before removing hoses or hydraulic components, relieve pressure in the attachment hydraulic system. Turn the truck off and move the truck control handle several times in both directions.

1. Disconnect the hoses from the cylinder and tag for reassembly. Cap the cylinder fittings.
2. Remove the hairpin clips and clevis pins from the carriage mounting yokes. Remove the cylinder. Keep track of shims.

3. Inspect the outside of the cylinder shell for damage that could impair performance or cause leak under pressure. If damage is found, replace the complete cylinder assembly.

**NOTE:** Internal piston seals are not serviceable. Replace the complete cylinder.

4. Inspect the cylinder rods for damage. If bent or scored, replace the complete cylinder.

5. Inspect the carriage mounting yokes for damage. Repair the yokes or replace the carriage.

6. For reassembly, reverse the above procedures with the following exceptions:
   - Make sure cylinder anti-roll pin is in place.
   - Replace rod seal carriers as shown in Section 4.3-2.
   - Make sure shims are in place on seal carrier opposite cylinder roll pin. Shim this side only for a maximum of 0.5 mm clearance with cylinder in place.

**IMPORTANT:** Fittings must bottom against flow restrictor in cylinder port for proper hydraulic flow characteristics.

**IMPORTANT:** Shim cylinder (end opposite roll pin) for 0.5 mm max. clearance when mounted in sideshifting frame.
4.3-2 Rod Seal Carrier Replacement

**NOTE:** The rod seal carriers are the only field serviceable parts on the cylinder and are supplied with the seals already loaded. The cylinder must be removed from the carriage to replace the seals.

1. Remove the cylinder from the carriage as described in Section 4.3-1.

2. Clamp the end of the cylinder in a soft-jawed vise.
   
   **CAUTION:** Do not clamp on the cylinder shell. Clamp on the ends of the cylinder only.

3. Unscrew the seal carrier from each end of the cylinder and slide off the cylinder rod.

4. For reassembly, reverse the above procedures with the following exceptions:
   
   - Break any sharp edges on the cylinder rod end and clean with solvent.
   - Make sure seals and O-ring are in place. Apply a thick film of petroleum jelly to the interior bore. Carefully slide the seal carrier onto the cylinder rod and screw into the cylinder retainer. Tighten to 240 ft-lbs. (325 Nm).
5.1 Specifications

5.1-1 Hydraulics

**Truck Relief Setting**
2300 psi (160 bar) Recommended
3500 psi (245 bar) Maximum

**Truck Flow Volume**

<table>
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<tr>
<th></th>
<th>Min.</th>
<th>Recommended</th>
<th>Max.</th>
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<tr>
<td>35C, 55C, 70C</td>
<td>1 GPM (4 L/min.)</td>
<td>2 GPM (7.5 L/min.)</td>
<td>3 GPM (12 L/min.)</td>
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</table>

① Cascade Integral Sideshifters are compatible with SAE 10W petroleum base hydraulic fluid meeting mil. Spec. MIL-0-5606 or MIL-0-1204B. Use of synthetic or aqueous base hydraulic fluid is not recommended. *If fire resistant hydraulic fluid is required, special seal must be used. Contact Cascade.*

② Flow less than recommended will result in slow sideshift speed.

③ Flow greater than maximum can result in excessive heating, reduced system performance and reduced hydraulic system life.

**Hoses and Fittings**
All supply hoses and fittings should be at least No. 6 with 9/32 in. (7 mm) minimum ID.

5.1-2 Auxiliary Valve Functions

Check for compliance with ANSI (ISO) standards:
5.1-4 Torque Values

Fastener torque values for the C-Series Integral Sideshifter is shown in the table below in both US and Metric units. All torque values are also called out in each service section throughout the manual.

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Fastener Location</th>
<th>Size</th>
<th>Ft.-lbs.</th>
<th>Nm</th>
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<tr>
<td>1</td>
<td>Lower hooks capscrews</td>
<td>M16 5/8 in.</td>
<td>120</td>
<td>165</td>
</tr>
<tr>
<td>2</td>
<td>Backrest capscrews</td>
<td>M16</td>
<td>145</td>
<td>195</td>
</tr>
<tr>
<td>3</td>
<td>Rod Seal Carrier</td>
<td>1-5/16 in.</td>
<td>240</td>
<td>325</td>
</tr>
<tr>
<td>4</td>
<td>Pallet Guard</td>
<td>M16</td>
<td>145</td>
<td>195</td>
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Do you have questions you need answered right now?
Call your nearest Cascade Service Department.
Visit us online at www.cascorp.com

**AMERICAS**

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