MITSUBISHI FORKLIFT TRUCKS

Service Manual

Chassis & Mast

FBC15K, FBC18K, FBC18KL

A3BC1-10200-up
A3BC1-20200-up
A3BC1-30200-up
A3BC2-40200-up

FBC20K, FBC25K

A3BC2-10200-up
A3BC2-20200-up
A3BC2-30200-up
A3BC2-40200-up
A3BC2-80200-up

FBC25KE, FBC25KL, FBC30K

A3BC3-10200-up
A3BC3-20200-up
A3BC3-30200-up
A3BC3-40200-up
A3BC3-80200-up

FBC30KL

A3BC4-40200-up

99759-73110

Chapter 1: General Information

Chapter 2: Front Axle & Reduction Differential

Front Axle

Reduction Differential

Chapter 3: Transfer Assembly

Chapter 4: Rear Axle

Chapter 5: Brake System

Chapter 6: Steering System

Steering System

Steering Gear

Steer Pump

Chapter 7: Hydraulic System

Hydraulic System

Chapter 7: Hydraulic System, continued

Chapter 8: Mast and Forks

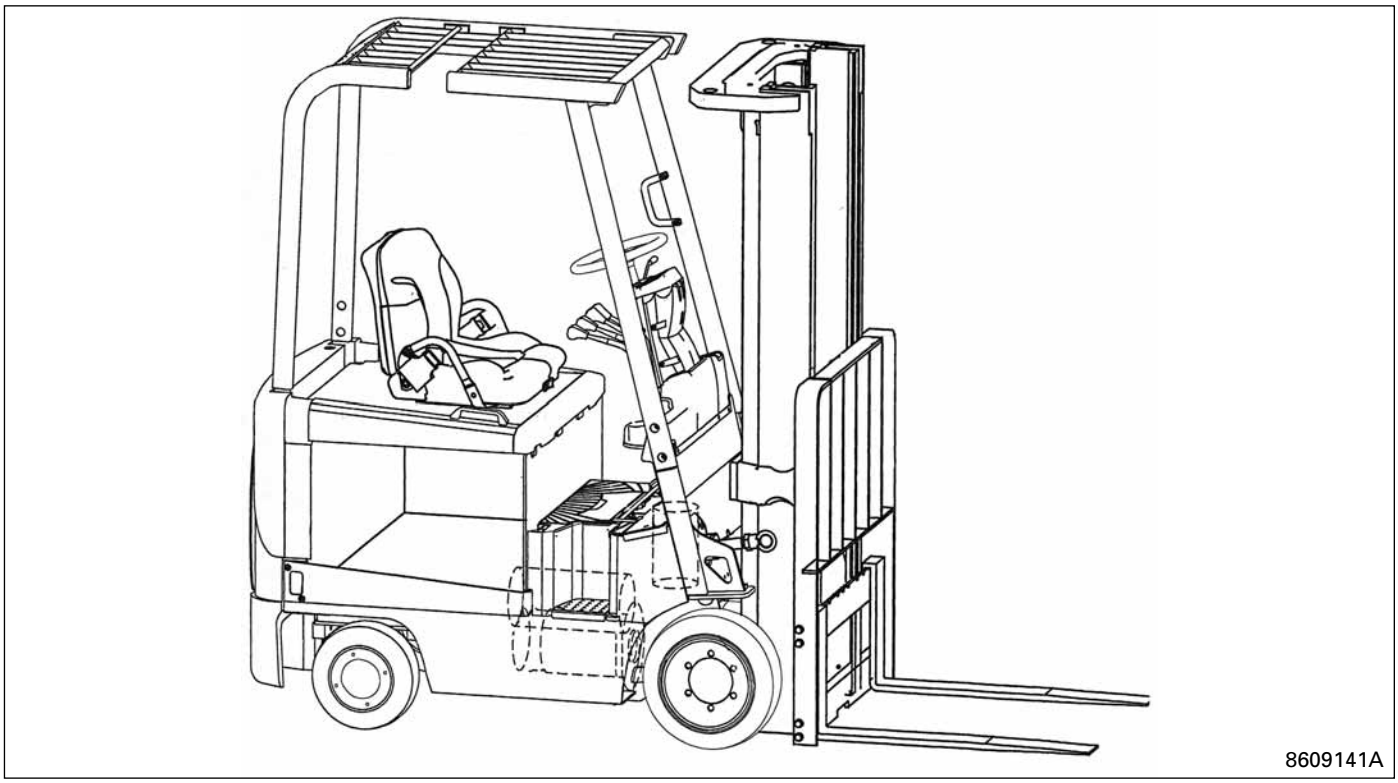
Chapter 9: Troubleshooting Section

Chapter 10: Maintenance Service Data

Chapter 1: General Information

Scope

This service manual deals with all components or systems of the Mitsubishi Forklift Trucks, except for the electrical system, which is covered in a separate manual.

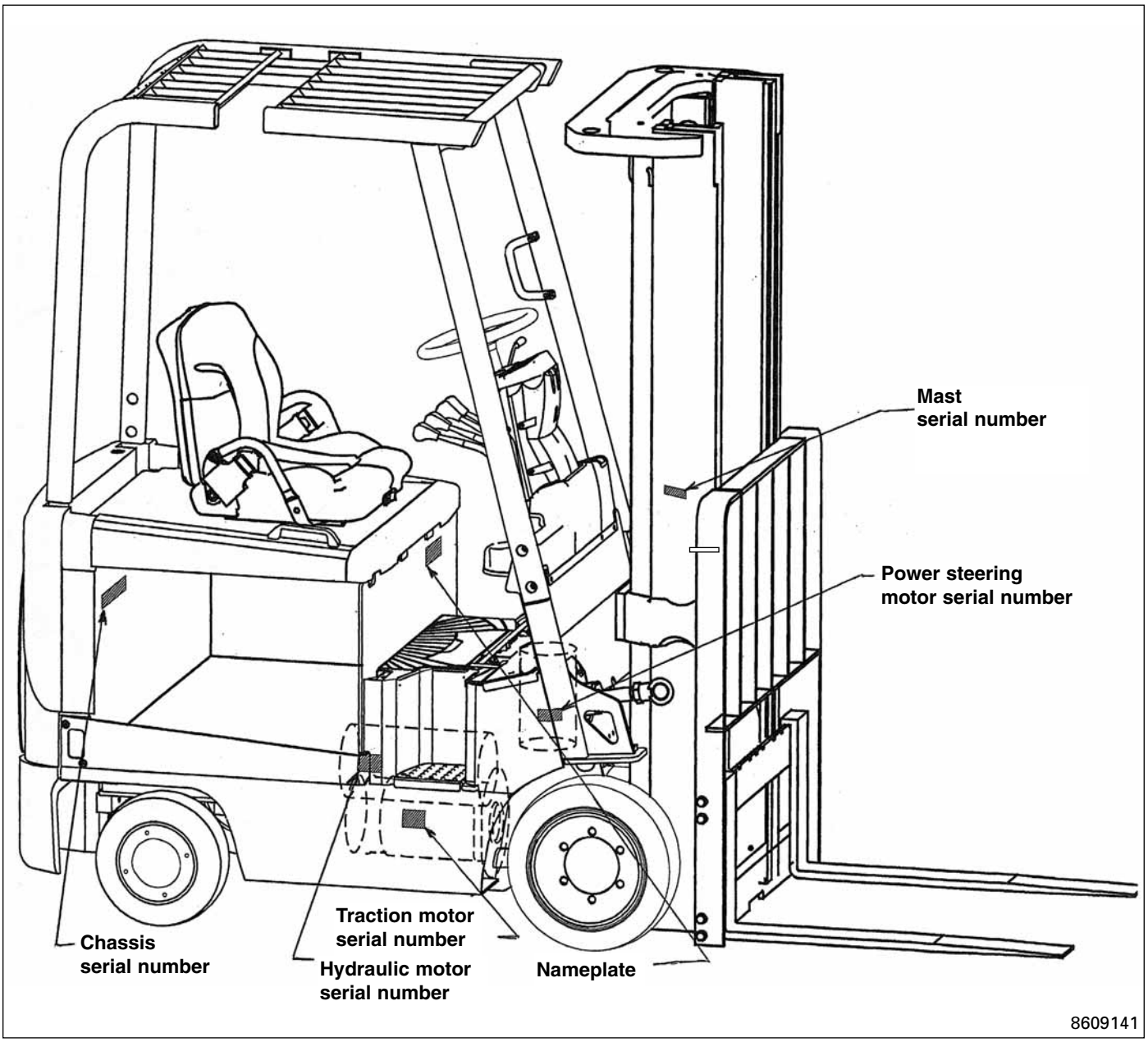


Truck Models Covered

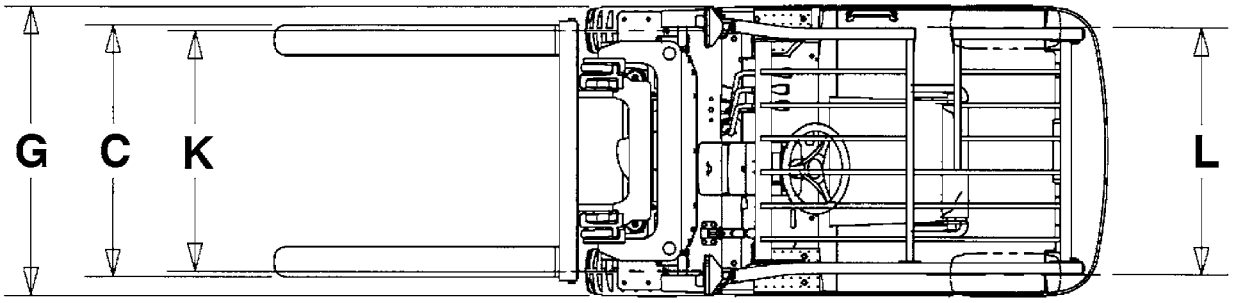
This service manual furnishes service and maintenance information for the following trucks.

Truck Model	Serial Number
FBC15K, FBC18K, FBC18KL	A3BC1-10200-up
	A3BC1-20200-up
	A3BC1-30200-up
	A3BC2-40200-up
FBC20K, FBC25K	A3BC2-10200-up
	A3BC2-20200-up
	A3BC2-30200-up
	A3BC2-40200-up
	A3BC2-80200-up
FBC25KE, FBC25KL, FBC30K	A3BC3-10200-up
	A3BC3-20200-up
	A3BC3-30200-up
	A3BC3-40200-up
	A3BC3-80200-up
FBC30KL	A3BC4-40200-up

Nameplate and Serial Number Locations



Dimensions



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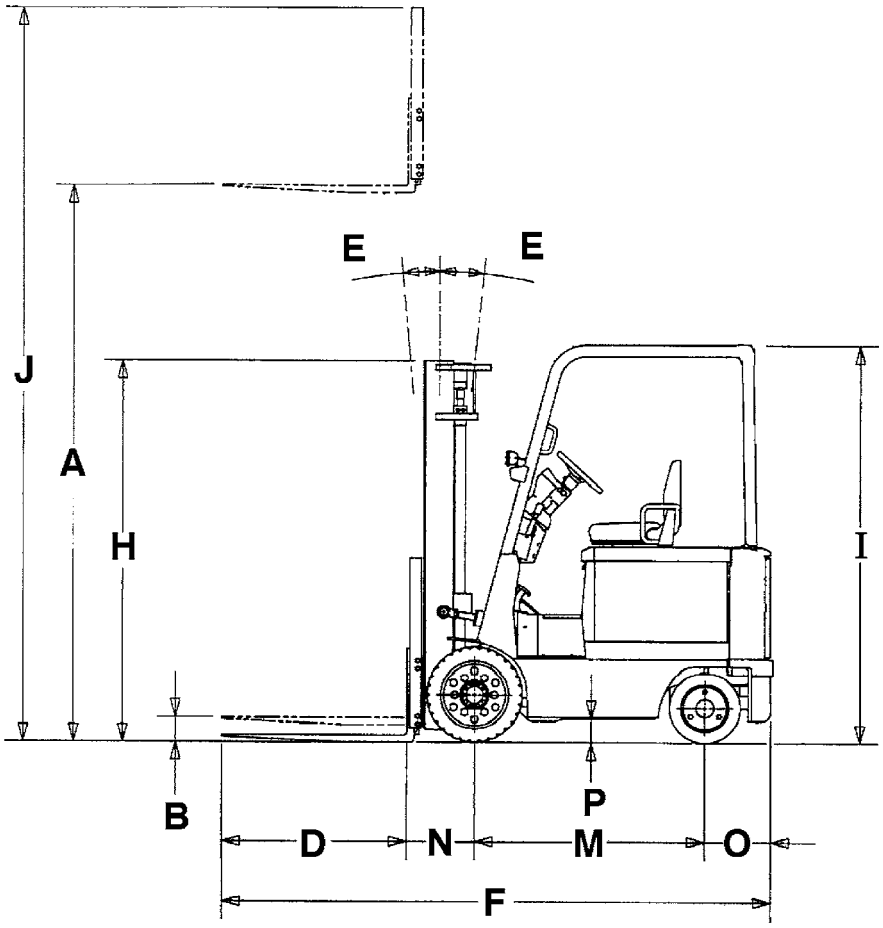

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Dimensions Chart

Ref#	Truck Model	FBC15K, FBC18K	FBC18KL	FBC20K, FBC25K	FBC25KE	FBC25KL	FBC30K	FBC30KL
A	Maximum Lift	3320 (130)	3320 (130)	3340 (131)	3340 (131)	3340 (131)	3310 (130)	3215 (126)
B	Free Lift	115 (4.5)	115 (4.5)	130 (5.1)	130 (5.1)	130 (5.1)	135 (5.3)	135 (5.3)
C	Maximum Fork Spacing (outside to outside)	818 (32.0)	818 (32.0)	818 (32.0)	818 (32.0)	818 (32.0)	818 (32.0)	818 (32.0)
D	Fork Length	1070 (42)	1070 (42)	1070 (42)	1070 (42)	1070 (42)	1070 (42)	1070 (42)
E	Tilt Angle (forward/backward)	5°/6°	5°/6°	5°/6°	5°/6°	5°/6°	5°/6°	5°/6°
F	Overall Length	3050 (120)	3123 (122.8)	3152 (124)	3252 (127.9)	3252 (127.9)	3325 (130.8)	3325 (130.8)
G	Overall Width (outside of tires)	945 (37.2)	970 (38.2)	1054 (41.5)	1054 (41.5)	1103 (43.4)	1103 (43.4)	1103 (43.4)
H	Overall Height (to top of mast, lowered)	2105 (83)	2105 (83)	2110 (83.5)	2110 (83.5)	2110 (83.5)	2110 (83.5)	2110 (83.5)
I	Overall Height (to top of overhead guard)	2180 (85.8)	2180 (85.8)	2207 (86.9)	2207 (86.9)	2207 (86.9)	2207 (86.9)	2207 (86.9)
J	Overall Height (to top of mast, extended)	4560 (180)	4560 (180)	4570 (180)	4570 (180)	4570 (180)	4540 (179)	4540 (179)
K	Tread (front)	793 (31.2)	818 (32.2)	875 (34.4)	875 (34.4)	900 (35.4)	900 (35.4)	900 (35.4)
L	Tread (rear)	826 (32.5)	826 (32.5)	897 (35.3)	897 (35.3)	897 (35.3)	897 (35.3)	897 (35.3)
M	Wheelbase	1170 (46.1)	1170 (46.1)	1280 (50.4)	1380 (54.3)	1380 (54.3)	1380 (54.3)	1380 (54.3)
N	Front Overhang	376 (14.8)	376 (14.8)	394 (15.5)	394 (15.5)	394 (15.5)	406 (15.9)	406 (15.9)
O	Rear Overhang	434 (17)	507 (19)	408 (16)	408 (16)	408 (16)	469 (18.4)	469 (18.4)
P	Underclearance (at center of wheelbase)	118 (4.6)	118 (4.6)	124 (4.9)	124 (4.9)	124 (4.9)	124 (4.9)	124 (4.9)

Unit: mm (in.)

General Information (Standard Models)

				Truck Model								
			Units	FBC15K	FBC18K	FBC18KL	FBC20K	FBC25K	FBC25KE	FBC25KL	FBC30K	FBC30KL
	Standard Controller			GE SX Controller								
	Standard Simplex Mast Size		meters	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
	Service Weight (standard axle)	Without Battery	kg (lb)	2095 (4620)	2335 (5140)	2595 (5720)	2685 (5920)	2870 (6330)	2695 (5940)	2865 (6320)	3335 (7353)	3502 (7721)
		With Max. Battery		3298 (7270)	3534 (7790)	3797 (8370)	4296 (9470)	4482 (9880)	4509 (9940)	4681 (10320)	5150 (11353)	5317 (11722)
Work Performance	Rated Capacity/ Load Center		kg/mm (lb/in.)	1500/500 (3000/24)	1800/500 (3500/24)	1800/500 (4000/24)	2000/500 (4000/24)	2500/500 (5000/24)	2500/500 (5000/24)	2500/600 (5000/24)	3000/500 (6000/24)	3500/500 (6500/29)
	Maximum Fork Height		mm (in.)	3320 (130)			3340 (131)				3310 (130)	3215 (126)
	Lift Speed (Rated Load)	36V	m/sec. (fph)	.24 (48)	.23 (45)	.34 (67)	.31 (61)	.28 (56)			.26 (51)	.23 (45)
		48V		.34 (67)	.32 (64)	.47 (93)	.40 (78)	.38 (74)			.36 (70)	.31 (62)
	Lowering Speed (rated load)			.50 (99)			.50 (98)					
	Tilt Angle (forward/backward)		degrees	5° / 6°								
	Free Lift		mm (in.)	115 (4.5)			130 (5.1)				135 (5.3)	
Traveling Performance	Travel Speed (Without Load)	36V	km/h (mph)	12.9 (8.0)		14.3 (8.9)	11.6 (7.2)			11.1 (6.9)	10.8 (6.7)	13.2 (8.2)
		48V		DNA		17.9 (11.1)	14.8 (9.2)			14.5 (9.0)	14.2 (8.8)	16.4 (10.2)
	Minimum Turning Radius		mm (in.)	1790 (70.5)		1840 (72.5)	1890 (74.5)		1990 (78.5)		2045 (80.5)	
Power Train	Traction Motor Output	36V	60min. HP(kW)	8.2 (6.1)		9.6 (7.1)	8.3 (6.1)					
		48V		DNA		13.4 (10.0)	11.7 (8.7)					
	Transfer Gear	Type		Spur								
		Ratio		3.538			3.067					
	Reduction Gear	Type		Bevel								
		Ratio		4.571			5.0					
	Differential	Axle Housing		Banjo								
		Gear Type/ Number	Gears	Straight Bevel/2								
			Pinions	Straight Bevel/2								

				Truck Model								
			Units	FBC15K	FBC18K	FBC18KL	FBC20K	FBC25K	FBC25KE	FBC25KL	FBC30K	FBC30KL
Power Steering System	Type			Dynamic Load Sense								
	Turning Angle	Inside	Degrees	83°			83°					
		Outside		54°			56°					
	Steering Wheel Diameter		mm (in.)	328 (13)								
	Cylinder Minimum Test Pressure		kgf/cm^2 (psi) [kPa]	107 (1522) [10,500]			163 (2320) [16,000]					
Brake System	Service Brake	Type		Self-Adjusting Duo-Servo								
		Inside Drum Diameter	mm (in.)	$254\ ^{+0}\ ^{0.13}(10.00\ ^{+0}\ ^{0.0051})$								
		Lining Thickness	mm (in.)	4.87 (0.19)			6 (0.24)					
		Master Cylinder ID	mm (in.)	22.22 (0.8748)								
		Wheel Cylinder ID		22.22 (0.8748)			28.58 (1.1252)					
	Park Brake	Type		Mechanical, Mounted on Front Wheels								
		Lever Operating Effort	kgf (lbf) [N]	25 to 30 (55 to 66) [245 to 294]								
Traveling System	Mounting	Front Wheels		Fixed Type								
		Rear Wheels		Center Pivot Type								
	Wheel Alignment	Oscillation Angle	Degrees	3°								
		Camber		1°								

				Truck Model								
			Units	FBC15K	FBC18K	FBC18KL	FBC20K	FBC25K	FBC25KE	FBC25KL	FBC30K	FBC30KL
Hydraulic System	Hydraulic Pump	Type		Gear								
		Make		Parker Hydraulics, Inc.								
		Model		1PX230		1SX250	1PX290			1SX250		
		Displacement	cc (cu in.)	23.0 (1.403)/rev.		25.(1.526)	29(1.77)			25(1.526)		
		Make		Husco International								
	Control Valve	Model		5000CC Sectional Valve								
		Relief Pressure	kgf /cm^2 (psi) [kPa]	263 (3750) [25855]								
	Flow Regulator Valve	Type		Variable								
		Regulated Flow Rate	liter (cu.in.) / min	48(2929)			59 (3600)				71(4332)	
	Lift Cylinders	ID	mm (in.)	45 (1.77)			50 (1.97)			55 (2.17)		
		Stroke		1650 (64.96)						1600 (62.99)		
	Tilt Cylinders	ID		63 (2.48)			70 (2.75)			80 (3.15)		
		Stroke		79 (3.11)			81 (3.19)					
	Hydraulic Tank Capacity liter (Approx)		1 (US gal.)	8 (4.8)			24 (6.3)			30 (7.9)		
Mast and Forks	Mast			Roller type CL								
	Mast Dimensions (Flange Inside Width x THK x WEB THK)	Outer	mm (in.)	100 x 15 x 12 (3.94 x 0.59 x 0.47)			115 x 20 x 13 4.53 x 0.79 x 0.51)			115 x 21 x 13 (4.53 x 0.83 x 0.51)		
		Inner		100 x 17 x 12 (3.94 x 0.67 x 0.47)			115 x 20 x 13 (4.53 x 0.83 x 0.51)					
	Main Rollers	Type		#6308 Ball Bearing			#6309 Ball Bearing					
		Diameter x Width		100 x 30 (3.94 x 1.18)			115 x 35 (4.53 x 1.58)			100 x 30 (3.94 x 1.18)		
	Side Rollers	Type		Lubricating type needle roller bearing								
		Diameter x Width	mm (in.)	42 x 36 (1.65 x 1.42)								
	Lift Chains			BL534			BL634			BL834		
	Forks (Lgth x Wdth x Thk)		mm (in.)	1070x100x35 (36x4x1.3)			1070 x100 x40 (42 x 3.9 x 1.6)			1070 x 125 x 45 (42 x 5 x 1.8)		
	Fork Spacing (out to out) min/max			240 / 818 (9.4/32)			284 / 958 (11.2/37.7)					
Battery	Voltage			36/48		36/48		36/48		36/48		36/48
	Amp Hours (6 hr. rate)		36V	900			1300			1300		
			48V	700			800			1000		
	Compartment Dimensions	Height-Center	mm (in.)	598 (23.6)								
		Height-Edges		592 (23.3)								
		Length		708 (27.9)			775 (30.5)			875 (34.4)		
		Width		906 (35.6)			1003 (39.5					
	Weight (Min/Max)		kg (lb)	750/1200 (1650/2650)			1000/1600 (2200/3550)	1315/1600 (2900/3550)		1400/1800 (3100/4000)		

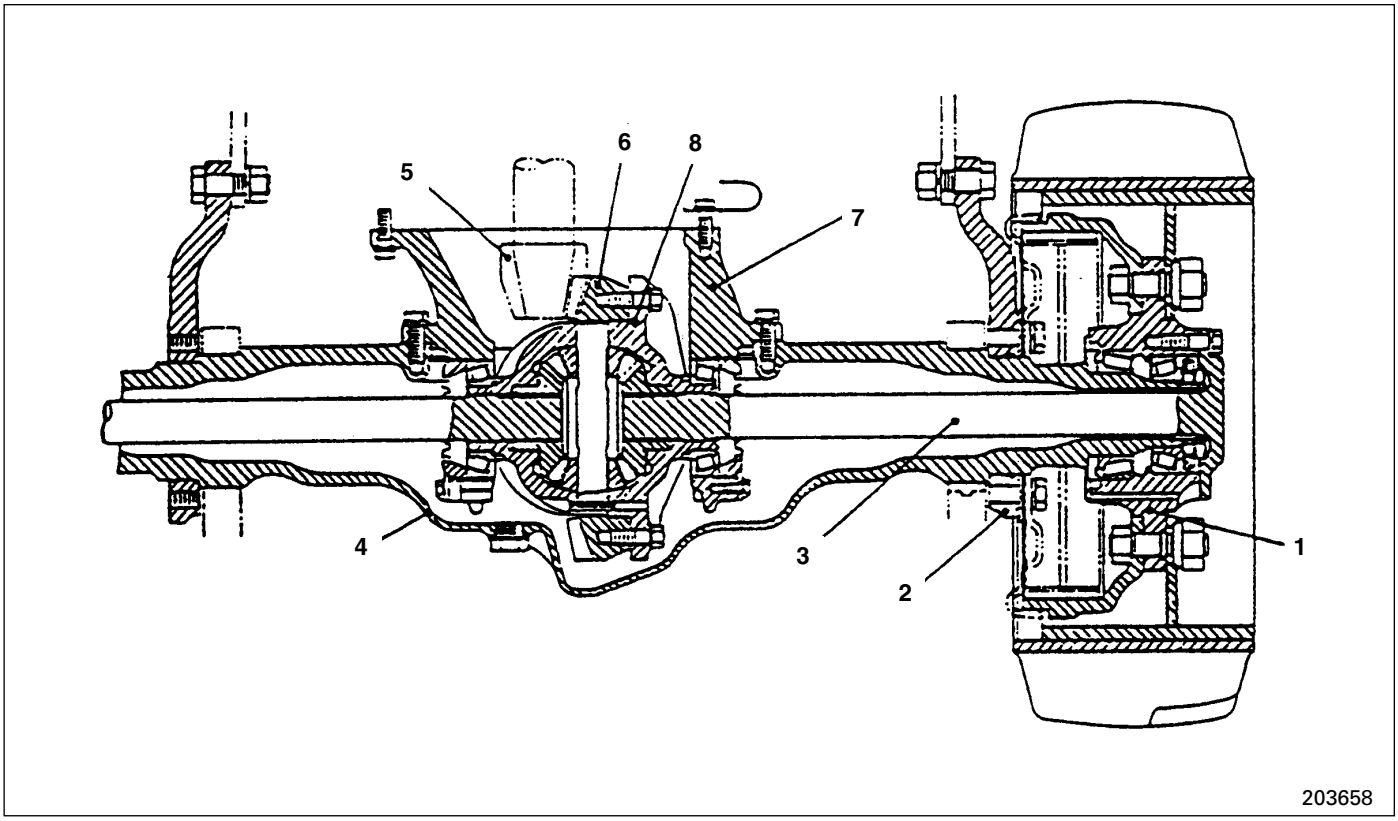
Chapter 2: Front Axle & Reduction Differential

Front Axle

Reduction Differential

Front Axle

Description



1. Front wheel hub
2. Frame support
3. Axle shaft
4. Axle housing
5. Reduction pinion
6. Reduction gear
7. Differential case
8. Differential carrier

General Information

The frame supports hold the front axle housing in such a manner as to allow a limited amount of rotary motion of the housing, the rotary sliding surfaces being lubricated with grease.

The cushion tire is press-fitted to the outer ring of the wheel hub.

Removal

Front Wheels

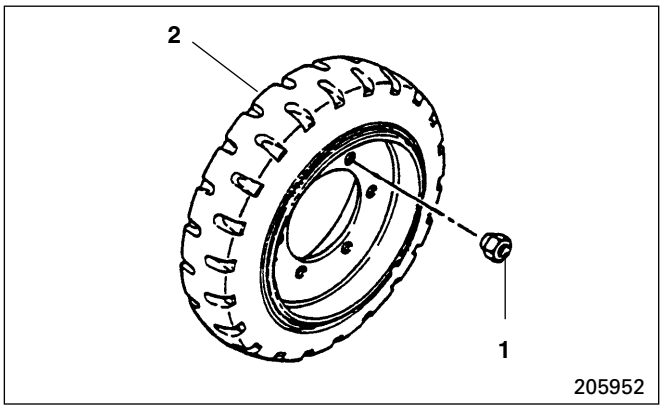
⚠ WARNING

Be sure to use the same size and brand tire for replacement.

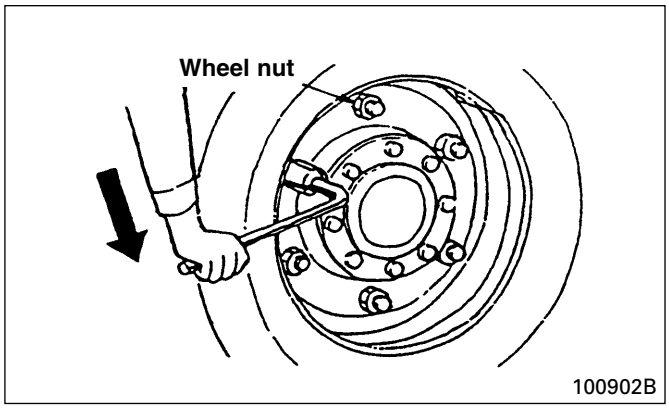
Suggestions

1. Park the truck on level floor with the parking brake applied, the direction lever in neutral, the forks lowered, and the key switch off.
2. Prepare tools, jacks, and wheel blocks.
3. Block the rear wheels.
4. Loosen the wheel nuts about two turns.

Removal Sequence



1. Wheel Nuts
2. Front Wheel



NOTE

Loosen, but do not remove, the wheel nuts.

5. Raise the front end of the truck. Use one of the methods shown.

⚠ WARNING

To prevent possible injury, do not replace the tire when the truck is loaded.

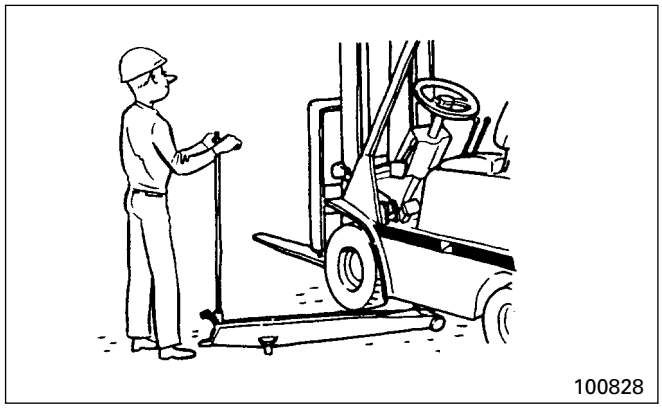
Dismount the truck before raising the front tire.

To prevent possible personal injury, raise the truck only until the tire just clears the ground.

Do not put any portion of your body under the truck. Securely support the truck on blocks after raising it.

Method 1

Position the jack under the frame and raise the truck until the tire clears the floor.



Jack Capacities

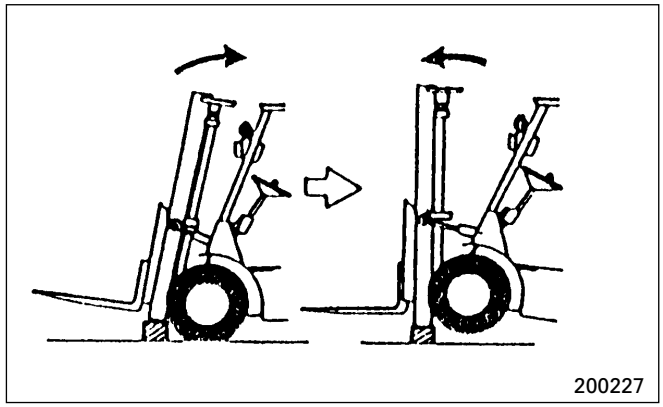
FBC15K - 18KL	3000 kgf (6700 lbf)
FBC20K - 30KL	5000 kgf (12,000 lbf)

Method 2

Tilt the mast all the way back, place wood blocks under the mast, and tilt the mast forward.

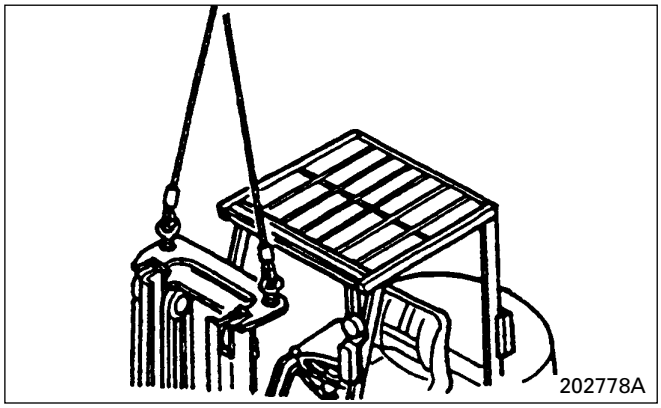
⚠ CAUTION

After raising the front end, securely support it by blocks.



Method 3

Fasten a hoist to the mast and lift the front end of the truck as shown.



6. Remove the wheel nuts (loosened in Step 4.)

⚠ CAUTION

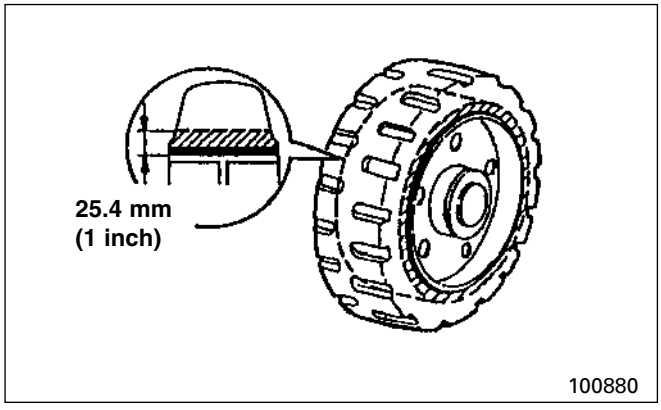
Be careful not to damage the bolt threads when removing the wheel.

7. Remove the wheel.

NOTE

Service Limit For Cushion Tires

Replace the tire if the height of the solid rubber portion is 25.4 mm (1 in. or less). For tire replacement, consult your Forklift Truck Dealer.



Installation

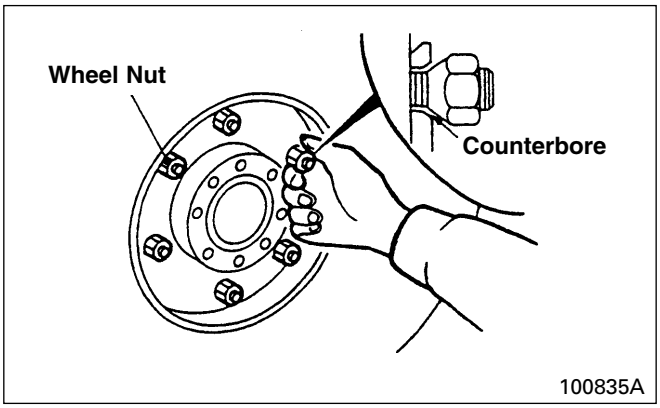
To install, reverse the removal sequence and do the following steps.

⚠ CAUTION

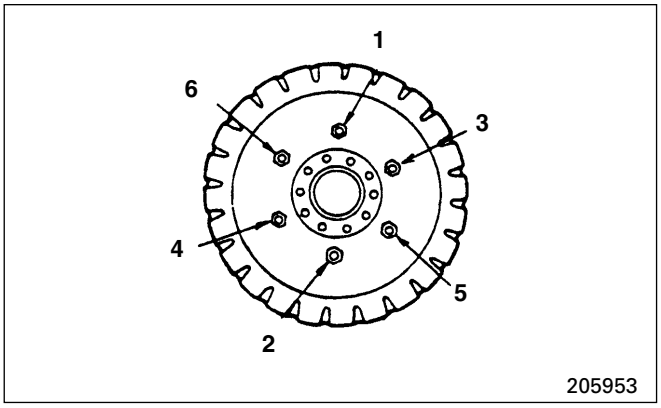
Use the same size and brand of tire.

Make sure the clamping surfaces of the wheel nuts and counterbores in the rim are free of dirt.

1. Install the tire and tighten the wheel nuts. Tighten each nut until its tapered portion is in full-face contact with the counterbore in the rim.

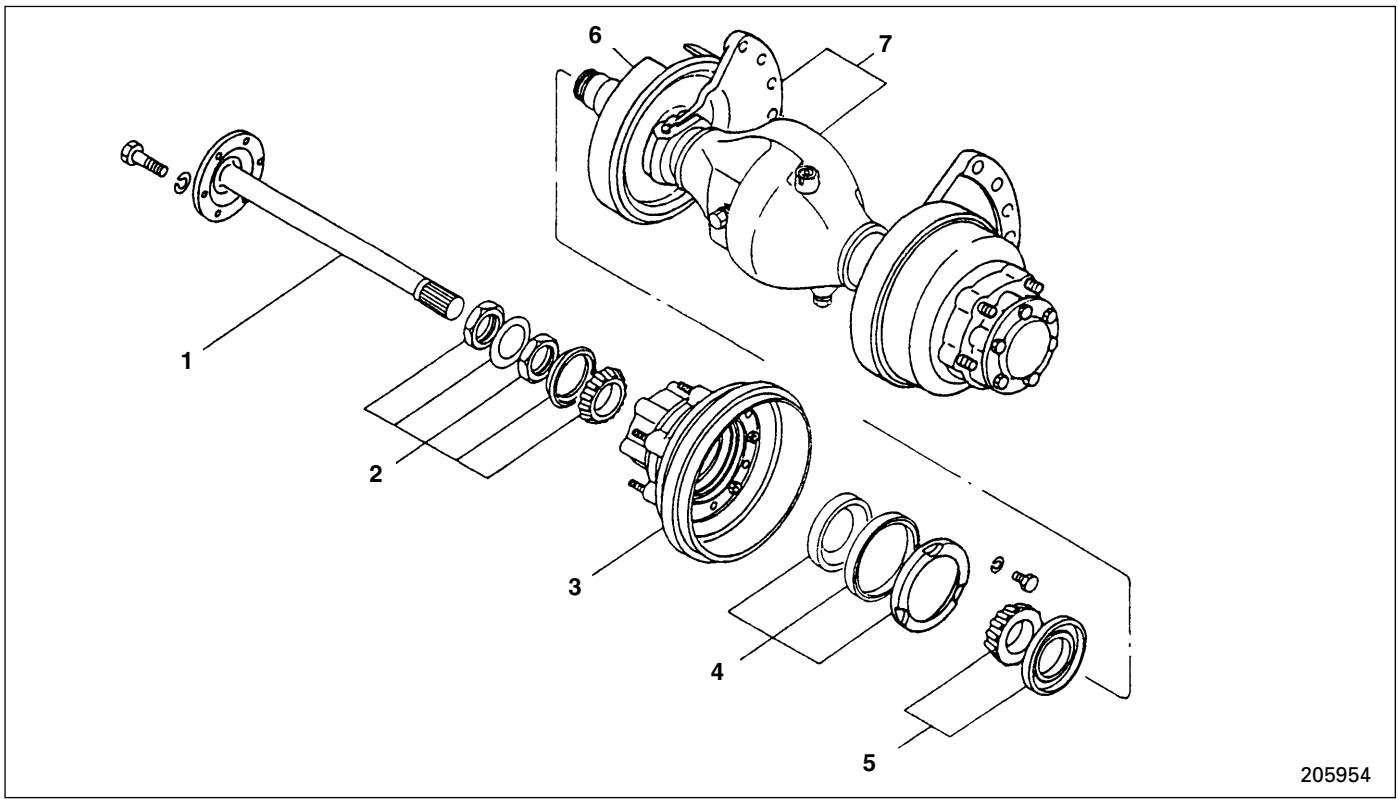


2. Lower the truck until the tire touches the floor. Then tighten the wheel nuts in numbered sequence shown below, in two or three steps, to the specified torque.



Tightening Torque For Wheel Nuts	
FBC15K - 18KL	**FBC20K - 30KL**
16 kgf•m	38.5 kgf•m
(116 lbf•ft)	(278 lbf•ft)
[157 N•m]	[378 N•m]

Disassembly



Sequence

1. Axle shaft
2. Lock nut, lock washer, oil seal, and tapered roller bearing (inner bearing)
3. Hub & drum assembly [Front wheel hub, brake drum, wheel bolts, drum nuts, and tapered roller bearing (outer bearing)]
4. Tapered roller bearing (outer bearing), oil seal, and oil deflector
5. Tapered roller bearing (inner bearing), and seal retainer
6. Brake assembly
7. Frame support and axle housing

Start By:

1. Remove the mast. (For replacement of the front axle housing and disassembly of the differential, refer to section, MAST AND FORKS.)
2. Jack up the truck.
3. Support the front end of the truck at both sides with blocks or stands to keep the truck in a horizontal position.
4. Remove the front wheels.

NOTE

It is not necessary to remove the axle housing or drain the oil for removal of the shaft only.