Shop Manual

VEBM480104

WA470-3

Wheel Loader

Serial Number

WA470H20051 and up

CONTENTS

SAFETY
SAFETY NOTICE

IMPORTANT SAFETY NOTICE

Proper service and repair is extremely important for safe machine operation. Some of the described service and repair techniques require the use of tools specially designed by Komatsu for the specific purpose.

To prevent injury to workers, the symbol ⚠ is used to mark safety precautions in this manual. The cautions accompanying these symbols must always be followed carefully. If any dangerous situation arises or may possibly arise, first consider safety, and take the necessary actions to deal with the situation.

GENERAL PRECAUTIONS

Mistakes in operation are extremely dangerous. Read the OPERATION AND MAINTENANCE MANUAL carefully BEFORE operating the machine!

Always follow the safety rules valid in your country carefully!

1. Before carrying out any greasing or repairs, read all the precautions given on the decals which are fixed to the machine.
2. When carrying out any operation, always wear safety shoes and helmet. Do not wear loose work clothes, or clothes with buttons missing.
   - Always wear safety glasses when hitting parts with a hammer.
   - Always wear safety glasses when grinding parts with a grinder, etc.
3. If welding repairs are needed, always have a trained, experienced welder carry out the work. When carrying out welding work, always wear welding gloves, apron, glasses, cap and other clothes suited for welding work.
4. When carrying out any operation with two or more workers, always agree on the operating procedure before starting. Always inform your fellow workers before starting any step of the operation. Before starting work, hang UNDER REPAIR signs on the controls in the operator's compartment.
5. Keep all tools in good condition and learn the correct way to use them.
6. Decide a place in the repair workshop to keep tools and removed parts. Always keep the tools and parts in their correct places.

   Always keep the work area clean and make sure that there is no dirt or oil on the floor.
   Never smoke while working.
   Smoke only in the areas provided for smoking.

PREPARATIONS FOR WORK

7. Before adding oil or making any repairs, park the machine on hard, level ground, and block the wheels or tracks to prevent the machine from moving.
8. Before starting work, lower blade, ripper, bucket or any other work equipment to the ground and install the safety bar on the frame. If this is not possible, insert the safety pin or use blocks to prevent the work equipment from falling. In addition, be sure to lock all the control levers and hang warning signs on them.
9. When disassembling or assembling, support the machine with blocks, jacks or stands before starting work.
10. Remove all mud and oil from the steps or other places used to get on and off the machine. Always use the handrails, ladders or steps when getting on or off the machine. Never jump on or off the machine. If it is impossible to use the handrails, ladders or steps, use a stand to provide safe footing.

PRECAUTIONS DURING WORK

11. When measuring hydraulic pressure, check that the measuring tool is correctly assembled before taking any measurements.
12. When removing the oil filler cap, drain plug or hydraulic pressure measuring plugs, loosen them slowly to prevent the oil from spurting out.
    Before disconnecting or removing components of the oil, water or air circuits, first remove the pressure completely from the circuit.
13. The water and oil in the circuits are hot when the engine is stopped, so be careful not to get burned.
    Wait for the oil and water to cool before carrying out any work on the oil or water circuits.
14. Before starting work, remove the leads from the battery. Always remove the lead from the negative (–) terminal first.
15. When raising heavy components, use a hoist or crane.
    Check that the wire rope, chains and hooks are free from damage.
    Always use lifting equipment which has ample capacity.
    Install the lifting equipment at the correct places.
    Use a hoist or crane and operate slowly to prevent the component from hitting any other part. Do not work with any part still raised by the hoist or crane.
16. When removing covers which are under internal pressure or under pressure from a spring, always leave two bolts in position on opposite sides. Slowly release the pressure, then slowly loosen the bolts to remove.
17. When removing components, be careful not to break or damage the wiring. Damaged wiring may cause electrical fires.
18. When removing piping, stop the fuel or oil from spilling out. If any fuel or oil drips onto the floor, wipe it up immediately. Fuel or oil on the floor can cause you to slip, or can even start fires.
19. As a general rule, do not use gasoline to wash parts. In particular, use only the minimum of gasoline when washing electrical parts. Do not smoke!
20. Be sure to assemble all parts again in their original places.
    Replace any damaged parts with new parts.
    - When installing hoses and wires, be sure that they will not be damaged by contact with other parts when the machine is being operated.
21. When installing high pressure hoses, make sure that they are not twisted. Damaged tubes are dangerous, so be extremely careful when installing tubes for high pressure circuits. Also, check that connecting parts are correctly installed.
22. When aligning two holes, never insert your fingers or hand. Be careful not to get your fingers caught in a hole.
23. When assembling or installing parts, always use the specified tightening torques. When installing protective parts such as guards, or parts which vibrate violently or rotate at high speed, be particularly careful to check that they are installed correctly.

FOREWORD

GENERAL

This shop manual has been prepared as an aid to improve the quality of repairs by giving the service personnel an accurate understanding of the product and by showing them the correct way to perform repairs and make judgements. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This shop manual mainly contains the necessary technical information for operations performed in a service workshop. For ease of understanding, the manual is divided into the following chapters; these chapters are further divided into the each main group of components.

STRUCTURE AND FUNCTION

This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.

TESTING AND ADJUSTING

This section explains checks to be made before and after performing repairs, as well as adjustments to be made at completion of the checks and repairs.
Troubleshooting charts correlating "Problems" to "Causes" are also included in this section.

DISASSEMBLY AND ASSEMBLY

This section explains the order to be followed when removing, installing, disassembling or assembling each component, as well as precautions to be taken for these operations.

MAINTENANCE STANDARD

This section gives the judgement standards when inspecting disassembled parts.

NOTICE

The specifications contained in this shop manual are subject to change at any time and without any advance notice. Use the specifications given in the book with the latest date.

HOW TO READ THE SHOP MANUAL

VOLUMES

Shop manuals are issued as a guide to carrying out repairs. They are divided as follows:

Chassis volume: Issued for every machine model
Engine volume: Issued for each engine series
Electrical volume: } Each issued as one volume to cover all models
Attachments volume: }

These various volumes are designed to avoid duplicating the same information. Therefore, to deal with all repairs for any model , it is necessary that chassis, engine, electrical and attachment volumes are available.

DISTRIBUTION AND UPDATING

Any additions, amendments or other changes will be sent to KOMATSU distributors. Get the most up-to-date information before you start any work.

FILING METHOD

1. See the page number on the bottom of the page. File the pages in correct order.
2. Following examples show how to read the page number.
   Example 1 (Chassis volume):

   10 - 3

   - Item number (10. Structure and Function)
   - Consecutive page number for each item.

   Example 2 (Engine volume):

   12 - 5

   - Unit number (1. Engine)
   - Item number (2. Testing and Adjusting)
   - Consecutive page number for each item.

3. Additional pages: Additional pages are indicated by a hyphen (-) and number after the page number. File as in the example.
   Example:

10-4	12-203
10-4-1	12-203-1
10-4-2	12-203-2
10-5	12-204

(10-4-1 and 10-4-2 are added pages between 10-4 and 10-5; 12-203-1 and 12-203-2 are added pages between 12-203 and 12-204.)

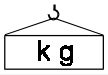
SYMBOLS

So that the shop manual can be of ample practical use, important safety and quality portions are marked with the following symbols.

Symbol	Item	Remarks
	Safety	Special safety precautions are necessary when performing the work.
★	Caution	Special technical precautions or other precautions for preserving standards are necessary when performing the work.
	Weight	Weight of parts of systems. Caution necessary when selecting hoisting wire, or when working posture is important, etc.
	Tightening torque	Places that require special attention for the tightening torque during assembly.
	Coat	Places to be coated with adhesives and lubricants, etc.
	Oil, water	Places where oil, water or fuel must be added, and the capacity.
	Drain	Places where oil or water must be drained, and quantity to be drained.

HOISTING INSTRUCTIONS

HOISTING

> ⚠ Heavy parts (25 kg or more) must be lifted with a hoist, etc. In the **DISASSEMBLY AND ASSEMBLY** section, every part weighing 25 kg or more is indicated clearly with the symbol 
>

- If a part cannot be smoothly removed from the machine by hoisting, the following checks should be made:
  1) Check for removal of all bolts fastening the part to the relative parts.
  2) Check for existence of another part causing interference with the part to be removed.

WIRE ROPES

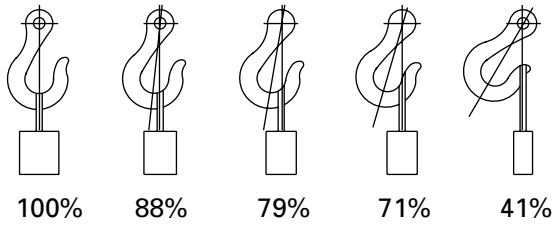
1) Use adequate ropes depending on the weight of parts to be hoisted, referring to the table below:

Wire ropes
(Standard "Z" or "S" twist ropes without galvanizing)

Rope diameter (mm)	Allowable load (tons)
10	1.0
11.2	1.4
12.5	1.6
14	2.2
16	2.8
18	3.6
20	4.4
22.4	5.6
30	10.0
40	18.0
50	28.0
60	40.0

★ The allowable load value is estimated to be one-sixth or one-seventh of the breaking strength of the rope used.

2) Sling wire ropes from the middle portion of the hook.
Slinging near the edge of the hook may cause the rope to slip off the hook during hoisting, and a serious accident can result. Hooks have maximum strength at the middle portion.



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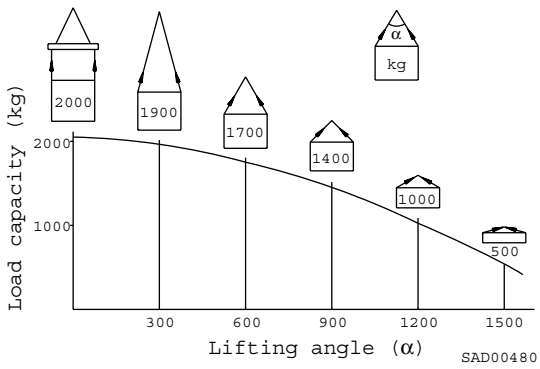
3) Do not sling a heavy load with one rope alone, but sling with two or more ropes symmetrically wound onto the load.
> ⚠ Slinging with one rope may cause turning of the load during hoisting, untwisting of the rope, or slipping of the rope from its original winding position on the load, which can result in a dangerous accident.

4) Do not sling a heavy load with ropes forming a wide hanging angle from the hook.
When hoisting a load with two or more ropes, the force subjected to each rope will increase with the hanging angles. The table below shows the variation of allowable load (kg) when hoisting is made with two ropes, each of which is allowed to sling up to 1000 kg vertically, at various hanging angles.
When two ropes sling a load vertically, up to 2000 kg of total weight can be suspended. This weight becomes 1000 kg when two ropes make a 120° hanging angle. On the other hand, two ropes are subjected to an excessive force as large as 4000 kg if they sling a 2000 kg load at a lifting angle of 150°.



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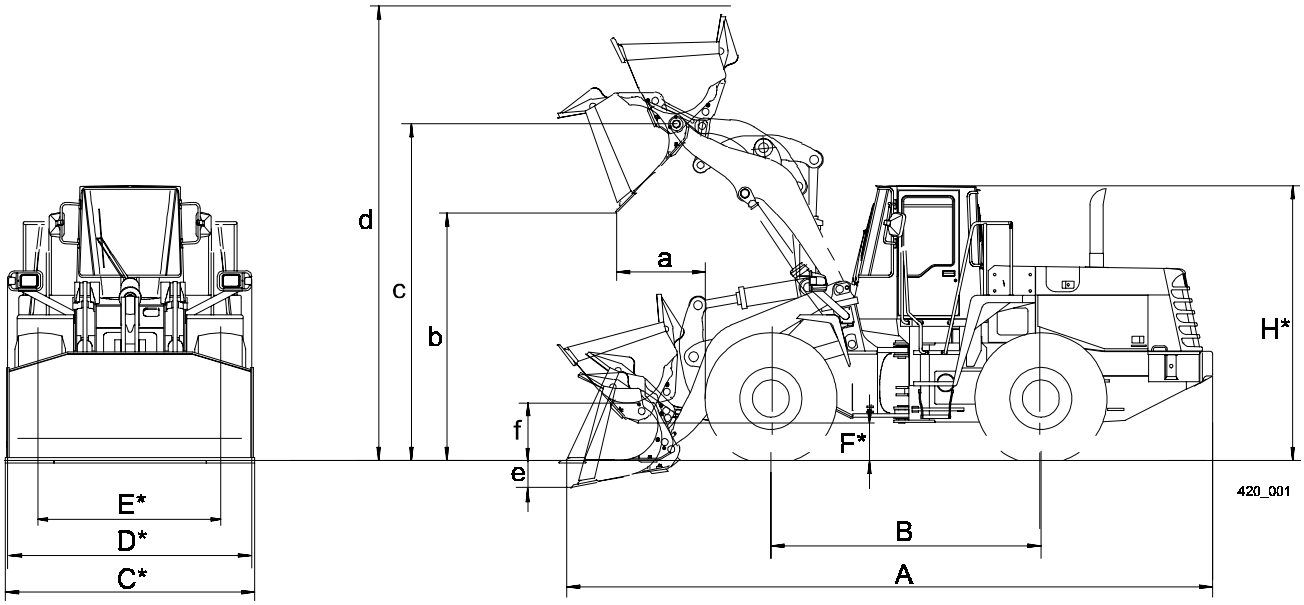
01 GENERAL

DIMENSIONS, WEIGHTS AND OPERATING DATA

Up to SN WA470H20668



Buckets

	Bucket capacity as per ISO 7546 m^3	4,0	4,0	4,4	4,4
	Pract. filling capacity (100-120%) m^3	4,0 -4,8	4,0-4,8	4,4 - 5,3	4,4 - 5,3
	Bucket width m	3,0	3,2	3,0	3,2
	Specific density t/m^3	1,8	1,8	1,6	1,6
	Bucket weight w/o teeth kg	2.180	2.190	2.230	2.245
	Stat. tipping weights, straight kg	17.860	17.950	17.830	17.920
	Stat. tipping weights, articulated 40° kg	15.884	15.964	15.857	15.937
	Breakout force hydraulic kN	184	201	184	201
	Hydraulic lifting capacity, on ground kN	241	244	241	244
	Operating weight kg	23.100	23.110	23.150	23.165
a	Reach at full lift 45° mm	1.260	1.181	1.260	1.181
b	Dumping height 45° mm	3.000	3.080	3.000	3.080
c	Lift height, hinge pin mm	4.205	4.205	4.205	4.205
d	Bucket to edge height mm	5.866	5.830	5.900	5.900
e	Digging depth mm	71	71	71	71
f	Carry height, hinge pin mm	510	510	510	510
A	Overall length mm	8.790	8.645	8.760	8.645
B	Wheelbase mm	3.400	3.400	3.400	3.400
C	Bucket width mm	3.000	3.200	3.000	3.200
D	Width less bucket mm	2.957	2.957	2.957	2.957
E	Track width mm	2.210	2.210	2.210	2.210
F	Ground clearance mm	525	525	525	525
H	Overall height mm	3.550	3.550	3.550	3.550

* This dimensions refer to machines with 26,5 - 25 tyres.

Special bucket sizes:
3,8 m^3 - v-edge bucket
4,0 m^3- HD bucket
6,5 m^3 - light material bucket

The 4,0/4,4 m^3 standard buckets shown in the table can be supplied with bold on cutting edge.

SPECIFICATIONS

Machine model				WA470-3
Serial No.				H20001 - H20668
Weight	Operating weight		(kg)	23,100
Performance	Bucket capacity (heaped)		(m^3)	4,4 (with BOC)
	Travel speed	FORWARD 1st	(km/h)	6.4
		FORWARD 2nd	(km/h)	11.6
		FORWARD 3rd	(km/h)	21.6
		FORWARD 4th	(km/h)	37
		REVERSE 1st	(km/h)	6.7
		REVERSE 2nd	(km/h)	12.3
		REVERSE 3rd	(km/h)	22
		REVERSE 4th	(km/h)	37.5
	Min. turning radius	Center of outside wheel	(mm)	6,320
Dimensions	Overall length		(mm)	8,645 (with BOC)
	Overall width (chassis)		(mm)	3,010
	Bucket width (with BOC)		(mm)	3,200
	Overall height	(top of cab)	(mm)	3,550
		(Bucket raised)	(mm)	5,900
	Wheelbase		(mm)	3,400
	Tread		(mm)	2,210
	Min. ground clearance		(mm)	525
	Height of bucket hinge pin		(mm)	4,205
	Dumping clearance (tip of BOC)		(mm)	3,080
	Dumping reach (edge of bucket)		(mm)	1,181
	Bucket dump angle		(deg)	46
	Bucket tilt angle (travel posture)		(deg)	50
	Digging depth (10° dump) (with BOC)		(mm)	305

Machine model				WA470-3
Serial No.				H20001 - H20668
Engine	Model			S6D125
	Type			4-cycle, water-cooled, in-line, 6-cylinder, direct injection, with turbocharger
	No. of cylinders – bore x stroke		(mm)	6 – 125 mm x 150 mm
	Piston displacement		(cc)	11,040
	Flywheel horsepower		(kW (PS)/rpm)	194 (264) /2,200
	Maximum torque		(Nm (kgm)/rpm)	1,050 (107) / 1400
	–			–
	High idling speed		(rpm)	2,350 - 2,450
	Low idling speed		(rpm)	700 - 750
	Starting motor			24 V 7.5 kW
	Alternator			24 V 50 A
	Battery			12 V 143 Ah x 2
Power train	Torque converter			3-element, 1-stage, single-phase (Komatsu TCA38-4Z)
	Transmission			Spur gear, constant-mesh multiple-disc, hydraulically actuated, modulation type
	Reduction gear			Spiral bevel gear, splash lubrication
	Differential			Straight bevel gear, torque proportioning
	Final drive			Planetary gear single stage, splash lubrication
Axle, wheel	Drive type			Front-, rear-wheel drive
	Front wheel			Fixed frame, full-floating type
	Rear wheel			Center pin support full-floating type
	Tire			26.5-25-16PR
	Wheel rim			22.00 x 25TB
	Inflation pressure	Front tire	(bar)	3.0
		Rear tire	(bar)	2.0
Brakes	Service brake			Front-, rear-wheel independent system control, sealed multiple-disc wet-type disc brake With hydraulic booster
	Parking brake			Drive shaft, wet type disc brake Hydraulically released spring type

WEIGHT TABLE

⚠ This weight table is a guide for use when transporting or handling components.

Unit: kg

Machine model		WA470-3	
Serial No.		H20001 - H20668	
Engine		1120	
Radiator		168	
Transmission (including torque converter)		1,000	
Center drive shaft		36	
Front drive shaft		40	
Rear drive shaft		19	
Front axle		1,455	
Rear axle		1,466	
Front differential		235	
Rear differential		244	
Planetary carrier (each)		525	
Axle pivot (rear axle)		148	
Wheel (each)		243	
Tire (each)		404	
Steering valve		24	
Steering cylinder (each)		38	
Brake valve (R.H.)		8.5	
Hydraulic tank		231	
Hydraulic, PPC pump (tandem pump)		27	
Steering, switch pump (tandem pump)		20	
PPC valve		3	
Main control valve		90	
Lift cylinder (each)		192	
Bucket cylinder		222	
Engine hood		184	
Front frame		1,816	
Rear frame		1,435	
Bucket link		89	
Bellcrank		415	
Lift arm (including bushing)		1,440	
Bucket (with BOC)		1,967	

FILLING CAPACITIES AND SPECIFICATIONS OF THE LUBRICATING AND OPERATING MEANS

Up to SN WA470H20668

WA470-3	LUBRICANTS, FUEL ETC. AND FILLING CAPACITIES					
	Lubricants, fuel etc.	**BI code ****)**	**Quality grades**	**Temperature ranges**	**Viscosity ranges**	**Approx. filling capacity in litres**
Engine	Engine oil EO	EO 1540 A EO 1030 A EO 30 EO 10	CCMC D4 or, if not available, API CE or API CF -4 [2])	-10° to 50° C -20° to 40° C 0° to 40° C -20° to 10° C	SAE 15W-40 *) SAE 10W-30 SAE 30 SAE 10W	44 (38 **)
Transmission	Engine oil EO	EO 10	CCMC D4 or, if not available, API CD	-	SAE 10W	60
Axles with standard locking differentials type KWA 022 W-1 KWA 022 W-2	Universal transmission and hydraulic oil	NRS	Fuchs: RENOGEAR HYDRA ZF 20W-40*) Komatsu: AXO 75 Caltex: RPM TRACTOR HYDRAULIC FLUID Chevron: TRACTOR HYDRAULIC FLUID Texaco: TDH OIL Mobil: MOBILAND SUPER UNIVERSAL			2x65
	or engine oil EO	EO 30	CCMC D4 or, if not available, API CD	-	SAE 30	
Axles with multi-disc locking differentials type KWA 022 W-3 KWA 022 W-4	Universal transmission and hydraulic oil	NRS	Fuchs: RENOGEAR HYDRA ZF 20W-40*)			
Hydraulic system, steering, brakes	Hydraulic oil HYD	HYD 0530	HVLP, HVLP D	-35° to 50° C	ISO VG 46 *)	240 (155 **)
	or engine oil EO	EO 10	CCMC D4 or, if not available, API CD	-35° to 40° C	SAE 10W	
	or hydraulic oil BIO-E-HYD	BIO-E-HYD 0530	HEES (to VDMA fluid technology)	-35° to 50° C	ISO VG 46	
Cooling system	Long-life coolant with anti-frost and rust prevention SP-C	SP-C	Anti-frost and rust prevention			68
Fuel tank	Diesel fuel [3])	CFPP class B CFPP class D CFPP class E CFPP class F	DIN-EN 590	up to 0°C up to -10°C up to -15°C up to -20°C		400
Grease nipples, central lubrication	Multi-purpose grease MPG on a lithium base	MPG-A	KP2N-20	-10° to 50° C -35° to -10° C	NLGI 2 *) NLGI 0	
Air conditioning	Coolant Refrigerating machine oil	NRS NRS	R134a (CFC-free) PAG (polyalkylglycol oil)			1500 g 150 cm [3]

The specified filling capacities are approximate guidelines; test specifications are binding. The selection of the viscosity class depends on the predominantly existing outside temperature. The temperature limits are to be regarded as guidelines which can be exceeded up or down for a brief period.

*) Works filling **) Top-up quantity

[2]) If no engine oil of the API CE or API CF-4 specification is available, API CC or API CD-classified engine oil can be used alternatively. The oil change intervals must be split in half in this case, however.

[3]) If the fuel sulphur content is between 0.5 and 1.0 %, the oil change interval must be 1/2 normal. With a sulphur content of more than 1.0 %, the oil change interval must be 1/4 normal.

****) BI codes are the "standard lubricants" for construction machinery and vehicles of the Hauptverband der Deutschen Bauindustrie e.V (BI). The brochure "Regelschmierstoffe für Baumaschinen- und Fahrzeuge" (Standard Lubricants for Construction Machinery and Vehicles" can be obtained from bookstores or Bauverlag GmbH, Wiesbaden and Berlin, under the ISBN no. 3-7625-3102-1.

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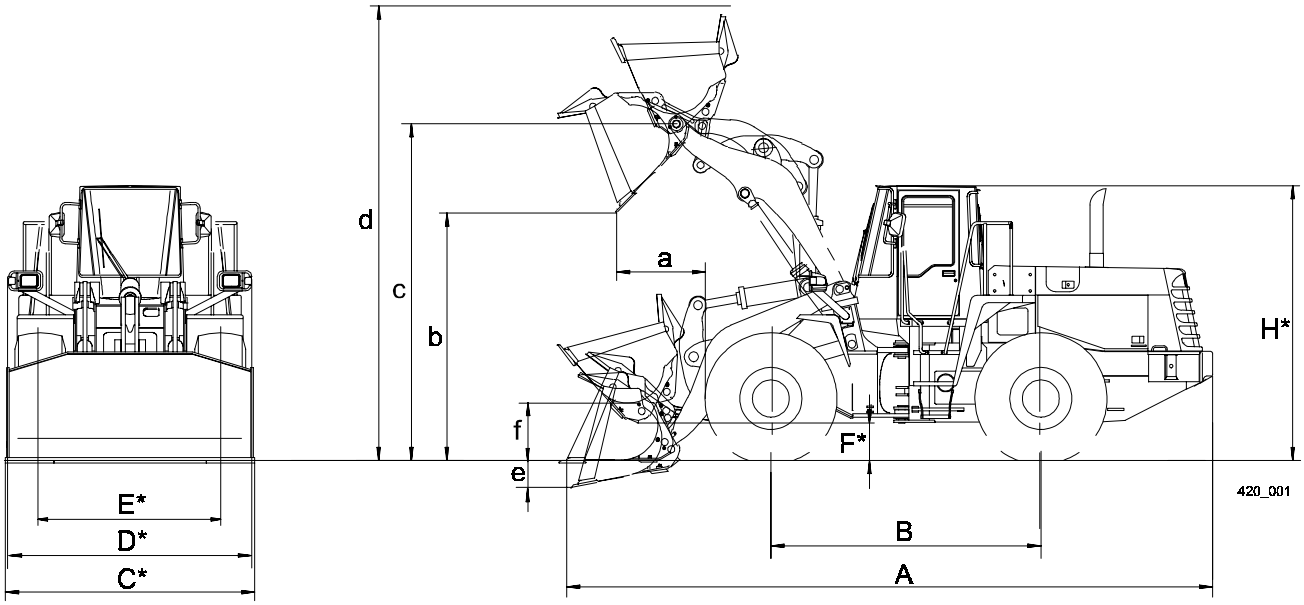
DIMENSIONS, WEIGHTS AND OPERATING DATA

SN WA470H20669 and up



Buckets

	Bucket capacity as per ISO 7546 m^3	4,2	4,3	4,6	4,7
	Pract. filling capacity (100-120%) m^3	4,2 -5,0	4,35-5,22	4,6 - 5,52	4,75 - 5,7
	Bucket width m	3,0	3,17	3,0	3,17
	Specific density t/m^3	1,8	1,75	1,6	1,55
	Bucket weight w/o teeth kg	2.107	2.186	2.228	2.308
	Stat. tipping weights, straight kg	18.310	18.219	18.119	18.125
	Stat. tipping weights, articulated 40° kg	16.090	15.992	15.898	15.895
	Breakout force hydraulic kN	181,2	182,5	171,9	176,1
	Hydraulic lifting capacity, on ground kN	243,3	246,7	243,4	243,1
	Operating weight kg	23.367*	23.447*	23.487*	23.567*
a	Reach at full lift 45° mm	1.276	1.266	1.326	1.301
b	Dumping height 45° mm	3.000	3.005	2.938	2.963
c	Lift height, hinge pin mm	4.220	4.220	4.220	4.220
d	Bucket to edge height mm	5.880	5.844	5.914	5.910
e	Digging depth mm	57	57	57	57
f	Carry height, hinge pin mm	425	425	425	425
A	Overall length mm	8.594	8.584	8.669	8.634
B	Wheelbase mm	3.400	3.400	3.400	3.400
C	Bucket width mm	3.000	3.170	3.000	3.170
D	Width less bucket mm	2.885	2.885	2.885	2.885
E	Track width mm	2.210	2.210	2.210	2.210
F	Ground clearance mm	489	489	489	489
H	Overall height mm	3.474	3.474	3.474	3.474

* This dimensions refer to machines with 26,5-25 L3 XHA tyres.

Special bucket sizes:
3,8 m^3 - v-edge bucket
4,1 m^3- HD bucket
6,5 m^3 - light material bucket

The standard buckets shown in the table can be supplied with bold on cutting edge.

SPECIFICATIONS

Machine model				WA470-3
Serial No.				H20669 to H20941
Engine	Model			Cummins MTA 11 (STC)
	Type			4-cycle, water-cooled, in-line, 6-cylinder, direct injection, with turbocharger
	No. of cylinders – bore x stroke		(mm)	6 – 125 mm x 147 mm
	Piston displacement		(cc)	10,800
	Flywheel horsepower		(kW (PS)/rpm)	202 (275)/ 2.100
	Maximum torque		(Nm/rpm)	1.299 / 1300
	Spec. fuel consumption		(g/kWh)	208
	High idling speed		(rpm)	2.200 - 2.300
	Low idling speed (no load)		(rpm)	750 - 780
	Starting motor			24 V 7.5 kW
	Alternator			24 V 50 A
	Battery			12 V 143 Ah x 2
Power train	Torque converter			3-element, 1-stage, single-phase (Komatsu TCA38-4Z)
	Transmission			Spur gear, constant-mesh multiple-disc, hydraulically actuated, modulation type
	Reduction gear			Spiral bevel gear, splash lubrication
	Differential			Straight bevel gear, torque proportioning
	Final drive			Planetary gear single stage, splash lubrication
Axle, wheel	Drive type			Front-, rear-wheel drive
	Front wheel			Fixed frame, full-floating type
	Rear wheel			Center pin support full-floating type
	Tire			26.5-25
	Wheel rim			22.00 x 25TB
	Inflation pressure	Front tire	(bar)	3.0
		Rear tire	(bar)	2.0
Brakes	Service brake			Front-, rear-wheel independent system control, sealed multiple-disc wet-type disc brake With hydraulic booster
	Parking brake			Drive shaft, wet type disc brake Hydraulically released spring type

Machine model				WA470-3
Serial No.				H20669 to H20941
Steering system	Type			Articulated steering
	Structure			Recirculating ball type Hydraulically actuated
Hydraulic system	Hydraulic pump type			Gear pump
	Delivery (l /min.)	Hydraulic pump		302
		Switch pump		122
		Steering pump		124
		PPC/brake pump		62
	Control valve	Set pressure for work equipment	(MPa (bar))	2-spool type 20.58 (210)
		Set pressure for steering	(MPa (bar))	Spool type 20.58 (210)
	Cylinder	Boom cylinder No. – bore x stroke	(mm)	Reciprocating piston 2 – 180 x 746
		Bucket cylinder No. – bore x stroke	(mm)	Reciprocating piston 1 – 200 x 550
		Steering cylinder No. – bore x stroke	(mm)	Reciprocating piston 2 – 100 x 440
Work equipment	Actuation lever			Mono (Double/Joystick as Option)
	Bucket edge type			Flat edge with BOC

WEIGHT TABLE

⚠ This weight table is a guide for use when transporting or handling components.

Unit: kg

Machine model		WA470-3	
Serial No.		H20669 - H20941	
Engine		981	
Radiator		168	
Transmission (including torque converter)		1,000	
Center drive shaft		36	
Front drive shaft		40	
Rear drive shaft		19	
Front axle		1,455	
Rear axle		1,466	
Front differential		235	
Rear differential		244	
Planetary carrier (each)		525	
Axle pivot (rear axle)		148	
Wheel (each)		243	
Tire (each)		404	
Steering valve		24	
Steering cylinder (each)		38	
Brake valve (R.H.)		8.5	
Hydraulic tank		231	
Hydraulic, PPC pump (tandem pump)		27	
Steering, switch pump (tandem pump)		20	
PPC valve		3	
Main control valve		90	
Lift cylinder (each)		192	
Bucket cylinder		222	
Engine hood		184	
Front frame		1,816	
Rear frame		1,435	
Bucket link		89	
Bellcrank		415	
Lift arm (including bushing)		1,440	
Bucket		2,107	

FILLING CAPACITIES AND SPECIFICATIONS OF THE LUBRICATING AND OPERATING MEANS

From SN WA470H20669 up to H20941

WA470-3	LUBRICANTS, FUEL ETC. AND FILLING CAPACITIES					
	Lubricants, fuel etc.	**BI code ****)**	**Quality grades**	**Temperature ranges**	**Viscosity ranges**	**Approx. filling capacity in litres**
Engine	Engine oil EO	EO 1540 A EO 1030 A EO 30 EO 10	CCMC D4 or, if not available, API CE or API CF -4 [2])	-10° to 50° C -20° to 40° C 0° to 40° C -20° to 10° C	SAE 15W-40 *) SAE 10W-30 SAE 30 SAE 10W	44 (34 **)
Transmission	Engine oil EO	EO 10	CCMC D4 or, if not available, API CD	-	SAE 10W	60 (60 **)
Axles with standard locking differentials type KWA 022 W-1 KWA 022 W-2	Universal transmission and hydraulic oil	NRS	Fuchs: RENOGEAR HYDRA ZF 20W-40*) Komatsu: AXO 75 Caltex: RPM TRACTOR HYDRAULIC FLUID Chevron: TRACTOR HYDRAULIC FLUID Texaco: TDH OIL Mobil: MOBILAND SUPER UNIVERSAL			2x65
	or engine oil EO	EO 30	CCMC D4 or, if not available, API CD	-	SAE 30	
Axles with multi-disc locking differentials type KWA 022 W-3 KWA 022 W-4	Universal transmission and hydraulic oil	NRS	Fuchs: RENOGEAR HYDRA ZF 20W-40*)			
Hydraulic system, steering, brakes	Hydraulic oil HYD	HYD 0530	HVLP, HVLP D	-35° to 50° C	ISO VG 46 *)	240 (155 **)
	or engine oil EO	EO 10	CCMC D4 or, if not available, API CD	-35° to 40° C	SAE 10W	
	or hydraulic oil BIO-E-HYD	BIO-E-HYD 0530	HEES (to VDMA fluid technology)	-35° to 50° C	ISO VG 46	
Cooling system	Long-life coolant with anti-frost and rust prevention SP-C	SP-C	Anti-frost and rust prevention			68
Fuel tank	Diesel fuel [3])	CFPP class B CFPP class D CFPP class E CFPP class F	DIN-EN 590	up to 0°C up to -10°C up to -15°C up to -20°C		381
Grease nipples, central lubrication	Multi-purpose grease MPG on a lithium base	MPG-A	KP2N-20	-10° to 50° C -35° to -10° C	NLGI 2 *) NLGI 0	
Air conditioning	Coolant Refrigerating machine oil	NRS NRS	R134a (CFC-free) PAG (polyalkylglycol oil)			1500 g 150 cm [3]

The specified filling capacities are approximate guidelines; test specifications are binding. The selection of the viscosity class depends on the predominantly existing outside temperature. The temperature limits are to be regarded as guidelines which can be exceeded up or down for a brief period.

*) Works filling **) Top-up quantity

[2]) If no engine oil of the API CE or API CF-4 specification is available, API CC or API CD-classified engine oil can be used alternatively. The oil change intervals must be split in half in this case, however.

[3]) If the fuel sulphur content is between 0.5 and 1.0 %, the oil change interval must be 1/2 normal. With a sulphur content of more than 1.0 %, the oil change interval must be 1/4 normal.

****) BI codes are the "standard lubricants" for construction machinery and vehicles of the Hauptverband der Deutschen Bauindustrie e.V. (BI). The brochure "Regelschmierstoffe für Baumaschinen- und Fahrzeuge" (Standard Lubricants for Construction Machinery and Vehicles" can be obtained from bookstores or Bauverlag GmbH, Wiesbaden and Berlin, under the ISBN no. 3-7625-3102-1.

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Machine model				WA470-3
Serial No.				H20942 and up
Engine	Model			Komatsu SA6D125E-2
	Type			4-cycle, water-cooled, in-line, 6-cylinder, direct injection, with turbocharger
	No. of cylinders – bore x stroke		(mm)	6 – 125 mm x 150 mm
	Piston displacement		(cc)	11,040
	Flywheel horsepower		(kW (PS)/rpm)	194 (264) / 2,200
	Maximum torque		(Nm (kgm)/rpm)	1,050 (107) / 1400
	–			–
	High idling speed		(rpm)	2,350 - 2,450
	Low idling speed		(rpm)	700 - 750
	Starting motor			24 V 7.5 kW
	Alternator			24 V 50 A
	Battery			12 V 143 Ah x 2
Power train	Torque converter			3-element, 1-stage, single-phase (Komatsu TCA38-4Z)
	Transmission			Spur gear, constant-mesh multiple-disc, hydraulically actuated, modulation type
	Reduction gear			Spiral bevel gear, splash lubrication
	Differential			Straight bevel gear, torque proportioning
	Final drive			Planetary gear single stage, splash lubrication
Axle, wheel	Drive type			Front-, rear-wheel drive
	Front wheel			Fixed frame, full-floating type
	Rear wheel			Center pin support full-floating type
	Tire			26.5-25-16PR
	Wheel rim			22.00 x 25TB
	Inflation pressure	Front tire	(bar)	3.0
		Rear tire	(bar)	2.0
Brakes	Service brake			Front-, rear-wheel independent system control, sealed multiple-disc wet-type disc brake With hydraulic booster
	Parking brake			Drive shaft, wet type disc brake Hydraulically released spring type

WEIGHT TABLE

⚠ This weight table is a guide for use when transporting or handling components.

Unit: kg

Machine model		WA470-3	
Serial No.		H20942 and up	
Engine		1250	
Radiator		168	
Transmission (including torque converter)		1,000	
Center drive shaft		36	
Front drive shaft		40	
Rear drive shaft		19	
Front axle		1,455	
Rear axle		1,466	
Front differential		235	
Rear differential		244	
Planetary carrier (each)		525	
Axle pivot (rear axle)		148	
Wheel (each)		243	
Tire (each)		404	
Steering valve		24	
Steering cylinder (each)		38	
Brake valve (R.H.)		8.5	
Hydraulic tank		231	
Hydraulic, PPC pump (tandem pump)		27	
Steering, switch pump (tandem pump)		20	
PPC valve		3	
Main control valve		90	
Lift cylinder (each)		192	
Bucket cylinder		222	
Engine hood		184	
Front frame		1,816	
Rear frame		1,435	
Bucket link		89	
Bellcrank		415	
Lift arm (including bushing)		1,440	
Bucket (with BOC)		1,967	

FILLING CAPACITIES AND SPECIFICATIONS OF THE LUBRICATING AND OPERATING MEANS

WA470H20942 and up

WA470-3	LUBRICANTS, FUEL ETC. AND FILLING CAPACITIES					
	Lubricants, fuel etc.	**BI code ****)**	**Quality grades**	**Temperature ranges**	**Viscosity ranges**	**Approx. filling capacity in litres**
Engine	Engine oil EO	EO 1540 A EO 1030 A EO 30 EO 10	CCMC D4 or, if not available, API CE or API CF -4 [2])	-10° to 50° C -20° to 40° C 0° to 40° C -20° to 10° C	SAE 15W-40 *) SAE 10W-30 SAE 30 SAE 10W	44 (38 **)
Transmission	Engine oil EO	EO 10	CCMC D4 or, if not available, API CD	-	SAE 10W	60
Axles with standard locking differentials type KWA 022 W-1 KWA 022 W-2	Universal transmission and hydraulic oil	NRS	Fuchs: RENOGEAR HYDRA ZF 20W-40*) Komatsu: AXO 75 Caltex: RPM TRACTOR HYDRAULIC FLUID Chevron: TRACTOR HYDRAULIC FLUID Texaco: TDH OIL Mobil: MOBILAND SUPER UNIVERSAL			2x65
	or engine oil EO	EO 30	CCMC D4 or, if not available, API CD	-	SAE 30	
Axles with multi-disc locking differentials type KWA 022 W-3 KWA 022 W-4	Universal transmission and hydraulic oil	NRS	Fuchs: RENOGEAR HYDRA ZF 20W-40*)			
Hydraulic system, steering, brakes	Hydraulic oil HYD	HYD 0530	HVLP, HVLP D	-35° to 50° C	ISO VG 46 *)	240 (155 **)
	or engine oil EO	EO 10	CCMC D4 or, if not available, API CD	-35° to 40° C	SAE 10W	
	or hydraulic oil BIO-E-HYD	BIO-E-HYD 0530	HEES (to VDMA fluid technology)	-35° to 50° C	ISO VG 46	
Cooling system	Long-life coolant with anti-frost and rust prevention SP-C	SP-C	Anti-frost and rust prevention			68
Fuel tank	Diesel fuel [3])	CFPP class B CFPP class D CFPP class E CFPP class F	DIN-EN 590	up to 0°C up to -10°C up to -15°C up to -20°C		400
Grease nipples, central lubrication	Multi-purpose grease MPG on a lithium base	MPG-A	KP2N-20	-10° to 50° C -35° to -10° C	NLGI 2 *) NLGI 0	
Air conditioning	Coolant Refrigerating machine oil	NRS NRS	R134a (CFC-free) PAG (polyalkylglycol oil)			1500 g 150 cm [3]

The specified filling capacities are approximate guidelines; test specifications are binding. The selection of the viscosity class depends on the predominantly existing outside temperature. The temperature limits are to be regarded as guidelines which can be exceeded up or down for a brief period.

*) Works filling **) Top-up quantity

[2]) If no engine oil of the API CE or API CF-4 specification is available, API CC or API CD-classified engine oil can be used alternatively. The oil change intervals must be split in half in this case, however.

[3]) If the fuel sulphur content is between 0.5 and 1.0 %, the oil change interval must be 1/2 normal. With a sulphur content of more than 1.0 %, the oil change interval must be 1/4 normal.

****) BI codes are the "standard lubricants" for construction machinery and vehicles of the Hauptverband der Deutschen Bauindustrie e.V (BI). The brochure "Regelschmierstoffe für Baumaschinen- und Fahrzeuge" (Standard Lubricants for Construction Machinery and Vehicles" can be obtained from bookstores or Bauverlag GmbH, Wiesbaden and Berlin, under the ISBN no. 3-7625-3102-1.

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Note 1

Axle oils (AXO)

The selection of the oils depends on the equipment of the axle:

1a: Standard axles TPD (without multi-disc limited-slip differential)

Characteristics: Type KWA 022 W-1, front
Type KWA 022 W-2, rear

These axles must be filled with the following recommended oil brands:

FUCHS:	RENOGEAR HYDRA ZF 20W-40
KOMATSU:	AX0 75.
CALTEX:	RPM TRACTOR HYDRAULIC FLUID
CHEVRON:	TRACTOR HYDRAULIC FLUID
TEXACO:	TDH OIL
MOBIL:	MOBILAND SUPER UNIVERSAL

For reasons of harmonization, engine oil in accordance API CD/SAE 30 may be used in the standard axle instead of axle oil. Any noises from the brakes do not affect the life.

1b: Axles with multi-disc limited-slip differential

Characteristics: Type KWA 022 W-3, front
Type KWA 022 W-4, rear

These must be filled with

FUCHS: RENOGEAR HYDRA ZF 20W-40

The use of not recommended axle oils may cause unnormal noises from the differential.

- Only use original Komatsu parts for replacement.
- When changing or adding oil, do not use a different type of oil.
- Unless otherwise specified, the oil and coolant used at the time of shipment are as shown in the table below.

Item	Lubricating and operating means
Engine	Engine oil: API CD, SAE 10W-30
Transmission	Engine oil: API CD, SAE 10W
Axles **	For machines with standard differential TPD: Axle oil: FUCHS RENOGEAR HYDRA ZF 20W-40 or AXO75 For machines with multiple-disk limited-slip differential: Axle oil: FUCHS RENOGEAR HYDRA ZF 20W-40
Hydraulik tank	Hydraulic oil: H-LP, DIN 51 524, part 2, ISO VG 46 or Engine oil: SAE 10 W, API classification CD
Lubricating nipple	EP lubricating grease on lithium basis, NLGI 2
Fuel	ASTM D975: No. 2 ASTM D975: No. 1 in winter (from October to March)
Radiator	Komatsu super coolant AF-ACL, mixed with 30 % water
Air conditioner	cfw free refrigerant R 134a

) For more details refer to **Note1.

Oil

- Oil is used in the engine and work equipment under extremely severe conditions (high temperature, high pressure), and it deteriorates with use.
  Always use oil that matches the grade and temperature given in the Operation and Maintenance Manual.
  Even if the oil is not dirty, always replace the oil after the specified interval.

- Oil can be compared to blood in the human body, so always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from penetrating.
  The majority of problems with machines are caused by the entry of such impurities.
  Take particular care not to let any impurities penetrate when storing or adding oil.

- Never mix oils of different grades or brands.

- Always add the specified amount of oil.
  Having too much oil or too little oil may both cause problems.

- If the oil in the work equipment is not clear, there is probably water or air getting into the circuit. In such cases, please contact your Komatsu distributor.

- When changing the oil, always replace the related filters at the same time.

- We recommend to have an analysis of the oil made periodically to check the condition of the machine. Those who wish to use this service, are requested to their Komatsu distributor.

FUEL

- The fuel pump is a precision instrument; if fuel containing water or dirt is used, it cannot work properly.
- Be extremely careful not to let impurities penetrate when storing or adding fuel.
- Always use the fuel specified in the Operation and Maintenance Manual.
  Fuel may congeal depending on the temperature (particularly at low temperatures below -15 °C), so change to a fue matching this temperature.
- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.
- If the fuel sulphur content is between 0.5 and 1.0 %, the oil change interval must be 1/2 normal.
  If the fuel sulphur content is more 1.0 %, the oil change interval must be 1/4 normal.

COOLANT

- River water contains large amounts of calcium and other impurities, so if it is used, scale will stick to the engine and radiator causing a defective heat exchange and overheating.
- Do not use water that is not suitable for drinking.
- When using anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.
- Komatsu machines are supplied with Komatsu original anti-freeze in the coolant when the machine is shipped.
  This anti-freeze prevents corrosion in the cooling system.
  The anti-freeze can be used continuously for two years or 4000 hours. Therefore, it can be used as it is even in hot areas.
- Anti- freeze is flammable, so be extremely careful not to expose it to open flame or fire.
- The proportion of anti-freeze to water differs according to the ambient temperature.
  For details of the mixing ratios, see "24.2.2 CLEANING THE INSIDE OF THE COOLING SYSTEM".
- If the engine overheats, wait for the engine to cool before adding coolant.
- If the coolant level is low, it will cause overheating and corrosion due to the air in the coolant.

GREASE

- Grease is used to prevent twisting and noise at the joints.
- The nipples not included in the maintenance section are nipples for overhaul, so they need not be lubricated. If any part becomes stiff after being used for a long time, add grease.
- Always wipe off all of the old grease that is pushed out when greasing. Be particularly careful to wipe off the old grease in places where sand or dirt in the grease would cause the rotating parts to wear.

STORING OIL AND FUEL

- Keep oil and fuel indoors to prevent any water, dirt or other impurities from penetrating.
- When keeping barrels for a long period, lay down the barrel on its side so that the filler port is at the side (to prevent moisture from being sucked in).
  If barrels have to be stored outside, cover them with a waterproof sheet or take other measures to protect them.
- To prevent any change in quality during long term storage, be sure to use in the order of 'first in - first out' (use the oldest oil or fuel first).

FILTERS

- Filters are extremely important safety parts. They prevent impurities in the fuel and air circuits from entering important equipment and causing problems.
  Replace all filters periodically. For details, see the Operation and Maintenance Manual.
  However, when working under severe conditions, it is necessary to consider replacing the filters at shorter intervals according to the oil and fuel (sulfur content) being used.
- Never try to clean the filters (cartridge type) and use them again. Always replace with new filters.
- When replacing oil filters, check if any metal particles are stuck to the old filter. If any metal particles are found, please contact your Komatsu distributor.
- Do not open packs of spare filters until just before they are to be used.
- Always use original Komatsu filters.

BIODEGRADABLE HYDRAULIC OILS AND LUBRICANTS

- The use of biodegradable hydraulic oils and lubricants - on the basis of synthetic esters - for Komatsu machines is permitted. For information on the products cleared for use and best suited for your application contact our authorized service workshops.

OUTLINE OF ELECTRIC SYSTEM

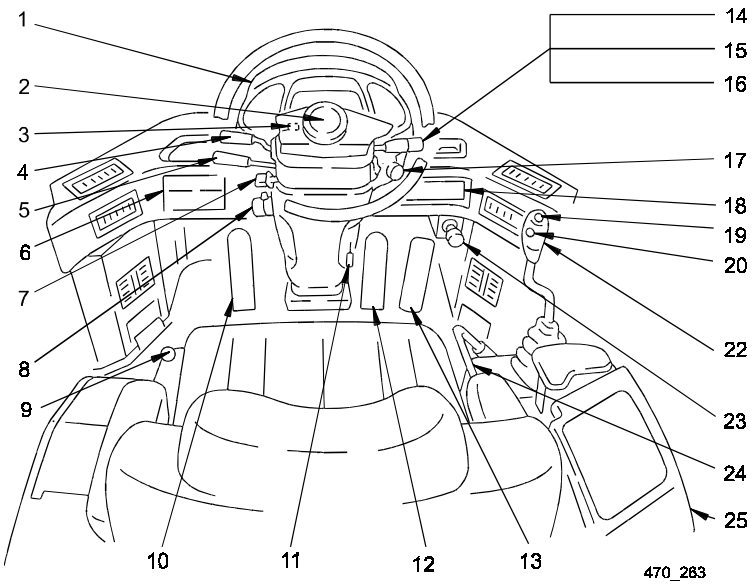
- If the wiring gets wet or the insulation is damaged, the electric system leaks resulting in hazardous malfunctions of the machine.
- Maintenance work at the electric system includes: (1) check fan belt tension, (2) check damage or wear to the fan belt and (3) check battery fluid level.
- Never remove or disassemble any electric components installed in the machine.
- Never install any electric components other than those specified by Komatsu.
- Be careful to keep the electric system free of water when washing the machine or when it is raining.
- When working on the seashore, carefully clean the electric system to prevent corrosion.
- The optional power source must never be connected to the fuse, starter switch, or battery relay.

GENERAL VIEW OF CONTROLS AND GAUGES

STANDARD TYPE

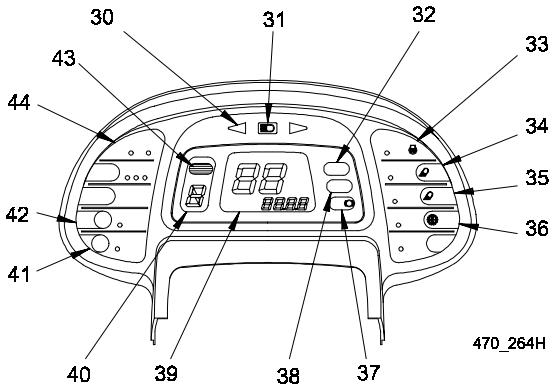
1 Main monitor
2 Horn switch
3 Hazard lamp switch
4 Directional lever
5 Speed control lever
6 Air conditioner panel
7 Speed control lever stopper
8 Wiper switch
9 Parking brake lever
10 Brake pedal
11 Steering column tilt lever
12 Brake pedal
13 Accelerator pedal
14 Lamp switch
15 Turn signal lever
16 Dimmer switch
17 Starting switch
18 Car radio
19 Kickdown switch
20 Gear hold position

22 Lift arm and bucket control lever
23 Cigarette lighter
24 Safety lock
25 Maintenance monitor



GENERAL VIEW

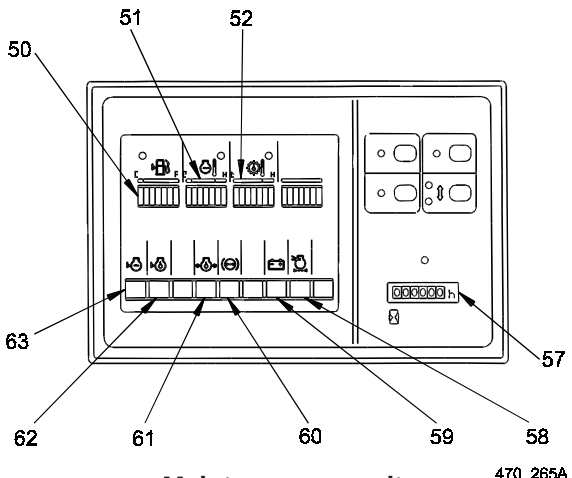
30 Turn signal pilot lamp
31 High beam pilot lamp
32 Centralized checking lamp
33 Engine pre-heating pilot lamp
34 Pilot lamp for front working lamp
35 Pilot lamp for rear working lamp
36 Transmission cut-off selector pilot lamp
37 Parking brake pilot lamp
38 Central warning lamp
39 Speedometer
40 Transmission shift indicator
41 ALS Electronic
42 Auto-greasing switch
43 HOLD signal
44 Emergency steering operating monitor
45 Work mode selector switch / *SN: WA470H21164*
46 Autoshift transmission pilot switch / *SN: WA470H21104*



Main monitor

50 Fuel gauge
51 Engine cooling water temperature gauge
52 Torque converter oil temperature gauge

57 Service meter
58 Air cleaner clogging warning pilot lamp
59 Charge monitor
60 Brake oil pressure warning pilot lamp
61 Engine oil pressure warning lamp
62 Engine oil level warning pilot lamp
63 Engine water level warning lamp



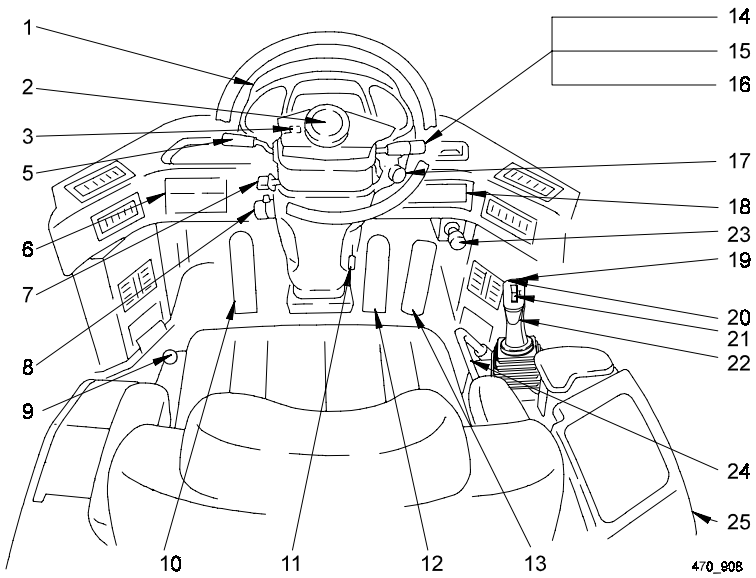
Maintenance monitor

GENERAL VIEW OF CONTROLS AND GAUGES

WITH MULTI-FUNCTION CONTROL LEVER (if installed)

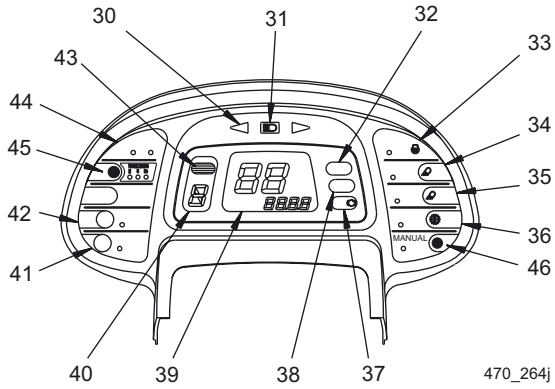
1. Main monitor
2. Horn switch
3. Hazard lamp switch

5. Speed control lever
6. Air conditioner panel
7. Speed control lever stopper
8. Wiper switch
9. Parking brake lever
10. Brake pedal
11. Steering column tilt lever
12. Brake pedal
13. Accelerator pedal
14. Lamp switch
15. Turn signal lever
16. Dimmer switch
17. Starting switch
18. Car radio
19. Kickdown switch
20. Gear hold position
21. Directional lever
22. Multi-function control lever
23. Cigarette lighter
24. Safety lock
25. Maintenance monitor



GENERAL VIEW

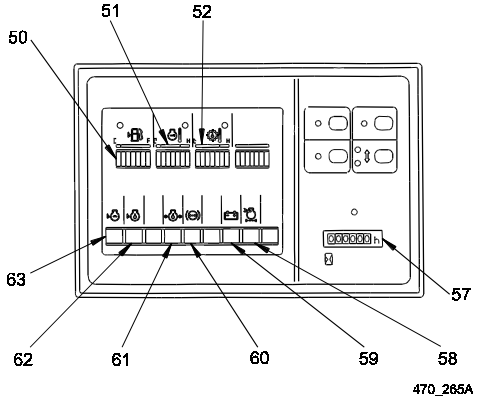
30. Turn signal pilot lamp
31. High beam pilot lamp
32. Centralized checking lamp
33. Engine pre-heating pilot lamp
34. Pilot lamp for front working lamp
35. Pilot lamp for rear working lamp
36. Transmission cut-off selector pilot lamp
37. Parking brake pilot lamp
38. Central warning lamp
39. Speedometer
40. Transmission shift indicator
41. ALS-Electronic
42. Auto-greasing switch
43. Hold signal
44. Emergency steering operating monitor
45. Work mode selector switch / *SN: WA470H21164*
46. Autoshift transmission pilot switch / *SN: WA470H21104*



MAIN MONITOR

50. Fuel gauge
51. Engine cooling water temperature gauge
52. Torque converter oil temperature gauge

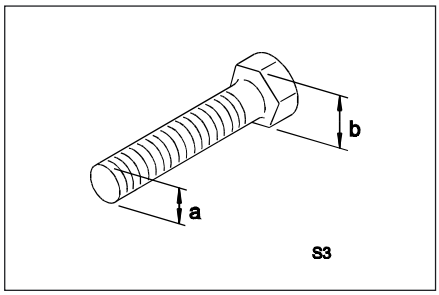
57. Service meter
58. Air cleaner clogging warning pilot lamp
59. Charge monitor
60. Brake oil pressure warning pilot lamp
61. Engine oil pressure warning lamp
62. Engine oil level warning pilot lamp
63. Engine water level warning lamp



MAINTENANCE MONITOR

TORQUE LIST

Unless otherwise specified, tighten the metric bolts and nuts to the torque shown in the table. The tightening torque is determined by the width across flats of the nut and bolt. If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.



Tread diameter of the bolt (mm) (a)	Width across flat (mm) (b)	(T) (H) S2		
		Nm	kgm	lbft
6	10	13.2 ± 1.4	1.35 ± 0.15	9.73 ± 1.03
8	13	31,4 ± 2,9	3,2 ± 0,3	23.2 ± 2.1
10	17	65,7 ± 6,8	6,7 ± 0,7	48.5 ± 5.0
12	19	112 ± 9,8	11,5 ± 1,0	82.6 ± 7.2
14	22	177 ± 19	18,0 ± 2,0	131 ± 14
16	24	279 ± 29	28.5 ± 3	206 ± 21
18	27	383 ± 39	39 ± 3	282 ± 29
20	30	549 ± 58	56 ± 6	405 ± 43
22	32	745 ± 78	76 ± 8	549 ± 58
24	36	927 ± 98	94.5 ± 10	684 ± 72
27	41	1320 ± 140	135 ± 15	973 ± 100
30	46	1720 ± 190	175 ± 20	1270 ± 140
33	50	2210 ± 240	225 ± 25	1630 ± 180
36	55	2750 ± 290	280 ± 30	2030 ± 210
39	60	3280 ± 340	335 ± 35	2420 ± 250

NOTE
When tightening panels or other parts having tightening fixtures made of plastic, be careful not to use excessive tightening torque: doing so will damage the plastic parts.