SERVICE MANUAL

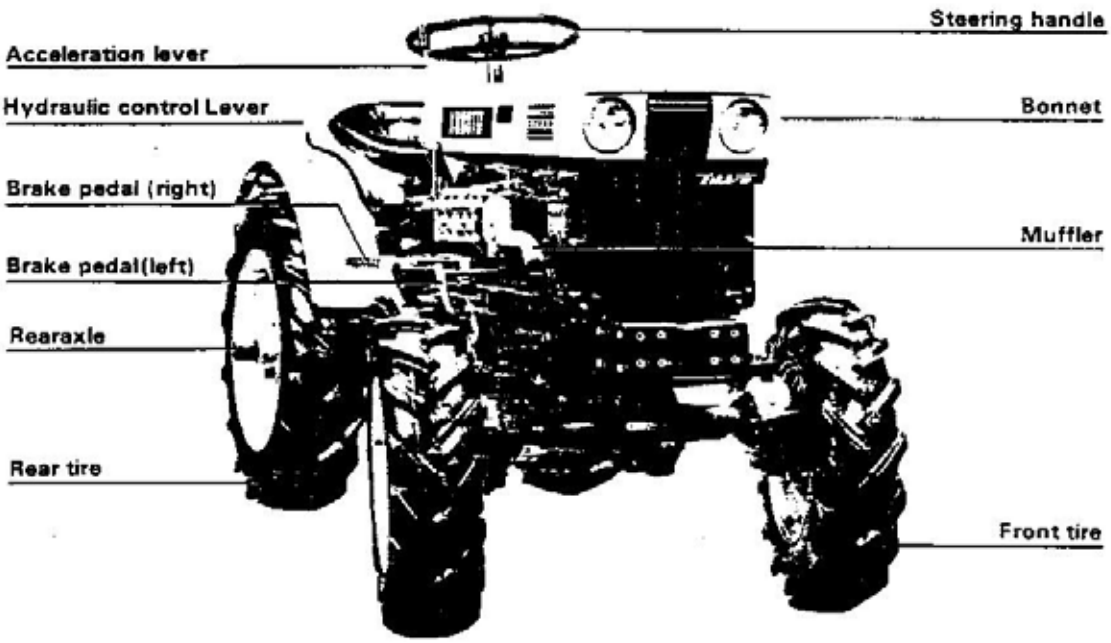
70000-70168

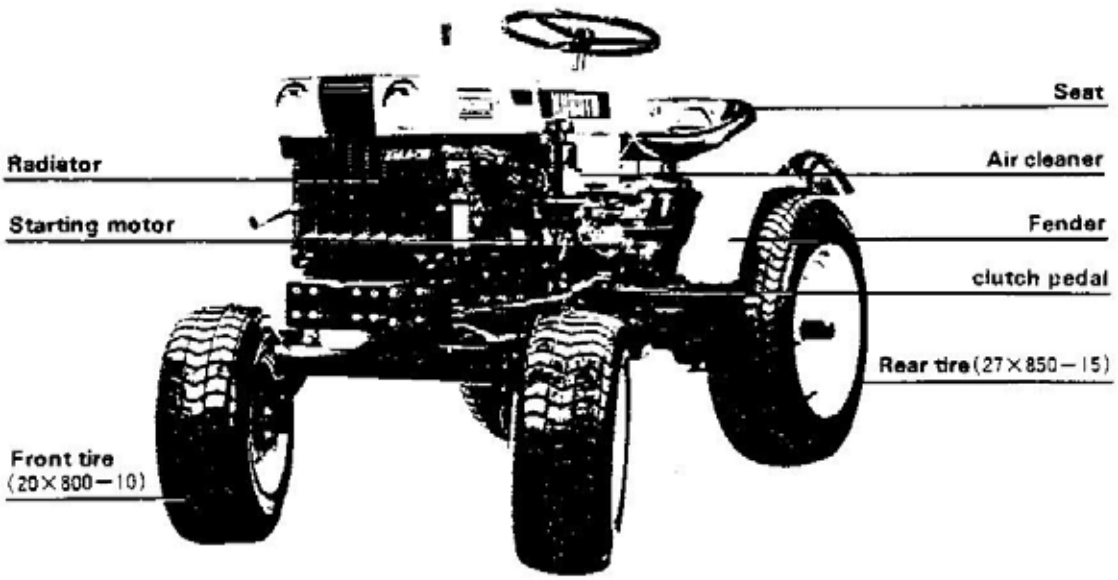
KUBOTA TRACTOR

MODEL B6000

CONTENTS

1. Outside Views





2. Features

■ Compact and powerful 2-cylinder diesel engine !
Kubota ZL600 diesel is a water-cooled, heavy-duty and powerful engine, which will certainly display its excellent performance by powering the excellent mechanism of the B6000 tractor in various work in dry fields, wet fields, pastures, orchards and gardens.

■ Unique spherical combustion chamber !
Kubota's unique spherical combustion chamber is employed in the engine. This makes starting very easy, fuel consumption very low and output very high. This engine is certainly very economical from all points.

■ Starts up at once by battery-starter !
Since battery-starter, glow plug, decompression device and unique spherical combustion chamber are equipped, it is easy to start up.

■ Endurance even at low engine speed !
ZL600 engine has been specially designed for Kubota B6000 tractor. The torque performance is very good, always ensuring peak performance under extra overload when the speed is lowered. As driven by such a powerful engine, the tractor can be used under adverse condition and will not stall on the job.

■ 4-wheel drive ! (B6000)
Since B6000 tractor is driven with four wheels, it has big traction force and is available for any field work and traieing work with the standard rubber tires.

■ Light weight but powerful design !
Special consideration has been given to compact but powerful design and easier operation. Since newly developed tilling blades are employed, it ensures wider tilling and stable operation.

■ Easy to take out auxiliary hydraulic power !
Extra hydraulic power can be easily taken out from the cap of the hydraulic cylinder when other hydraulic implement than the rotary tiller is used. Hydraulic control valve already equipped can be utilized in such cases, too.

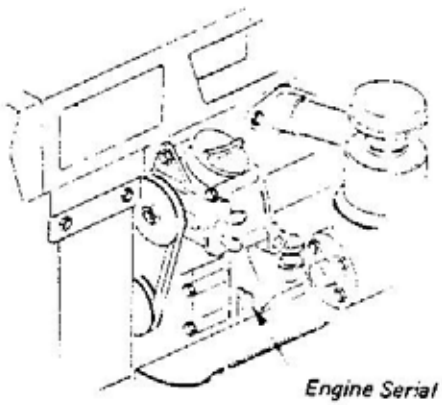
■ Differential lock !
Like bigger tractor, the differential lock is employed in this compact Kubota B6000 tractor. Even when one of the rear wheels slips, engaging the differential lock prevents such slips, ensures straight travelling and increases the trailing power.

■ Hydraulic operation when disengaging clutch !
Hydraulic pump is directly connected with diesel engine, hydraulic operation is available even when main clutch is disengaged. This mechanism would be so convenient when the implement is mounted or dismounted.

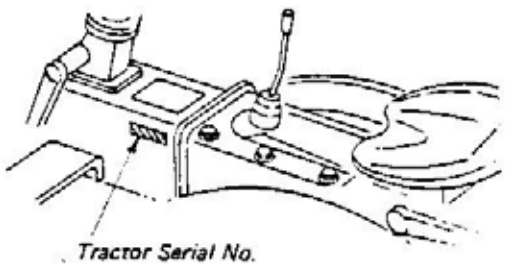
■ Comfortable riding !
Since ZL600 engine is 2-cylinder with minimum vibration and noise, and tractor has a special cushion under the seat, they minimize the fatigue to the operator and make tractor work a very comfortable one.

■ Water-, mud-, dust-proofed !
The important parts such as shafts, brakes, etc. are water-proofed, mud-proofed and dust-proofed.

If there are any necessity for difficult adjustments or repairs, please contact your Kubota Dealer stating the Model, Tractor Serial No. and Engine Serial No.



Engine Serial No.



Tractor Serial No.

(Serial No. means a production number.)

3. Specifications

Model		KUBOTA B6000	KUBOTA B6000E	KUBOTA B6000E-T
Engine:		KUBOTA ZL600		
Type		Vertical, water-cooled, 4-cycle diesel engine		
Cylinders		2		
Total displacement		35.21 cu. in. (577cc)		
Bare engine horse power		12.5 HP		
Revolution speed		2,700 rpm		
Max. revolution		2,900 rpm		
Fuel		Diesel light oil or No.2 diesel oil		
Starting		Electric starter with battery, glow plug & decompression device		
Starter		12V 0.8KW		
Lubrication		Forced lubrication by trochoidal pump		
Cooling		Water with pressurized radiator		
Battery		65AH		
Fuel tank cap.		2.38GA (9 lit.)		
Radiator cap.		0.79GA (3 lit.)		
Engine oil cap		0.53GA (2 lit)		
Fuel injection nozzle		DN12 SD12		
Injection pressure		2000psi (140 kg/cm^2)		
Injection timing		26° BTDC		
Dimensions:				
Overall length		71-5/8 inch (1820mm)	70-7/8 inch (1800mm)	70-4/8 inch (1790mm)
Overall width		36-2/8 inch (920mm)	36-2/8 inch (920mm)	37-6/8 inch (960mm)
Overall height		43-6/8 inch (1110mm)	42-7/8 inch (1090mm)	42-4/8 inch (1080mm)
Wheel base		45-5/8 inch (1160mm)	47-2/8 inch (1200mm)	47-2/8 inch (1200mm)
Min. ground clearance		9-4/8 inch (240mm)	10-5/8 inch (270mm)	9-4/8 inch (240mm)
Treads	Front	29-7/8 ~ 31-4/8 inch (760 ~ 800mm)	27-1/8 ~ 29-7/8 inch (690 ~ 760mm)	29-7/8 inch (760mm)
	Rear	28 ~ 36-2/8 inch (710 ~ 920mm)	28 ~ 36-2/8 inch (710 ~ 920mm)	24 ~ 35-4/8 inch (610 ~ 910mm)
Tires	Front	6–12	400–9	20 x 800 – 10
	Rear	7–16	7–16	27 x 850 – 15
Transmission:		Forward 6	Reverse 2	
Wheel alinement:				
Type		Center-pivot type		
Kingpin inclination		8°		
Toe-in		0 to 0.2" (0 to 5mm)		
Camber		2°		
Caster		1°		
Trail		0.55" (14mm)		
Clutch:		Dry single plate, pedal type		
Differential:		Bevel gear type (both front and rear)	Bevel gear type (rear only)	
Brake:				
Type		Internal-expanding type		
Lining OD width		3.74 x 1.02 (95 x 26mm)		
Parking brake		Hook-interlocked with main brake		

	B6000	B6000E	B6000E-T
PTO shaft:			
Location	Transmission case rear center		
Size	No. 5 Involute spline		
RPM	560, 840, 1350 w/engine at 2700 rpm.		
Attachment lifter:			
Type	Hydraulic type		
Hydraulic pump	Gear pump (10.8 lit/min)		
Pressure	1200 psi (85 kg/cm²)		
Cylinder Bore Stroke	2.36" x 3.27" (60 x 83 mm)		
Max. lifting	795 lbs. (360 kg) at lower link tip		
Min. turning radius	70" (1.78m)	65" (1.67m)	
Weight:	860 lbs. (390 kg)	770 lbs. (350 kg)	

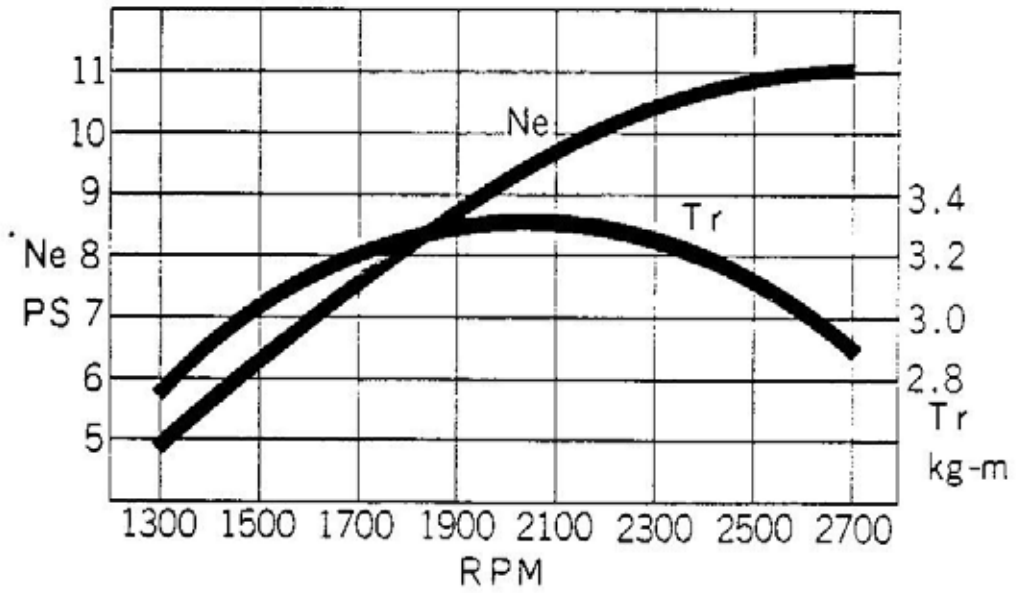
* The uses of the P.T.O. are power take off for various implements as well as for attaching the rotary directly to the rear and the rear mount mower.

■ Traveling Speeds

Speed / Gearshift	mph (km/h) B6000	B6000E	B6000E-T	Job type
Forward 1st	0.75	(1.21)	0.69 (1.10)	Rotary tilling, flat tilling, ridging
2nd	1.12	(1.81)	1.02 (1.65)	Rotary tilling, flat tilling
3rd	1.79	(2.88)	1.64 (2.63)	Rotary soil crushing, Mowing
4th	3.24	(5.21)	2.96 (4.76)	Mowering, Plowing
5th	4.83	(7.77)	4.41 (7.10)	Plowing
6th	7.72	(12.42)	7.04 (11.33)	Trailer work, road traveling
Reverse 1st	0.97	(1.56)	0.88 (1.42)	
2nd	4.16	(6.70)	3.80 (6.12)	

4. Engine

4.1 Performance curve of KUBOTA model ZL600 Diesel Engine



4.2 Main parts and handling instructions, Engine

(1) Fuel system

1. Fuel system is as shown in Fig. 1. The fuel flows in the direction shown by arrow marks. There are 3 air vents, 2 places (A) on the upper part of the fuel filter and, (B) on the upper part of the fuel injection pump. These 3 air vents would vent all the air from the fuel system.

2 Through the transparent cup, it is possible to see the inside of the fuel filter Therefore, it is possible to check the condition of the filter as well as the water, sediment, etc. at the bottom of the fuel filter. The case can be easily removed by hand. Disassemble and clean after every 100 hours of use.

3 Fuel injection timing is adjusted by changing the number of shims used. A piece of the shim corresponds to 1.5°, approximately, in crank angle. Therefore, the injection will take place 1.5° later when a piece is added and 1.5° earlier when a piece is removed.

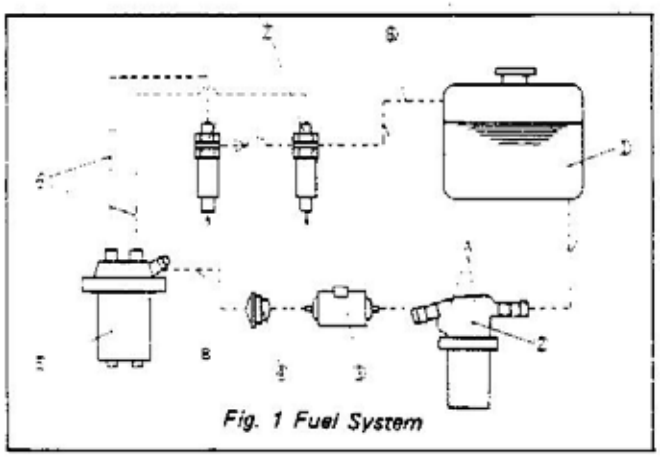
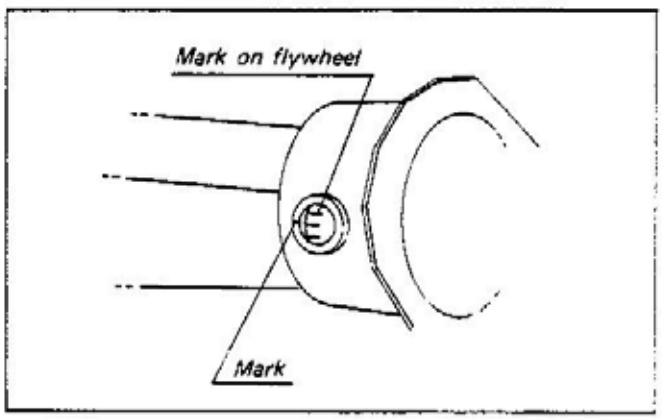


Fig. 1 Fuel System

1. *Fuel tank*
2. *Fuel filter*
3. *Fuel pump*
4. *Fuel filter*
5. *Fuel injection pump*
6. *Injection pipe*
7. *Nozzle holder*
8. *Overflow pipe*



Mark 1FI on flywheel means 1st cylindeis injection timing and Mark 2FI on flywheel means 2nd cylindeis injection timing.

4 Fuel injection pump

(a) Outline of structure and function

The fuel injection pump employed is called Model PFR for 2 cylinders. It is manufactured in Japan through license agreement with Robert Bosch Co. of West Germany, and the most suitable pump for the Kubota Diesel Engine. The fuel injection pump is made very precisely and has direct relationship to the engine. Be very cautious in handling of the pump. The pump housing is of cast iron, and houses and protects the parts inside. The delivery valve is assembled between the delivery chamber and the high pressure pipe, and is closed by the delivery valve spring. When the pressure in the delivery chamber rises, this valve opens. However, it prevents the fuel counterflow. Another function of this valve is to reduce the residual pressure within the injection (high pressure) pipe by suction, and thereby prevents the dripping of the fuel oil. The pump elements are the cylinder and the plunger. The cylinder is equipped with a feed hole, and the plunger, a control groove. The cylinder and the plunger has a precision fit so the two elements should be handled as an unit. They should not be considered as separate units. The control rack is engaged to the pinion, and the pinion and plunger turns together. Therefore, when the rack is moved, the plunger turned, too, and adjusts the amount of injection. It is connected to the governor in the engine, and fuel is injected in accordance with the engine load and rpm. The rotating movement of the fuel cam within the engine is converted to the reciprocating movement of the plunger by the tappet. Through the lower spring seat, the plunger spring pushes down the plunger at all times.

(b) Flow of fuel under pressure

The fuel which has been sent from the feed pump to the fuel injection pump is sent under pressure in the following manner by the action of the plunger.

i. When the plunger is at bottom dead center, the fuel flows from the fuel chamber through the feed hole as shown in Fig. 2(1) into the pump cylinder.

ii. The camshaft turns and the plunger rises. When the upper surface of the plunger is the same as the upper tip of the feed hole, fuel is started to be sent under pressure (Fig. 2, (2)). When the plunger further rises thereafter, the fuel opens the delivery valve, and is sent to the high pressure pipe and the nozzle. Fig. 2(3).

iii. The plunger rises further, and when the slanting control group and the feed hole is aligned, as shown in Fig. 2(4), the high pressure fuel at the top of the plunger flows through the hole in the central part of the plunger, through the control group, feed hole and is sent back to the fuel chamber. The pressure then is decreased and the sending of fuel under pressure is completed.

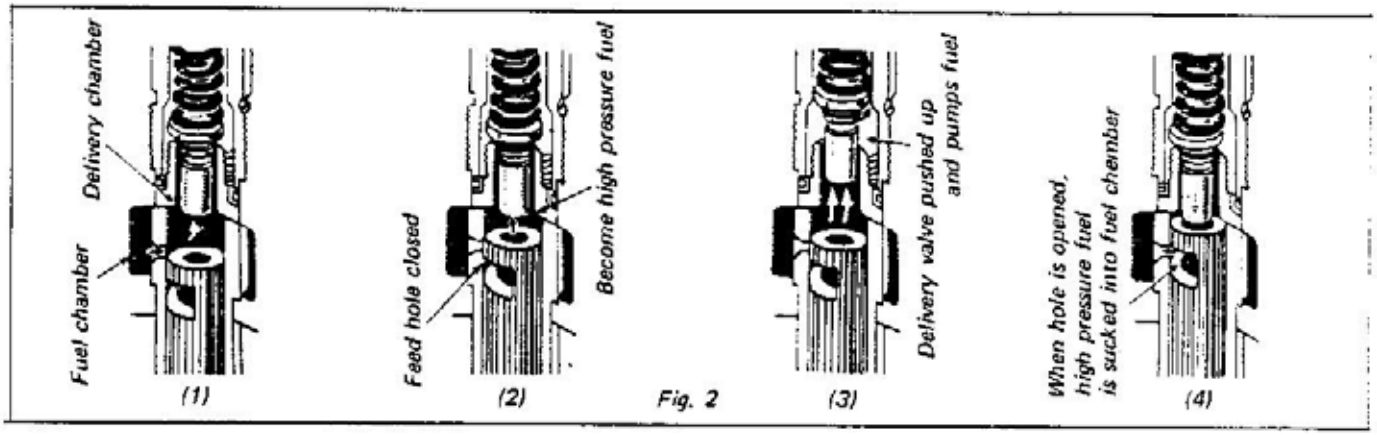


Fig. 2

(c) Adjustment of amount of injection

Fig. 3 illustrates the changes of the amount of injection at the various position of rotation of the plunger.

i. Before the feed hole is closed by the upper surface of the plunger, there is a passage formed with the control group so the fuel is not affected by the pressure and the amount of injection becomes nothing.

ii. Next, when the plunger is turned in the direction shown by the arrow mark, there is an effective stroke equivalent to A before the feed hole and the control group meet, and fuel is injected that amount.

iii. When the plunger is turned further, the amount of injection becomes maximum. In other words, the effective stroke becomes maximum.

(d) Effective stroke

Effective stroke is the distance from the time the feed hole is closed by the upper surface of the plunger until the control group comes to the place of the feed hole after the plunger has risen. Therefore, the effective stroke changes with the rotation of the plunger, and eventually, the amount of fuel injection is in proportion with the effective stroke.

The teeth of the control rack is engaged with the pinion. And the pinion is fixed to the control sleeve which can rotate freely around the outer circumference of the cylinder. At the bottom of this sleeve is the driving face of the lower part of the plunger. Therefore, by moving the control rack forward or backward, the plunger is turned, and consequently the amount of injection is altered.

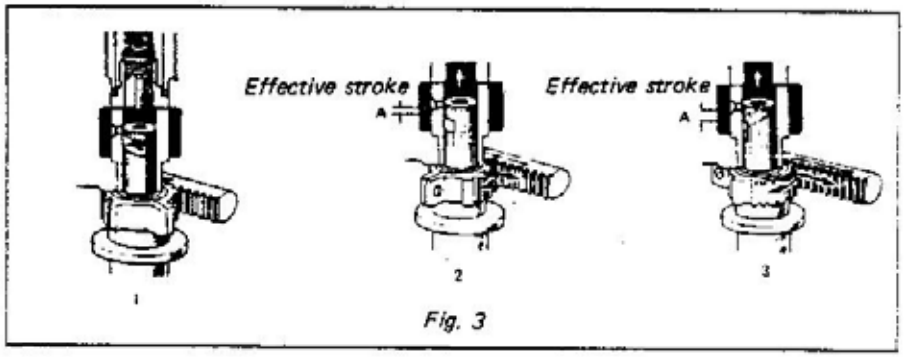


Fig. 3

Precautions in handling of fuel injection pump

There are many precise parts in the structure of the pump so if there should be even a little carelessness in the handling of the pump, there are cases when there would be much influence in the operation. So be very careful of the following points.

i. If the pump should be sealed, refrain from removing the seal and making repairs by yourself. These parts are related to the adjustment of the pump, and has a great influence on the performance of the pump, and eventually the performance of the engine.

ii. Be very careful so that water, dirt, etc. is not mixed in at the time of supply of the fuel oil. The fuel passes through the element and the nozzle which may be called the most important part of the pump, and onto the cylinder of the engine. These clearances are super-precision parts which may be (0,00004 in., 1/1000mm), so if water should be mixed in the fuel, it may cause scoring or rust, etc. which are damaging troubles to the element, valve, nozzle, etc. of the injection pump. Moreover, it may cause plunger, spring, camshaft bearing, tappets, etc. to wear out very quickly or may cause corrosion of these parts.

Always consider drum cans which have been left outdoors to contain water. Be sure to filter well before using.

Water is at the bottom of the drum can, so do not use until the last drop.

iii. The tightening torque of the delivery valve holder is 5 ~ 6 Kg-m.
If the holder should be tightened more than the specified torque, it may cause fractures in the pump housing which might cause fuel to leak, cause rack to fuel heavy, or might cause it to become caught, which might become the cause of very serious troubles.

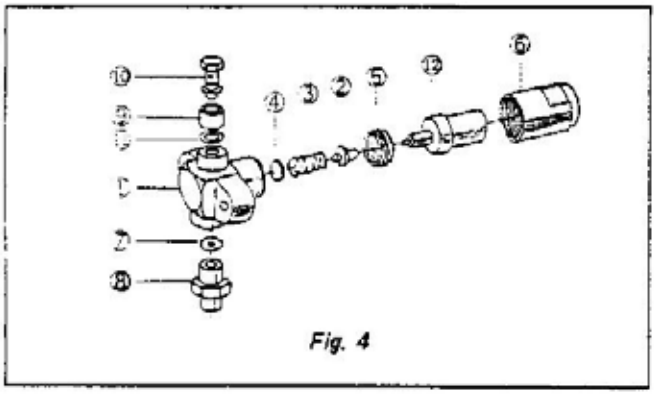


Fig. 4

1. *Nozzle holder body*
2. *Pressure pin*
3. *Nozzle spring*
4. *Adjusting washer*
5. *Distance piece*
6. *Retaining nut*
7. *Washer*
8. *Inlet connector complete*
9. *Ring*
10. *Pipe joint bolt*
11. *Washer*
12. *Nozzle piece*

(e) Nozzle holder
The structure of the nozzle holder is as shown in Fig. 4.
There is a bar filter in the nozzle holder and small fine dirt is filtered here so the fuel system is protected perfectly from dirt. However, the fuel pump and the nozzle are very precisely machined so great care should be taken at the time of handling so that these parts would not become dirty.
It is possible to adjust the pressure of the injection by the shims inside of the nozzle holder but there should hardly be any need to make the adjustment. However, if there should be need to make the adjustment, insert shims between 1 and 4 in Fig. 4. A shim with a thickness of 0.004 in (0.1mm) would increase the pressure about 142 psi (10 kg/cm^2).

(f) The injection pressure is 140 kg/cm^2. Using a nozzle tester check the injection pressure and atomization. (See Fig. 5).
In case of checking the spray pattern of either of the nozzles by having fuel injected into the air with the nozzle holder installed at the end of injection pressure pipe, keep the other cylinder at rest too by either removing the nozzle holder or slackening the union nut which connects the holder with the injection pressure pipe. This care is necessary because the engine may otherwise start up when the starter is operated for the testing.
For testing, set the speed control lever at the maximum speed, and operate the starter. As the fuel is sprayed out, the needle valve, if works normally, will produce pulsation sounds of high pitch closely resembling flute tone. Should no such pulsation sounds take place or fuel not spray but flow out or the atomization be unsatisfactory even if fuel sprays, check for the cause and remedy.

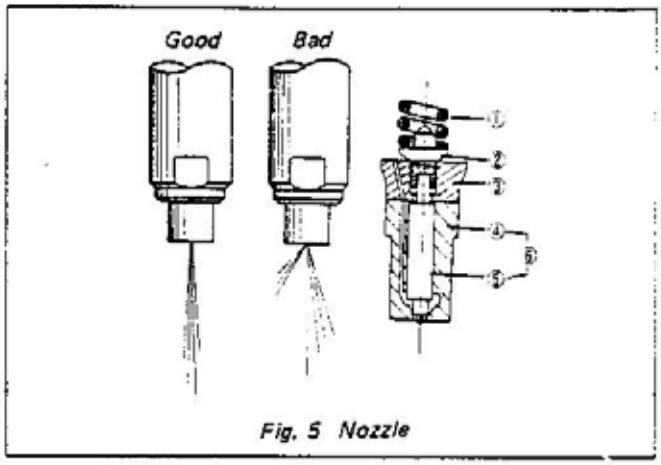


Fig. 5 Nozzle

1. *Pressure spring*
2. *Pressure pin*
3. *Distance piece*
4. *Nozzle body*
5. *Needle valve*
6. *Nozzle piece*

CAUTIONS:

a. Disassembly and assembly of nozzle piece should be conducted in fresh fuel, with close care.
b. Replacement of nozzle piece should be as complete assembly and not as individual parts such as nozzle body, needle valve, etc.
c. Touching spraying fuel is very dangerous. The atomized fuel may enter your fresh deep, damaging the structure of the part and poisoning your blood it contacts with. For this reason, refrain by all means from touching fuel in spraying.
d. Standard torque for tightening the retaining nut should be 43 to 58 ft. lb (6 to 8 kg. m).
Any torque higher than this will cause motion of needle spray valve to be too heavy resulting in poor injection.

(2) Lubrication System

1 The oil filter is equipped inside of the crankcase as shown in Fig. 6.

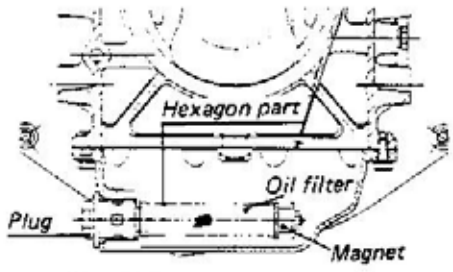


Fig. 6 Installation of oil filter

2 A magnet is provided at the tip of oil filter and removes all metal grit. This prevents the wear of the various parts. At the time the engine oil is changed, clean the inside of the crankcase and be sure to remove the oil filter. Clean the magnetic filter as well as the oil filter.

3 The lubricating system is as illustrated in Fig. 7. The lube oil which has passed through the fuel filter is sucked up by the trochoid pump. The oil is regulated to a pressure of 4.5 kg/cm^2 by a regulating valve.
A part of this oil passes through the crankshaft and lubricates the crank pin metal while another part passes through the crankcase and is sent to the rocker arms. An oil switch is equipped on the passage and controls the oil pressure.
That is, if the oil pressure falls below 0.036 psi (0.5 kg/cm^2), the pilot lamp lights up to inform the operator.
During operation, if the pilot lamp does not go out under normal speed, check the cause in the decrease in the oil pressure and make necessary remedy before operating. (check to see if the clearances are not too great, or if the oil pressure regulating valve is operating normally, etc.)

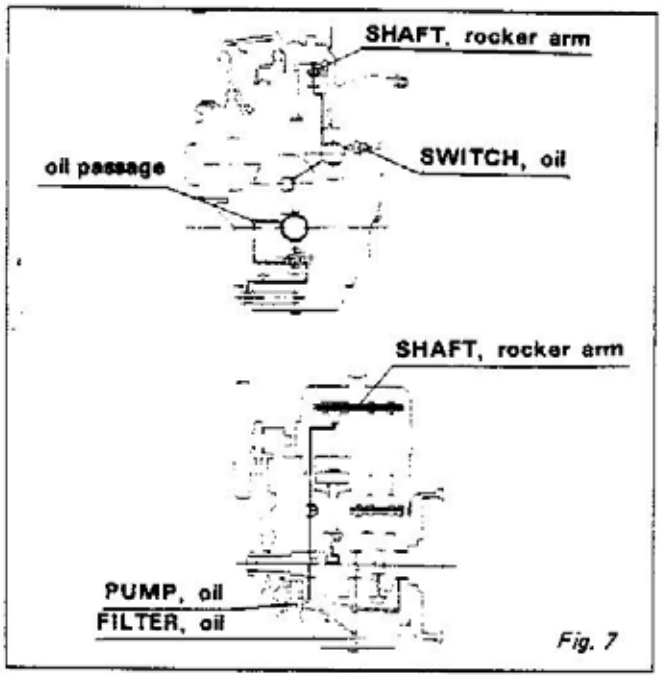


Fig. 7

[Causes of drop in lube oil pressure]

(1) The clearances of the various bearings in the lube oil system may be too large.
(2) The rocker arm bracket may not be set firmly. Oil may be leaving from the joints and may cause pressure drops.

[Changing lube oil]

(1) Engine oil should be drained and replaced with new oil the first time after about 35 hours operation. Thereafter, change oils after every 75 hours of operation.
(2) Drain oil from the engine while the engine is warm. (This would allow all the oil to drain out.)
(3) When the engine oil is to be changed, be sure to wash the inside of the crankcase as well as the inside of the oil filter.
(4) At the time of changing the brand of the engine oil, even if engine has not been run the specified amount of hours, be sure to wash the inside of the crankcase and the oil filter before making the change. When oil with different viscosities are to be used, proceed in the same way. (Be careful not to mix oils of different brands.)
(5) When the inside of the crankcase has been washed, be sure to wipe the solvent off clean so that there would be no solvent left. Solvents may be the cause of diluting the engine oil.

(3) Combustion system

1 A combustion system which is even more efficient than the conventional combustion chamber, that is, the unique Kubota swirl chamber combustion system (shown in Fig. 8) has been adopted for the engine.
In this system the fuel and air is mixed very efficiently and the use of the air after ignition is very high, so fuel consumption is low.

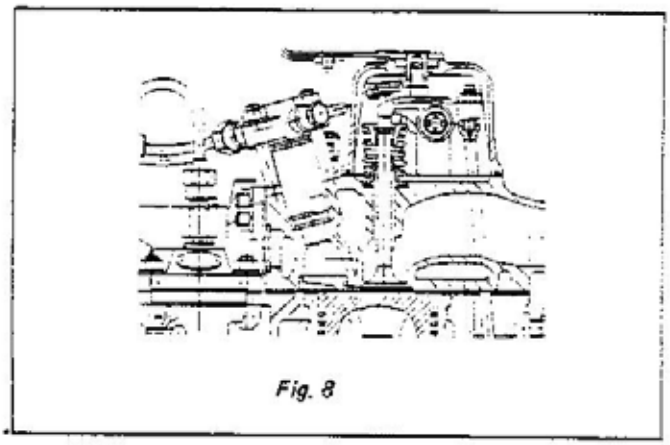


Fig. 8

2 The role of sending the necessary amount of air for combustion at just the right time is performed by the valve timing and the air cleaner.

(a) The related valve structure drawing is as shown in Fig. 9. The valve must be assembled correctly to the cylinder head as shown in the drawing (Fig. 9).
The sinting of the valve from the surface of the head should be 0.85 ~ 1.05 mm as shown in Fig. 10. Be sure to check the dimensions. If the dimensions should be smaller than that specified, the valve would hit the top of the piston and may cause damages.

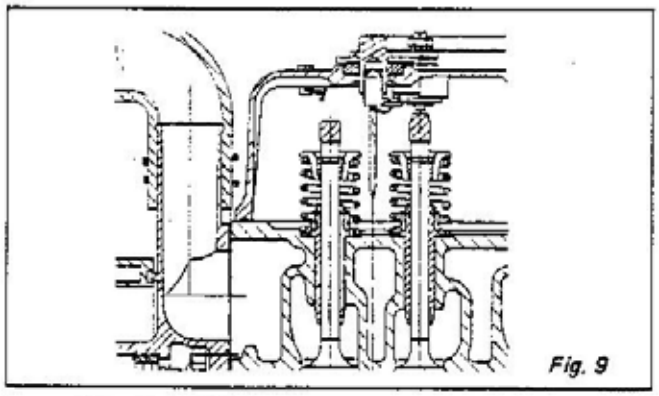


Fig. 9

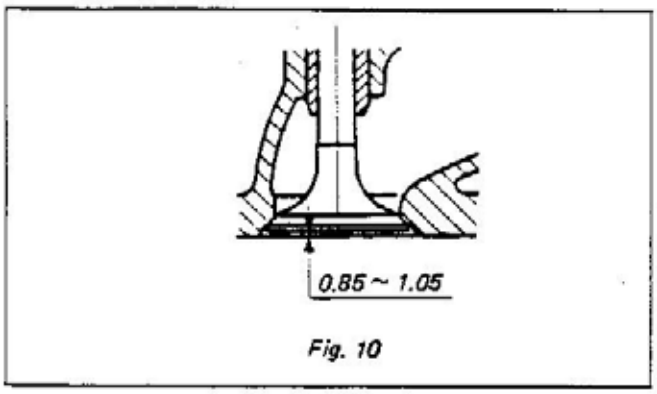


Fig. 10

(b) Adjustment of valve clearances

Valve clearance is a very important part which governs the performance of the engine. It is necessary that it be correctly adjusted.

i. Remove the head cover and with the compression in the top condition, align the mark on the top of flywheel with the mark in the clutch adjusting hole on the side of the clutch housing (that is, the position where the tip of the rocker arm is not pushing the valve down); and then make the adjustment.

ii. With the engine in the cold condition, set to the top position of compression, and loosen lock nut 1 and adjust so that the valve clearance would be 0.0079 ~ 0.0098 in (0.2 to 0.25 mm) by a thickness gage. Then tighten lock nut securely to fix tight. (See Fig. 11.)

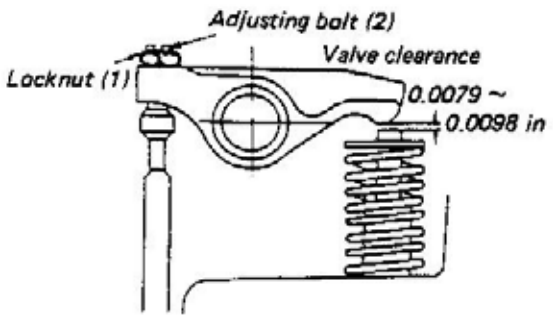


Fig. 11 Adjustment of valve clearance

iii. If there is no thickness gage, first make the clearance "0" by the adjusting bolt 2 (When doing this, be sure not to push down too hard.) Next, turn the bolt 70° to 90° to loosen, then the valve clearance would be 0.0079 ~ 0.0098 in (0.2 to 0.25 mm), the specified clearance. The screw thread pitch of the adjusting bolt is 0.039 in (1 mm). After making the adjustment, be sure to tighten securely. If a thickness gage is available, make adjustments by the thickness gage.

(c) Valve timing

When the valve clearance is adjusted as shown in Fig. 12, figures as shown in chart at right can be obtained.

Item		Design figures
Inlet valve open	IO	TC –20°
Inlet valve closed	IC	BC +45°
Exhaust valve open	EO	BC –50°
Exhaust valve closed	EC	TC +15°

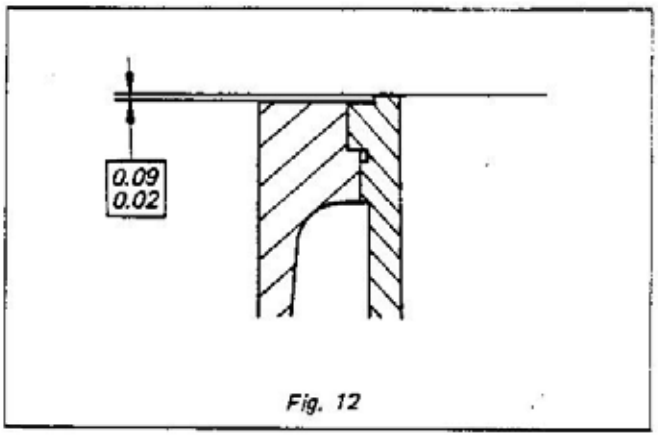


Fig. 12

(d) Decomp device

Assemble the related parts correctly and move the knob from the position of operation to the position of decomp and check to see of the decomp device is working properly. If the battery seems to be over-discharged or if the temperature should be low, and the self-starting motor does not turn, pull the decomp knob, and the engine would become depressed, the speed of rotation of the engine would be increased and it would be possible to give enertia to the flywheel. Absolutely refrain from operating the decomp lever when the engine is running.

(e) Top clearance

The top clearance should be 0.6 ~ 0.8 mm. To check the measurement of the top clearance, tighten the cylinder head securely in the order shown in the next section.
The measurement should be taken by a fuse.
The cylinder gasket shim should be inserted on the head side.
The protrusion allowance of the top surface of the liner above the cylinder frame is 0.0008 in to 0.0035 in. (0.02 to 0.09 mm) as shown in Fig. 12. If the liner should be in excess of this figure it may become the cause of troubles.

■ Tightening of cylinder head

The tightening torque of the cylinder head nut is 6 ~ 6.5 kg-m. Only two of the eleven bolts used are stud bolts. At the time of tightening the cylinder head nuts, be sure to tighten the nuts uniformly. To do this, tighten the nuts in the order a little at a time very carefully.
Also, it is necessary to retighten the nuts if the tractor has been used for a long period of time. After retightening the nuts, be sure to adjust the valves to the correct clearances as related in the previous section. If the cylinder gasket has been exchanged for a new gasket, run the engine for about 30 minutes and retighten as related above.

(4) Air cleaner

The air cleaner plays a very important role in the engine. Fill oil to the lower shoulders of the oil pan, that is up to the OIL ↓ LEVEL mark.
When adding oil, check the oil level after the oil stuck to the elements has returned to the oil pan, (this is about 15 minutes after the engine is stopped), and if oil is insufficient, add oil. Ordinarily after 50 hours of use, change oil and at the same time wash and clean the filter element and the oil pan. (Absolutely refrain from using gasoline. Use solvents and shake off well before assembling.)
When tractor is used in specially dusty places, check every day and clean.
Also, check the packings and assembled parts well to see that no unfiltered air is being seecked into the engine.

(5) Main component parts

1. Be sure to assemble the gears by matching mating marks correctly as shown in Fig. 13. The backlash of the gears is 0.04 to 0.11 mm.
2. The crankshaft gear should be heated to about 176°F (80°C) and pushed into place on the crankshaft. If interference should be excessive and there are fears that the shaft would be damaged, heat to a higher temperature to make the gear softer.
3. To assemble camshaft gear, refer to Fig. 14, place stopper (3) on camshaft (2) first. Next, insert key, lubricate, and insert camshaft gear (1). Lastly, insert the sir clip.

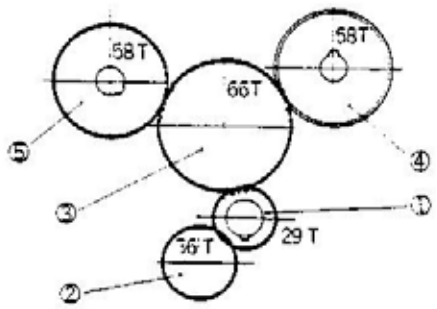


Fig. 13 Mating Marks of Gear Train

1. *Crankshaft gear*
2. *Oil pump drive gear*
3. *Idle gear*
4. *Camshaft gear*
5. *Fuel injection pump drive gear*

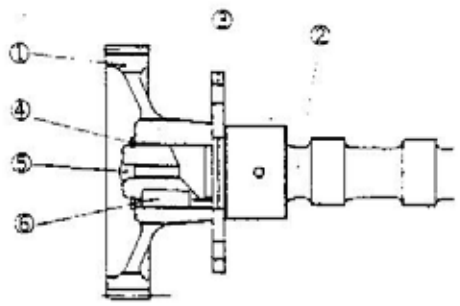


Fig. 14 Assembly of Camshaft Gear with Camshaft

1. *Camshaft gear*
2. *Camshaft*
3. *Camshaft stopper*
4. *Cir-clip*
5. *Pin plug*
6. *Key*

4. On the main bearing case, flywheel side, fit metals 21 21 and side metals 22 23, and next, fit into flywheel side crankshaft journal. Then, using lock washer 28, tighten main bearing cases 25 26 with bolt 27 to the specified tightening torque of 3 ~ 3.5 kg-m.

5. At the time of assembling main bearing case and crankshaft, be sure to observe the following precautions. (Fig. 15).
(a) Use main bearing case bolt 44 and lock washers 45 46 (15321-04571), and be sure to tighten to the specified tightening torque of 3 ~ 3.5 kg-m.
(b) Before assembling the bearing on the crankshaft, apply engine oil liberally over the metal surface that contacts with the shaft.
Surfaces to joint of each bearing case and metal should be clean and dry. Be sure to have no dirt entrapped in between in the course of assembling, otherwise it will form a cause of troubles. These precautions apply to any kind of bearings and bushings.

6. Installing bearing-assembled crankshaft in engine frame: Place the standard gasket on the bearing side surface which faces the flywheel, and assemble the crankshaft into place giving close attention to crankpins and bosses so as to give no damage to these parts.
(a) After assembling, check and make certain that oil passage of the bearing case align with the corresponding oil hole in the crankshaft. Then install set bolt securely. Do not fail to use set bolt gasket.
(b) Then tighten bolt 47 which fixes the case to the frame using the washer 48. The tightening torque should be 5 ~ 5.5 kg-m.

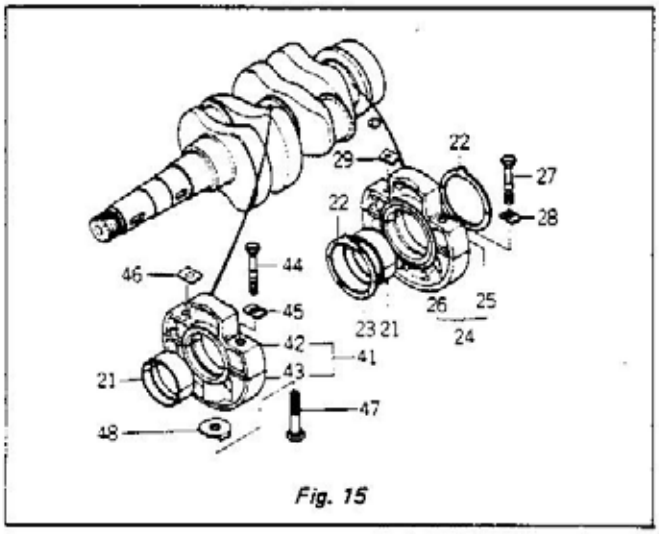


Fig. 15

(c) Con-rod bolts tightening torque should be 3 ~ 3.5 kg-m. Width across flats is 13 mm.

7. The structure of the idle gear is as shown in Fig. 16.

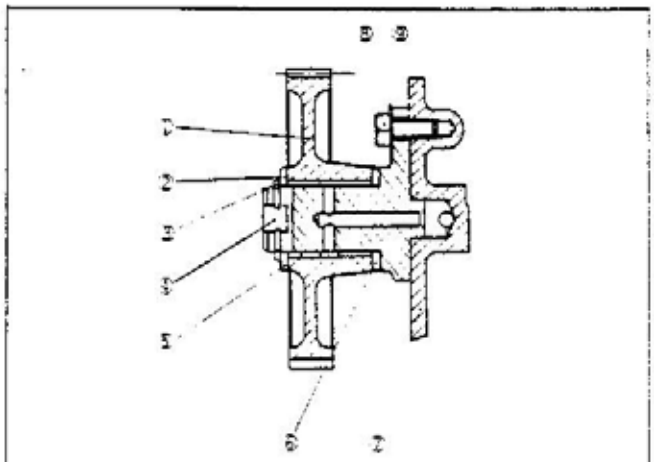


Fig. 16 Structure of Idle Gear

1. *Idle gear*
2. *Idle gear collar-2*
3. *Idle gear retainer*
4. *Idle gear shaft*
5. *Idle gear bushing*
6. *Idle gear collar-1*
7. *Engine frame*
8. *Bolt*
9. *Idle gear shaft washer*

Fix the idle gear to the crankcase securely with 3 bolts (tightening torque 2.4 ~ 2.8 kg-m). Be sure to bend the lock washer. After assembly, check to make sure the gear turns lightly.

8. The structure of the fuel camshaft is as shown in Fig. 17. Assemble the bearings and governor unit to the camshaft and install in the crankcase.

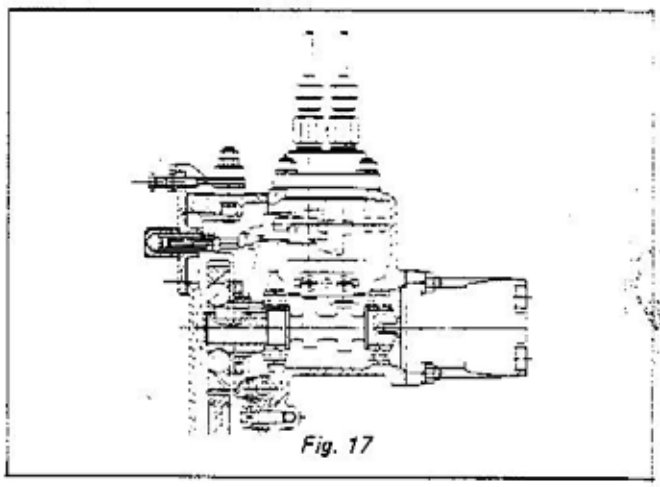


Fig. 17

9. When attaching flywheel to crankshaft, be sure to clean the entire surface carefully. Then coat the sliding surface with a thin film of engine oil but remove all traces of oil from the jointing surface by washing with gasoline and dry well. After assembly, tighten carefully to the specified tightening torque of 5.5 ~ 6 kg-m. Also, be sure to bend the lock washer.
10. The tension of the cooling fan belt should be as shown in Fig. 18. push downward the central part of the belt between the cooling fan pulley and the dynamo pulley with the fingers. The amount of slackness should be 0.4 in at 22.05 bs (10 mm, at 10 kg). If the tension of the belt should be too weak, the speed of revolution of the cooling fan would drop, and the cooling efficiency would drop. The generating efficiency would also drop. Moreover, the belt will slip, causing the belt to become heated, which would shorten the life of the belt extremely. The belt should be a little taut and when necessary tightened further by the dynamo pulley.

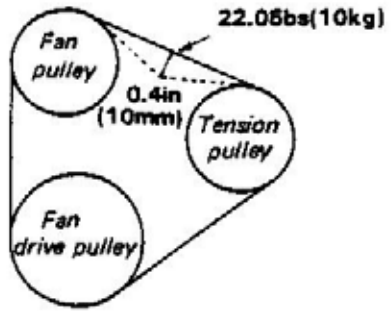
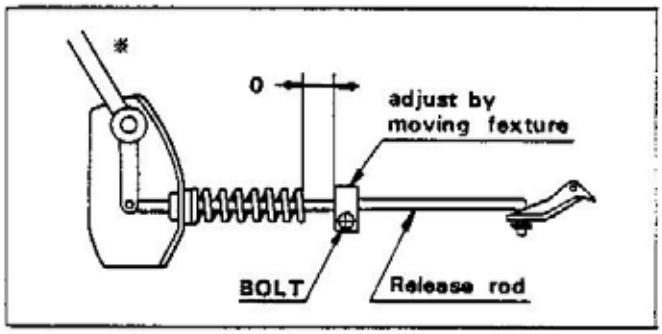


Fig. 18 Tension of Fan Belt

11. The following are precautions concerning the radiator.
(a) Fur inhibitor, detergent, and anti-freezer should be used in accordance with the instructions in the related Instruction Manuals.
(b) Be sure at all times to remove insects, mud, dust, dirt, and any other foreign matters which may get stuck to the grill fins and tubes, so as not to reduce the cooling effect of the radiator.
(c) After finishing each seasonal work, check and make certain that the nuts which are used for connecting the shockabsorbing rubber and the bottom of the radiator are sufficiently tight.
(d) For other precautions, refer to the Instruction Manual.

(6) Idling adjustment



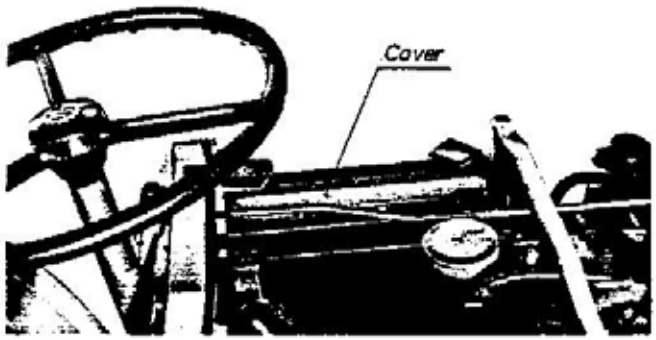
At time of idling set to position marked with * and confirm whether operation is correct.

5. Battery

5.1 Checks and repair of battery

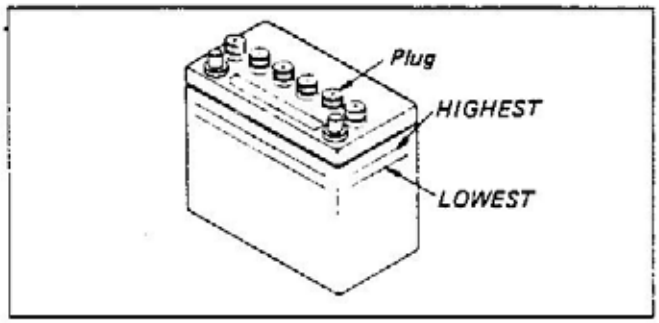
Recently, the batteries have been improved greatly. However, how the batteries are handled greatly affects the life, poor maintenance causing short lives, which means unnecessary expenditures. Handle the battery correctly and obtain the greatest efficiency.

- The battery of the tractor is absolutely necessary for starting the engine, the electric source for the fuel pump, source of lights, etc.
- When the battery becomes discharged, it would become difficult to start the engine and the lights would become dim.
  It would be too late if the battery should be discharged to such a condition. The battery should be charged before it becomes completely discharged.



- In the battery, the water in the electrolyte would become evaporated or the electrolyte would decrease during the charging procedure.
  When there is a shortage of the electrolyte, the battery would be damaged, if the electrolyte should be excessive, it would spill and damage the tractor.
- Maintain the electrolyte at proper level, between HIGHEST and LOWEST lines. Be sure to add distilled water up to the HIGHEST line in order to keep the level always higher than the LOWEST line.

To add distilled water to the battery, remove the plug cover and the respective plugs. Then fill with water.



When charging the battery, connect the + of the battery to the + of the charger; and the – of the battery to the – of the charger and charge in the ordinary way (long time charging).

Rapid charging method is the way of charging the battery in a very short time with a large current when the battery is in the discharged condition. This method should be used only in cases of emergenicies. It should be added here that if the engine should be started in this way, after the tractor work is finished and as soon as possible, the battery should be correctly and fully charged in a long time.

*When mounting the battery on the tractor, be sure to connect + and – terminals correctly. If not, it may damage the fuel delivery pump.

When repairing the electric circuit, be sure to disconnect the minus cord from the battery. (Remove the – cord.) Life of the battery is said to be 2 years. Using more than 2 years will cause difficulty in starting the engine. Replace the battery with a new one.

■ For Long time Storage

(1) When the tractor is to be stored for a long period of time, remove the battery from the tractor, fill the electrolyte to the correct level and keep stored in a dry and shady place.

(2) The battery will discharge even during the storage, so charge the battery once a month during the summer and once in two months during the winter.

(3) An inexpensive, simple to handle battery charger is available at your Kubota dealer so that the battery can be charged even at home. Buy a battery charger and a hydrometer so that the battery could be well-maintained.
  The relation between the atmospheric temperature and specific gravity of the electrolyte, which shows the charged condition, is approximately as of the following table;
  (Strictly speaking, it is difficult to judge only by the specific gravity.)

Temperature / Specific gravity	68°F (20°C)	59°F (15°C)	50°F (10°C)	41°F (5°C)	32°F (0°C)	23°F (–5°C)
Usable	1.260 ~ 1.230	1.264 ~ 1.234	1.267 ~ 1.237	1.271 ~ 1.241	1.274 ~ 1.244	1.278 ~ 1.248
Immediate charge is necessary	1.220	1.224	1.227	1.231	1.234	1.238

When using a rapid charger, please be careful of the following;

(1) In case the battery becomes so discharged that it is impossible to start the engine, it is necessary to charge the electrolyte with a specific gravity of about 1.16 to that of about 1.26 or for about 24 hours (all day and night).

(2) If the battery has been used, for instance, during spring, summer and autumn, and is to be stored for the winter (a long period of time), charge the battery for 8 hours (from morning till night). This would prevent battery from rapid deterioration.

(3) When the battery is to be used for the first time in spring after a winter's storage, the battery has discharged. If the battery had been charged before storage in autumn, the battery would return to normal if charged for 8 hours (from morning till night).

If the engine is repeatedly started and stopped, there is no time for charging by the engine dynamo, and the battery would become completely discharged. If the battery becomes weak through repeated starting and stopping, charge the battery immediately. When a weak battery is used, it would become more difficult to start the engine, causing unnecessary work on the battery, which further causes the battery to become discharged.

when the battery is used in a good condition, it would be easy to start the engine, using only a little electricity. Eventually, it means that the good condition of the battery can be maintained. If the specific gravity of the electrolyte drops to 1.23 at 20°C, charge immediately.

[NOTE]

Battery electrolyte is diluted hydrosulphuric acid. Even a drop on clothing would cause a hole. Be careful in handling the electrolyte.

Check the specific gravity of the electrolyte in each of the six compartments of the battery.

When the battery is charged at an automobile repair shop, or a gasoline stand, instruct the attendant to charge the battery fully. Check yourself to see that the specific gravity is more than 1.26 at 20°C after charging has been completed.

Precautions at time of charging

When the battery is to be charged, charge in the following order.

(1) Remove the terminal of the minus cord of the battery first. If the plus terminal is removed first, short-circuits would be caused when tools, etc. comes into contact with the body.

(2) Remove the battery from the tractor and wipe the top of the battery clean with a piece of cloth.

(3) Remove the plug cover and the 6 plugs, and adjust the level of the electrolyte to the correct level.

(4) Connect to the charger, and charge the battery. Hydrogen gas develops during charging, so be very careful there are no fires or sparks nearly.

(5) After charging has been completed, remove the connecting wire. Then, check the specific gravity of the respective compartments after divelopment of gases has settled down.

(6) Set plugs and plug cover, and mount onto the tractor. Attach the plus terminal first, and then attach the minus terminal.
If the battery cord should be pushed tightly by the cover, etc., it would be the cause of short-circuits, or leokage of electricity, so be very careful at the time of mounting on the tractor.

(7) Clean the terminals of the battery cord very well. Tighten securely, and grease the parts so that they would not corrode.

(8) Be sure to set the rubber cap on the battery cord terminal.

5.2 Starter

Nominal voltage	12V	
Nominal output	0.8KW	
Direction of rotation	Clockwise (seen from pinion side)	
Suitable battery	NS70, 65AH	
Brush	Length	Standard 19mm
	Limit of use	Until 13mm
Brush spring Pressure	Standard	1020g ~ 1380g
	Min. pressure	600g

At the time of removing the starter, be sure to remove the minus side cord of the battery.

5.3 Generator (dynamo)

Type	Alternating current	
Nominal output	Daytime	90W
	Night time	60W (30W used for headlights)
Revolution	about 5400 rpm	

5.4 Rectifier

Silicon diode type using 4 diodes
All wave rectifier

5.5 Battery

Nomenclature	NS 70
Voltage Capacity	12V 65AH
Weight	Approx. 13.5kg without electrolyte
Electrolyte	Approx. 4.64 liters
Specific gravity of electrolyte	1.260 at 20°C

5.6 Horn

Specified voltage	12V
Current required	Less than 1.5A
Noise	100dB ± 5
Basic frequency	44Hz ± 30
Working voltage	9 ~ 14.5V

5.7 Magnetic pump

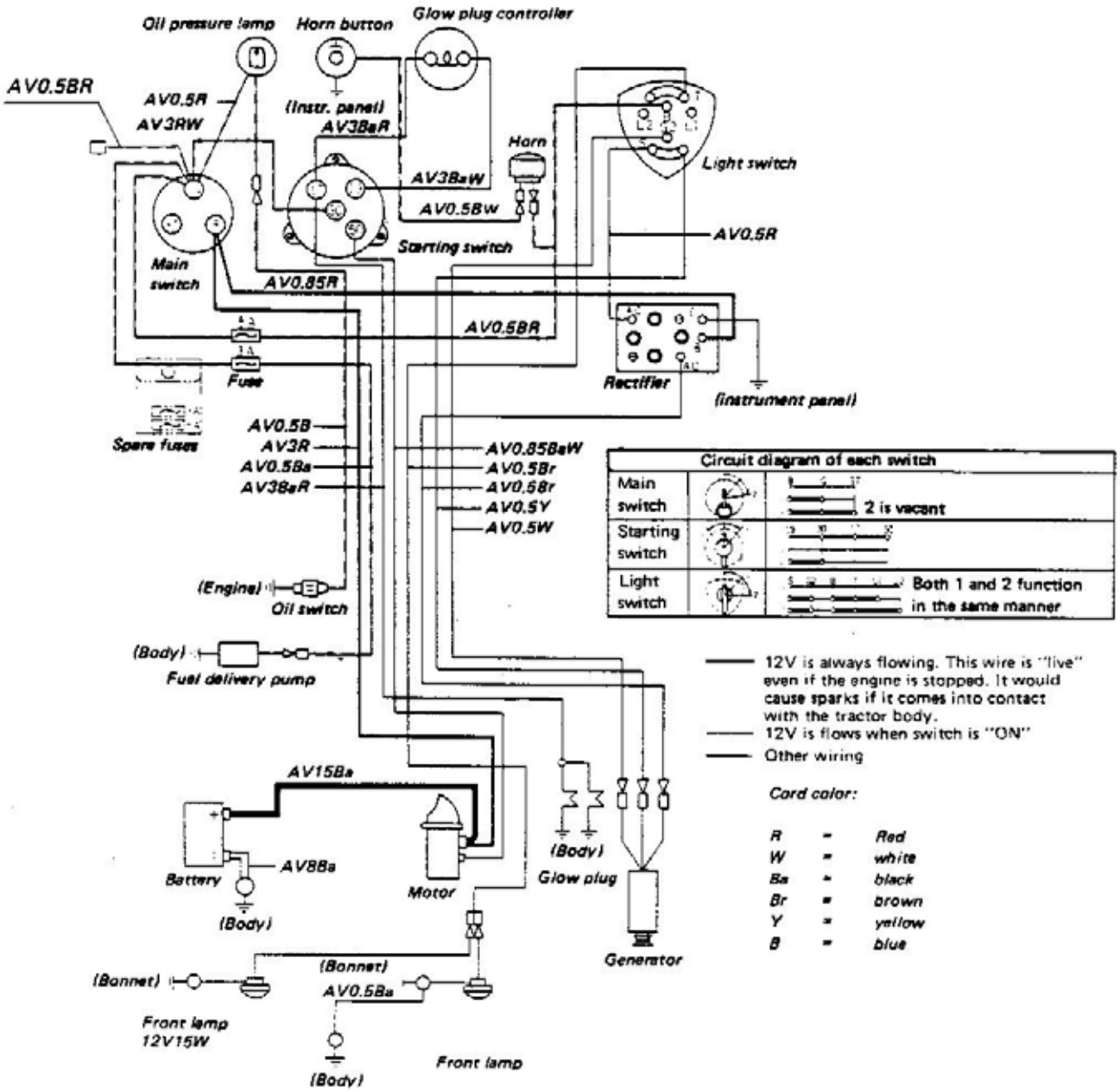
Specified voltage	12V
Working voltage	8 ~ 16V
Discharge	500cc
Average current	about 0.8A
Direction of installation	Discharge side up

The working part has a piston and valve in the central part, with the coil in the outer part. When the current is turned on, a magnetic field is formed in the coil, causing the piston to rise, which discharges the fuel. When the piston reaches the upper limit, the current is cut off, and the piston is pushed down by the force of the spring. This action is repeated to force the fuel to flow.

5.8 Fuse

There are two types, 3A and 5A. When a fuse blows, be sure to check for the cause before replacing.

5.9 Wiring Diagram



6. Tractor

6.1 General precautions

The following are general precautions and services required for disassembly and assembly:

(1) Do not use any kind of adhesive or bonding agents on "O" rings and oil seals.

(2) Oil seal: Fill grease between lips before use. Install according to the diagram. (Example)

(3) Roll Pin (Spring pin): (Examples)

In case of driving in a roll pin, be attentive to the slot in relation of force to be applied to the pin. The slot should face the direction of the force or that of the rotation as case requires, as shown with line in the diagrams.

(4) Keep disassembled parts in order as respective groups.

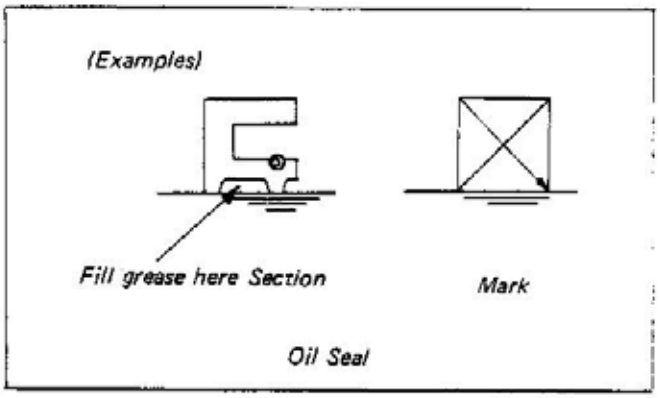
Don't mix them up together. Of them all, bolts absolutely require this care since there are special kinds employed at specific places. Those marked with "7T" are specially hardened ones.

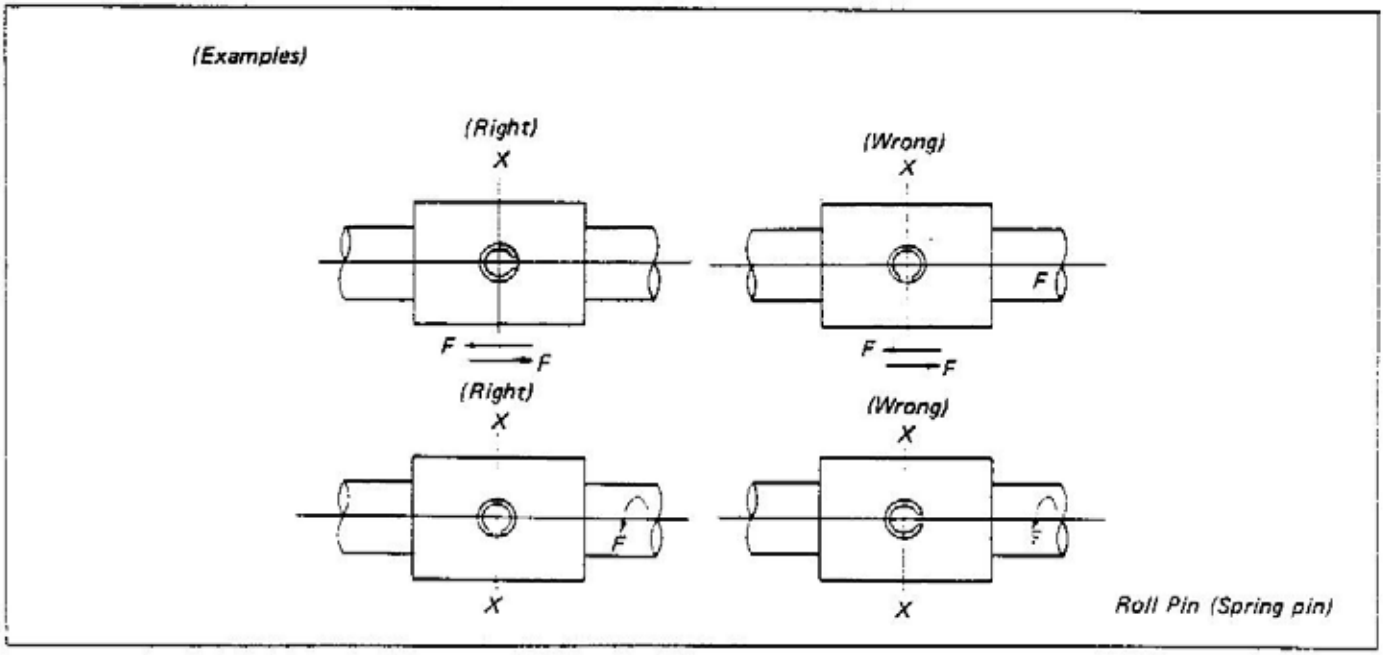
(5) For tightening bolts, be sure to use respective tightening torques, which are listed in the torque specifications. Do not fail to employ washers, caulking materials, and nuts, as specified, to lock them securely.

(6) For replacements of parts, be sure to use Kubota Genuine Parts.

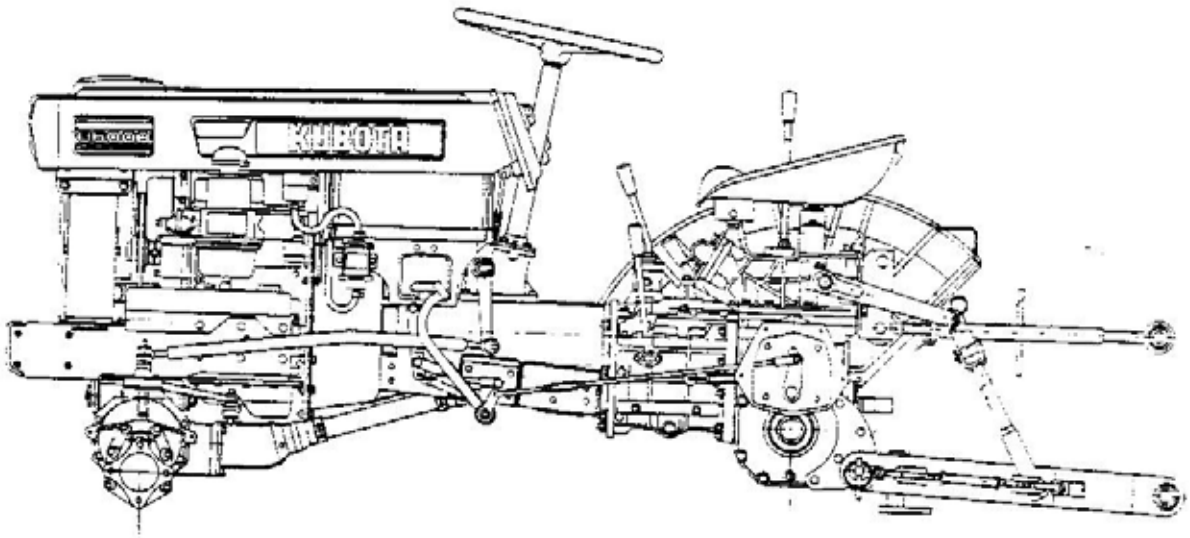
(7) In case of raising the tractor with a jack and supporting with the stand, the ground should be level and solid and the wheels be blocked for safety's sake.

(8) At the time of disassembling and repairing, it is recommended to note and record Engine No. and Tractor No. of the specific tractor. This will be useful in case of ordering new parts and inquiring for information regarding the tractor.

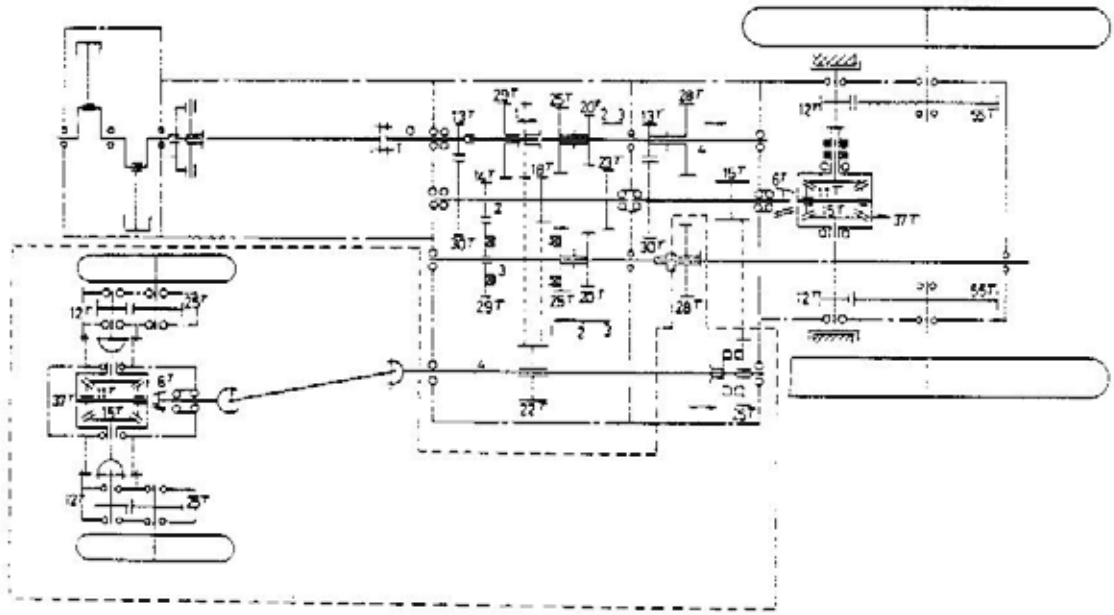




6.2 Outer appearance



6.3 B6000 4 wheel drive



The structure within the dotted lines for model B6000E and ET are not shown.

7. Disassembly of Main Parts

7.1 Removal of the front acle

(1) Remove the drag link from the pitman's arm and knuckle arm.
(2) Raise the whole tractor with a jack and remove the right and left tires.
(3) Before removing the front axle and front wheel gear case, drain out the oil in the case.
(4) Remove the center pin. Then the front axle can be removed.

7.2 Removal of engine

(1) Open the bonnet, and remove the wires. Then unscrew the 2 set bolts on the right and left sides which fixes the bonnet to the radiator, and remove the bonnet.
(2) Remove all wiring. (These include + and − of battery, cords, self-starter cord, generator cord, oil lamp, and glow plug.)
(3) Loosen the battery retainer and remove battery.
(4) Stop the fuel and remove fuel piping. Remove fuel tank band and dismount the fuel tank.
(5) Loosen the 4 bolts (M8) and remove tank battery support.
(6) Remove throttle lever and decompression lever.
(7) Remove muffler cover and muffler.
(8) Remove the 2 hydraulic oil pipes from the oil pressure pump.
(9) Remove the starter.
(10) Remove bolts which set engine to housing and pull engine out to the front.

7.3 Disassembly of brakes

(1) Remove differential lock rod.
(2) Remove fender.
(3) Remove brake return spring and brake rod.
(4) Remove brake cover and brake drum.

7.4 Disassembly of pedals

(1) Remove differential lock rod.
(2) Remove clutch rod.
(3) Remove the joint pin of the left brake pedal and remove the pedal.
(4) When the pedal rod is pulled out, the clutch pedal can be removed.
(5) Pull out the split pin of the differential lock pedal rod, and remove differential lock pedal.

7.5 Disassembly of frame clutch housing

(1) Remove nut fixing housing to transmission case and pull out to the front.

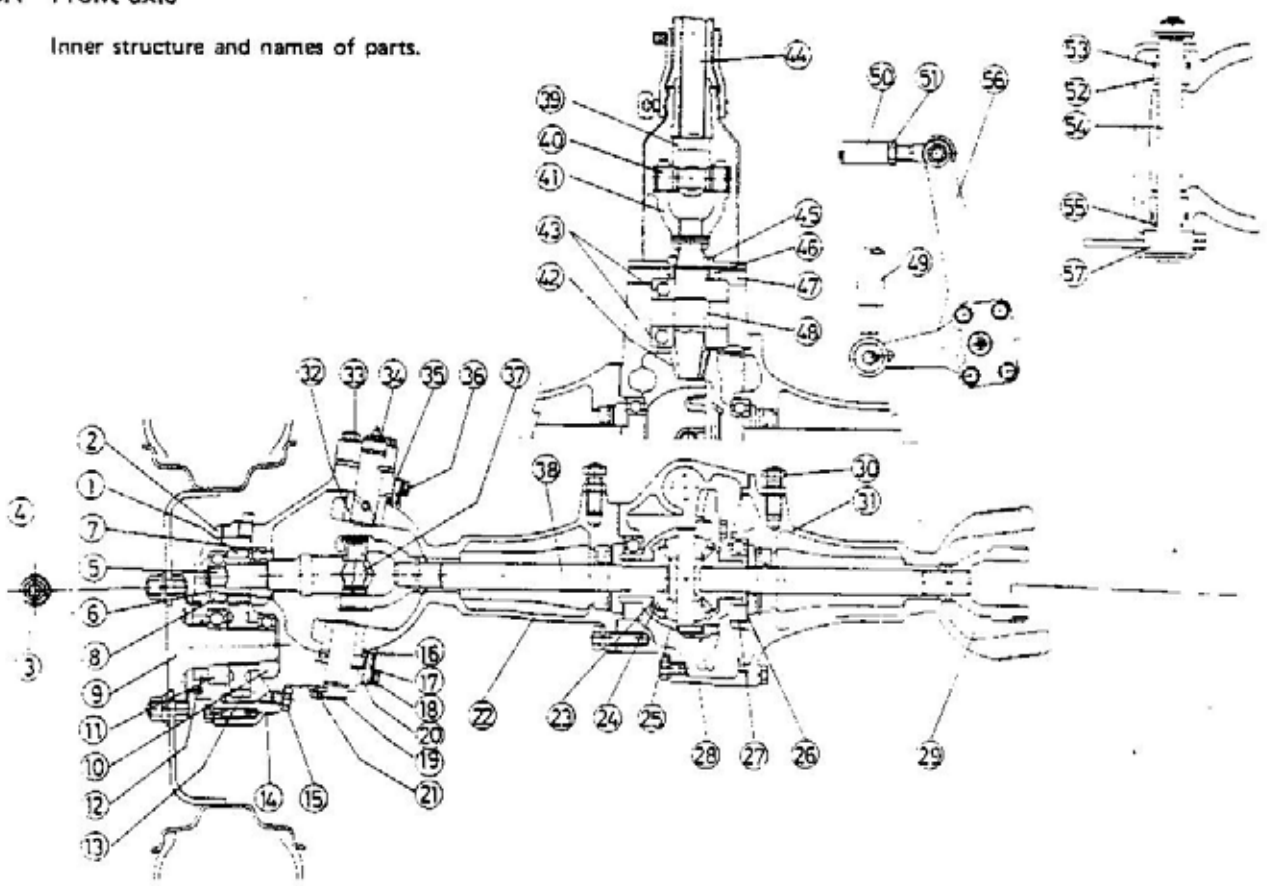
7.6 Seat, Control rod and Lift Arm

Remove the control valve, propellor shaft and drive shaft. shaft.
This would leave only the transmission case and differential gear case.

8. Front Axle

8.1 Front axle

Inner structure and names of parts.



1 GEAR, spur 12
2 COVER, gear case
3 STUD
4 NUT
5 SHAFT, universal joint
6 SEAL, oil
7 BEARING, ball
8 BEARING, ball
9 HUB, front wheel
10 BEARING, ball
11 BEARING, ball
12 SEAL, oil
13 GEAR, spur 25
14 CASE, front wheel gear
15 PLUG
16 SEAL, dust
17 COVER, dust 1
18 COVER, dust 2
19 KINGPIN 2
20 BEARING, thrust ball
21 PLATE, lock 2
22 CASE, front axle 3
23 SHIM
24 GEAR, diff side
25 CASE, diff 2
26 SHIM 1
27 BEARING ball
28 CASE, front axle 1
29 JOINT, universal 3
30 BOLT
31 CASE, front axle 2
32 BUSH
33 ARM, knuckle 2
34 KINGPIN, 1
35 HOLDER, dust seal 1
36 PACKING, felt
37 JOINT, universal
38 SHAFT, front wheel drive
39 JOINT, universal 2
40 JOINT, universal
41 JOINT, universal
42 SHAFT, pinion bevel gear
43 BEARING, ball
44 SHAFT, front axle drive
45 NUT
46 SEAL, oil
47 COVER
48 COLLAR
49 LINK, drag
50 ROD, tie
51 NUT, LH
52 BUSH
53 O RING
54 PIN, center
55 O RING
56 ARM, knuckle
57 BUSH

8.2 Front axle (4 wheel drive)

[Disassembly]

(1) Remove the tie-rod from the knuckle arm.
(2) Remove dust cover, and move the dust seal, the dust seal holder and packing to the inside.
(3) Remove the knuckle arm, and remove kingpin 1.
(4) Remove lock plates and withdraw kingpin 2.
(5) Pull out front wheel gear case, and remove dust seal, dust seal holder and packing.
(6) Remove front wheel gear case cover.
(7) Remove circlip on the end of universal joint shaft and pull out the ball bearing, #6302, with a bearing puller. (Be careful when removing. If a bronze hammer should be used to knock out, the inner #6204 ball bearing would be knocked out at the same time, which would be very tight. There are fears that the shaft may be deformed because the diameter of the shaft is so small.)
(8) Pull out the #6206 ball bearing from the front wheel shaft. Between 26T gear and #6206 ball bearing, there is a circlip, so it cannot be removed by hammering.
(9) The right side and the left side are the same.
(10) Remove front axle case 2 to the left and the front axle case 3 to the right. The differential is removed to the left.
(11) Remove the universal joint on the tip of the pinion shaft, remove the cover and pull out the pinion shaft.
(12) Disassembly of universal joint
  (a) Remove the circlip of the universal joint.
  (b) Push out the universal joint as much as it would go, using a bronze rod.
  (c) Pull out very carefully the needle bearing in the tip of the universal joint, using a plier. Be careful or the needle bearing would fall apart.

[Assembly]

(1) Assembly is in the reverse order of disassembly.
(2) At the time of assembly make adjustments if the bevel gear and pinion do not mesh correctly on the backlash is wrong. (standard is 0.13 ~ 0.25 mm.)
(3) Be careful not to scratch or otherwise damage the spherical surfaces of front axle cases 2 and 3. At the time, wipe off oil grease and dirt.
(4) Do not hammer in kingpins 1 and 2 with hammers, etc. Alegn well and push in by hand.
(5) Lubricate the universal joint inside of the front axle case with about 200 grams of high quality chassis grease. Also lubricate the king pin, joints, spherical surfaces, and other moving parts with grease.
(6) Also lubricate the universal joint of the drive shaft with about 40 grams of chassis grease.

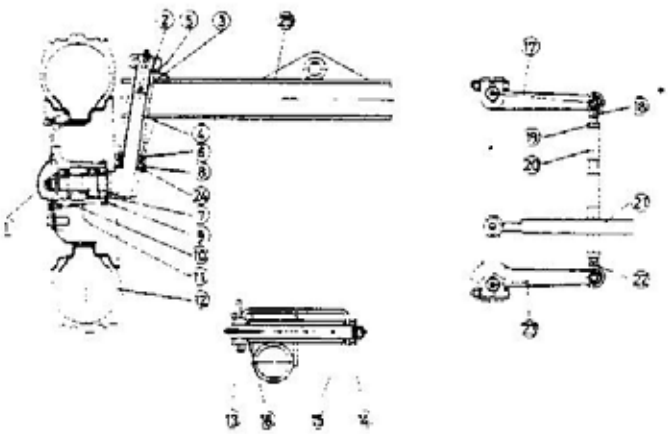
[NOTE]

There are 4 sets of universal joints used. The same cross joints are used for all the universal joints.

Universal joint 1	3 pcs
Front axle drive shaft	(Universal joint 1 is welded on.)
Universal joint shaft	(Shaft and universal joint 1 integrally forged) 2 pcs
Universal joint 2	(Boss Part has been lengthened to serve as sliding spline) 1 pc
Universal joint 3	2 pcs

8.3 Front axle

Structure and nomenclature.



①CAP, front wheel hub
②COLLAR
③BUSH
④KINGPIN
⑤O RING
⑥BEARING, thrust ball
⑦SEAL, oil
⑧SEAL, oil
⑨COLLAR
⑩HUB, front wheel
⑪BEARING, ball
⑫FRONT WHEEL
⑬BUSH
⑭PIN, center
⑮SEAL, oil
⑯O RING
⑰ARM, knuckle 2
⑱ASSY END, rod 2
⑲NUT, LH
⑳ROD, tie
㉑LINK, drag
㉒ASSY END, rod 3
㉓ARM, knuckle 1
㉔COLLAR
㉕AXLE, front

8.4 Disassembly and assembly, front axle

(1) Front wheel hub

1 Remove the front wheel tire. Remove the front wheel cap. Remove the split pin exposed and then slacken the slotted nut.

2 Tap out the hub with a hammer (mallet, copper or plastic hammer) to outside.

3 Before assembling, apply sufficient wheel-bearing grease (SAE multipurpose type grease) to the bearings and oil seal. Also, fill the space inside the hub with grease up to 1/3 to 1/2 of the space.

CAUTION:

Do not use grease contaminated with foreign matters. Be very careful to keep the hub free from mud, dirt, sand and other impurities.

4 After filling grease, proceed to assemble. Before tightening the slotted nut, make certain bearings are in correct place on the shaft. If not in respective place correctly, this will affect the tightening torque for the nut causing unturning.

(2) Knuckle shaft

1 Remove the knuckle arm and "O" ring.

2 Lift up the front axle to the extent that the knuckle shaft can just be removed downward and then remove the knuckle shaft downward.

3 Before assembly, apply sufficient chassis grease to the thrust bearing and oil seal.

After applying grease, proceed to assemble.

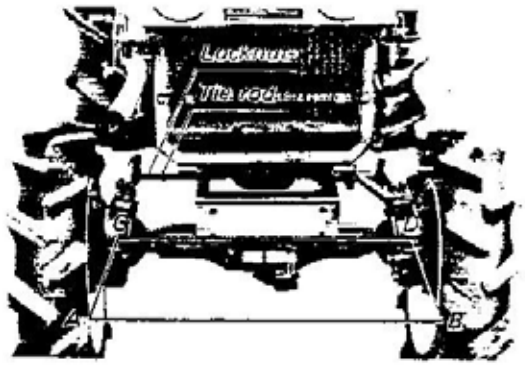
CAUTION:

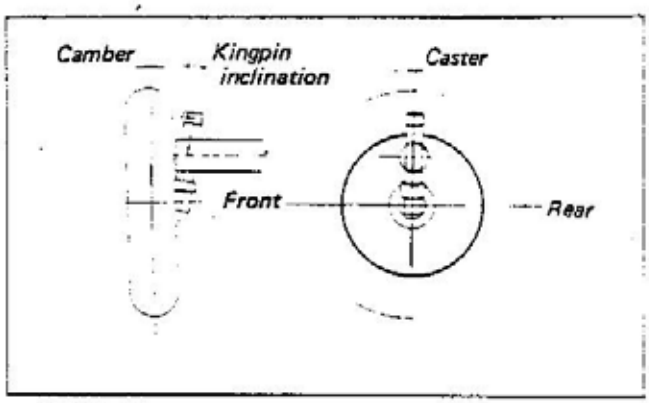
Be attentive to the thrust bearing because it is likely installed upside down. Assemble as shown in the drawing.

(3) Front wheel alignment

* Specifications:

Camber:	2°
Caster:	1°
Kingpin inclination:	8°
Toe-in:	0 ~ 5 mm



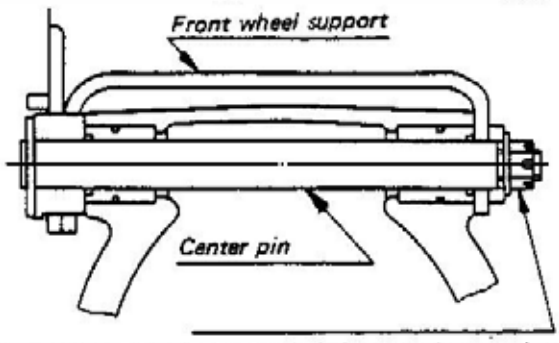


*Adjustment:

Camber, caster, and kingpin angles are all constant and they would require no adjustments as long as checks and maintenance services are performed accurately. As for toe-in, however, it should be adjusted at times, in the following manner:

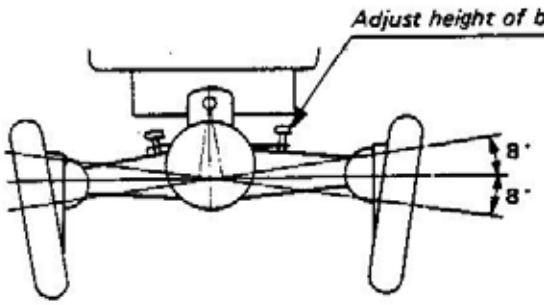
Refer to Fig. loosen the lock nut and turn the tie-rod so that CD − AB = 0 ~5 mm. To take measurements, use a wheel alinement tester or a toe-in gauge. If neither is available, measure with a precise tape measure.

8.5 Tightness of center pin and nut



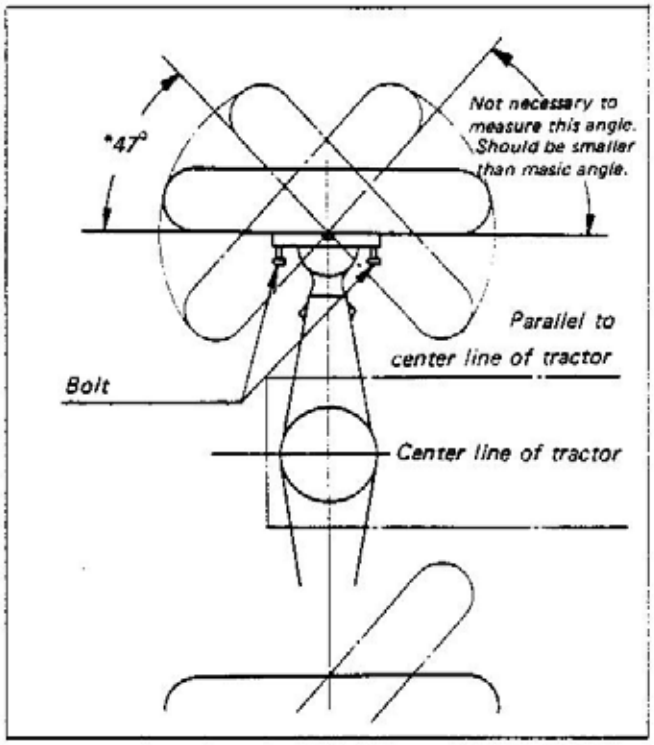
If not enough, front wheel axle is loose and moves back and forth. If too tight, rolling is not smooth.

8.6 Adjustment of front axle for rolling



The right and the left must be of the same angle.

8.7 Adjustment of front wheel angle

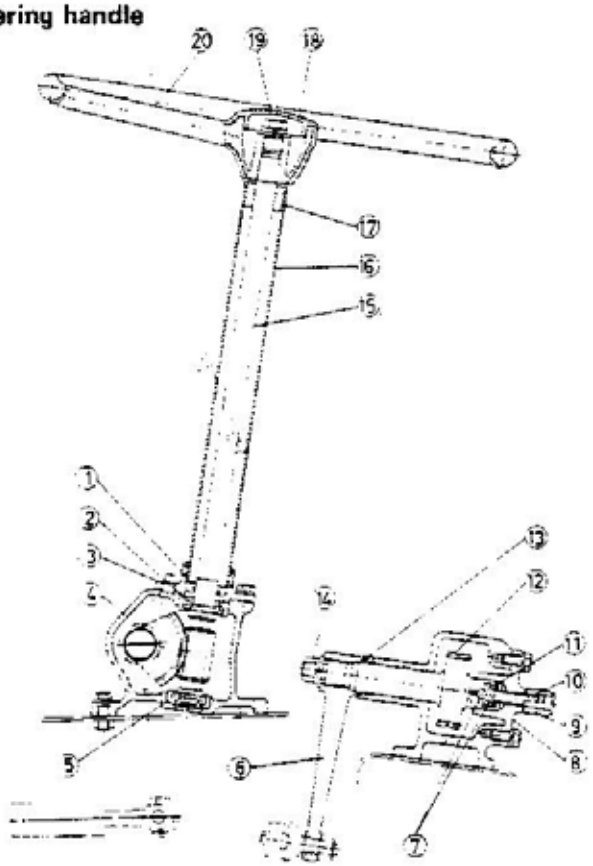


Outward angle in front of the tractor is shown by * mark.

Measure at 2 places, the right and the left.

9. Steering Handle

9.1 Structure of steering handle



1 SEAL oil
2 BEARING, ball
3 PLUG
4 CASE, steering
5 BEARING, ball
6 ARM, pitman
7 BELL
8 COVER, side
9 NUT, adjusting screw
10 SCREW, adjusting
11 COLLER
12 SHAFT, sector
13 SEAL, oil
14 NUT
15 SHAFT, steering
16 POST, steering
17 BUSH, post
18 CAP, steering wheel
19 NUT
20 WHEEL, steering

9.2 Steering gear case

[Disassembly]

(1) Remove the instrument panel from the steering post. Remove steering gear case from frame clutch housing.
(2) Remove handle and steering post.
(3) Pull out steering shaft. Turn case upside down to drain out oil.
(4) Remove the pitman's arm.
(5) Remove the cover set bolts, push the sector shaft from the left and remove together with the cover.
(6) Screw in the adjusting bolt to remove the cover and the sector shaft.

[Assembly]

(1) Assemble the sector shaft. The bearing part is long so lubricate well and assemble.
(2) The balls of the bearing on the lower part of the steering shaft may not be set on the retainer, so check well before assembly. It should be added that the steering shaft can be assembled by hand so do not hammer into place with hammer, etc.
(3) Turn the adjusting screw counter-clockwise and assemble the cover.
(4) Assemble the steering post and the steering wheel.
(5) Adjust the play of the steering wheel to 10 ~ 30 mm and lock well with the lock nut.
(6) Align the assembly mark of the sector shaft to the mark on the pitman arm, and then assemble.

9.3 Adjustment of steering wheel

The standard play of the steering wheel is 10 ~ 30 mm at the circumference. To make the adjustment, loosen nut shown by arrow, turn the adjusting bolt clock wise and the play will become smaller. After making the adjustment, be sure to tighten well.