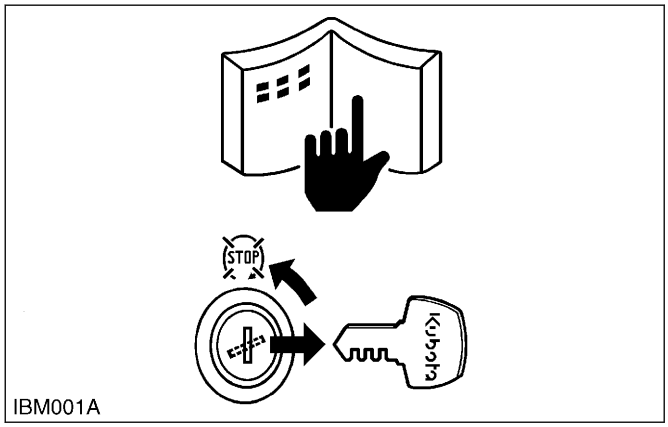
2. Before you start service



IBM001A

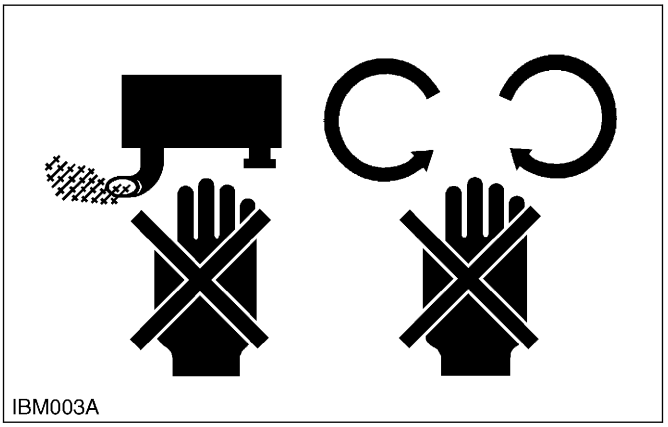
- Read all instructions and safety instructions in this manual and on your machine safety decals.
- Clean the work area and machine.
- Park the machine on a stable and level ground, and set the parking brake.
- Lower the implement to the ground.
- Stop the engine, then remove the key.
- Disconnect the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

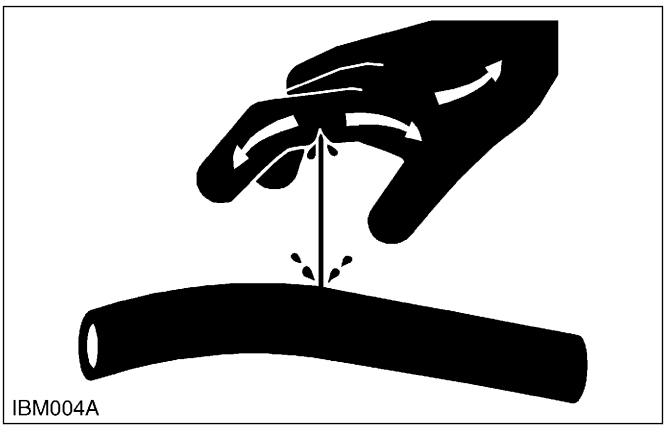
3. Start safely

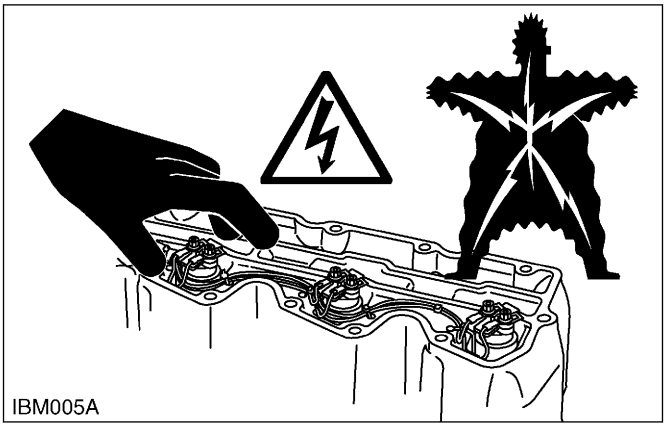

IBM002A

- Do not do the procedures below when you start the engine.
  1. Short across starter terminals.
  2. Bypass the safety start switch.
- Do not alter or remove any part of machine safety system.
- Before you start the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
- Do not start the engine when you stay on the ground. Start the engine only from operator's seat.

4. Operate safely


IBM003A


IBM004A


IBM005A

- Do not use the machine after you consume alcohol or medication or when you are tired.
- Put on applicable clothing and safety equipment.
- Use applicable tools only. Do not use alternative tools or parts.
- When 2 or more persons do servicing, make sure that you do it safely.
- Do not touch the hot parts or parts that turn when the engine operates.
- Do not remove the radiator cap when the engine operates, or immediately after it stops. If not, hot water can spout out from the radiator. Only remove the radiator cap when it is at a sufficiently low temperature to touch with bare hands. Slowly

4. Safety labels for backhoe

The safety labels are installed on the backhoe. If a label becomes damaged, illegible or is not on the backhoe, replace it. The label part number is listed in the parts list.

DANGER, WARNING AND CAUTION LABELS OF THE BACKHOE

(1) Part No. 75597-7528-1

1HNAAACAP008E

(2) Part No. 75595-7517-2

1HNAAACAP011E

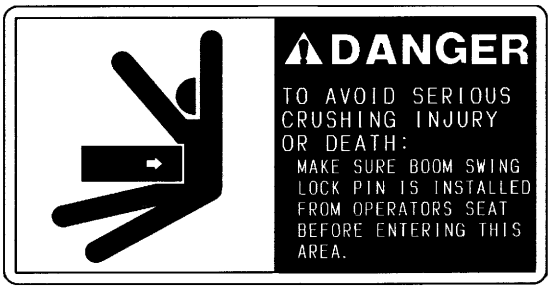
(3) Part No. 75595-7524-2

1HNAAACAP012E

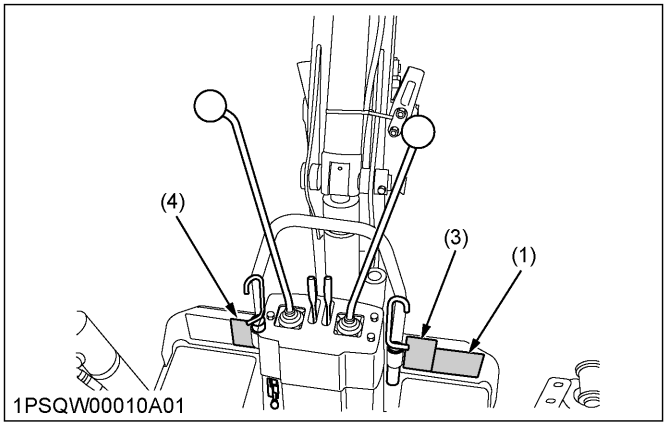
(4) Part No. 7K501-7529-1

1AJABAEAP028A

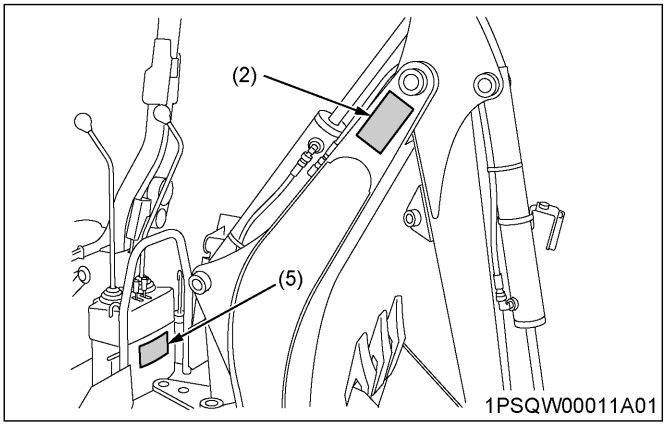
(5) Part No. 75597-7517-2



1HNAAACAP010E



1PSQW00010A01



1PSQW00011A01

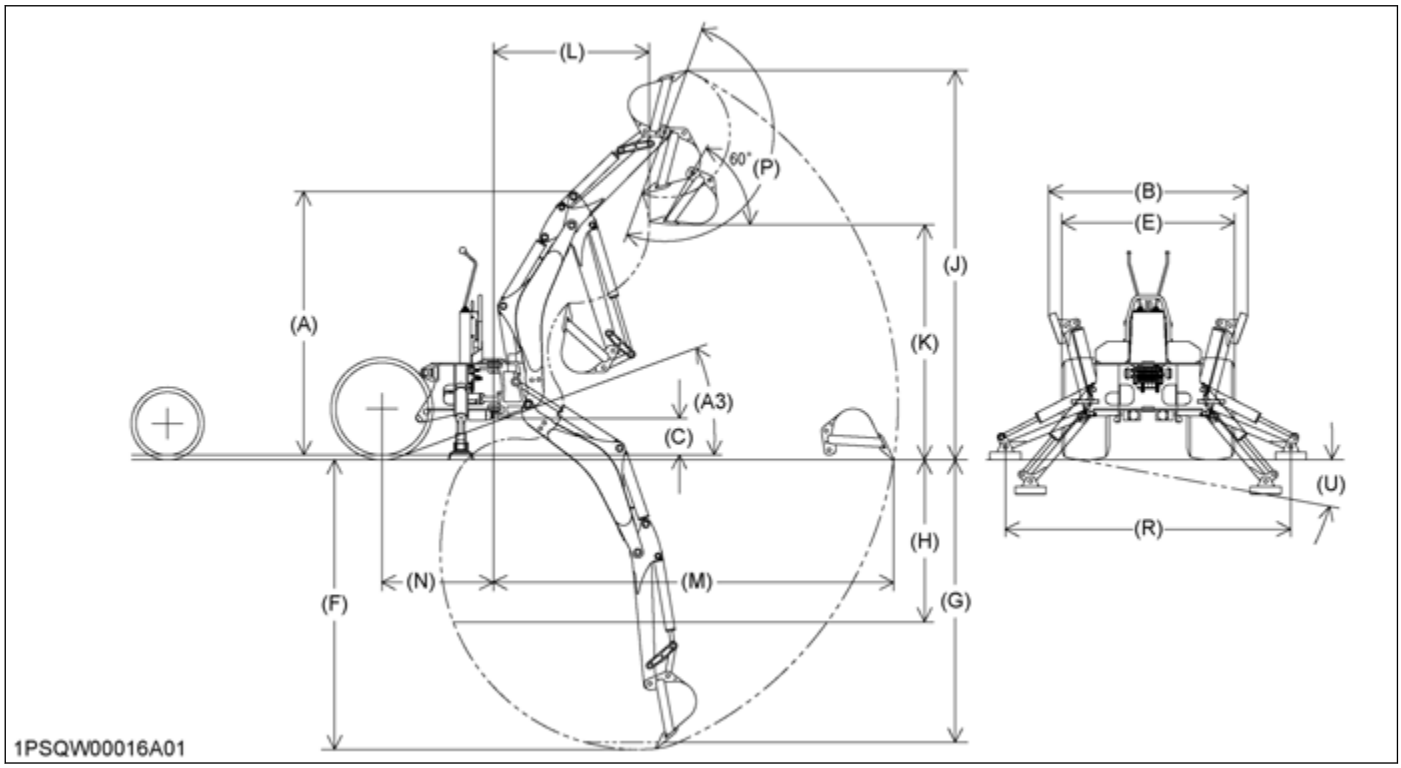
1PSQW00009A01

4.2 Backhoe dimensions

Model		BT603
(A)	Transport height	1719 mm (67.68 in.)
(B)	Stabilizer spread-transport	1296 mm (51.02 in.)
(C)	Ground clearance	240 mm (9.45 in.)
(E)	Overall width	1128 mm (44.41 in.)
(F)	Maximum digging depth	1889 mm (74.37 in.)
(G)	Digging depth, 2 ft. flat bottom	1842 mm (72.52 in.)
(H)	Digging depth, 8 ft. flat bottom	1059 mm (41.69 in.)
(J)	Operating height, fully raised	2539 mm (99.96 in.)
(K)	Loading height	1533 mm (60.35 in.)
(L)	Loading reach	1016 mm (40.00 in.)
(M)	Reach from swing pivot	2612 mm (102.8 in.)
(N)	Swing pivot to rear axle center line	726 mm (28.6 in.)
(P)	Bucket rotation	3.14 rad (180°)
(R)	Stabilizer spread-operating	1862 mm (73.31 in.)
(A3)	Angle of departure per SAE J1234	0.351 rad (20.1°)
(U)	Leveling angle	0.19 rad (11°)
Swing arc		2.44 rad (140°)

NOTE

- **The specifications are taken with KUBOTA BX23S tractor. (Tire size: Front 18×8.5-10, Rear 26×12.00-12)**



1. Place the mower on level ground.
2. Loosen the check plug (2), and check to see if oil seems from the opening.
3. If the oil level is low, remove the oil filler plug (3) and add new gear oil.

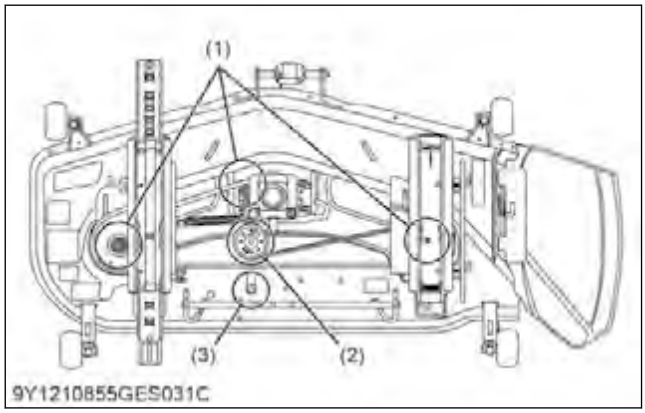
RELATED PAGE
LUBRICANTS, FUEL AND COOLANT on page 2-7

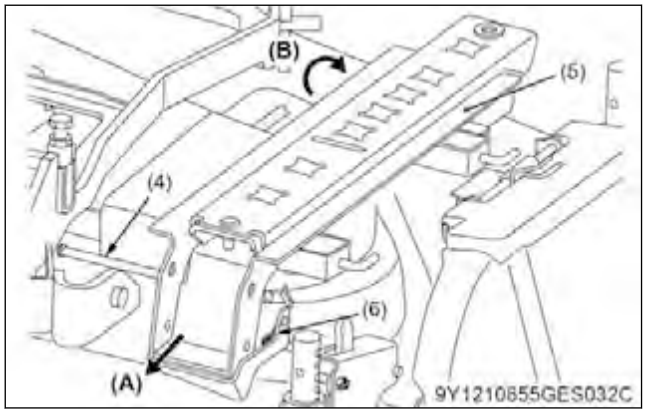
2.1.5 Greasing spindle shafts, belt tension pivot and tension pulley

1. Grease the grease fittings (1), (2), (3) if the amount of grease is insufficient.

[Only for RCK54D-26BX]

2. Remove the ramp bracket (5) for greasing spindle shafts. To remove the ramp bracket, remove the pin (6) and clevis pin (4) and slide the ramp bracket to the rear side (A). Then lift up (B) the ramp bracket to remove from mower deck.

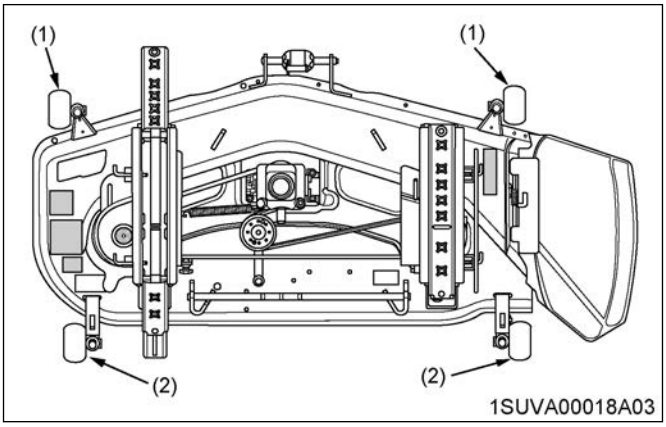




(1) Grease fitting (Spindle shaft)
(2) Grease fitting (Belt tension pulley)
(3) Grease fitting (Belt tension pivot)
(4) Clevis pin
(5) Ramp bracket
(6) Pin
(A) Rear
(B) Up

2.1.6 Greasing front and rear anti-scalp rollers

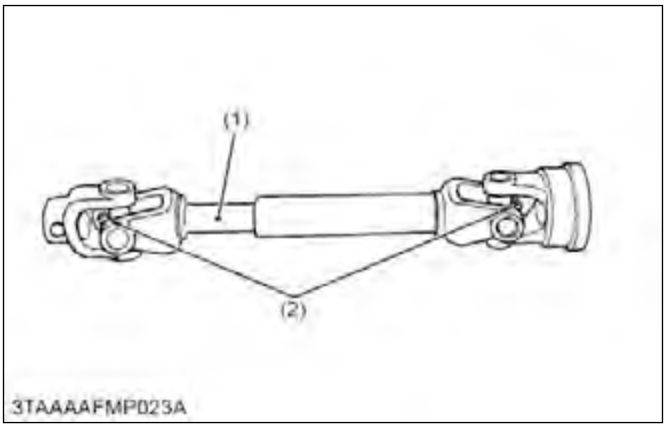
1. Grease the grease fitting (1), (2) of the front and rear anti-scalp rollers if the amount of grease is insufficient.



(1) Grease fitting (Front anti-scalp roller)
(2) Grease fitting (Rear anti-scalp roller)

2.1.7 Greasing universal joint

1. Grease the internal splines (1) and grease fittings (2) of the universal joint if the amount of grease is insufficient.



(1) Spline
(2) Grease fitting

M	Chamfer 1 mm (0.039 in.)
N	Chamfer 0.4 mm (0.157 in.)
O	Chamfer 3 mm (0.118 in.)
P	Chamfer 2 mm (0.079 in.)
Q	21.4 mm (0.843 in.)
R	19 mm (0.748 in.)
S	17 mm (0.669 in.)
T	10 mm (0.393 in.)
U	50 mm dia. (1.969 in. dia.)
V	9.8 mm dia. (0.386 in. dia.)
W	16 mm dia. (0.629 in. dia.)
X	34.5 mm dia. (1.358 in. dia.)
Y	38 mm dia. (1.496 in. dia.)
Z	25 mm (0.984 in.)
a	1.05 rad (10°)
b	Chamfer 0.3 mm (0.012 in.)
c	23 mm (0.906 in.)
d	10 mm (0.394 in.)
e	1 mm (0.039 in.)
f	6.5 mm (0.256 in.)
g	Chamfer 0.5 mm (0.020 in.)
h	11.1 to 11.3 mm (0.437 to 0.445 in.)
i	18.8 to 19.0 mm (0.740 to 0.748 in.)
(1)	Spacer
(2)	Block
(3)	Cap

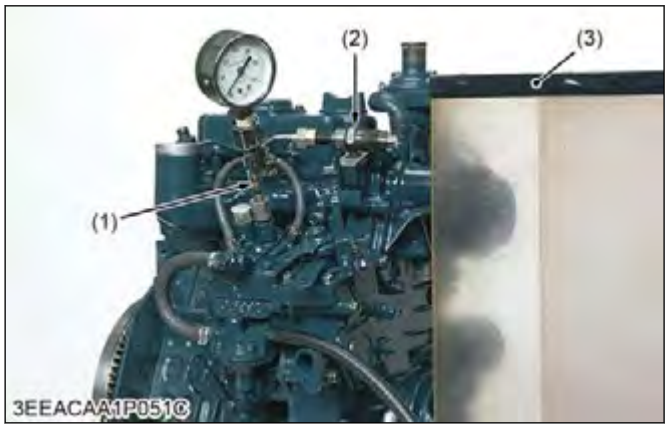
8. If injection timing is out of adjustment, readjust the timing with shims.

Injection timing	Factory specification	0.3360 to 0.3621 rad (19.25 to 20.75°) before T.D.C.

4.4.2 Checking fuel tightness of pump element

NOTE

- **Never try to disassemble the injection pump assembly. For repairs, you are strongly requested to contact a Kubota-authorized pump service shop.**



(1) Injection pump pressure tester
(2) Injection nozzle
(3) Protection cover for jetted fuel

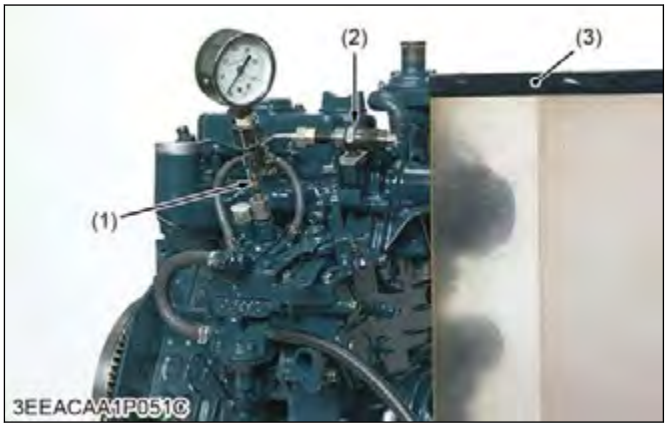
1. Remove the engine stop solenoid.
2. Remove the injection pipes and glow plugs.
3. Install the injection pump pressure tester to the injection pump.
4. Install the injection nozzle (2) jetted with the proper injection pressure to the injection pump pressure tester (1). (Refer to the photo.)
5. Set the speed control lever to the maximum speed position.
6. Run the starter to increase the pressure.
7. If the pressure cannot reach the allowable limit, replace the pump with new one or repair with a Kubota-authorized pump service shop.

Fuel tightness of pump element	Allowable limit	13.73 MPa 140.0 kgf/cm^2 1991 psi

4.4.3 Checking fuel tightness of delivery valve

NOTE

- **Never try to disassemble the injection pump assembly. For repairs, you are strongly requested to contact a Kubota-authorized pump service shop.**



(1) Injection pump pressure tester
(2) Injection nozzle
(3) Protection cover for jetted fuel

1. Remove the engine stop solenoid.
2. Remove the injection pipes and glow plugs.
3. Set a pressure tester to the fuel injection pump.
4. Install the injection nozzle (2) jetted with the proper injection pressure to the injection pump pressure tester (1).
5. Run the starter to increase the pressure.
6. Stop the starter when the fuel jets from the injection nozzle. After that, turn the flywheel by the hand and raise the pressure.
7. Now turn the flywheel back about half a turn (to keep the plunger free). Keep the flywheel at this position and clock the time taken for the pressure to drop.
8. Measure the time needed to decrease the pressure.
9. If the measurement is less than allowable limit, replace the pump with new one or repair with a Kubota-authorized pump service shop.

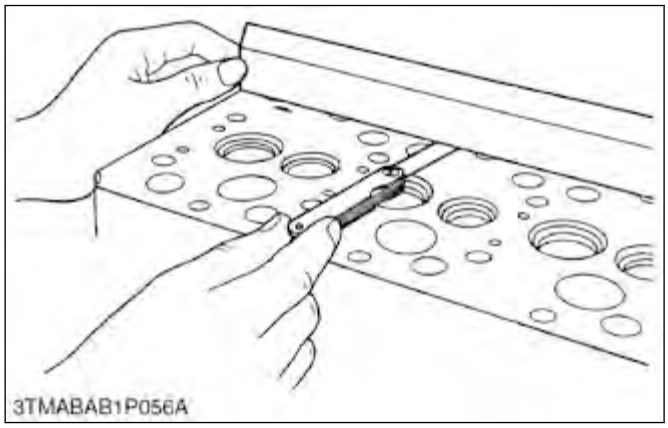
Fuel tightness of delivery valve	Factory specification	10 seconds 13.73 → 12.75 MPa 140.0 → 130.0 kgf/cm^2 1991 → 1849 psi
	Allowable limit	5 seconds 13.73 → 12.75 MPa 140.0 → 130.0 kgf/cm^2 1991 → 1849 psi

4.4.4 Checking nozzle spraying condition

CAUTION

- **Check the nozzle injection pressure and condition after you make sure that there is nobody standing in the direction the fume goes. If the fume from the nozzle directly contacts the**

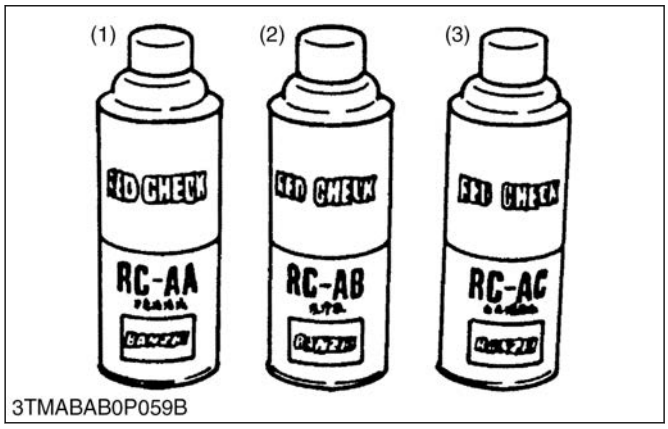
3. Measure the clearance with a thickness gauge.



4. If the measurement exceeds the allowable limit, correct it with a surface grinder.

Cylinder head surface flatness	Allowable limit	0.05 mm 0.002 in.

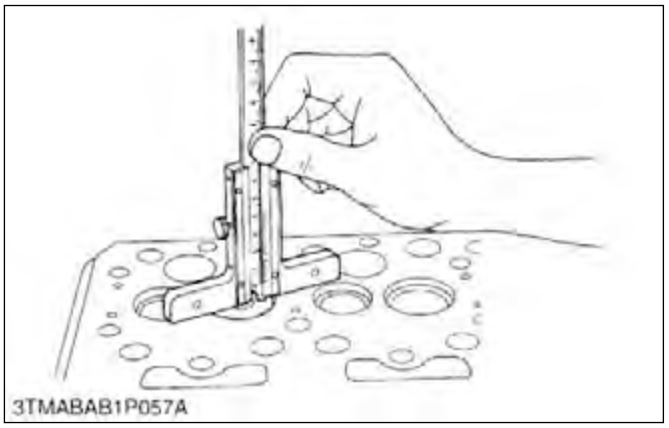
6.1.3 Checking cylinder head flaw

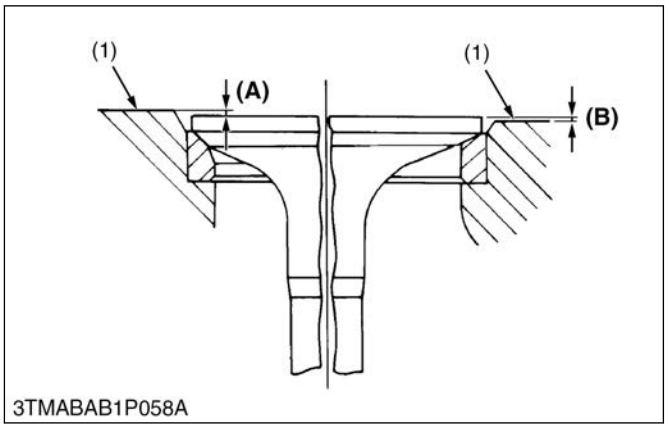


(1) Red permeative liquid (3) White developer
(2) Detergent

1. Prepare an air spray red check.
2. Clean the surface of the cylinder head with detergent (2).
3. Spray the cylinder head surface with the red permeative liquid (1). Leave it five to ten minutes after spraying.
4. Wash away the red permeative liquid on the cylinder head surface with the detergent (2).
5. Spray the cylinder head surface with white developer (3).
6. If flawed, it can be identified as red marks.

6.1.4 Checking valve recessing





(1) Cylinder head surface (B) Protrusion
(A) Recessing

1. Clean the cylinder head surface, valve face and valve seat.
2. Insert the valve into the valve guide.
3. Measure the valve recessing with a depth gauge.
4. If the measurement exceeds the allowable limit, replace the valve.

Valve recessing	Factory specification	0.10 (protrusion) to 0.10 (recessing) mm 0.0039 (protrusion) to 0.0039 (recessing) in.
	Allowable limit	0.30 (recessing) mm 0.012 (recessing) in.

5. If it still exceeds the allowable limit after replacing the valve, replace the cylinder head.

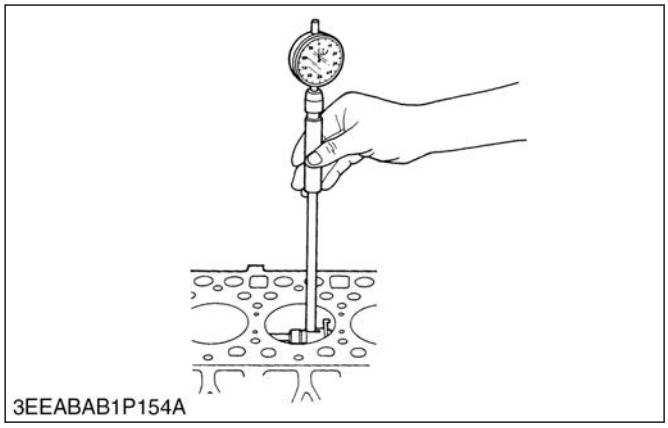
6.1.5 Checking clearance between valve stem and valve guide

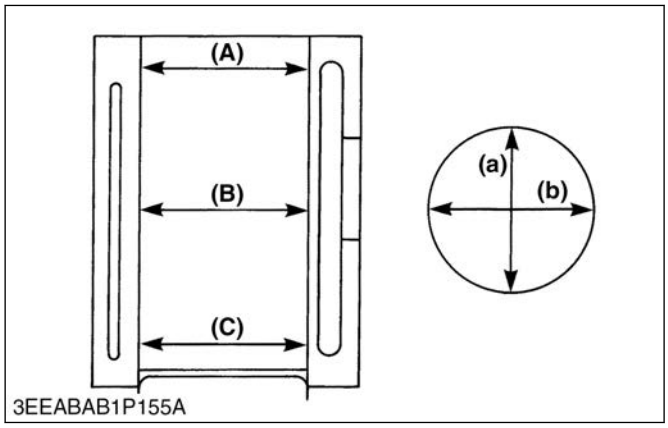
1. Remove carbon from the valve guide section.

6.5 Cylinder

6.5.1 Checking cylinder wear

1. Measure the I.D. of the cylinder at the six positions (see figure) with a cylinder gauge to find the maximum and minimum I.D.'s.





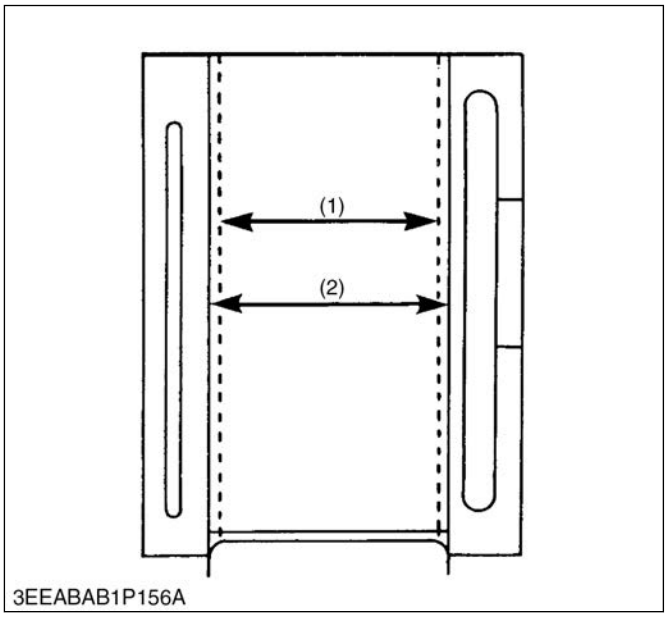
(A) Top
(B) Middle
(C) Bottom (Skirt)
(a) Right-angled to piston pin
(b) Piston pin direction

2. Get the difference (maximum wear) between the maximum and the minimum I.D.'s.
3. If the wear exceeds the allowable limit, bore and hone to the oversize dimension. (See "Correcting cylinder".)

Cylinder liner I.D.	Factory specification	72.000 to 72.019 mm 2.8347 to 2.8353 in.
	Allowable limit	72.150 mm 2.8406 in.

4. Visually check the cylinder wall for scratches. If deep scratches are found, the cylinder should be bored. (See "Correcting cylinder".)

6.5.2 Correcting cylinder (Oversize)



(1) Cylinder I.D. (Before correction)
(2) Cylinder I.D. (Oversize)

1. When the cylinder is worn beyond the allowable limit, bore and hone it to the specified dimension.

Cylinder liner I.D.	Factory specification	72.250 to 72.269 mm 2.8445 to 2.8452 in.
	Allowable limit	72.400 mm 2.8504 in.
Finishing		Hone to 2.2 to 3.0 µm Rz (87 to 110 µin. Rz)

2. Replace the piston and piston rings with oversize ones.

Oversize:
0.25 mm (0.0098 in.)

Marking:
025

NOTE

- **When the oversize cylinder is worn beyond the allowable limit, replace the cylinder block with a new one.**

SERVICING

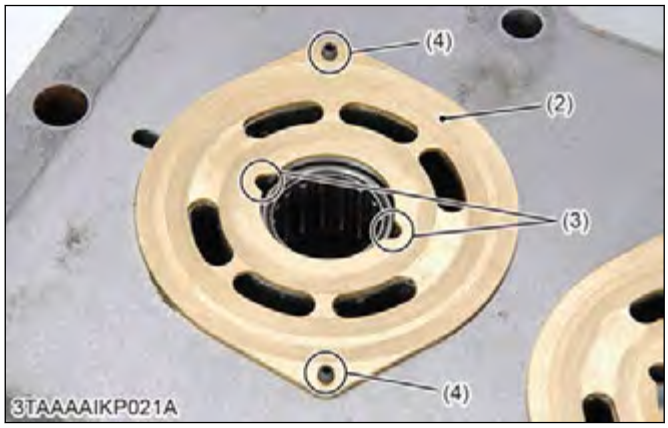
1. Troubleshooting for transaxle

Hydrostatic transmission

Symptom	Probable cause and checking procedure	Solution	Reference page
System will not operate in either direction	1. Oil lever is low	Check oil level or fill oil to proper level	2-26
	2. Speed control pedal linkage damaged	Repair linkage	4-42
	3. Charge pressure is too low	1. Replace oil filter cartridge	2-26
		2. Check charge pressure	4-31
		3. Inspect or flush charge relief valve	4-56
	4. Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	4-56
	5. Component parts damaged	Replace hydrostatic transmission assembly	4-42
Vibration and noise	1. Oil level is low	Check oil level or fill oil to proper level	2-26
	2. Speed control pedal linkage damaged	Repair linkage	4-42
	3. Charge pressure is too low	1. Replace oil filter cartridge	2-26
		2. Check charge pressure	4-31
		3. Inspect or flush charge relief valve	4-56
	4. Check and high pressure relief valve does not move smoothly	Inspect or replace check and high pressure relief valve	4-56
	5. Component parts damaged	Replace hydrostatic transmission assembly	4-42
Loss of power	1. Oil level is low	Check oil level or fill oil to proper level	2-26
	2. Speed control pedal linkage damaged	Repair linkage	4-42
	3. Charge pressure is too low	1. Replace oil filter cartridge	2-26
		2. Check charge pressure	4-31
		3. Inspect or flush charge relief valve	4-56

(Continued)

(When reassembling)

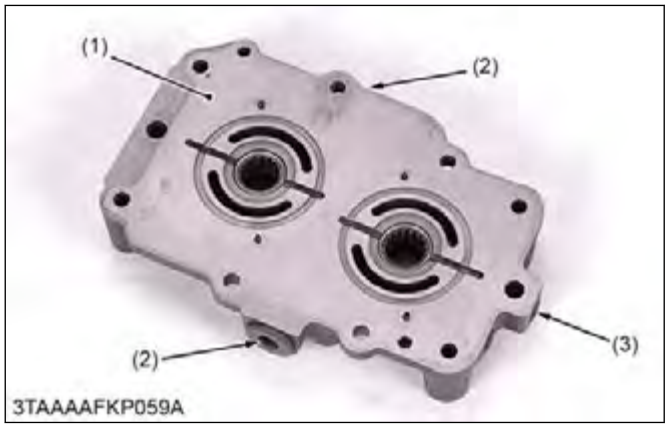


(2) Valve plate
(3) Groove
(4) Anchor pin

1. Check the direction of the groove (3).
2. Install the valve plates (2) to the anchor pins (4) securely.
3. Install the groove of the valve plate (pump plate) to the engine side.

5.2.5 Removing check and high pressure relief valve plug

1. Remove the check and high pressure relief plug (G 1/2).

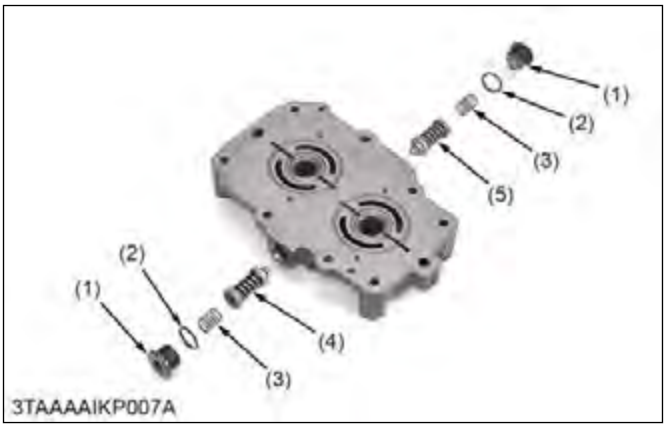


(1) Center section
(2) Plug
(3) Plug

(When reassembling)

Tightening torque	Check and high pressure relief valve plug (G 1/2)	59 to 78 N·m 6.0 to 8.0 kgf·m 44 to 57 lbf·ft

5.2.6 Checking check and high pressure relief valve



(1) Plug
(2) O-ring
(3) Spring
(4) Check and relief valve (Forward)
(5) Check and relief valve (Reverse)

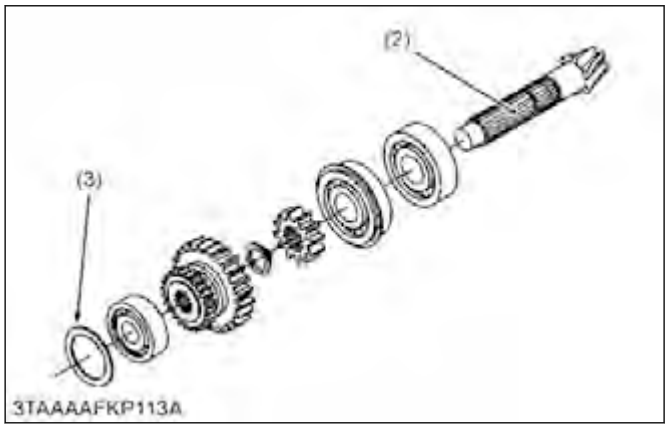
1. After removing the plug (1), draw out the spring (3) and the check and high pressure relief valve assembly (4), (5).

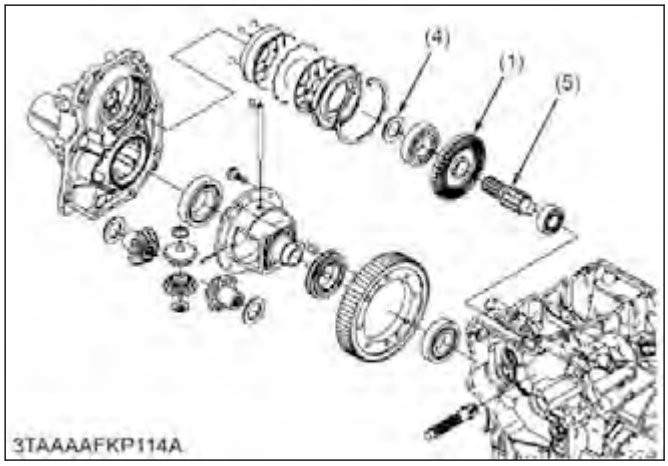
(When reassembling)

- Be careful not to damage the O-ring (2) on the plug (1).
- Since there is an orifice in the check and relief valve body (reverse) (5), re-install the check and relief valve (4), (5) to their original positions.

Orifice	Factory specification	1.5 mm 0.059 in.

6.2.11 Checking backlash between spiral bevel pinion gear and bevel gear



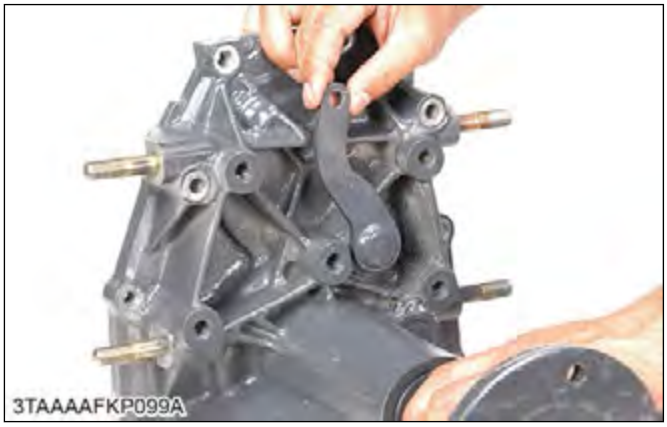


(1) Bevel gear
(2) Spiral bevel pinion gear
(3) Shim
(4) Shim
(5) Final gear shaft (Brake shaft)
(A) Bevel gear teeth upper surface

1. Temporarily assemble the spiral bevel pinion gear (2) and the bevel gear (1) in the transaxle case.
2. Hold the wire of solder or plastigauge on the bevel gear teeth upper surface (A).
3. Turn the front drive shaft one turn clockwise by hands.
4. Measure the backlash between the spiral bevel pinion gear and the bevel gear.
5. If the backlash exceeds the factory specifications, adjust the shims (3), (4).

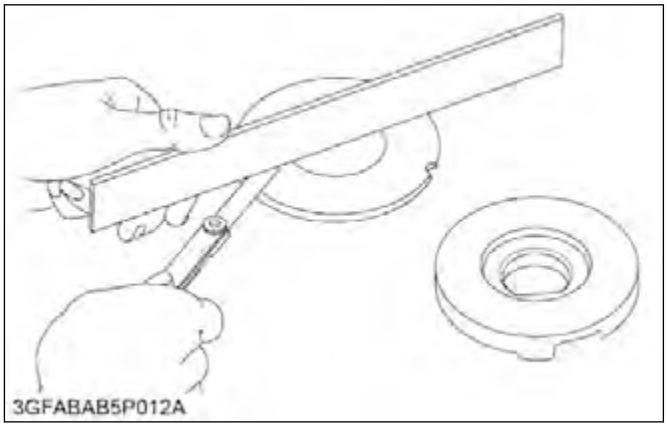
Backlash between spiral bevel pinion and bevel gear	Factory specification	0.10 to 0.30 mm 0.0040 to 0.011 in.

6.2.12 Checking brake cam lever movement



1. Move the brake cam lever by hand to check its movement.
2. If its movement is heavy, refine the brake cam with a emery paper.

6.2.13 Checking flatness of actuator and bearing holder

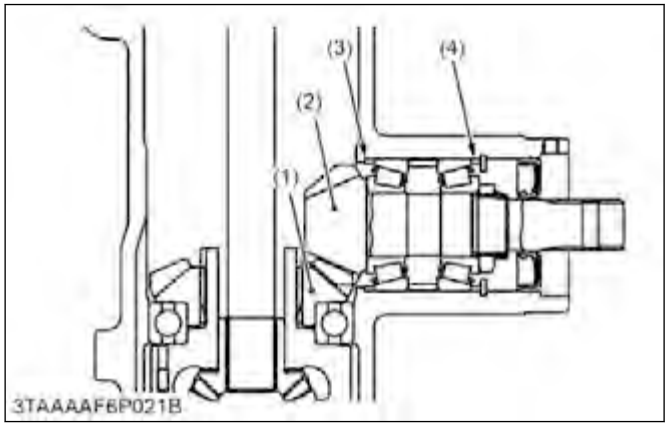


1. Place a straightedge on the contacting surface of the actuator and the bearing holder.
2. Inspect the friction surface of the actuator and the bearing holder with the straightedge, and determine if a feeler gauge will fit on the part of wear.

Flatness of actuator and bearing holder	Allowable limit	0.30 mm 0.012 in.

3. If it will fit, resurface.

6.5 Checking backlash between bevel pinion shaft and bevel gear



(1) Bevel gear
(2) Bevel pinion shaft
(3) Adjusting collar
(4) Adjusting collar

1. Put the wire of solder or plastigauge on the position where the tooth proper contact of bevel pinion shaft.

Wire of solder	Factory specification	Thickness 0.5 mm 0.02 in.

2. Fix the bevel gear and rotate the bevel pinon shaft carefully.
3. Measure the backlash.
4. If the backlash is not within the factory specifications, change the adjusting collar (3) and (4).

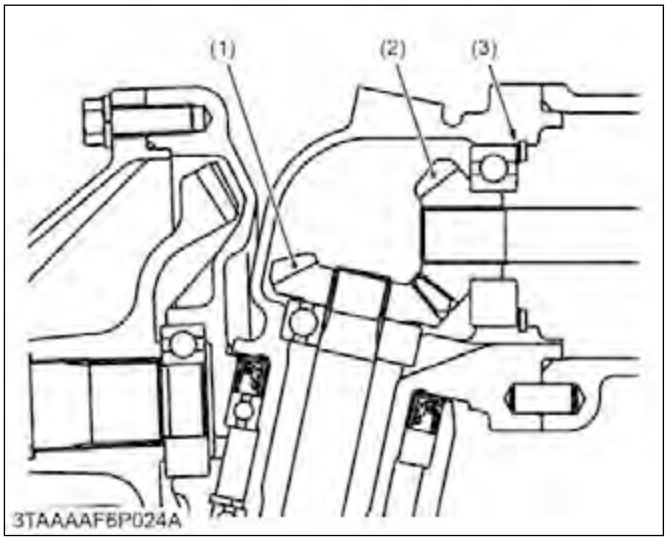
Backlash between bevel pinion shaft and bevel gear	Factory specification	0.1 to 0.3 mm 0.004 to 0.01 in.

(Reference)

Thickness of adjusting collars (3), (4)	3.40 mm 0.134 in.
	3.60 mm 0.142 in.
	3.80 mm 0.150 in.
	3.90 mm 0.154 in.
	4.00 mm 0.157 in.
	4.10 mm 0.161 in.
	4.20 mm 0.165 in.
	4.40 mm 0.173 in.
	4.50 mm 0.177 in.
	4.60 mm 0.181 in.

5. Adjust the backlash properly by repeating the above procedures.

6.6 Checking backlash between 12T bevel gear and 15T bevel gear



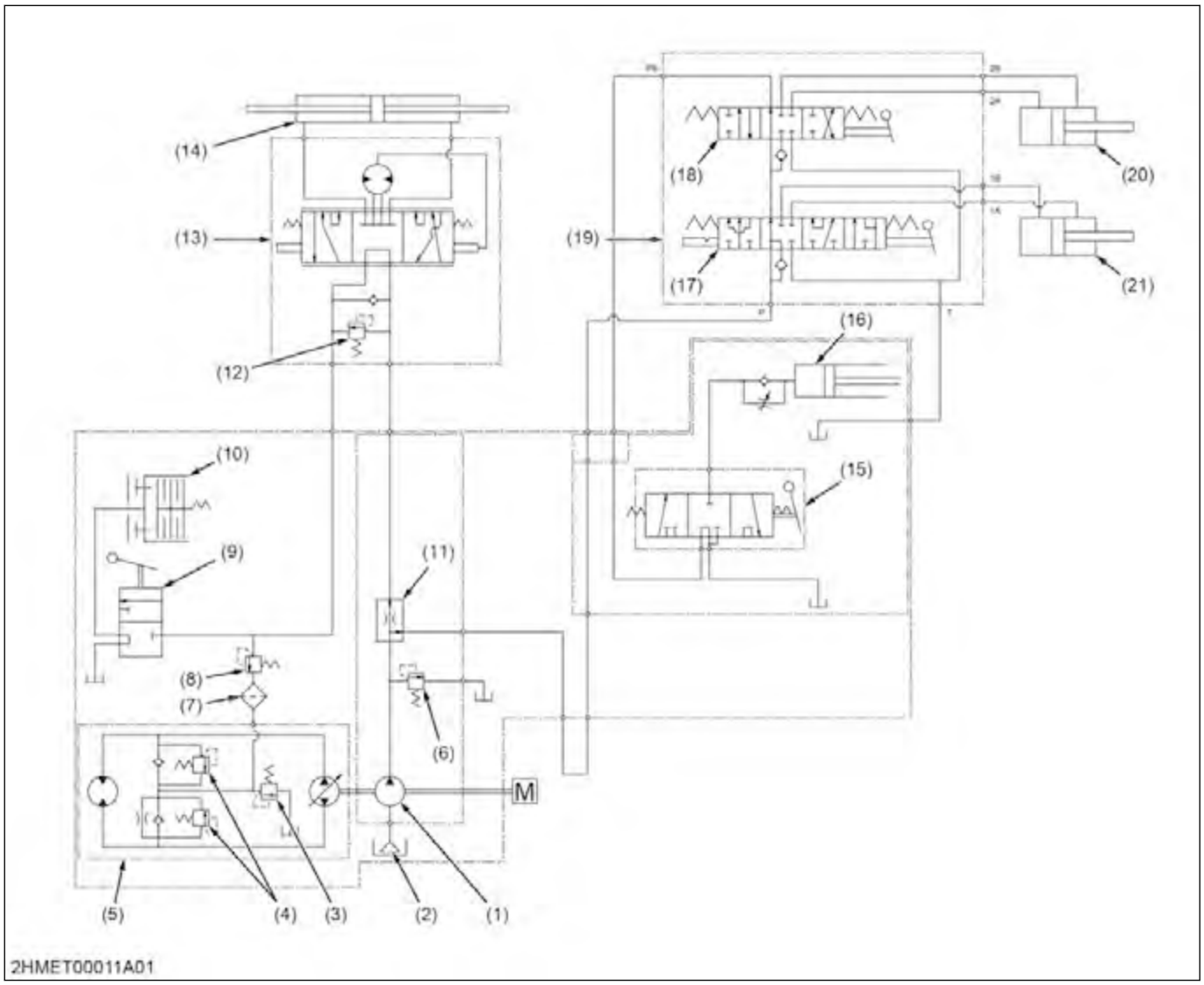
(1) 15T bevel gear
(2) 12T bevel gear
(3) Shim

1. Stick a strip of wire of solder or plastigauge to three spots on the 15T bevel gear (1) with grease.
2. Fix the front axle case, bevel gear case and front gear case.
3. Turn the axle.
4. Remove the bevel gear case from front axle case and measure the backlash.

2. Hydraulic circuit

The hydraulic system of this tractor consists of a hydraulic pump, control valve for front loader, 3 point hitch system and other components.
This system has the following functions:

1. Oil is supplied by hydraulic pump which is driven by pump drive shaft in the transmission case. As the pump drive shaft is connected to the propeller shaft, hydraulic pump starts running when engine is started.
2. The hydraulic pump supplies the high pressured oil to auxiliary hydraulic control valve for front loader, control valve for 3 point hitch system, power steering controller, PTO clutch valve and hydrostatic transmission after dividing oil flow by flow priority valve.

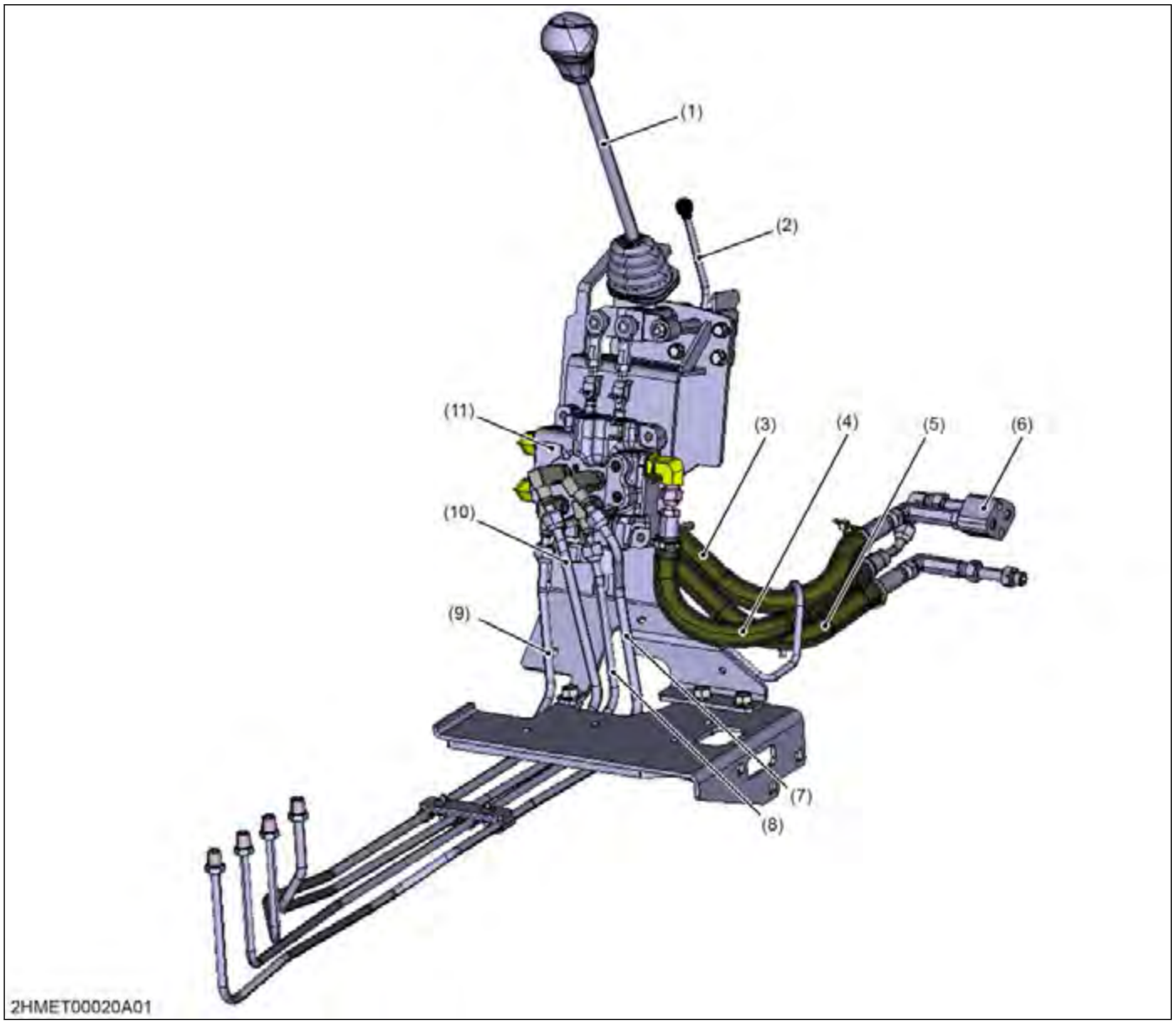


(1) Hydraulic pump
(2) Hydraulic oil filter
(3) Charge relief valve
(4) Check and high pressure relief valve
(5) Hydrostatic transmission
(6) Relief valve
(7) Hydraulic oil filter
(8) PTO clutch relief valve
(9) PTO clutch relief valve
(10) PTO clutch
(11) Flow priority valve
(12) Power steering relief valve
(13) Power steering controller
(14) Steering cylinder
(15) Control valve
(16) Hydraulic cylinder
(17) Boom control valve
(18) Bucket control valve
(19) Front loader control valve
(20) Bucket cylinder
(21) Boom cylinder

10. Front loader valve

10.1 Structure

10.1.1 Structure of front loader valve and pipe

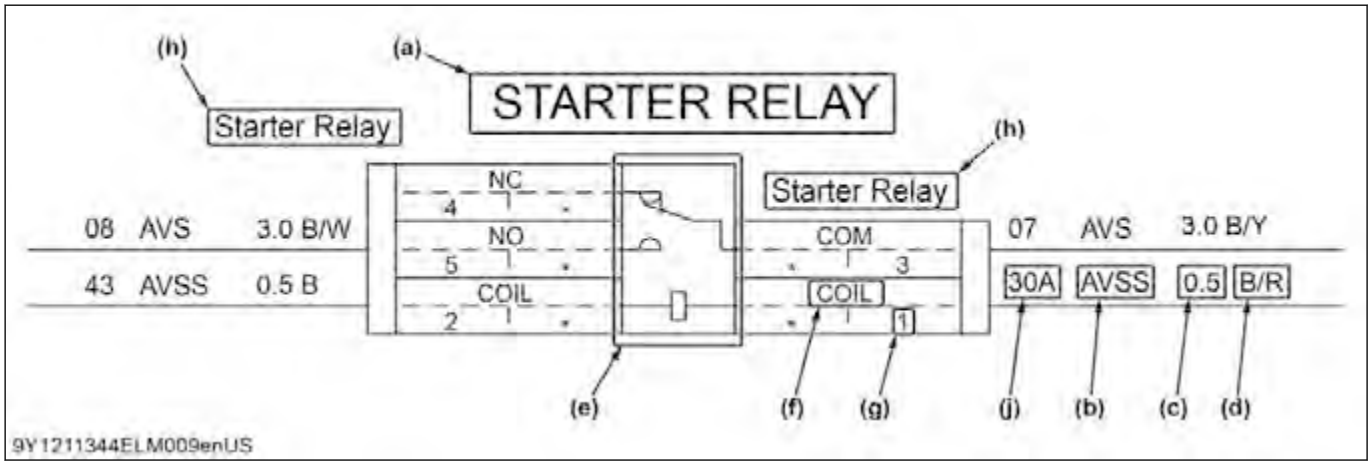


(1) Control lever
(2) Lock lever
(3) Pipe (Power beyond)
(4) Pipe (Pressure)
(5) Pipe (Return)
(6) Hydraulic outlet (Block type)
(7) Pipe (1A) for boom cylinder
(8) Pipe (1B) for boom cylinder
(9) Pipe (2B) for bucket cylinder
(10) Pipe (2A) for bucket cylinder
(11) Front loader control valve

3. Reading electrical circuit diagrams

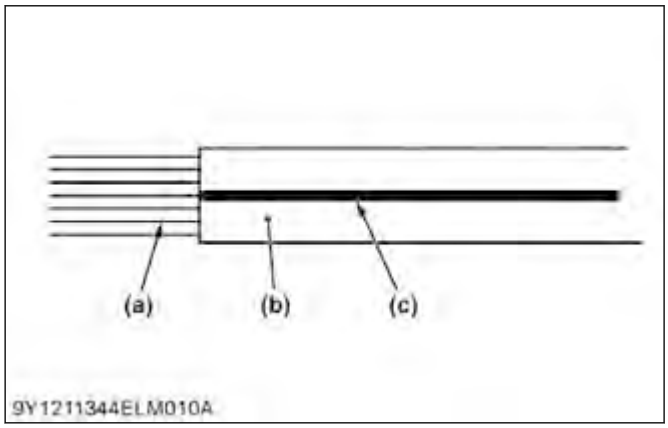
3.1 How to read wiring diagram

Electrical wiring chart symbols for harnesses and wires



	Item	(Example) Contents of illustration	Reference
(a)	Name of part	STARTER RELAY	
(b)	Wire specification code	All use (common)	
(c)	Wire size	0.50 mm^2	
(d)	Wire color	Black/Red	Wire color page
(e)	Unit symbol	Relay	Unit symbol page
(f)	Pin name	Coil	
(g)	Pin No.	1	
(h)	Connector name	Starter relay	Connector diagram
(i)	Wire number	30 A	

Color of wiring



(a) Wire size (mm^2) (b) Insulation base color (c) Stripe color

(Ex.)
1.25-Y/R means :
1.25 : Wire size (mm^2)
Y : Base color (yellow)
R : Stripe color (red)