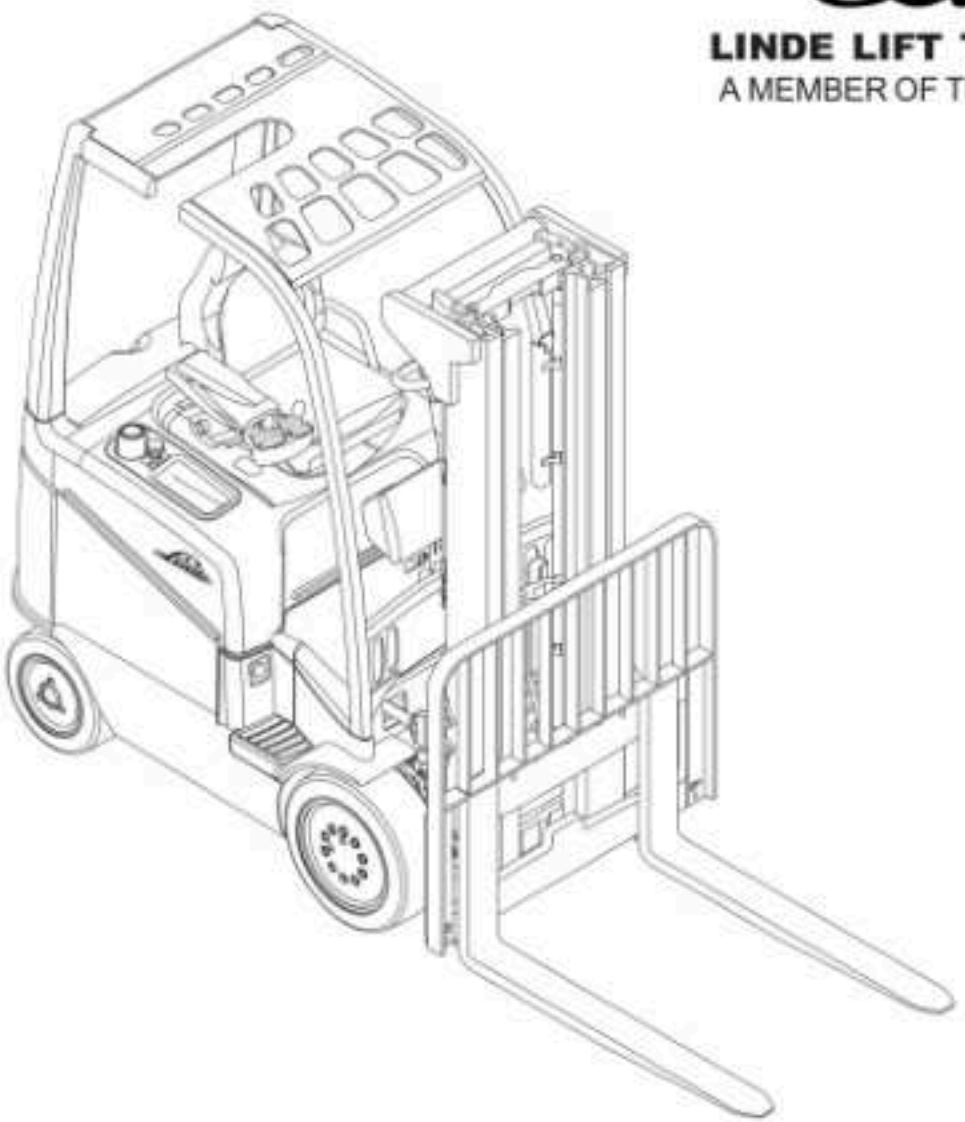
LINDE LIFT TRUCK CORP.
A MEMBER OF THE LINDE GROUP



# 347 Service Manual

## Electric Powered Fork Lift Truck
## E20C/600 E25C/600 E30C E30C/600

347 804 2403 07.04

Contracts #2792 thru 2795

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## ABBREVIATIONS

| | |
|---|---|
| °C | centigrade |
| cc | cubic centimeter |
| cm | centimeter |
| cu in | cubic inches |
| °F | fahrenheit |
| fl oz | fluid ounces |
| ft | foot, feet |
| ft-lbs | foot-pounds |
| gal | gallon, gallons |
| in | inch, inches |
| in-lbs | inch-pounds |
| kg | kilogram, kilograms |
| kg/cm² | kilograms per square centimeter |
| kg-m | kilogram-meter |
| km | kilometer (100 meters) |
| kph | kilometer per hour |
| lb, lbs | pound, pounds |
| lbs/sq in | pounds per square inch |
| l | liter |
| m | meter, meters |
| mi | mile, miles |
| mm | millimeter (1/1000 of a meter) |
| mph | miles per hour |
| N-m | newton meters |
| oz | ounce, ounces |
| psi | pounds per square inch |
| qt | quart, quarts |

## CONVERSION TABLE

| | |
|---|---|
| bar x 14.5 | psi |
| cc x 0.0610 | cu in |
| cc x 0.03519 | fl oz (imp) |
| cc x 0.03381 | fl oz (US) |
| cu in x 16.39 | cc |
| fl oz (imp) x 28.41 | cc |
| fl oz (US) x 29.57 | cc |
| ft-lbs x 12 | in-lbs |
| ft-lbs x 1.383 | kg-m |
| ft-lbs x 1.355 | N-m |

## CONVERSION TABLE *(continued)*

| | |
|---|---|
| gal (imp) x 4.546 | liters |
| gal (imp) x 1.201 | gallon (US) |
| gal (US) x 3.7853 | liters |
| gal (US) x 0.8326 | gallon (imp) |
| grams x 0.03527 | oz |
| in x 0.2540 | mm |
| in x 2.54 | cm |
| in-lbs x 0.0833 | ft-lb |
| in-lbs x 0.1153 | kg-m |
| kg x 2.2046 | lb |
| kg x 35.274 | oz |
| kg-m x 7.233 | ft-lb |
| kg-m x 86.796 | in-lbs |
| kg/cm 2 x 14.22 | psi |
| km x 0.6214 | miles |
| kPa x 6.8948 | psi |
| lb x 0.4536 | kg |
| lb x 4.445 | N |
| lb/sq in x 0.1450 | kPa |
| liter x 35.19 | fl oz (imp) |
| liter x 33.81 | fl oz (US) |
| liter x 2.113 | pint (US) |
| liter x 0.8799 | quart (imp) |
| liter x 1.0567 | quart (US) |
| meter x 3.281 | feet |
| meter x 1.094 | yards |
| mile x 1.6093 | km |
| mm x 0.03937 | inches |
| N x 0.225 | lb |
| N-m x 0.738 | ft-lb |
| oz x 28.35 | gram |
| psi x 0.1450 | kPa |
| qt (imp) x 1.1365 | liters |
| qt (imp) x 1.201 | quart (US) |
| qt (US) x 0.9463 | liters |
| qt (US) x 0.8326 | quart (imp) |
| fl oz (US) x 1.04 | fl oz (imp) |



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# UNIT EQUIVALENTS

## LENGTH

| | |
|---|---|
| **mm** | 0.03937 in |
| **cm** | 0.3937 in |
| **meter** | 3.28 ft |
| **kilometer** | 0.621 mile |
| **inch** | 2.54 cm |
| **foot** | 0.3048 meter |
| **yard** | 0.9144 meter |
| **mile** | 1.61 km |

## CAPACITY

| | |
|---|---|
| **liter** | 0.0353 cu ft |
| **liter** | 0.2642 gallons (US) |
| **liter** | 61.023 cu in |
| **liter** | 2.202 lb of fresh water at 62° |
| **liter** | 1000 cc |
| **liter** | 35.19 fl oz (Imp) |
| **liter** | 33-82 fl oz (US) |
| **gal (US)** | 3.785 liters |
| **gal (Imp)** | 4.546 liters |
| **cu ft** | 28.32 liters |
| **cu in** | 0.0164 liter |
| **fl oz (US)** | 29.57 cc |
| **fl oz (Imp)** | 28.41 cc |

## WEIGHT/FORCE

| | |
|---|---|
| **gram** | 15.432 grains |
| **gram** | 0.0353 oz |
| **kilogram** | 2.2046 lbs |
| **kilogram** | 0.0011 ton (sht) |
| **metric ton** | 1.1025 ton (sht) |
| **grain** | 0.0648 gram |
| **lb** | 0.454 kg |
| **N** | 0.225 lb |
| **oz** | 28.35 gram |
| **ton (sht)** | 907.18 kg |
| **ton (sht)** | 0.907 metric ton |
| **ton (sht)** | 2000 lb |

## AREA

| | |
|---|---|
| **sq cm** | 0.1 550 sq in |
| **sq m** | 10.76 sq ft |
| **sq in** | 6.45 sq cm |
| **sq ft** | 0.0929 sq m |

## VOLUME

| | |
|---|---|
| **cu cm** | 0.061 cu in |
| **cu m** | 35.315 cu ft |
| **cu in** | 16.38 cu cm |
| **cu ft** | 0.028 cu m |

## PRESSURE

| | |
|---|---|
| **1 bar** | 14.5 psi |
| **kilo pascal** | 0.1450377 lbs per sq in |
| **lb per sq in** | 6.894757 kilo pascal |
| **kg per sq cm** | 0.96784 standard atmosphere |
| **standard atmosphere** | 1.033228 kg per sq cm |
| **standard atmosphere** | 4.6959 lbs per sq in |

## TEMPERATURE

| | |
|---|---|
| °C x 1.8 + 32 | **°F** |
| °F - 32 x 0.555 | **°C** |



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**⚠ CAUTION:**

**INSURE THAT FUNCTION II ON PUMP CONTROLLER IS ADJUSTED TO A SETTING OF 150 BEFORE OPERATING HYDRAULIC SYSTEM FOR TRUCKS EQUIPPED WITH AUTOBRAKE. FAILURE TO DO SO COULD RESULT IN DAMAGE TO HYDRAULIC SYSTEM.**

## PUMP MOTOR CONTROLLER TROUBLESHOOTING:

Troubleshooting the pump motor controller consists of following the given troubleshooting procedures corresponding to the fault code displayed on the dash display or the programming handset. Many controller faults can be caused by erroneous or missing inputs at the 23-pin connector (2X1). These will be the result of problems in the electrical system (switches, wiring, etc.) outside of the controller. The possibility of all such problems should be eliminated before condemning the controller. (The smaller 12-pin connector, 2X18, is used only for output to the dash display.)

It must be kept in mind that faults at the Linde Load Controller will not be shown on the dash display. If hydraulic function is lost or compromised with no fault code shown in the display, then troubleshooting should be directed at the Linde Load Controller.

**NOTE**

**If the hydraulic pump motor runs continuously as soon as the key is turned on, this indicates a power supply problem at pin 2X2:13 of the Linde Load Controller preventing it from holding the pump speed signal high at 2X1:7. Check the power supply circuit to the Linde Load Controller including fuse F8, the DC/DC converter, and wiring from these to 2X2:13.**

**⚠ WARNING:**

**ALWAYS DISCONNECT THE BATTERY, DISCHARGE THE CONTROLLER CAPACITORS, AND JACK THE TRUCK UP SO THAT THE DRIVE WHEELS ARE CLEAR OF THE FLOOR BEFORE TROUBLE-SHOOTING THE CONTROLLER OR ELECTRICAL SYSTEM. RECONNECT THE BATTERY AS NEEDED FOR SPECIFIC CONTROLLER CHECKS. CAPACITORS SHOULD BE DISCHARGED BY CONNECTING A 200 OHM, 2 WATT RESISTOR ACROSS THE POSITIVE AND NEGATIVE CONNECTION BARS ON THE CONTROLLER.**

Always check resistance between the frame and the power and control terminals of the controller before troubleshooting. Intermittent or misleading faults can occur with a resistance of less than 20,000 ohms. Resistance of less than 1000 ohms indicates a direct



| | |
|---|---|
| 2X1:1 | Should have full battery voltage as soon as battery is connected. If not, check fuse F3 and wiring. |
| 2X1:2 | Should have full battery voltage when key switch is turned on. If not, check key switch, fuse F1, and wiring. |
| 2X1:3 | Should have full battery voltage when key switch is turned on. If not, check resistor 1R1 and wiring to key switch. |
| 2X1:5 | Should have full battery voltage when key switch is turned on. If not, check resistor 2R1 and wiring to key switch. |
| 2X1:16 | This is a negative input. There should be full battery voltage relative to battery positive whenever the battery is connected and the pump motor is cool. If not, check the pump motor thermal switch and wiring. |
| 2X1:17 | Should have full battery voltage when key switch is turned on. If not, check contactor (2K1) coil, and wiring. |
| 2X1:18 | Should normally be 4.75 volts. If not, this indicates a problem back at the drive motor controller. |

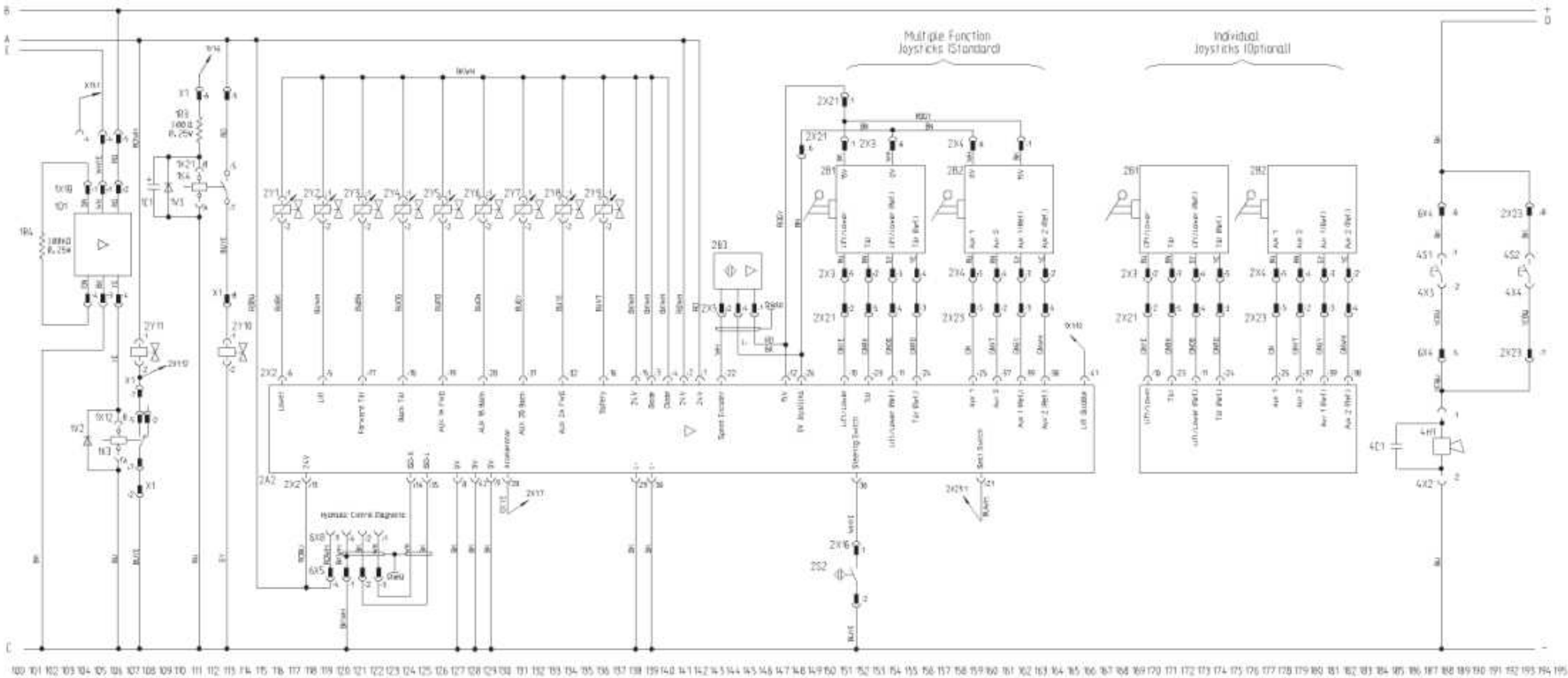
Pins 13 and 14 provide output to the drive motor controller for brush wear and overtemperature conditions. These output conditions are explained on page 06-37. Pin 13 is wired to 1X14:8 and pin 14 is wired to 1X14:9.

Pin 7 is the speed signal input from the Linde Load Controller. With the key switch on, it should have a voltage signal varying from 3.2 volts to 1.0 volts as the joysticks are operated or about 2.2 volts when the steering alone is operated.



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Wiring Schematic (page 2)




# 347 WIRING SCHEMATIC (Page 2)

**Load Controller**

**Joysticks**

**Horn**

**Auto Brake (Optional)**

06

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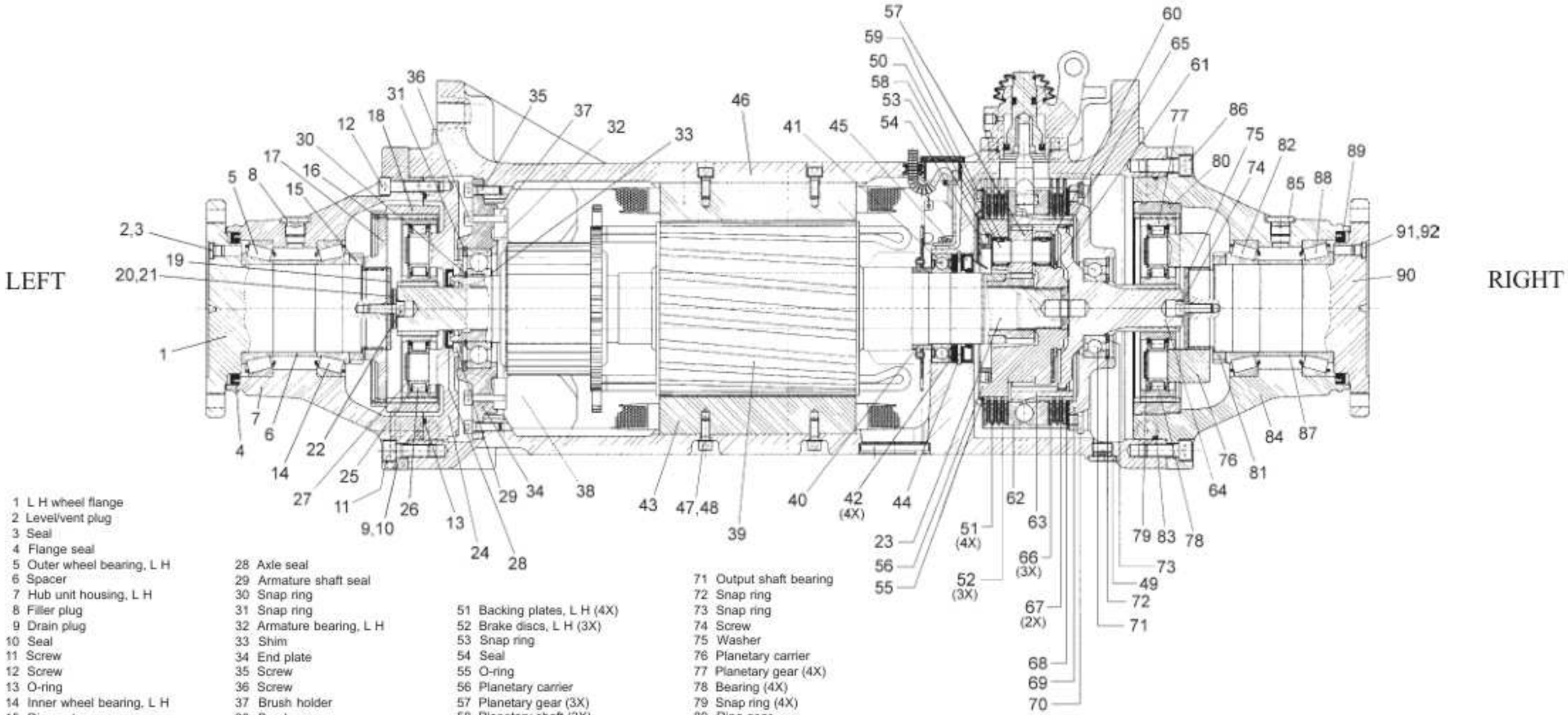
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| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| ⚠ **WARNING:** BEFORE PERFORMING ANY SERVICE ON THE HYDRAULIC SYSTEM, SECURELY BLOCK THE MAST AND CARRIAGE TO PREVENT THEM FROM DROPPING. | | |
| **Unable to lift or tilt load** | Load is too heavy | Reduce weight of the load to truck's rated capacity |
| | Insufficient or no oil | Fill reservoir to proper level Check suction line for plug |
| | Obstruction in hydraulic lines | Repair or replace line(s) |
| | Cylinder binding or damaged | Check for binding or broken plunger; repair or replace |
| | Control valve not working | Repair or replace valve |
| | Hydraulic circuit interrupt energized (interrupt speed set to 0%)or circuit faulty | Charge battery or allow pump motor or controller to cool, or repair interrupt circuit |
| | Relief pressure set too low | Adjust valve |
| | Pin hole or loose fitting in the suction line | Replace line and/or tighten connections |
| | Worn or damaged pump | Repair or replace pump |
| **Lift or tilt function actuates too slowly** | Excessive internal leakage of cylinder packings | Replace seals |
| | Leaks in hydraulic lines | Tighten all lines |
| | Misalignment or binding | Check mast, carriage and tilt for alignment or binding |
| | Relief pressure too low | Adjust valve |
| | Internal leakage in pump | Replace pump |
| | Hydraulic circuit interrupt energized (interrupt speed set slow)or circuit faulty | Charge battery or allow pump motor or controller to cool, or repair interrupt circuit |





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1 L H wheel flange
2 Level/vent plug
3 Seal
4 Flange seal
5 Outer wheel bearing, L H
6 Spacer
7 Hub unit housing, L H
8 Filler plug
9 Drain plug
10 Seal
11 Screw
12 Screw
13 O-ring
14 Inner wheel bearing, L H
15 Ring nut
16 Snap ring
17 Ring gear face plate
18 Ring gear
19 Washer
20 Shims
21 Washer
22 Screw
23 Lateral transfer axle
24 Planetary carrier
25 Planetary gear (4X)
26 Bearing (4X)
27 Snap ring (4X)

28 Axle seal
29 Armature shaft seal
30 Snap ring
31 Snap ring
32 Armature bearing, L H
33 Shim
34 End plate
35 Screw
36 Screw
37 Brush holder
38 Brush
39 Armature
40 Tachometer rotor
41 Armature bearing, R H
42 Spring washers (4X)
43 Field coils
44 Snap ring
45 Seal
46 Main housing
47 Washer
48 Screw
49 Drain plug
50 Baffle plate

51 Backing plates, L H (4X)
52 Brake discs, L H (3X)
53 Snap ring
54 Seal
55 O-ring
56 Planetary carrier
57 Planetary gear (3X)
58 Planetary shaft (3X)
59 Bearing (6X)
60 Seal
61 Snap ring
62 Expander ring
63 Ring gear
64 R H side output shaft
65 Snap ring
66 Backing plates, R H (3X)
67 Brake discs, L H (2X)
68 Shim(s)
69 Bearing plate
70 Snap ring

71 Output shaft bearing
72 Snap ring
73 Snap ring
74 Screw
75 Washer
76 Planetary carrier
77 Planetary gear (4X)
78 Bearing (4X)
79 Snap ring (4X)
80 Ring gear
81 Ring nut
82 Inner wheel bearing, R H
83 O-ring
84 Hub unit housing, R H
85 Filler plug
86 Screw
87 Spacer
88 Outer wheel bearing, R H
89 Seal
90 R H wheel flange
91 Seal
92 Level/vent plug

# Transaxle Sectional View



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