



Service Manual

Controller

FC/MC

EP13PNT ETB21-00011-01999 / ETB21-02001-49999

EP15PNT ETB21-50011-51999 / ETB21-52001-99999

EP16CPNT ETB22-00011-01999 / ETB22-02001-49999

EP18CPNT ETB22-50011-51999 / ETB22-52001-99999

EP16PNT ETB23-00011-01999 / ETB23-02001-49999

EP18PNT ETB23-50011-51999 / ETB23-52001-99999

EP20PNT ETB24-00011-01999 / ETB24-02001-99999

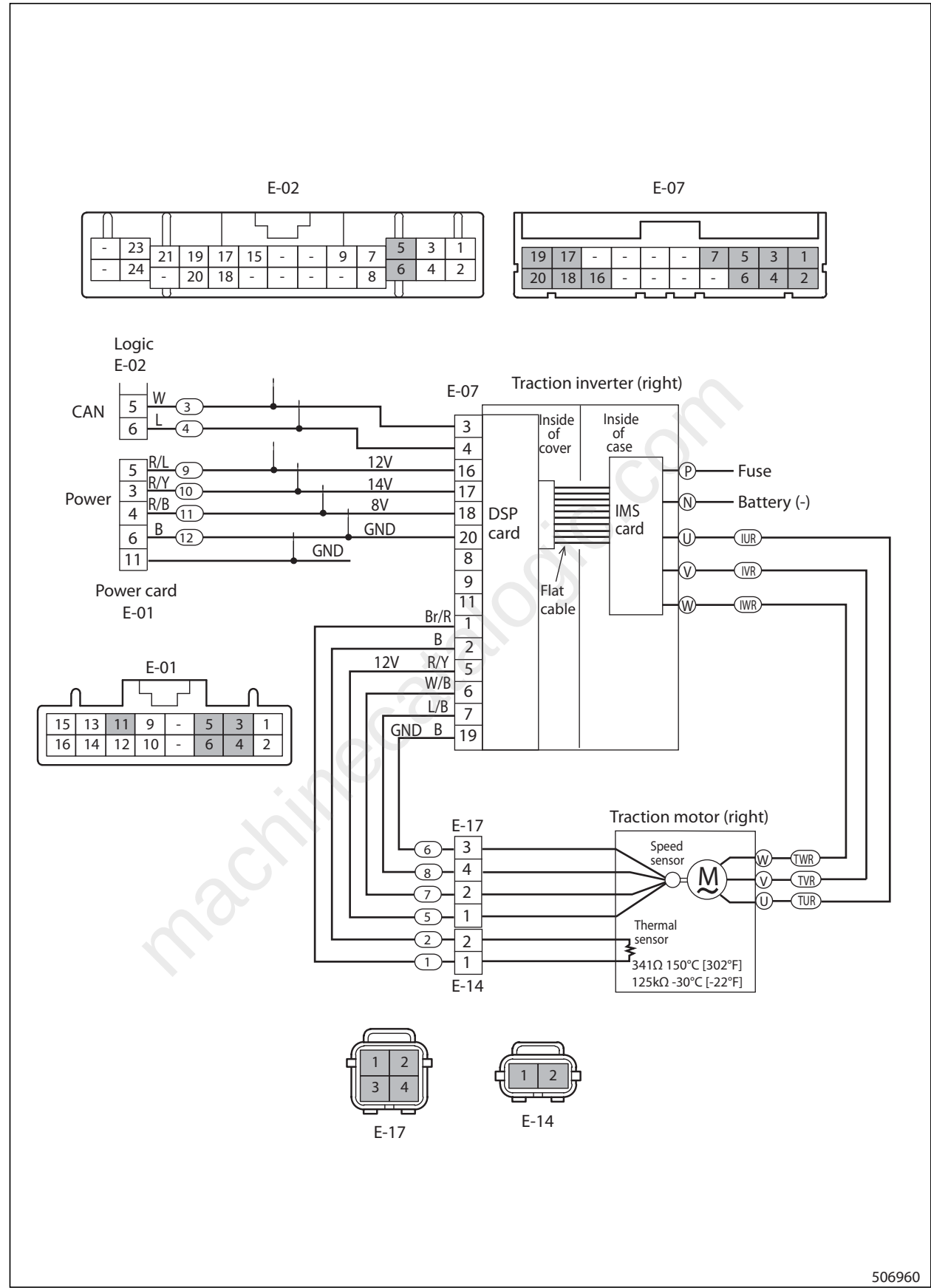
EP16CPN ETB27-00011-01999 / ETB27-02001-49999

EP18CPN ETB27-50011-51999 / ETB27-52001-99999

EP16PN ETB28-00011-01999 / ETB28-02001-49999

EP18PN ETB28-50011-51999 / ETB28-52001-99999

EP20PN ETB29-00011-01999 / ETB29-02001-99999



8. Removing Pump Motor

8.1 Suggestions for Removal

⚠ CAUTION

- Record places of the harness connections before removal.
- Turn the key switch to the off position and operate hydraulic levers a few times to release high pressure in the hydraulic piping before disconnecting hydraulic hoses or pipes.
- When disconnecting hydraulic pipes, cap them to prevent dust from entering into hydraulic components and pipes.

(1) Remove the floor plates.

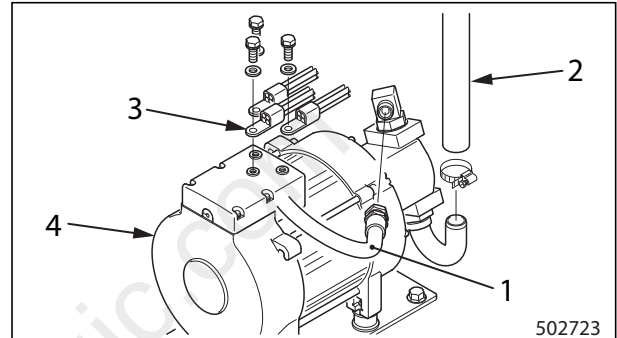
(2) Disconnect following hoses from the gear pump.

- High-pressure hose (from the control valve)
- Low-pressure hose (from the hydraulic tank)

Note: Prepare a drip pan to catch remaining oil inside the hoses.

Plug the hose openings to prevent from leaking.

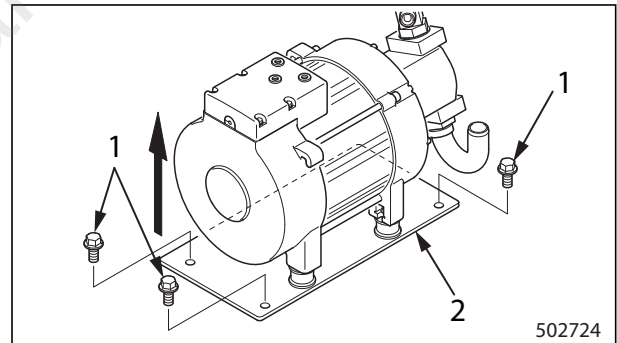
(3) Disconnect lead wires of the pump motor.



1. High-pressure hose
2. Low-pressure hose

3. Lead wires
4. Pump motor

(4) Remove flange bolt for the motor bracket, and hoist the pump motor with the motor bracket.

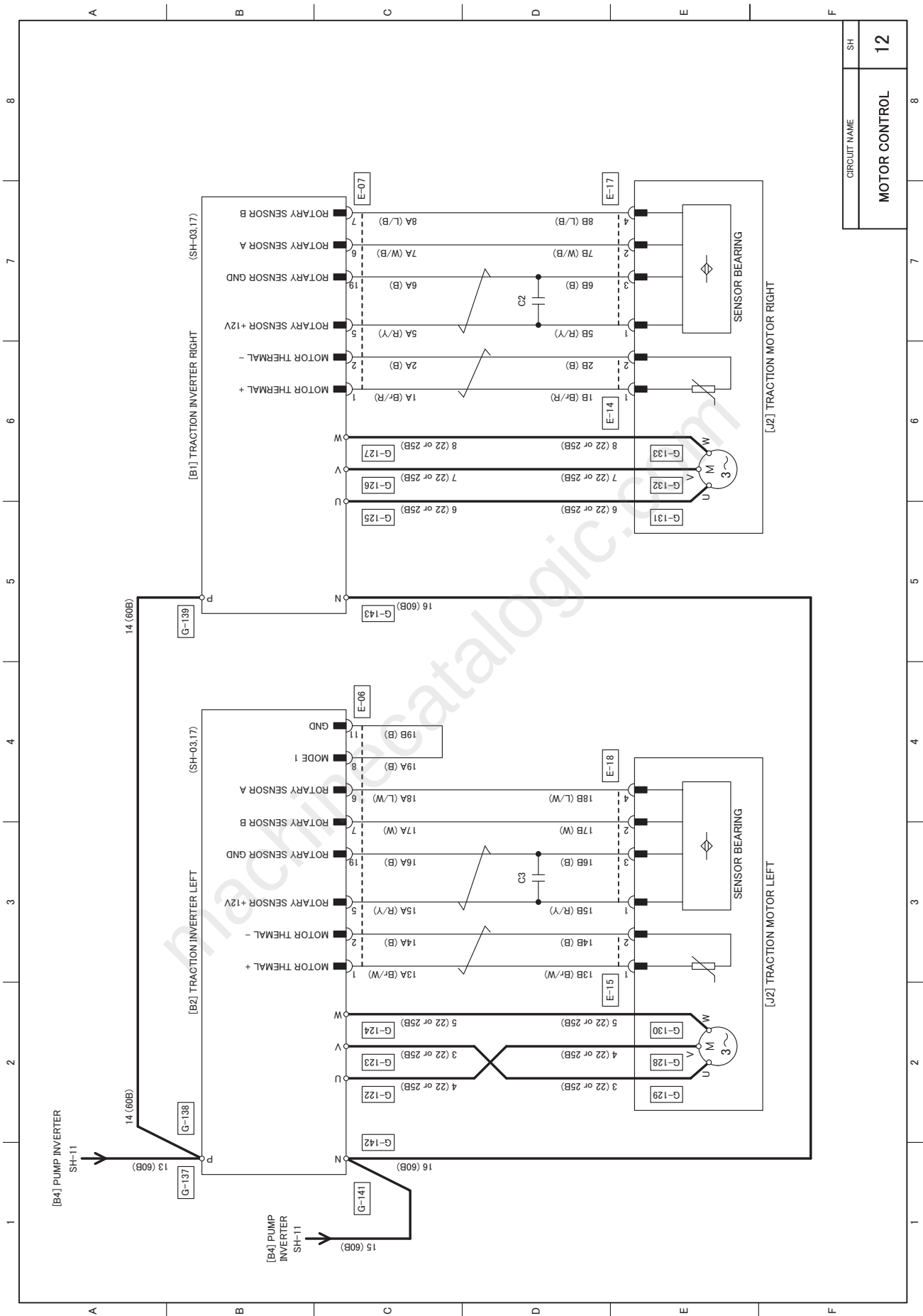


1. Flange bolt

2. Motor bracket

Tightening torque for flange bolt

38.6 to 47.2 N·m (4.0 to 4.8 kgf·m) [28.5 to 34.8 lbf·ft]

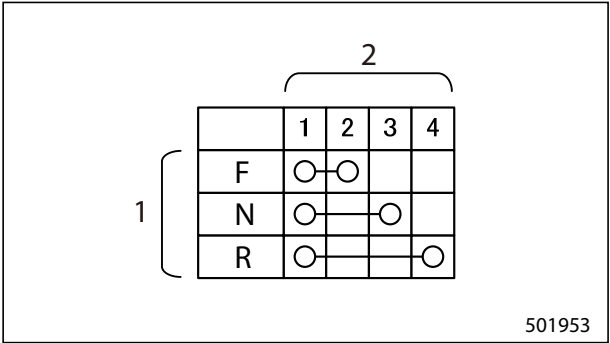


CIRCUIT NAME	SH
MOTOR CONTROL	12

Special Symbols

The following symbols are used when the representation by general symbols is difficult.

This diagram shows that No. 1 and No. 3 terminals are connected when the switch position is placed in NEUTRAL position.



501953

1. Switch position

2. Terminal

2.2 Sheet Symbol

A sheet symbol is provided in each circuit diagram sheet so that the relationship between diagrams can be clarified. The sheet symbol consists of "SH" and two digit numbers, for example, "SH-01" or "SH-02".

#47 Foot Direction

This setting defines the foot direction control.

1: Standard direction lever

2: Foot Direction Control (FoDiCo)

3: Armrest FNR

#48 Load Meter Function (E-03-28)

Enable or disable the load meter option.

0: Disable

1: Enable

To use this function, an oil pressure sensor is required. Units are selectable between KG and LBS from the display.

A different method of calculation is used based on the #44 Mast type. On the lift truck with 2-FF or 3-FF, when the mast is positioned in the first stage, the value displayed on the load meter is valid, however, when the mast is in the second stage, the load meter does not show the correct value.

CAUTION

The value of the load meter should be used as a reference only, as it is calculated from an oil pressure converted value. Do not use this value for calculation of the rated load for lift truck performance.

#50 Tilt Horizon Function (E-04-57, E-03-28)

Enable or disable the tilt horizon function.

0: Disable

1: Enable

To use this function, ALS switch, tilt angle sensor and oil pressure sensor are required.

For MC trucks, prepare the output unit and tilt lock valve for this job.

To stop the mast in a horizontal position during empty load or when the mast is tilting forward, press the ALS switch.

See the table below for the movement when ALS switch is pressed.

Loaded or empty	Tilt lever operation	Status of mast (angle)	Mast movement
Empty load	Backward tilt	Forward tilt/backward tilt	Will be tilted backward.
	Forward tilt	Backward tilt	Will be tilted forward.
		Forward tilt	Will not be tilted forward.
Loaded	Backward tilt	Forward tilt/backward tilt	Will not be tilted backward. (On Mc model, will be tilted backward.)
	Forward tilt	Forward tilt/backward tilt	Will not be tilted forward.

#51 Tilt Horizon Adjustment

Tilt angle sensor horizontal value setting

Zero point should be set up with the normal tilt angle kept in horizontal position.

#55 Load Meter Adjustment

Load meter zero point setting

Zero point setting is also available from the display.

#-- Tire Adjustment

Tire angle sensor straight position setting

Straight position should be set up.

The zero set is done at the moment you press the "<<" button without pushing the "write" button.

► Lift Truck Models Covered in This Manual

3 wheel model

Model	Serial number	Control lever
EP13PNT	ETB21-00011-01999 ETB21-02001-49999	FC/MC
EP15PNT	ETB21-50011-51999 ETB21-52001-99999	
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EP20PNT	ETB24-00011-01999 ETB24-02001-99999	

4 wheel model

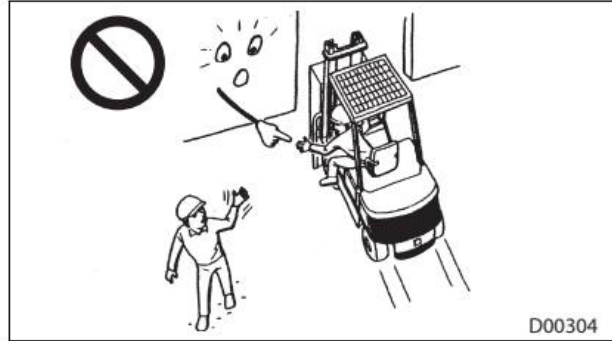
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Abbreviation

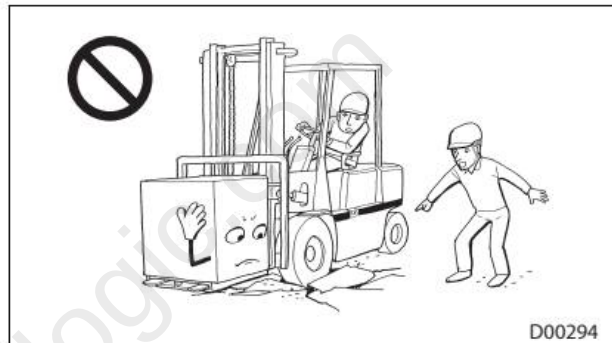
- FC is short for fingertip control.
- MC is short for mechanical control.

⚠ WARNING**Stay within the confines of the lift truck!**

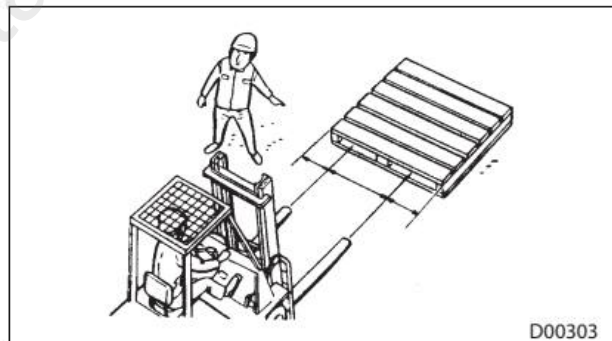
- Make sure there is enough space to pass through.
- Keep your hands and feet inside the operator compartment. DO NOT put any part of the body outside the operator compartment of the lift truck.
- In a confined area, place a guide and observing the instructions of the guide, always work under the overhead guard.

**⚠ WARNING****Always be aware of floor capacity!**

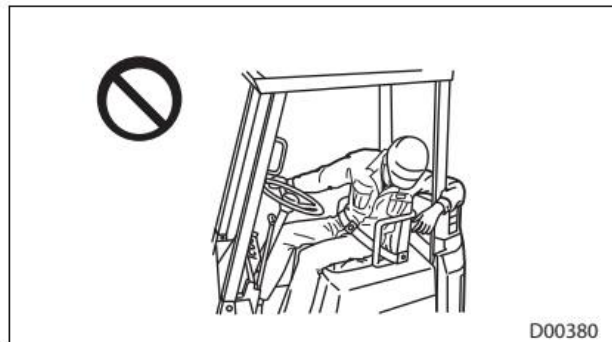
Make sure the floor will support the weight of the loaded lift truck.

**⚠ WARNING****Avoid off-center loading!**

Set the forks as far apart as possible for maximum support of the pallet or load. Too small a fork spread could cause instability of the load. DO NOT pick up an off-center load.

**⚠ WARNING****Stay under the overhead guard!**

DO NOT hold on to the overhead guard.



Full Version Available

Caterpillar EP16CPNT Forklift Service and Operator Manual (99759-6P110)

Caterpillar EP16CPNT forklift service manual, covers hydraulics, mast, drive unit, wiring, and electric systems. Searchable PDF download.

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