WSM

WORKSHOP MANUAL
TRACTOR

MX5200

Kubota

KiSC issued 12, 2018 A

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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 try to repair or use this unit.

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

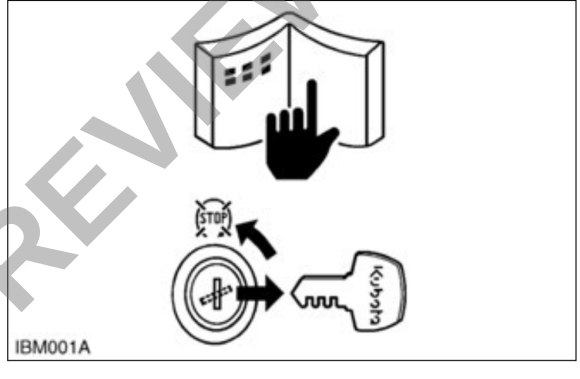
WARNING
- **Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**

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

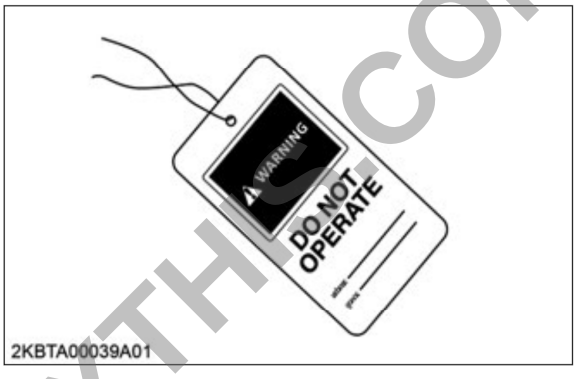
IMPORTANT
- **Indicates that equipment or property damage could result if instructions are not followed.**

NOTE
- **Gives helpful information.**

1. Working precautions



- Understand all safety instructions and safety labels in this manual.
- Park the machine on a stable and level ground then lower the attachment to check the machine safely.
- Stop the engine and remove the key when leaving the operator's seat for cleaning, maintenance, and servicing.



- Hang a DO NOT OPERATE tag near the operator's seat.
- Do not use worn or cracked tools. Use tools in a proper way with enough strength.
- In regards to the facility which is used in the work shop, follow each safety instruction.

2. Preparing for emergencies



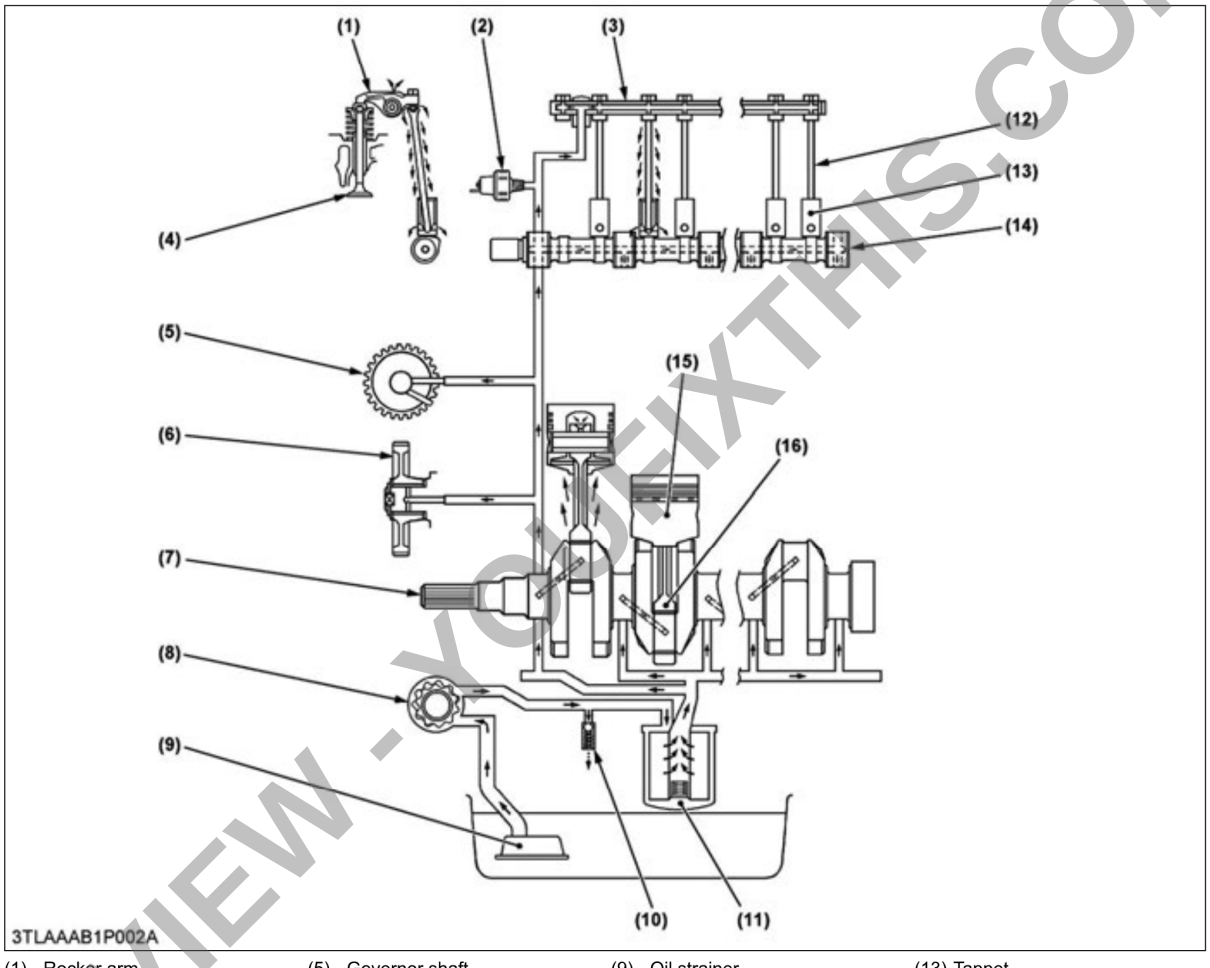
- Keep a first aid kit and fire extinguisher ready at all times.
- Keep emergency numbers near your telephone at all times.

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MECHANISM

1. Lubricating system

1.1 Function of lubricating system



(1) Rocker arm
(2) Oil pressure switch
(3) Rocker arm shaft
(4) Valve
(5) Governor shaft
(6) Idle gear
(7) Crankshaft
(8) Oil pump
(9) Oil strainer
(10) Relief valve
(11) Oil filter cartridge
(12) Push rod
(13) Tappet
(14) Camshaft
(15) Piston
(16) Connecting rod

A lubricating system consists of an oil strainer (9), oil pump (8), relief valve (10), oil filter cartridge (11) 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 oil filter cartridge where it is further filtered. Then the oil is forced to crankshaft (7), connecting rods (16), idle gear (6), governor shaft (5), camshaft (14) and rocker arm shaft (3) to lubricate each part through the oil gallery.

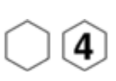
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TIGHTENING TORQUES

Refer to the following table if the tightening torques of screws, bolts and nuts are not specified in each part.

1. General use screws, bolts and nuts

Indication on top of bolt	 No-grade or 4T						 7T						 9T		
Indication on top of nut	 No-grade or 4T												 6T		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M6	7.9 to 9.3	0.80 to 0.95	5.8 to 6.8	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8	18 to 20	1.8 to 2.1	13 to 15	17 to 19	1.7 to 2.0	13 to 14	24 to 27	2.4 to 2.8	18 to 20	18 to 20	1.8 to 2.1	13 to 15	30 to 34	3.0 to 3.5	22 to 25
M10	40 to 45	4.0 to 4.6	29 to 33	32 to 34	3.2 to 3.5	24 to 25	48 to 55	4.9 to 5.7	36 to 41	40 to 44	4.0 to 4.5	29 to 32	61 to 70	6.2 to 7.2	45 to 52
M12	63 to 72	6.4 to 7.4	47 to 53	—	—	—	78 to 90	7.9 to 9.2	58 to 66	63 to 72	6.4 to 7.4	47 to 53	103 to 117	10.5 to 12.0	76.0 to 86.7
M14	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	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	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	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

2. Stud bolts

Material of opponent part	Ordinariness			Aluminum		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M8	12 to 15	1.2 to 1.6	8.7 to 11	8.9 to 11	0.90 to 1.2	6.5 to 8.6
M10	25 to 31	2.5 to 3.2	18 to 23	20 to 25	2.0 to 2.6	15 to 18
M12	30 to 49	3.0 to 5.0	22 to 36	31	3.2	23
M14	62 to 73	6.3 to 7.5	46 to 54	—	—	—
M16	98.1 to 112	10.0 to 11.5	72.4 to 83.1	—	—	—
M18	172 to 201	17.5 to 20.5	127 to 148	—	—	—

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SERVICING

1. Troubleshooting for engine

Symptom	Probable cause and checking procedure	Solution	Reference page
Engine does not start	1. No fuel	Fill fuel	3-5
	2. Air in the fuel system	Vent air	3-28
	3. Water in the fuel system	Change fuel and repair or replace fuel system	—
	4. Fuel hose clogged	Clean or replace	3-25
	5. Fuel filter clogged	Replace	3-18
	6. Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	3-3
	7. Fuel with low cetane number	Use specified fuel	3-3
	8. Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	4-37
	9. Incorrect injection timing	Adjust	4-20
	10. Fuel camshaft worn	Replace	4-45
	11. Injection nozzle clogged	Clean or replace	4-22
	12. Injection pump malfunctioning	Replace	4-40
	13. Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair or replace	4-50 4-45 4-47 4-51
	14. Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	4-38 4-37
	15. Improper valve timing	Correct or replace timing gear	4-45
	16. Piston ring and cylinder worn	Replace	4-48
	17. Excessive valve clearance	Adjust	3-20
	18. Stop solenoid malfunctioning	Replace	4-40
Starter does not operate	1. Battery discharged	Charge	3-13
	2. Starter malfunctioning	Repair or replace	4-35 12-44
	3. Key switch malfunctioning	Replace	12-22

(Continued)

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2. Specification table

Model				MX5200	
				Manual transmission	HST
Engine	Model			V2403-M-TE3	
	Type			Indirect injection, Vertical, Water-Cooled 4 cycle diesel (E-TVCS)	
	Number of cylinders / Aspiration			4 / Turbocharged	
	Total displacement		L	2.434	
	Bore and stroke		mm	87 x 102.4	
	Net power*1		kW (PS) / rpm	38.2 (51.9) / 2700	37.8 (51.4) / 2700
	PTO power (factory observed)*1		kW (PS) / rpm	33.6 (45) / 2700	32.4 (43.5) / 2700
	Maximum torque		N·m (kgf·m)	166.3 (16.8)	
	Battery capacity			12 V, RC : 133 min, CCA : 582 A	
Capacities	Fuel tank		L	48.0	
	Engine crankcase (with filter)		L	8.0	
	Engine coolant		L	7.0	
	Transmission case		L	44.0	
Dimensions	Overall length (without 3p)		mm	3245	
	Overall width (min. tread)		mm	1770	
	Overall height (with ROPS)		mm	2430	
	Wheel base		mm	1895	
	Min. ground clearance		mm	385	
	Tread	Front	mm	1325	
		Rear	mm	1375, 1490	
Weight (with ROPS)			kg	1642	1712
Traveling system	Standard tire size	Front		9.5-16	
		Rear		14.9-26	
	Clutch			Dry type single stage	
	Steering			Hydrostatic power steering	
	Transmission			Gear shift, 8 forward and 8 reverse	Hydrostatic transmission, 3 range speed
	Braking system			Mechanical, Wet disk type	
	Min. turning radius (with brake)		m	2.7	
Hydraulic unit	Hydraulic control system			Position control	
	Pump capacity		L / min	35.8	
	3-point hitch			SAE Category 1, 2	
	Max. lift force	At lift points	kg	1300	
		24in. behind lift points	kg	1050	
	System pressure		MPa (kgf / cm^2)	17.7 (180)	

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SERVICE INTERVALS TABLE

No.	Items			Indication on hour meter													Interval	Ref. page	
				50	100	150	200	250	300	350	400	450	500	550	600	650	700		
1	Greasing		---	○	○	○	○	○	○	○	○	○	○	○	○	○	○	every 50 Hrs	3-8	
2	Engine start system	[Manual transmission]	Check	○	○	○	○	○	○	○	○	○	○	○	○	○	○	every 50 Hrs	3-9	
		[HST]																	3-10	
3	Wheel bolts and nuts torque		Check	○	○	○	○	○	○	○	○	○	○	○	○	○	○	every 50 Hrs	3-10	
4	Battery condition		Check		○		○		○		○		○		○		○	every 100 Hrs	3-13	*1
5	Fan belt		Adjust		○		○		○		○		○		○		○	every 100 Hrs	3-12	
6	Clutch		Adjust	◎	○		○		○		○		○		○		○	every 100 Hrs	3-12	
7	Brake		Adjust		○		○		○		○		○		○		○	every 100 Hrs	3-12	
8	Fuel filter element		Clean		○		○		○		○		○		○		○	every 100 Hrs	3-11	
			Replace								○							every 400 Hrs	3-18	
9	Air cleaner element [Double element type]	Primary element	Clean		○		○		○		○		○		○		○	every 100 Hrs	3-10	*2
			Replace															every 1000 Hrs or 1 Year	3-21	*3
		Secondary element	Replace															every 1000 Hrs or 1 Year	3-21	*3
10	Engine oil		Change	◎			○				○				○			every 200 Hrs	3-15	
11	Engine oil filter		Replace	◎			○				○				○			every 200 Hrs	3-14	
12	Transmission oil filter [HST]		Replace	◎			○				○				○			every 200 Hrs	3-15	
13	Toe-in		Adjust				○				○				○			every 200 Hrs	3-16	
14	Hydraulic oil filter	[Manual transmission]	Replace								○							every 400 Hrs	3-17	
		[HST]		◎							○									
15	Transmission fluid		Change								○							every 400 Hrs	3-17	
16	Front axle pivot		Adjust												○			every 600 Hrs	3-19	
17	Engine valve clearance		Adjust															every 800 Hrs	3-20	
18	Front axle case oil		Change															every 800 Hrs	3-19	
19	Injection pressure of fuel injector nozzle		Check															every 1500 Hrs	3-21	
20	Cooling system		Flush															every 2000 Hrs or 2 years	3-22	*4
21	Coolant		Change															every 2000 Hrs or 2 years	3-22	*4
22	Injection pump		Check															every 3000 Hrs	3-24	
23	Turbocharger		Check															every 3000 Hrs	3-24	
24	Fuel line		Check															every 1 Year	3-25	*5
			Replace															every 4 years	3-28	*5
25	Radiator hose and clamp		Check															every 1 year	3-26	*5
			Replace															every 4 years	3-27	*5
26	Power steering oil line		Check															every 1 year	3-27	*5
			Replace															every 4 years	3-28	*5

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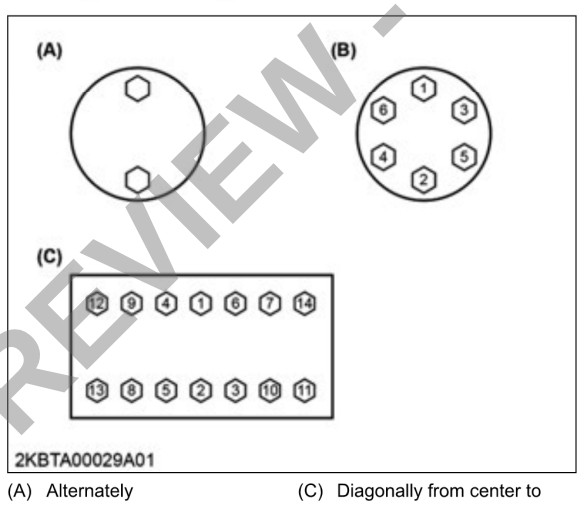
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GENERAL WORKING PRECAUTIONS



- When servicing, observe the safety regulations in the operator's manual and workshop manual.
- Clean the machine before maintenance.
- Before working, remove the negative (-) terminal from the battery or turn off the battery isolator switch.
- Disassemble the machine at a clean location.
- Whenever a special tool is required, use the special tool that Kubota recommends. Or, craft the special tools according to the illustrations in this manual.
- Use genuine Kubota parts to ensure safety and machine performance.

1. Tightening bolts and nuts



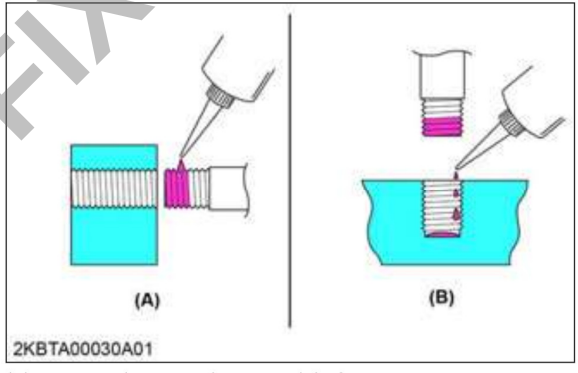
(A) Alternately
(B) Diagonally
(C) Diagonally from center to outside

- Tighten the bolts and nuts with their specified torque.

■ NOTE
- **Tighten the bolts and nuts alternately from top to bottom and left to right so the torque is distributed evenly.**
- **Gradually tighten the bolts and nuts two or three times.**

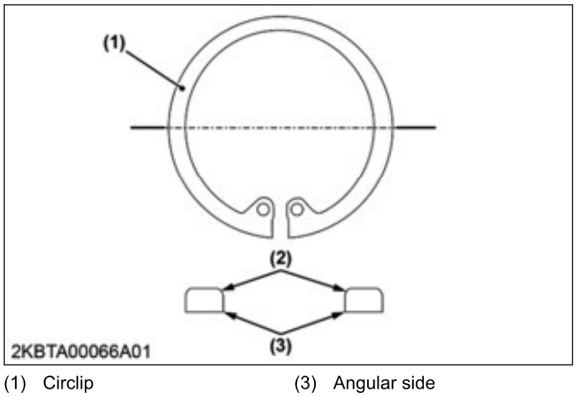
2. Applying thread-locking fluid

1. Clean and dry the location where a thread-locking fluid will be applied with a solvent to remove moisture, oil, and dirt.
2. Apply the thread-locking fluid to the tip of the bolt.
3. If the threads are large, apply the thread-locking fluid all around the bolt hole.



(A) Bolt hole (bolts, nuts)
(B) Screw hole

3. Installing circlips



(1) Circlip
(2) Rounded side
(3) Angular side

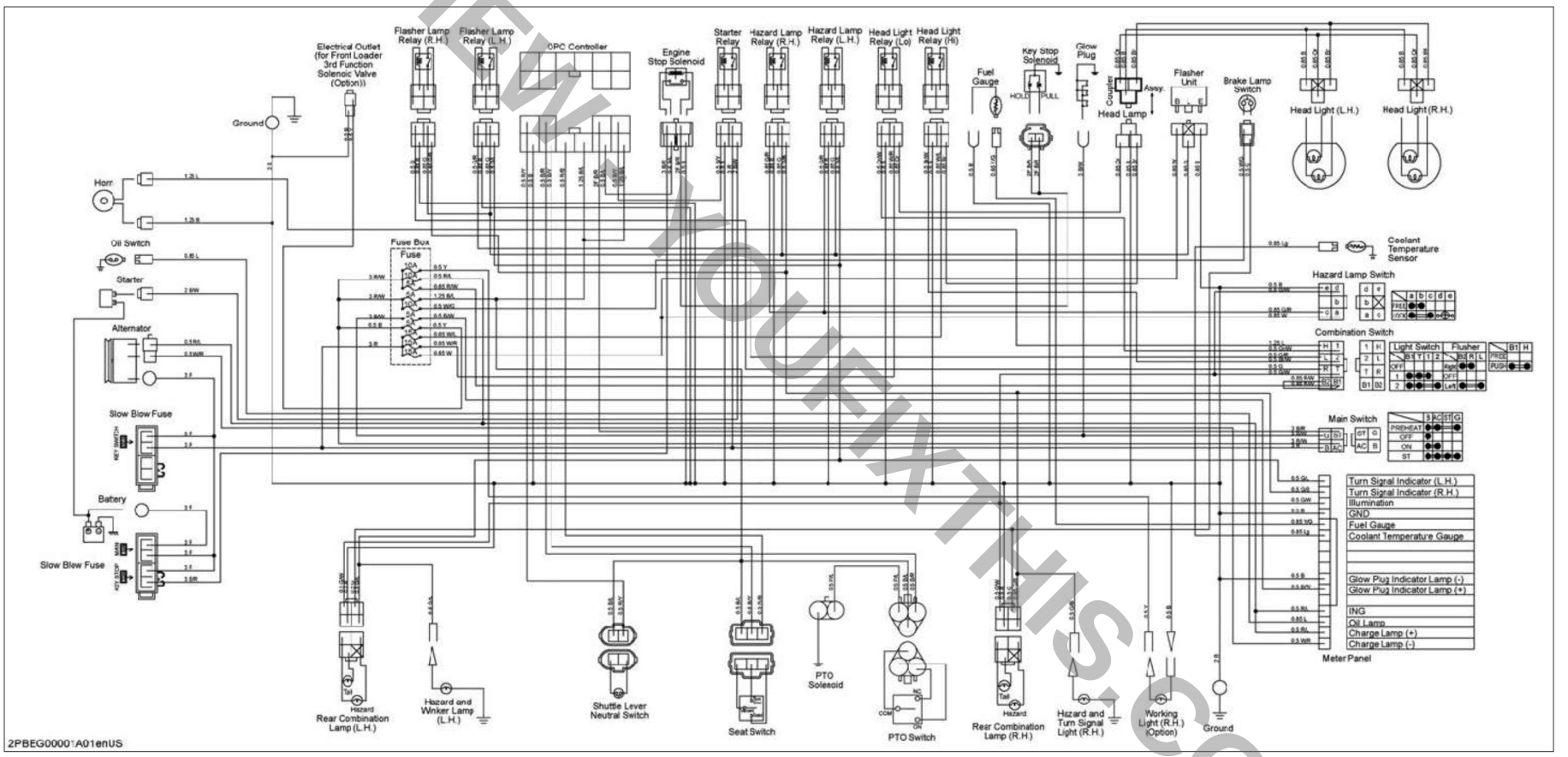
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MECHANISM

1. Electrical diagram

Manual transmission model

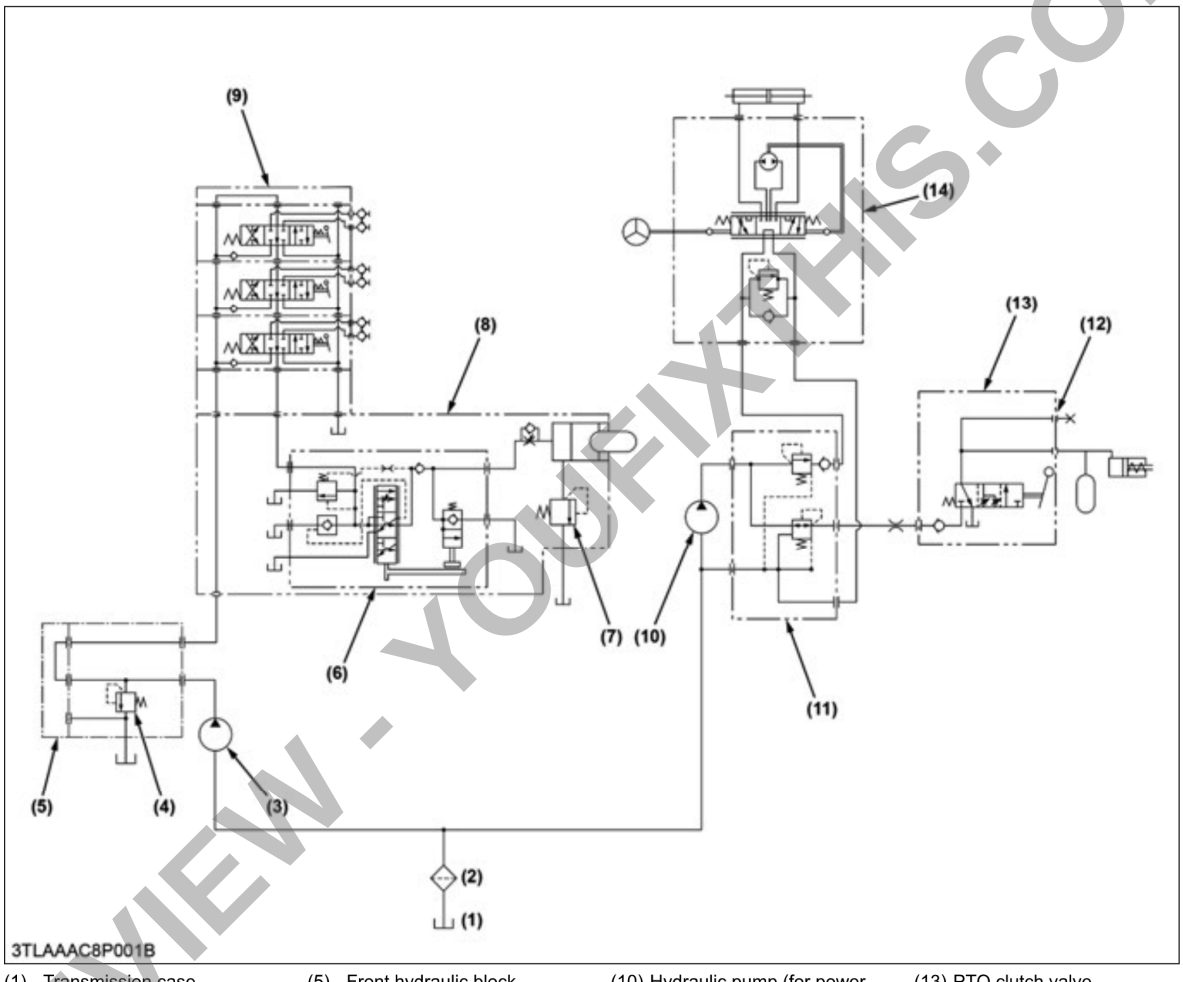


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MECHANISM

1. Hydraulic circuit

1.1 Hydraulic circuit for manual transmission model



(1) Transmission case
(2) Oil filter
(3) Hydraulic pump (for 3-points hitch)
(4) Relief valve
(5) Front hydraulic block
(6) Position control valve
(7) Cylinder safety valve
(8) Hydraulic cylinder block
(9) Auxiliary control valve (Option)
(10) Hydraulic pump (for power steering and PTO clutch)
(11) Regulator valve
(12) Check port (for PTO clutch operating pressure)
(13) PTO clutch valve
(14) Power steering controller

Specification of hydraulic parts

(3)	Above 35.8 L/min. (9.46 U.S.gals/min., 7.87 Imp.gals/min.)
(4)	18.1 to 19.1 MPa (185 to 194 kgf/cm^2, 2630 to 2770 psi)
(7)	19.6 to 22.6 MPa (200 to 230 kgf/cm^2, 2850 to 3270 psi)
(9)	Above 18.6 L/min. (4.91 U.S.gals/min., 4.09 Imp.gals/min.)
(12)	12.7 to 13.7 MPa (130 to 139 kgf/cm^2, 1850 to 1980 psi)

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	Bevel gear for front axle
A	12.75 to 12.90 mm square (0.50 to 0.51 in. square)
B	20.000 to 20.021 mm dia. (0.78741 to 0.7822 in. dia.)
C	22.5 mm dia. (0.886 in. dia.)
D	0.52 rad (30°)
E	23 mm dia. (0.91 in. dia.)
F	Involute spline (refer to below)
G	Chamfer 1.0 mm (0.039 in.)
H	30 mm (1.18 in.)
I	5 mm (0.19 in.)
J	55 mm (2.17 in.)
K	40 mm dia. (1.57 in. dia.)
L	50 mm dia. (1.97 in. dia.)

(Involute Spline)

		Bevel gear for front axle
Spline (Internal)		22.5 × 16Z × 1.25 m × 20
Coefficient of profile shifting		+0.800
Tool	Tooth form	Stub tooth
	Module	1.250
	Pressure angle	0.35 rad (20°)
Number of teeth		16
Diameter of basic pitch circle		20.0 mm
Tooth thickness	Grade	Class a
	Between pin diameter	17.000 to 17.655 mm (Pin diameter = 2.50 mm)

(Reference)

- This tool can be made by welding the coupling (TC650-4452) and socket wrench for rear bevel gear shaft.

2.8 Cylinder safety valve setting pressure adaptor

Use for setting the safety valve to the nozzle tester to measure cracking pressure and check oil tightness of the safety valves.

■ NOTE

- **This special tool is not provided, so make it referring to the figure.**

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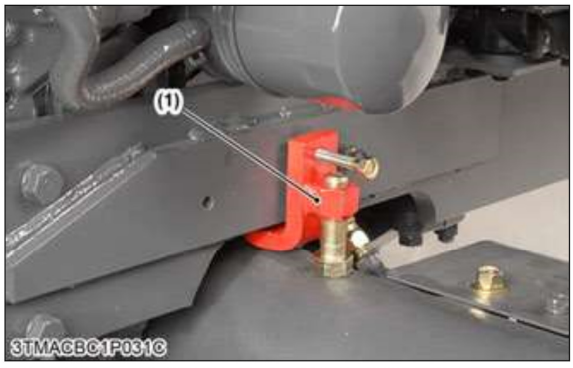
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5.1.1.13 Separating engine from clutch housing case

Tools required

- Front axle rocking restrictor
- Liquid gasket (Three Bond 1206C or equivalent)

1. Set the front axle rocking restrictor (1) to the front axle and chock the front wheels.
2. Remove the fuel tank base mounting screws (2) from the fuel tank base.





(1) Front axle rocking restrictor (2) Fuel tank base mounting screw

3. Support the clutch housing with a disassembling stand.
4. Support the mid case with a disassembling stand.
5. Remove the engine and clutch housing case mounting screws and nuts.
6. Separate the engine and the clutch housing case.





(When reassembling)

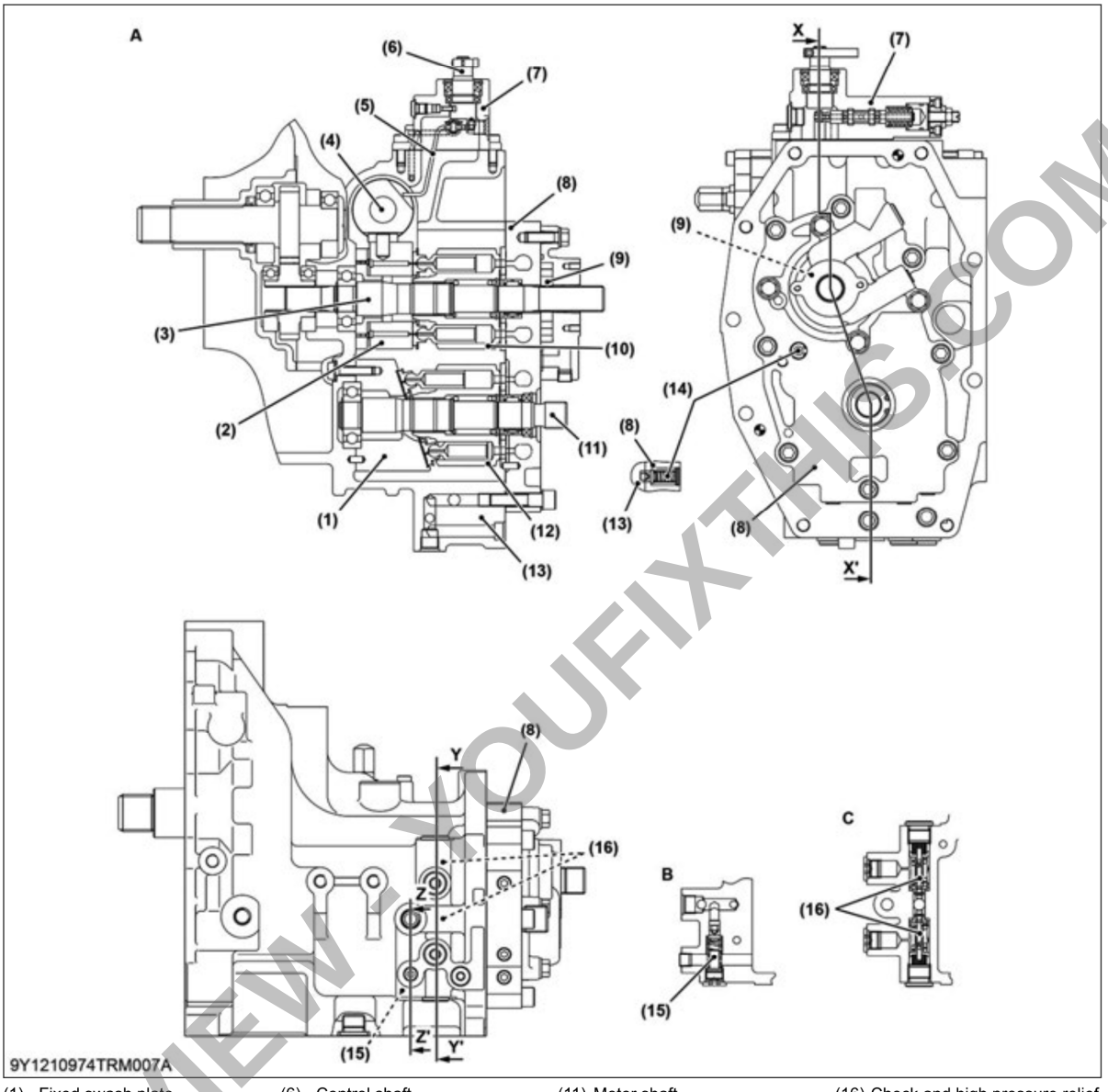
- Apply grease to the spline of clutch shaft.
- Apply liquid gasket (Three Bond 1208D or equivalent) to the joint face of the flywheel housing and clutch housing.
- Tighten to the specified tightening torque.

Tightening torque	Engine and clutch housing mounting screw and nut M12, grade 7	77.5 to 90.2 N·m 7.91 to 9.19 kgf·m 57.2 to 66.5 lbf·ft
	Engine and clutch housing mounting stud bolt	39.2 to 49.0 N·m 4.00 to 4.99 kgf·m 29.0 to 36.1 lbf·ft

5.1.1.14 Removing radiator upper hose, inlet hose, radiator lower hose and alternator

1. Slide the hose clamp and disconnect the radiator upper hose (1) from the thermostat cover.
2. Slide the hose clamp and disconnect the inlet hose (2) from the turbocharger.
3. Slide the hose clamp and disconnect the radiator lower hose (3) from the engine.

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(1) Fixed swash plate
(2) Variable swash plate
(3) Pump shaft
(4) Servo piston
(5) Feedback lever
(6) Control shaft
(7) Regulator assembly
(8) Port block cover
(9) Charge pump
(10) Cylinder block (Pump)
(11) Motor shaft
(12) Cylinder block (Motor)
(13) HST case
(14) Case relief valve
(15) Charge relief valve
(16) Check and high pressure relief valve
A: Sectional view X-X'
B: Sectional view Z-Z'
C: Sectional view Y-Y'

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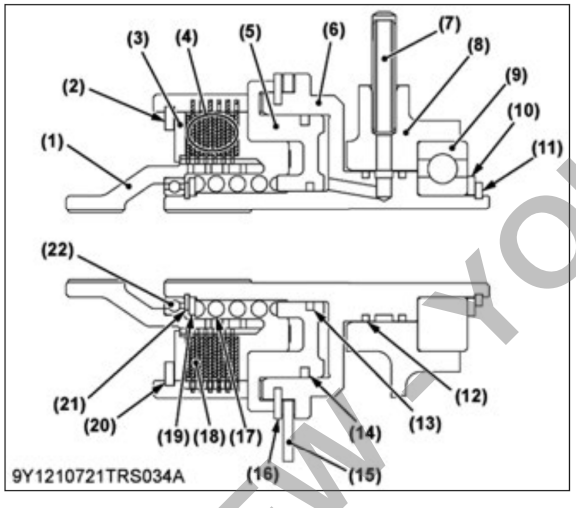
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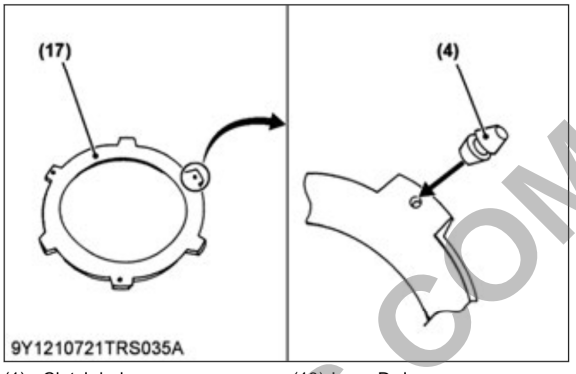
- Install oil pipe (2) to the side hole of PTO clutch holder (4) firmly.
- Replace the oil pipe (2) with a new one.

Tightening torque	PTO clutch valve mounting bolt (M8)	23.5 to 27.5 N·m 2.40 to 2.80 kgf·m 17.4 to 20.2 lbf·ft
	PTO clutch holder mounting bolt (M10)	48.1 to 55.9 N·m 4.91 to 5.70 kgf·m 35.5 to 41.2 lbf·ft

5.4.2.4 Removing clutch hub, clutch disks and clutch plates

1. Remove the circlip (2) and the back plate (3).
2. Remove the clutch hub (1), the plates (17) and the disks (18) from the PTO clutch case (6).
3. Remove the circlip (11).
4. Remove the hydraulic pipe (7) from the bearing case (8).





(1) Clutch hub
(2) Circlip
(3) Back plate
(4) Rubber
(5) Piston
(6) PTO clutch case
(7) Hydraulic pipe
(8) Bearing case
(9) Ball bearing
(10) Plate
(11) Circlip
(12) Ring seal
(13) Inner D-ring
(14) Outer D-ring
(15) Brake disk
(16) Brake plate
(17) Plate
(18) Disk
(19) Washer
(20) Circlip
(21) Shim
(22) Ball bearing

(When reassembling)

- Install the clutch disks (18) and plates (17) mutually.
- Do not confuse the back plate (3) and the plates (17). The back plate (3) is thicker than the plates (17).
- Assemble that the rubbers (4) and portion of the plates (17) are same position while assembling.
- Replace the ring seals with the new ones.

5.4.2.5 Removing piston and PTO brake disk

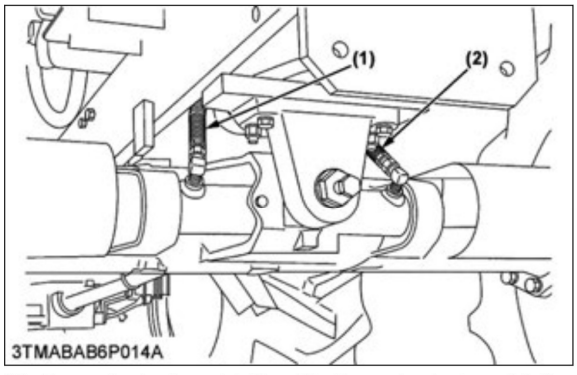
1. Depress the return spring (3) by using a jig (10).
2. Remove the circlip (1) form the PTO clutch case (7).
3. Remove the piston (4).

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5.1.3 Removing power steering hoses

1. Disconnect the power steering hoses (1), (2) from steering cylinder.



(1) Power steering hose 1 (with white and yellow tape)
(2) Power steering hose 2 (with white tape)

2. Remove the cylinder cover.

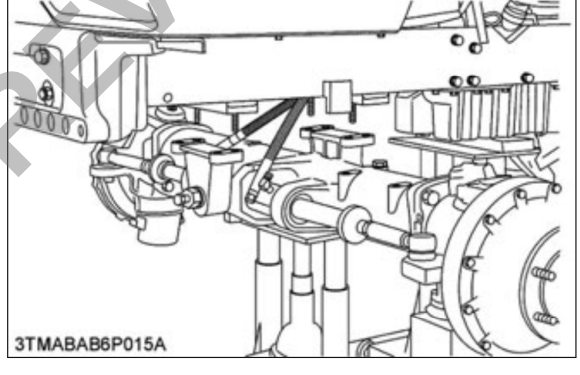
(When reassembling)

- Connect the power steering hose 1 with white and yellow tape to the R.H.

Tightening torque	Power steering hose retaining nut	25 to 29 N·m 2.6 to 2.9 kgf·m 19 to 21 lbf·ft
	Cylinder cover	61 to 70 N·m 6.3 to 7.1 kgf·m 45 to 51 lbf·ft

5.1.4 Removing front wheel and front axle

1. Check the front axle and engine are securely mounted on the disassembling stand.
2. Loosen the front wheel mounting nuts.
3. Lift the front axle and remove the front wheels.
4. Remove the bracket (front) mounting bolts and nuts.
5. Remove the bracket (rear) mounting bolts and nuts.
6. Separate the front axle from front axle bracket.



(When reassembling)

■ IMPORTANT

- **Adjust the front axle pivot.**

Tightening torque	Front wheel mounting nut	124 to 147 N·m 12.7 to 14.9 kgf·m 91.5 to 108 lbf·ft
	Bracket mounting bolt and nut	78 to 90 N·m 8.0 to 9.1 kgf·m 58 to 66 lbf·ft

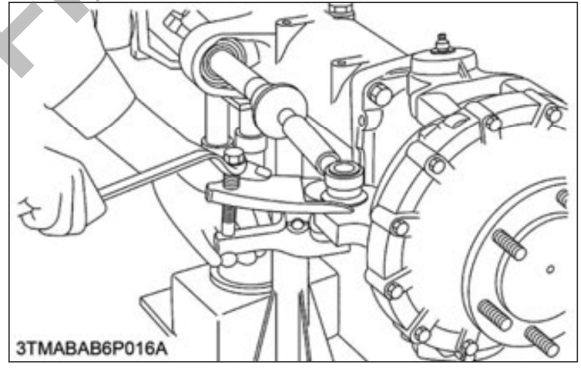
RELATED PAGE
4.3 Adjusting front axle pivot on page 9-6

5.1.5 Removing tie-rods

Tools required

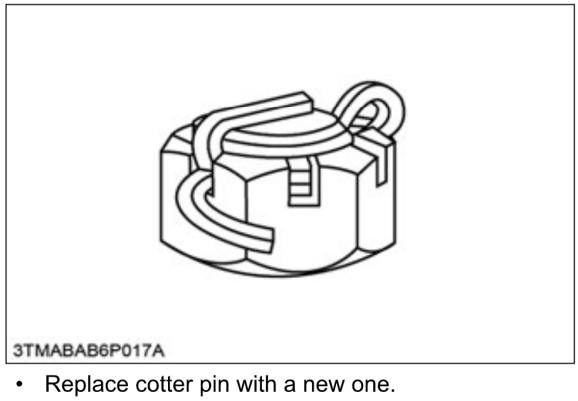
- Tie-rod end lifter

1. Pull out the cotter pin and remove the tie-rod end slotted nuts.
2. Remove the tie-rod with a tie-rod end lifter.



(When reassembling)

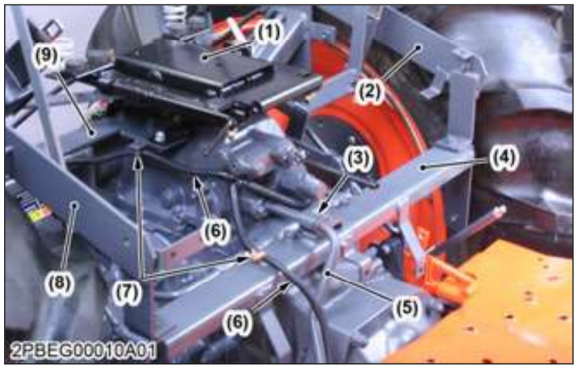
- After tightening the tie-rod end nut to the specified torques.
- Install a cotter pin as shown in the figure.

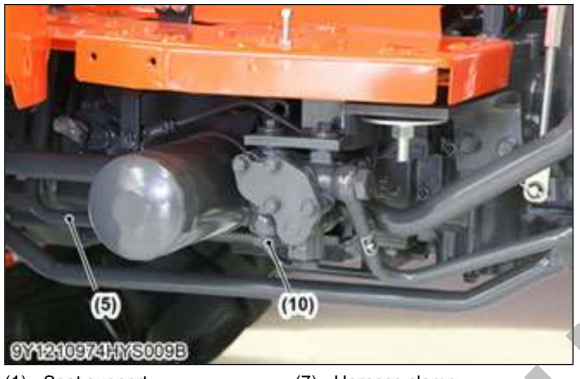


- Replace cotter pin with a new one.

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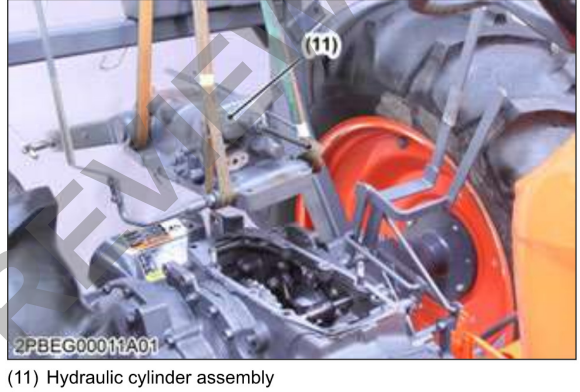
7. Remove the seat under cover bracket (4).





(1) Seat support
(2) Fender bracket (L.H.)
(3) Pipe camp
(4) Seat under cover bracket
(5) 3-points delivery pipe
(6) Wiring harness
(7) Harness clamp
(8) Fender bracket (R.H.)
(9) Seat under stay
(10) Joint bolt (3-points delivery pipe)

8. Loosen and remove the mounting bolts and nuts of the hydraulic cylinder assembly (11).
9. Support the hydraulic cylinder assembly (11) with nylon sling and hoist.



(11) Hydraulic cylinder assembly

(When reassembling)

- Apply liquid gasket (Three Bond 1206C or equivalent) to joint face of the hydraulic cylinder assembly and transmission case after eliminating the water, oil and stuck liquid gasket.
- When replacing the hydraulic cylinder assembly mounting stud bolts, apply liquid lock (Three Bond 1324 or equivalent) the stud bolt.

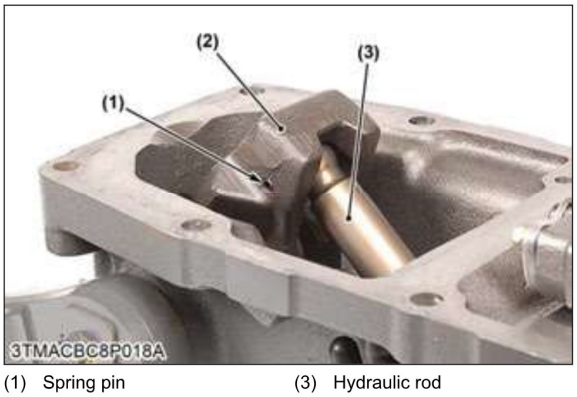
Tightening torque	Mounting bolt for 3-points delivery pipe	23.5 to 27.4 N·m 2.40 to 2.79 kgf·m 17.4 to 20.2 lbf·ft
	Joint bolt(3-points delivery pipe) (10)	49.0 to 69.0 N·m 5.00 to 7.03 kgf·m 36.2 to 50.8 bf·ft
	Mounting stud bolt for hydraulic cylinder assembly	34.3 to 49.0 N·m 3.50 to 4.99 kgf·m 25.3 to 36.1 lbf·ft
	Mounting bolt and nut for hydraulic cylinder assembly	77.4 to 90.2 N·m 7.90 to 9.19 kgf·m 57.1 to 66.5 lbf·ft

5.2.4 Removing hydraulic rod and hydraulic piston

CAUTION

- **Do not put your hand into the hydraulic cylinder block because the hydraulic piston jumps out with a strong force, which is dangerous.**

1. Tap out the spring pin (1).
2. Remove the hydraulic rod (3).



(1) Spring pin
(2) Hydraulic arm
(3) Hydraulic rod

3. Remove the plug (screw head size: 17 mm) from front of hydraulic cylinder.

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