WSM

WORKSHOP MANUAL
TRACTOR

BX1500

Kubota

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SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol" is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully.It is essential that you read the instructions and safety regulations before you attempt to repair or use this unit.

DANGER
- Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

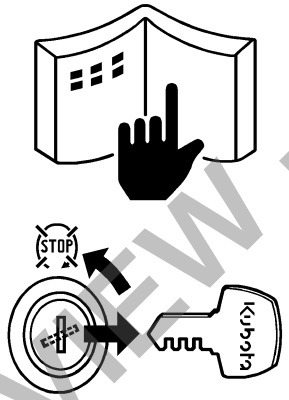
WARNING
- Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
- Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

IMPORTANT
- Indicates that equipment or property damage could result if instructions are not followed.

NOTE
- Gives helpful information.

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BEFORE SERVICING AND REPAIRING

- Read all instructions and safety instructions in this manual and on your machine safety decals.
- Clean the work area and machine.
- Park the machine on a firm and level ground, and set the parking brake.
- Lower the implement to the ground.
- Stop the engine, and remove the key
- Disconnect the battery negative cable
- Hang a **"DO NOT OPERATE"** tag in operator station.

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SAFETY STARTING

- Do not start the engine by shorting across starter terminals or bypassing the safety start switch.
- Do not alter or remove any part of machine safety system.
- Before starting the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
- Never start the engine while standing on ground. Start the engine only from operator's seat.

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SPECIFICATIONS

Model			BX1500
PTO power			7.9 kW (10.6 HP)*
Engine	Maker		KUBOTA
	Model		Z602-E
	Type		Indirect injection. Vertical, water-cooled, 4-cycle diesel
	Number of cylinder		2
	Bore and stroke		72 x 73.6 mm (2.83 x 2.90 in.)
	Total displacement		599 cm^3 (36.6 cu.in.)
	Engine gross power (DIN)		11.2 kW (15.0 HP)
	Rated revolution		53.3 r/s [3200 min^{-1} (rpm)]
	Maximum torque		35.0 N·m (3.57 kgf·m, 25.8 ft-lbs) / 36.7 to 43.3 r/s [2200 to 2600 min^{-1} (rpm)]
	Battery		12 V, CCA : 435 A, RC : 62 min.
	Starting system		Electric starting with cell starter, 12 V, 1.0 kW
	Lubrication system		Forced lubrication by trochoidal pump
	Cooling system		Pressurized radiator, forced circulation with water pump
	Fuel		Diesel fuel No.2-D [above -10 ℃(14 ℉)], Diesel fuel No.1[below -10 ℃ (14 ℉)
Capacities	Fuel tank		17 L (4.5 U.S.gals, 3.7 Imp.gals)
	Engine crankcase (with filter)		1.9 L (2.01 U.S.qts, 1.67 Imp.qts)
	Engine coolant (with recovery tank)		2.9 L (3.06 U.S.qts, 2.55 Imp.qts)
	Transmission case		10.1 L (2.7 U.S.gals, 2.2 Imp.gals)
	Front axle case		2.3 L (2.43 U.S.qts, 2.02 Imp.qts)
Dimensions	Overall length (without 3P)		1905 mm (75.0 in.)
	Overall width		1130 mm (44.5 in.)
	Overall height (with ROPS)		1765 mm (69.5 in.)
	Overall height (top of steering wheel)		1197 mm (47.1 in.)
	Wheel base		1340 mm (52.8 in.)
	Minimum ground clearance (bottom of hitch bracket)		142 mm (5.6 in.)
	Tread	Front	885 mm (34.8 in.)
		Rear	820 mm (32.2 in.)
Weight (with ROPS)			550 kg (1213 lbs)
Traveling system	Tires	Front	16 x 7.50 - 8 (Turf)
		Rear	24 x 12.00 - 12 (Turf)
	Steering		Hydrostatic power steering
	Transmission		Main-hydrostatic transmission, Range gear shift (2 forward and 2 reverse)
	Brake		Wet disc type
	Min. turning radius (without brake)		2.18 m (7.15 feet)
	Differential		Bevel gear

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6. MAINTENANCE CHECK LIST

No.	Item	Period	Indication on hour meter										Important		Reference page
			50	100	150	200	250	300	350	400	450	500			
1	Engine oil	Change	★	☆		☆		☆		☆		☆			G-15
2	Engine oil filter	Replace	★			☆				☆					G-15
3	Transmission oil filter	Replace	★					☆							G-16
4	Transmission fluid	Change	★					☆							G-16
5	Transmission strainer	Clean						☆							G-26
6	Front axle case oil	Change						☆							G-26
7	Front axle pivot	Adjust								☆					G-27
8	Engine start system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆			G-17
9	Greasing	-	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆			G-18
10	Wheel bolt torque	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆			G-18
11	Battery condition	Check		☆		☆		☆		☆		☆	*4		G-19
12	Air cleaner element	Clean		☆		☆		☆		☆		☆	*1	@	G-21
		Replace											*2		G-28
13	Fuel filter element	Check		☆		☆		☆		☆		☆		@	G-22
		Replace										☆			G-27
14	Fan belt	Adjust		☆		☆		☆		☆		☆			G-22
15	HST neutral spring	Adjust		☆		☆		☆		☆		☆			G-23
16	Brake	Adjust		☆		☆		☆		☆		☆			G-23
17	Radiator hose and clamp	Check				☆				☆					G-24
		Replace													G-28
18	Power steering oil line	Check				☆				☆					G-24
		Replace													G-28
19	Fuel line	Check		☆		☆		☆		☆		☆		@	G-22
		Replace													G-28
20	Intake air line	Check				☆				☆				@	G-25
		Replace											*3		G-28
21	Toe-in	Adjust				☆				☆					G-25
22	Engine valve clearance	Adjust													G-27
23	Fuel injection nozzle injection pressure	Check												@	G-27
24	Injection pump	Check												@	G-28
25	Cooling system	Flush													G-29
26	Coolant	Change													G-29
27	Fuel system	Bleed													G-31
28	Fuse	Replace													G-31
29	Light bulb	Replace													G-32

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4. LUBRICANTS, FUEL AND COOLANT

No.	Place	Capacity	Lubricants, fuel and coolant
		BX1500	
1	Fuel tank	17.0 L 4.5 U.S.gals 3.7 Imp.gals.	No. 2-D diesel fuel No. 1-D diesel fuel if temperature is below -10 °C (14 °F)
2	Cooling system with recovery tank	2.9 L 3.06 U.S.qts. 2.55 Imp.qts.	Fresh clean water with anti-freeze
3	Engine crankcase	1.9 L 2.01 U.S.qts. 1.67 Imp.qts.	Engine oil: API service classification CD, CE or CF Below 0 °C (32 °F) : SAE10W, 10W-30 or 10W-40 0 to 25 °C (32 to 77 °F) : SAE20, 10W-30 or 10W-40 Above 25 °C (77 °F) : SAE30, 10W-30 or 10W-40
4	Transmission case	10.1 L 2.7 U.S.gals. 2.2 Imp.gals.	KUBOTA SUPER UDT fluid*
5	Front axle case	2.3 L 2.43 U.S.qts. 2.02 Imp.qts.	KUBOTA SUPER UDT fluid or SAE80, 90 gear oil

Greasing				
No.	**Place**	**No. of greasing point**	**Capacity**	**Type of grease**
6	Battery terminal	2	Moderate amount	Multipurpose type grease
7	Speed control pedal	1	Until grease overflow	

*KUBOTA original transmission hydraulic fluid.

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3. TIGHTENING TORQUES

Tightening torques of screws and nuts on the table below are especially specified.
(For general use screws and nuts : See page G-9.)

Item	Size x Pitch	N·m	kgf·m	ft-lbs
Under cover mounting screw and nut	M6 x 1	7.8 to 8.8	0.8 to 0.9	5.8 to 6.5
Balance mounting screw	M12 x 1.25	88.8 to 90.2	9.1 to 9.2	65.5 to 66.5
Front coupling mounting screw	M8 x 1.25	23.5 to 27.4	2.4 to 2.8	17.3 to 20.2
Engine mounting nut	M8 x 1.25	23.5	2.4	17.3
Cushion mounting nut	M8 x 1.25	23.5	2.4	17.3
Air cleaner stay screw	M8 x 1.25	23.5 to 27.4	2.4 to 2.8	17.4 to 20.3
Engine support screw	M10 x 1.25	48.0 to 55.9	4.9 to 5.7	35.4 to 41.2
Balancer stay screw	M10 x 1.25	48.0 to 55.9	4.9 to 5.7	35.4 to 41.2
*Cylinder head cover cap screw	M6 x 1	6.86 to 11.3	0.7 to 1.15	5.1 to 8.3
Injection pipe retaining screw	M12 x 1.5	24.5 to 34.3	2.5 to 3.5	18.1 to 25.3
Overflow pipe retaining nut	M12 x 1.5	19.6 to 24.5	2.0 to 2.5	14.5 to 18.1
Nozzle holder assembly	M20 x 1.5	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Glow plug	M8 x 1	7.84 to 14.7	0.8 to 1.5	5.8 to 10.8
*Rocker arm bracket screw	M6 x 1	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
*Cylinder head screw	M8 x 1.25	37.2 to 42.1	3.8 to 4.3	28.0 to 31.7
*Fan drive pulley screw	M12 x 1.5	98.0 to 107.8	10.0 to 11.0	73.8 to 79.5
*Idle gear shaft mounting screw	M6 x 1	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
*Connecting rod screw	M7 x 0.75	26.5 to 30.4	2.7 to 3.1	19.5 to 22.4
*Flywheel screw	M10 x 1.25	53.9 to 58.8	5.5 to 6.0	39.8 to 43.4
Bearing case cover mounting screw	M6 x 1	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
*Main bearing case screw 2	M7 x 1	26.5 to 30.4	2.7 to 3.1	19.5 to 22.5
*Main bearing case screw 1	M6 x 1	12.7 to 15.7	1.3 to 1.6	9.37 to 11.6
Nozzle holder	-	34.3 to 39.2	2.0 to 2.5	25.3 to 28.9
Oil pressure switch	PT 1/8	14.7 to 19.6	1.5 to 2.0	10.8 to 14.5

■ **NOTE**

- **In removing and applying the screws and nuts marked with "*", a pneumatic wrench or similar pneumatic tool, if employed, must be used with enough care not to get them seized.**
- **For * marked screws and nuts on the table, apply engine oil to their threads and seats before tightening.**
- **The letter "M" in Size x Pitch means that the screw or nut dimension stands for metric. The size is the nominal outside diameter in mm of the threads. The pitch is the nominal distance in mm between two threads.**

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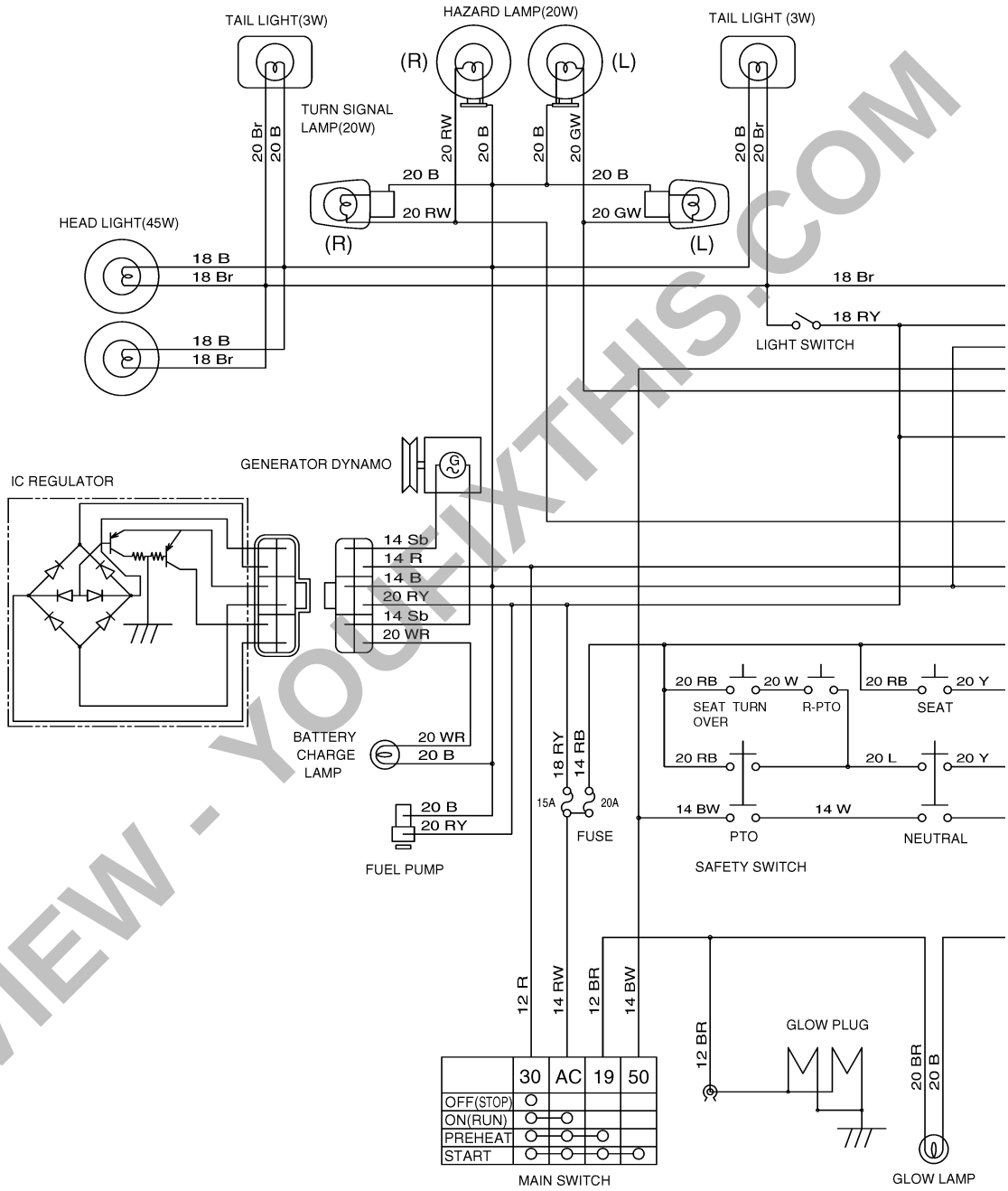
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1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	● No fuel	Replenish fuel	G-8
	● Air in the fuel system	Bleed	G-31
	● Water in the fuel system	Change fuel and repair or replace fuel system	G-22
	● Fuel pipe clogged	Clean	G-22
	● Fuel filter clogged	Change	G-27
	● Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	G-8
	● Fuel with low cetane number	Use specified fuel	G-8
	● Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	1-S17
	● Incorrect injection timing	Adjust	1-S53
	● Fuel camshaft worn	Replace	—
	● Injection nozzle clogged	Clean	1-S55
	● Injection pump malfunctioning	Replace	—
	● Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair or replace	—
	● Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S13
	● Improper valve timing	Correct or replace timing gear	1-S23
	● Piston ring and cylinder worn	Replace	1-S40,S41, S47
	● Excessive valve clearance	Adjust	1-S15
(Starter Does Not Run)	● Battery discharged	Charge	G-20
	● Starter malfunctioning	Repair or replace	G-17, 6-S19
	● Main switch malfunctioning	Repair or replace	—
	● Safety switches malfunctioning	Adjust or replace	6-S15
	● Wiring disconnected	Connect	—

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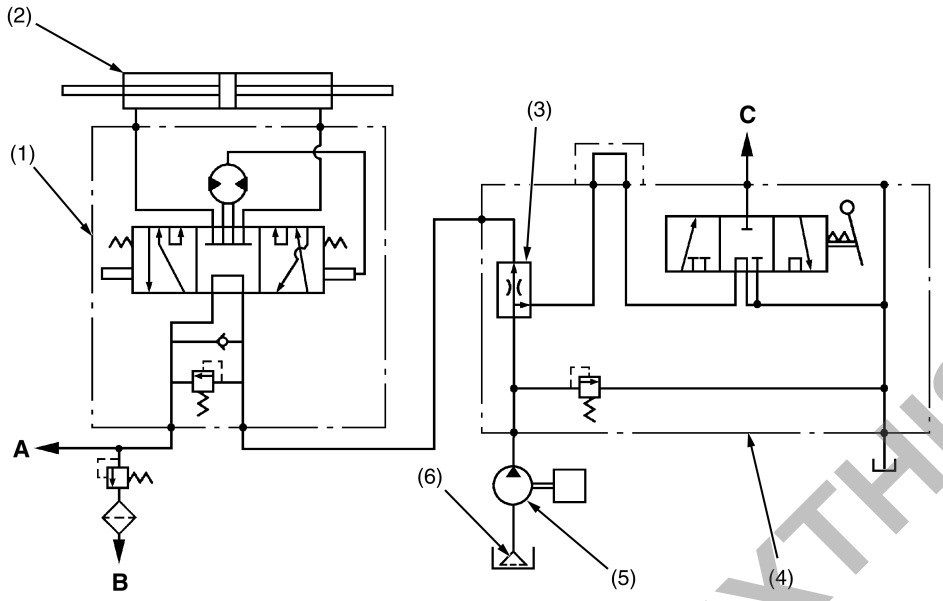


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1. HYDRAULIC CIRCUIT



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(1) Steering Controller
(2) Steering Cylinder
(3) Flow Priority Valve
(4) Hydraulic Control Valve Assembly
(5) Hydraulic Pump
(6) Oil Strainer

A: To PTO Clutch Valve
B: To HST
C: To Hydraulic Cylinder
D: To Implement
E: From Implement

This model is provided with a full hydrostatic power steering.

In the full hydrostatic power steering, the steering controller is connected to the steering cylinder with only the hydraulic piping. Accordingly, it does not have mechanical transmitting parts such as steering gear, pitman arm, drag link, etc.. Therefore, it is simple in construction. This steering system consists of the oil strainer (6), hydraulic pump (5), flow priority valve (3), steering controller (1), steering cylinder (2), etc..

Flow priority valve (3) which located in the hydraulic control valve assembly (4) divides the oil into two direction. One is the control flow to power steering (constantly 7 L/min., 1.8 U.S.gals./min., 1.5 Imp.gals./min.), and the other is excessive flow to control valve of implement lift control.

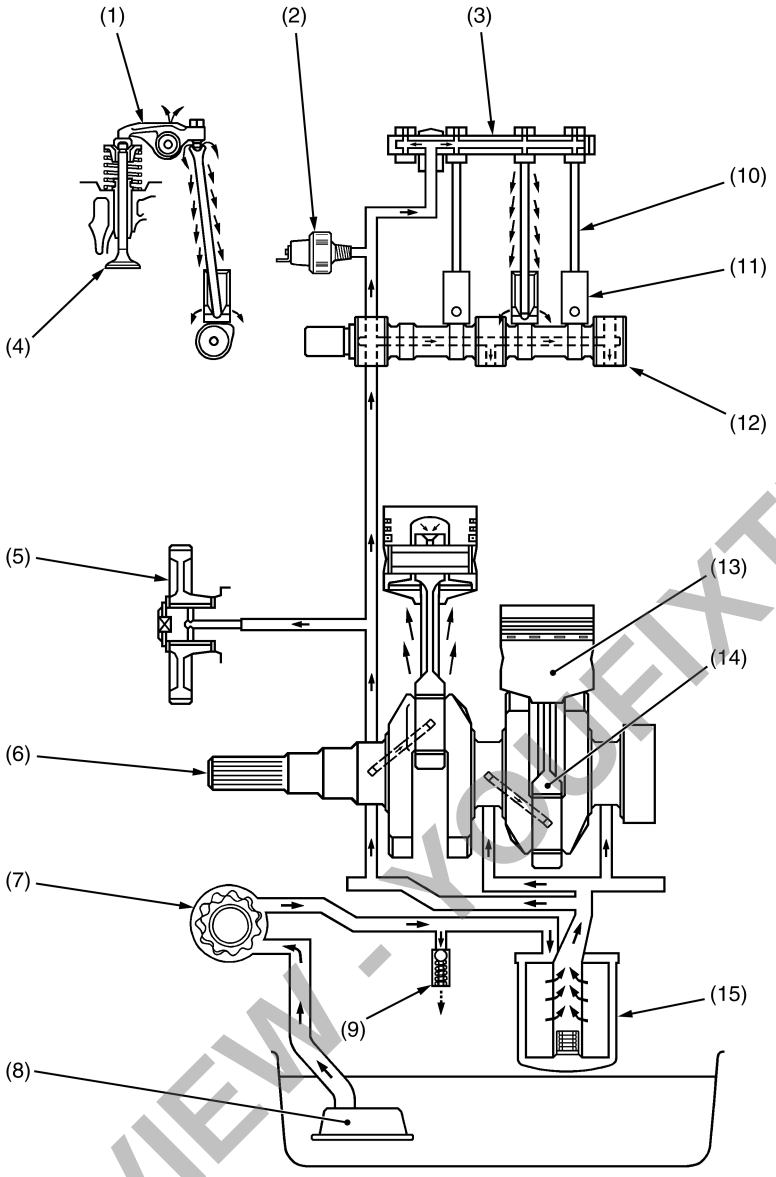
By operating the power steering body, the required amount of oil is fed to the steering cylinder (2).

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1. LUBRICATING SYSTEM



(1) Rocker Arm
(2) Oil Pressure Switch
(3) Rocker Arm Shaft
(4) Valve
(5) Idle Gear
(6) Crankshaft
(7) Oil Pump
(8) Oil Strainer
(9) Relief Valve
(10) Push Rod
(11) Tappet
(12) Camshaft
(13) Piston
(14) Connecting Rod
(15) Oil Filter Cartridge

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This engine's lubricating system consists of oil strainer (8), oil pump (7), relief valve (9), oil filter cartridge (15) and oil pressure switch (2).

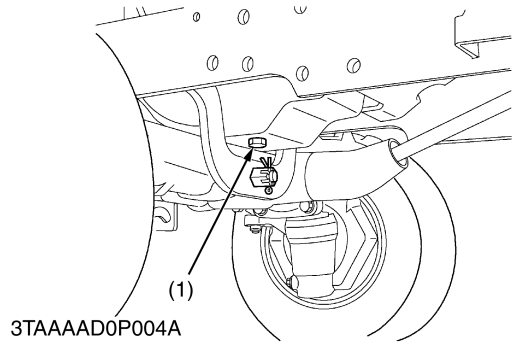
The oil pump sucks lubricating oil from the oil pan through the oil strainer and the oil flows down to the filter cartridge, where it is further filterd. Then the oil is forced to crankshaft (6), connecting rods (14), idle gear (5), camshaft (12) and rocker arm shaft (3) to lubricate each part.

Some part of oil, splashed by the crankshaft or leaking and dropping from gaps of each part, lubricates these parts: piston (13), cylinders, small ends or connecting rods, tappets (11), push rods (10), inlet and exhaust valves (4) and timing gears.

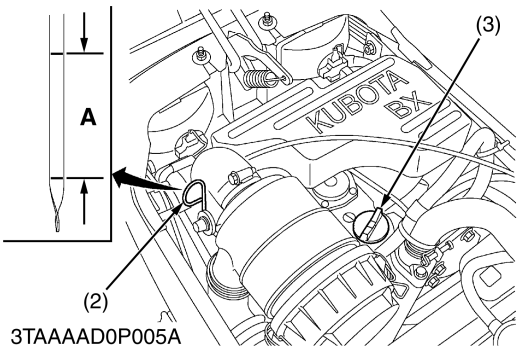
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[2] CHECK POINTS OF INITIAL 50 HOURS



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Changing Engine Oil

CAUTION

- Be sure to stop the engine before changing engine oil.

1. Start and warm up the engine for approx. 5 minutes.
2. Place an oil pan underneath the engine.
3. To drain the used oil, remove the drain plug (1) at the bottom of the engine and drain the oil completely.
4. Screw in the both drain plug (1).
5. Fill new oil up to upper line on the dipstick (2).

IMPORTANT

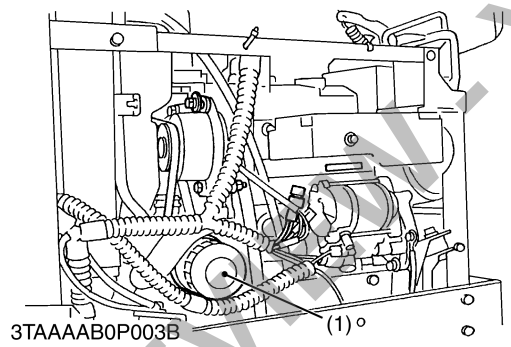
- **When using an oil of different manufacture or viscosity from the previous one, remove all of the old oil.**
- **Never mix two different types of oil.**
- **Use the proper SAE Engine Oil according to ambient temperatures.**
- **Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-8.)**

Engine oil capacity	1.9 L 2.01 U.S.qts. 1.67 Imp.qts

(1) Drain Plug
(2) Dipstick
(3) Oil Inlet

(A) Oil level is acceptable within this range

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Replacing Engine Oil Filter Cartridge

CAUTION

- **Be sure to stop the engine before changing oil filter cartridge.**

1. Remove the oil filter cartridge with the filter wrench.
2. Apply a slight coat of oil onto the new cartridge gasket.
3. To install the new cartridge, screw it in by hand. Over tightening may cause deformation of rubber gasket.
4. After the new cartridge has been replaced, the engine oil normally decrease a little. Thus see that the engine oil does not leak through the seal and be sure to read the oil level on the dipstick. Then, replenish the engine oil up to the specified level.

IMPORTANT

- **To prevent serious damage to the engine, replacement element must be highly efficient. Use only a KUBOTA genuine filter or its equivalent.**

(1) Engine Oil Filter Cartridge

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