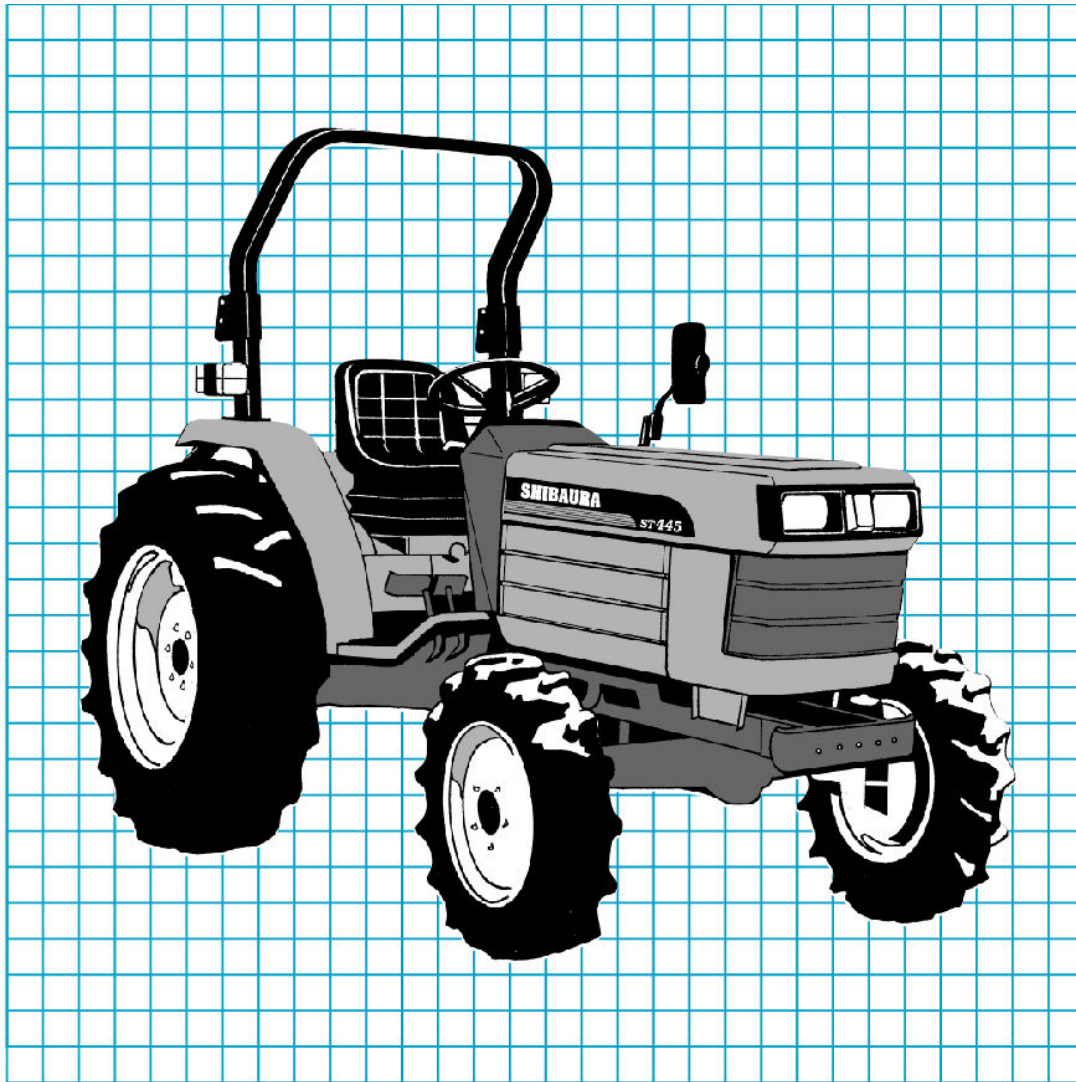


SHIBAURA

TRACTOR OPERATOR'S MANUAL

MODEL
ST440/ST445



ISHIKAWAJIMA-SHIBAURA MACHINERY CO., LTD.

Electro-magnetic Interference (EMC)

This tractor complies strictly with the European Regulations on electro-magnetic emissions. However, interference may arise as a result of add-on equipment which may not necessarily meet the required standards. As such interference can result in serious malfunction of the unit and/or create unsafe situations, you must observe the following:

- Ensure that each piece of non-SHIBAURA equipment fitted to the tractor bears the CE mark.
- The maximum power of emission equipment(radio,telephones,etc.) must not exceed the limits imposed by the national authorities of the country where you use the tractor.
- The electro-magnetic field generated by the add-on system should not exceed 24V/m at any time and at any location in the proximity of electronic components.

Failure to comply with these rules will render the SHIBAURA warranty null and void.

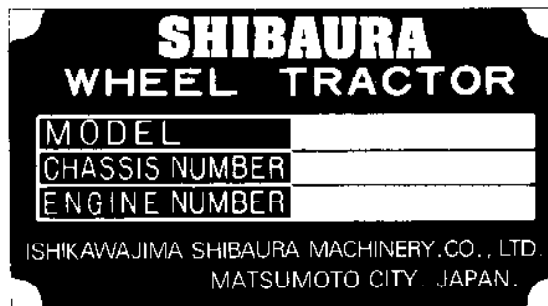
GENERAL INFORMATION

PLEASE READ CAREFULLY:

For a complete list of the pre-delivery service checks performed by your dealer, refer to the PRE-DELIVERY SERVICE check list found at the back of this manual. Keep one copy as your record of the service performed. The other should be removed from the manual and kept by your dealer. MAKE SURE THAT BOTH COPIES ARE COMPLETED AND THAT YOU AND THE DEALER SIGN BOTH COPIES.

After you have operated your tractor for fifty hours, take this manual and your tractor to your dealer. He will then perform the factory recommended 50-HOUR SERVICE as listed on the lower portions at the back of this manual — without charge — except for lubricant, oil, or filters replaced as part of normal maintenance. MAKE SURE THAT YOU AND THE DEALER SIGN BOTH COPIES.

A PRODUCT IDENTIFICATION PLATE is located on the right-hand side of the front frame. The numbers on the plate are important should your tractor require future service. For your convenience, have your dealer record the numbers in the appropriate spaces below.



SHIBAURA policy is one of continuous improvement, and the right to change prices, specification or equipment at any time without notice is reserved.

All data given in this manual is subject to production variations. Dimensions and weights are approximate only and the illustrations do not necessarily show tractors in standard condition. For exact information about any particular tractor please consult your SHIBAURA Tractor Dealer.

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INTERNATIONAL SYMBOLS

As a guide to the operation of your tractor, various international symbols have been utilized on the instruments and controls. The symbols are shown below with an indication of their meaning.

	Engine Speed		Diesel Fuel		Read Operator's Manual
	Hours Recorded		Glow		Battery
	Engine Water Temperature		Engine Stop		Power Take-off (ON)
	Air Filter		Engine Oil		Power Take-off (OFF)
	Engine Oil Pressure		Engine Start		"Tortoise"-Slow or Minimum Setting
	Hazard Warning		Parking Brake		"Hare,"-Fast or Maximum Setting
	Axle Connect		Lights (Upper Beam)		Warning
	Axle Disconnect		Lights (Lower Beam)		Control Lever Operating Direction
	Continuously Variable		Lock		Rock Shaft (Raised)
	Increase		Release Lock		Rock Shaft (Lowered)
	Decrease		Up		Remote Cylinder (Float)
	Fuel Level		Down		Remote Cylinder (Retracted)
	Creeper Range		Differential Lock		Remote Cylinder (Extended)
	High Range		Raise ROPS		Forward
	Middle Range				Horn
	Low Range				
	Neutral				

SAFETY PRECAUTIONS

The following precautions are suggested to help prevent accident

PERSONAL SAFETY

Throughout this manual and on machine decals, you will find precautionary statements ("CAUTION", "WARNING", and "DANGER") followed by specific instructions. These specifications are intended for the personal safety of you and those working with you. Please take the time to read them.



The word "CAUTION" is used where a safe behavioral practice according to operating and maintenance instructions and common safety practices will protect the operator and others from accident involvement.



The word "WARNING" denotes a potential or hidden hazard, which has a potential for serious injury. It is used to warn operators and others to exercise every appropriate means to avoid a surprise involvement with machinery.



The word "DANGER" denotes a forbidden practice in connection with a serious hazard.

Failure to follow the "CAUTION", "WARNING", and "DANGER" instructions may result in bodily injury or death.

MACHINE SAFETY

Additional precautionary statements ("ATTENTION", and "IMPORTANT") are followed by specific instructions. These statements are intended for machine safety.

ATTENTION: The word "ATTENTION" is used to warn the operator of potential machine damage if a certain procedure is not followed.

IMPORTANT: The word "IMPORTANT" is used to inform the reader of something he needs to know to prevent minor machine damage if a certain procedure is not followed.

A careful operator is the best operator. Most accidents can be avoided by observing certain precautions. Read and take the following precautions before operating this tractor to help prevent accidents. Equipment should be operated only by those who are responsible and instructed to do so.

SAFETY AND THE TRACTOR

1. Read the Operator's Manual carefully before using the tractor. Lack of operating knowledge can lead to accidents.
2. Use an approved Roll bar and Seat Belt for safe operation. Overturning a tractor without a roll bar can result in death or injury. If your tractor is not equipped with a rollbar and seat belt, see your SHIBAURA Tractor Dealer.
3. Use the handholds and step plates when getting on and off the tractor to prevent falls. Keep steps and platform cleared of mud and debris.
4. Do not permit anyone but the operator to ride on the tractor. There is no safe place for extra riders.
5. Keep all safety decals clean of dirt and grime, and replace all missing, illegible, or damaged safety decals. See the list of decals in the Decal section of this manual.

SERVICING THE TRACTOR

1. The cooling system operates under pressure, which is controlled by the radiator cap. It is dangerous to remove the cap while system is hot. Always turn cap slowly to the first stop and allow the pressure to escape before removing the cap entirely.
2. Do not smoke while refueling the tractor. Keep any type of open flame away. Wait for engine to cool before refueling.

SAFETY PRECAUTIONS

The following precautions are suggested to help prevent accident

3. Keep the tractor and equipment, particularly brakes and the steering, maintained in a reliable and satisfactory condition to ensure your safety and comply with legal requirements.
4. Keep open flame away from battery or cold weather starting aids to prevent fires or explosions. Use jumper cables according to instructions to prevent sparks, which could cause explosion.
5. Stop the engine before performing any service on the tractor.
6. Escaping hydraulic/diesel fluid under pressure can penetrate the skin causing serious injury. If fluid is injected into the skin, obtain medical attention immediately or gangrene may result.
- * **DO NOT** use your hand to check for leaks. Use a piece of cardboard or paper to search for leaks.
- * Stop **engine** and relieve pressure before connecting or disconnecting lines.
- * Tighten all connections before starting engine or pressurizing lines.
7. Do not modify or alter or permit anyone else to modify or alter this tractor or any of its components or any tractor function without first consulting SHIBAURA Tractor Dealer.
8. The fuel oil in the injection system is under high pressure and can penetrate the skin. Unqualified persons should not remove or attempt to adjust a pump, injector, nozzle or any other part of the fuel injection system. Failure to follow these instructions can result in serious injury.
9. Continuous long term contact with used engine oil may cause skin cancer. Avoid prolonged contact with used engine oil. Wash skin promptly with soap and water.
10. Some components on your tractor, such as gaskets and friction surfaces (brake linings, clutch linings etc.), may contain asbestos. Breathing asbestos dust is dangerous to your health. You are therefore advised to have any maintenance or repair operations on such components carried out by an authorized SHIBAURA Tractor Dealer. If however, service operations are to be undertaken on parts that contain asbestos, the essential precautions listed below must be observed:
 - * Work out of doors or in a well-ventilated area.
 - * Dust found on the tractor or produced during work on the tractor should be removed by extraction not by blowing.
 - * Dust waste should be dampened, placed in a sealed container and marked to ensure safe disposal.
 - * If any cutting, drilling, etc., is attempted on materials containing asbestos, the item should be dampened and only hand tools or low speed power tools used.

OPERATING THE TRACTOR

1. Apply the parking brake, place the PTO lever in the "OFF" position, the lift control lever in the down position, the remote control valve levers in the neutral position, and the transmission in neutral before starting the tractor.
2. Do not start the engine or operate controls while standing beside the tractor. Always sit in the tractor seat when starting the engine or operating controls.
3. Do not bypass the neutral start switches. Consult your SHIBAURA Tractor Dealer if your neutral start controls malfunction. Use jumper cables only in the recommended manner. Improper use can result in tractor runaway.
4. Avoid accidental contact with the gear shift levers while the engine is running. Unex-

SAFETY PRECAUTIONS

The following precautions are suggested to help prevent accident

- pected tractor movement can result from such contact.
5. Disengage PTO, shut off the engine and apply the parking brake before getting off the tractor.
 6. Do not park the tractor on a steep incline.
 7. Do not operate the tractor engine in an enclosed building without adequate ventilation. Exhaust fumes can cause death.
 8. If power steering or engine ceases operating, stop the tractor immediately.
 9. Pull only from the drawbar or the lower link drawbar in the down position. Use only a drawbar pin that locks in place. Pulling from the tractor rear axle or any point above the axle may cause the tractor to upset.
 10. If the front end of the tractor tends to rise when heavy implements are attached to the three-point hitch, install front end or front wheel weights. Do not operate the tractor with a light front end.
 11. Always set the hydraulic selector lever in position control when attaching equipment and when transporting equipment. Be sure hydraulic couplers are properly mounted and will disconnect safely in case of accidental detachment of implement.
 12. Do not leave equipment in the raised position.
 13. Use the Flasher/Turn Signal Lights and SMV signs when traveling on public roads both day and night unless prohibited by law.
 14. Be sure tractor lights are adjusted to prevent blinding an oncoming vehicle operator.
 2. To avoid upsets drive the tractor with care and at speeds compatible with safety, especially when operating over rough ground, when crossing ditches or slopes, and when turning corners.
 3. Lock tractor brake pedals together when transporting on roads to provide two wheel braking.
 4. Keep the tractor in the same gear when going downhill as used when going uphill. Do not coast or free wheel down hills.
 5. Any towed vehicle whose total weight exceeds that of the towing tractor must be equipped with brakes for safe operation.
 6. When the tractor is stuck or tires are frozen to the ground, back up the tractor to prevent upset.
 7. Always check overhead clearance, especially when transporting the tractor.
 8. When operating at night, adjust lights to prevent blinding an oncoming driver.

OPERATING THE PTO

9. When operating PTO driven equipment, shut off the engine and wait until the PTO stops before getting off the tractor and disconnecting the equipment.
10. Do not wear loose clothing when operating the power take off, or when near rotating equipment.
11. When operating stationary PTO driven equipment, always place both gear shift levers in neutral, apply the tractor parking brake and block the rear wheels front and back.

DRIVING THE TRACTOR

1. Watch where you are going especially at row ends, on roads, around trees and low hanging obstacles.
12. To avoid injury, do not clean, adjust, unclog or service PTO driven equipment when the tractor engine is running.

SAFETY PRECAUTIONS

The following precautions are suggested to help prevent accident

13. Make sure the PTO master shield is installed at all times and always replace the PTO shield cap when the PTO is not in use.

SAFETY PRECAUTIONS

The following precautions are suggested to help prevent accident

DIESEL FUEL

1. Under no circumstances should gasoline, alcohol or blended fuels be added to diesel fuel. These combinations can create an increased fire or explosive hazard. Such blends are more explosive than pure gasoline in a closed container such as a fuel tank. Do not use these blends.
2. Never remove the fuel cap or refuel with the engine running or hot.
3. Do not smoke while refueling or when standing near fuel.
4. Maintain control of the fuel filler pipe nozzle when filling the tank.
5. Do not fill the fuel tank to capacity. Allow room for expansion.
6. Wipe up spilled fuel immediately.
7. Always tighten the fuel tank cap securely.
8. If the original fuel tank cap is lost, replace it with a SHIBAURA approved cap. A non-approved, proprietary cap may not be safe.
9. Keep equipment clean and properly maintained
10. Do not drive equipment near open fires.
11. Never use fuel for cleaning purposes.
12. Arrange fuel purchases so that summer grade fuels are not held over and used in the winter.

SAFETY FRAME (ROPS)

If your SHIBAURA Tractor is equipped with a safety frame it must be maintained in a serviceable condition. Be careful when driving through doorways or working in confined spaces with low headroom.

Under no circumstances:

1. modify, drill or alter the safety frame in any way as doing so could render you liable to legal prosecution.
2. attempt to straighten or weld any part of the main frame or retaining brackets which have suffered damage. By doing so you may weaken the structure and endanger your safety.
3. secure any parts on the main frame or attach your safety frame with other than the special high tensile bolts and nuts specified.
4. attach chains or ropes to the main frame for pulling purposes.
5. take unnecessary risks even though your safety frame affords you the maximum protection possible.

CONTROLS, INSTRUMENTS AND OPERATIONS

SEAT, ROPS AND MIRROR

Seat Adjustment

Your SHIBAURA Tractor is equipped with an adjustable suspension seat as shown in Figure 1.

To adjust the seat fore and aft, move the release lever ①, towards the fender, slide the seat to the desired position, releasing the lever to lock.

The seat height is controlled variably by the knob ②. While sitting in the seat, turn it clockwise to increase the height, or turn it counterclockwise to reduce the height.

To adjust the seat suspension for individual operators ; with moving the Lever ③ straight up, turn it clockwise to be for more (+) and turn it counter-clockwise to be for less (-).



Figure 1 - Tractor Seat Adjustment

- ① Fore/aft Lever ② Height Adjuster knob
③ Flotation Adjuster Lever

Mirror Adjustment

Your tractor equipped with a mirror.

The mirror can be moved fore/aft or outside/inside as desired, in Figure 2.

To adjust the mirror, move the arm fore/aft or loosen the screw tightened clamp for repositioning the mirror.



Figure 2 - Mirror Adjustment

CONTROLS, INSTRUMENTS AND OPERATIONS

ROLLOVER PROTECTIVE STRUCTURE(ROPS)

Your tractor is equipped with a foldable Roll Over Protective Structure(ROPS). If, for some reason, the ROPS was deleted by the original purchaser or has been removed, it is recommended that you equip your tractor with a ROPS.

ROPS are effective in reducing injuries during tractor overturn accidents. Overturning tractor without a ROPS can result in serious injury or death.

Roll Over Protective Structure (ROPS), is available from your SHIBAURA Tractor Dealer.



WARNING : When improperly operated, a tractor can roll over. For low clearance use only, the ROPS may be lowered. No protection is provided when the tractor is operated with the ROPS in the lowered position. Always raise the ROPS and lock it immediately after low clearance work.



Figure 3 - Rollover Protective Structure (ROPS)

Folding the ROPS

A foldable ROPS is factory installed on your tractor. Operate with ROPS in the raised position whenever possible. Use the ROPS in the folded position only when absolutely necessary.

To fold the ROPS remove two lock pins, Figure 4, Lower the upper of the ROPS rearward.

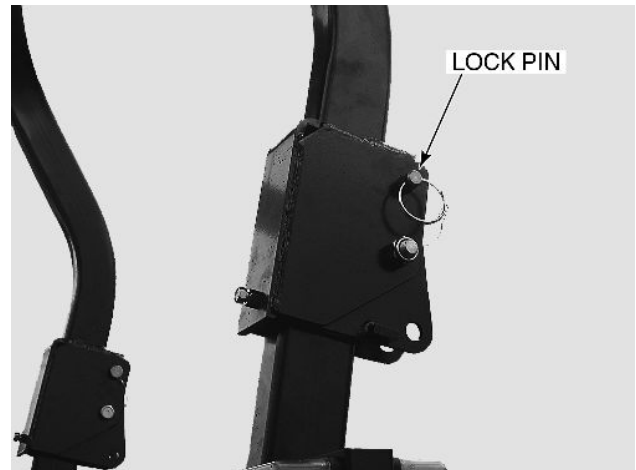


Figure 4 - ROPS, Raised Position

Install two lock pins to anchor the ROPS firmly once in position. To raise the ROPS reverse the above procedure.



Figure 5 - ROPS, Folded Position



WARNING : Do not operate the tractor with the ROPS folded as a standard operating mode. A folded ROPS does not provide rollover protection.

Always pull from the tractor the drawbar. Do not attach chains or ropes to the ROPS for pulling purposes since the tractor can tip backwards.

CONTROLS, INSTRUMENTS AND OPERATIONS

LIGHTING—European Type

HAZARD FLASHER WARNING LIGHTS AND COMBINATION SWITCH

Your SHIBAURA tractor is equipped with hazard light, Figure 6. The light switch must be turned to the "ON" position before the hazard light will operate.

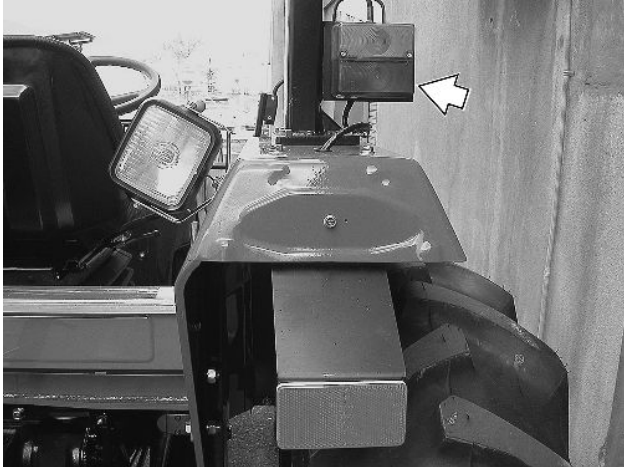


Figure 6 - Hazard Flasher and Turn Signal Lights

Lighting Switches

Your tractor is equipped with a combination switch ①, operating turn signals, hazard lights and the horn. The main lighting switch ②, is mounted on the left side of the instrument console.

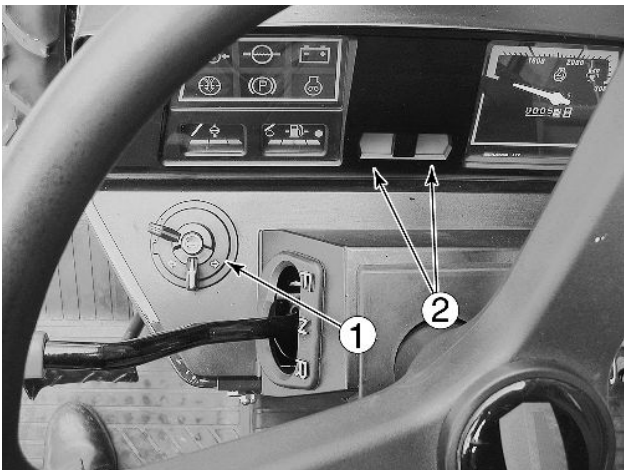


Figure 7A - ①Combination Switch
②Flasher Warning Lights

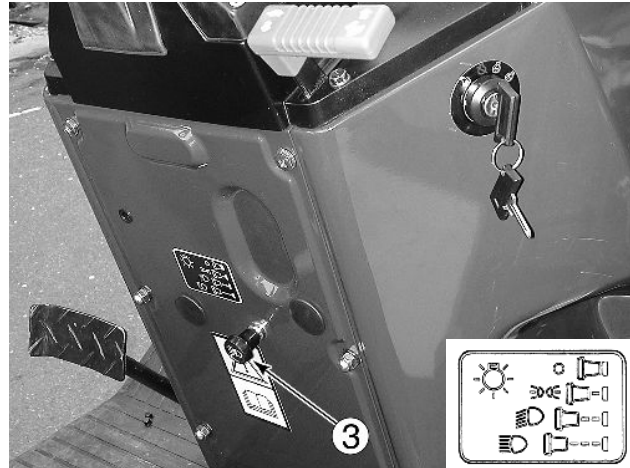


Figure 7B - ③Main Lighting Switch

Combination Switch

The turn signal lights are activated by moving the switch to the left or right as required. The turn signal switch is not self-canceling. To operate the hazard function, move the hazard flasher switch, clockwise to activate all four indicator lights. Depressing the center button will sound the horn.

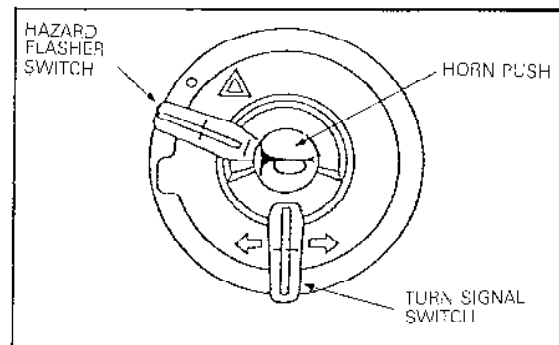


Figure 8 - Combination Switch

CONTROLS, INSTRUMENTS AND OPERATIONS

MAIN LIGHTING SWITCH

The main lighting switch, shown in Figure 7B, is a pull-push type switch. Its positions are :

- 1st position.....Lights "OFF"
- 2nd position.....Side and Tail Lights "ON"
- 3rd position.....Side, Tail and Headlights "ON"
(Low Beam)
- 4th position.....Side, Tail and Headlights "ON"
(High Beam)

Trailer Turn Indicator Light

The warning light ②, Figure 7A, will flash when the lever is moved to the right-hand or left-hand, in union with tractor/trailer turn signals if trailer is attached.

LIGHTING—Asian Type

FLASHER WARNING LIGHT

Your SHIBAURA tractor is equipped with flasher warning lights, Figure 9. The switch, Figure 10 for the warning lights is located on the instrument panel.

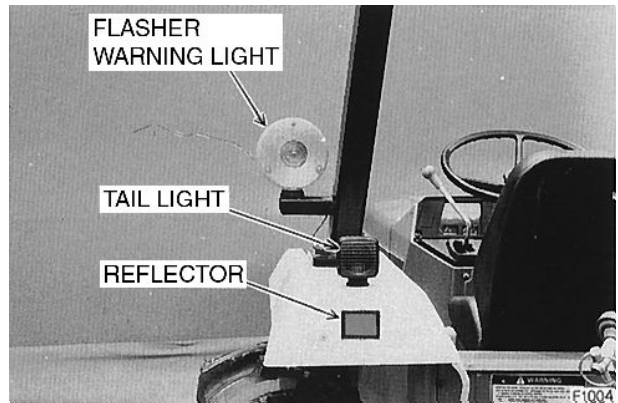


Figure 9 - Flasher Warning and Tail Lights

The light switch must be turned in one of the "ON" positions before the flasher will operate.

For your protection, use the flasher warning lights and the SMV emblem when traveling on public roads, day or night.

COMBINATION SWITCH

The light switch, shown in Figure 10, is a dial type switch. Its positions are ;

Turning counter-clockwise.....OFF

Turning clockwise to

the 1st position Headlights (High Beam) ON

Turning further clockwise to

the 2nd position Headlights (Low Beam) ON

Turn-signal light (Flasher Warning light) will come on when the switch turned upward or downward.

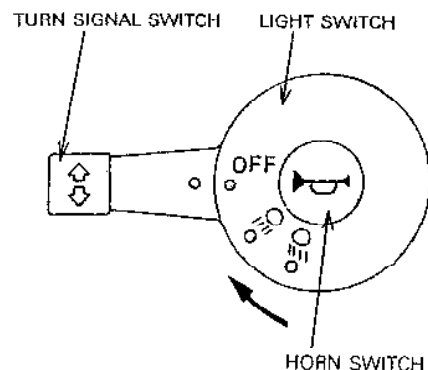


Figure 10 - Combination Switch

CONTROLS, INSTRUMENTS AND OPERATIONS

INSTRUMENT PANEL

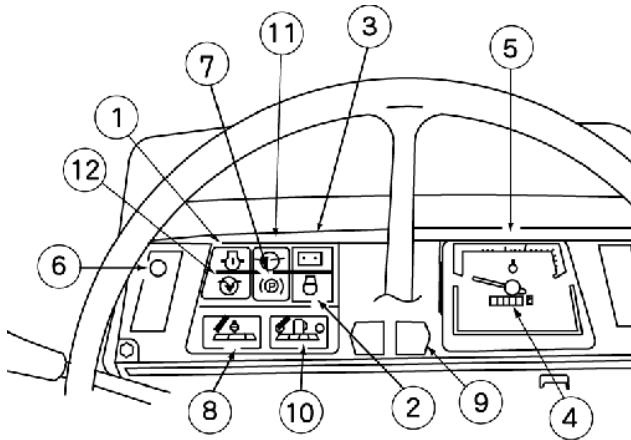


Figure 11 - Instrument Panel

- ① **Engine Oil Pressure Warning Light** - Illuminates with the key switch in the "ON" or "HEAT" positions and remains lit for a short period of time after the engine is started. The light indicates oil pressure only and goes out when sufficient oil pressure is present at the oil sender. If the bulb becomes lit during operation, stop the tractor engine immediately and investigate the cause.
- ② **Cold Starting Indicator Light** - Illuminates when the key switch is turned to the "HEAT" position. It remains lit for approximately 5 seconds when the key is held in position, during which time the glow plugs are heating the pre-combustion chambers.
- ③ **Battery Charge Warning Light** - Illuminates when the key switch is in the "ON" or "HEAT" positions and goes out when engine is started. If this bulb becomes lit during operation, it indicates the charging system is not operating normally. As the battery can become fully discharged under these conditions, the problem should be investigated as soon as possible.
- ④ **Proof Meter** - Records the hours and portions of hours that your tractor has been operated based on an average engine speed of 1883 RPM. Use the proof meter as a guide to determine hourly service maintenance intervals.
- ⑤ **Tachometer** - Registers engine RPM (Revolutions Per Minute). The gauge is marked in increments of 100 and will return to zero when the engine is not running.
- ⑥ **High Beam Indicator** - Illuminates when the head-lights are switched to main beam.
- ⑦ **Parking Brake Light** - Illuminates if the parking brake is engaged when the key switch is turned from "OFF" position.
- ⑧ **Fuel Gauge** - Indicates the amount of diesel fuel when the key switch is in the "ON" or "HEAT" positions. It will register empty with the key switch in the "STOP" position.
- ⑨ **Turn Indicator Warning Lights** - Flash in unison with the turn signal warning light when the lever is moved to the right-hand or left-hand.
- ⑩ **Temperature gauge** - Indicates coolant temperature. It is activated when the key switch is turned to the "ON" or "HEAT" positions. The gauge will register cold with the key switch in the "STOP" position. If the needle registers in the green range, this indicates a normal operating temperature. If the needle moves to the red portion of the gauge, this indicates an overheated condition. Stop the tractor engine immediately and investigate the cause.
- ⑪ **Coolant level warning light** - The warning light is not on under normal operating conditions. If the light comes on, stop the engine and investigate. Regularly check the radiator for proper coolant level.
- ⑫ **Air cleaner warning light** - This is an indication that the air cleaner element is clogged. Disassemble the air cleaner, and clean. Refer to page 40.

CONTROLS, INSTRUMENTS AND OPERATIONS

KEY SWITCH

The key switch is shown in Figure 12.

Turning the key to the left, "HEAT" position will activate the cold start aid.

Turning the key to the right, "ON" position will activate the indicator lights and instruments.

Turning the key further right to the "START" position will start the engine. Upon release, the key will spring return to the "ON" position.

To stop the engine, turn the key to the "OFF" position.

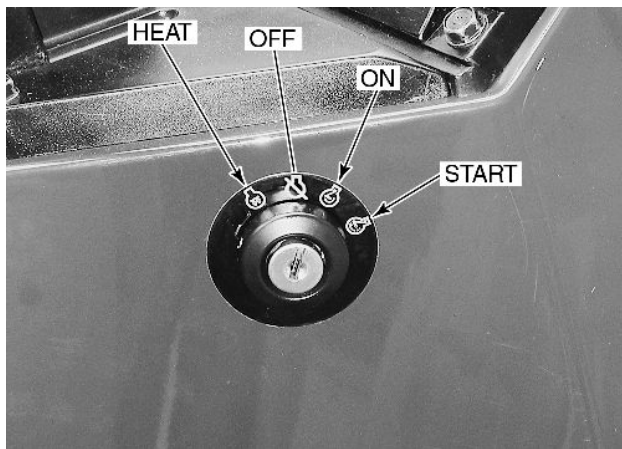


Figure 12 - Key Switch

IMPORTANT : The key switch must remain in the ON position while operating the engine. The warning lights and battery charging system will not function with the switch in the OFF position.

PRE-HEATING THE ENGINE

Your tractor has a diesel engine. Before starting a cold engine, the pre-combustion chambers must be heated.

To preheat the engine, turn the key switch to the "HEAT" position, Figure 12 and hold the key in this position for approximately 5 seconds. The glow plugs heat the combustion chambers during this time, and the engine will now be ready to start.

NOTE: When ambient temperature are colder, a longer preheat time may be necessary. Even after the cold start indicator light has gone out, the glow

plugs will continue to heat if the key is held in the "HEAT" position.



WARNING : Do not use ether with the thermostat starting aid.

STARTING THE ENGINE

The safety key switch allows activation of the starting motor only when:

1. The transmission main shift lever is in the NEUTRAL position, in Figure 13.
2. The clutch control lever is in the OFF position.

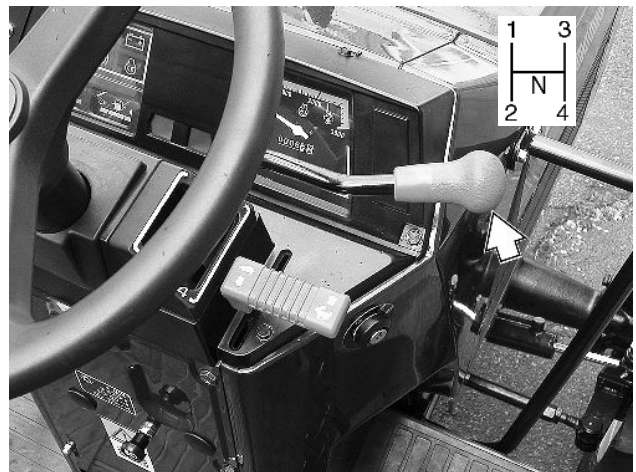


Figure 13 - Transmission Main Shift Lever

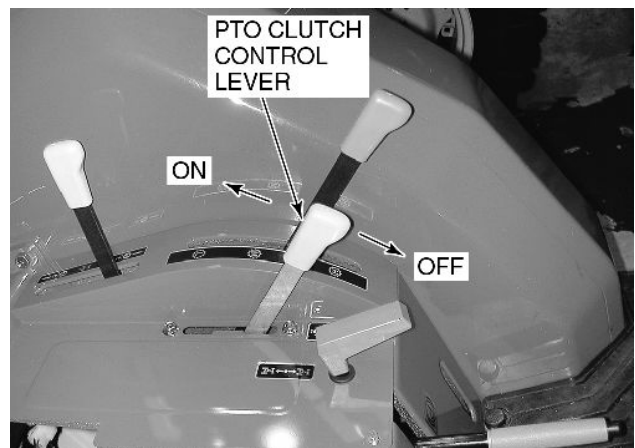


Figure 14 - PTO Clutch Control Lever

CONTROLS, INSTRUMENTS AND OPERATIONS

Always use safety practices when starting your tractor. Position the hand throttle rearward so that it is one-fourth to one-third open when starting the tractor. After starting return the throttle to the idle position and allow the engine to idle for 1 minute before operating the tractor.



WARNING : Never attempt to start the engine while standing beside the tractor—always sit in the seat when starting the engine.

IMPORTANT : Never turn the key to the “START” position when the engine running. Doing so may cause starting motor failure.

IMPORTANT : Do not engage the starting motor continuously for more than 30 seconds ; doing so may cause starting motor failure.

NOTE : A coolant immersion heater which provides for easier starting in temperatures below 0° F (−17.7°C) by warming the engine oil and coolant, is available as a dealer installed option.

STARTING THE TRACTOR WITH JUMPER CABLES



WARNING : Start engine only from the operator’s seat.

If it is necessary to use jumper cables to start the tractor, follow the instructions below.

1. Shield eyes.
2. Connect one end of the jumper cable to the tractor battery positive (+) terminal and the other to the auxiliary battery positive (+) terminal. Connect one end of the other cable first to the auxiliary battery negative (−) terminal, and the other end to the tractor starter ground terminal. Follow the starting procedures indicated previously above.

Idle the engine and turn on all electrical equipment (lights, etc.), then disconnect the cables in reverse order of the connecting procedure above. This will help protect the alternator from damage due to extreme load changes.



WARNING : Batteries contain sulfuric acid and produce explosive gases. Follow the instructions below to prevent personal injury.

- Wear eye and skin protection.
- Keep sparks and flame away.
- Always have adequate ventilation while charging or using the battery.
- Follow the battery manufacturer’s instructions shown on the battery.

STOPPING THE ENGINE

Push the hand throttle fully forward and turn the key switch, Figure 12, to the “OFF” position to stop the engine.

IMPORTANT : Failure to turn the key switch to the “OFF” position after the engine has stopped will allow the warning lights to remain on, causing the battery to discharge.

CONTROLS, INSTRUMENTS AND OPERATIONS

BREAK-IN PROCEDURES

Your SHIBAURA Tractor will provide long and dependable service if given proper care during the 50 hour break-in period. During the first 50 hours of operation :

1. Avoid “lugging” the engine. Operating in too high a gear under heavy load may cause engine “lugging”, which is indicated when the engine will not respond to a throttle increase.
2. Use the lower gear ratios when pulling heavy loads and avoid continuous operation at constant engine speeds. You will save fuel and minimize engine wear by selecting the correct gear ratio for a particular operation. Operating the tractor in low gear with a light load and high engine speed will waste fuel.
3. Avoid prolonged operation at either high or low engine speeds without a load on the engine.
4. Check the instruments frequently and keep the radiator and oil reservoirs filled to their recommended levels. Daily checks include :
 - Engine oil level
 - Radiator coolant
 - Air cleaner
5. After the first 50 hours of use, be sure to perform the maintenance chart, on Page **34**.

ELECTRICAL SOCKET for Trailer

A standard seven pin socket, Figure **15**, is provided mounted on the left side of the tractor at the rear. With reference to the picture inset, the socket connections (as viewed from the rear of the tractor) are as follows;

Pin No.	Wire Colour	Circuit
①	Green/Red	L.H. Turn Signal
②		Not Used
③	Black	Earth(Ground)
④	Green/White	R.H. Turn Signal
⑤	Red	R.H. Parking Light
⑥	Green/Purple	Stop Lights
⑦	Red/Black	L.H. Parking Light

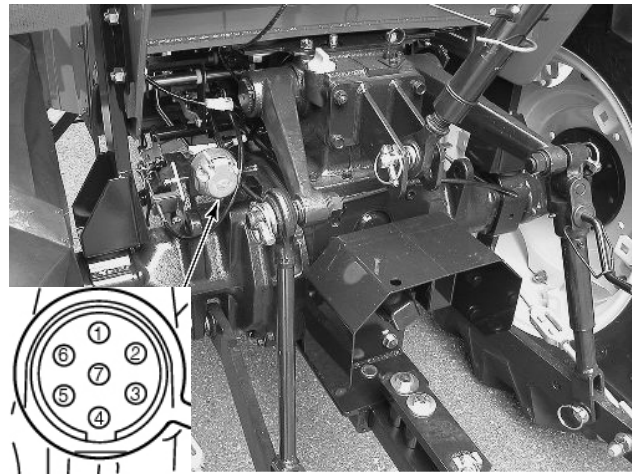


Figure 15 - Seven Pin Electrical Socket

CONTROLS, INSTRUMENTS AND OPERATIONS

THROTTLE CONTROLS

HAND THROTTLE AND ENGINE STOP CONTROL

The hand throttle is shown in Figure 16. Push the throttle forward to increase engine rpm. Pull the throttle rearward to decrease engine rpm.



Figure 16 - Hand throttle

FOOT THROTTLE

The foot throttle, shown in Figure 17, can be used separately, or in conjunction with the hand throttle. With the hand throttle control lever set at a selected engine rpm, the foot throttle can be used to increase engine rpm to its maximum speed. Upon release of the foot throttle, the engine speed will return to the rpm at which the hand throttle has been set, or idle if the hand throttle is not at a pre-set position.

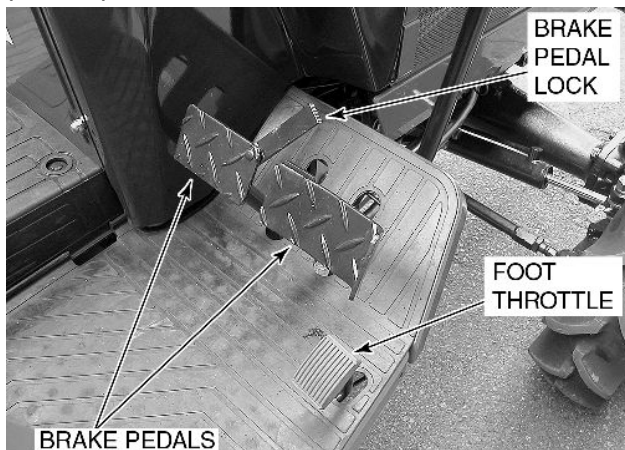


Figure 17 - Foot throttle and Brake Controls

BRAKE CONTROLS

BRAKE PEDALS

The brake pedals are shown in Figure 18. The right brake pedal is used to brake the right rear wheel. The left pedal is used to brake the left rear wheel. Depress both pedals simultaneously to stop the tractor.



WARNING : When operating the tractor at high speeds, never attempt to make sharp turns by using the brakes.

BRAKE PEDAL LOCK

The brake pedal lock, shown in Figure 18, is used to secure the brake pedals together. Lock the pedals together whenever the tractor is operated at high speeds and at any time the tractor is used on the highway.



Figure 18 - Brake Pedal Lock

CONTROLS, INSTRUMENTS AND OPERATIONS

HYDRAULIC LIFT SYSTEM

SINGLE LEVER HYDRAULIC LIFT SYSTEM (Standard)

The hydraulic lift system provides accurate, smooth, and instant hydraulic power for raising a variety of compatible equipment whenever the engine is running. The position control feature of the system maintains the selected height or depth of three point linkage equipment in relation to the tractor. When the hydraulic lift control lever is moved to a higher or lower setting in the quadrant, the system repositions the equipment to a higher or lower position and maintains the selected position, Figure 34.

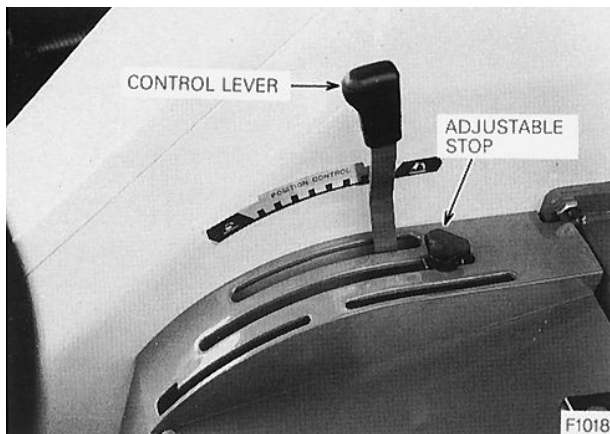


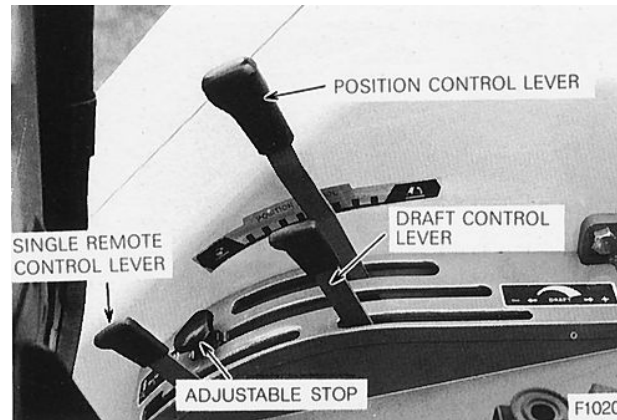
Figure 34 – Hydraulic Lift System Control

TWO LEVER HYDRAULIC LIFT SYSTEM WITH DRAFT AND POSITION CONTROL (Optional)

If your tractor is equipped with the optional Two Lever Control System shown in Figure 35, there are two modes of Hydraulic Lift System operation — Position Control or Draft Control — that can be selected to satisfy operating conditions for the implement being used.



WARNING : Make sure the area is clear of people before lowering equipment.



(Pedals and Position)

POSITION CONTROL

When operating in position control, there is a definite relationship between the position of the control lever in the quadrant and the position of the equipment. The lever must be moved to change the position of the equipment relative to the tractor. The system will automatically maintain the equipment in the selected position.

Position control provides easy, accurate control of three-point linkage equipment that operates above the ground ; such as sprayers, rakes, mowers, etc. It also provides a uniform depth when using a blade or similar equipment on level ground.

The position control lever is used to raise and lower the equipment.

DRAFT CONTROL

When operating in draft control, the draft control lever is used to adjust sensitivity to draft loads. Once the lever is positioned, the hydraulic lift system will automatically adjust the depth of the equipment to maintain an even load on the tractor as soil conditions vary. The hydraulic system senses draft-changes through changes in upper link compression. The operation of the upper link draft sensing system is described in the following paragraph.

CONTROLS, INSTRUMENTS AND OPERATIONS

Upper Link Compression Loads : As the equipment is pulled through the soil, the draft caused by soil resistance tends to rotate the equipment upward around the lower link hitch points. This draft creates a pushing or compressive force on the upper link. When changes in soil resistance cause the draft to increase, the compression force on the upper link will also increase. These changes in upper link compression, signal the hydraulic system through internal linkage, to raise the equipment slightly to maintain uniform draft.



WARNING : Always lower the hydraulic lift and all other hydraulic equipment before stopping the tractor.

SHIBAURA tractors having the Hydraulic Draft Control option are equipped with two lever hydraulic lift control systems. The operation of each system is described below :

TWO LEVER CONTROLS

POSITION CONTROL OPERATION

The two lever control system is shown in Figure 35. Position control is obtained by placing the draft control lever all the way forward and then moving the position control lever to position the equipment as desired. The front (position) lever is used to set the desired working height or depth.

DRAFT CONTROL OPERATION

Draft control is obtained by placing the position control lever in the forward position. Use the draft control to adjust the draft setting (the lift system will automatically maintain the selected draft as described above).

OPERATING IN BOTH POSITION AND DRAFT CONTROL

The position control may be used together with the draft control as follows :

1. Set the position control lever at the maximum desired implement depth. The hydraulic system will not lower the implement below the preselected depth. (This will also prevent “diving” which may be encountered with light equipment, such as a rear blade, when grading or backfilling.)

2. Adjust the draft control lever for the maximum draft load (pull) desired.

The hydraulic lift system will now provide normal draft response within the range set by the position control. This adjustment provides more uniform depth while maintaining an even pull in widely varying soil conditions.



WARNING : Make sure the area is clear of people before lowering equipment.

HYDRAULIC LIFT ROCKER

The hydraulic lift rocker, Figure 36, has two holes for attaching the upper link, Attach the link in the lower hole for light draft loads (cultivating) and in the top hole for heavier draft loads (plowing) shown.

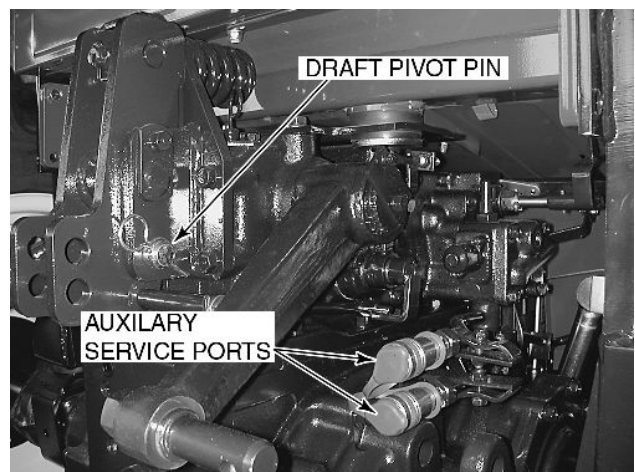


Figure 36 - Hydraulic Lift Rocker

NOTE : Fix the draft-arm with pin, Figure 36, when operating equipment without draft control.

CONTROLS, INSTRUMENTS AND OPERATIONS

FLOW CONTROL VALVE

The flow control valve, Figure 37, provides an adjustment to regulate the flow of oil from the lift cylinder, thus slowing or increasing the rate of drop of the lower links.

To adjust rate of flow, either turn the flow control valve clockwise to decrease the rate of drop or counterclockwise to increase the rate of drop. The flow control valve must be opened before hydraulic lift control will function.



Figure 37 - Flow Control Valve

HYDRAULIC MANIFOLD BLOCK/DIVERTER

The hydraulic Manifold Block is provided to supply hydraulic oil to equipment such as a front loader, dozer blade, etc. Location of the Block is shown in Figure 38.

To operate auxiliary equipment, remove the plugs from the manifold block and connect the feed hose to the outlet port, Figure 38 and the return hose to the inlet port.

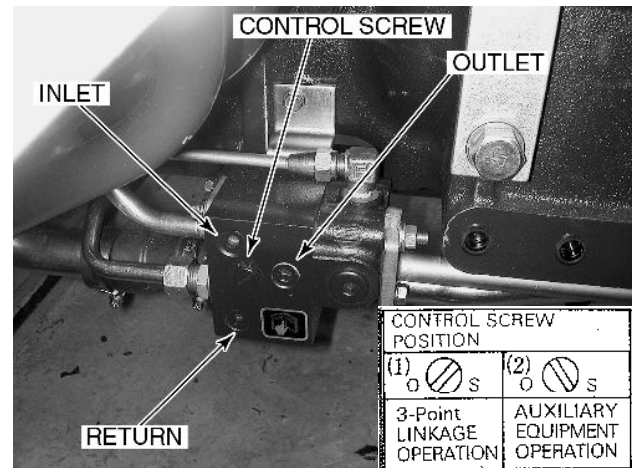


Figure 38 - Hydraulic Manifold Block

IMPORTANT : In order to operate auxiliary equipment, the control screw must be turned to the position shown at (2). With a front remote valve installed, it is **not** required to turn the control screw to the position shown at (1) to operate the three point linkage. When it is required to operate the three point linkage **only**, the screw must be turned to the position shown at (1).

CONTROLS, INSTRUMENTS AND OPERATIONS

REAR REMOTE CONTROL VALVES (Optional)

Rear remote control valve

Your tractor can be equipped with single/double acting remote control valve.

The remote valve may be changed with control screw turning on the valve.

The remote control lever is located on the right-hand quadrant, shown in Figure 39.

To operate the remote valve, pull the remote control lever rearward to extend the cylinder.

Push the remote control lever forward to retract the cylinder. Release the control lever to stop the cylinder in any position.

In the case of single acting remote valve, release the control lever to stop the cylinder in any position. before it is fully extended, the lever automatically returns to the Neutral.

The rear remote are standard with 3/8" quick couplers, in Figure 40.



Figure 39 - Rear remote Control Valve (Optional)

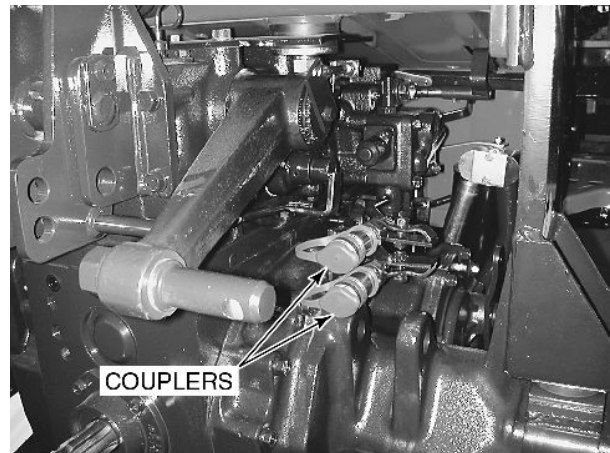


Figure 40 - Hydraulic Coupler

CONTROLS, INSTRUMENTS AND OPERATIONS

TWO-SPOOL CONTROL VALVE (OPTIONAL)

The optional two-spool control valve is mounted on the right side of the clutch housing beside the engine hood. This valve is used mainly for front end loader operation, but may also be used to operate other front-mounted implements.

With loader fitted, pull the control lever rearwards to the loader arms and push forwards to lower them. Moving the lever to the right will "dump" the bucket to the dig position.

NOTE : When the control lever is pushed right to the second position, a regenerative feature is activated and the exhaust oil from one end of the cylinder is transferred to the other end of the cylinder. When this feature is used, the cylinder will operate at a faster rate. This regenerative feature cannot be used with single-acting cylinders.

Push the control lever forward or pull it sideways to the left to retract the cylinder. Release the control lever to stop the cylinder in any position before it is fully extended. The lever automatically returns to Neutral. Fully forward past the detent position is a "FLOAT" position which allows a cylinder to extend or retract freely. The simultaneous operation of two services may be achieved by moving the lever diagonally.



WARNING : Before disconnecting cylinders or equipment, make certain that the implement or equipment is supported securely.



WARNING : Remote couplers must be properly mounted and securely fastened to tractor mounting bracket for proper function of safety disconnect feature.

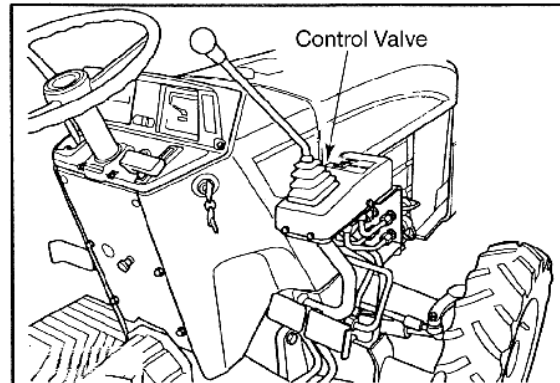
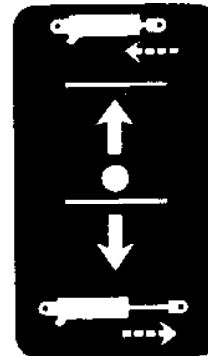


Figure 41 - Two- spool Control Valve (Optional)

Single Spool



Double Spool

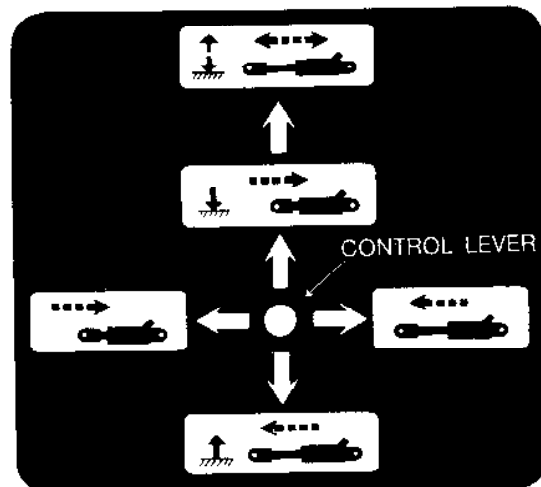


Figure 42 - Operating Two-spool Control Valve

CONTROLS, INSTRUMENTS AND OPERATIONS

DRIVING THE TRACTOR

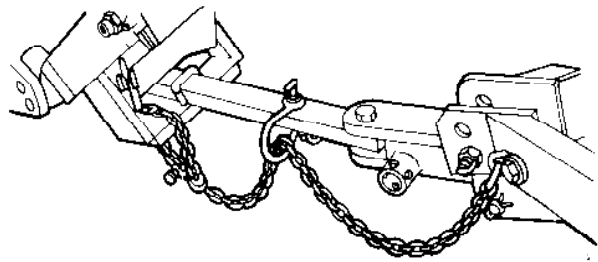


WARNING : Observe the following precautions when driving the tractor.

- Watch where you are going—especially at row ends, on roads, and around trees.
- Keep the tractor in gear when going down hill. Use a low gear to maintain control with minimum braking.
- If the tractor is stuck, back out to prevent upsetting the unit.
- Always use the drawbar for pull-type work. Do not pull from any other part of the tractor, especially ROPS since it may tip backward.
- Keep the lights adjusted so they do not blind the operator of an oncoming vehicle.
- Engage the clutch slowly when driving out of a ditch, gully, or up a steep hillside. Disengage the clutch promptly should the front wheels rise off the ground.
- Reduce speed before turning quickly or applying brakes. Lock the brake pedals together when traveling at high speeds. Brake both wheels simultaneously when making an emergency stop.
- Never apply the differential lock when turning.
- Use extreme caution and avoid hard applications of the tractor brakes when pulling heavy towed loads at road speeds.
- Always sit in the driver's seat while starting or driving the tractor.

- Any towed vehicle whose total weight exceeds that of the towing tractor must be equipped with brakes for safe operation.
- Always check overhead clearance, especially when transporting the tractor.

IMPORTANT : When transporting on the highway, it is recommended that a safety chain with tensile strength equal to the gross weight of the implement be connected between the tractor and the towed implement. This will control the implement in the event the hitch pin is lost.



NOTE : Attaching hardware will need to be procured locally. Check implement assembly or operators manual for attaching hardware specifications, such as bolt size and grade, chain strength, washers, lock-washer, nuts, etc.

After attaching the safety chain, make a trial run by driving the tractor to the right and to the left for a short distance to check the safety chain adjustment.

If necessary, readjust to eliminate tight or loose chain. Safety chains and suitable hardware are available from your SHIBAURA Tractor Dealer

CONTROLS, INSTRUMENTS AND OPERATIONS

WHEEL TREAD SETTINGS

NOTE : Tread settings are measured from center of tire to center of tire.

Front Wheel Settings

Front Tire Type	Tread Setting	Note
Agricultural 7-16	115.5 cm	Not Adjustable
Agricultural 8-16	115.5 cm	Not Adjustable
Turf		

IMPORTANT : Never attempt to widen the tread setting by reversing front wheels on a four-wheel drive system.

NOTE: Torque front wheel bolts; M12 to 92-116 N-m

Rear Wheel Settings

Rear Tire Type	Tread Setting	Note
Agricultural 13.6-24	127.5 cm	Adjustable by switching Disc in or disc out
Agricultural 14.9-24	125 cm	Adjustable by switching Disc in or disc out
Turf		

NOTE: Torque rear wheel bolts; M16 to 206-255 N-m

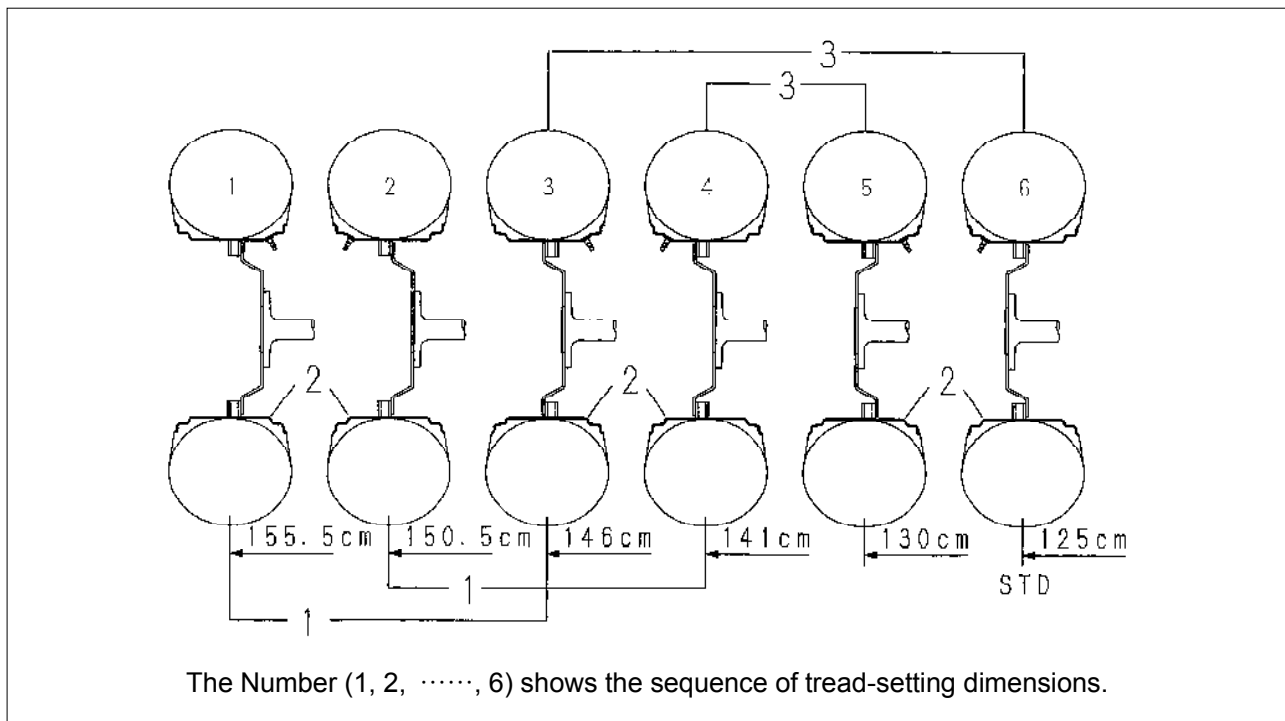
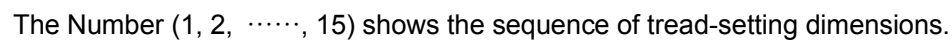


Figure 43 - Rear Wheel Tread Settings (Tire; AG14.9-24) - ST445

1. Reposition Rim On Disc
 2. Rim Repositioned On Opposite Disc
 3. Inter-Changing Rear Wheel Assemblies
- Give These Combinations



1. Reposition Rim On Disc
2. Rim Repositioned On Opposite Disc

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CONTROLS, INSTRUMENTS AND OPERATIONS

TRACTOR WEIGHTING

To obtain sufficient traction for maximum performance in heavy draft operations and to counter-balance rear-mounted equipment, weight should be added to the tractor in the form of liquid ballast, cast iron weights, as shown in Figure 45 and 46, or combination of both. Only enough weight should be added to provide good traction and stability.

Adding more weight than is needed results in unnecessary soil compaction and increased rolling resistance and thus higher fuel consumption.

NOTE : When adding weight to the tractor, tire pressure may need to be increased. Refer to the Tire Inflation Pressure data found on the next page.

WEIGHTING FOR STABILITY

Front end ballast may be required for stability and steering control when weight is transferred from the front wheels to the rear wheels as the implement is raised by the tractor 3-point hitch.

As a general guide :

Ballast the tractor(less implement) so that approximately 1/3 of the tractor weight is on the front wheels. For optimum traction, tractor equipped with FWD should be ballasted so 40-45% of machine weight is on front wheels.

When a mounted implement is raised to the transport position, the front wheel reaction should be at least 20% of tractor weight.

Add additional front end ballast as required for stability during operation and transport. Tractor front end ballast may not always maintain satisfactory stability if the tractor is operated at high speed on rough terrain. Reduce tractor speed and exercise caution under these conditions.

When using front mounted equipment, add weight to the rear axle to maintain good traction and stability.

Front-mounted equipment varies in weight. Refer to

equipment manual for ballasting.



WARNING : If proper stability cannot be obtained within the weighting limitations below, reduce the load on the tractor until stability is obtained.

WEIGHTING LIMITATIONS

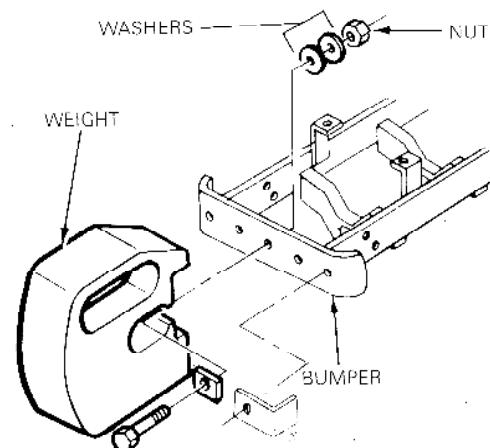
The weighting limitations that follow are limitations only ; they do not imply that the tractor should be weighted to obtain the weights shown. Use only enough weight to obtain good performance, and do not exceed the tire load capacities.

CAST IRON WEIGHTS(OPTIONAL)

Cast iron weights are a factory installed option or are available as accessories from your SHIBAURA Tractor Dealer. Weights can be mounted on the front end of the tractor, and on the rear wheels with AG tire only as shown in Figure 45 and 46.

Front End Weights

Location	Weight(s)
Front End	Maximum of 3 Weights per tractor @ 30 kg each 90 kg total



CONTROLS, INSTRUMENTS AND OPERATIONS

Figure 45 - Front End Weights

CONTROLS, INSTRUMENTS AND OPERATIONS

Rear Wheel Weights

Location	Weight(s)
Rear wheel with AG tire only	Maximum of 4 weights per tractor @ 30 kg each 120 kg total

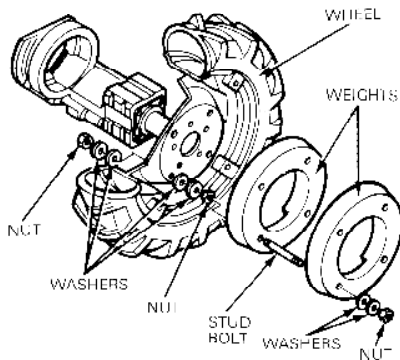


Figure 46 - Rear wheel weights

TIRE PRESSURE

Tire pressure must be considered when adding weights, implements or attachments to the tractor or damage to the tractor may occur.

The chart below outlines type inflation pressures.

FRONT TIRE INFLATION PRESSURES		
Tire Type	Tire Size	Inflation Pressure
Agricultural	7-16, 4PR, R1 or 8-16, 4PR	60-140 kPa
Turf		
REAR TIRE INFLATION PRESSURES		
Agricultural	13.6-24, 4PR or 14.9-24, 4PR	80-120 kPa
Turf		

NOTE : Do not under-inflate or over-inflate tires. Do not exceed maximum inflation pressure listed.

LIQUID BALLAST(OPTIONAL)

It is a common practice to add weight to the tractor by filling the rear tires with liquid. A calcium chloride (CaCl_2) and water solution is recommended due to its low freezing point and greater density (weight per gallon) than water.

Never exceed the total recommended weight for the tractor. Because special equipment is required to fill the tires, we recommend that you consult your SHIBAURA Tractor Dealer.

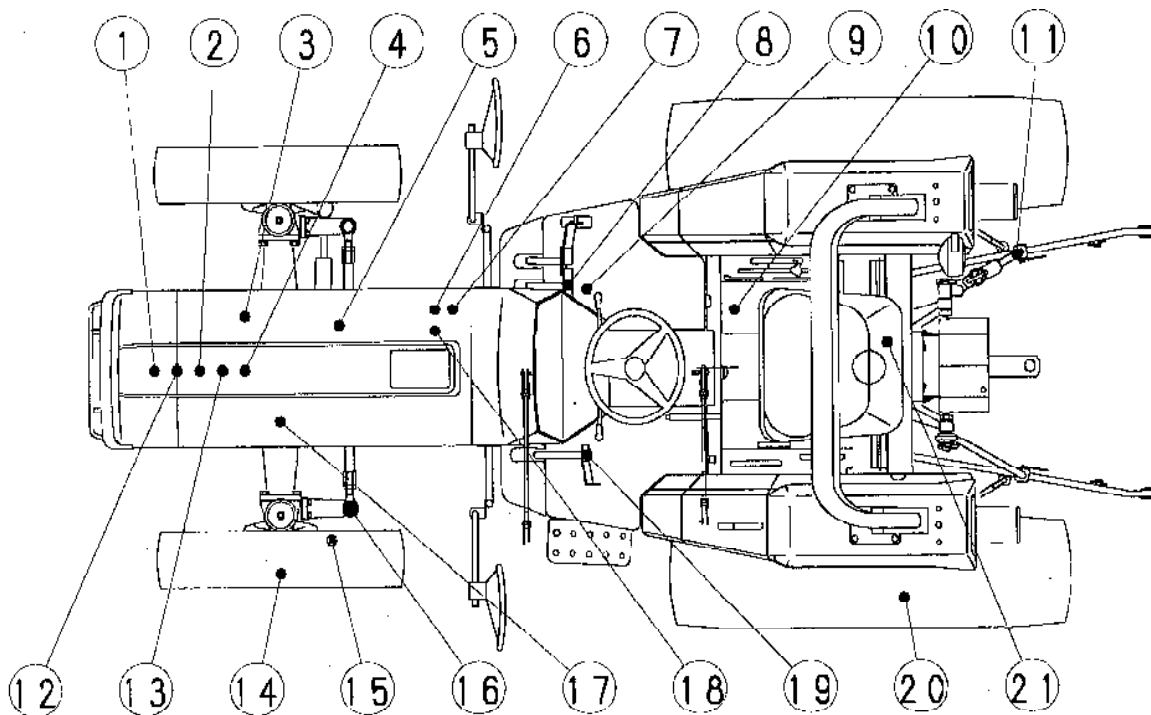
Tires should never be filled beyond 75% (tire filled to the valve stem when valve stem is at its highest point at the top of the wheel.)

NOTE : Rear wheel weights can be used with liquid ballast for only agricultural Tire.

NOTE : Hardware to mount weights should be obtained locally. Use standard "1/2" cap screw instead of the stud bolts.

LUBRICATION AND MAINTENANCE

LUBRICATION AND MAINTENANCE CHART — SHIBAURA ST440 • ST445 FOUR-WHEEL DRIVE



NO.	LUBRICATION AND MAINTENANCE ITEMS	CHECK	CLEAN	LUBE	CHANGE	ADJUST	SERVICE INTERVALS	NO.	LUBRICATION AND MAINTENANCE ITEMS	CHECK	CLEAN	LUBE	CHANGE	ADJUST	SERVICE INTERVALS
2	Radiator Coolant	×					Every 10 Hours or Daily	6	Fuel Filter		×				Every 100 Hours
12	Air Cleaner	×						12	Air Cleaner Element		×				
18	Engine Oil Level	×						18	Engine Oil				×		
1	Battery	×					First 50 Hours	4	Fan Belt	×				×	
10	Hydraulic Oil Filter	×			×			6	Fuel Filter Element				×	×	Every 200 Hours
14	Tires/Wheel Bolt Torque	×						7	Engine Oil Filter				×		
—	All Fluid Levels	×						8	Brakes				×	×	
3	Power Steering Oil Level	×					Every 50 Hours	14	Wheel Bolt Torque				×	×	
14	Battery	×						3	Power Steering Oil				×		Every 300 Hours
15	Final Reduction Gear Cases Oil Level	×						10	Hydraulic Oil Filter				×		
17	Front Axle Oil Level	×						15	Final Reduction Gear Cases Oil				×		
20	Transmission Oil Level	×						17	Front Axle Oil				×		
	Lubrication Fittings;							20	Transmission and Rear Axle Oil				×		
5	Power Steering Cylinder			×				2	Radiator Coolant				×		Seasonal
8	Brake Pedal			×				3	Power steering Oil				×		
9	Pedal Shaft			×				12	Air Cleaner Element				×		
11	3-Poin Linkage			×											
13	Pivot Shaft			×											
16	Power Steering Linkage			×											
19	Clutch Pedal			×		×									

LUBRICATION AND MAINTENANCE

FUEL AND LUBRICANTS

DIESEL FUEL

Type of fuel to use :

When operating in temperatures above -6.7°C (20°F), use diesel fuel oil No. 2 - D with a minimum cetane rating of 40.

When operating in temperatures below -6.7°C (20°F), use diesel fuel oil No. 1 - D with a minimum cetane rating of 40.

Low ambient temperatures as well as engine operation at high altitudes may require use of fuels with higher cetane ratings.

Fuel represents a major portion of your tractor operating costs ; therefore, it is important to use it efficiently. Do not let low price tempt you to use inferior diesel fuel. The initial savings is a false economy when you consider the damage poor fuel can do to your tractor fuel system.

FUEL USAGE SAFETY

Fuel is becoming very expensive and scarce. As a result, many of our customers are trying new fuels or blends to reduce costs and conserve energy.

Today's new fuels or blends are frequently more volatile and there is a need to handle them carefully. Furthermore, some of the blends are dangerous and should not be used at all.

- **Under no circumstances** should gasoline, alcohol or gasohol be added to diesel fuel. These combinations can create an increased fire hazard.
- Never remove the Fuel Cap or refuel the tractor when the engine is running or is hot.
- Don't smoke while refueling or while anywhere near fuel.

- When filling the tank, maintain control of the nozzle.
- Don't fill the fuel tank to capacity...allow room for expansion.
- Wipe up spills immediately
- Always tighten the fuel tank cap securely.
- If the original equipment fuel tank cap is lost, always replace it with a SHIBAURA approved cap. A will-fit cap may not be safe.
- Keep equipment properly maintained.
- Keep equipment clean — free of trash and oil.
- Don't drive equipment near open fires.
- Never use gasoline for cleaning parts.

NOTE : Use only fuel designated for diesel engines. Some heating fuels contain harmful chemicals that, if used, can seriously affect tractor efficiency and performance.

Refer to the "Engine Oil Recommendations" on Page 37 for additional fuel information.



WARNING : Fuel oil in the injection system is under high pressure and can penetrate the skin.

Unqualified persons should not remove or attempt to adjust a pump injector, nozzle or any part of the fuel injection system.

DO NOT use your hand to check for leaks. Use a piece of cardboard or paper to search for leaks.

If any fluid is injected into the skin, obtain medical attention immediately or gangrene may result.

Failure to follow these instructions can result in serious injury.

LUBRICATION AND MAINTENANCE

REFUELING THE TRACTOR

The fuel filler cap is located at the rear of the tractor hood. Before removing the cap, wipe all dust and dirt from around the cap to prevent debris from falling into the tank while filling.

Use an approved fuel container and check the inside of the container periodically for cleanliness. Fuel tank capacity is 39 liters.

NOTE : The fuel cap is a vented-type. Use only an approved SHIBAURA replacement cap to prevent fuel system-related problem.

If there is no filter on the outlet of the storage tank, filter the fuel through a 100-mesh screen or finer when filling the tractor fuel tank. Keep the tractor tank as full as possible to minimize condensation.

NOTE : It is a good practice to fill the tractor fuel tank with fuel at the end of each day, as this will reduce overnight condensation.

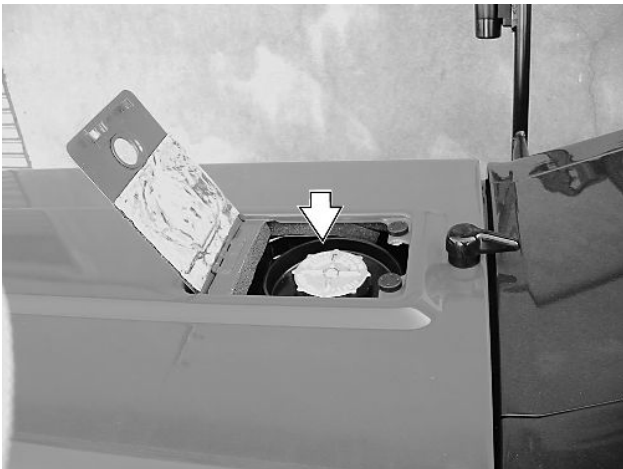


Figure 47 - Filler Cap, fuel

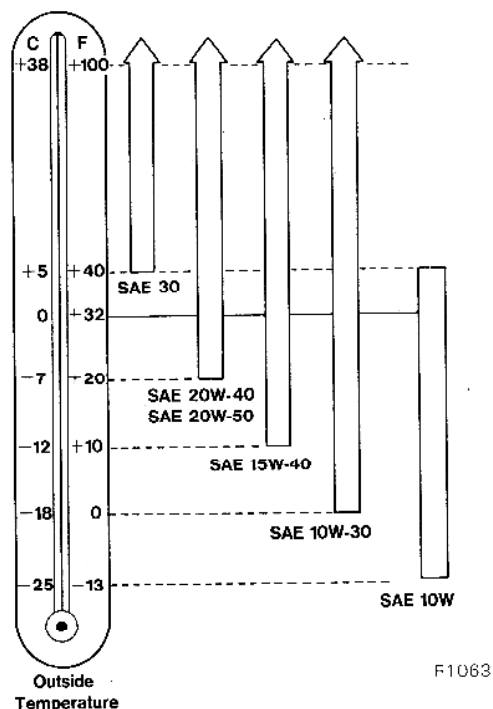
LUBRICANTS

Type of lubricant to use,
 Transmission, Rear Axle, Final
 Reduction, and Hydraulic System SAE 80
 Front Axle, Final Reduction Oil..... SAE 80
 Power Steering Oil..... ISO. VG46
 Engine Crankcase Service Grade CD
 SAE 10W30, for year around use
 or
 SAE 20W for use -5°C — 25°C
 SAE 30 for use 10°C — 35°C

All Lubrication Fittings NLG 1 GRADE 2 EP
 GREASE WITH LTUIM
 SOAP

NOTE : Use the following chart to determine which SAE Grade engine oil to use :

In areas where prolonged periods of extreme temperatures are encountered, local lubricant practices are acceptable, such as the use of SAE 5W (CC) in extremely cold temperatures or the use of SAE 40 (CD) or SAE 50 (CD) in extremely high temperatures.



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LUBRICATION AND MAINTENANCE

IMPORTANT : Engine crankcase oil drain intervals should be adjusted downward when diesel fuel sulfur content is over 0.5%.

Consult your dealer for details of Engine Crankcase Oil usage.

FUEL AND LUBRICANT SERVICE PROCEDURES

ENGINE

Checking Oil Level : Check the engine oil level daily or every 10 hours.

1. With the tractor standing level, and after the engine has been stopped for a period of time, check the oil level with the dipstick, Figure 48.

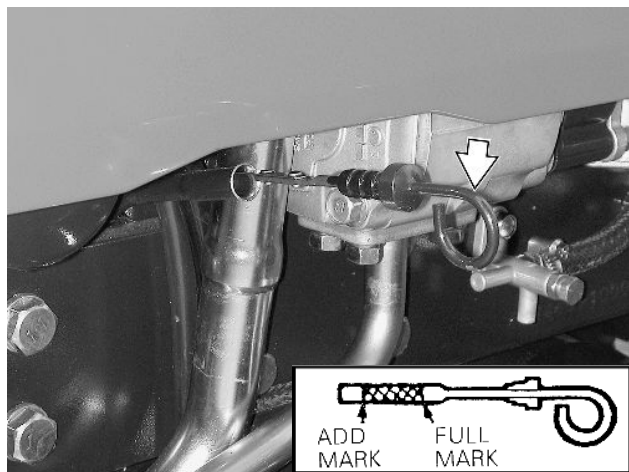


Figure 48 - Engine Oil Level Dipstick

2. If the oil level is low, remove the filler cap, Figure 50, and add oil to the engine through the filler hole to bring the oil level between the marks on the dipstick. Be careful not to overfill.
3. Install the oil filler cap.

Changing Oil and Filter : Change the engine oil every 100 hours and the engine oil filter every 200 hours.

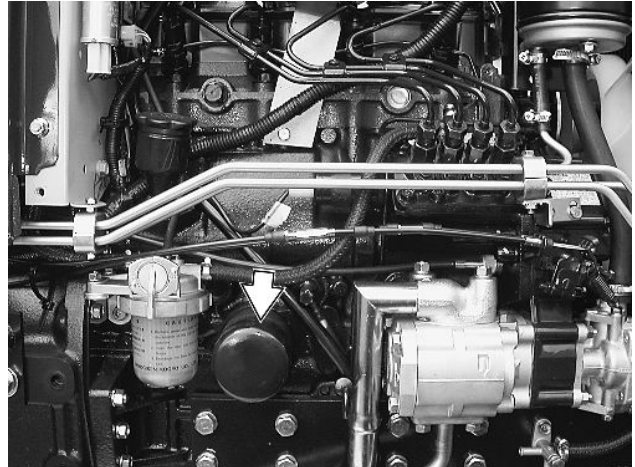


Figure 49 - Engine Oil Filter

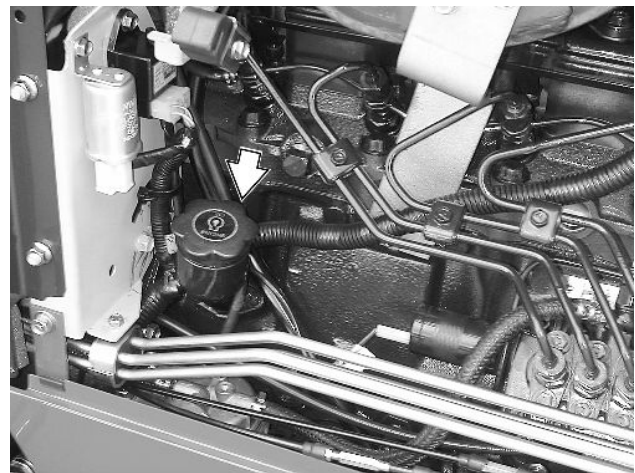


Figure 50 - Engine Oil Filler Cap

NOTE : Oil intervals should be adjusted according to sulfur-content of diesel fuel. The use of fuel with a sulfur content over 1.3% is not recommended.

Sulfur Content, %	Oil Change Interval
Below 0.5	Normal
0.5 — 1.0	1/2 Normal
Over 1.0	1/4 Normal

LUBRICATION AND MAINTENANCE



Figure 51 - Engine Oil Drain Plug

NOTE : More frequent engine oil and filter changes are recommended if the tractor is operated for extended periods of time at maximum rated power and speed. Under such conditions, or other types of continued severe operating conditions, the engine oil and the engine oil filter should be changed at 70 hours intervals.

1. With the engine off, but at normal operating temperature, drain and discard the engine oil by removing the drain plugs, Figure 51. Reinstall the plugs after the oil has drained and discard the oil.
2. Unscrew the oil filter, Figure 49, catching the used oil in a suitable container placed below the filter. Discard the filter.
3. Coat the gasket on the new filter with a film of oil. Screw the filter into place until the gasket contacts its mating surface, then turn the filter approximately $\frac{3}{4}$ of a turn by hand. Do not over-tighten.
4. Add new oil of the type specified, page 36. Start the engine and check the filter for leaks after adding the oil. Be sure the oil is at the proper level.

FUEL FILTER

Draining the Filter : Drain the diesel fuel filter when water is visible in the sediment bowl.

Cleaning the Fuel Filter : Clean the fuel filter every 100 hours by rinsing in a container of clean diesel fuel.

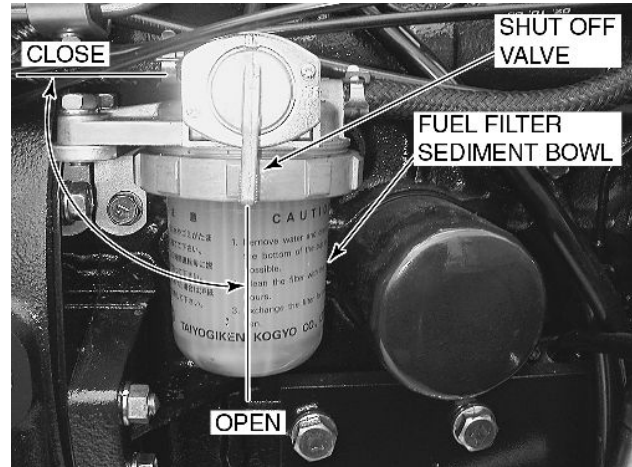


Figure 52 - Fuel Filter

1. Be sure there is adequate fuel in the fuel tank, close the fuel shut-off valve, then remove the fuel sediment bowl, Figure 52.
2. Open the fuel shut-off valve until all water has been removed and only fuel flows from the filter.
3. Install the fuel sediment bowl and bleed the system as outlined under "Bleeding the Fuel System."

LUBRICATION AND MAINTENANCE

Changing the Fuel Filter : Change the diesel fuel filter every 200 hours.

1. Close the shut-off valve, Figure 52.
2. Remove the sediment bowl, Figure 52.
3. Open the fuel shut-off valve to drain any remaining water from the tank.
4. Discard the old element and install a new element.
5. Install and securely tighten the sediment bowl.
6. Open the fuel shut-off valve so fuel will flow to the filter.
7. Bleed the fuel filter and injection pump as covered under "Bleeding the Fuel System."



WARNING : Fuel oil in the injection system is under high pressure and can penetrate the skin.

Unqualified persons should not remove or attempt to adjust a pump injector, nozzle or any part of the fuel injection system.

DO NOT use your hand to check for leaks. Use a piece of cardboard or paper to search for leaks. If any fluid is injected into the skin, obtain medical attention immediately or gangrene may result.

Failure to follow these instructions can result in serious injury.

Bleed the fuel system as follow :

1. Be sure there is adequate fuel in the fuel tank.
2. Open the fuel shut-off valve.
3. Open the bleed screw, Figure 53 and let the air bubbles escape from the strainer, then close the bleed screw.

BLEEDING THE FUEL SYSTEM

Bleed the fuel system after it has been drained :

- If a new filter element has been installed,
- If the tractor has run out of fuel,
- If the lines leading to or from the filter have been disconnected,
- If the injection pump has been removed and reinstalled.

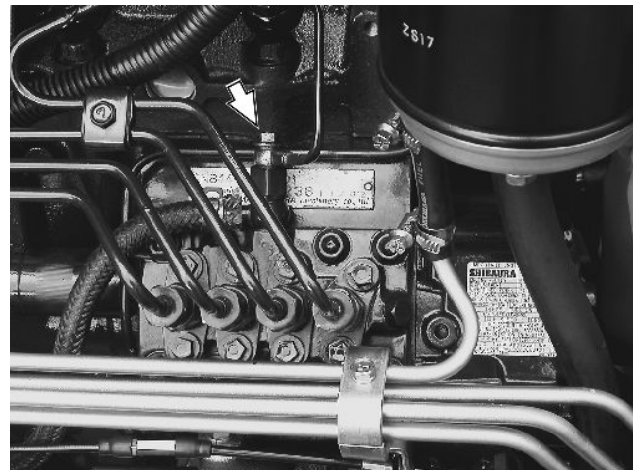


Figure 53 - Fuel System Bleed Screw

Injector Lines : Bleed the injector lines if the tractor has run out of fuel, if new injectors have been installed, or if the injection pump has been removed for service repairs.

LUBRICATION AND MAINTENANCE

4. Push the hand throttle to the high speed position. Turn the engine over for a few seconds to bleed the high pressure fuel tube.
5. Loosen the injector line fittings at the injectors.
6. Move the hand throttle control lever to its wide open position.
7. Crank the engine until air-free fuel flows from each connection, then tighten the fittings to 24 -29 Nm.

IMPORTANT : Do not crank the engine continuously for more than 30 seconds. Doing so may cause starting motor failure. If air is not purged from the system, repeat the procedure.

AIR CLEANER

Checking element : Check the air cleaner element and dust pan for cleanliness, daily or every 10 hours, Figure 54.

Clean the air cleaner primary (outer) element every 100 hours of service.

The air cleaner contains two elements: an outer primary element and an inner safety element. To remove the primary element, push in on the end cap and rotate counterclockwise. Remove the end cap from the air cleaner body to expose the primary element, Figure 54.

Clean the element every 100 hours of service.

1. Loosen the mounting nut and remove the dust cap, Figure 54.
2. Remove the seal and dust pan from the dust cap and clean the dust cap, seal and dust pan using a damp lint free cloth, Figure 54.
3. Remove the wing nut holding the filter element and remove the filter element from the body.
4. Pat the sides of the element with the palm of the hand to remove dust trapped in the pleats.

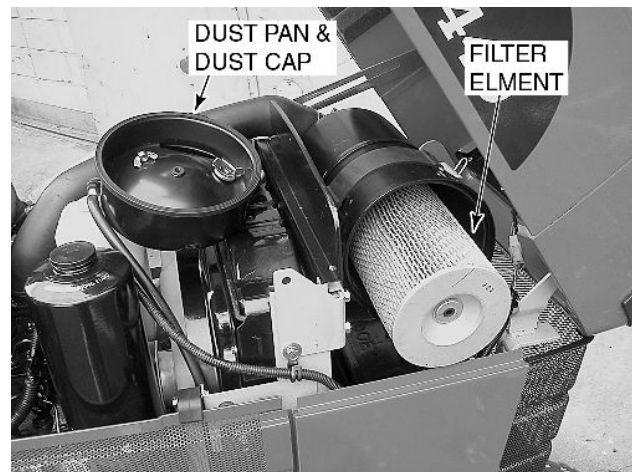


Figure 54 - Air Cleaner—Disassembled

IMPORTANT : Tapping the element against a hard surface or with hard objects may dent or break the element end cap seals.

LUBRICATION AND MAINTENANCE

5. Using low air pressure (not over 30 psi, 2.1 bar), blow out the remaining dust from the inside out (opposite normal air flow through the element).

IMPORTANT : Be careful not to rupture the filter element. Maintain a reasonable distance between the air nozzle and the filter element when directing air up and down the clean air side of the element pleats.

6. Clean the fins and inside of the air cleaner body with a dry cloth.
7. Check with a light bulb inside the element for leaks in paper or bonding of paper to end plate. Replace element if any leaks are found.
8. Reassemble the air cleaner.

IMPORTANT : Failure to obtain a good seal between elements and the container may cause major engine damage.

Change the element:

At the start of the each season, change the air cleaner element.

NOTE: For maximum engine protection and air cleaner service life, install a new inner safety element, Figure 54, every third primary element change or after every 1000 hours of operation, whichever comes first.

TRANSMISSION, REAR AXLE AND HYDRAULIC SYSTEM

Checking Oil Level : Check the oil level every 50 hours.

1. With the tractor standing level and the engine off, check the oil level with the dipstick, Figure 55.
2. The oil is at the correct level when the oil level is between the mark and the lower end of the dipstick. If low, add new oil of the type specified, page 36.
The filler plug is shown in Figure 55.
Do not fill beyond the mark on the stick, as the transmission will be overfilled.

3. Install the filler plug and dipstick.

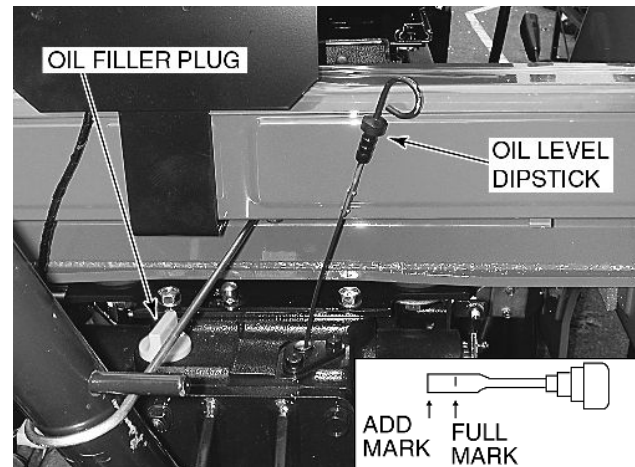


Figure 55 - Transmission, Rear Axle and Hydraulic System Oil Level Dipstick/Filler Plug

Changing Oil : Change the oil every 300 hours.

1. With the oil at normal operating temperature, drain and discard the oil by removing the transmission, rear axle center housing drain plugs, Figure 56. Reinstall the plugs after the oil has drained. Discard the oil.
2. Check and if necessary clean or replace the hydraulic oil filter.
3. Remove the filler plug and dipstick, Figure 55, and fill with new oil of the type specified, page 36.

LUBRICATION AND MAINTENANCE

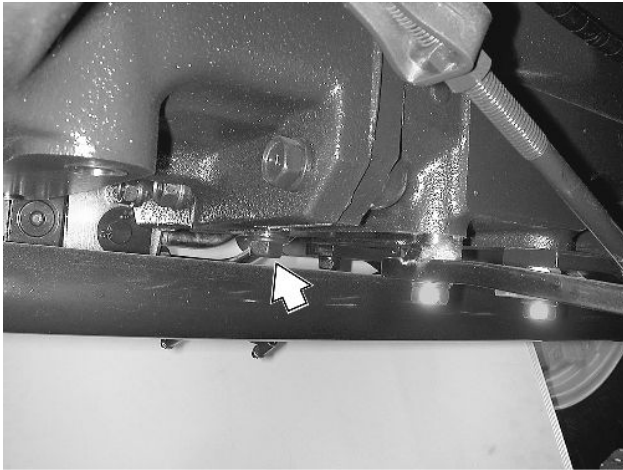


Figure 56 - Transmission and Rear Axle Center Housing - Oil Drain Plugs

4. The oil reservoir is filled to the correct level when the oil level is between the mark and the lower end of the dipstick. Do not fill beyond the mark on the stick, as the oil reservoir will be overfilled.
5. Install the dipstick and filler plug.

IMPORTANT : Because there is a common sump for the transmission, rear axle and hydraulic system, special attention is necessary in keeping the oil clean.

POWER STEERING

Checking Oil Level : Check the oil level every 50 hours.

1. With the tractor standing level and the engine off, check the oil level with the dipstick, Figure 57.
2. The oil is at the correct level when the oil level is between the mark and the lower end of the dipstick. If low, add new oil of the type specified, page 36, through the combined dipstick/filler plug. Do not fill beyond the mark on the stick, as the oil reservoir will be overfilled.
3. Install the dipstick/filler plug.

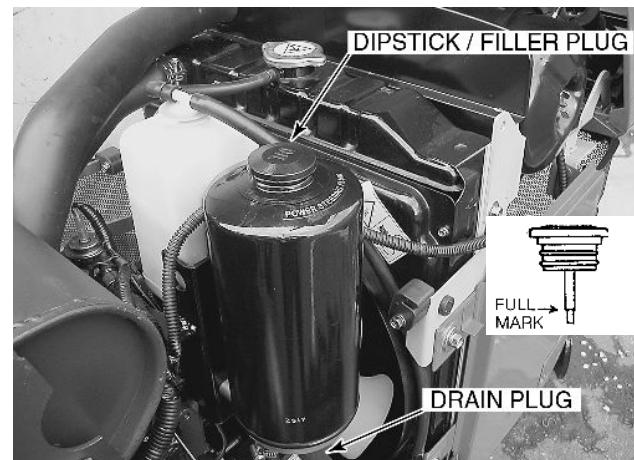


Figure 57 - Power Steering Oil Level Dipstick/Filler Plug and Drain Plug

Changing Oil : Change the oil every 600 hours.

1. With the oil at normal operating temperature, drain the oil by removing the drain plug of reservoir for power steering, Figure 57. Reinstall the plug after the oil has drained. Discard the oil.
2. Remove the filler plug, Figure 57 and fill with new oil of the type specified, page 36.
3. The oil reservoir is filled to the correct level when the oil level is between the mark and the lower end of the dipstick. Do not fill beyond the mark on the stick, as the oil reservoir will be overfilled.

LUBRICATION AND MAINTENANCE

4. Install the dipstick/filler plug.

LUBRICATION AND MAINTENANCE

HYDRAULIC SYSTEM OIL FILTER

The hydraulic system is equipped with a spin-on type oil filter, Figure 58. Replace the filter after the first 50 hours of operation and every 300 hours thereafter following the procedure below.



Figure 58 - Hydraulic Oil Filter

Unscrew the oil filter and discard.

Coat the gasket on the new filter with a film of oil.
Screw the filter into place until the gasket contacts the sealing surface, then tighten the filter approximate 3/4 of a turn by hand. Do not over tighten

Start the engine and check the hydraulic oil filter for leaks.

Stop the engine and check the hydraulic oil level.
Replenish if necessary.

LUBRICATION FITTINGS

The following lubrication points(refer to the Lubrication Chart, page 34) require the application of a good quality grease every 50 hours. In extremely dirty conditions, lubrication should be more often. Refer to page 36 for the type of grease that should be used.

Steering Linkage
Front Axle Pivot
Pedal shaft, Clutch and Brake Pedals
3-point linkage
Front-wheel drive shaft
Brake pedal
Power Steering Cylinder

1. Wipe away all old grease and dirt from the lubrication fittings to prevent dirt or foreign material from entering the fittings when new grease is applied.
2. Use a high pressure grease gun to force in the new grease until clean grease oozes from the assembly being lubricated.
3. Wipe away any excess grease.

LUBRICATION AND MAINTENANCE

GENERAL MAINTENANCE

COOLING SYSTEM

The cooling system in your SHIBAURA Tractor has been filled with one year life antifreeze.

To obtain maximum efficiency and service life from the engine, it must operate at the correct temperature. This is dependent on the cooling system. The system should be kept filled with a 50/50 solution of permanent antifreeze and clear water.

Checking Coolant Level : Check the coolant level between the Low and the Full marks on the coolant reservoir, Figure 59, daily or every 10 hours. This check should be made when the engine is stopped.

It is not necessary to open the radiator cap when checking the coolant level. But when changing the coolant, follow the next WARNING to open the radiator cap.



WARNING : The cooling system operates under pressure which is controlled by the radiator cap. It is dangerous to remove the cap while the system is hot. Always cover the cap with a thick cloth and turn the cap slowly counterclockwise to the first stop. Allow all pressure to escape before removing the cap completely.

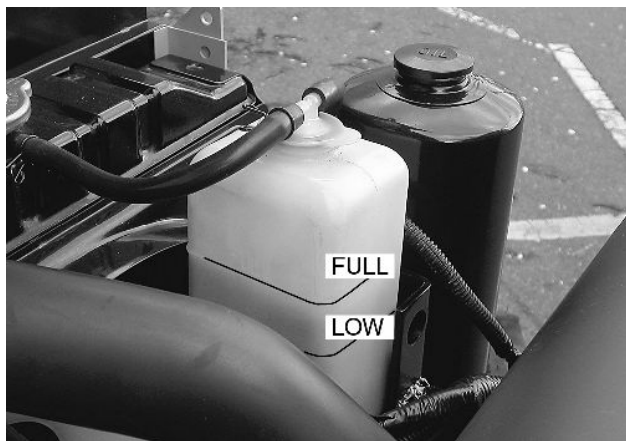


Figure 59 - Radiator Coolant Reservoir

If the cooling system already contains antifreeze, add only antifreeze solution of the correct water /

antifreeze mixture.

Plain water will dilute the solution and weaken its protection.

IMPORTANT : The radiator is filled with non-amino type antifreeze. Alcohol-type antifreeze is not recommended. Do not mix alcohol-type solution with permanent antifreeze.

Keep the radiator fins clear of chaff or dirt to allow free passage of air, Figure 62.

Draining and Flushing the Cooling System :

Drain and flush the radiator and engine block every 12 months. Refill with a 50/50 mixture of long life antifreeze, or equivalent, and clear water.

To Drain the System :

1. Remove the radiator cap, Figure 62 on next page and open the drain valve on both the radiator and the engine block. The radiator drain valve is located on the bottom right side of the radiator. The engine block drain valve is located on the right side of the engine. See Figure 60.

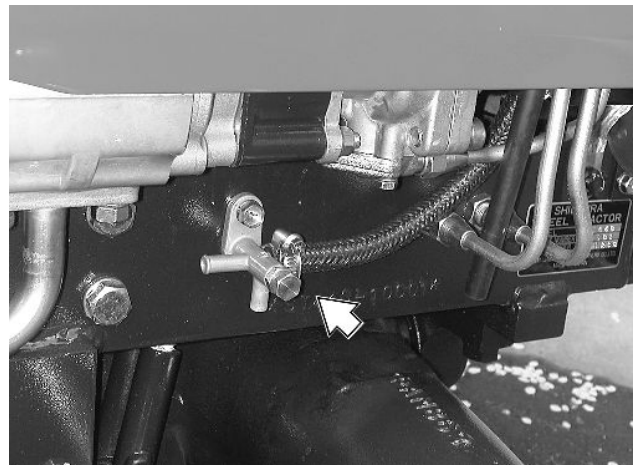


Figure 60 - Radiator Drain Valve

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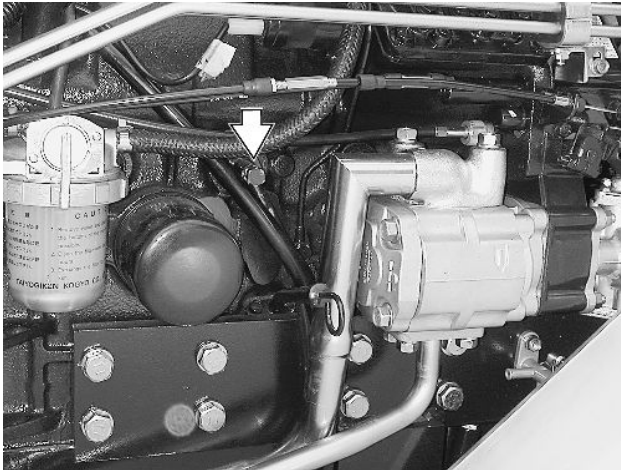


Figure 61 - Coolant Drain Valve

2. After the coolant has drained, place a water hose in the radiator filler neck and run water through the system with the engine running. Make sure water is flowing from the drain valve before starting the engine. When the water flowing from the drain valve is free of discoloration and sediment, stop the engine and remove the hose. Allow all water to drain from the system through drain valves.
3. Close the drain valve and slowly refill the system with a 50/50 solution of permanent anti-freeze and clear water. Fill until the coolant level is approximately 40 to 50 mm below the bottom of the filler neck. Do not fill beyond this level.

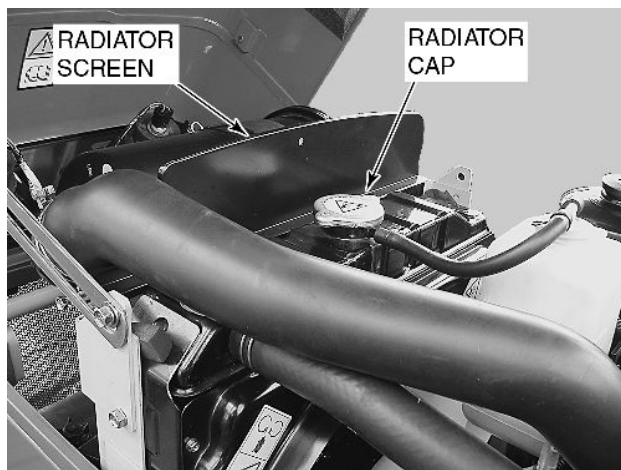


Figure 62 - Radiator Screen and Radiator cap

4. Clean the radiator cap and cap seal. Install the cap.

5. Clean the radiator front screen, Figure 62.

NOTE: Radiator screen can be drawn out upword after moving the air cleaner and rubber hose together with releasing the band.

6. Run the engine until normal operating temperature is reached, then stop the engine and re-check the coolant level. Add coolant as required.

IMPORTANT : Never run the engine when the cooling system is empty, and do not add cold water or cold antifreeze solution if the engine is hot.

Thermostat : The thermostat is located in the coolant outlet connection in the front of the cylinder head, Figure 63.



Figure 63 - Engine Temperature sensor

When the engine is cold, the thermostat, which is a head sensitive valve, shuts off the flow of coolant to the radiator, thus allowing rapid engine warm up. A recirculating bypass allows the coolant to circulate within the engine whenever the thermostat shuts off flow to the radiator.

LUBRICATION AND MAINTENANCE

IMPORTANT : Do not remove the thermostat in an attempt to improve the cooling. This will cause the engine to run below normal working temperatures, resulting in excessive engine wear.

If it ever becomes necessary to install a new thermostat, it should be positioned in the recess of the water outlet connection so that the heat element(spring end) will be in the cylinder head of the engine.

LUBRICATION AND MAINTENANCE

Fan Belt : A belt-driven fan at the front of the engine draws air through the fins of the radiator to cool the coolant in the radiator. A slipping fan belt will lower the efficiency of the fan, resulting in the engine running too hot. If the belt is too tight, it will shorten the alternator bearing life. A correctly tightened belt will deflect 10 to 15 mm when 9 to 11 kg thumb pressure is applied midway between the belt pulleys. Check the condition and tension of the fan belt every 200 hours. If the belt shows signs of cracking or fraying, install a new belt.

To Adjust Belt Tension :

1. Loosen the alternator mounting bolts, Figure 64.

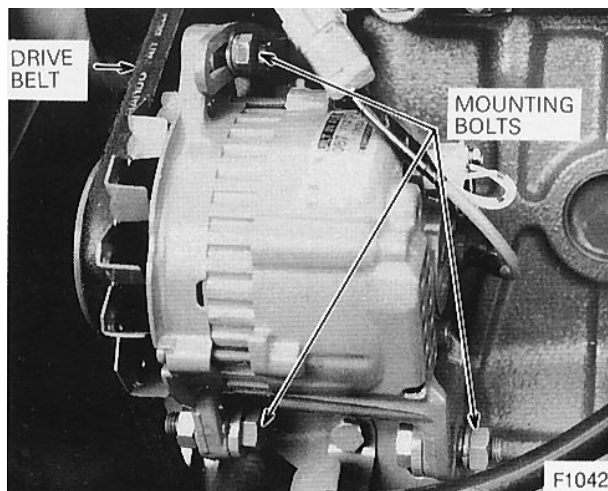


Figure 64 - Alternator Mounting Bolts



WARNING : Never attempt to loosen or tighten the bolts when the engine is running.

2. Pry the alternator away from the engine and tighten the mounting bolts.
3. Recheck belt deflection.

ENGINE SPEED ADJUSTMENT

The adjustments for idle and maximum no-load speed settings should be adjusted according to the following procedures :

Idle Speed

1. Pull the throttle lever rearward to the lowest engine speed, this makes foot throttle free.
2. Adjust to the designated idling engine speed by adjusting idling stop bolt and lock it.

Maximum Speed

1. Push the hand throttle lever forward to the maximum engine speed.
2. To adjust maximum engine speed to 2810 – 2860 rpm, elongate outer cable gradually by tightening the adjusting screw of throttle wire, and lock the adjusting screw.

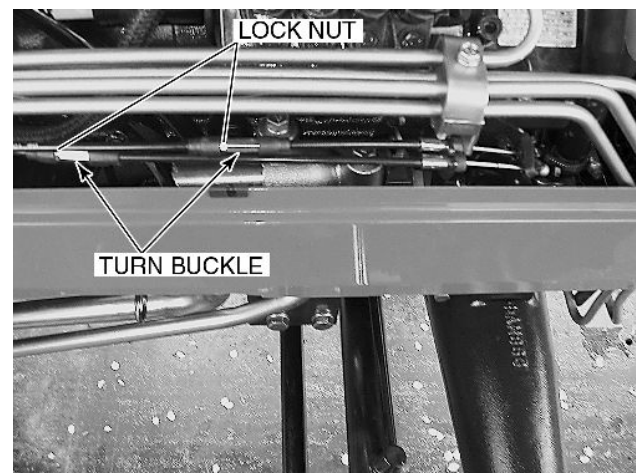


Figure 65 - Throttle Adjustment

3. To shorten outer cable release the adjusting screw of throttle wire.
4. Use the same procedure for adjusting maximum speed on the foot throttle pedal stroke.

LUBRICATION AND MAINTENANCE

CHECK WHEEL BOLT TORQUE

NOTE: Check wheel bolt torque after the first 50 hours operation and every 200 hours thereafter. Additionally, tighten the wheel bolts to the specified torque any time the wheel assembly is removed from the tractor or the bolts are loosened.

Front Wheel Bolt Torque	Rear Wheel Bolt Torque
92 – 116 Nm	206 – 255 Nm

Check wheel bolt torque daily until stabilizes.



Figure 66 - Wheel Hub-Bolts

MAINTENANCE AND INSPECTION OF THE ROPS

NOTE: Inspect the ROPS after the first 20 hours of operation. Following the initial inspection, the ROPS should be checked after every 500 hours of operation or every six months, whichever comes first.

1. Check the torque of the ROPS mounting bolt 佳, Figure 66. Tighten both nut and bolt (M12) to the correct torque of 74.5 Nm if necessary.
2. Also check the torque of the ROPS to fender mounting bolt 加, Figure 66. Tighten the bolts (M12) to the correct torque of 74.5 Nm, if necessary.

POSSIBLE DAMAGE TO THE ROPS

If the machine has rolled over or the ROPS has been in some other type of accident (such as hitting an overhead object during transport) you must replace the ROPS to get the original protection.

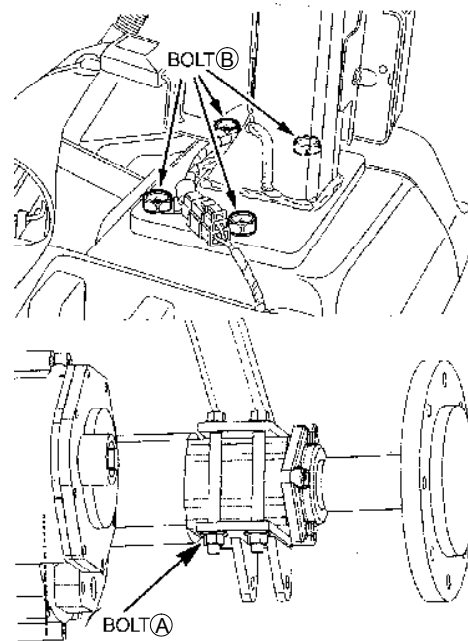


Figure 67 - ROPS Mounting Bolts/ Nuts

After an accident, check for damage to (1) the ROPS, (2) the operator's seat. Before you operate the machine, replace all damaged parts.

IMPORTANT : Do not try to weld or straighten the ROPS.



WARNING : Always pull from the tractor drawbar. Never attach chains, ropes, or cables to the rops or cab for pulling purposes or the tractor will tip backwards.



WARNING : If the rops or cab is removed or replaced, make sure that the proper hardware is used and the recommended torque values are applied to the attaching bolts.

LUBRICATION AND MAINTENANCE

BATTERY

Keep the battery connections tight and free of corrosion. An ammonia or baking soda-water solution is good for washing the outside surface and terminals of the battery. Make sure the solution does not enter the battery. After cleaning, wash the battery with clean water. Apply a small amount of petroleum jelly to the terminals to protect them from corrosion.

In freezing temperatures, the battery must be maintained in a good state of charge. When a battery is discharged or run down, the electrolyte is weak and may freeze, causing damage to the case. If it becomes necessary to add water (distilled), it should be done just before using the tractor so the charging will mix the water with the electrolyte and prevent the water from freezing.

Determine the battery charge by checking the specific gravity of the electrolyte.

Checking Electrolyte Level : Check the electrolyte level in the battery every 50 hours.



WARNING: When the alternator is charging, an explosive gas is produced inside the battery. Therefore, always check the electrolyte level with the engine sopped. Do not use an exposed flame and do not smoke when checking the battery electrolyte level.

1. Clean the top of the battery, then remove the vent plugs.
2. If the electrolyte level is low, add distilled water. The level is correct when the liquid is 1/4 inch (6.35 mm) above the plates.

LUBRICATION AND MAINTENANCE

NOTE: Keep distilled water in a clean, wellcovered, non-metallic container.

3. Install the vent plug after making sure the vent holes are not blocked. At below freezing temperatures, be sure to run the engine for a period of time, after adding water, so the battery will charge and prevent the water from freezing.

ALTERNATOR

The alternator, Figure 70, is belt-driven from the engine crankshaft pulley. It is important that belt slippage does not occur, otherwise, the charging rate will be affected. Details of belt adjustment are given on page 46.

Other than belt adjustment, the only maintenance required on the alternator is to periodically inspect the terminals and keep them clean and tight. The alternator cooling fan should also be cleaned periodically.

When working on or checking the alternator, comply with the following precautions to prevent alternator damage.

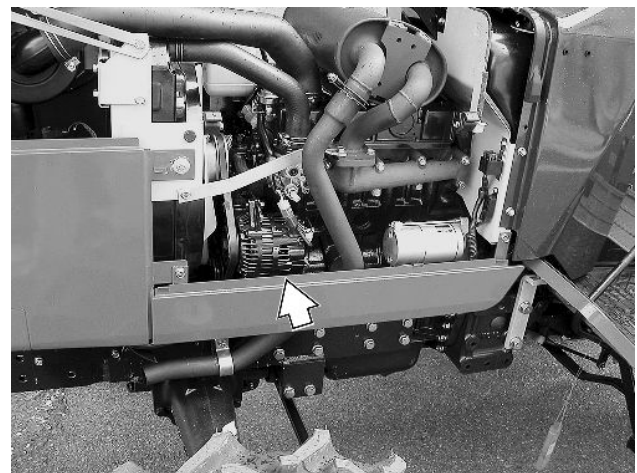


Figure 70 - Alternator

- DO NOT, under any circumstances, short the FIELD terminal of the alternator to ground.
- DO NOT disconnect the alternator output lead or battery cables while the alternator is operating.
- DO NOT remove the alternator from the tractor without first disconnecting the negative (—) battery cable. If the battery is to be removed, disconnect the negative cable first.
- If a battery is being installed, MAKE CERTAIN that the positive (+) cable is connected first and that the negative terminal is connected to ground. Reverse polarity will destroy the rectifier diodes in the alternator.

LUBRICATION AND MAINTENANCE

If the charge indicator warning light indicates that the alternator is not charging the battery, check the fan belt and the wiring connections. If these are satisfactory and the warning light continues to indicate no charge, consult your SHIBAURA Tractor Dealer.

FUSES

Fuse Blocks

The fuse box, Figure 71, is located on the left-hand side of the engine compartment fire wall. Two additional line fuses, Figure 72, are attached to the headlight support bracket inside the engine hood.

When viewed from front to rear, the upper and lower fuse blocks contain the following fuses:

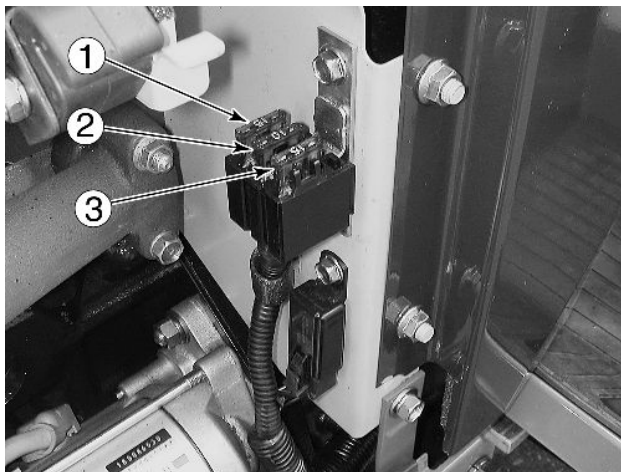


Figure 71 - Fuse Box

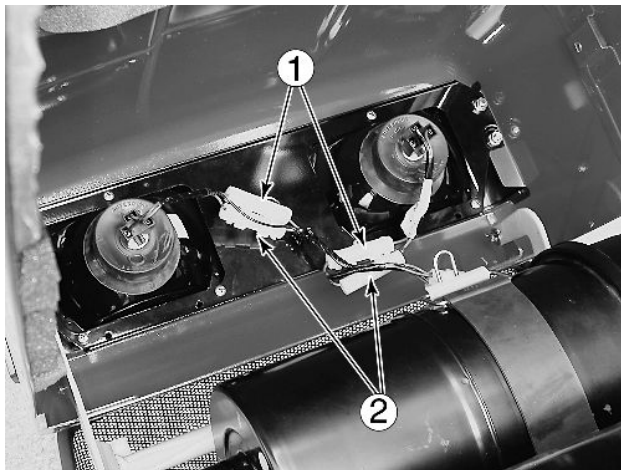


Figure 72 - Headlight Line Fuses

Fuse Box - Figure 71		
	Fuse Size	Circuit Protected
①	15 amp.	Engine fuel solenoid, Parking lights
②	10 amp.	Instrument panel lights, Hazard lights
③	15 amp.	Headlights, Horn

Headlight Line Fuses - Figure 72		
	Fuse Size	Circuit Protected
①	7.5 amp.	Headlight – High Beam
②	7.5 amp.	Headlight – Low Beam

NOTE : Before replacing a fuse ensure all electrical circuits are switched off. Always replace blown fuses with the size specified for that circuit.

Fusible Link

A fusible link wire, Figure 73, is used to protect the tractor's entire electrical system. If too much amperage passes through this wire it will melt down so that it will no longer allow circuit to pass (similar to the way a fuse works). The fusible link wire is a red wire that goes from the starter terminal to a connector that links into the main wiring harness.

To replace the fusible link wire:

1. Disconnect the negative battery cable from the battery.
2. Unplug the connector linking the wire to the main wiring harness.
3. Remove the old fusible link wire from the starter terminal.
4. Replace the old fusible link wire with a new one, first attaching to starter terminal, and then connecting into the main wire harness.

LUBRICATION AND MAINTENANCE

IMPORTANT: Always replace the fusible link wire with the appropriate fusible link wire for this tractor.

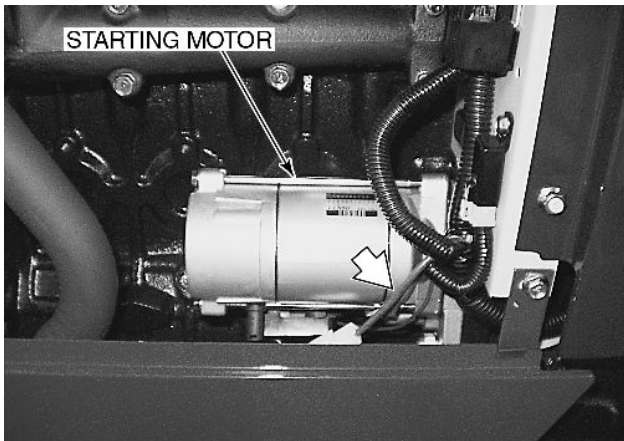


Figure 73 - Fusible Link Wire

HEADLIGHT

Should a headlight failure occur, the bulb must be replaced. To change the bulb :

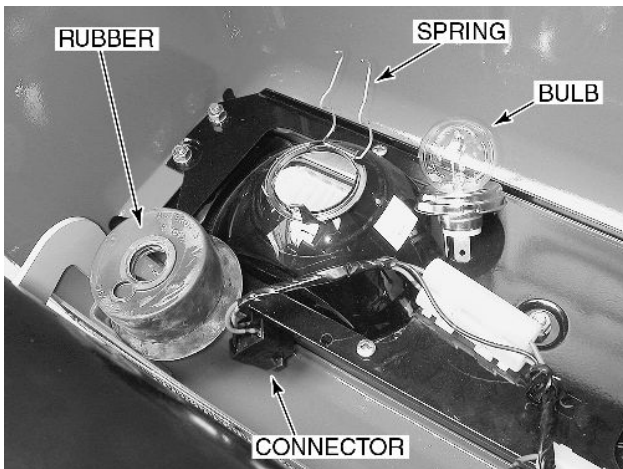


Figure 74 - Headlight Bulb

1. Pull up the connector and rubber from the housing, Figure 74.
2. Take off the spring.
3. Remove the bulb.
4. Install a new bulb and install the spring, rubber and connector.

TAIL LAMP AND FLASHER WARNING LIGHTS

To replace a tail lamp bulb or flasher warning light bulb :

1. Remove the lens, then remove the bulb.
2. Install a new bulb and reinstall the lens and/or rim assembly.



Figure 75 - Tail Light and Flasher Warning Lights

INSTRUMENT LIGHT

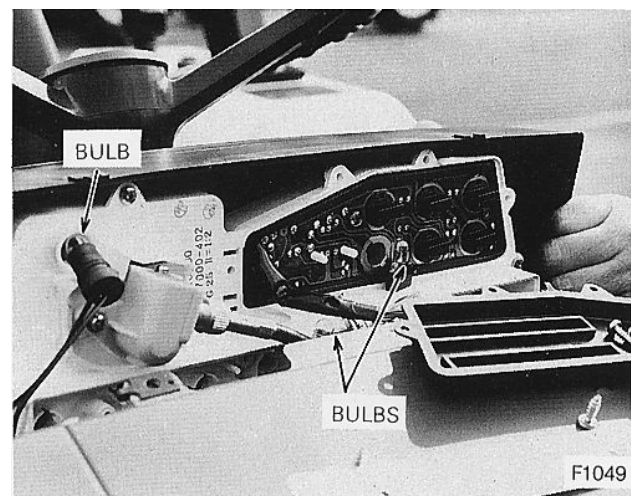


Figure 76 - Instrument Panel Warning Lights

To change an instrument bulb :

1. Remove the instrument panel.
2. Pull out lens-cover by removing the stay.

LUBRICATION AND MAINTENANCE

3. Replace bulb.
4. Install the lens-cover and fix the instrument panel.

TIRES

Inflation and Service

- Upon receiving your tractor, check the air pressure in the tires as indicated in the tables.
- Check tire pressure every 50 hours, or weekly.
- Tire inflation pressure affects the amount of weight which a tire may carry.
Do not over-or under inflate the tires.
- Do not re-inflate a tire that has been run flat or seriously under-inflated until the tire has been inspected for damage by a qualified person.



WARNING : Inflating or servicing tires can be dangerous. Trained personnel should be called to service and/or mount tires when possible. In any event to avoid possible serious or fatal injury, follow the safety precautions below :

- When checking tire pressure, inspect the tire for damaged side walls and tread cuts. Neglected damage will lead to early tire failure.
- Be sure the rim is clean and free of rust.

- Lubricate both tire beads and rim flanges with soap solution. Do not use oil or grease.
- Use a clip-on tire chuck with a remote hose and gauge which allows the operator to stand clear of the tire while inflating it.
- NEVER INFLATE TO OVER 240 kPa TO SEAT BEADS. If beads have not seated by time pressure reaches 35 psi, deflate the assembly, reposition tire on rim, relubricate both tire beads and rim flanges and re-inflate. Inflation beyond 240 kPa with-unseated beads may break the bead or rim with explosive force sufficient to cause serious injury.
- After seating the beads, adjust inflation pressure to recommended operating pressure.
- Do not inflate a tire unless the rim is mounted on the tractor or is secured so that it will not move if the tire or rim should suddenly fail.
- Do not weld, braze, otherwise repair, or use a damaged rim.
- Never attempt tire repairs on a public road or highway.
- Use jack stands or other suitable blocking to support the tractor while repairing tires.
- Insure jack has adequate capacity to lift your tractor.
- Insure jack is placed on a firm level surface.
- Do not put any of your body under the tractor or start the engine while the tractor is on the jack.
- Torque lug nuts to specification after reinstalling wheel. Check lug nut torque daily until torque stabilizes.
- Refer to tractor weighting section before adding ballast to the tires.

LUBRICATION AND MAINTENANCE

LUBRICATION AND MAINTENANCE

FRONT WHEEL TOE-IN

Front wheel toe-in adjustments on your tractor were made at the factory. Normally, the wheels maintain their toe-in ; however, an occasional check should be made.

Checking Toe-In

1. With the front wheels in the straight-ahead position, mark the front of the wheels (not the tires) at wheel hub height, Figure 77.
2. Measure and record the distance between the front of the wheels at the marks, then push the tractor forward or backward until marks are at wheel hub height on the rear of the wheel.
3. Measure and record the distance between the marks at the rear of the wheels.
4. The difference between the dimensions recorded in Step 2 and 3 should give zero to 0-5 mm toe-in. The distance between the marks on the wheels should be zero to 0-5 mm greater when the marks are at the rear than at the front.
5. If the toe-in is not correct, adjust as outlined in the following procedure.

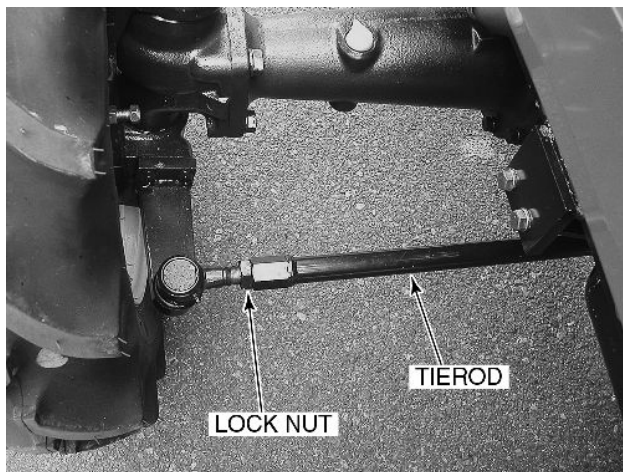


Figure 77 - Checking Toe-In

Adjusting Toe-In

1. Loosen the tie rod lock nuts.
2. Adjust the tie rod tube assembly as required to give zero to 0-5 mm toe-in.
3. After the correct toe-in is obtained, tighten the tie rod lock nuts.

FOOT-BRAKE ADJUSTMENT

Whenever the brake pedal travel becomes excessive, or if the travel of one pedal is unequal to that of the other, adjustment of each pedal should be made in the following manner :

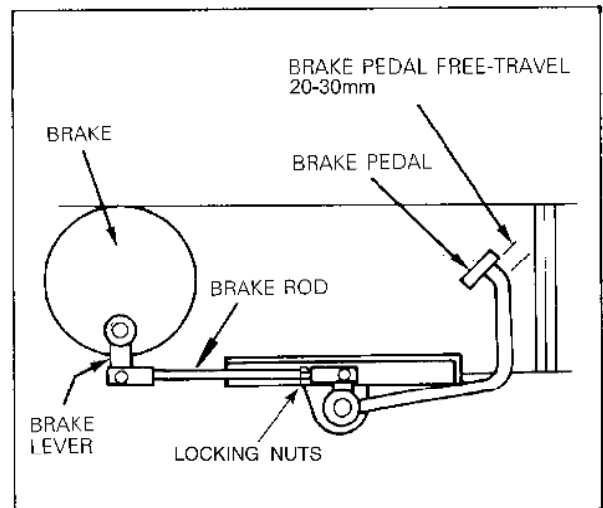


Figure 78 - Brake Pedal Adjustment

1. Loosen the lock-nut, Figure 78, and rotate the brake rod as necessary until there is 20-30mm of pedal free play. Lengthening the rod increases free play while shortening the rod decreases free play.
2. Test drive the tractor to make sure the braking action of both rear wheels is equal. Readjust as necessary.

LUBRICATION AND MAINTENANCE

Parking Brake Adjustment

If the parking brake lever travel becomes excessive or the parking brake efficiency is reduced, the parking brake should be adjusted as follows:

1. Check and if necessary, adjust the foot brakes, as previously described.
2. Release the parking brake lever, Figure 79. Slacken the locknut and turn the adjusting nut so that both rear wheels are locked when the parking brake lever is applied 3-4 notches on the ratchet.
3. Ensure the rear wheels turn freely with the parking brake lever released.
4. Tighten the locknut without disturbing the adjusting nut.

IMPORTANT : Check the brake cables for corrosion, fraying or kinks. Ensure both inner cables move freely in the outer cables and are lubricated with a high quality grease. Replace any unserviceable cables.

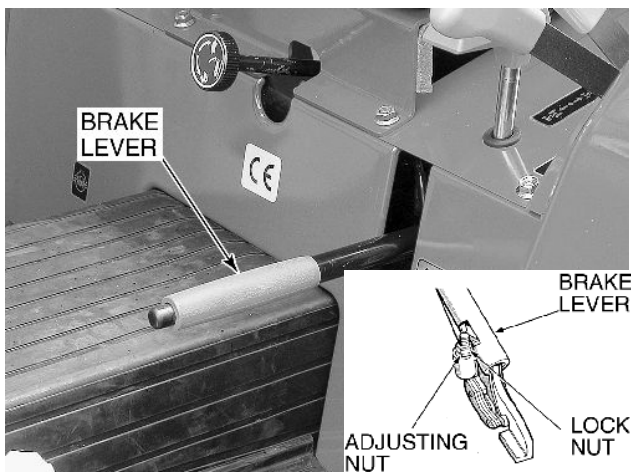


Figure 79 - Parking Brake Adjustment

CLUTCH PEDAL ADJUSTMENT

To obtain maximum clutch life, it is essential that the clutch pedal free travel be checked every 50 hours so as to maintain free travel at 20-30 mm, Figure 80.

1. Remove the cotter pin and clevis pin.
2. Turn the clevis to increase or decrease pedal travel as required.

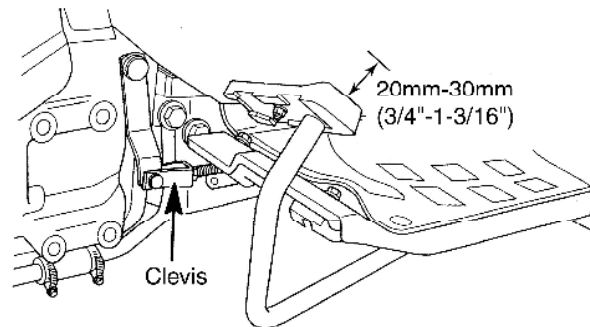


Figure 80 - Clutch Pedal Free Travel Adjustment

FOUR-WHEEL DRIVE FRONT AXLE DIFFERENTIAL CASE AND FINAL REDUCTION GEAR CASES

Checking Oil Level : Check the oil level every 50 hours.

1. With the tractor standing level and the engine off, check the oil level with the dipstick, Figure 81.
2. The oil is at the correct level when the oil level is between the mark and lower end of the dipstick. If low, add new oil of the type specified, page 35, through the combined dipstick/ filler plug. Do not fill beyond the mark on the stick, as the front axle case will be overfilled.
3. Install the dipstick/filler plug.

LUBRICATION AND MAINTENANCE

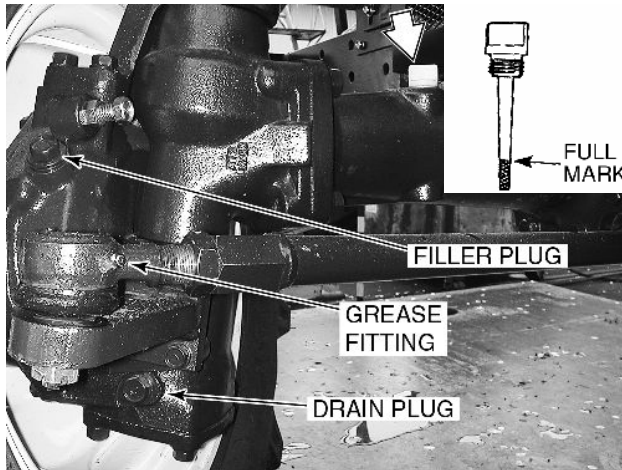


Figure 81 - Front Axle Oil Level Dipstick/Filler Plug, Grease Fitting and Drain Plug



Figure 82 - Front Axle Differential Drain Plug and Grease Fitting

Changing Oil : Change the oil every 300 hours.

1. With the oil at normal operating temperature, drain the oil by removing the front axle differential, Figure 82, and final reduction gear case drain plugs, Figure 81. Reinstall the plugs after the oil has drained. Discard the oil.

NOTE: Remove the front wheel before drain or refill oil of the final reduction gear case.

2. Remove the filler plugs at each final reduction gear case, Figure 81, and fill with new oil as specified on page 36, and install the filler plug.
3. Remove the dipstick/filler plug on the top, right side of axle housing, Figure 81, and fill with new oil of the type specified, page 36.
4. The front axle is filled to correct level when the oil level is between the mark and lower end of the stick. Do not fill beyond the full mark on the stick, as the front axle will be overfilled.
5. Install the dipstick/filler plug.

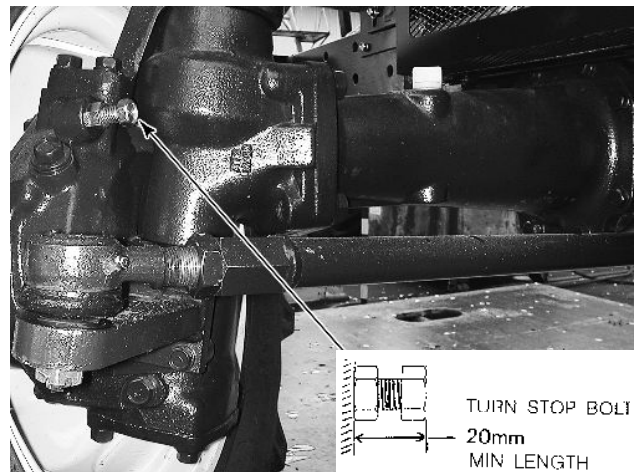


Figure 83 - Turn Stop Bolt

NOTE: To ensure correct steering operation the stop bolt, Figure 83, should protrude a minimum of 20mm from the casing.

LUBRICATION AND MAINTENANCE

TRACTOR STORAGE

Tractors that are to be stored for an extended period should be protected during storage. The following is a suggested list of operations to be carried out.

1. Thoroughly clean the tractor. Use touch-up paint where necessary to prevent rust.
2. Check the tractor for worn or damaged parts. Install new parts as required.
3. Raise the lift arms hydraulically to their fully raised position so the lift piston is in a fully extended position. This fills the cylinder with oil and will protect the cylinder wall surfaces from corrosion.
4. Lubricate the tractor. Drain and refill the transmission, hydraulic system and rear axle with new oil. Drain the engine oil and refill with new lubricating oil. Also clean the air cleaner.

IMPORTANT : Do not use No.2 diesel fuel for winter storage because of wax separation and setting at low temperature.

5. Open the drain valve of radiator and engine block. Flush the system, close the drain valve, and fill with a 50/50 solution of permanent anti-freeze and clear water.
6. Remove the battery and clean it thoroughly. Be sure that it is fully charged. Place it in storage in a cool, dry place above freezing temperature. The battery should be charged periodically during storage.
7. Place blocking under the tractor axles to remove the weight from the tires.
8. Cover the exhaust pipe opening.
9. Place pedal spacer between clutch pedal and step plate to separate clutch disc from flywheel, Figure 84.



Figure 84 - Installing Pedal Spacer

Tractor that have been placed in storage should be completely serviced in the following manner before using :

1. Inflate the tires to the recommended pressures, and remove the blocking.
2. Check the oil level in the engine crankcase, the common sump (for the hydraulic lift, transmission, rear axle and optional power steering), and optional front wheel drive axle.
3. Install a fully-charged battery and remove the exhaust cover, if other than a rain cap.
4. Check the cooling system for proper level of 50/50 solution of antifreeze and clear water.
5. Remove pedal spacer from between clutch pedal and step plate.
6. Start the engine and allow it to idle a few minutes. Be sure the engine is receiving lubrication and that each control is functioning correctly.
7. Drive the tractor without a load and check to be sure it is operating satisfactorily.

LUBRICATION AND MAINTENANCE

GENERAL METRIC BOLT TORQUE SPECIFICATION TABLE

USE THE FOLLOWING TORQUES WHEN SPECIAL TORQUES ARE NOT GIVEN

NOTE : These values apply to fasteners as received from supplier, dry, or when lubricated with normal engine oil. They do not apply if special graphited or moly disulphide greases or other extreme pressure lubricants are used.

		Coarse Thread		Fine Thread	
Bolt Size	Grade No.	Pitch (mm)	Newton-Meters	Pitch (mm)	Newton-Meters
M6	4T   	1.0	4.9 — 6.9	—	—
	7T   		8.3 — 11.3		
	10T  		11.8 — 15.7		
M8	4T	1.25	12.7 — 16.7	1.0	15.2 — 20.1
	7T		22.6 — 28.4		26.5 — 34.3
	10T		28.4 — 36.3		30.4 — 40.2
M10	4T	1.5	25.5 — 33.3	1.25	28.4 — 36.3
	7T		44.1 — 55.9		49.0 — 62.8
	10T		53.9 — 69.6		57.9 — 73.5
M12	4T	1.75	37.3 — 47.1	1.25	43.1 — 54.9
	7T		65.7 — 83.4		74.5 — 94.1
	10T		92.2 — 116		99.0 — 127
M14	4T	2.0	62.8 — 80.4	1.5	69.6 — 87.3
	7T		104 — 131		117 — 148
	11T		139 — 175		147 — 186
M16	4T	2.0	86.3 — 110	1.5	91.2 — 115
	7T		149 — 184		157 — 192
	11T		206 — 255		221 — 270
M18	4T	2.0	114 — 141	1.5	131 — 163
	7T		196 — 235		230 — 279
	11T		275 — 333		299 — 368
M20	4T	2.5	144 — 179	1.5	172 — 211
	7T		240 — 289		275 — 333
	11T		363 — 441		397 — 485

SPECIFICATIONS

ENGINE

Type Diesel
 Number of Cylinders 4

COOLING SYSTEM

Type Pressurized Liquid with
 Re-circulating Bypass

Tractor Model	ST440	ST445
Engine Model	N844	N844L
Bore	84 mm	84 mm
Stroke	90 mm	100 mm
Displacement	1995 cc	2216 cc
Compression Ratio	22.5	22.5

Firing Order 1 - 3 - 4
 -2

Low Idle Speed 1000 – 1100
 rpm

Maximum Speed :

High Idle 2810 -2860 rpm

Rated 2600 rpm

Valve Clearance(Cold Engine) :

Intake 0.20 mm

Exhaust 0.20 mm

CAPACITIES

Fuel Tank 39 Liters

Cooling System

With Filter 5.6 Liters

Engine Crankcase :

Less Filter 5.5 Liters

With Filter Change 6.0 Li-

ters

Rear Axle and Transmission 36 Liters

(Includes Hydraulics)

Power Steering 1.4 Liters

Front Differential Gear Case

and Final Reduction 5.3 Liters

SPECIFICATIONS

COOLING SYSTEM—Cont'd.

Water Pump :

Type.....Centrifugal

Drive.....V-Belt

Water Pump Belt

Deflection 10-15 mm
when 9-11 kg

Thumb Force is Applied
Midway Between Pulleys.

Fan Diameter 41.0 cm

Thermostat :

Start to Open..... 71°C(160° F)

Fully Open..... 85°C(185° F)

Radiator Cap 90 kPa

ELECTRICAL SYSTEM

Alternator.....12-volt, Heavy
Duty, 40 amps

Battery..... 12-volt, 64 amp.
5-Hour Rating with
Negative Ground

Starting Motor 2.0 kw
Solenoid, Pre-Engaged Reduction

FUEL SYSTEM

Type of

Fuel to Use	Temperature	Type
Diesel	Above—6.7°C (20° F)	No.2D Cetane Rating min. 40
	Below—6.7°C (20° F)	No.1D Cetane Rating min. 40

Injection Pump :

Type.....In-Line

Timing.....ST440 20° BTDC
ST445 18° BTDC

CLUTCH

Type..... ST440 240 mm
ST445 260 mm

Dry Disc.,
Organic Face

Pedal Free-Travel..... 20-30 mm

BRAKES

Type.....Multi-disc, wet
Disc.....175/143 mm Diameter (Out-
er/Inner)

SPECIFICATIONS

STEERING

Type Power
Turns Lock-to-Lock 3.5
Front Wheel Toe-In 0-5 mm

Turning Radius
(Without Brake) 3.05 m

POWER TAKE-OFF

Type Transmission, Independent
Shaft 35 mm

6 Spline SAE STD

Engine Speed for 540 rpm
PTO Operation 2405

Horsepower PTO Observed (HP)
ST440 25.4 kw (34)
ST445 28.5 kw (38)

HYDRAULIC LIFT SYSTEM

Type Category 1
3-point Linkage

Pump Type Gear
Pump Capacity 37 Liters p.m.
@17.2 MPa at 2800 eng. rpm

System Relief Valve
Setting 17.2 MPa

CAST IRON WEIGHTS

(3) Front End Weights 30 kg each, total 90 kg
(4) Rear Wheel Weights 30 kg each, total 120 kg

Draw Bar

Extension Type Standard
145 mm

TIRES

Front :
AG 7-16, 4Ply
AG 8-16, 4Ply
Turf(Optional)

Rear :
AG 13.6-24, 4Ply
AG 14.9-24, 4Ply
Turf(Optional)

ROPS ATTACHING BOLT TORQUES

ROPS to Fender (Bolt:M12) 74.5 N.m
ROPS to Rear axle (Bolt:M12) 74.5 N.m

LUBRICANTS

TRACTOR COMPONENT

Engine Oil SAE 10W 30
Transmission, Rear Axle,
and Hydraulic System Oil SAE 80
Power Steering oil ISO VG 46
Lubrication Fittings NLG 1 No.2
Front Axle SAE 80

NOTE : Should the recommended engine oil not be readily available, use a commercial oil as shown on page 36.

IMPORTANT : Engine crankcase oil drain intervals should be adjusted downward when diesel fuel sulfur content is over 0.5%. (See page 37.)

Coolant Non-amino type

SPECIFICATIONS

GENERAL DIMENSIONS

Tire Size	Front Rear	ST440	ST445
		7-16	8-16
		13.6-24	14.9-24
Overall Length (With 3-point Hitch)		3210 mm	3210 mm
Overall Width		1610 mm	1640 mm
Overall Height (With ROPS)		2450 mm	2470 mm
Wheel base		1765 mm	1765 mm
Minimum ground clearance		310 mm	330 mm
Tread Setting : Front		1155 mm	1155 mm
Tread Setting : Rear		1275 mm	1250 mm
Weight(With ROPS)		1460 kg	1510 kg

GROUND SPEEDS at the Engine Rated Speed (2600 RPM) Without Creeping Gears

Forward	km/h	
	ST440	ST445
Ratio	AG 13.6-24	AG 14.9-24
1st	1.53	1.59
2nd	1.95	2.02
3rd	2.44	2.53
4th	3.22	3.34
5th	4.16	4.31
6th	5.30	5.50
7th	6.62	6.86
8th	6.75	9.65
9th	12.6	13.0
10th	16.0	16.6
11th	20.0	20.8
12th	26.4	27.4

Rearward	km/h	
	ST440	ST445
Ratio	AG 13.6-24	AG 14.9-24
1st	1.72	1.78
2nd	2.19	2.27
3rd	2.73	2.84
4th	3.62	3.75
5th	4.66	4.83
6th	5.95	6.16
7th	7.43	7.69
8th	9.81	10.2
9th	14.10	14.6
10th	18.0	18.6
11th	22.4	23.2
12th	29.6	30.7

SEFETY DECALS

In the event that decals become damaged or illegible, they should be replaced with new decals at their original position. Replacement decals are available from your SHIBAURA Tractor Dealer.

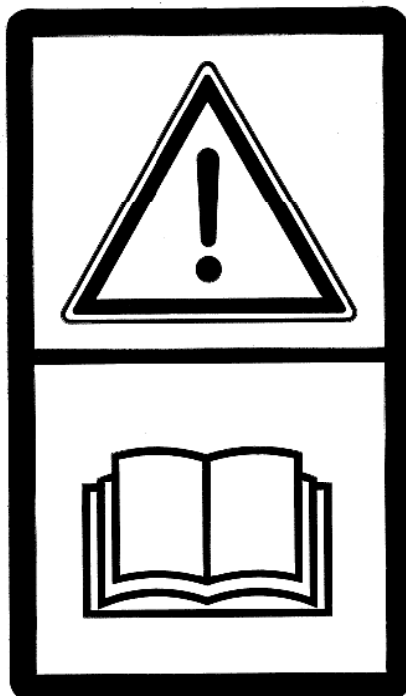


WARNING - BATTERY

PART NO. - 490992480

LOCATION - Top of battery

- Batteries produce explosive gas. Keep sparks and flames away.
- Battery contains sulfuric acid. Wear protective clothing and use eye protection.



DANGER !

PART NO. - 390197900

LOCATION - Inside of hood and back of instrument panel

- See operator's manual.

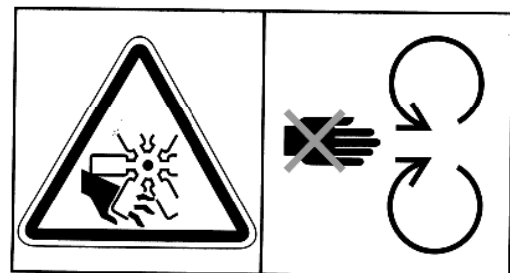


DANGER !

PART NO. - 390198010

LOCATION - Left-hand / inside of ROPS

- Always raise the ROPS immediately after low clearance operation.



WARNING - Keep Hands and Clothing away from Rotation Fan.

PART NO. - 390198020

LOCATION - Rear of radiator

- Never touch rotating parts when engine is running.



WARNING - Radiator Cap

PART NO. - 490992490

LOCATION - On radiator cap

- Do not open while hot
- Contents under pressure

INSTRUCTION DECALS



Range Selector Lever

PART NO.- 390174090

LOCATION - On L.H. lever guide



PTO Control Lever-2-speed

PART NO.- 390174110

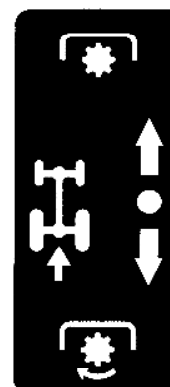
LOCATION - Inside of L.H. fender



Four-Wheel Drive Control Lever

PART NO.- 390170630

LOCATION - Left & below seat,
near the lever



PTO Clutch Control

PART NO.- 390174100

LOCATION - Inside of L.H.
fender

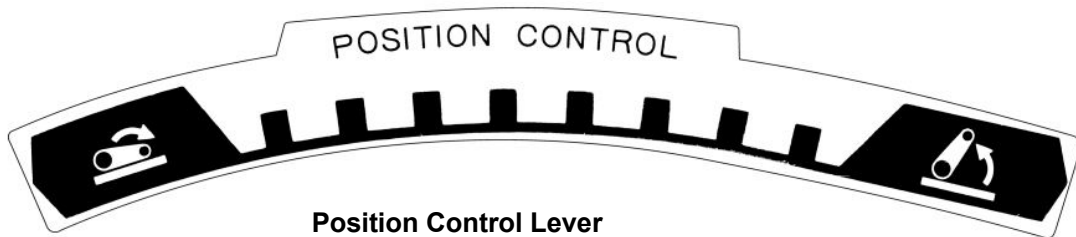


Differential Lock

PART NO.- 390191690

LOCATION - Above pedal below
seat

INSTRUCTION DECALS



Position Control Lever

PART NO. - SBA 390371320

LOCATION - Inside of R.H. fender



Draft Control Lever

PART NO. - SBA 390371300

LOCATION - Right of seat of the rear of draft quadrant lever



Flow Control Knob

PART NO. - 390370290

LOCATION - Top of flow control knob



Power Steering Fluid

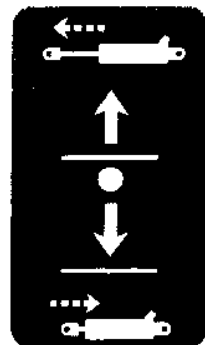
PART NO.- SBA 390230130

LOCATION - On top of P.S. reservoir

Rear Remote Control

PART NO. - 390370300

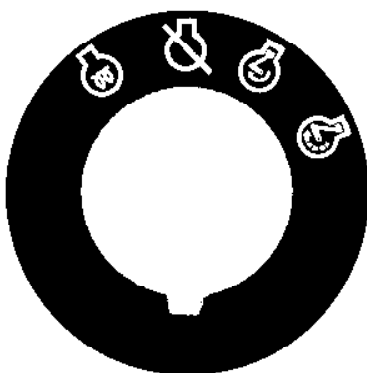
LOCATION - Right & below seat



Engine Oil

PART NO. - 390230120

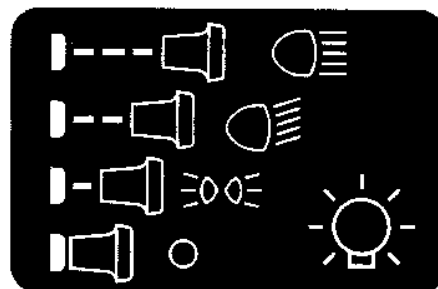
LOCATION - Engine oil filler cap



Starter Switch

PART NO. - 390194290

LOCATION - Right side of instrument panel

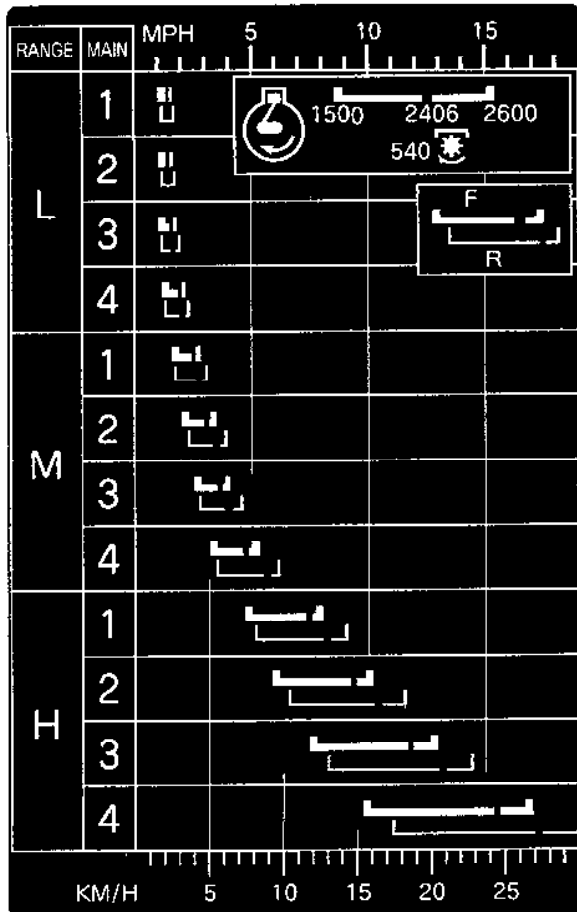


Main Lighting Switch

PART NO. - 390380590

LOCATION - Back of instrument panel

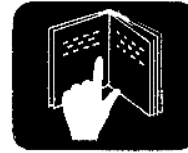
INSTRUCTION DECALS



Ground Speeds

PART NO. - 390174080

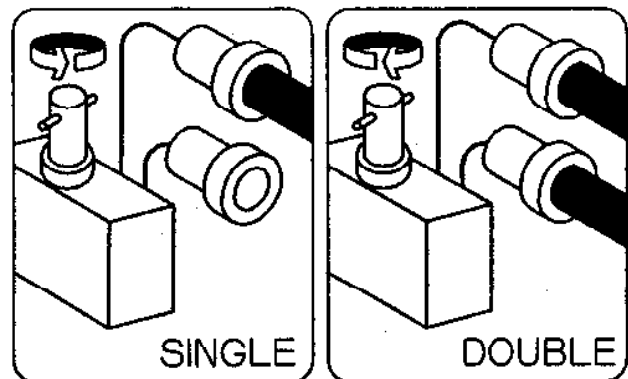
LOCATION - Top of L.H. fender



HYD. Manifold Operation

PART NO. - SBA 390192850

LOCATION - On top of Hyd. manifold



Single/Double Acting Control

PART NO. - 390372090

LOCATION - Back of tractor,
near seat



Parking Brake Control

PART NO. - 390197710

LOCATION - Left & below seat,
near lever

PRE-DELIVERY SERVICE CHECK AND ADJUST AS REQUIRED

INOPERATIVE SERVICE CHECKS

1. Tire pressure ☐
2. Air cleaner element
and hose connections ☐
3. Radiator coolant level ☐
4. Fan belt tension ☐
5. Battery cleanliness, vent openings,
electrolyte level, and charge ☐
6. Engine oil level ☐
7. Power steering reservoir oil level ☐
8. Transmission and rear axle ☐
9. Front axle and front differential
oil level (4WD) ☐
10. Hydraulic Lift control adjustment ☐
11. Upper link, and hitch ☐
12. Brake adjustment and pedal
equalization ☐
13. Rear wheel disc and hub bolts
for tightness ☐
14. Front wheel hub bolts
for tightness (4WD) ☐

15. Front wheel toe-in ☐
16. Fuel level ☐
17. Sheet metal and paint condition ☐
18. Check lift rod for proper operation ☐
19. Drain diesel fuel filter ☐

SAFETY ITEMS CHECKS

1. ROPS installed ☐
2. Seat belts installed ☐
3. Bolt torque check of ROPS
and seat belt ☐
4. PTO master shield installed ☐
5. SMV emblem installed ☐
6. Safety decals installed ☐
7. Neutral start switches operation ☐
8. Parking brake & latch operation ☐
9. Flashing lights/tail lights operation ☐
10. Operator's Manual ☐

OPERATIVE SERVICE CHECKS

All operating checks are to be performed with the tractor at normal operating temperature

1. Lights and instruments for proper
operation, and fuel shut down
with key switch OFF ☐
2. Fluid and oil leaks ☐
3. Maximum no-load speed and
idle speed adjustments ☐
4. P.T.O. engagement and
disengagement ☐
- Clutch pedal and P.T.O. lever ☐
5. Hydraulic System:
 ● Selector lever for position control ☐
- Flow control operation ☐
6. 4-wheel drive lever operation ☐
7. Low speed (creeper) lever ☐
8. Operation of H.S.T ☐

TRACTOR MODEL NO. _____

INSPECTION PERFORMED
WARRANTY EXPLAINED

TRACTOR SERIAL NO. _____

OWNER'S SIGNATURE

DATE

DEALER'S SIGNATURE

DATE

50-HOUR SERVICE CHECK AND ADJUST AS REQUIRED

INOPERATIVE SERVICE CHECKS

1. Tire pressure ☐
2. Check air cleaner hose connection ☐
3. Replace diesel fuel filter(s) ☐
4. Tighten in-line pump delivery
valve holders ☐
5. Radiator coolant level ☐
6. Fan belt tension ☐
7. Battery cleanliness and vent openings,
electrolyte level and charge ☐
8. All electrical cables, terminals
and wires ☐
9. Drain and refill engine oil ☐
10. Replace engine oil filter ☐
11. Power steering reservoir oil level ☐
12. Transmission and rear axle
oil level ☐
13. Front differential and front axle
oil level (4WD) ☐
14. Injection pump timing ☐
15. Cylinder head bolt torque ☐
16. Replace hydraulic system oil filter ☐

17. Replace H.S.T. cartridge oil filter ☐
18. Bolt torque check of ROPS
and seat belt ☐

OPERATIVE SERVICE CHECKS

1. Lights and instruments for proper
operation, and fuel shut down
with key switch OFF ☐
 2. Fluid and oil leaks ☐
 3. Maximum no-load speed and
idle speed adjustments ☐
 4. Starting and starter safety switches ☐
 5. Valve lash, engine ☐
 6. Hydraulic system:
 ● Selector lever for position
 control operation ☐
 - Flow control operation ☐
- (Note: Flow control only on
H.P.L. lowering rate
speed can be adjusted)

PERFORMANCE SERVICE CHECKS

1. Engine operation including throttle
and governor operation ☐
2. Transmission including clutch ☐
3. Steering control ☐
4. Differential lock engagement
and disengagement ☐
5. Brake action ☐
6. All optional equipment and
accessories ☐
7. Hydrostatic Transmission ☐

TRACTOR MODEL NO. _____

INSPECTION PERFORMED

TRACTOR SERIAL NO. _____

OWNER'S SIGNATURE

DATE

DEALER'S SIGNATURE

DATE

PRE-DELIVERY SERVICE CHECK AND ADJUST AS REQUIRED

INOPERATIVE SERVICE CHECKS

1. Tire pressure ☐
2. Air cleaner element and hose connections ☐
3. Radiator coolant level ☐
4. Fan belt tension ☐
5. Battery cleanliness, vent openings, electrolyte level, and charge ☐
6. Engine oil level ☐
7. Power steering reservoir oil level ☐
8. Transmission and rear axle ☐
9. Front axle and front differential oil level (4WD) ☐
10. Hydraulic Lift control adjustment ☐
11. Upper link, and hitch ☐
12. Brake adjustment and pedal equalization ☐
13. Rear wheel disc and hub bolts for tightness ☐
14. Front wheel hub bolts for tightness (4WD) ☐

15. Front wheel toe-in ☐
16. Fuel level ☐
17. Sheet metal and paint condition ☐
18. Check lift rod for proper operation ☐
19. Drain diesel fuel filter ☐

SAFETY ITEMS CHECKS

1. ROPS installed ☐
2. Seat belts installed ☐
3. Bolt torque check of ROPS and seat belt ☐
4. PTO master shield installed ☐
5. SMV emblem installed ☐
6. Safety decals installed ☐
7. Neutral start switches operation ☐
8. Parking brake & latch operation ☐
9. Flashing lights/tail lights operation ☐
10. Operator's Manual ☐

OPERATIVE SERVICE CHECKS

All operating checks are to be performed with the tractor at normal operating temperature

1. Lights and instruments for proper operation, and fuel shut down with key switch OFF ☐
2. Fluid and oil leaks ☐
3. Maximum no-load speed and idle speed adjustments ☐
4. P.T.O. engagement and disengagement ☐
- Clutch pedal and P.T.O. lever ☐
5. Hydraulic System:
 - Selector level for position control ☐
 - Flow control operation ☐
6. 4-wheel drive lever operation ☐
7. Low speed (creeper) lever ☐
8. Operation of H.S.T ☐

TRACTOR MODEL NO. _____

INSPECTION PERFORMED
WARRANTY EXPLAINED

TRACTOR SERIAL NO. _____

OWNER'S SIGNATURE

DATE

DEALER'S SIGNATURE

DATE

50-HOUR SERVICE CHECK AND ADJUST AS REQUIRED

INOPERATIVE SERVICE CHECKS

1. Tire pressure ☐
2. Check air cleaner hose connection ☐
3. Replace diesel fuel filter(s) ☐
4. Tighten in-line pump delivery valve holders ☐
5. Radiator coolant level ☐
6. Fan belt tension ☐
7. Battery cleanliness and vent openings, electrolyte level and charge ☐
8. All electrical cables, terminals and wires ☐
9. Drain and refill engine oil ☐
10. Replace engine oil filter ☐
11. Power steering reservoir oil level ☐
12. Transmission and rear axle oil level ☐
13. Front differential and front axle oil level (4WD) ☐
14. Injection pump timing ☐
15. Cylinder head bolt torque ☐
16. Replace hydraulic system oil filter ☐

17. Replace H.S.T. cartridge oil filter ☐
18. Bolt torque check of ROPS and seat belt ☐

OPERATIVE SERVICE CHECKS

1. Lights and instruments for proper operation, and fuel shut down with key switch OFF ☐
2. Fluid and oil leaks ☐
3. Maximum no-load speed and idle speed adjustments ☐
4. Starting and starter safety switches ☐
5. Valve lash, engine ☐
6. Hydraulic system:
 - Selector lever for position control operation ☐
 - Flow control operation ☐

Note: Flow control only on H.P.L. lowering rate speed can be adjusted

PERFORMANCE SERVICE CHECKS

1. Engine operation including throttle and governor operation ☐
2. Transmission including clutch ☐
3. Steering control ☐
4. Differential lock engagement and disengagement ☐
5. Brake action ☐
6. All optional equipment and accessories ☐
7. Hydrostatic Transmission ☐

TRACTOR MODEL NO. _____

INSPECTION PERFORMED

TRACTOR SERIAL NO. _____

OWNER'S SIGNATURE

DATE

DEALER'S SIGNATURE

DATE



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