LINDE LIFT TRUCK CORP.
A MEMBER OF THE LINDE GROUP



EW / EWR Service Manual

Electric Powered Pallet Truck

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Contract 2692, 2693, 2696 May 2004

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ABBREVIATIONS

cc	cubic centimeter
cm	centimeter
cu in	cubic inches
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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BRAKE ASSEMBLY AND LINKAGE

The brake is an automotive type drum brake actuated by a mechanical linkage. The brake acts directly on the drive motor armature shaft via the brake drum. (A non ventilated brake drum is fitted on trucks equipped with the optional washdown package.) The brake is engaged when the control handle moves out of the normal operating range. Braking force is determined solely by a compression spring (item 12) in the brake linkage. As the brake shoes wear, it may become necessary to tighten the adjusting nut (10), further compressing the spring, to maintain proper braking distance.

⚠ WARNING:

SECURELY BLOCK TRUCK BEFORE PERFORMING ANY OF THE FOLLOWING PROCEDURES!

Linkage Disassembly

- Turn off keyswitch and disconnect the battery.
- Remove lock ring (14) and disengage swivel block (13) from lever (9).
- Remove cotter pin (15) and washers (16). Disengage rod (17) from lever (18) and remove lock nut (10), washer (11), spring (12) and swivel block (13).
- To disassemble the upper linkage, remove cotter pin (25), washer (24), and clevis pin (21).
- Remove cotter pin (30) and washer (23).
- Withdraw the lever (18) from the tripod, catching spacer tube (19) and lever (22) as the lever is removed. If necessary, remove nut (29), washer (28), spacer (27), and cam follower (26).
- Remove bushings (20) only if damaged and in need of replacement.

Brake Disassembly and Lining Replacement

- Turn the keyswitch off and disconnect the battery.
- Remove the bolt from the lower wiring harness/ motor cable clamp.
- Remove the C-clip ring (14) at the swivel block (13) on the brake linkage. Pull the swivel block out of the actuating lever to disconnect the brake linkage.
- Remove the three tripod mounting bolts from the underside of the drive motor flange.
- Set the entire tripod and handle assembly aside.
- Remove the brake drum nut with an impact wrench or place a screwdriver through the brake drum and engage the backing plate so that the motor cannot spin and use a conventional wrench. An impact wrench is required for trucks with solid brake drums (wash down package).
- Use two large screwdrivers or prybars to pry the brake drum off the motor shaft.
- Check brake lining (5) thickness. Replace brake linings if either one is worn to 2.5 mm (3/32 in.) at any point or it appears they will be worn down before the next inspection. To replace brake linings, remove the return springs (4) then lift out linings.
- When replacing brake linings, check return spring length. The free length of a new spring is 72 mm (2.84 in.) measured from the outsides of the wire diameters at the outermost portions of the hooks. Replace the return springs if stretched to more than 76 mm (3.0 in.) in free length.
- If it is necessary to service or replace the lever (9) or backing plate (6), remove screws (2), lock washers (3), and lift the backing plate off the drive motor. Remove large snap ring (8) from the lever and separate it and cam (7) from the backing plate.
- Install linings and other brake components in the reverse order of removal. If new linings are installed, adjust the linkage spring (12) to a compressed length of 37 mm (1.46 in.) by turning the adjusting nut (10) while the control handle is released (out of normal operating position).

Brake Adjustment

The braking force is adjustable at the compression spring (12) in the brake linkage. This spring has a normal uncompressed length of 44.5 mm (1.75 in.). It is set at the factory to a compressed length of 37 mm (1.46 in.) with the control handle released (out of the normal operating range). As the brake linings wear, it may become necessary to further compress the spring by tightening its adjusting nut (10). Before doing so, always check brake lining thickness as well as the condition of the spring itself. The spring should be replaced if its uncompressed length is less than 42 mm (1.66 in.). Also check proper linkage operation as well as actuation by the brake cam mounted on the control handle at the pivot shaft.

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DRIVE MOTOR CONTROLLER TROUBLESHOOTING

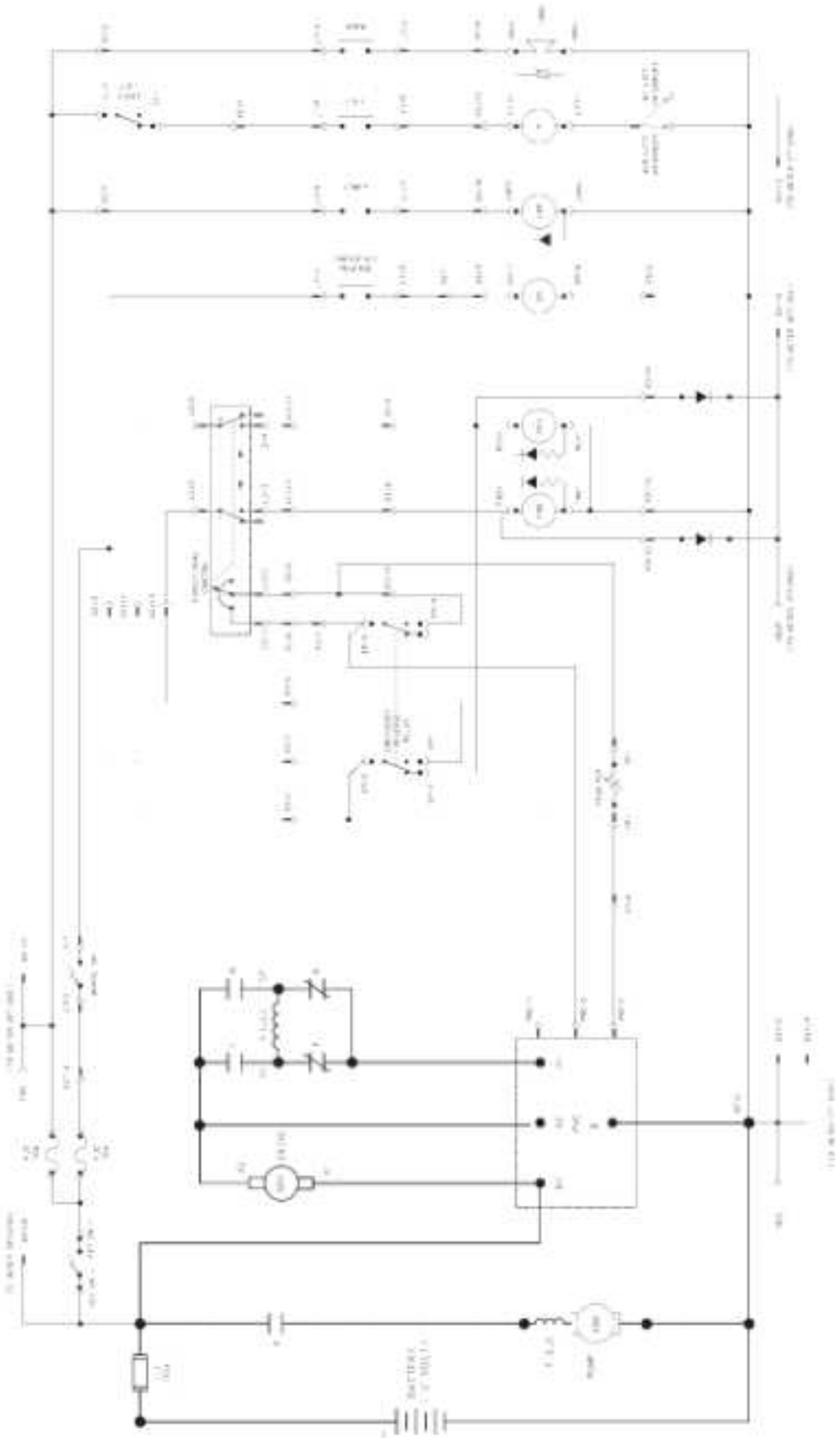
Status Code	Description of Status	Cause of Status Indication
03	Reverse Directional Switch is closed on initial power up	PL2:5 is greater than 60% of battery voltage at initial key switch on
MEMORY RECALL **NO**	**CORRECTIVE ACTIONS**	
Circuits valid for Traction Controller	**Symptom** Control will not operate because of Static Return to off (SRO) lock out.	
	Possible Cause Reverse directional switch is closed on initial start up (i.e. closure of battery, key switch or foot switch). • Return directional switch lever to neutral and then return lever to reverse position. Reverse directional switch is welded closed or mis-adjusted to be held closed. • Adust directional switch to insure that it opens when the directional switch is returned to neutral. • Replace directional switch if adjustments do not correct the issue.	Short circuit between battery positive and PL2:5. • Disconnect the wire from PL2:5 and check for a short circuit between battery positive and the wire that was connected to PL2:5. Defective Control. • Replace the controller unit.

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DRIVE MOTOR CONTROLLER TROUBLESHOOTING

Status Code	Description of Status	Cause of Status Indication
04	Belly button switch is closed on start up.	PL2:3 is greater than 50% of battery voltage when key switch is closed.
MEMORY RECALL **NO**	**CORRECTIVE ACTIONS**	
Circuits valid for Traction Controller	**Symptom** Control will not operate.	
	Possible Cause Defective belly button switch circuit. • Check belly button switch to insure that it is open when brake handle is pulled down.	

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