GENERAL

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4. LUBRICANTS, FUEL AND COOLANT

No.	Place		Capacity	Lubricants, fuel and coolant
			ZD25F	
1	Fuel		30 L 7.9 U.S.gals. 6.6 Imp.gals.	No. 2-D diesel fuel No. 1-D diesel fuel if temperature is below – 10 °C (14 °F)
2	Coolant	Cooling system	4.0 L 4.2 U.S.qts. 3.5 Imp.qts.	Fresh clean water (soft water) with anti-freeze
		Recovery tank	0.25 L 0.26 U.S.qts. 0.22 Imp.qts.	
3	Engine crankcase		3.4 L* 3.6 U.S.qts. 3.0 Imp.qts.	Engine oil : API Service Classification CC or CD 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		3.2 L 3.4 U.S.qts. 2.8 Imp.qts.	KUBOTA UDT or SUPER UDT fluid*1
5	Transmission case with filter and hose		4.0 L 4.2 U.S.qts. 3.5 Imp.qts.	
6	Rear axle case		1.8 L each 1.9 U.S.qts. each 1.6 Imp.qts. each	KUBOTA UDT or SUPER UDT fluid*1 or SAE 80 · 90 gear oil
7	Mower gear case		0.40 L 0.42 U.S.qts. 0.35 Imp.qts.	SAE 90 gear oil

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5. TIGHTENING TORQUES

[1] GENERAL USE SCREWS, BOLTS AND NUTS

Screws, bolts, and nuts whose tightening torques are not specified in this Workshop Manual should be tightened according to the table below.

Indication on top of bolt	⟨4⟩ No-grade or 4T						⟨7⟩ 7T						⟨9⟩ 9T		
Material of bolt	SS400, S20C						S43C, S48C						SCr435, SCM435		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit / Diameter	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs
M6 (6 mm, 0.24 in.)	7.85 to 9.31	0.80 to 0.95	5.79 to 6.87	7.85 to 8.82	0.80 to 0.90	5.79 to 6.50	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.85 to 8.82	0.80 to 0.90	5.79 to 6.50	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8 (8 mm, 0.31 in.)	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1	16.7 to 19.6	1.7 to 2.0	12.3 to 14.4	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1	29.5 to 34.3	3.0 to 3.5	21.7 to 25.3
M10 (10 mm, 0.39 in.)	39.3 to 45.1	4.0 to 4.6	29.0 to 33.2	31.4 to 34.3	3.2 to 3.5	23.2 to 25.3	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5	60.9 to 70.6	6.2 to 7.2	44.9 to 52.0
M12 (12 mm, 0.47 in.)	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5	–	–	–	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5	103 to 117	10.5 to 12.0	76.0 to 86.7
M14 (14 mm, 0.55 in.)	108 to 125	11.0 to 12.8	79.6 to 92.5	–	–	–	124 to 147	12.6 to 15.0	91.2 to 108	–	–	–	167 to 196	17.0 to 20.0	123 to 144
M16 (16 mm, 0.63 in.)	167 to 191	17.0 to 19.5	123 to 141	–	–	–	197 to 225	20.0 to 23.0	145 to 166	–	–	–	260 to 304	26.5 to 31.0	192 to 224
M18 (18 mm, 0.71 in.)	246 to 284	25.0 to 29.0	181 to 209	–	–	–	275 to 318	28.0 to 32.5	203 to 235	–	–	–	344 to 402	35.0 to 41.0	254 to 296
M20 (20 mm, 0.79 in.)	334 to 392	34.0 to 40.0	246 to 289	–	–	–	368 to 431	37.5 to 44.0	272 to 318	–	–	–	491 to 568	50.0 to 58.0	362 to 419

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[2] STUD BOLTS

Material of opponent part	Ordinariness			Aluminum		
Unit / Diameter	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs
M8 (8 mm, 0.31 in.)	11.8 to 15.6	1.2 to 1.6	8.68 to 11.5	8.82 to 11.8	0.90 to 1.2	6.51 to 8.67
M10 (10 mm, 0.39 in.)	24.6 to 31.3	2.5 to 3.2	18.1 to 23.1	19.7 to 25.4	2.0 to 2.6	14.5 to 18.8
M12 (12 mm, 0.47 in.)	29.5 to 49.0	3.0 to 5.0	21.7 to 36.1	31.4	3.2	23.1

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6. MAINTENANCE CHECK LIST

No.	Items \ Period		Service interval					After purchase		Important	Reference page
			50	100	150	200	400	1 year	2 years		
1	Engine oil	Change	★	☆							G-17
2	Engine oil filter	Replace	★			☆					G-17
3	Transmission fluid	Change				★	☆				G-19
4	Transmission oil filter	Replace	★			☆					G-18
5	Transmission strainer	Clean				★	☆				G-19
6	Rear axle gear case (RH and LH) fluid	Change				★	☆				G-20
7	Front axle pivot	Adjust		★		☆					G-18
8	Safety device	Check	☆								G-21
9	Greasing (without mower)	–	☆								G-23
10	Mower gear box oil	Check	☆								G-25
		Change			☆						G-30
11	Air cleaner element	Clean	☆							*1	G-24
		Replace						☆		*2	G-32
12	Battery condition	Check		☆							G-25
13	Fan belt	Adjust		☆							G-27
14	Parking brake	Check		☆							G-28
15	Fuel filter element	Check		☆							G-27
		Replace					☆				G-32
16	Fuel line	Check		☆							G-27
		Replace							☆		G-35
17	Radiator hose and clamp	Check				☆					G-30
		Replace							☆		G-35
18	Hydraulic hose	Check				☆					G-30
		Replace							☆		G-35
19	Intake air line	Check				☆					G-31
		Replace							☆		G-35
20	Motion control lever pivot	Adjust				☆					G-31
21	Radiator	Clean						☆			G-33
22	Coolant	Change						☆			G-33
23	Mower gear box oil seal	Replace							☆		G-35
24	Fuel system	Bleed	Service as required								G-37
25	Fuse	Replace									G-36
26	Blade	Replace									G-37
27	Mower belt	Replace									G-37

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■ **IMPORTANT**

- **The jobs indicated by ★ must be done initially.**

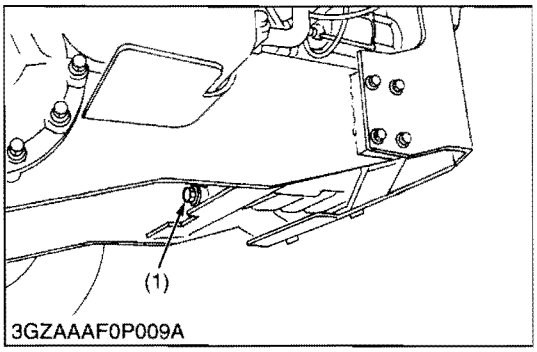
***1 Air cleaner should be cleaned more often in dusty conditions than in normal conditions.**

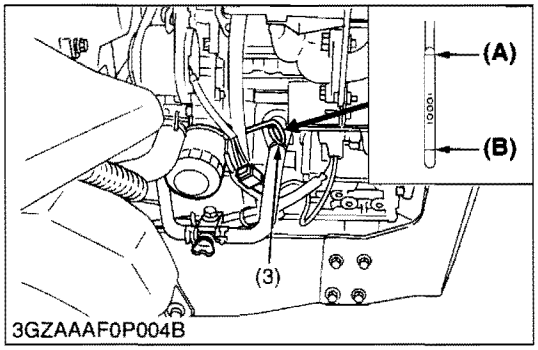
***2 Every year or every 6 times of cleaning.**

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[2] CHECK POINTS OF INITIAL 50 HOURS





Changing Engine Oil

⚠ CAUTION

- **Be sure to stop the engine before changing 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 drain plug (1).
5. Fill new oil up to upper line on the dipstick (3).

■ IMPORTANT

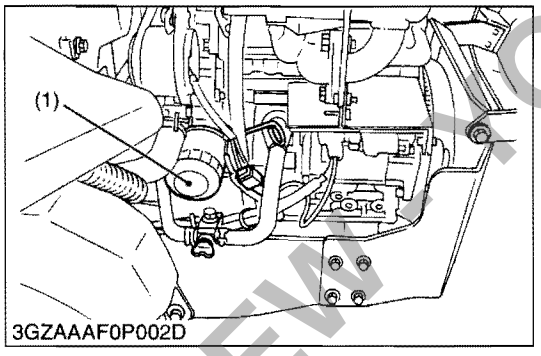
- **When using an oil of different manufacture or viscosity from the previous one, remove all of the old oil.**
- **Never mix two different type of oil.**
- **Use the proper SAE engine oil according to ambient temperatures.**
  Refer to "LUBRICANTS, FUEL AND COOLANT".
  (See page G-7.)

Engine oil capacity	3.4 L 3.6 U.S.qts. 3.0 Imp.qts.

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

(A) Upper Level
(B) Lower Level

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Replacing Engine Oil Filter Cartridge

⚠ CAUTION

- **Be sure to stop the engine before changing the oil filter cartridge.**
- **Allow engine to cool down sufficiently, oil can be hot and may cause burns.**

1. Remove the engine oil filter cartridge (1) with the filter wrench.
2. Apply a slight coat of oil onto the rubber gasket of new cartridge.
3. To install the new cartridge, screw it in by hand. Over tightening may cause deformation of rubber gasket.
4. After the cartridge has been replaced, the engine oil level normally lowers a little. Add engine oil to proper level. Check for oil leaks around filter gasket.

■ IMPORTANT

- **To prevent serious damage to the engine, element of recommended type must be used. Use only a genuine KUBOTA filter or its equivalent.**

(1) Engine Oil Filter Cartridge

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SPECIFICATIONS

Model			ZD25F
Maximum gross power			20.9 kW (28 HP)*1
Engine	Model		D1005-E2-ZD
	Type		Indirect injection, vertical, water cooled, 4-cycle diesel engine
	Number of cylinders		3
	Bore and stroke		76.0 × 73.6 mm (2.99 × 2.90 in.)
	Total displacement		1001 cm^3 (61.1 cu.in.)
	Rated revolution		3000 rpm
	Combustion chamber		Spherical type (E-TVCS)
	Fuel injection pump		Bosch MD type mini pump
	Governor		Centrifugal ball mechanical governor
	Injection nozzle		Throttle type
	Injection timing		0.30 to 0.33 rad (17° to 19°) before T.D.C.
	Injection order		1-2-3
	Injection pressure		13.73 MPa (140 kgf/cm^2, 1990 psi)
	Lubricating system		Forced lubrication by gear pump
	Cooling system		Pressurized radiator, forced circulation with water pump
	Lubricating oil		API Service classification CC or CD, Below 0 °C (32 °F) : SAE 10W or 10W-30, 0 to 25 °C (32 °F to 77 ° F) : SAE 20 or 10W-30, Above 25 °C (77 °F) : SAE 30 or 10W-30
	Starting system		Electric starter (12 V, 1.1 kW)
	Battery		51 R (12 V, 450 CCA)
	Fuel		No. 2-D Diesel fuel (ASTM D975) [No. 1-D diesel fuel, if temperature is below – 10 °C (14 °F)]
Capacities	Fuel tank		30 L (5.8 U.S.gals., 4.8 Imp.gals.)
	Engine crankcase		3.4 L (3.6 U.S.qts., 3.0 Imp.qts.)
	Engine coolant		4.0 L (4.2 U.S.qts., 3.5 Imp.qts.)
	Recovery tank		0.25 L (0.26 U.S.qts., 0.22 Imp.qts.)
	Transmission (Including HST and cylinder)		4.0 L (4.2 U.S.qts., 3.5 Imp.qts.)*2
	Rear axle gear case		1.8 L (1.9 U.S.qts., 1.6 Imp.qts.)*2 each
	Mower gear case oil		0.40 L (0.42 U.S.qts., 0.35 Imp.qts.)
Tires	Front		15 × 6.0-6 (4PR) Rib
	Rear		24 × 12.0-12 (4PR) Turf
Travelling speeds	Forward		0 to 15.0 km/h (0 to 9.3 mph)*3
	Reverse		0 to 8.3 km/h (0 to 5.2 mph)*3
Dimensions	Overall length		2260 mm (90.0 in.)
	Overall width (Without mower)		1328 mm (52.3 in.)
	Overall height	With ROPS upright	1895 mm (74.6 in.)
		With ROPS folded	1455 mm (57.3 in.)
	Wheel base		1365 mm (53.7 in.)
	Treads	Front	1070 mm (42.1 in.)
		Rear	1080 mm (42.5 in.)

NOTE: *1 Manufacturer's estimate
*2 Oil amount when the oil level is at the upper level.
*3 At 3000 engine rpm

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1. TROUBLESHOOTING

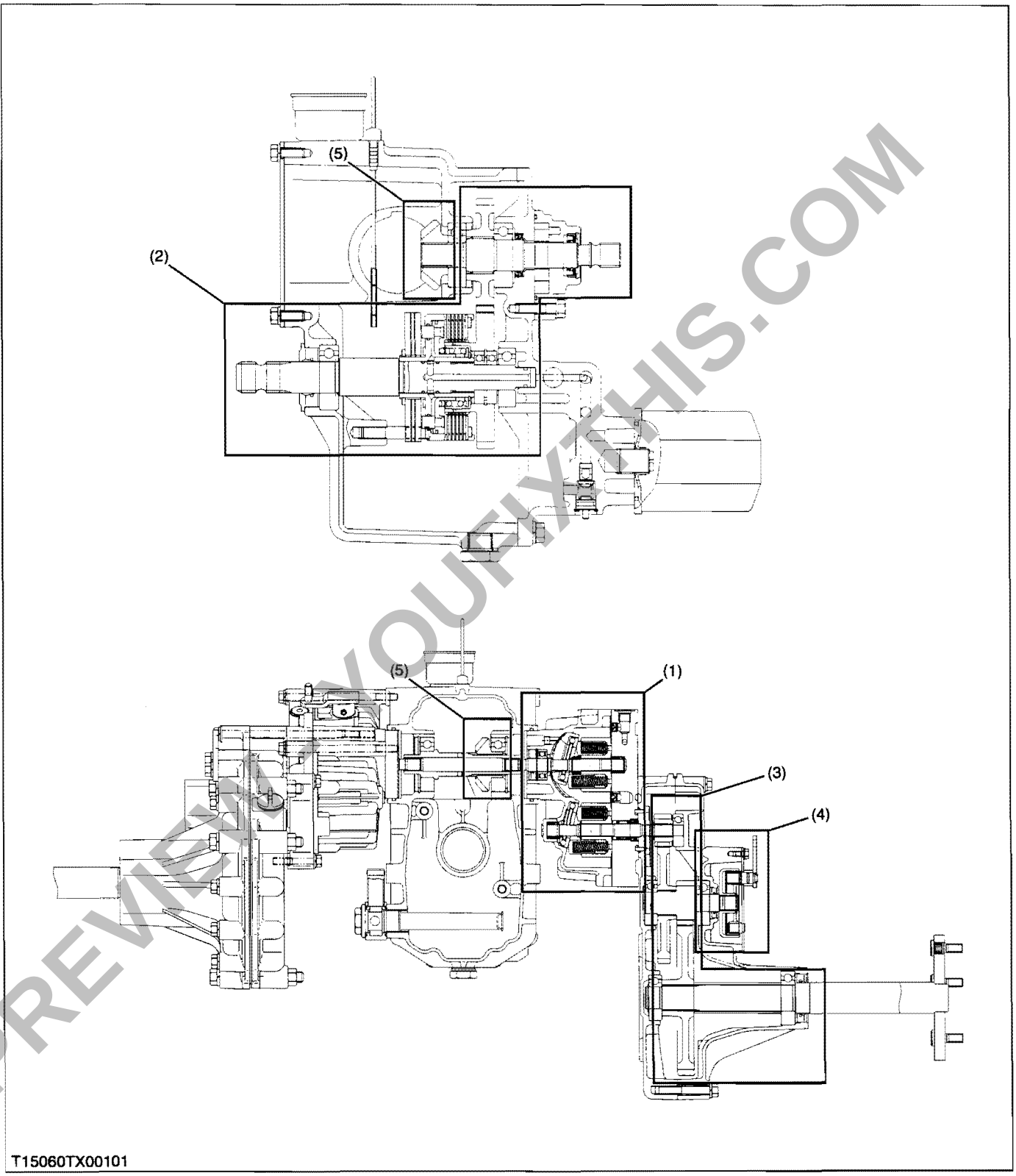
Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	• No fuel	Replenish fuel	–
	• Air in the fuel system	Bleed fuel system	–
	• Water in the fuel system	Change fuel and replace fuel system	–
	• Fuel pipe clogged	Clean fuel pipe	–
	• Fuel filter clogged	Replace fuel filter	G-32
	• Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	G-7
	• Fuel with low cetane number	Use specified fuel	G-7
	• Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	1-S18
	• Incorrect injection timing	Adjust injection timing	–
	• Fuel camshaft worn	Replace fuel camshaft	1-S22
	• Injection nozzle clogged	Clean injection nozzle	–
	• Injection pump malfunctioning	Repair or replace injection pump	1-S22
	• Seizure of crankshaft, camshaft, piston, cylinder or bearing	Replace crankshaft, camshaft, piston, cylinder or bearing	1-S23, S25, S28
	• Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S19
	• Improper valve timing	Correct valve timing	1-S23
	• Piston ring and cylinder worn	Replace piston ring	1-S26
	• Excessive valve clearance	Adjust valve clearance	1-S17
(Starter Does Not Run)	• Battery discharged	Charge battery	G-26
	• Starter malfunctioning	Repair or replace starter	5-S12
	• Slow blow fuse blown	Replace slow blow fuse	G-36
	• Main switch malfunctioning	Repair or replace main switch	5-S8
	• PTO switch defective	Replace PTO switch	5-S10
	• Parking brake switch defective	Replace brake switch	5-S10
	• Motion control lever switch defective	Replace reverse switch or adjust reverse switch gap	5-S10
	• Seat switch defective	Replace seat switch	5-S10
	• Wiring harness disconnected	Connect wiring harness	–

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1. STRUCTURE

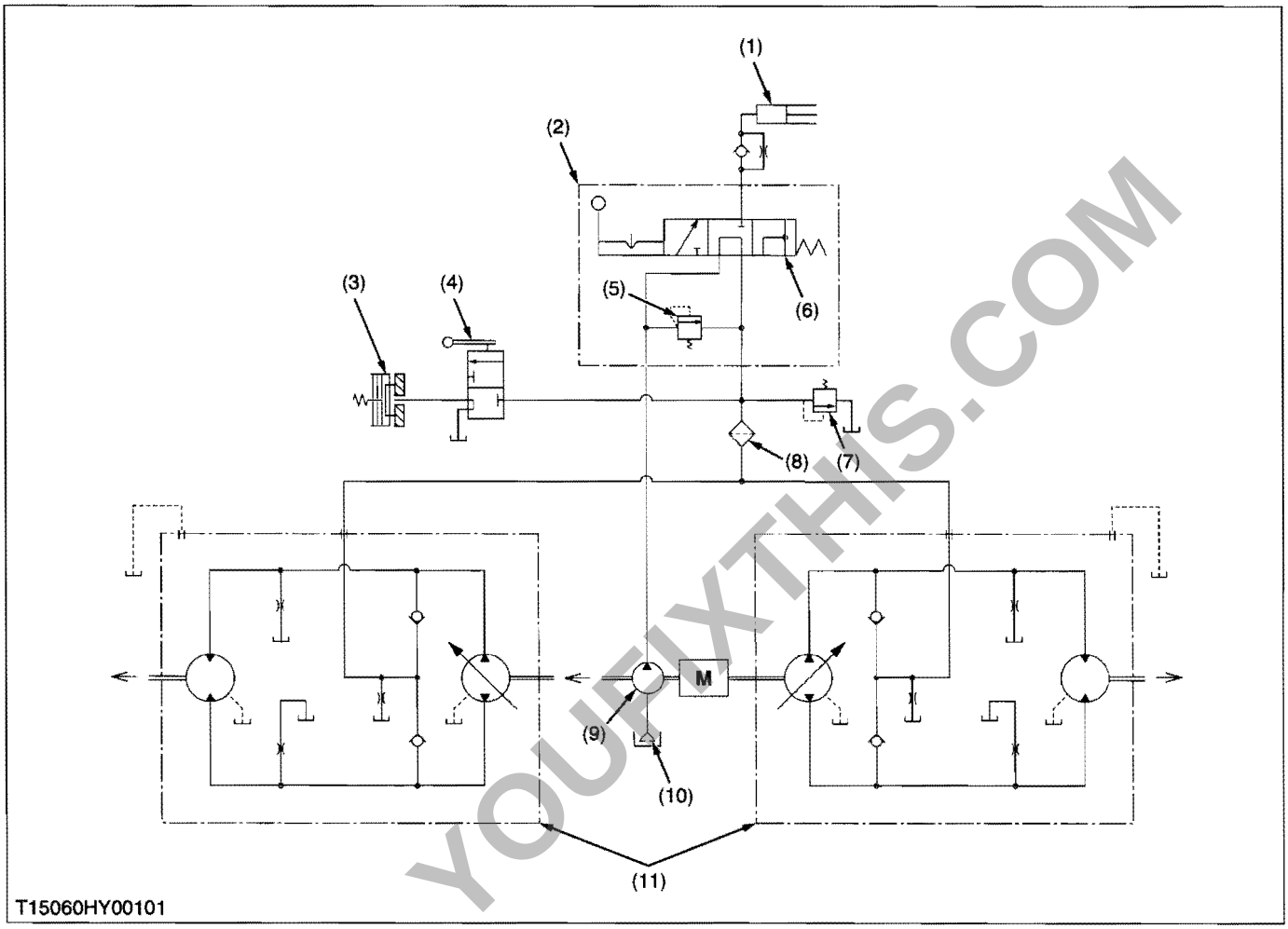


(1) Hydrostatic Transmission
(2) PTO Section
(3) Final Reduction Gear Section
(4) Parking Brake Section
(5) Bevel Gear Section

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1. HYDRAULIC CIRCUIT



(1) Hydraulic Cylinder
(2) Hydraulic Control Valve Assembly
(3) PTO Clutch
(4) PTO Clutch Valve
(5) Relief Valve
(6) Control Valve
(7) Regulator Valve
(8) Oil Filter
(9) Hydraulic Pump
(10) Oil Strainer
(11) Hydrostatic Transmission

The hydraulic system of this machine is composed of a hydraulic pump (9), control valve (6), hydraulic cylinder (1) and other components.

This system has the following functions.

Oil is supplied by hydraulic pump (9) which is driven by engine.

Power from the input shaft (pump shaft) is distributed right and left with the bevel gears and drives each hydrostatic transmission (9).

Moreover, oil from the hydraulic pump (9) is sent to the transmission center case through the control valve. On the other hand, oil is regulated with the regulator valve (7) to constant pressure and sent to the hydrostatic transmission (9) and PTO clutch (11).

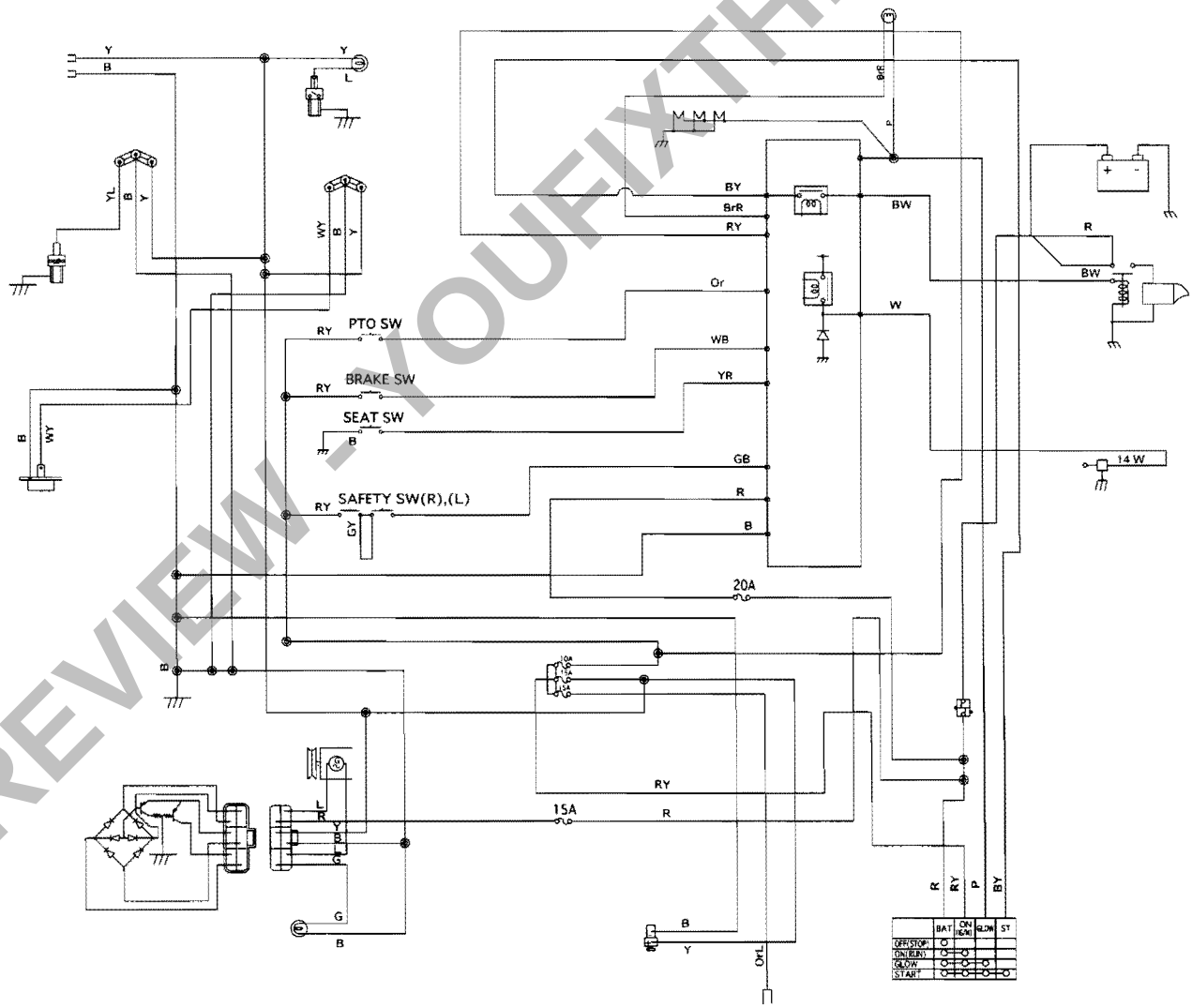
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1. WIRING DIAGRAM

• **Color or Wiring**

W ····· White	Or ····· Orange	BrR ····· Brown / Red	BW ····· Black / White
R ····· Red	BY ····· Black / Yellow	WR ····· White / Red	BR ····· Black / Red
L ····· Blue	WB ····· White / Black	WY ····· White / Yellow	GW ····· Green / White
P ····· Pink	GB ····· Green / Black	RW ····· Red / White	YR ····· Yellow / Red
B ····· Black	OrL ····· Orange / Blue	RY ····· Red / Yellow	YL ····· Yellow / Blue
G ····· Green	YB ····· Yellow / Black	YW ····· Yellow / White	

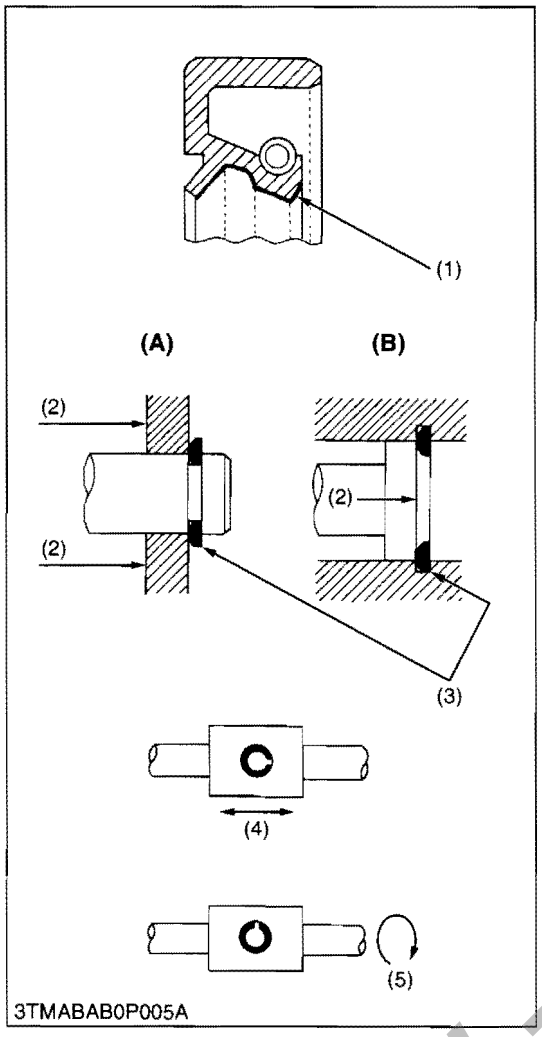


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2. GENERAL PRECAUTIONS



- During disassembly, carefully arrange removed parts in a clean area to prevent confusion later. Screws, bolts and nuts should be installed in their original position to prevent reassembly errors.
- When special tools are required, use KUBOTA genuine special tools. Special tools which are not frequently used should be made according to the drawings provided.
- Before disassembling or servicing electrical wires, always disconnect the ground cable from the battery first.
- Remove oil and dirt from parts before measuring.
- Use only KUBOTA genuine parts for parts replacement to maintain machine performance and to assure safety.
- Gaskets and O-rings must be replaced during reassembly. Apply grease to new O-rings or oil seals before assembling. See the figure left side.
- When reassembling external snap rings or internal snap rings, they must be positioned so that sharp edge faces against the direction from which a force is applied. See the figure left side.
- When inserting spring pins, their splits must face the direction from which a force is applied. See the figure left side.
- To prevent damage to the hydraulic system, use only specified fluid or equivalent.

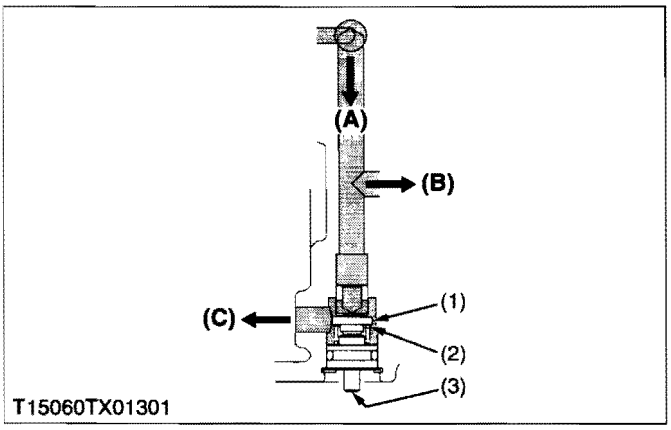
(1) Grease
(2) Force
(3) Sharp Edge
(4) Axial Force
(5) Rotating Movement

(A) External Snap Ring
(B) Internal Snap Ring

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■ Regulator Valve

This machine is controlled with the regulator valve so that the oil sent from the hydraulic pump may become the setting pressure. And the oil flows into PTO clutch and hydrostatic transmission.

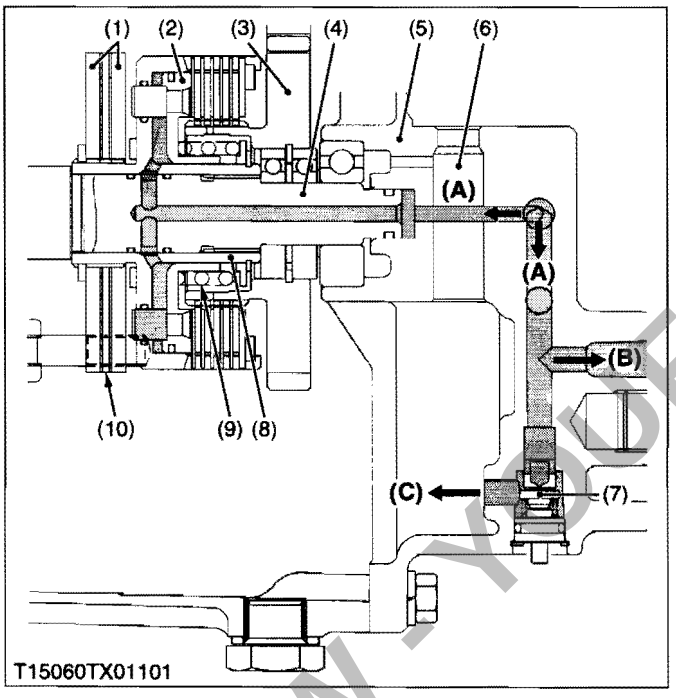
(Reference)

- Regulator valve setting pressure: 0.50 to 0.69 MPa
  5.0 to 7.0 kgf/cm^2
  71.1 to 99.6 psi

(1) Poppet
(2) Spring
(3) Plug

(A) From Hydraulic Pump
(B) To Hydrostatic Transmission
(C) To Transmission Case

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■ PTO Clutch "Engaged"

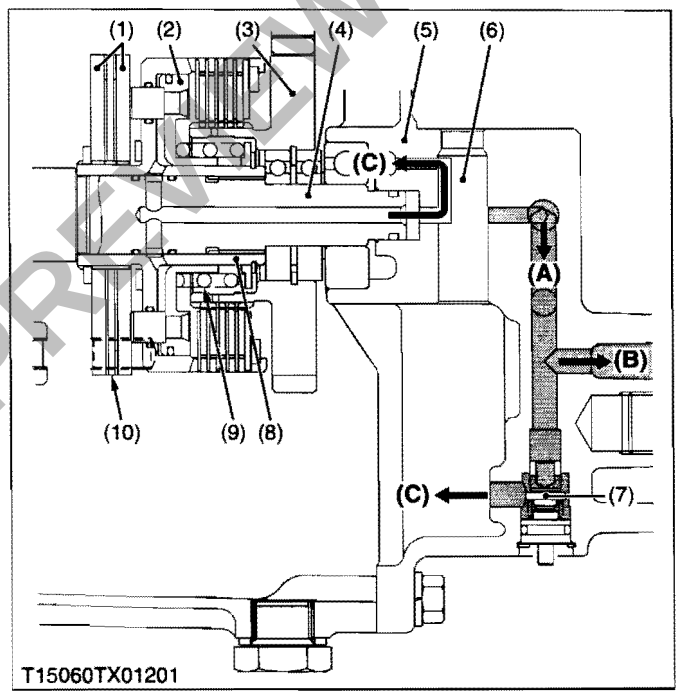
When the PTO clutch lever is set at the **"Engaged"** position, the PTO clutch valve (6) rotates and form the oil line to the PTO clutch pack.

Oil entering the clutch pack pushes the clutch piston (5) to engage the clutch pack.

(1) Brake Pressure Plate
(2) Clutch Piston
(3) 12T Gear Clutch
(4) Clutch Shaft (PTO Shaft)
(5) Transmission Case
(6) PTO Clutch Valve
(7) Poppet
(8) Clutch Spline Boss
(9) Spring
(10) Brake Disc

(A) From Hydraulic Pump
(B) To Hydrostatic Transmission
(C) To Transmission Case

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■ PTO Clutch "Disengaged"

When the PTO clutch lever is set at the **"Disengaged"** position, the PTO clutch valve (6) rotates and close the oil passage to the PTO clutch pack. The oil in the PTO clutch pack drained into the transmission case (5). Thus the clutch piston (2) is pushed back by the spring (9).

When the piston (2) is pushed back, the piston push to the brake pressure plate (1) so as to stop the rotation and drag of the PTO shaft (4).

(1) Brake Pressure Plate
(2) Clutch Piston
(3) 12T Gear Clutch
(4) Clutch Shaft (PTO Shaft)
(5) Transmission Case
(6) PTO Clutch Valve
(7) Poppet
(8) Clutch Spline Boss
(9) Spring
(10) Brake Disc

(A) From Hydraulic Pump
(B) To Hydrostatic Transmission
(C) To Transmission Case

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