CAT® Lift Trucks

Service Manual

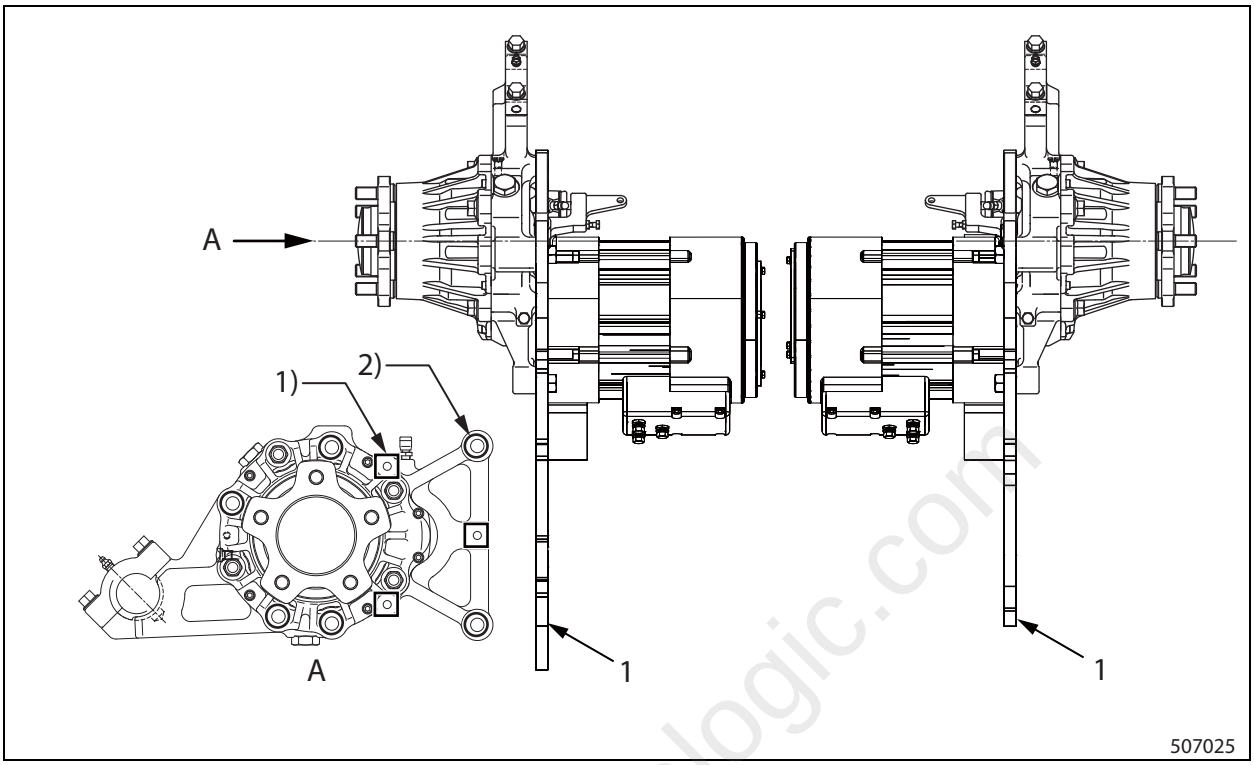
Chassis & Mast

FC/MC

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

99759-6M120

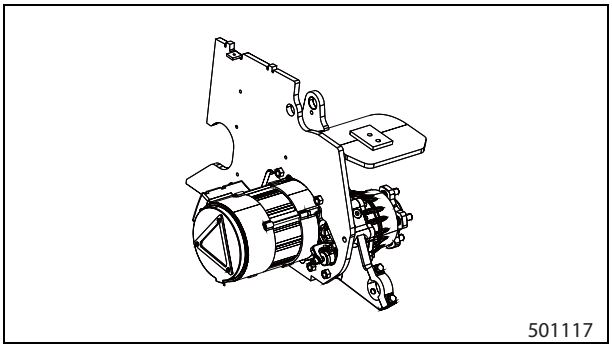
3. Removing Transfer Assemblies, Traction Motors



1. Frame

1) Motor mounting bolts, 3 places
2) Mounting bolt to the body, 6 places

(1) Remove the mast assembly. See "MAST AND FORKS".
(2) Remove all the electric wirings, solenoid brake cable, and hydraulic lines connected to the motor and transfer.
(3) Hitch a sling to lift the motor. Wind the sling to prevent it from falling.
(4) Place a jack under the transfer, and support the transfer with the jack.
(5) Loosen the bolts that secure the transfer to the frame, and slightly pull the transfer with the jack away from the frame.
After making sure that the transfer can be pulled out horizontally, remove the bolts that secure the transfer to the frame, and remove the transfer with the jack from the frame.



Item	Value
Total weight of transfer, Traction motor	70 kg (154.3 lb)

Bleeder valve

- Replace the bleeder valve once a year.

Other parts

- Check the push rod assembly and boot for damage.

Air bleeding

Be sure to bleed the master cylinder of air in the following cases.

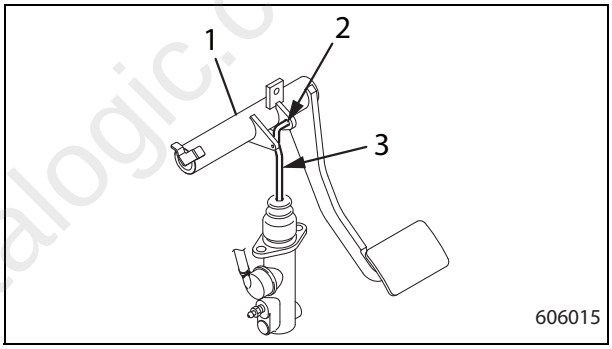
- After the master cylinder is disassembled for maintenance.
- When brake pedal movement is spongy.

⚠ CAUTION

- Use the specified brake oil [DOT-3] or [DOT-4]. Do not mix any mineral oil.
- Do not use any mineral oil as brake fluid.
- During the air bleeding, keep the brake oil level in the reserve tank by refilling.

(1) Remove the original push rod from the master cylinder.
(2) Loosen the bolt for pedal height adjustment.
(3) Remove the brake microswitch.
(4) Insert the special rod into the master cylinder, and fit the end into the link hole.

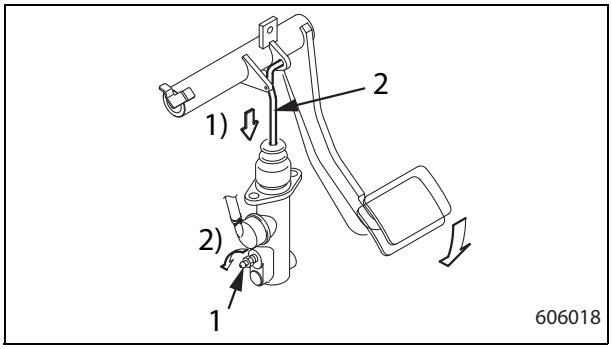
Note: To bleed air completely, the piston of the master cylinder must be pressed down to the bottom several times. The standard push rod is not long enough for this purpose. Therefore, use a special rod (longer one) instead.



1. Brake pedal
2. Link hole
3. Special rod

Tool name	Part number
Special rod	97967-00400

(5) Tighten bleeder valve.
(6) Fill the tank with brake fluid. Don't feed with pressure.
(7) Loosen bleeder valve of master cylinder while pushing brake pedal.



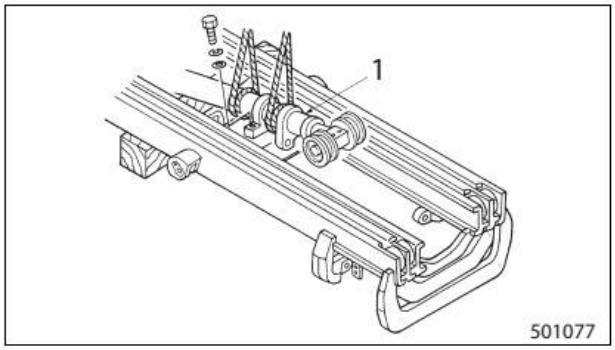
1. Bleeder valve
2. Special rod

1) Push
2) Loosen

9.2 Suggestions for Disassembly

Removing first lift cylinder

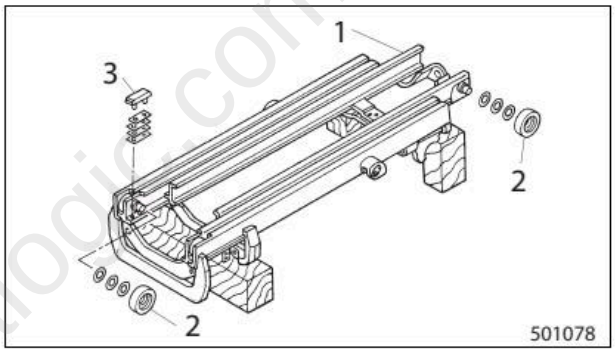
(1) Remove retaining bolts from the first lift cylinder.
(2) Hitch slings on lift cylinder, and slowly remove the cylinder.
Use two slings. Wind or tie slings securely to prevent from slipping.



1. First lift cylinder

Removing inner mast and main rollers

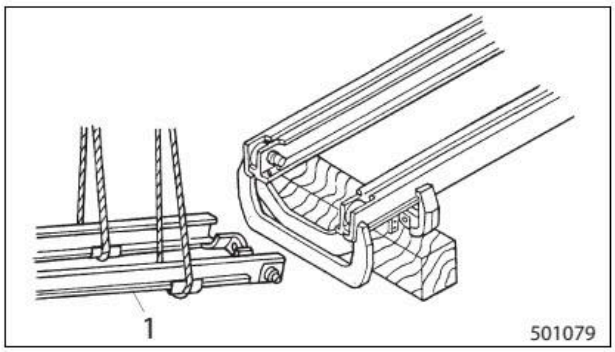
Lower the inner mast so that the main rollers can be removed. Remove main rollers and mast strips.



1. Inner mast
2. Main roller
3. Mast strip

Removing inner mast

Using slings, lift and remove the inner mast, steering it to pass over the roller shaft sections of the middle mast.



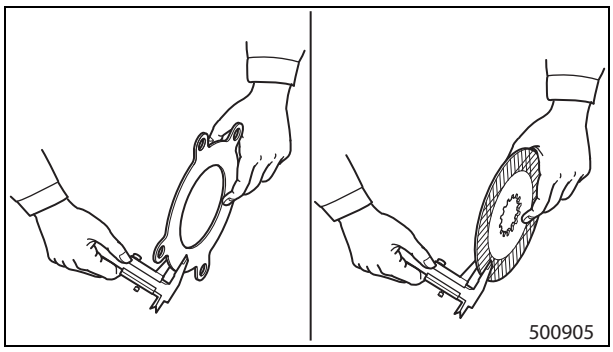
1. Inner mast

4. Inspecting Transfer Units

(1) Check the gear teeth and splines for damage and wear.
(2) Check the bearing for damage, wear, rotational resistance and abnormal noise.
(3) Check the main case and cover for cracks and other damage.
(4) Check the oil seal and retainer for damage on the contact face.
(5) Replace the oil seal and O-ring with new ones if damage is found during removal.
(6) Checking friction and mating plates

- Check the friction plate for seizure, local contact, deflection, or other damage.
- Check the mating plate for heat spots (scattered black burn spots).
- Check the inner teeth for wear and damage.
- Measure the thickness of each plate.

Note: If any of above is found in any one of plates, replace all of the plates.

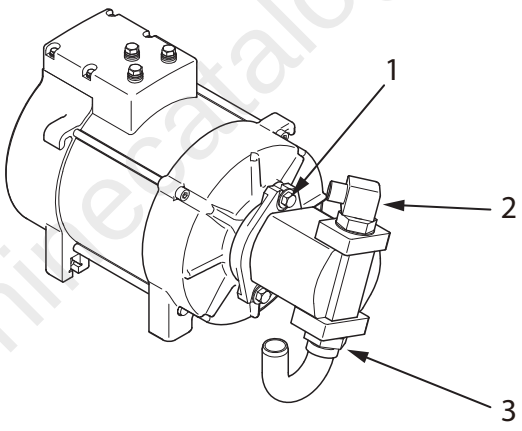


Item	Standard	Limit
Friction plate	2.6 ± 0.1 mm (0.102 ± 0.004 in.)	2.3 mm (0.0906 in.)
Mating plate	2 ± 0.1 mm (0.08 ± 0.004 in.)	1.8 mm (0.0709 in.)

20. Service Data

20.1 Gear Pump

Ref.	Item		Specified value
-	Forward tilt angle [Standard simplex mast model]	Standard	5°
-	Backward tilt angle [Standard simplex mast model]	Standard	7.5°
-	Lift cylinder vertical drift (at rated load) (Rod retraction stroke) (Oil temperature 40 to 50 °C (104 to 122 °F))	Standard	50 mm (1.97 in.) (15 minutes)
-	Tilt cylinder drift (at rated load) (Rod extension stroke) (Oil temperature 40 to 50 °C (104 to 122 °F))	Standard	22 mm (0.87 in.) (15 minutes)
-	Displacement	Standard	18.9 cc (1.15 cu.in.)/rev
1	Tightening torque for mounting bolts	Standard	19.6 to 24.5 N·m (2.0 to 2.5 kgf ·m) [14.5 to 18.1 lbf·ft]
2	Tightening torque for elbow	Standard	69 ± 7 N·m (7.04± 0.71 kgf ·m) [50.89 ± 5.16 lbf·ft]
3	Tightening torque for connector	Standard	108 ± 11 N·m (11.01± 1.12 kgf ·m) [79.66 ± 8.11 lbf·ft]



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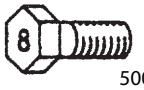
4. Specifications

This specification describes the lift truck with simplex 3.3 m mast.

SPECIFICATION			UNIT	EP16CPN	EP18CPN	EP16PN	EP18PN	EP20PN
PERFORMANCE	RATED CAPACITY, 500 mm (24 in.)		kg (lb)	1600 (2500)	1800 (2900)	1600 (3000)	1800 (3500)	2000 (4000)
	LOAD CENTER		mm (in.)	500 (24)		500 (24)		
	MAXIMUM FORK HEIGHT		mm (in.)	3325 (130.91)		3325 (130.91)		
	FREE LIFT		mm (in.)	115 (4.53)		115 (4.53)		
	LIFT SPEED (UNLOADED/LOADED)		m/s (mph)	0.6/0.5 (118.11/ 98.43)	0.6/0.44 (118.11/ 86.61)	0.6/0.5 (118.11/ 98.43)	0.6/0.44 (118.11/ 86.61)	0.6/0.4 (118.11/ 78.74)
	LOWERING SPEED (UNLOADED/LOADED)		m/s (mph)	0.5/0.52 (98.43/102.36)		0.5/0.52 (98.43/102.36)		
	TILT ANGLE (FORWARD/BACKWARD)		deg	5/7.5		5/7.5		
	TRAVEL SPEED	FORWARD (UNLOADED/ LOADED)	km/h (mph)	17/17 (10.56/10.56)		17/17 (10.56/10.56)		
		REVERSE (UNLOADED/ LOADED)	km/h (mph)	17/17 (10.56/10.56)		17/17 (10.56/10.56)		
	MINIMUM TURNING RADIUS		mm (in.)	1900 (74.80)		2015 (79.33)		
	WORKING AISLE WIDTH 1000 x 1200 mm (39.37 x 47.24 in.) PALLETS		mm (in.)	3473 (136.73)	3473 (136.73)	3588 (141.26)	3588 (141.26)	3599 (141.69)
	WORKING AISLE WIDTH 800 x 1200 mm (31.50 x 47.24 in.) PALLETS		mm (in.)	3273 (128.86)	3273 (128.86)	3388 (133.39)	3388 (133.39)	3399 (133.82)

3. Tightening Torques for Standard Bolts and Nuts

3.1 Metric Fine Thread

Nominal size	Pitch	With spring washer								
		 500244			 500245			 500246		
mm (in.)	mm (in.)	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
6 (0.24)	1 (0.04)	7.4	0.75	5.46	9.6	0.98	7.08	12.7	1.30	9.37
8 (0.31)	1.25 (0.05)	16.7	1.70	12.32	22.6	2.30	16.67	30.4	3.10	22.42
10 (0.39)	1.25 (0.05)	34.3	3.50	25.30	45.1	4.60	33.26	69.6	7.10	51.33
12 (0.47)	1.25 (0.05)	63.7	6.50	46.98	82.4	8.40	60.77	122.6	12.50	90.42
14 (0.55)	1.5 (0.06)	102.0	10.40	75.23	132.4	13.50	97.65	192.2	19.60	141.76
16 (0.63)	1.5 (0.06)	157.9	16.10	116.46	202.0	20.60	148.99	287.3	29.30	211.90
18 (0.71)	1.5 (0.06)	224.6	22.90	165.65	292.2	29.80	215.51	413.8	42.20	305.20
20 (0.79)	1.5 (0.06)	310.9	31.70	229.30	404.0	41.20	297.97	573.8	58.51	423.21
22 (0.87)	1.5 (0.06)	413.8	42.20	305.20	537.5	54.81	396.43	763.0	77.80	562.75
24 (0.94)	1.5 (0.06)	547.2	55.80	403.59	711.0	72.50	524.40	1006.2	102.60	742.12
27 (1.06)	1.5 (0.06)	794.3	80.99	585.84	1032.6	105.29	761.59	1451.1	147.97	1072.47
30 (1.18)	1.5 (0.06)	1100.3	112.20	811.53	1430.8	145.90	1055.29	2012.3	205.19	1484.17
33 (1.30)	1.5 (0.06)	1467.1	149.60	1082.06	1907.4	194.50	1406.80	2680.2	273.30	1976.78
36 (1.42)	1.5 (0.06)	1918.2	195.70	1414.77	2493.8	254.29	1839.30	3497.1	356.60	2579.29
39 (1.54)	1.5 (0.06)	2461.5	251.00	1815.48	3198.8	326.18	2359.28	4469.9	455.80	3296.77

Full Version Available

Caterpillar EP20PN Forklift Service and Operator Manual (99759-6M120)

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