



Service Manual

Chassis & Mast

EC15K, EC18K, EC18KL

A3EC1-10200-up

A3EC1-20200-up

A3EC1-30200-up

A3EC2-40200-up

EC20K, EC25K

A3EC2-10200-up

A3EC2-20200-up

A3EC2-30200-up

A3EC2-40200-up

A3EC2-80200-up

EC25KE, EC25KL, EC30K

A3EC3-10200-up

A3EC3-20200-up

A3EC3-30200-up

A3EC3-40200-up

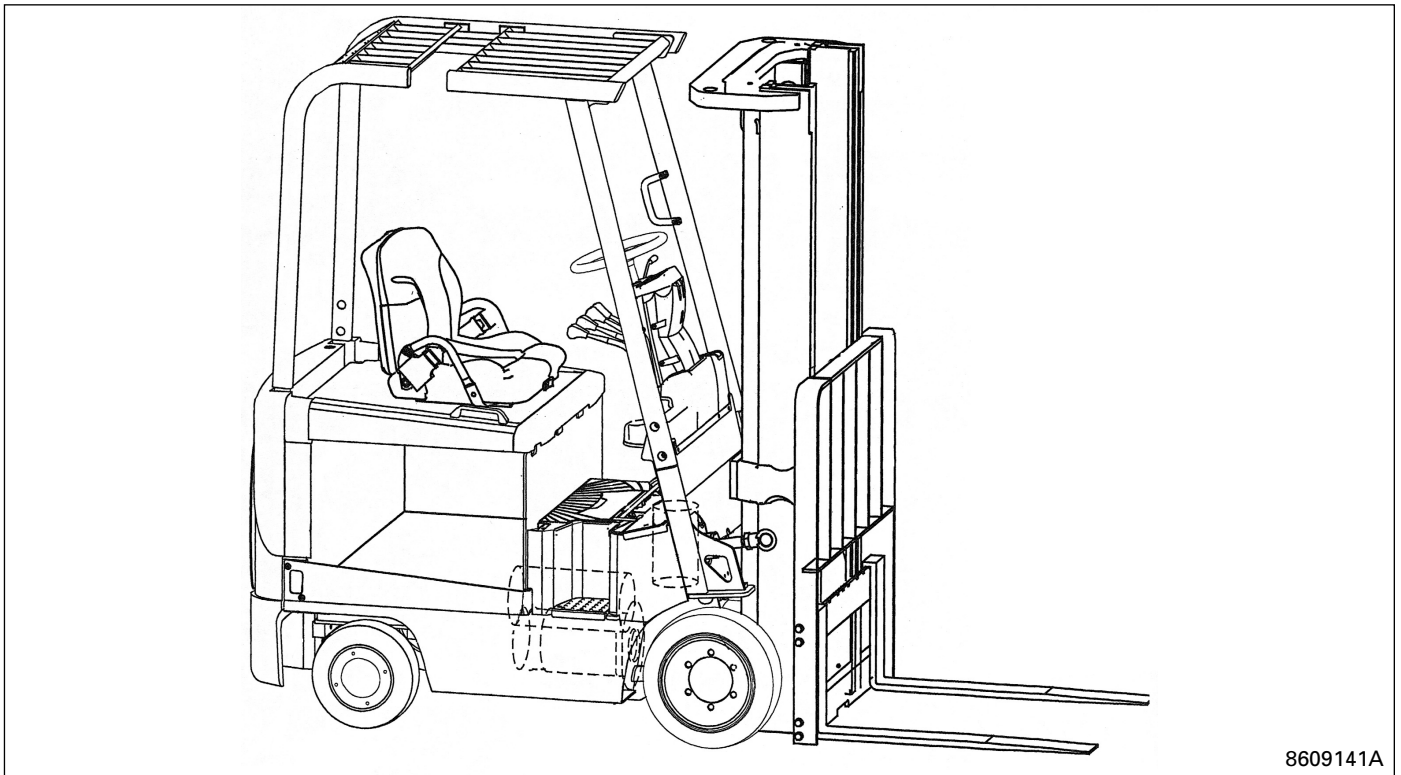
A3EC3-80200-up

EC30KL

A3EC4-40200-up

Scope

This service manual deals with all components or systems of the Cat lift trucks, except for the electrical system, which is covered in a separate manual.



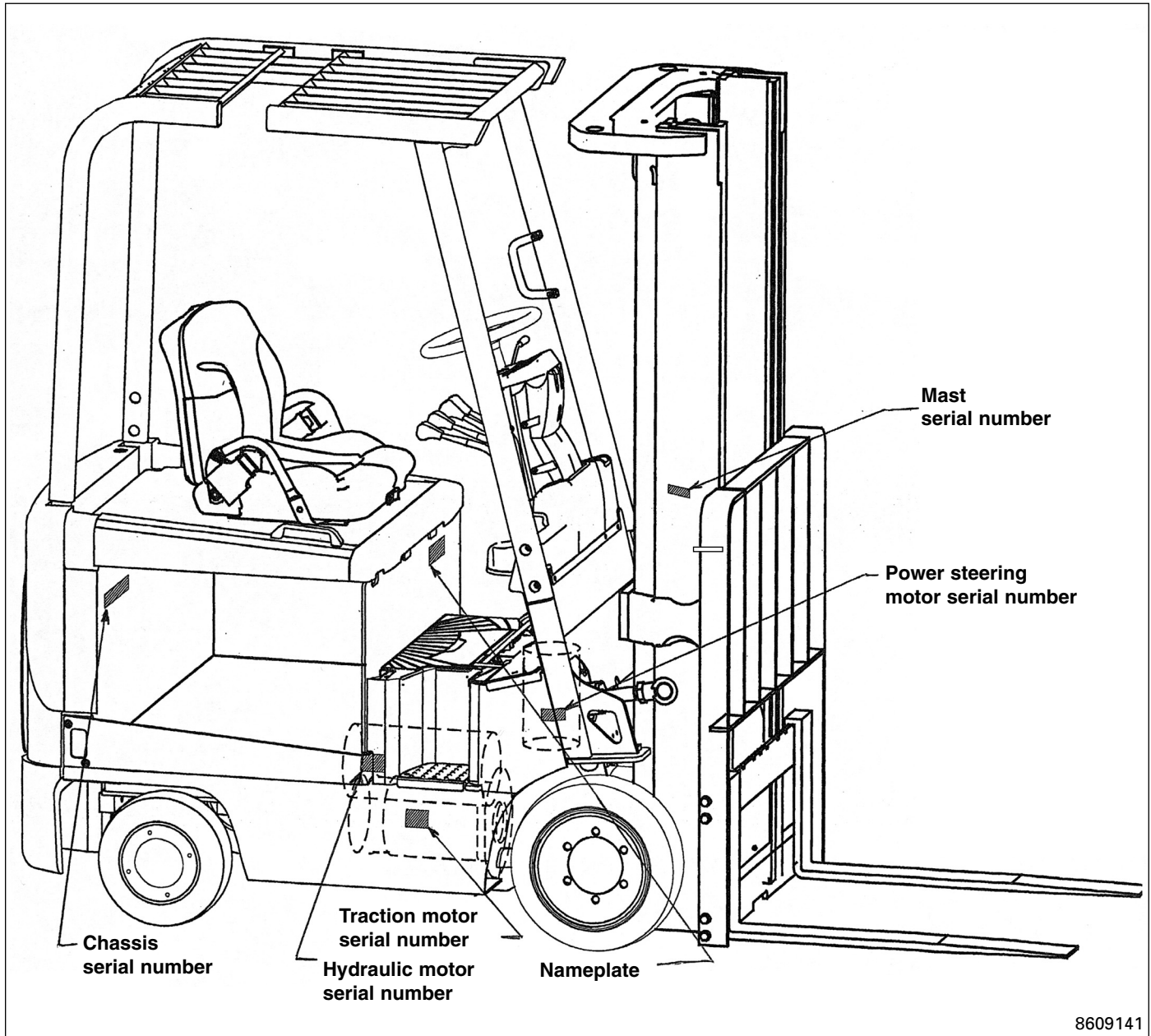
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Truck Models Covered

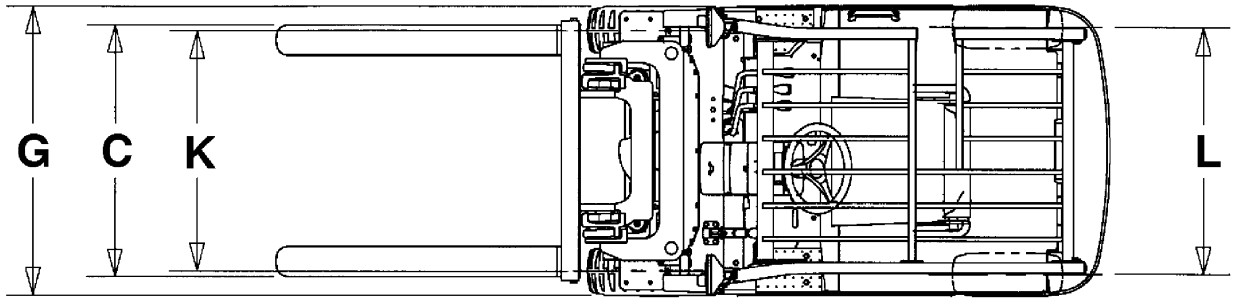
This service manual furnishes service and maintenance information for the following trucks.

Truck Model	Serial Number
EC15K, EC18K, EC18KL	A3EC1-10200-up
	A3EC1-20200-up
	A3EC1-30200-up
	A3EC2-40200-up
EC20K, EC25K	A3EC2-10200-up
	A3EC2-20200-up
	A3EC2-30200-up
	A3EC2-40200-up
	A3EC2-80200-up
EC25KE, EC25KL, EC30K	A3EC3-10200-up
	A3EC3-20200-up
	A3EC3-30200-up
	A3EC3-40200-up
	A3EC3-80200-up
EC30KL	A3EC4-40200-up

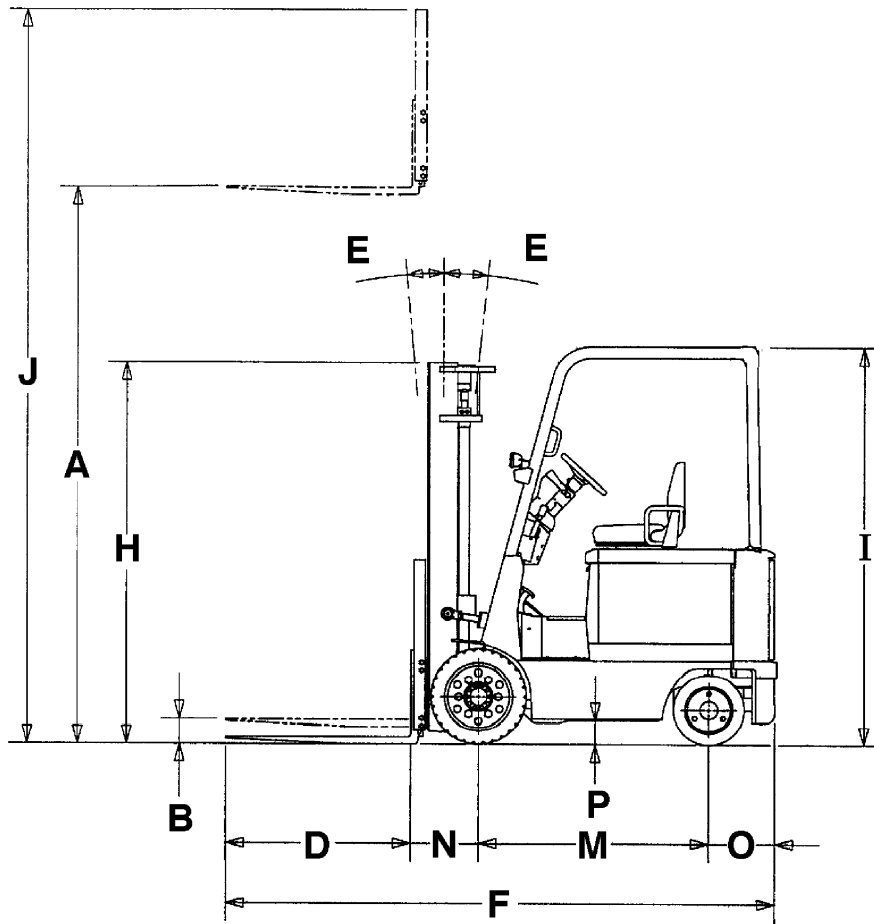
Nameplate and Serial Number Locations



Dimensions



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8609143

GENERAL INFORMATION

Dimensions Chart

Ref#	Truck Model	EC15K, EC18K	EC18KL	EC20K, EC25K	EC25KE	EC25KL	EC30K	EC30KL
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)1070	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	EC15K	EC18K	EC18KL	EC20K	EC25K	EC25KE	EC25KL	EC30K	EC30KL
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)
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)		
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)		
Traction Motor Output	36V	60min.	8.2 (6.1)	9.6 (7.1)	8.3 (6.1)						
	48V	HP(kW)	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/	Gears	Straight Bevel/2								
	Number	Pinions	Straight Bevel/2								

GENERAL INFORMATION

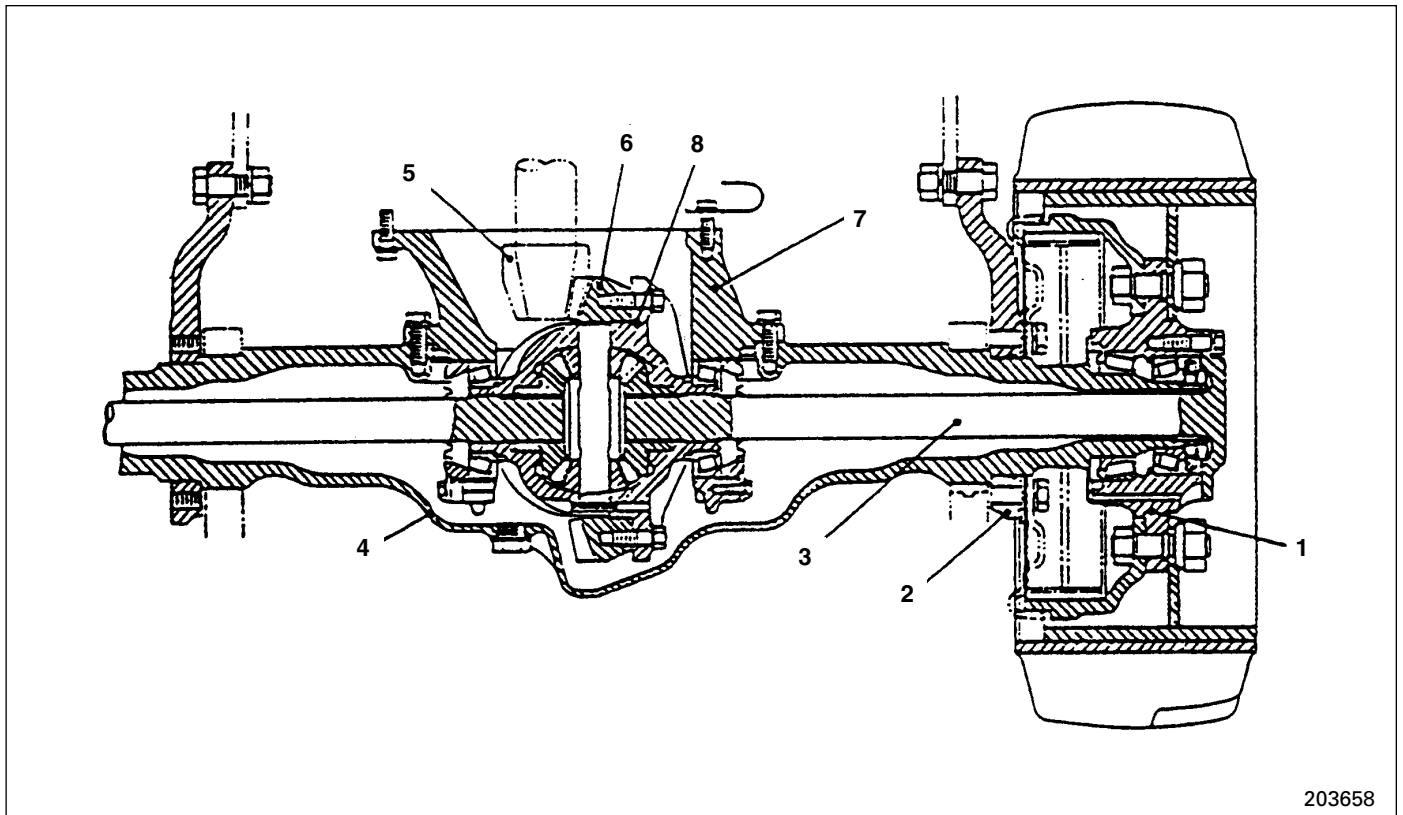
			Truck Model								
			Units	EC15K	EC18K	EC18KL	EC20K	EC25K	EC25KE	EC25KL	EC30K
Power Steering System	Type		Dynamic Load Sense								
	Turning Angle	Inside	Degrees	83°				83°			
		Outside		54°				56°			
	Steering Wheel Diameter		mm (in.)	328 (13)							
Cylinder Minimum Test Pressure		kgf/cm ² (psi) [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°									

GENERAL INFORMATION

		Truck Model									
		Units	EC15K	EC18K	EC18KL	EC20K	EC25K	EC25KE	EC25KL	EC30K	EC30KL
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]							
		Type		Variable							
	Flow Regulator Valve	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	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)	

Front Axle

Description



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

FRONT AXLE: REMOVAL & INSTALLATION

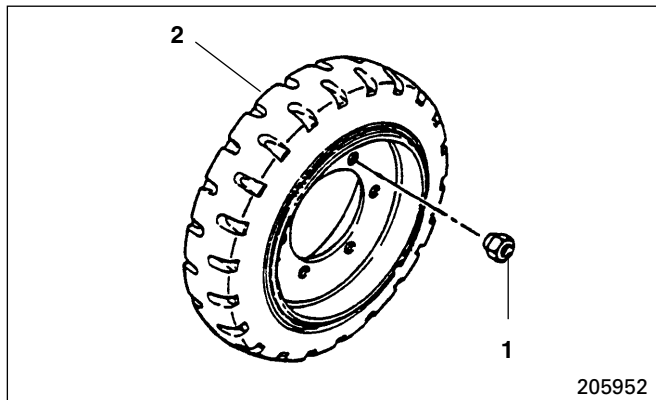
Removal

Front Wheels

WARNING

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

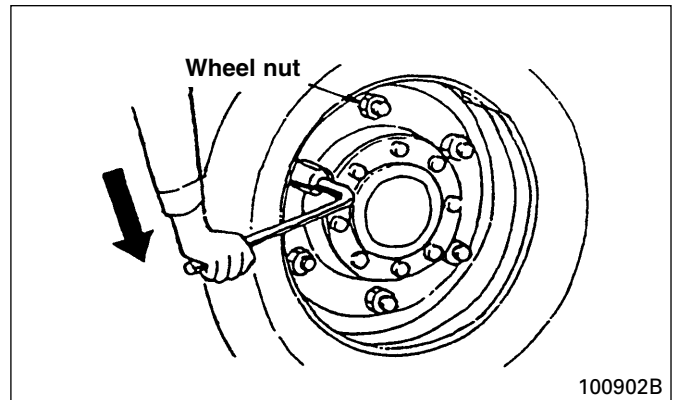
Removal Sequence



1. Wheel Nuts
2. Front Wheel

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.



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.

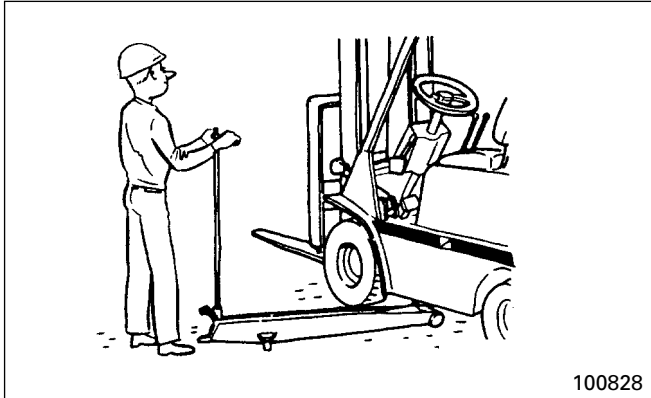
To prevent possible personal injury, raise the truck only until the tire just clears the ground.

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

FRONT AXLE: REMOVAL & INSTALLATION

Method 1

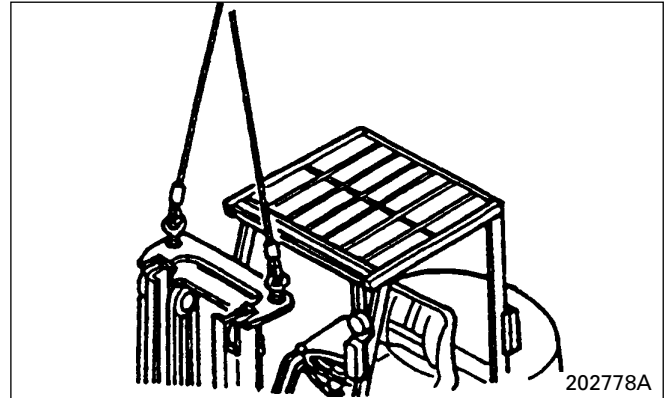
Position the jack under the frame and raise the truck until the tire clears the floor.



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Method 3

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



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Jack Capacities

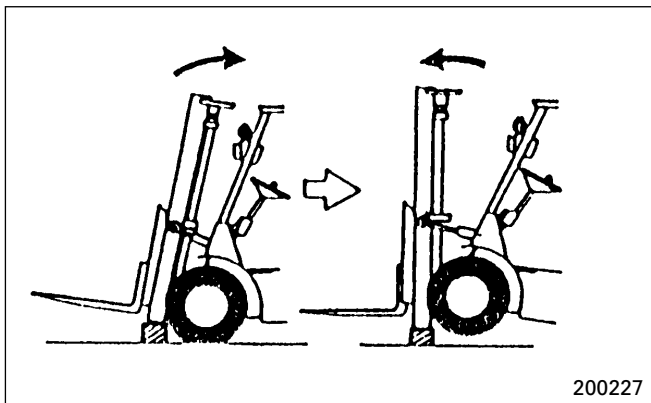
EC15K - 18KL	3000 kgf (6700 lbf)
EC20K - 30KL	5000 kgf (12,000 lbf)

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.



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

CAUTION

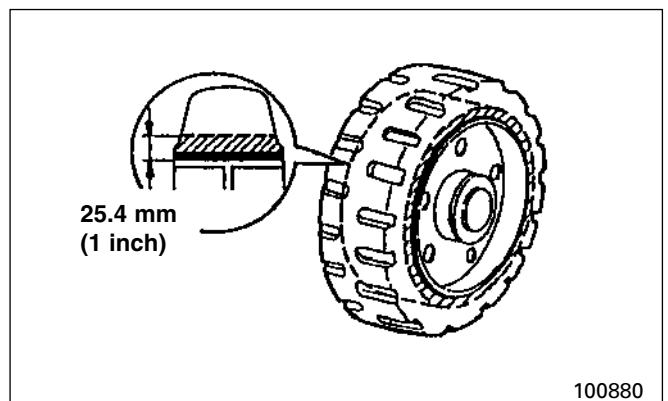
Be careful not to damage the bolt threads when removing the wheel.

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 Cat lift dealer.



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FRONT AXLE: REMOVAL & INSTALLATION

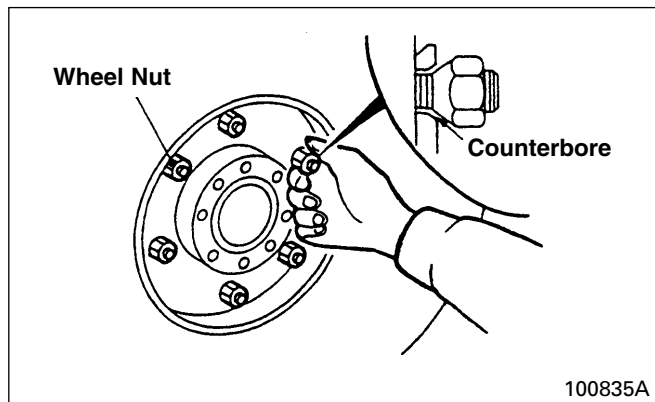
Installation

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

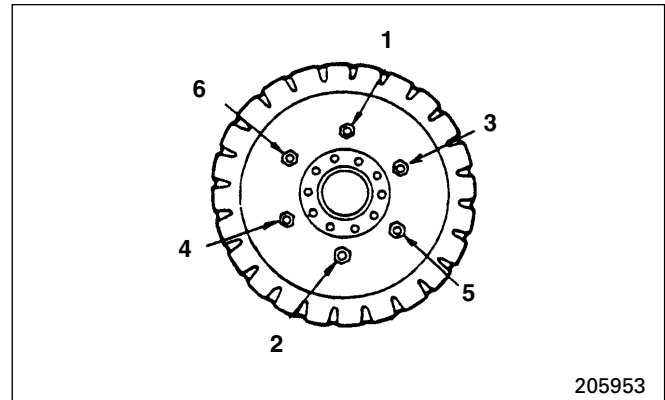


*Use the same size and brand of tire.
Make sure the clamping surfaces of the wheel nuts and counterbores in the rim are free of dirt.*

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.

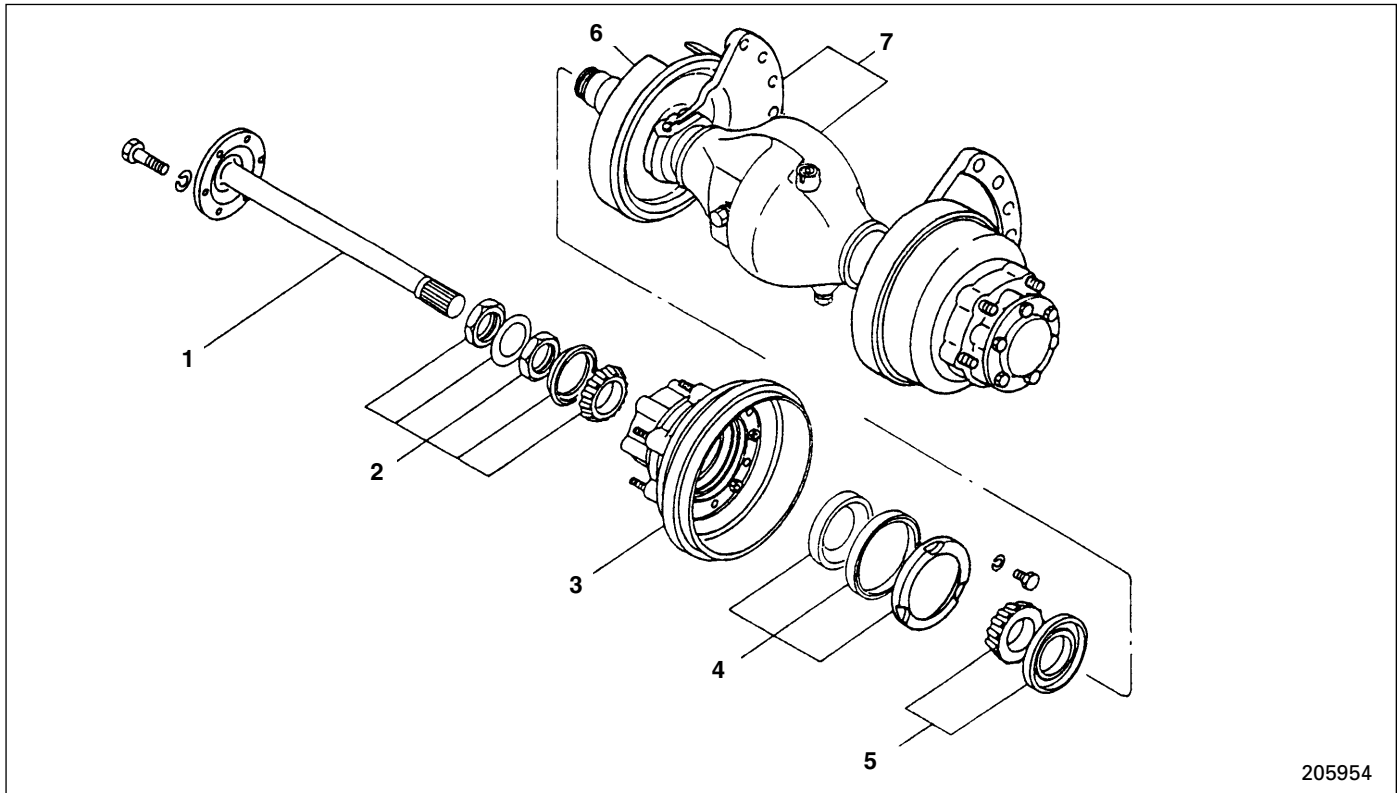


2. Lower the truck until the tire touches the floor. Then tighten the wheel nuts in numbered sequence shown below, in two or three steps, to the specified torque.



Tightening Torque For Wheel Nuts	
EC15K - 18KL	EC20K - 30KL
16 kgf•m	38.5 kgf•m
(116 lbf•ft)	(278 lbf•ft)
[157 N•m]	[378 N•m]

Disassembly



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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.

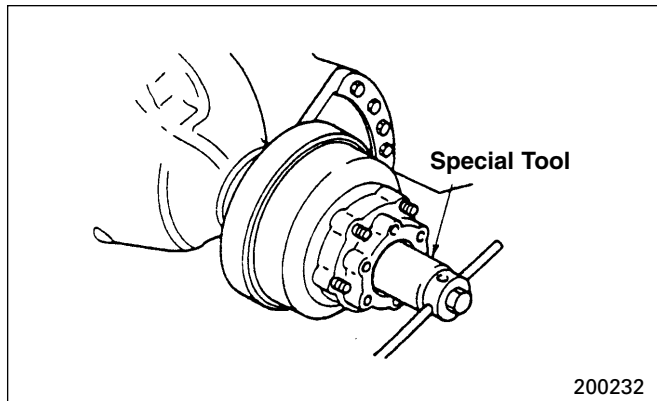
FRONT AXLE: DISASSEMBLY

Suggestions

Removing the Lock Nut

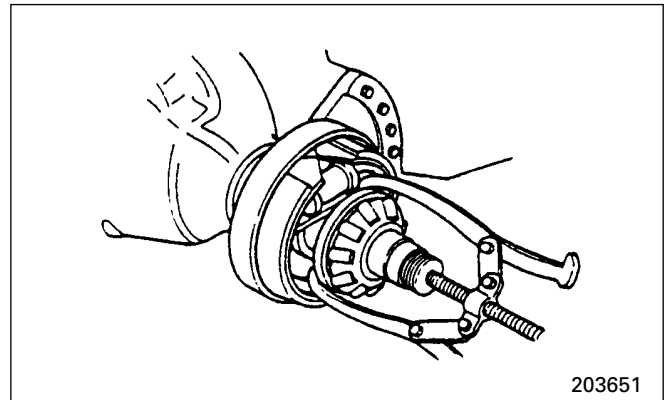
Use a lock nut wrench (Special Tool).

Tool	EC15K - 18KL	EC20K - 30KL
Lock Nut Wrench	91268-00800	03703-59001



Removing Bearings

The inner race of the tapered roller bearing remains in the axle housing when the hub is drawn out. Remove this race together with the seal retainer with a bearing puller.



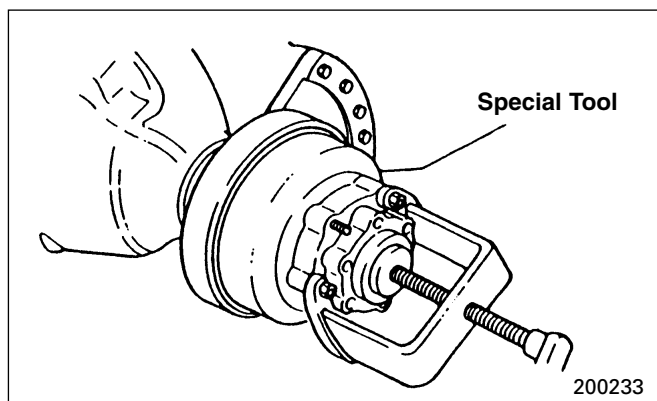
Removing Front Wheel Hub

Use a wheel hub puller (Special Tool).

Tool	EC15K - 18KL	EC20K - 30KL
Wheel Hub Puller (Puller seat)	64309-40100 (64309-10601)	MH061017

NOTE

It is not necessary to remove the oil seal from the hub or to disassemble the oil deflector unless the seal is defective.

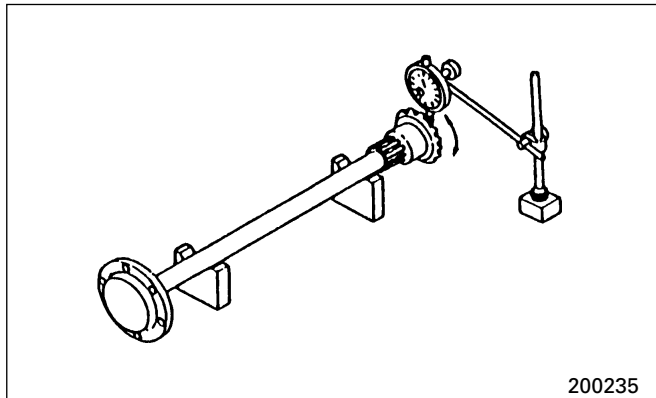


Inspection after Disassembly

Axle Shafts

Looseness of Mating Splines

Mount the differential bevel gear on the splined end of the shaft and set a dial indicator as shown below. Turn the bevel gear and read the indicator.



Free movement (looseness of splines)	A	0.07 to 0.17 (0.0028 to 0.0067)
	B	0.5 (0.020)

Unit: mm (in.)

A = Assembly Standard B = Repair or Service Limit

Axle Housing

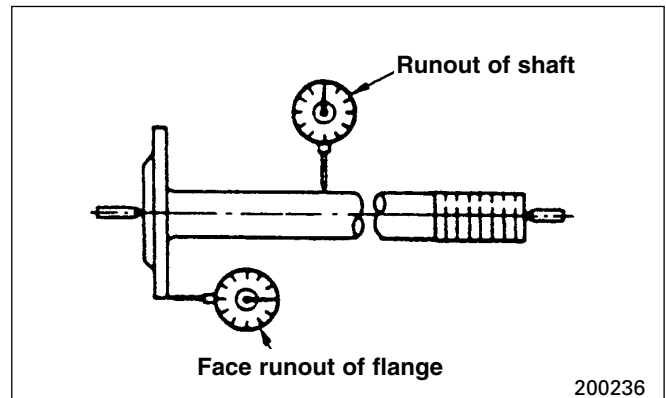
1. Check the surfaces of axle housing in contact with the mast bearing for damage.
2. Check the entire axle housing for distortion, dents, and other defects, paying particular attention to the welds to see if any weld is cracked.

Oil Seals and Retainers

1. Check the outer surface of the oil seal retainer for wear or damage.
2. Check the outer and inner oil seals for wear and damage.

Runout

Set a dial indicator at the middle part of the axle shaft. Turn the shaft and read the indicator to find runout.



		EC15K -18KL	EC20K -30KL
Runout of axle shaft (1/2 of dial indicator reading)	A	0.5 (0.020) maximum	1.0 (0.039) maximum
	B	1.0 (0.039)	2.0 (0.079)

Unit: mm (in.)

A = Assembly Standard B = Repair or Service Limit

Set a dial indicator against the flange of the axle shaft as shown. Turn the shaft and read the indicator to find face runout.

Face runout of axle shaft flange	A	0.05 (0.0020)
	B	0.5 (0.020)

Unit: mm (in.)

A = Assembly Standard B = Repair or Service Limit

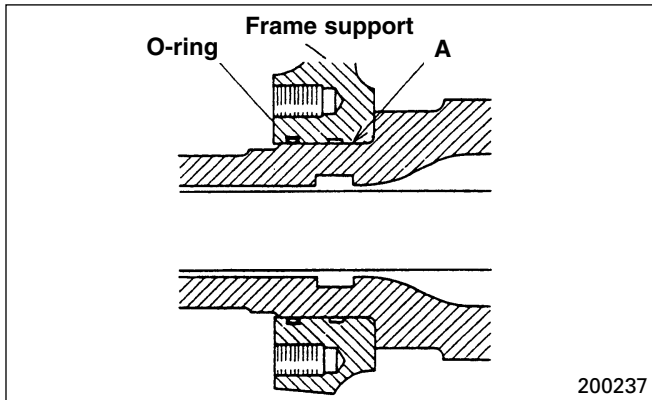
FRONT AXLE: REASSEMBLY

Reassembly

To reassemble, reverse the steps of the disassembly sequence and do the following steps.

Axle Housing

1. Install the O-ring in the outer groove (of the two grooves in the bore of each frame support).
2. Apply grease to the surfaces A of the support and axle housing.

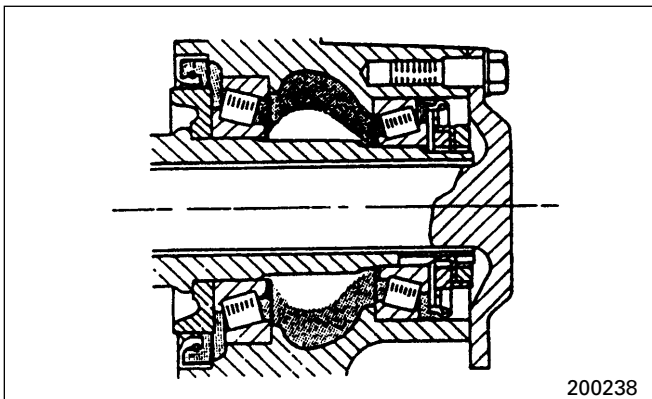


Front Wheel Hub

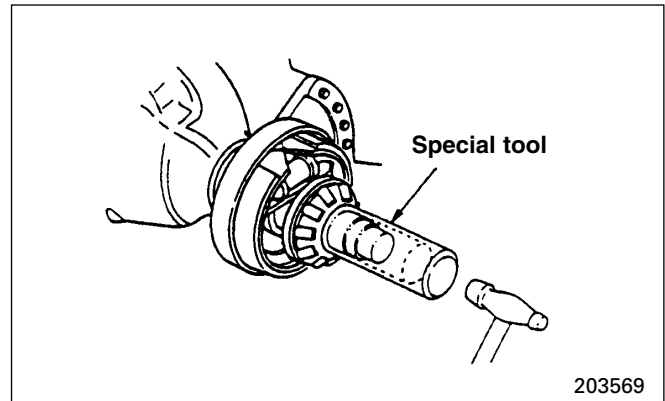
1. Fill the front wheel hub, especially the roller holder and oil seal lip groove, with grease.

NOTE

Be careful not to apply grease to the brake drum.



2. Install the inner race and oil seal retainer of the wheel hub bearing with an installer (Special Tool).



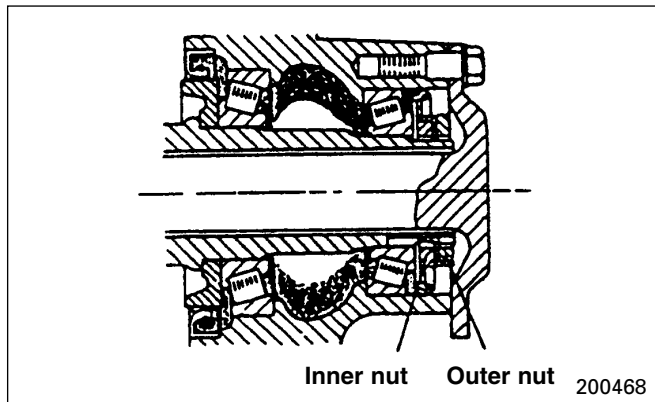
Tool	EC15K - 18KL	EC20K-30KL
Installer	64309-12300	91468-00300

3. Apply retaining compound to the flange surfaces of the axle shafts.

Hub Bearing Preload

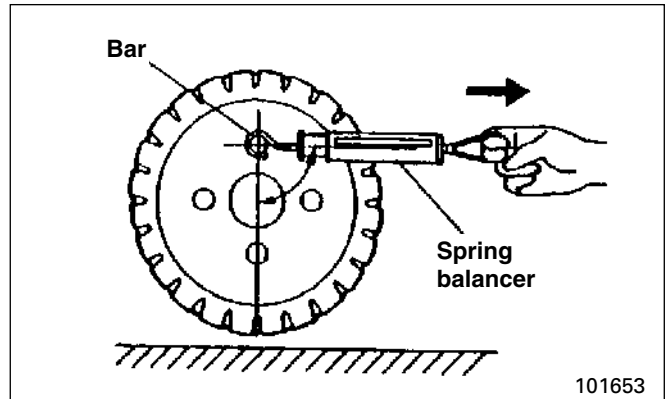
Tighten the inner nut to produce the required preload. Tighten the outer nut to the specified torque and check the preload. Be sure that the preload noted after tightening the outer nut meets the specification. This step is for new bearings. Where the bearings removed in disassembly are reused, try to produce the preload at the lower side of the range.

Preload for hub bearing	5 to 50 kgf•cm (0.4 to 3.6 lbf•ft) [0.5 to 4.9 N•m]
Tightening torque for lock nuts	20 kgf•m (145 lbf•ft) [196 N•m]



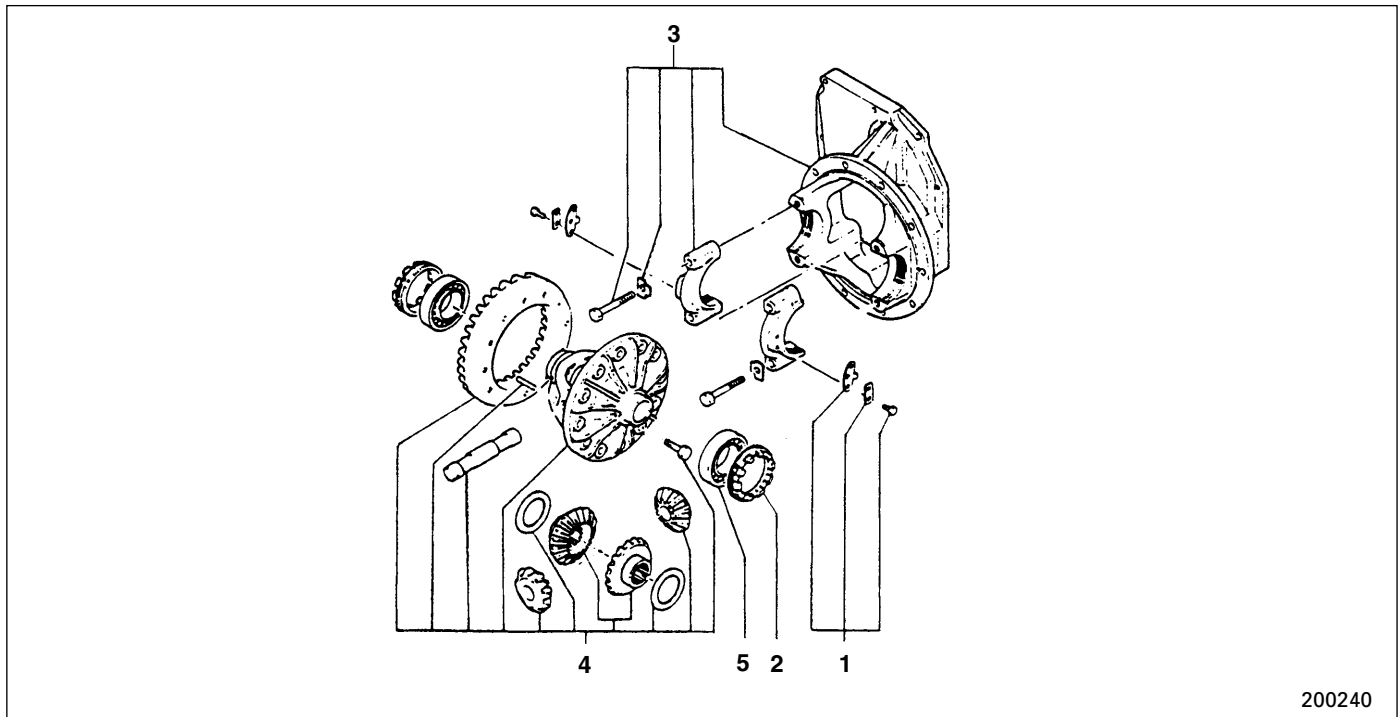
Installation and Setting Preload

1. Fill the hub with the recommended grease as listed in the service manual.
2. Pack the inner and outer bearing with the recommended grease.
3. Install the inner bearing to the back side of the hub.
4. Install the inner seal.
5. Clean the lining surface of the drum.
6. Install the hub onto the axle.
7. Install the outer bearing, grease seal and preload nut.
8. If the bearings are being reused, try to produce the lower side of the applied force in tangential direction.
9. For new bearings, tighten the preload nut to 14 kgf•m (101 lbf•ft) [137 N•m]. Slowly rotate the hub slightly more than 3 turns, back the nut off 80°, and set the applied force in tangential direction.
10. For models with an outer lock nut, torque the nut to 20 kgf•cm (145 lbf•ft) [196 N•m]. After torquing the lock nut, check the force applied in tangential direction again to insure the preload did not change.



Reduction Differential

Description



200240

Sequence

1. Lock plates
2. Side bearing nuts
3. Differential carrier assembly (lock washers, side bearing caps, and differential carrier)
4. Reduction gear and differential gear assembly (spring pins, pinion shafts, differential pinions, differential bevel gear, washers, and differential case)
5. Tapered roller bearings

Start By:

Remove the differential carrier from the transmission case.

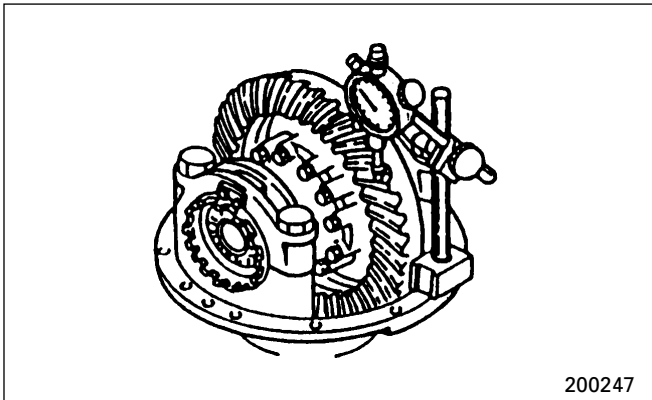
Disassembly

Suggestions

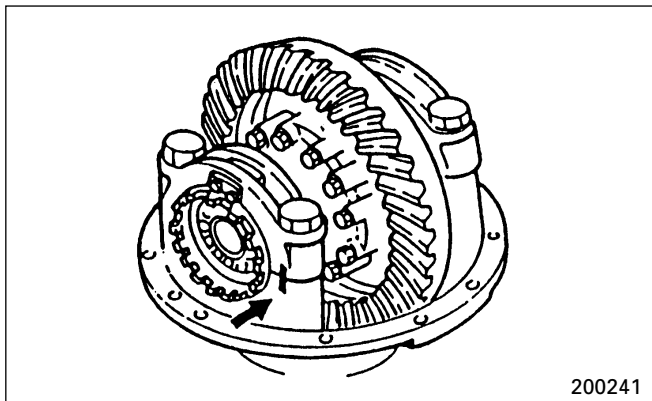
1. Before removing the differential carrier from the transmission case, measure the gear backlash to aid in obtaining correct backlash at the time of reassembly.

Backlash between reduction gear and pinion	0.15 to 0.25 (0.0059 to 0.0098)
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Unit: mm (in.)

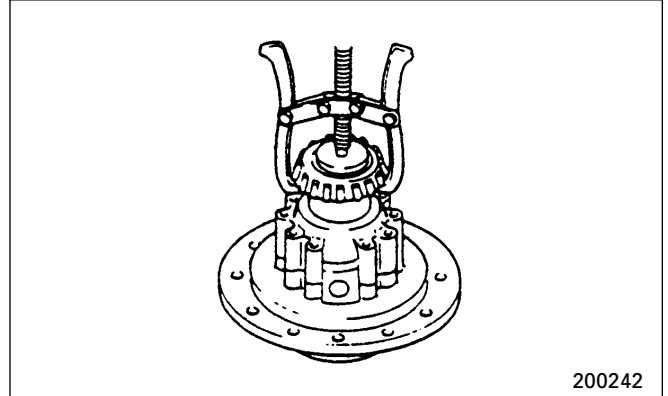


2. Put a mark across the bearing cap, adjusting screw and carrier on each side.
The caps are not interchangeable.



Removing Bearing Inner Races

Use a bearing puller to remove the inner races from the differential case.



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