CAT® Lift Trucks

# Service Manual

## Chassis & Mast

## EC15N, EC18N

A4EC1-10200-up
A4EC1-20200-up

## EC20N, EC25N

A4EC2-10200-up
A4EC2-20200-up

## EC25EN, EC25LN, EC30N

A4EC3-20200-up
A4EC3-30200-up
A4EC3-40200-up

99759-6K110

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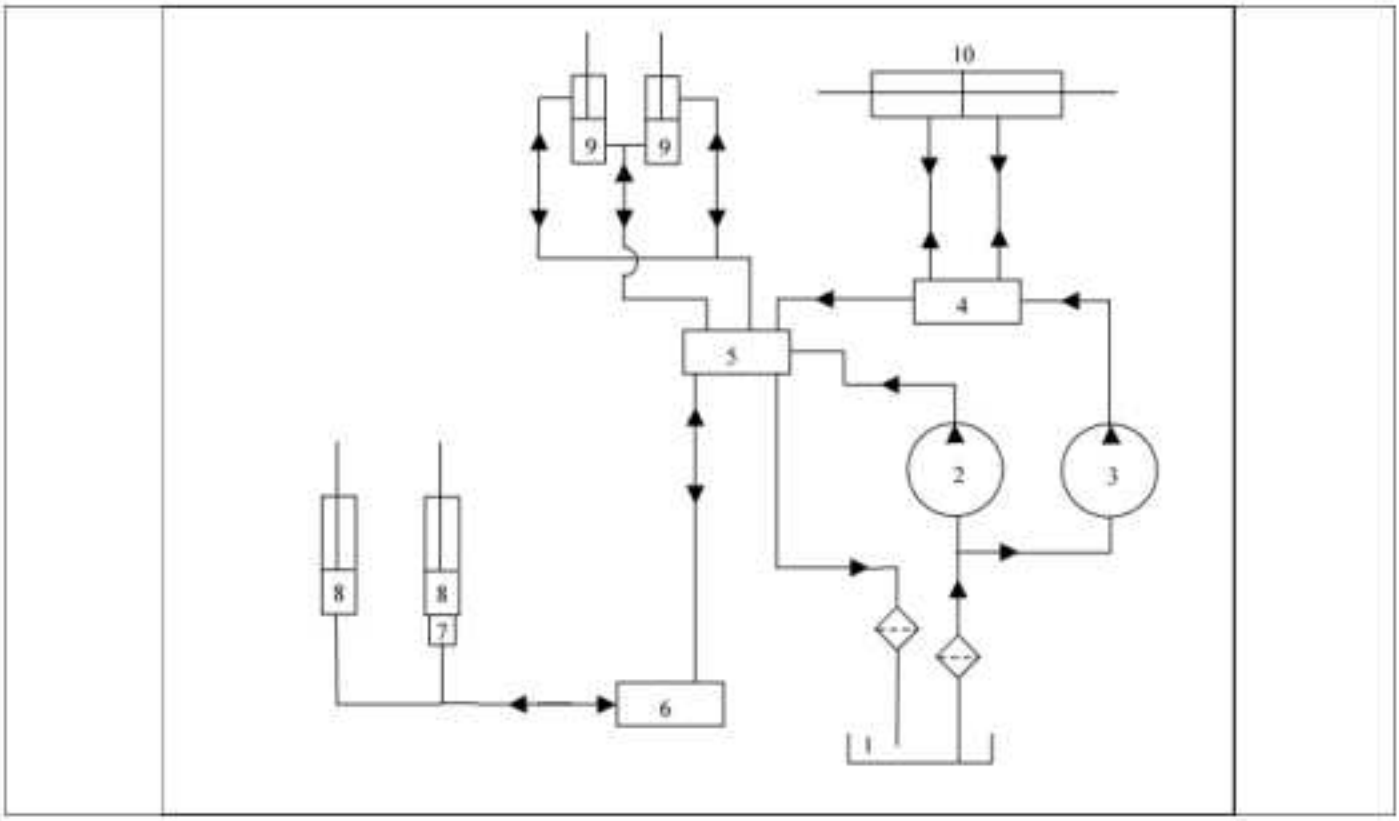


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# Hydraulic System

## Description

### Schematic for Trucks




1. Hydraulic tank
2. Hydraulic lift pump
3. Steer pump
4. Steer gear
5. Main control valve
6. Flow regulator valve
7. Down safety valve
8. Lift cylinder
9. Tilt cylinder
10. Steering cylinder

### General Information

The hydraulic pump draws oil from the oil tank and delivers it to the main control valve, which dispenses it for lift and tilt functions.

The steer gear and steer pump are covered in the STEERING SYSTEM section and the steering cylinder is covered in the REAR AXLE section.



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| | Complaint | Possible Cause | Remedy |
|---|---|---|---|
| Parking Brake | Lever stroke is too small | Lining-to-drum clearance too small | Readjust |
| | Squeals during traveling | Lining-to-drum clearance too small | Readjust |
| | | Brake drum badly distorted | Repair or replace |
| | Will not apply | Parking brake cable longer than specified | Check drum-to-lining clearance and, if brake will not apply, turn adjusting knob clockwise |
| | | Linings worn to service limit | Replace shoe & lining assembly |
| | | Lining-to-drum clearance too small | Readjust |
| | | Lack of brake lever operating effort | Readjust to 25 to 30 kgf (55 to 66 lbf) [245 to 294 N] |

| | Complaint | Possible Cause | Remedy |
|---|---|---|---|
| Steering System | Hard steering | a) Overloaded steer axle | Reduce load |
| | | b) Damaged mechanical linkage | Replace |
| | | c) Dry mechanical linkage joints | Lubricate |
| | | d) Mechanical joints too tight | Readjust |
| | | e) Kingpin bearings improperly preloaded | Readjust |
| | | f) Low pump pressure | Replace pump |
| | Truck wanders | a) Damaged or worn mechanical linkage | Replace |
| | | b) Loose cylinder piston | Replace cylinder rod |
| | Truck drifts | a) Damaged or worn mechanical linkage | Replace |
| | | b) Tire diameter differs between right and left | Replace tire |
| | Erratic steering | Loose cylinder piston | Replace cylinder rod |
| | Excessive free play at steered wheels | Damaged or worn linkage between cylinder and steered wheels | Replace |
| | Axle shimmy | a) Excessive clearance between the kingpin and its bearings | Repair or replace |
| | | b) Worn or damaged hub bearing | Replace |
| | Rear tires wear prematurely or unevenly | Tire on one side differs in kind or brand from that on the other side. | Replace tires |



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| Inspection Point | | How to Check | Maintenance Intervals | | | | | Service Data |
|---|---|---|---|---|---|---|---|---|
| | | | Daily (pre-start) | Every 50 hours or weekly | Every 200 hours or monthly | Every 1200 hours or 6 months | Every 2400 hours or 1 year | |
| Brake pedal | Height of pedal above floor | Scale | ● | ● | ● | ● | ● | 89 ± 3 mm (3.5 ± 0.12 in.) |
| | Stroke to point where brakes start applying | Scale | ● | ● | ● | ● | ● | 3 to 10 mm (0.12 to 0.4 in.) |
| Parking brake | Performance | Test/spring balancer | ● | ● | ● | ● | ● | Lever lock position: 4° - 5°<br>Operating effort: 55–66 kgf (25–30 lbf) [245–294 N] |
| Brake hoses and pipes | Fluid leaks, damage or installation | Visual | ● | ● | ● | ● | ● | |
| Brake fluid | Level in reservoir | Visual | ● | ● | ● | ● | ★ | 103cc (7.9 cu. in.) |
| Wheel brakes | Master cylinder and wheel cylinders—operation, wear and damage | Overhaul/ Replace | | | | | ★ | |
| | Brake clutch/inching pedal rod | Visual/wrench | | | | ● | | |
| | Brake master cylinder hoses & rubber parts | | | | | | R | |
| | Service brake fluid | | | | | | R | |
| | Brake wheel cylinder rubber parts | | | | | | R | |
| Brakes drums and shoes | Drum-to-lining clearance | Feeler gauge | | | ● | ● | ● | **EC15N–EC18N** 0.2 to 0.5mm (0.01 to 0.02)<br>**EC20N–EC30N** 0.2 to 0.6mm (0.01 to 0.02) |
| | Sliding surfaces of shoes and wear of lining | Disassemble/ calipers | | | | | ● | **EC15N–EC18N** 2.5mm (0.10 in.)<br>**EC20N–EC30N** 3.0mm (0.12 in.) |
| | Drum—wear or damage | Visual scale | | | | | ● | **Service Limit:**<br>**EC15N–EC18N** $254 ^{+0.13}_{0}$ mm ($10.00 ^{+0.0051}_{0}$ in.)<br>**EC20N–EC30N** $310 ^{+0.13}_{0}$ mm ($12.20 ^{+0.0051}_{0}$ in.) |
| | Free length of return springs | Scale | | | | | ● | |
| | Operation of shoes | Test | | | | | ● | |
| | Anchor pins—seizure | Visual | | | | | ● | |



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## Basic Hydraulic Switch Adjustments

Install switch on Lift spool per Photo 1. Adjust and torque bolts on switches to 7 ± 1 in-lbs [0.79 N•m ± 0.11 N•m] (0.08 kgf•m ± 0.01 kgf•m).

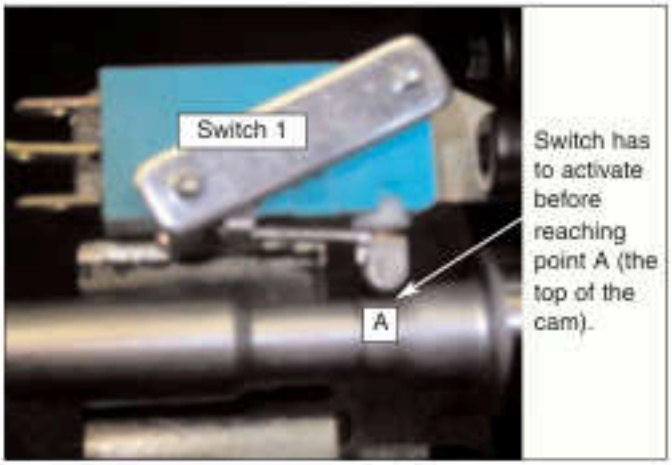



**Photo 1**

Install switch 2 on Lift spool per Photo 2 centered on identification groove. Adjust and torque bolts on the switches to 7 ± 1 in-lbs [0.79 N•m ± 0.11 N•m] (0.08 kgf•m ± 0.01 kgf•m).

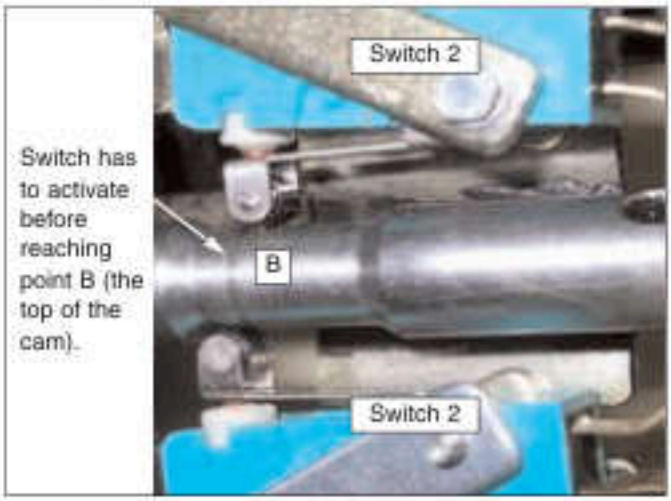



**Photo 2**

Install switch on Tilt spool or Auxiliary spool per Photo 3 centered on spool lobe. Adjust and torque bolts on switches to 7 ± 1 in-lbs [0.79 N•m ± 0.11 N•m] (0.08 kgf•m ± 0.01 kgf•m).

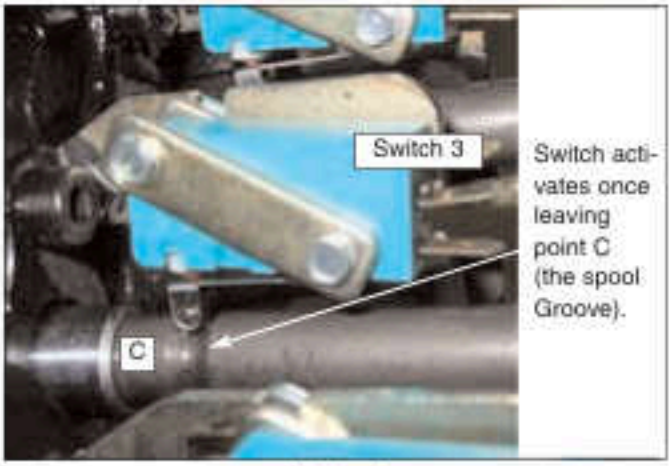



**Photo 3**



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