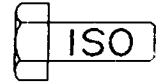
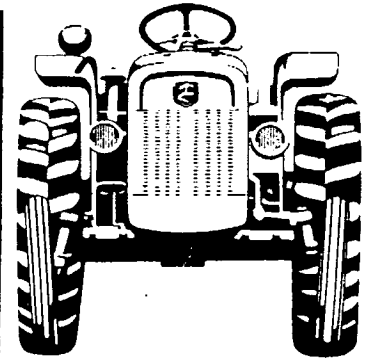


#6121



YOH SATOH AGRICULTURAL MACHINE MFG. CO., LTD.

**SATOH
TRACTOR
BEAVER
INSTRUCTION
BOOK**



SATOH AGRICULTURAL MACHINE MFG. CO., LTD.

SAFETY POINTS

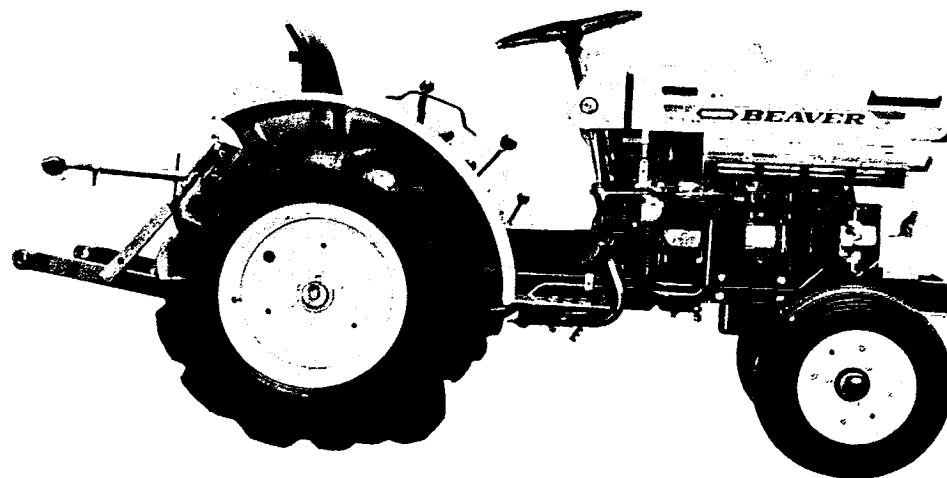
- ☆ When running the tractor at high speed or on roads, make sure the right and left brake pedals are linked and do not operate them independently.
- ☆ Make sure that a guard is in place when operating the belt pulley or P.T.O. driven shaft.
- ☆ You should be neat and tidy when you are close to moving parts, engine or implements.
- ☆ Be sure to pull out the starter key when leaving the tractor.
- ☆ Never make a sharp turn at high speed.
- ☆ When descending a slope in reverse, be sure not to abruptly operate the clutch or the brake.
- ☆ Never operate the differential lock when running on a public road.
- ☆ When making a sharp turn, confirm that the differential lock is disengaged.
- ☆ Never operate the tractor on a slope that seems to be dangerous. Do not operate the clutch, brake, throttle lever and steering wheel abruptly on a slope as it is dangerous. Be careful particularly when running on a slippery road.
- ☆ Do not carry any persons on the tractor, linkage drawbar or implement.
- ☆ When towing, set the hitch point below the center line of the rear axle.

SATOH TRACTOR **BEAVER**

Model S-370

with 2-cylinder Diesel Engine

INSTRUCTION BOOK



SATOH AGRICULTURAL MACHINE MFG. CO., LTD.

HIBIYA KOKUSAI BLDG., NO. 2, 2-CHOME, UCHISAIWAI-CHO,
CHIYODA-KU, TOKYO, JAPAN

INTRODUCTION

Equipped with a high-powered 2-cylinder diesel engine, the SATOH BEAVER performs an extensive range of farming jobs. Because it incorporates SATOH's latest technological innovations as well as many years of research and experience in manufacturing farm tractors, it has passed the severest tests and its outstanding performance and high efficiency have already been recognized.

Every piece of the BEAVER is made of selected quality materials and by the world's most advanced machine tools. It also combines SATOH's highest standards of design and workmanship, therefore, both a longer service life and versatility are ensured.

However, for the best performance to realize all the SATOH BEAVER'S potentialities, the operator's cooperation is a must. For this reason, not only must you perform daily checks and periodical services, but also you must strictly follow the instructions given in this manual. These instructions can be followed even by a novice, however, for easier and quicker operation, an operator is requested to have a full knowledge of the service procedures and a skilled level of technique. Once you are fully acquainted with the technical information described in this manual, you will become a qualified mechanic.

Prior to the use of this new tractor, be sure to read "Operation" and "Periodical Service" in this manual. It is desired that you keep this manual on hand so that you can refer to it whenever necessary.

For further questions, apply to your local Satoh Dealer, giving the SERIAL and ENGINE NUMBER of your tractor.

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PRECAUTIONS ON A NEW TRACTOR

All components of Satoh Beaver are subject to strict checks during factory assembly. However, a new tractor should be used with special care. For the first 25 ~ 50 hours, it should not be used for heavy duty work. If the tractor is requested to operate with a heavy load, the gear should be one stage lower than required.

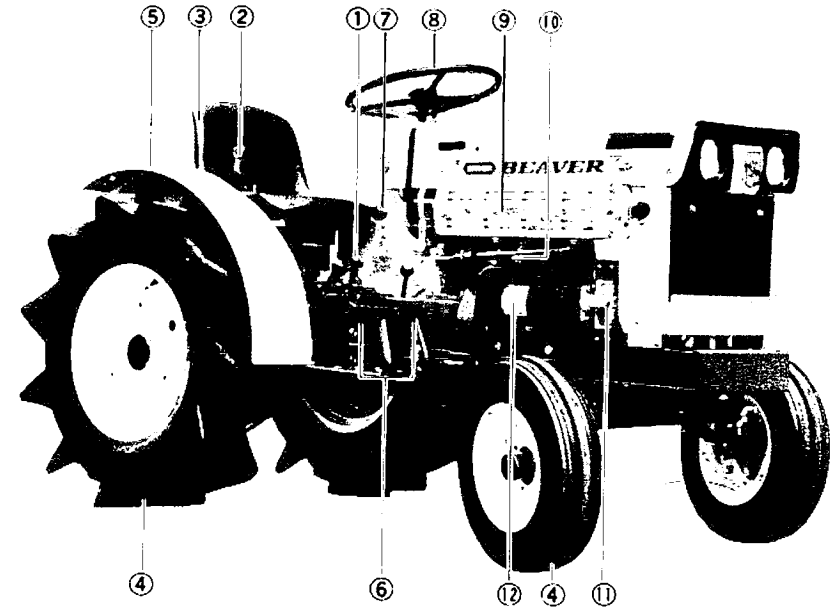
50-HOUR SERVICE

After first 50-hour of operation, the following services should be made.

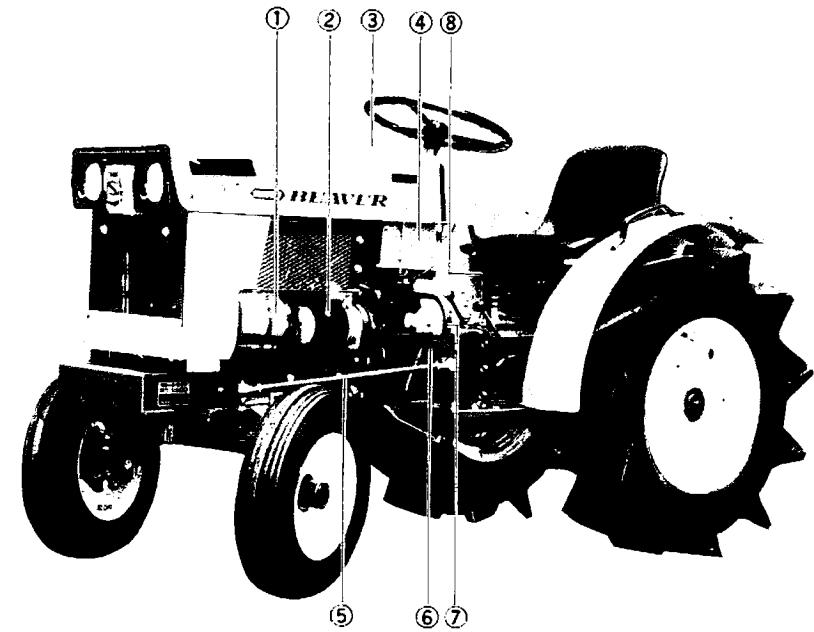
1. Replace the engine oil and the oil filter.
2. Replace the transmission oil and other gear oil.
3. Retighten the cylinder head bolts and adjust the valve clearance.
4. Retighten all bolts, nuts and screws.
5. Check and adjust the fan belt.
6. Check the tire pressure and tire condition.

This 50-hour Service must be performed without fail, which is essential to keep the tractor always in the top condition.

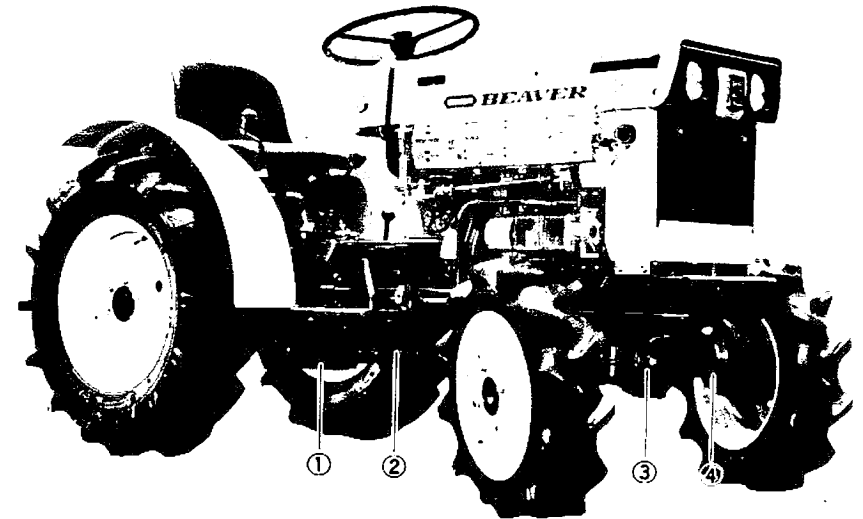
EXTERNAL VIEW AND NOMENCLATURE OF EACH PART



No.	Part Name	No.	Part Name
1	Sub shift lever	7	Main shift lever
2	Hydraulic control lever	8	Steering wheel
3	Seat	9	Muffler
4	Tire	10	Fuel filter
5	Fender	11	Hydraulic pump
6	Brake pedals	12	Oil filter



No.	Part Name	No.	Part Name
1	Alternator	5	Drag link
2	Starter motor	6	Clutch pedal
3	Throttle lever	7	Pitman arm
4	Battery	8	PTO gear shift lever



No.	Part Name	No.	Part Name
1	Mid PTO	3	Front axle diff. case
2	Propeller shaft	4	Front axle gear case

SECTION 1. OPERATION

STARTING AND STOPPING THE ENGINE

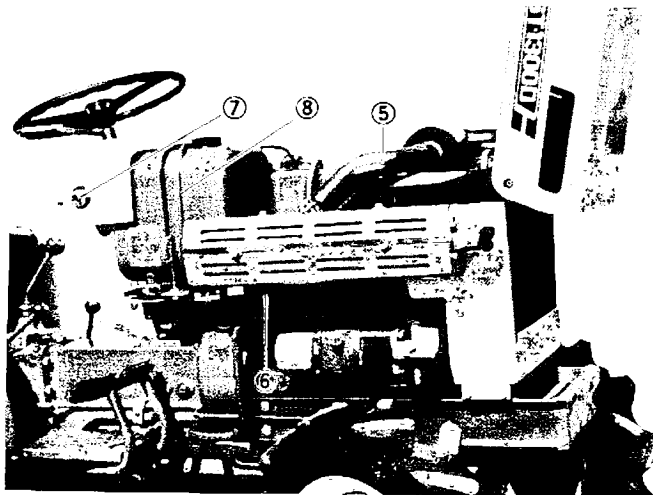
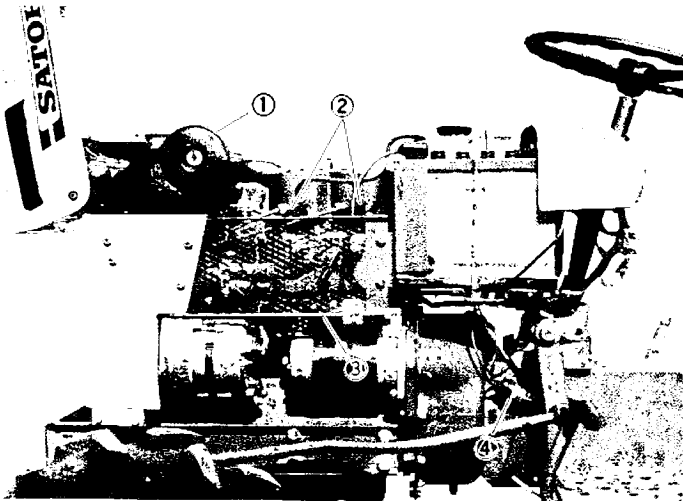
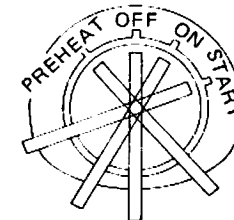
Before starting the engine, be sure to check fuel, engine oil, cooling water and transmission oil, and in addition front axle diff. case oil and front axle gear case oil for 4-wheel drive for quantity.

And also daily inspections specified in SECTION 2 are to be carried out before starting.

1. Set the throttle lever halfway between lower idling and higher idling.
2. Turn the starter key to "PREHEAT" and hold it in this position for about 30 seconds (until the preheat indicator becomes hot red), so that preheat combustion chamber gets hot.
3. The engine is provided with a safety switch, so that the starter motor will not run unless the clutch is disengaged. Accordingly, when starting the engine, depress the pedal to disengage the clutch.
4. Turn the starter key to the "START" position and the starter motor will rotate and the engine will start. After starting, take your hand off the key and then the key automatically returns to "ON" position. The key must be in the "ON" position while the engine is running.
5. If the engine does not start on the first attempt, do not rotate the starter motor continuously beyond 10 seconds.
After a while, heat the glow plug enough and start again.

NOTE:

- 1) To start the engine in cold weather, heat the glow plug long enough to raise the temperature sufficiently in combustion chamber.
 - 2) In order to confirm that the engine is running smoothly, after the engine has started, listen to the sound carefully to ascertain if there is anything abnormal and inspect for oil and water leakage.
6. To stop the engine, turn the throttle lever to the "STOP" position, and set the starter key to "OFF". After stopping, be sure to pull out the starter key from the switch.



No.	Part Name	No.	Part Name
1	Air cleaner	5	Air hose
2	Nozzle holder	6	Control rod
3	Safety cover	7	Starter switch
4	Safety starter switch	8	Fuel level gauge

CONTROLS

BATTERY CHARGE WARNING LAMP

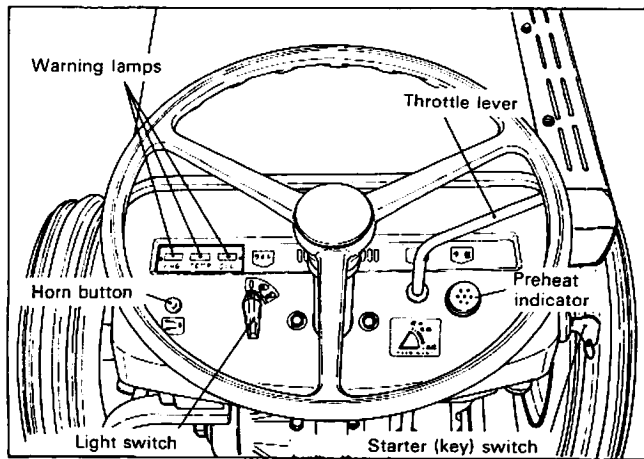
This lamp lights when the starter key is set to "ON" position. If the battery is being properly charged while the engine is running, this lamp will become off.

WATER TEMPERATURE WARNING LAMP

This lamp will not light even in the case the starter key is turned to the "ON" position. It lights only when the engine cooling water temperature becomes abnormally high. If this lamp illuminates, it indicates lack of water in the radiator, overheating, or other troubles. In this case, stop the engine and check for the cause before restarting.

OIL PRESSURE WARNING LAMP

This lamp lights when the starter key is turned to "ON" position. If lubrication is made properly while the engine is running, this lamp turns off.



LIGHT SWITCH

The head light switch is installed on instrument panel and the operation is accomplished by turning the switch lever clockwise.

0..... Extinguished

One step..... Headlight is on

Two step Headlight is dimmed and directed downwards

Flood lamp is optional equipment.



SAFETY STARTER SWITCH

Beaver is equipped with a safety starter switch to prevent an accident in starting the engine.

By depressing the clutch pedal fully to disengage the clutch, the starter switch is connected to enable to start the engine.

GLOW PLUG

The engine of Beaver is fitted with glow plugs which heat the combustion chamber so that the engine starts easily even in cold weather.

PREHEAT INDICATOR

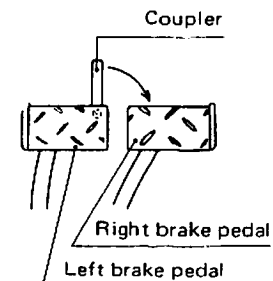
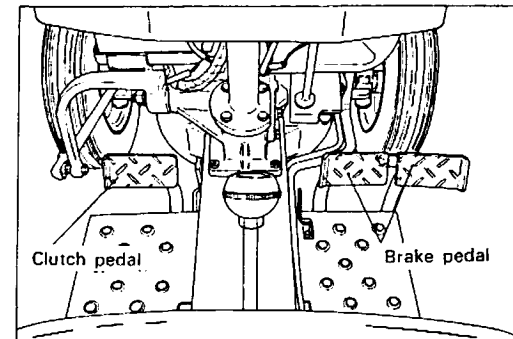
The preheat indicator which indicates the heating state of the glow plug in the combustion chamber is installed on the instrument panel. It is easily seen from the heating condition of the preheat indicator resistance wire.

THROTTLE LEVER

When the throttle lever is pulled toward operator, the engine speed increases. The range controlled by the lever is from 800 to 2,900 rpm.

CLUTCH

When the clutch pedal is operated, it is essential to avoid the operation of a half-engaged clutch as much as possible. When declutching you are also advised to lower the engine speed. The life of the clutch depends on the operating habit of the user. The clutch works in combination with the PTO.



BRAKE

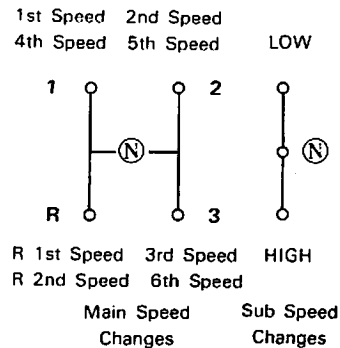
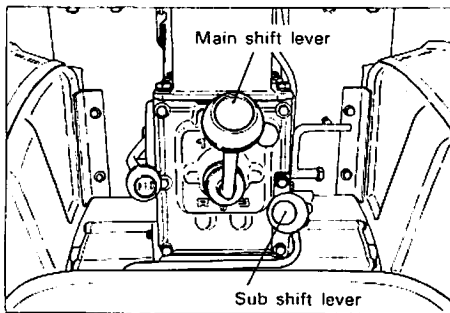
To stop the tractor running, first reduce the engine speed. Then depress the clutch pedal with the left foot, and depress the brake pedal with the right foot.

NOTE: While travelling on roads, be sure to link both the right and left brake pedals. When parking, depress the brake pedals and lock the pedals with the side brake lever.

8-SPEED TRANSMISSION

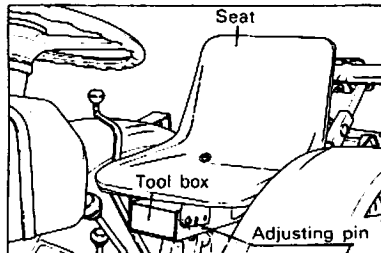
The gear shift positions are as shown in the diagram below. By combination of the main and sub shift levers, six forward speeds and two reverse speeds can be obtained.

The first, second, and third forward speed and first reverse speed can be obtained with sub shift lever in the LOW position, and the fourth, fifth, and sixth forward speed and second reverse speed can be obtained with the sub shift lever in the HIGH position.



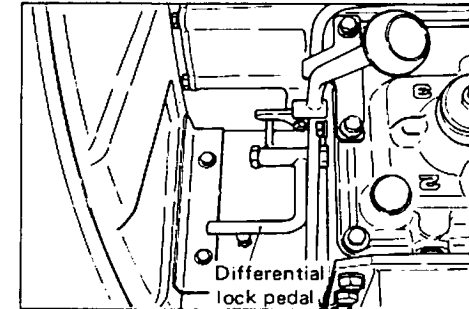
SEAT

The operator's seat can be adjusted in the range of 1.18 in. (30 mm) to the front and rear directions so that the operator can obtain the most suitable position.



DIFFERENTIAL LOCK

The differential lock is a device for making the rear wheels to rotate at the same speed so that the left or right wheel will not slip.



How to Engage the Differential Lock

To engage the differential lock, stop the tractor running before slipping or slowing down, and then, depress the pedal with the right heel. If proper engagement is not achieved at the first try, the pedal should be depressed again harder. If either of the left or right wheel has already begun slipping, turn the throttle lever to the idle running or disengage the clutch, then, depress the differential lock pedal. Make sure that the pedal is fully depressed. As far as the pedal is depressed, the diff. lock is engaged.

How to Release the Differential Lock

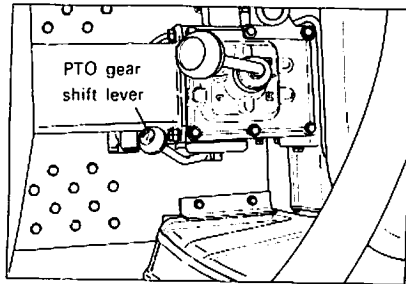
Immediately after the right foot is taken off the pedal, the differential lock is automatically released by the force of spring. However, it must be noticed that under certain condition it may not be possible to release the lock. If this occurs, the right and left brake pedals should be quickly and alternatively depressed, and then, the differential lock will be set free. If the same occurs while plowing, the brake pedal of the land wheel side can be used to disengage the lock. When the both right and left brakes are linked for towing a trailer, operation of the steering wheel to right and left allows the lock to be free. When the tractor stops with the differential lock engaged, quick reverse running can release the lock.

NOTE:

Avoid using the differential lock when operating the tractor at high speed or running on a road.

REAR PTO OPERATION

The PTO (power take off) shaft for driving the equipment is located at the rear. Three different speeds can be obtained by shifting the PTO lever.



Standard

1st speed	517/engine 2,700 rpm
2nd speed	762/engine 2,700 rpm
3rd speed	1,249/engine 2,700 rpm

With PTO Adaptor

1st speed	537/engine 2,700 rpm
2nd speed	791/engine 2,700 rpm
3rd speed	1,297/engine 2,700 rpm

1. When any implement is mounted on the tractor, be careful to set the universal joint within specified angle (normally 15°).
2. When the PTO is under an impact load, properly adjust the slide clutch on the implement side so that no overload will be given to the transmission.
3. To reduce the thrust load on the PTO driven shaft as much as possible, it is advisable to perform a test operation without any load on the implement.
4. Lubricate the PTO driven shaft before operation.
5. Avoid using a square-shaped driven shaft as much as possible.
6. Special care should be given to the yoke position so that the driven shaft is well balanced.

TREAD ADJUSTMENT

The rear tread can be adjusted to be 29.13 in. (740 mm) and 35.12 in. (892 mm) by turning over the wheel in its mounting.

BALLAST WEIGHT

Tire slipping will not only damage the tire, but also waste the fuel. If heavier traction force is needed, the ballast should be attached to each wheel.

Chassis weight	55 lb (25 kg)
Front wheel weight	35 lb (16 kg) × 2
Rear wheel weight	51 lb (23 kg) × 2

TIRE PRESSURE

Tire pressure should be checked frequently. Improper tire pressure, either too high or too low, will result in the quick wear of the tire. It is advisable that tire pressure should be checked at least once a week. (See SECTION 4, "Tire Pressure")

3-POINT LINKAGE

The 3-point linkage is designed for implements of ASAE Category 0. The top link and the lift rod (right side) length are adjustable.

Top link adjustable range	+3.54 in. (90 mm) -2.36 in. (60 mm)
Lifting rod (leveling rod) adjustable range at lower link end	±2.44 in. (62 mm)

NOTE:

- 1) When an implement is towed with the linkage drawbar installed on lower links, the lower links should be always kept horizontal.
- 2) Installed with implement by method of 3-point linkage, the wider rear tread or 35 in. should be given.

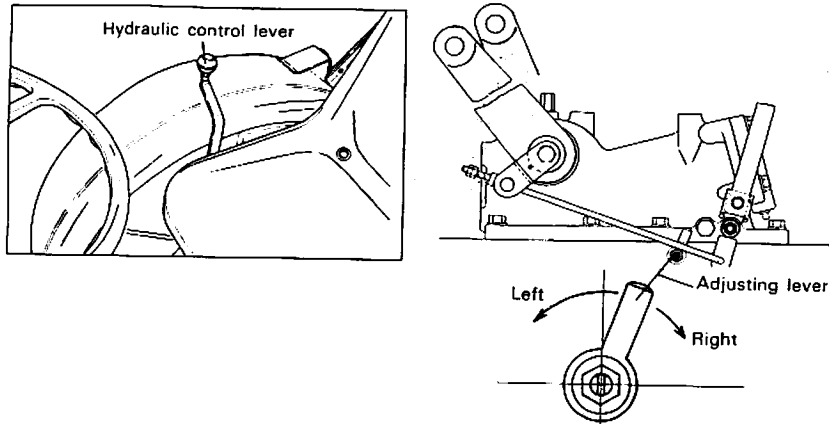
HYDRAULIC SYSTEM

Feature

1. "Up" and "Down" can be controlled by the lever located at the right side of the seat.
2. The hydraulic pump is directly connected to the engine, therefore, the pump operates independently from the clutch operation.
3. Employment of a flow control valve has made it possible to control the lowering speed of an implement. Further, the implement can be locked at any desired position.
4. Hydraulic adaptor plate (accessory)
Installing the adaptor plate on the hydraulic case, the oil can be taken off and delivered into the cylinder of an implement with a control valve.

Mechanism and Operation of Hydraulic System

To operate the Satoh tractor properly, a good knowledge of the operation of each hydraulic mechanism is required.



1. When the control lever is pulled toward the rear of the tractor, the hydraulic lift arm moves up, and when pushed toward the front, lowers the lift arm.
2. Adjusting lever
The adjusting lever installed on the right side of hydraulic case serves for adjusting the implement lowering speed and locking the implement. Turning this lever to the right slows down the lowering speed, and turning it further fully to the right will stop the equipment even when the control lever is at DOWN position. Turning the adjusting lever to the left increases the lowering speed, which should be adjusted to conform with the implement lowering speed desired.

DRAWBAR

The Satoh Beaver is equipped with a permanent drawbar.

FRONT PTO

Front PTO device is easily installed on the front side of the engine crank shaft and thus live power is obtained with ease.

The said power can be used for snow blower, mid mounted mower and so on.

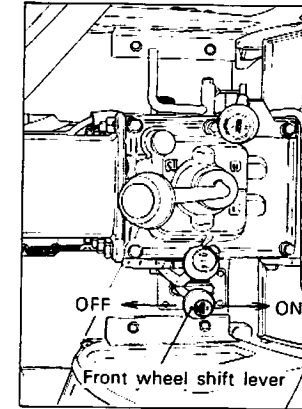
4-WHEEL DRIVE BEAVER

Feature

1. By means of the engine and the foot brakes, the brake works effectively for each of four wheels to shorten the brake distance substantially.
2. Employing spherical seal mechanism prevents water from penetrating into the front axle final gear case.
3. By employment of double joint system, the stable steering operation is given.

Operation

Engagement and disengagement of the front wheel drive is made by operating the front wheel shift lever located on the left side of transmission case. When the lever is pushed backwards, the front wheel drive is engaged, and when it is pushed forwards it is disengaged.



Efficiency of the 4-Wheel Drive

1. Traction of the four-wheel-drive is about 40% up on that of a two-wheel-drive. Therefore, its effectiveness will be proven particularly in jobs on a hill, on a slope and in a wet field as well as in the trailer work which require substantial traction power.
2. Stable cultivation is carried out because the brake of the front wheel functions well even in a rotary cultivating work in a hard field.

SECTION 2. REGULAR MAINTENANCE

Daily and periodical inspections are indispensable to keep the tractor in the top condition all the time.

If any tractor is not properly serviced, its performance and reliability will be greatly reduced and unexpected repairs may be often required, costing more than the expense for periodical inspection in the long run.

The periodical inspection is further divided into the six stages; A, B, C, D, E and F. These services are performed according to the time of operation, so you must check and note hours run.

The following service chart is based on the normal operating conditions, therefore, if the tractor is operated in an exceptionally dusty or muddy place, greasing and air cleaner checking should be given more often.

NOTE:

To keep the tractor clean is the most important. The grease nipple should be cleaned before greasing. Dust should be wiped off the oil pan plug and filler cap before they are removed.

All tools and instruments used for the engine, transmission and fuel tank should also be kept clean. Even a fine dust in the fuel system may cause troubles and power loss.

It is advisable to perform all service jobs indoors as much as possible.

SERVICE

Service should be given according to the service schedule. The service schedule is applicable to the tractor which is operated under normal working condition. If it is operated in a muddy place, frequent greasing is needed. If the tractor has been at the stationary works in a dusty place, the air cleaner and fuel filter should be cleaned frequently or replaced.

SERVICE SCHEDULE CHART

Hours of operation	A service	B service	C service	D service	E service	F service
50	○					
100		○				
200		○	○			
300		○		○		
400		○	○		○	
500		○				
600		○	○	○		
700		○				
800		○	○		○	○

* After 800 hrs. running, service should be repeated in the order of B, C, D, E and F.

* "A" service should be given only for a brand new tractor.

NOTE:

For specific services, please refer to SECTION 3.

DAILY INSPECTION

1. Check the engine oil for quantity and leakage.
2. Check the cooling water for quantity and leakage.
3. Check the bolts and nuts for tightness.
4. Check and adjust the tire pressure.
5. After operation, supply fuel so that the fuel level is 1.57 in. (4 cm) below the fuel tank inlet.
6. Check the battery liquid for quantity and clean the top surface of the battery.
7. If the tractor is operated in a dusty place, the air cleaner element should be cleaned.
8. Grease the front axle center pin.
9. Grease the king pin.
10. Grease the brake pedal boss.
11. Grease the clutch pedal boss.
12. Grease the drag link and tie rod ends.
13. Oil the sliding parts.
14. Grease the front axle gear case of 4-wheel drive Beaver.
15. Grease the front axle spherical surface of 4-wheel drive Beaver.

NOTE:

Before greasing, the grease nipple should be cleaned.

"A" SERVICE (After 50 hrs. run for a brand new tractor)

1. Engine oil replacement.
2. Engine oil filter replacement.
3. Cooling water replacement.
4. Cylinder head bolts retightening and valve clearance adjustment.
5. Fan belt tension adjustment.
6. Engine idling adjustment.
7. Air cleaner element cleaning.
8. Transmission oil replacement and hydraulic oil filter cleaning.
9. Front axle diff. case and gear case oil replacement of 4-wheel drive Beaver.

"B" SERVICE (Every 100 hrs. run)

1. Engine oil replacement.
2. Engine oil filter replacement.
3. Fuel filter cleaning.
4. Air cleaner element cleaning.
5. Engine idling adjustment.
6. Hydraulic oil filter cleaning.

"C" SERVICE (Every 200 hrs. run)

1. Fan belt tension adjustment.
2. Injection nozzle checking.

"D" SERVICE (Every 300 hrs. run)

1. Transmission oil replacement.
2. Front axle diff. case and gear case oil replacement of 4-wheel drive Beaver.

"E" SERVICE (Every 400 hrs. run)

1. Cylinder head valve clearance adjustment.
2. Fuel filter element replacement.
3. Glow plug checking.
4. Starter motor, alternator and regulator checking.
5. Fuel tank cleaning.
6. Air cleaner element replacement.

"F" SERVICE (Every 500 hrs. run)

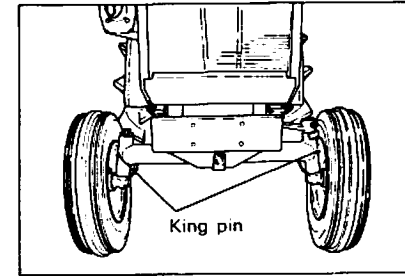
1. Cooling water replacement.
2. Bolt and nut retightening.
3. Injection pump checking.
4. Thermostat checking.
5. Engine compression checking.

RECOMMENDED LUBRICANTS AND ANTIFREEZE

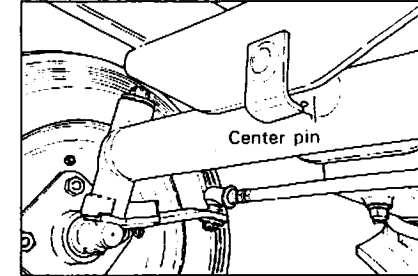
Air Temperature	A.P.I. Classification	Grade	Mobil	Esso	Shell
Engine and Governor					
Below 20°F (−7°C)	CB CC CD	Multigrade SAE 10W	Mobil Delvac 1210	Esso Lube D-3 10W Esso Lube HDX 10W Esso Lube HD 10W	Shell Myrina Oil 10W Shell Rimula CT 10W Shell Rotella TX 10W-30 Shell Rotella SX 10W
20°F to 90°F (−7°C to 32°C)	CB CC CD	Multigrade SAE 20W SAE 20 SAE 30	Mobil Delvac 1220 Mobil Delvac 1230	Esso Lube D-3 30 Esso Lube HDX 30 Esso Lube HD 30	Shell Myrina 30 Shell Rimula CT 30 Shell Rotella TX 30 Shell Rotella SX 30 Shell Multigrade 20W-40
Above 90°F (32°C)	CB CC CD	Multigrade SAE 40	Mobil Delvac 1230	Esso Lube D-3 40 Esso Lube HDX 40 Esso Lube HD 40	Shell Myrina Oil 40 Shell Rimula CT 40 Shell Rotella TX 40 Shell Rotella SX 40
Transmission, Hydraulic System, Steering Gear Box, Front Axle Gear Case (4-wheel drive) and Front Axle Diff. Case (4-wheel drive)					
Below 20°F (−7°C)			Mobilfluid 423 or Mobil AFT 220	Esso Lube HDX 10W or Esso Lube XD3 10W	Dentax 80
20°F to 90°F (−7°C to 32°C)					
Above 90°F (32°C)			Mobilube C80	Esso Gear Oil GP80	Dentax 90
Antifreeze					
			Parnazone	Esso Antifreeze	Shell Antifreeze

GREASING DIAGRAM

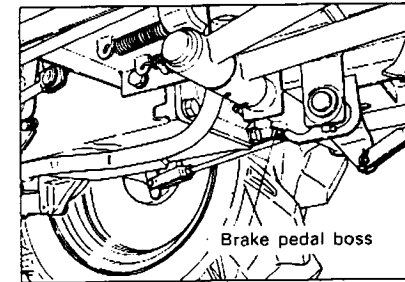
▼ Grease front axle king pin



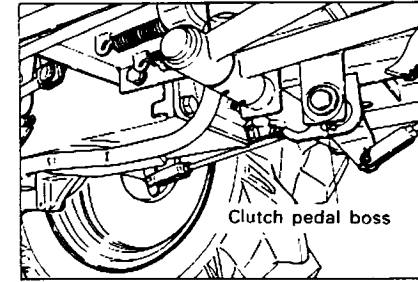
▼ Grease front axle center pin



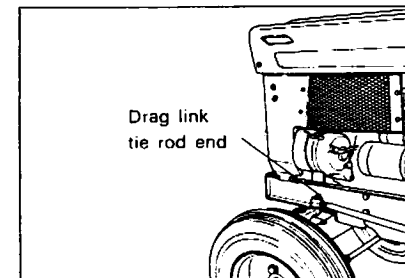
▼ Grease brake pedal boss



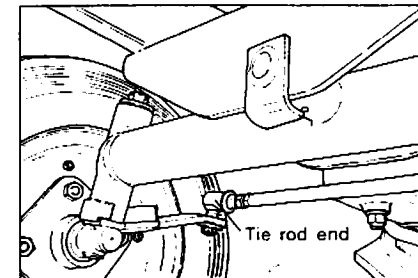
▼ Grease clutch pedal boss



▼ Grease drag link tie rod end

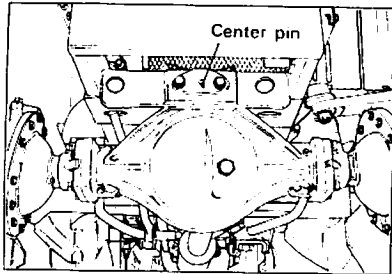


▼ Grease tie rod end

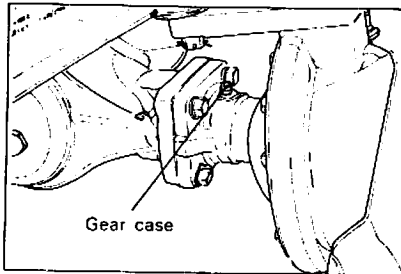


4-WHEEL DRIVE

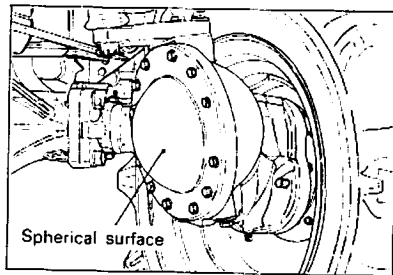
▼ Grease front axle center pin



▼ Grease gear case



▼ Grease spherical surface



SECTION 3. SERVICE INFORMATION

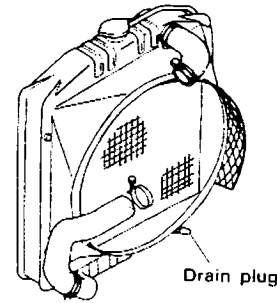
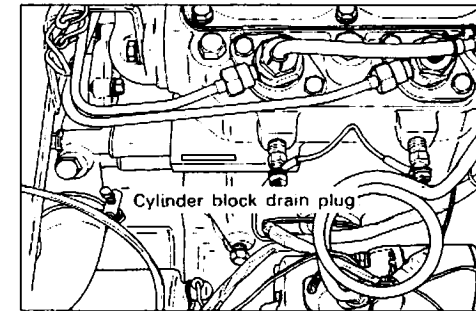
This chapter deals with technical information to be required for the operator with respect to the service.

Note:

When removing the cap lug or the cover, be sure to clean it so that no dust will enter into the tractor.

PRECAUTIONS IN COLD WEATHER

When the tractor requires storing for a long time, drain the water from the radiator and cylinder block, or use an anti-freezing solution. To completely drain the water, remove the radiator cap.



ANTIFREEZE

When the antifreeze solution is added to the engine cooling water, the following instructions should be observed. Otherwise, corrosion may develop in the cylinder block.

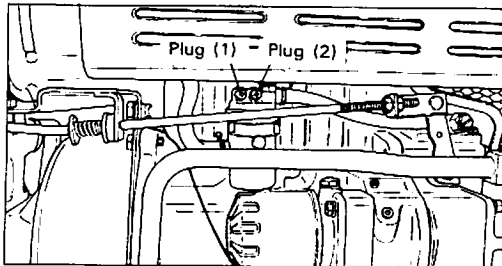
1. Make sure to use the antifreezing solution specified as "for the engines with the cast-iron cylinder blocks".
2. Before adding the antifreezing solution, completely wash the cooling system with a detergent.
3. The water to be added to the antifreeze must be clean soft water.
4. To refill with the cooling water, be sure to use a mixture of water and antifreeze.
5. Never reuse the same water-antifreeze mixture after it has been drained. After draining, be sure to completely wash the inside of the cooling system and refill with clean cooling water.
6. Make sure that no water leaks from hose joints and cylinder head gasket, and then, add the new antifreeze.

Do not use the same water-antifreeze mixture for more than two years, even if it is specified as "Permanent Anti-Freeze".

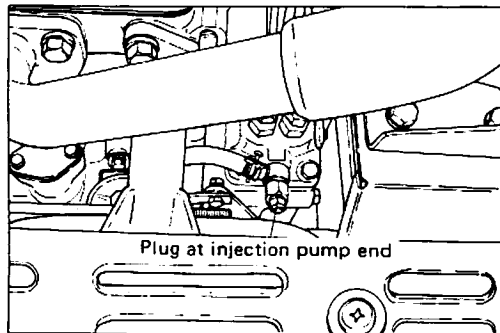
AIR BLEEDING IN THE FUEL SYSTEM

Either in case when the oil filter and the fuel pipe are detached from, when the fuel run out or when the tractor is not used for a long time, you may find the engine will not start even after the fuel tank has been filled up. This is a result of air getting into the fuel system. When this occurs the air in the fuel system must be removed in compliance with the following instructions.

1. Fill the fuel tank with fuel.
2. Loosen the fuel filter bleeder plug by two or three turns. (There are two bleeder plugs on the fuel filter. Bleed them, in sequence of the numbers marked below the plugs.)

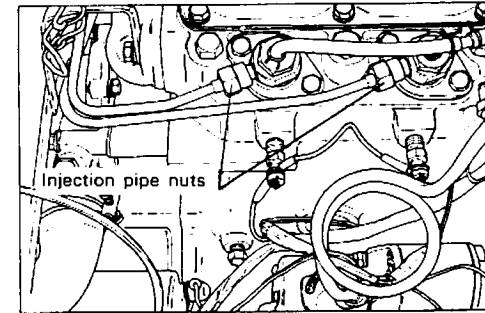


3. When there are no longer air bubbles flowing out, tighten the bleeder plug.
4. In the same manner, loosen the bleeder plug at the top of the injection pump by two or three turns. When no bubbles come out, retighten the plug.



Starting becomes possible after completing steps (1) to (4). If starting is still difficult after completing the steps (1) to (4), take further steps as follows.

5. Loosen the injection pipe nuts (two nuts) at the injection nozzle end.
6. Pull the throttle lever fully (High speed side).
7. Rotate the starter motor with the starter key so that fuel will flow out from the injection pipe. Be sure that the fuel contains no air bubbles and then retighten the nuts.

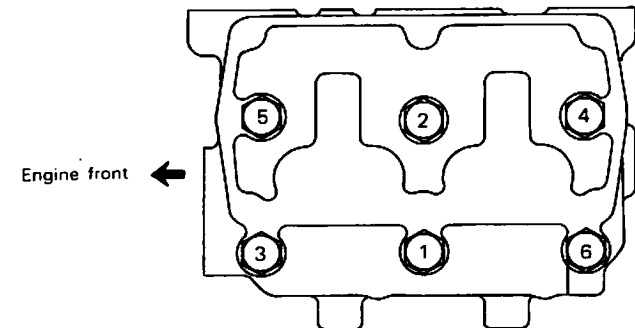


INJECTION PUMP AND NOZZLE

It is not necessary to disassemble fuel injection system (pump and nozzle) for normal operation. If you feel something abnormal with injection volume or injection pressure, please contact your local Satoh dealer.

RETIGHTENING THE CYLINDER HEAD BOLTS

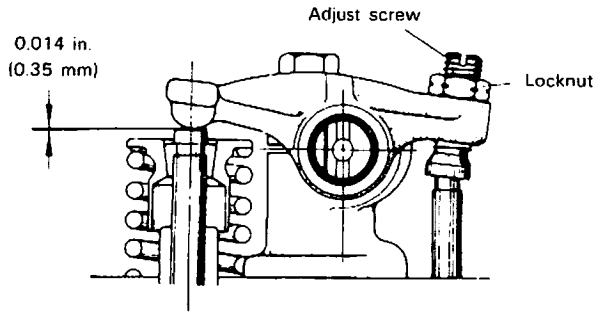
The cylinder head bolts should be tightened in the order as shown below. Tightening torque should be within 93-101 ft-lb (13 ~ 14 kg-m). It is advisable that torque wrench be used. After tightening the bolts check and adjust both the exhaust and intake valve clearances.



Cylinder head bolt tightening order

EXHAUST AND INTAKE VALVE CLEARANCE

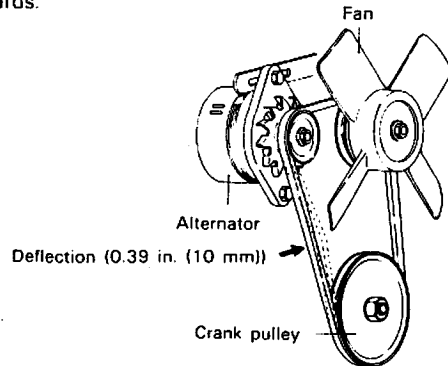
1. Turn the crank shaft so that the top mark meets the indicator of the timing cover, and the compression upper dead center of the 1st cylinder is obtained. Adjust the inlet and exhaust valve clearances of the 1st cylinder by loosening the lock nut and turning the adjust screw.
2. Turn the crank shaft further and make the compression upper dead center of 2nd cylinder. Adjust the intake and exhaust valve clearances of 2nd cylinder.
3. The clearance at cold engine is 0.014 in. (0.35 mm) (both intake and exhaust).



FAN BELT TENSION

When the fan belt tension is too slack, there is danger of the engine overheating.

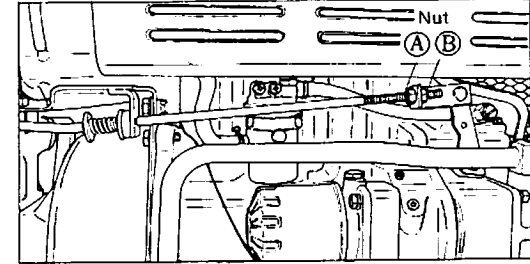
1. There should be a deflection of about 0.39 in. (10 mm) in the belt when an intermediate position in the fan belt between alternator and crank pulley is depressed with the thumb. (Pressure of about 22 lb (10 kg) is given)
2. If the deflection is too much, adjust it by shifting the alternator outwards.



ENGINE IDLING

Engine idling should be adjusted by controlling the speed control rod length.

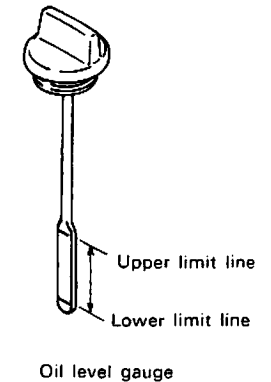
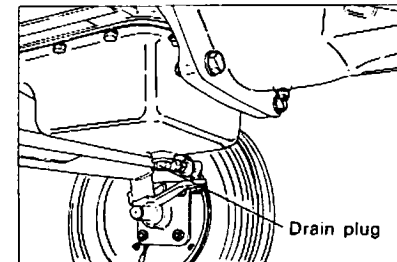
Push the throttle lever fully forwards, leave it in this position and then adjust the control lever length by screwing nut A and B so that the engine revolutions are between 800 ~ 1,000 rpm.



ENGINE OIL AND OIL FILTER

REPLACEMENT METHOD

1. Remove the oil pan drain plug, and drain out the used oil. Make the above while the engine is warm, and oil will be drained out completely.
2. Supply new engine oil up to the upper level on the oil gauge (0.79 gal (3.0 lit.))

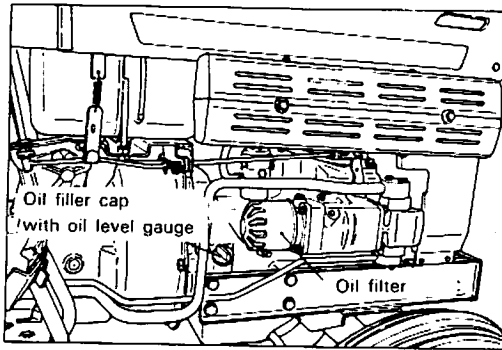


NOTE:

Special care should be taken so that no dust will enter into the engine. Before removing the oil filter cap, be sure to clean the cap and inlet. The oil feeder must be also clean. When it is used, clean the top and outlet of the feeder. To supply the oil, use a funnel with a filtering sieve.

HOW TO REPLACE THE OIL FILTER (CARTRIDGE TYPE)

1. Remove the oil filter. (A special tool is required for removal. Please contact your local Satoh dealer.)
2. Make sure to check the oil level with oil level gauge when the oil filter is replaced since the engine oil will be decreased. If insufficient, fill the oil up to the specified level.

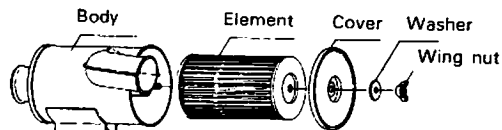
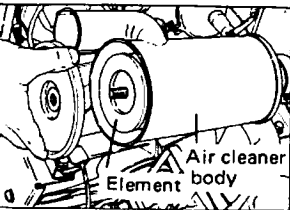


AIR CLEANER

The air cleaner element that is clogged with dirt and dust will cause starting difficulty and also decrease the engine performance, it is desirable to wash it earlier than the prescribed period.

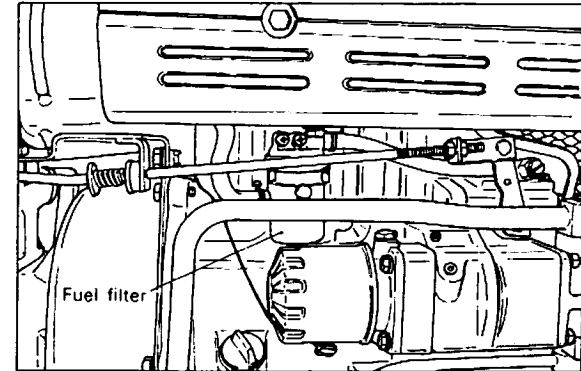
Clean the element as follows:

1. Unscrew the wing nut.
2. Take off the washer and cover.
3. Remove the element and blow off dust from the inside using compressed air.



FUEL FILTER

The fuel filter is of the cartridge type to allow easier servicing. The prescribed time for replacing the fuel filter is every 100 hrs. run, but it should be replaced earlier if water or sediment is found at the bottom of the filter.

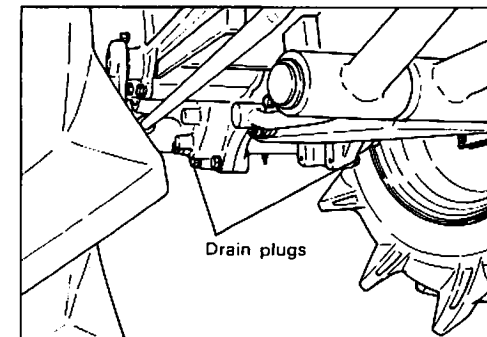


CAUTION:

1. If water or dirt get into the fuel, wear will be caused in the fuel pump and injection nozzles. Thus, special attention should be paid to fuel filter replacement to prevent water or dirt from entering.
2. When supplying fuel, be sure to pass it through the fuel tank screen.

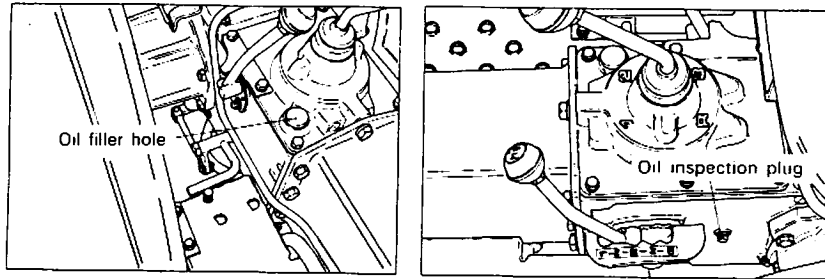
TRANSMISSION OIL

The oil in the transmission case is also used as the hydraulic oil.



Place an oil pan under the final gear case and drain out the oil by removing the final gear case drain plugs. After draining out the oil, remove the hydraulic oil filter and wash it.

Re-place the drain plugs and filter in their former places, and fill with 2.25 gal (8.5 liters) EP gear oil No. 80. (When the oil level is up to the oil inspection plug hole, the specified level is obtained.)



FRONT AXLE DIFF. CASE AND GEAR CASE OIL FOR 4-WHEEL DRIVE TRACTOR

FRONT AXLE DIFF. CASE OIL

Place an oil pan under diff. case and drain out the oil by removing the drain plug.

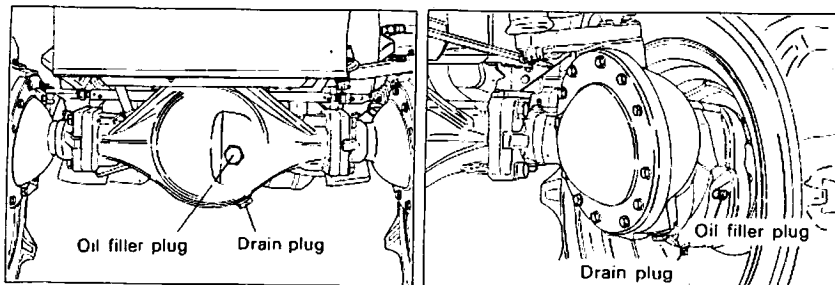
Re-place the drain plug and fill with 0.21 gal (0.8 lit.) of gear oil No. 80. (Fill with the gear oil until the oil level reaches the oil filler hole.)

FRONT AXLE GEAR CASE OIL

Place an oil pan under the gear case and drain out the oil by removing the drain plug.

Re-place the drain plug and fill with 0.03 gal. (0.12 lit.) of EP gear oil No. 80.

(Fill with gear oil until the oil level reaches to the oil filler hole.)



STEERING WHEEL

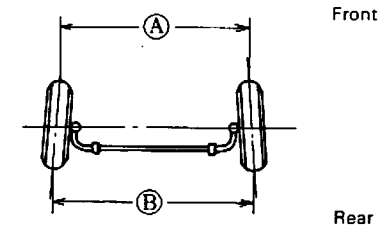
Standard steering wheel free-play is about 1.18 in. ~ 1.97 in. (B) (30 ~ 50 mm) at the rim circumference.

If the free-play is abnormally large, contact your local Satoh dealer.

TOE-IN

If driving becomes unstable, or if the steering wheel does not return automatically or is heavy to turn, the toe-in requires adjustment. Adjust it by controlling the tie rod length.

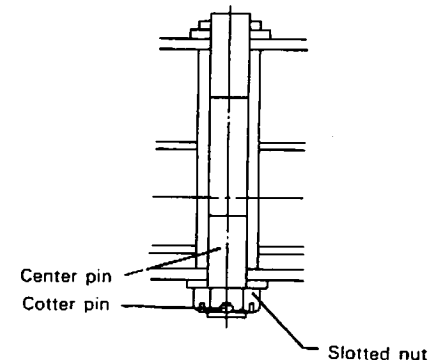
1. Measure the distances (A) and (B) of the front wheels.
2. Standard toe-in = (B) - (A) = 0.24 ± 0.08 in. (6 ± 2 mm.)



CENTER PIN

The front axle swings with the supporting point of the center pin. After long time of use, the vertical play becomes excessive in the front axle. In such case, proper adjustment is required.

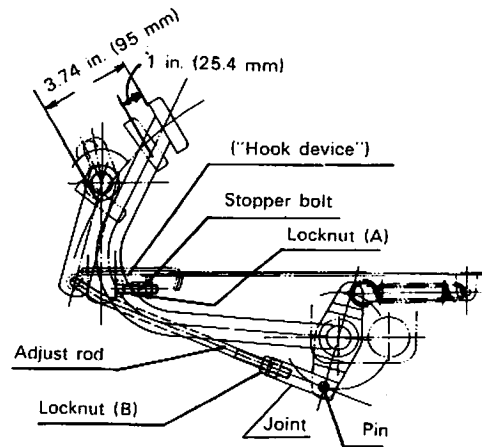
Pull out the cotter pin and tighten the slotted nut and then loosen it by 1/4 - 1/3 turn. Then be sure to re-install the cotter pin.



CLUTCH PEDAL

It is very important to keep the correct amount of free-play and the proper stroke of the clutch pedal. Thus, careful inspection and adjustment are frequently required.

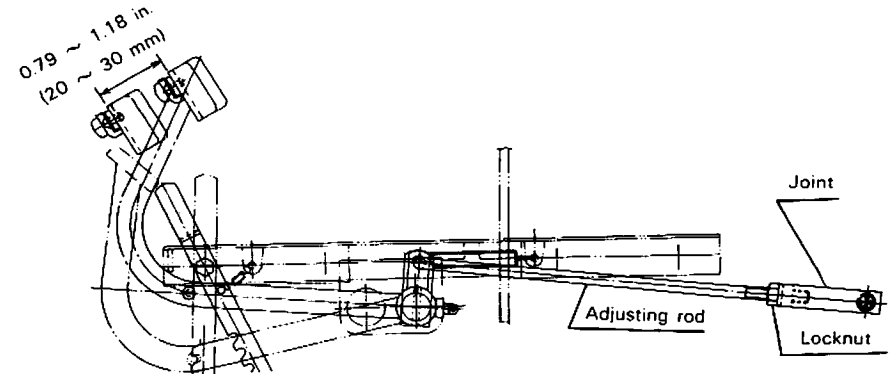
The prescribed free-play is about 1 in. (25.4 mm). When adjusting the free-play, loosen the lock nut (B) shown in the figure and pull out the pin. Then control the length of adjust rod to obtain the prescribed value while turning the joint. In this case, it is also required to adjust the clutch pedal stroke. The prescribed clutch pedal stroke is about 3.74 in. (95 mm). When adjusting, loosen locknut (A) and then adjust the length of the stopper bolt to obtain the prescribed value.



BRAKE PEDAL

The right and left brakes are independent of each other. It is required therefore to always keep the free-play of the brake pedals equally so that the brakes may work in the same manner.

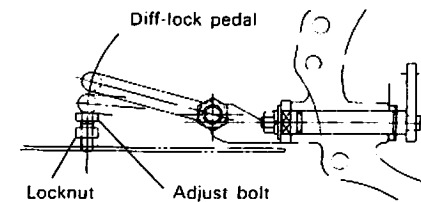
The prescribed free-play is from 0.79 in. (20 mm) to 1.18 in. (30 mm). When adjusting it, loosen the locknut and control the length of the adjusting rod while turning the joint.



DIFFERENTIAL LOCK

There is no necessity of frequent adjustment of the differential lock. The adjustment was properly made at the factory before shipment. If the pedal stroke becomes too small and the differential lock is difficult to operate, adjust it by means of the adjust bolt.

1. Depress the differential lock pedal fully.
2. In this state, turn the adjust bolt so that its head will contact the pedal.
3. After contacting, turn the bolt by 1/4 to 1/2 turn in the loosening direction. Then tighten the locknut.



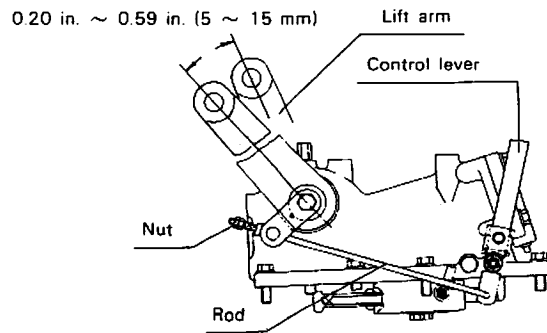
HYDRAULIC CONTROL

When an implement is fully lifted, the control lever automatically returns to NEUTRAL position. If the control lever does not return, adjust as follows:

1. Disconnect the lift rod from the lift arm.
2. Set the lift arm to UP position with the control lever. When at the UP position, check and adjust the free-play (A) to be about 0.20 in. ~ 0.59 in. (5 ~ 15 mm).

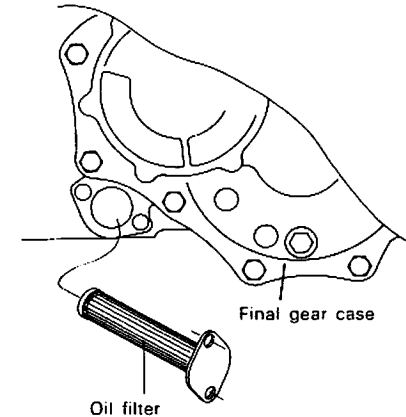
Unless the above free-play is obtained, the control lever will not automatically return to NEUTRAL position.

3. If the play is too small or there is no play, shift the adjust nut toward the control lever (in the tightening direction).
4. If the play is too large, shift the adjust nut toward the rod end (loosening direction).



HYDRAULIC OIL FILTER

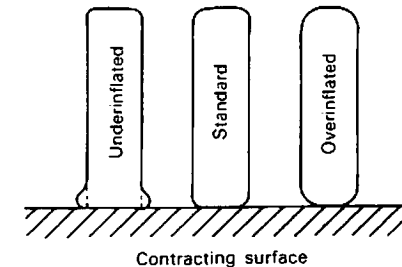
The various parts of the hydraulic system are designed with a high accuracy. Thus, even small particles of dirt in the oil may result in damaging these parts. An oil filter is provided at the end of the suction pipe. At the time when the transmission oil is changed, take off this filter and wash off all dirt. Then re-install it taking care not to damage it.



TIRE PRESSURE

The tires have been inflated to be of the specified pressure when shipped from the factory. Since the pressure will naturally become lower after long time, inflate to be of proper pressure.

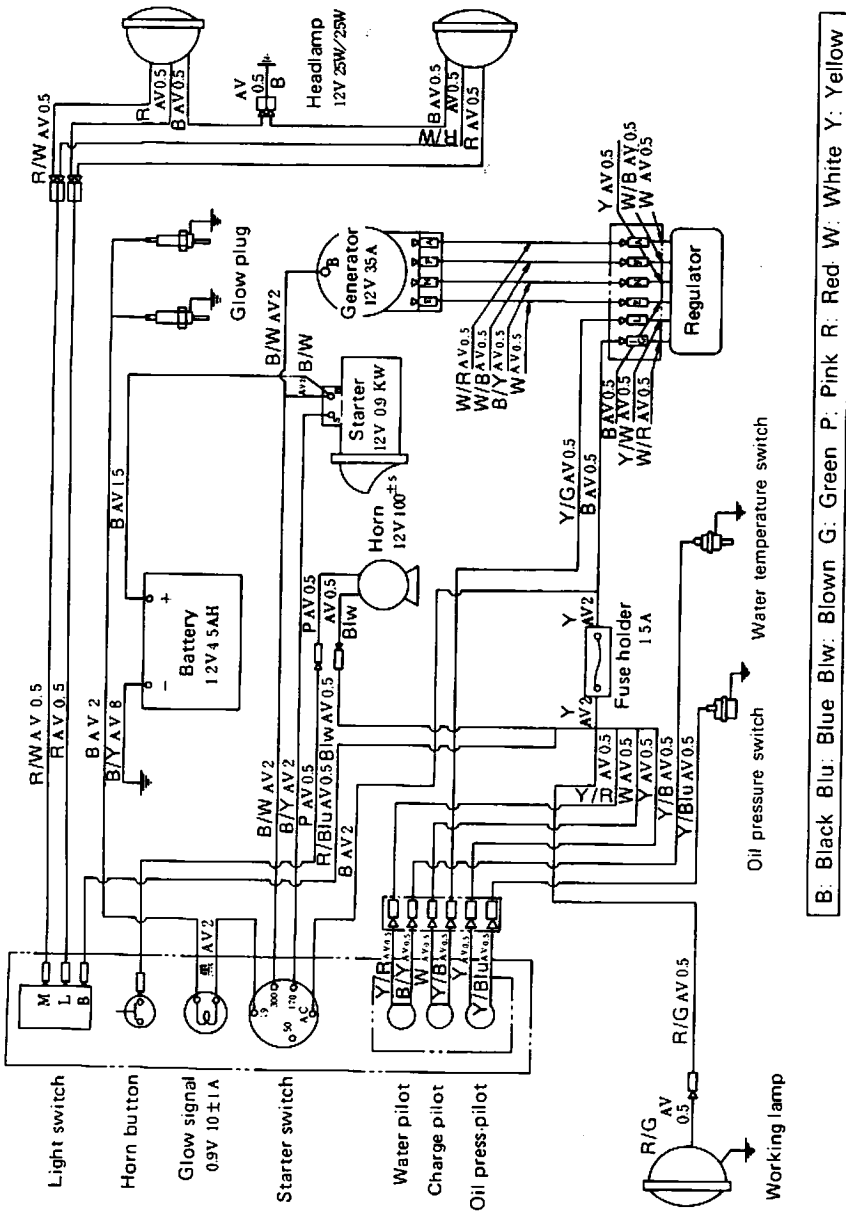
Prescribed tire pressure, both front and rear are 22.8 lb/in² (1.6 kg/cm²).



NOTE:

For specified air pressures of ES and high lug tire, refer to **SECTION 4**

WIRING DIAGRAM



SECTION 4. SPECIFICATIONS AND DATA

ENGINE

Model	KE 70
No. of cylinders	2
Cylinder arrangement	In line
Piston displacement	40.8 cu.in. (669 cc.)
Bore and stroke	2.87 × 3.15 in. (73 × 80 mm)
Rated rpm	2,700 rpm
Max. rpm	2,900 rpm
Combustion chamber	Swirl type
Max. bare HP	15/2,700 rpm.
Rated HP	13/2,700 rpm.
Max torque	25.28 ft-lb (3.5 kg-m)/2,300 rpm.
Compression pressure	455 lb/in ² (32 kg/cm ²)
Firing order	1, 2
Valve position	Overhead valve system
Weight	220 lb (100 kg)
Valve clearance Intake	0.01378 in. (0.35 mm)
Exhaust	0.01378 in. (0.35 mm)

COOLING SYSTEM

Water pump type	Centrifugal impeller type
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FUEL AND FUEL SUPPLYING SYSTEM

Fuel	Diesel
Injection pump	Bosch M type
Injection nozzle	Throttle type
Fuel filter	Cartridge type

LUBRICATION SYSTEM

Oil pump	Trocoid gear pump
Filter	Cartridge

AIR CLEANER

Type	Dry paper element type
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ELECTRICAL SYSTEM

Generator	Alternator type (AC)
Battery	12-Volt 45 AH
Starting motor	12-Volt 1.2 KW

CAPACITIES (Approximate initial fill)

Cooling water	1.10 gal. (4.2 lit.)
Engine lubricant	0.79 gal. (3.00 lit.)
Transmission oil	2.25 gal. (8.50 lit.)
Transmission oil (4-wheel drive)	2.59 gal. (9.8 lit.)
Front diff. case oil (4-wheel drive)	0.21 gal. (0.8 lit.)
Front gear case oil (4-wheel drive)	0.03 gal. (0.12 lit.)

DIMENSIONS ON STANDARD TYPE

Overall length	79.76 in. (2,026 mm)
Overall width	37.8 in. (960 mm)
Overall height	43.5 in. (1,105 mm)
Overall height (4-wheel drive)	44.09 in. (1,120 mm)
Wheel base	48.23 in. (1,225 mm)
Wheel base (4-wheel drive)	49.80 in. (1,265 mm)
Min. ground clearance	9.65 in. (245 mm)
Min. ground clearance (4-wheel drive)	9.1 in. (230 mm)
Weight	1,036 lb (470 kg)
Weight (4-wheel drive)	1,179 lb (535 kg)
Turning radius	66.93 in. (1,700 mm)

PERFORMANCE

Max. PTO HP	12.2/540 rpm (with PTO adaptor)
Rated PTO HP	12.2/540 rpm (with PTO adaptor)
Max. drawbar pull	772 lb (350 kg)
Max. drawbar pull (4-wheel drive)	1,213 lb (550 kg)

POWER LIFT

Pump	Gear pump (GP1/15)
Max. operating pressure	1,920 lb/in ² (135 kg/cm ²)
Max. lift power at lower link end	1,279 lb (580 kg)
Pump output	3.84 gpm (14.2 lit.)/2,700 rpm

CLUTCH

Type	Dry single disc
Clutch diameter, outer	7.24 in. (184 mm)
inner	5.00 in. (127 mm)

TRANSMISSION

Number of shift lever	2
Speed steps	6-forward 2-reverse
Speed change method	Selective sliding gear
Differential	With diff. lock

BRAKE

Type	Water proof internal expansion drum type
Drum diameter	4.49 in. (114 mm)
Shoe width	1.18 in. (30 mm)

STEERING

Type	Worm sector type
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PTO

Shaft diameter, standard	0.98 in. (25 mm)
option	SAE 1-3/8 in.
Shaft revolutions, standard	517, 762 and 1,249 rpm./ 2,700 engine rpm.
option	537, 791 and 1,297 rpm./ 2,700 engine rpm.

TREAD

Front	28.3 in. (720 mm)
Front (4-wheel drive)	29.9 in. (760 mm)
Rear	29.13 in. (740 mm) and 35.12 in. (892 mm)

3-POINT LINKAGE

Standard of the lower link	ASAE Category 0
Lower link stud hole diameter	0.64 in. (16.26 mm)
Upper link hitch pin diameter	0.64 in. (16.26 mm)

WHEEL

	Size	Tire pressure
AG tire	Front	4.00—9
	5—12 (4-wheel drive)	22.8 lb/in ² (1.6 kg/cm ²)
	Rear	17.1 lb/in ² (1.2 kg/cm ²)
ES tire	Front	8—16
	Rear	22.8 lb/in ² (1.6 kg/cm ²)
High lug tire	Front	18 × 7.00—8
	9.5—16	14.22 lb/in ² (1 kg/cm ²)
	Rear	19.91 lb/in ² (1.4 kg/cm ²)
High lug tire	Front	4.00—9
	Rear	22.8 lb/in ² (1.6 kg/cm ²)

TRAVELING SPEED

With AG tire (Tire size 8—16) at engine speed 2,700 rpm.

	Speed	Lever position	mile/h	km/h	m/sec
Max. speed	F-1	L-1	0.61	0.98	0.27
	F-2	L-2	0.92	1.48	0.41
	F-3	L-3	1.56	2.51	0.70
	F-4	H-1	2.66	4.29	1.19
	F-5	H-2	4.04	6.50	1.81
	F-6	H-3	0.87	11.06	3.07
	R-1	L-R	0.78	1.25	0.35
	R-2	H-R	3.41	5.48	1.52

With ES tire (Tire size 9.5—16) at engine speed 2,700 rpm.

	Speed	Lever position	mile/h	km/h	m/sec
Max. speed	F-1	L-1	0.63	1.01	0.28
	F-2	L-2	0.96	1.53	0.43
	F-3	L-3	1.64	2.61	0.73
	F-4	H-1	2.80	4.46	1.24
	F-5	H-2	4.24	6.75	1.88
	F-6	H-3	7.21	11.48	3.19
	R-1	L-R	0.81	1.29	0.36
	R-2	H-R	3.57	5.69	1.58

* Specifications differ slightly according to destination.

* Specifications may be subject to change without prior notice.

1064
1380 NAPA OIL FILTER
KNING COB 100 FUEL FILTER
6270 1710 COB 100 AIR FILTER
1135 34152000 FIBER FILTER

RM48 SE WOODS MOWER

12170 BLADES