



General Information

Section 01-03

Komatsu has made every effort to make this manual as accurate as possible based on the information available at the time of publication and printing. Continuous improvement and advancement of product design may cause changes to machines, which may not have been included in this publication. Komatsu reserves the right to make changes and improvements at any time. To ensure the most current information, please contact your service center.

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Scope of This Publication

GENERAL INFORMATION contains ESSENTIAL information for owners, maintenance personnel, and operators, about warranty requirements, operator training, machine dimensions, and operating clearances. It is ESSENTIAL for all personnel associated with the machine to become familiar with this information and the instructions contained in the other publications in this manual, BEFORE operating the machine. **We especially draw your attention to the following safety advisors.**

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Safety

This publication contains special instructions that pertain to safety, operation, maintenance, and repair of the machine. Listed below are the signal words and symbols that precede these instructions and their meanings:


DANGER

- The danger label indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

- The warning label indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

- The caution label, used with the safety alert symbol indicates a hazardous situation which, if not avoided, could result in minor or moderate injury (includes the safety alert symbol .

CAUTION

- The caution label (without safety alert symbol) is used to address practices not related to personal injury – only equipment damage.

NOTICE

The NOTICE graphic is to indicate areas of importance to the reader that are not related to personal injury or machine damage.

Safety, Warnings, and Cautions

WARNING

ROLLOVER PROTECTION STRUCTURE (ROPS)

- Crush hazards exist if modifications to, cutting, drilling or welding on the roll over protective structure (ROPS) occur. Modifications, cutting, drilling or welding can reduce its effectiveness in a roll over situation and may void its certification. Contact your authorized Komatsu Service Center before performing any of the above operations to the ROPS. Unauthorized modifications may cause a crush hazard resulting in serious injury or death.

TIRES

- Crush hazards exist if tires are used beyond their recommended specifications and deflate unexpectedly. Always consult the tire manufacturer when determining tramping speeds for the machine and tire wear for tires. Refer to Section 03-08 “TIRE & RIM” for more information about tires. Failure to monitor and maintain the tires as designed can cause crush hazards and uncontrolled machine movement resulting in serious injury or death.

STRUCK BY HAZARD

- Struck-by hazards exist when around hydraulic fluid, fuel, or grease that is under pressure. Hoses under pressure can blow out or come loose from connections, causing a struck-by hazard with deadly force. **DO NOT** tighten or loosen hydraulic, fuel, or grease lines without first relieving the pressure. **DO NOT** make adjustments to any fluid pressures while the machine is running. Shut down the machine, make the adjustment, then restart the machine to check the adjustment. Wear safety goggles for eye protection and wear all other locally required personal protective equipment (PPE) when working around possibly pressurized liquids. Failure to use proper PPE or to shut down the machine before making adjustments can cause a struck-by hazard resulting in serious injury or death.
- Struck-by hazard exists when around hydraulic fluid, fuel, or grease that is under pressure. Hoses under pressure can blow out or come loose from connections, causing a struck-by hazard with deadly force. **DO NOT** tighten or loosen hydraulic, fuel, or grease lines without first relieving the pressure. **DO NOT** make adjustments to any fluid pressures or flow while the machine is running. Shut down the machine, make the adjustment, then restart the machine to check the adjustment. Wear safety goggles for eye protection and wear all other locally required personal protective equipment (PPE) when working around possibly pressurized liquids. Failure to use proper PPE or to shut down the machine before making adjustments can cause a struck-by hazard resulting in serious injury or death.
- Struck-by hazard exists when setting fans and blowers. Altitude and air temperature can greatly affect radiator, blower, and auxiliary oil cooler fan speeds. Do not overspeed the fan or blower. Before making fan or blower speed adjustments always decrease the maximum pump pressure. This will help prevent fan or blower overspeed which can cause fan or blower destruction. Failure to reduce maximum pump pressure before making fan or blower speed adjustments can cause struck-by hazards resulting in serious injury or death.

SKIN INJECTION HAZARD

- Skin injection hazard exists when around hydraulic fluid, or grease that is under pressure. Fluid leaks under pressure may not be visible. When searching for leaks, **NEVER** use your hand; use a piece of metal. Wear work gloves and keep your hand well away from the possible source of leakage. Failure to use proper PPE or to shut down the machine before making adjustments can cause a skin injection hazard or a struck-by hazard resulting in serious injury or death.

BURN HAZARD

- Burn hazards exist when around hot hydraulic fluid that is under pressure. Hoses under pressure can blow out or come loose from connections, causing a burn hazard from leaks or spraying. **DO NOT** tighten or loosen hydraulic, fuel without first relieving the pressure. **DO NOT** make adjustments to any fluid pressures while the machine is running. Shut down the machine, make the adjustment, then restart the machine to check the adjustment. Wear safety goggles for eye protection and wear all other locally required personal protective equipment (PPE) when working around possibly hot pressurized liquids. Failure to use proper PPE or to shut down the machine before making adjustments can cause a burn hazard resulting in serious injury or death.

CAUTION

LUBRICANTS

- The use of non-recommended lubricants or the mixing of incompatible lubricants may damage components and void the warranty. Refer to Section 02 of the Service Manual for recommended lubricants.

WELDING

- Welding on the machine can damage the solid-state electronic controls for the engine, machine, and fire suppression system (optional), and also the bearings in mechanical components unless pre-cautions are taken. Before conducting any welding repair, refer to Section 03 "FIELD

WELDING” in the Service Manual and contact your authorized Komatsu Service Center for assistance.

- To prevent damage to the DDEC and Cummins electronic control system, disconnect the following **BEFORE** welding: battery power and ground cables and the power connector at the DDEC or Cummins Electronic Control Module (ECM). Failure to isolate the DDEC or Cummins system from high current (possible occurrence as a result of welding) can result in severe ECM damage.

PLANETARY DRIVE

- Unauthorized disassembly of planetary drive components may void the warranty. Under no circumstances should the owner attempt to disassemble a planetary drive past the instructions contained in this Service Manual. Contact the local service center for information about disassembly and warranty.
- Unauthorized disassembly or repair on planetary drives, traction motors, or generator may void the warranty. Do not perform unauthorized disassembly or repair on planetary drives, traction motors, or generator. All planetary drive, traction motor, and generator repairs are to be made by a Komatsu authorized repair facility.

ENGINE

- Use of ether will cause serious damage to the engine. Use of ether injection for any reason is **NOT** recommended or allowed by Komatsu. **DO NOT** use ether injection. **NEVER** spray ether-starting aid into the intake of the KLENZ air filtration system intake. Serious component damage could result.

FIRE PREVENTION

Fire hazard can be present if regular cleaning of all areas where flammable materials such as fuel, oil, grease, hydraulic fluid, and combustible debris may collect is not performed. The machine should be thoroughly cleaned after any fluid leak. Areas that should be cleaned regularly include (but are not limited to):

- Inside front frame
- Rear frame underneath and on sides of engine
- Top of engine, rear frame under the Hydraulic Pump Drive (HPD) gearbox and top of HPD
- Rear frame under stairways, cabinets
- Underneath cab, inside cab
- Around engine radiator area
- Any area where a buildup of materials could pose a fire hazard.
- Cleaning is also required in order to do the frame inspection.

Failure to properly clean, and keep the machine clean could result in destructive fire.

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Customer Responsibilities and Warranty Advisories

P&H wheel loaders are warranted in accordance with the warranty policy provided with the machine. The recommended operating and maintenance procedures set forth shall be followed to ensure warranty coverage is not jeopardized. Failure to comply with recommended operating and maintenance procedures may void machine warranty.

Any questions or problems relating to warranty policy or administration should be directed to Komatsu Service Center. Include the model and serial number, in-service date of the machine, and hour meter reading.

Break-In Period Service Procedures

Break-in period service procedures, as outlined in SERVICE UPON RECEIPT PROCEDURES located in Section 02 of the Service Manual must be performed and a record of these services must be maintained. In Section 02 of the Service Manual, a BREAK-IN PERIOD CHECKLIST is provided for this documentation.

Generator

The generator must be maintained in accordance with the instructions that are located in Section 06 of the Service Manual.

Planetary Drives, Hydraulic System, and Pump Drive Gearbox

The planetary drives, hydraulic system, and pump drive gearbox must be maintained in accordance with the following instructions that are located in Section 02, 03, and 04 in the Service Manual.

- a. Driver maintenance and rotation
- b. Break-in service procedures
- c. Modular preventive maintenance schedules – post break-in period

NOTICE

An on-going oil analysis program for these components, with samples collected every 500 hours, is mandatory to meet warranty requirements. Refer to Section 02 PREVENTIVE MAINTENANCE in the Service Manual.

LINCS Computer System Data Downloads

Monthly downloads of LINCS computer system production data must be submitted to the Komatsu Product Support Department. Failure to deliver these monthly reports may adversely affect warranty disposition. Contact your authorized Komatsu Service Center for assistance in this matter.

Engine Maintenance

The Service Manual contains only general service information for the machine's engine, such as oil and filter changes, fuel filter changes, cooling system maintenance etc. Engine manufacturers have extensive guidelines for engine maintenance requirements and parts replacement that are critically important to perform, such as valve adjustment, fuel injector maintenance etc. Complete maintenance schedules are located in the engine manufacturer's manuals. Komatsu provides these manuals with this Service Manual

when they are made available to Komatsu by the engine manufacturer. It is the customer's responsibility to ensure that the engine manufacturer's recommended preventive maintenance and parts replacement guidelines are followed to ensure long and economical engine life. Contact the Komatsu Service Center and applicable engine manufacturer's local authorized Service Center for additional information.

Operator and Support Personnel Training

It is ESSENTIAL the operator(s) read the Operator's Manual and be trained in the safe and effective operation of the machine BEFORE operating the machine.

If after reading this manual you have questions or do not understand any portions of the instructions, contact Komatsu or your Service Center.

Machine Data Plate

The Machine Data Plate Contains The Following Information About The Machine:

- Company address
- Model
- Product Identification Number
- Operating Mass
- Engine Power
- Year of construction



Figure 1. Machine data plate

General Machine Specifications

Komatsu has made every effort to make these specifications as accurate as possible at the time of printing. However, we reserve the right to make changes and improvements at any time, without notice, in equipment, materials, and specifications. To ensure the most current information, please contact your Service Center representative. Data herein is applicable to model L-1350 / L-1850 / L-2350 unless specified individually.

24V DC System

Batteries	Four (4) 12 volt (1 & 2 wired in series, 3 & 4 wired in series, those 2 sets of series are wired in parallel)	
Starter(s)	Two (2) Delco-Remy Series 50 MT Type 400 / Remote Pre-lube Starter (Cummins)	
L-1350 Alternator	Detroit Diesel Tier I & II: 220-amp, 24 volt	Cummins Tier I: 140 amp, 24 volt Cummins Tier II: 260 amp, 24 volt
L1850/L2350 Alternator	175 amps. With voltage regulator, 24 volt	

Cab

Spacious, ergonomically designed operator's cab is mounted directly over the center articulation point, providing excellent visibility. The cab is independently rubber mounted separate from the ROPS structure to minimize vibration and sound transmission. The environmental control system introduces only filtered air into the pressurized cab. Climate control vents are strategically located throughout the cab. The bucket seat has adjustable air suspension along with seat belts. Other standard features include joystick steering, tinted glass, sun visor, and full insulation for thermal and sound dampening.

Vibration

Hand arm emission does not exceed 2.5 m/s². Whole body emission does not exceed .5 m/s².

Standard Digital Indicators

Engine Coolant Temperature Monitoring
Engine Lube-Oil Pressure Monitoring
Fuel Level Monitoring
Hour meter
Speedometer
System Air Pressure Monitoring

Standard Indicator Lights and Audible Alarms

Warning lights and an audible alarm advise the operator of the condition of the engine, hydraulic, electrical, and electronic systems of the loader. The operator is additionally informed of a potential problem by text messages on a computer display.

The computer display also provides repair technicians with operational and history data in the event of a loader malfunction.

Cooling Air System

Function	Filtered Inlet Air Cools Generator and Traction Motors
Blower	Backward Inclined Blade Fan
Drive	Hydraulic Motor
Filters	Self-cleaning, with KLENZ™ System

Operating Weight (Approximate)

MACHINE MODEL/LIFT	Lbs.	Kgs.
L-1350 - Standard lift	405,000	183705
L-1350 - High lift	410,000	185973
L-1850 - Standard lift	535,000	242672
L-1850 - High lift	543,000	246,370
L-2350 - Standard lift	587,800	266622
L-2350 - High lift	599,800	272065
L-2350 - Super high lift	608,576	276045

Figure 2. Approximate operating weight of machines

L-1350 Approximate Component Weights

NOTE: These weights are only approximate as a guide for determining proper lifting procedures and equipment. These weights do not include liquids or external hardware in or on the components.

Item/Equipment	Lbs.	Kgs.
Engine, cummins qsk50	12,600	5,716
Engine, detroit diesel 12v4000	17,500	7,938
Power unit (engine/generator) cummins qsk50	19,000	8,618
Power unit (engine/generator) detroit diesel 12v4000	23,000	10,433
Generator	4,800	2,178
Bucket, 45-yd.	35,000	15,876
Bucket, 19.5-yd lm65sv2 adhl w/get	33,700	15,287
Bucket, 45-yd. W/get	47,000	21,319
Lift arm assembly, bellcrank, ballcaps Standard lift	41,000	18,598
Lift arm assembly, bellcrank, ballcaps High lift	42,000	19,051
Bellcrank	4,100	1,860
Level link	1,100	499
Front frame w/hoist cylinder	62,500	28,350
Rear frame w/engine, generator, rear axle	100,500	45,587
Hoist cylinder	4,200	1,906
Bucket cylinder (each)	2,700	1,225
Steering cylinder	800	363
Tire and rim assembly, 50/80 - 57 (each)	16,000	7,258
Tire	9,100	4,128
Rim	4,500	2,042
Planetary drive	9,200	4,174
Motor with brake b-40a	3,900	1,770
Motor, driver, brake b-40	13,100	5,943
Hydraulic reservoir (empty)	2,600	1,180
Hood structure, handrails (front)	650	295
Hood structure, handrails (rear)	1,800	817
Rear cowl, handrails, door structure	3,400	1,543
Radiator, oil cooler assembly	4,700	2,132
Rear axle (structure only)	8,800	3,992
Hydraulic pump gearbox (without pumps)	2,100	953
Hoist and bucket pump (each)	300	137
Hoist and bucket control valve (each)	300	137
Blower/air cleaner assembly	4,500	2,042
Muffler (each)	250	114
Electrical converter cabinet	3,100	1,407
Roll bar structure	7,500	3,402
Cab	3,000	1,361
Grid structure w/grids	650	295
Batteries	100	46
Mirror bar with lights	400	182

L-1850 Component Approximate Weights

NOTE: These weights are only approximate as a guide for determining proper lifting procedures and equipment. These weights do not include liquids or external hardware in or on the components. Always allow a safety margin above these weights.

Item/Equipment	Lbs.	Kgs.
Engine, cummins	18,100	8211
Power unit (engine/generator) cummins	27,000	12,247
Engine, detroit diesel	18,000	8,165
Power unit (engine/generator) detroit diesel	26,500	12,021
Generator	8,500	3,856
Bucket, 55-yd. Cv 65svvx, w/get	45,100	20,458
Bucket, 34-yd. Lm2 70sv2 adhl, w/get	42,900	19,460
Bucket, 27-yd. Lm2 70sv2ag, w/get	50,100	22,725
Lift arm assembly (high lift)	67,000	30,391
Bellcrank	7,150	3,244
Level link	850	386
Front frame w/hoist cylinder	74,000	33,566
Rear frame w/engine/generator/rear axle	167,000	75,750
Hoist cylinder	5,600	2,541
Bucket cylinder	3,300	1,497
Steering cylinder	800	363
Tire and rim assembly (each)	17,000	7,712
Tire	12,400	5,625
Rim	4,500	2,042
Planetary drive	15,000	6,804
Motor, w/brake	5,800	2,630
Motor, driver, brake	22,000	9,980
Hydraulic reservoir	2,700	1,225
Fuel reservoir (structure only) without hardware	4,825	2,189
Hood structure (front)	1050	477
Hood structure (rear)	1800	817
Rear cowl	3,300	1,497
Radiator, oil cooler assembly	3,800	1,724
Rear axle	11,000	4,990
Hydraulic pump gearbox (without pumps)	2,100	952
Hydraulic pump gearbox (with pumps)	4,500	2,042
Hoist and bucket pump (each)	300	137
Hoist and bucket control valve (dual control)	300	137
Hoist and bucket control valve (single control)	200	91
Blower/air cleaner assembly	4,500	2,042
Muffler	250	114
Electrical converter cabinet	4,300	1951
Roll bar structure	7,500	3,402
Cab	3,000	1361
Grid structure w/grids	950	431
Batteries	100	46
Mirror bar with lights	400	182

L-2350 Component Approximate Weights

NOTE: These weights are only approximate as a guide for determining proper lifting procedures and equipment. These weights do not include liquids or external hardware in or on the components. Always allow a safety margin above these weights.

Item/Equipment	Lbs.	Kgs.
Engine, cummins	18,100	8,211
Power unit (engine/generator) cummins	27,450	12,452
Engine, detroit diesel	18,000	8,165
Power unit (engine/generator) detroit diesel	26,500	12,021
Generator	8,500	3,856
Bucket, 70-yd l23g2 sl65sv2vx shl w/get	55,000	24,948
Bucket, 53-yd. Bucket, w/get	70,250	31,865
Bucket, 34-yd. Cv xs152rphl w/get	50,500	22,907
Lift arm assembly (high lift)	72,000	32,659
Bellcrank	8,175	3,709
Level link	1,530	694
Front frame w/hoist cylinder	82,000	37,195
Rear frame w/engine/generator/rear axle	173,000	78,472
Hoist cylinder	5,560	2,522
Bucket cylinder	3,000	1,361
Steering cylinder	1120	509
Tire and rim assembly (each)	22,200	10,070
Tire 70/70-57	15,500	7,031
Rim 60 x 57	6,700	3,039
Planetary drive	15,000	6,804
Motor with brake	5,800	2,630
Motor, driver, brake	18,800	8,527
Hydraulic reservoir	2,800	1,271
Fuel reservoir (structure only) without hardware	5,675	2,575
Hood structure (front)	1,050	477
Hood structure (rear)	1,800	817
Rear cowl	3,850	1,747
Radiator, oil cooler assembly	4,000	1,815
Rear axle	11,000	4,989
Hydraulic pump gearbox (without pumps)	2,100	952
Hydraulic pump gearbox (with pumps)	5,000	2,268
Hoist and bucket pump (each)	300	137
Hoist and bucket control valve (dual control)	300	137
Hoist and bucket control valve (single control)	200	91
Blower/air cleaner assembly	4,500	2,042
Muffler	250	114
Electrical converter cabinet	4,255	1,931
Roll bar structure	7,500	3,402
Cab	3,000	1361
Grid structure w/grids	950	431
Batteries	100	46
Mirror bar with lights	400	182

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Capscrew and Bolt-Nut Torque Specifications

There are some exceptions to the torques provided on the following pages. Reduced torques are specified in the planetary drive rebuild manual, for the capscrews holding the planetary drive covers, due to a copper sealing washer under the head of the capscrew.

The torque specifications on this chart apply only to Grade 8 bolts, black or gold colored, and 12PT black-colored alloy steel capscrews. 12PT capscrews with gold-colored zinc chromate plating are excluded from these specifications and the zinc chromate 12PT capscrews should not be used on loaders or dozers. (except for planetary drive covers)

These torque values are for normal routine operations. If doing component rebuilds or any other abnormal machine component assembly/disassembly, please contact the factory for these values for specific instances.

 <p style="text-align: right; font-size: small;">TA15358A</p>	 <p style="text-align: right; font-size: small;">TA15358B</p>	 <p style="text-align: right; font-size: small;">TA15356-1</p>
<p>Does not apply X</p>	<p>12PT Alloy Capscrew ✓</p>	<p>Grade 8 Bolt ✓</p>

NOTICE

Please note the additional tables for exceptions to the torque values for items such as Lift Arm Ballcaps, Super Nuts and steering pin bolts with drilled grease passages.

Please direct any questions to Komatsu Product Support.

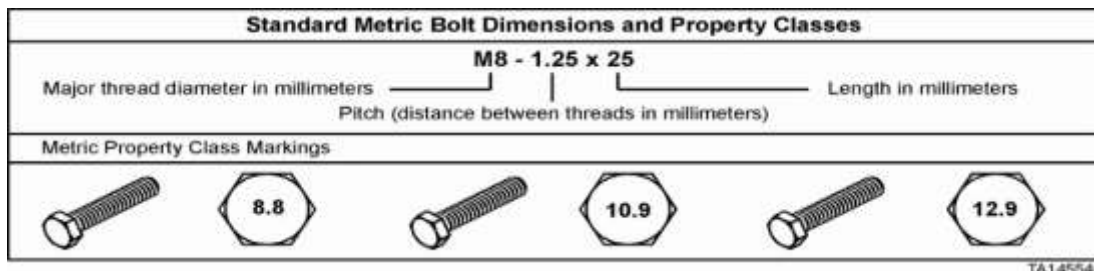
Capscrew and Bolt-Nut Torque Specifications Chart

Standard SAE G8 and Alloy Steel and Hex Socket Capscrews

Size	Thread	GRADE 8 Fasteners		Alloy Steel 12PT. and Hex Socket Capscrews	
		USA Units lb-ft	Metric Units N-m	USA Units lb-ft	Metric Units N-m
		**Lubed	**Lubed	**Lubed	**Lubed
1/4 (0.25)	20 UNC	9	13	12	16
	28 UNF	10	14	14	19
5/16 (0.3125)	18 UNC	18	25	24	33
	24 UNF	20	27	27	37
3/8 (0.375)	16 UNC	33	45	45	61
	24 UNF	37	50	50	68
7/16 (0.4375) (* See Note below)	14 UNC	52	71	70	95
	20 UNF	58	79	79	107
1/2 (0.5) (* See Note below)	13 UNC	80	109	108	146
	20 UNF	90	122	122	165
5/8 (0.625)	11 UNC	159	216	203	275
	18 UNF	180	244	230	312
3/4 (0.75)	10 UNC	282	383	361	490
	16 UNF	315	427	403	546
1 (1.0) (*** See Note below)	8 UNC	682	925	872	1182
	14 UNS	764	1,036	977	1325
1-1/8 (1.125)	7 UNC	966	1310	1235	1674
	12 UNF	1083	1468	1385	1878
1-1/4 (1.25) (**** See Note below)	7 UNC	1,363	1,848	1744	2365
	12 UNF	1,509	2,046	1930	2617
1-1/2 (1.5)	6 UNC	2,371	3,215	3033	4113
	12 UNF	2,668	3,618	3413	4628
* See Special Torque Specifications for ROPS super nut.		*** This bolt is UNS (with 14 threads per inch), it is NOT UNF. It is a unique thread count bolt.			
** See page 4 for specifications for "LUBED" – engine oil on threads and shoulder.		**** See Special Torque Specifications for loader lift arms and 1350/1850/2350 steering pins.			
*** See Special Torque Specifications for 950/1150 steering pins.					

Standard Metric Bolts and Grades (SAE J1701M)

Size (mm)	Pitch (mm)	Property Class 8.8		Property Class 10.9		Property Class 12.9	
		USA Units lb-ft	Metric Units N-m	USA Units lb-ft	Metric Units N-m	USA Units lb-ft	Metric Units N-m
		** Lubed	** Lubed	** Lubed	** Lubed	** Lubed	** Lubed
6	1.00	6	8	8	11	10	13
7	1.00	10	13	14	19	16	22
8	1.25	14	19	20	27	24	32
10	1.50	28	38	40	54	47	63
12	1.75	49	66	70	94	81	110
14	2.00	77	105	111	150	130	176
16	2.00	121	164	173	235	202	274
18	2.50	167	226	239	324	279	378
20	2.50	244	331	337	458	394	535
24	3.00	422	572	584	791	682	925



Capscrew and Bolt-Nut Torque Specifications

Special Torque Specifications

Alloy Steel 12PT. Capscrew for Wheel Loader Lift Arm Ballcaps

Size	Type	Thread	USA Units	Metric Units	Application
			lb-ft	N-m	
			**Lubed	**Lubed	
1-1/4 (1.250)	12PT. capscrew F-C on head	7 UNC	1900	2577	LHD, L-950, L-1150, L-1350, L-1850, and L-2350 (Lift arm ball caps only)
1-1/4 (1.250)	12PT. capscrew B-7 on head	12 UNF	1320	1790	L-1000-L-1100 (Lift arm ball caps only)

Steering Pins (Hex Head Bolt)

Size	Type	Thread	USA Units	Metric Lubed	Application
			lb-ft	N-m	
			** Lubed	** Lubed	
1 (1.0)	Bolt (drilled center)	8UNC	425	576	LHD, L-950, D-950, L-1150 (Steering Pins)
1-1/4 (1.250)	Bolt (drilled center)	7UNC	850	1152	L-1350, L-1850, L-2350 (Steering Pins)

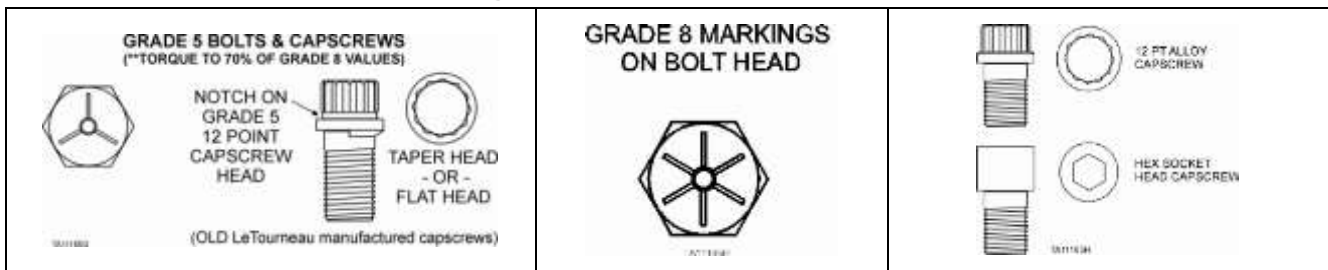
Aluminum 12pt. Capscrews used for Motor Pinion Balancing

Size	Type	Thread	USA Units (lb-ft)		Metric Units (N-m)	
			Dry	**Lubed	Dry	**Lubed
3/4 (0.75)	Aluminum	16 UNF	114	86	155	117
3/4 (0.75)	Aluminum 2024-T4	16 UNF	150	113	203	153
15/16 (.9375)	Aluminum 6061 T6	12 NF	217	163	294	221
15/16 (.9375)	Aluminum 2024-T4	12 NF (2 START)	285	214	387	290

2-Thread (2-Start) Steel 12PT. Capscrews

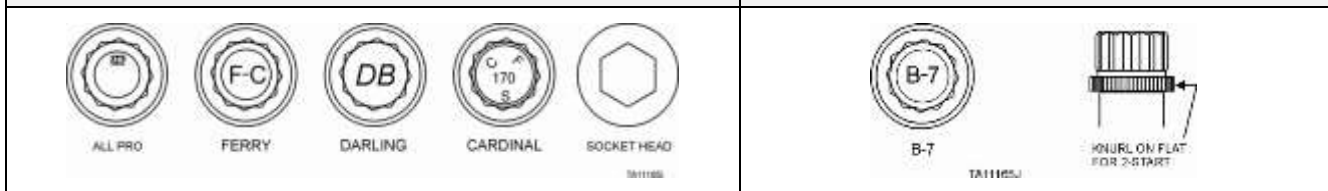
Size	Type	Thread	USA Units	Metric Units
			lb-ft	N-m
			** Lubed	** Lubed
3/8 (.3750)	12PT.	24 NF	25	34
9/16 (.5625)	12PT.	18 NF	87	119
15/16 (.9375)	12PT.	14 NF	428	584
1-5/16 (1.325)	12PT.	12 NF	1216	1660

Bolt and Capscrew Markings on Head



Typical Markings on Alloy Capscrew Heads

Typical B-7, 2-Start



** See "Key Items" for specifications for "LUBED" – engine oil on threads and shoulder.

Capscrew and Bolt-Nut Torque Specifications

Key Items

- “LUBED” is defined as having the threads and under the head lubricated with engine oil. Engine oil is defined as SAE 30 or 40 weight oil, including multi viscosity grades 5W-30 through 15W-40. No other lubricant (such as anti-seize, MolyKote, copper coat, grease, etc.) is permitted unless specifically called out in a Komatsu procedure.

****LUBED = Lubricated with engine oil on threads and under head**
 (SAE 30 or 40 weight oil, including multi viscosity grades 5W-30 through 15W-40)



NOTE: No other lubricant (such as anti-seize, never seize, MolyKote, copper coat, grease, etc.) is permitted unless specifically called out in a Komatsu procedure.

- All capscrews and bolts should be started by hand until a minimum of three (3) threads are engaged prior to any air impact equipment being used.
- If a procedure in a Rebuild Manual, Repair and Overhaul or Operating and Service Manual calls for the use of Loctite® threadlocker on the threads, the torque specification for “lubed” should be used. The threads on both the fastener and mating part should be thoroughly cleaned with a proper solvent prior to use of Loctite®. The Loctite® thread sealant should only be used on the threads - not the head.
- Certain applications in components such as drivers or lift arm ball caps may specify a FERRY brand of capscrew. Use only FERRY brand capscrews in these applications.
- Komatsu, recommends that any old 12PT. Komatsu-fabricated (fabrication was stopped many years ago) capscrew (refer to illustration under BOLT AND CAPSCREW MARKINGS ON HEAD) be replaced at the time of repair with alloy capscrews. If new capscrews are not available, then the Komatsu-fabricated capscrews should only be torqued to Grade 5 specifications (70% of Grade 8 value - lubed).
- The torque specifications on the charts on page 2 only apply to Grade 8 bolts, metric bolts and 12PT. black-colored alloy steel capscrews. Capscrews with gold-colored zinc chromate plating are excluded from these specifications and these capscrews should not be used on loaders or dozers except for driver covers.



Does not apply X



12PT Alloy Capscrew ✓



Grade 8 Bolt ✓

- **CLEANING:** It is mandatory to remove all paint, rust and debris from all mating surfaces, surfaces under the head of the bolt or capscrew and threads prior to installation and torquing of all bolts and capscrews.



Arrow indicates location to be cleaned



Cleaning paint and rust prior to torquing

Super Nut Specifications

Bolt size	Jack bolt size	Jack bolt thread	USA Units	Metric Units	Application
			lb-ft	N-m	
			*****Lubed	*****Lubed	
1 3/4" - 5	7/16 (0.4375)	20 UNF	68	92	Hoist Cylinder Rod Pin
2 1/4" - 4.25	1/2 (0.50)	20 UNF	114	155	ROPS Pin
2 3/4" - 8	<div style="background-color: #0056b3; color: white; padding: 5px; display: inline-block;">NOTICE</div> Refer to Authorized Cylinder Rebuild Center				Steering Cylinder Piston
*****NOTE: Supernut jackbolts require P/N 427-3753 Lube JL-G from Superbolt (do not use any substitute)					

Capscrew and Bolt-Nut Torque Specifications

Helpful Tips for Supernuts®

Prior to Tightening:

- 1) **Check threads of main stud:** If possible, verify that the tensioners spin on prior to the installation date. If a tensioner is tight or will not thread on, try using lapping compound on the main thread and work the tensioner in a back and forth motion making small advances when the thread loosens up. If necessary, chase the studs with a die.
- 2) **Use of spacers:** Tensioners should be positioned at the ends of the studs to minimize exposed threads and facilitate easy access to the jackbolts. A spacer (or stacked washers) can be used beneath the special hardened washer to accomplish this. A spacer will also “step over” a damaged area on a stud where years of bolting have deformed the first few threads.
- 3) **Back the tensioner off before tightening to provide 1/16” (1.59 mm) to 1/8” (3.175 mm) gap:** The additional jackbolt extension provides easy access for oiling the jackbolt tips prior to removal. This is especially beneficial for oiling when the tensioners are inverted. Note: There may be insufficient jackbolt stroke to allow this step when tensioning exceptionally long bolts or tie rods, or when closing a gap between flanges.
- 4) **For spinning the tensioner on and off the stud:** Custom “sockets” which grip the tensioner are available. Also, two deep well sockets inserted over two jackbolt hex’s at 180° apart can serve as “handles” for spinning the tensioners on and off the studs.

For Tightening:

- 5) **To improve efficiency when using impacts:** Don’t wait for the socket to stall completely on a specific jackbolt before advancing to the next jackbolt. It is faster, overall, to move quickly between jackbolts.
- 6) **Overshooting the target torque:** You may want to use 110 - 120% of the target torque for Step 3, Step 4, and for 1-2 rounds of Step 5. This may eliminate a tightening round. Be careful not to stabilize all of the jackbolts at this torque however. For long bolts or tie rods, you may want to experiment using even higher torque values. Call Superbolt before using more than 120% target torque.
- 7) **For gasketed joints:** During gasket compression, the load is transferred to the jackbolts (i.e. stud) being tightened. Don’t be concerned if some jackbolts (or tensioners) become loose during the procedure. Continue following the procedure. Don’t spin down tensioners that become loose during gasket compression.

Helpful Tips For Removal

- 8) **1/4 turn or less!:** Removing the jackbolts more than a 1/4 turn will increase the removal torque of the remaining jackbolts and you may get stuck. If this happens, you will have to retighten and start again.
- 9) **Stuck jackbolt removal:** If a jackbolt will not turn, remove, relube, and retighten a neighboring jackbolt and then try to turn it.

Air Impact Tool Selection (90 PSI (620 kPa) Air Pressure)**NOTICE**

The jackbolt torque actually achieved by an air impact wrench is usually only 30 - 50% of its rated output. For minimum hand work, use an air impact with an output of 110% - 120% target torque. For maximum power, use the largest air line fitting.

Up to 70 lbs-ft (311 N•m): For 15-35 lbs-ft (67-155 N•m) use a right angle ratchet or light duty 3/8” impact. For 35-70 lbs-ft (155-311 N•m) use a heavy duty 3/8” impact.

70-100 lbs-ft (311-445 N•m): Use a light duty 1/2” impact at a reduced pressure or setting. (Be careful not to over tighten! Calibrate the impact before starting.)


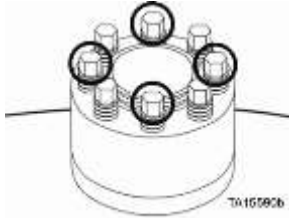
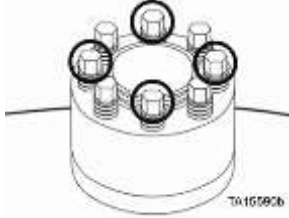
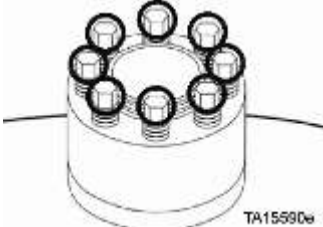

100-170 lbs-ft (445-756 N•m): For 100-130 lbs-ft (445-578 N•m) use a light duty 1/2” impact. For 130-170 lbs-ft (578-756 N•m) use a heavy duty 1/2” impact.

170-200 lbs-ft (756-890 N•m): Use a light duty 3/4” impact on low setting. Some heavy duty 1/2” impacts will also reach this range.

Over 200 lbs-ft (890 N•m): For 200-300 lbs-ft (890-1334 N•m), use a light to medium duty 3/4” impact. Over 300 lbs-ft (1334 N•m), use a heavy duty 3/4” impact.

Calibrating an air impact wrench: Tighten one jackbolt until the socket rotation stops and check the jackbolt with a torque wrench. The torque required to move the jackbolt further is the output of the impact as measured on Superbolt® tensioners.

Capscrew and Bolt-Nut Torque Specifications Installation Procedure for Supernuts

 <p>TA1559Ca</p>	<p>Step 1: Spin the tensioner onto the main thread until it seats against the washer. You may want to back off the tensioner slightly as mentioned in Helpful Tip #3.</p>
 <p>TA1659Cb</p>	<p>Step 2: Tighten (4) jackbolts at 90° apart (12:00, 6:00, 9:00, and 3:00) on all studs with a partial torque (30-70%). This serves to seat the flange. If using an air impact, use a reduced setting or lightly pulse and trigger at the full setting.</p>
 <p>TA1659Cb</p>	<p>Step 3: At 100% target torque, tighten the same (4) jackbolts on all studs.</p>
 <p>TA1559Cc</p>	<p>Step 4: At 100% target torque, tighten all jackbolts in a circular pattern. Do this for all studs (1 round only). See Helpful Tip #7 about using up to 120% torque.</p>
 <p>TA1559Cd</p>	<p>Step 5: Repeat 'STEP 4' until all jackbolts are stabilized (less than 10° rotation). This usually requires 2-4 additional passes. If using air tools, switch to a torque wrench when socket rotation is small. Use the torque wrench to stabilize at the target torque.</p>

NOTICE

Product with 4 or 6 jackbolts – use a star pattern for all steps.

Capscrew and Bolt-Nut Torque Specifications

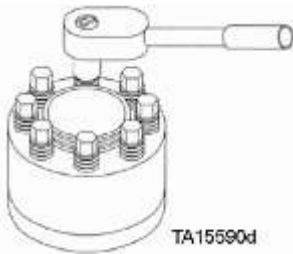
Removal Procedure for Supernuts

CAUTION

Jackbolts must be unloaded gradually. If some jackbolts are fully unloaded prematurely, the remaining jackbolts will carry the entire load and may be hard to turn. With extreme abuse, a jackbolt tip can deform, making removal difficult.

Service Under 250°F (121°C)

Preparation: Spray jackbolts with penetrating oil or hydraulic oil prior to start (especially if product is in corrosive environment)



Step 1: Loosen each jackbolt 1/8 turn following a circular pattern around the tensioner (1 round only). As you move around and get back to the first jackbolt, it will be tight again. Do this for all studs on the joint prior to the next step.

Step 2: Repeat a 2nd round as above for all studs, now loosening each jackbolt 1/4 turn in a circular pattern.

Step 3. Continue loosening 1/4 turn for 3rd and successive rounds until all jackbolts are loose.

NOTICE

Usually after the 3rd or 4th rounds, an impact can be used to completely extract the jackbolts, one by one. For long bolts or tie rods, additional rounds may be required before removing the jackbolts with an impact tool.

Step 4 Remove, clean and relubricate the jackbolts prior to next use with correct Superbolt lubricant (JL-G) Komatsu P/N 427-3753 (do not use any substitute).

GEN 2 Hydraulic Specifications Sheet

All pressures with Engine at High Throttle		Procedure paragraph number	L-1350	L-1850	L-2350
Governor	System air pressure	A	130psi +5 /-0	130psi +5 /-0	140psi +5 /-0
KLENZ	KLENZ regulator air pressure	B	90 PSI	90 PSI	90 PSI
Hyd Res Air	Hydraulic Reservoir regulator	C	4 to 6 psi	4 to 6 psi	4 to 6 psi
Engine Fan Circuit with single fan pump	Fan Pump (Stand by) - Idle	D	450 ± 50 (Stand-by)	450 ± 50 (Stand-by)	450 ± 50 (Stand-by)
	Fan Pump (Compensator) - High	D	820 RPM @ 1900 Eng RPM	820 RPM @ 1900 Eng RPM (8 blade fan) 750 RPM @ 1900 Engine RPM (11 blade fan)	820 RPM @ 1900 Eng RPM (8 blade fan) 750 RPM @ 1900 Engine RPM (11 blade fan)
	Fan Remote Relief - High	D	800 RPM (Max) @ 1900 Eng RPM	800 RPM @ 1900 Eng RPM (8 blade fan) 700 RPM @ 1900 Engine RPM (11 blade fan)	800 RPM @ 1900 Eng RPM (8 blade fan) 700 RPM @ 1900 Engine RPM (11 blade fan)
Engine Fan Circuit with dual (2) fan pumps	Fan Pump (Stand by) - Idle	D1**	NA	450 ± 50 (Stand-by)	450 ± 50 (Stand-by)
	Fan Pump (Compensator) - High	D1**	NA	750 RPM @ 1900 Engine RPM (11 blade fan)	850 RPM @ 1900 Engine RPM (11 blade fan)
	Fan Remote Relief - High	D1**	NA	800 RPM @ 1900 Engine RPM (11 blade fan)	875 RPM @ 1900 Engine RPM (11 blade fan)
Blower Circuit	Blower Pump (Stand by)	E	450 ± 50 (Stand-by)	450 ± 50 (Stand-by)	450 ± 50 (Stand-by)
	Blower Pump (Compensator)	E	3400 RPM @ Eng 1900	3400 RPM @ Eng 1900	3400 RPM @ Eng 1900
	Blower Remote Relief	E	3100 RPM @ 1900 Eng RPM	3100 RPM @ 1900 Eng RPM	3100 RPM @ 1900 Eng RPM
Accessory Pump	Accessory Pump Compensator	F	2500psi ± 20	2500psi ± 20	2500psi ± 20
Pilot Circuit	Pilot Pressure Relief Valve	G	450 ± 10	450 ± 10	450 ± 10
Driver Filtration	Sequence Valve	H	2200psi ± 20	2200psi ± 20	2200psi ± 20
Hoist / Bucket Circuit	Main Valve Relief	I	4500 psi +50 -0	4500 psi +50 -0	4500 psi +50 -0
	Hoist Base Circuit Relief	I	4500 psi ± 50	4500 psi ± 50	4500 psi ± 50
	Hoist Rod Circuit Relief	I	2000 psi ± 50	2000 psi ± 50	2000 psi ± 50
	Bucket Base Circuit Relief	I	4500 psi ± 50	4500 psi ± 50	4500 psi ± 50
	Bucket Rod Circuit Relief	I	2000 psi ± 50	2000 psi ± 50	2000 psi ± 50
	Hoist & Bucket Pump Compensators	J	4000 psi +100 / -0	4000 psi +100 / -0	4000 psi +100 / -0
	Secondary Dump Relief	K	800 ~ 1200 psi ± 50	800 psi ± 50	800 psi ± 50
Steer Circuit	Steering Main Relief (Flow Amp)	L	Turn in Full	Turn in Full	Turn in Full
	Steering Remote Relief (L950 & L1150)	L	N/A	N/A	N/A
	Steering Pump (Stand By)	M	450 ± 50 (Stand-by)	450 ± 50 (Stand-by)	450 ± 50 (Stand-by)
	Steering Pump (Compensator)	M	3400 psi ± 50	3400 psi ± 50	3600 psi ± 50
	Steering Crossover Relief Valve	M1	N/A	N/A	4300 psi ± 50
	Shock and Suction (Flow Amp)	N	4000 psi ± 50	4000 psi ± 50	4000 psi ± 50
	Relief (PVG)	O	4000 psi ± 50	4000 psi ± 50	4000 psi ± 50
	Aux. Steering Relief (L950 & L1150)	P	N/A	N/A	N/A
Aux. Steering Relief (L1350 thru L2350)	Q	2000 psi +50 -0	2000 psi +50 -0	2000 psi +50 -0	
Aux Oil Cooler Circuit	Aux oil cooler relief (L950 & L1150)	R	N/A	N/A	N/A
	Aux Oil Cooler Pump (Stand by) (Idle)	S	300 psi	300 psi	300 psi
	Aux Oil Cooler Pump (Compensator)	S	1400 RPM 1050 Hz	1400 RPM 1050 Hz	1400 RPM 1050 Hz
	Aux Remote Relief (High)	S	1300 RPM 975 Hz	1300 RPM 975 Hz	1300 RPM 975 Hz
Gear Box Circuit	Gearbox	Reference	50 to 125 psi at High Throttle	50 to 125 psi at High Throttle	50 to 125 psi at High Throttle
AutoLube Circuit	Pressure Reducing Valve	Reference	3500 psi (Grease Pressure) Non-Adjustable	3500 psi (Grease Pressure) Non-Adjustable	3500 psi (Grease Pressure) Non-Adjustable
	Flow Control	Reference	1.5 to 2 strokes per second Non-Adjustable	1.5 to 2 strokes per second Non-Adjustable	1.5 to 2 strokes per second Non-Adjustable
Cycle Times	Hoist Up		15 Sec	16 Sec	17 Sec
	Hoist Down		9-11 Sec	9-11 Sec	12-14 Sec
	Float		5 Sec	6 Sec	6 Sec
	Bucket Rollback		3-5 Sec	3-5 Sec	3-5 Sec
	Bucket Dump		3 Sec	4 Sec	3 Sec
	Steer Lock to Lock		6 Sec	6 Sec	6 Sec

Revision Notes: Replace Steering Remote Relief (L1350 thru L2350) with Steering Crossover Relief M1. Added procedure D1. NOTES: **Composite Fan, See WARNING about altitude and temperature.

REV12 (02/22/2019)

TA16130A1

NOTICE

Always follow all local organization/department rules or regulations when making any pressure or flow adjustment on the machine.

WARNING

Struck-by hazards exist when around hydraulic fluid, fuel, or grease that is under pressure. Hoses under pressure can blow out or come loose from connections, causing a struck-by hazard with deadly force. DO NOT tighten or loosen hydraulic, fuel, or grease lines without first relieving the pressure. DO NOT make adjustments to any fluid pressures or flow while the machine is running. Shut down the machine, make the adjustment, then restart the machine to check the adjustment. Wear safety goggles for eye protection and wear all other locally required personal protective equipment (PPE) when working around possibly pressurized liquids. Failure to use proper PPE or to shut down the machine before making adjustments can cause a struck-by hazard resulting in serious injury or death.

WARNING

Skin injection hazard exists when around hydraulic fluid, or grease that is under pressure. Fluid leaks under pressure may not be visible. When searching for leaks, NEVER use your hand; use a piece of metal. Wear work gloves and keep your hand well away from the possible source of leakage. Failure to use proper PPE or to shut down the machine before making adjustments can cause a skin injection hazard or a struck-by hazard resulting in serious injury or death.

WARNING

Burn hazards exist when around hot hydraulic fluid that is under pressure. Hoses under pressure can blow out or come loose from connections, causing a burn hazard from leaks or spraying. DO NOT tighten or loosen hydraulic, fuel without first relieving the pressure. DO NOT make adjustments to any fluid pressures or flow while the machine is running. Shut down the machine, make the adjustment, then restart the machine to check the adjustment. Wear safety goggles for eye protection and wear all other locally required personal protective equipment (PPE) when working around possibly hot pressurized liquids. Failure to use proper PPE or to shut down the machine before making adjustments can cause a burn hazard resulting in serious injury or death.

WARNING

Struck-by hazards exist when setting fans and blowers. Altitude and air temperature can greatly affect radiator, blower, and auxiliary oil cooler fan speeds. Do not overspeed the fan or blower. Before making fan or blower speed adjustments always decrease the maximum pump pressure. This will help prevent fan or blower overspeed which can cause fan or blower destruction. Failure to reduce maximum pump pressure before making fan or blower speed adjustments can cause struck-by hazards resulting in serious injury or death.

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