

SHIBAURA

OPERATOR'S MANUAL (EN)

MODEL

ST450



IHI Shibaura Machinery Corporation

Explore the Engineering Edge

IHI GROUP

TO THE OWNER

This manual contains information concerning the adjustment and maintenance of your SHIBAURA Model ST450. You have purchased a dependable machine, but only by proper care and operation can you expect to receive the performance and long service built into this tractor. Please have all operators read this manual carefully and keep it available for ready reference. If you lose or damage this manual, ask a new manual to SHIBAURA dealer right away.

This machine is designed and made solely for use in customary agricultural or similar operations such as to pull, to carry and to power a variety of mounted or towed equipment, although within some physical limits. Only attachments recommended and approved by SHIBAURA should be used with your tractor.

Your SHIBAURA dealer will instruct you in the general operation of your tractor. (Refer to the "Delivery Report" at the back of this manual.) Your dealer's staff of factory-trained service technicians will be glad to answer any questions that may arise regarding the operation of your tractor.

Your SHIBAURA dealer carries a complete line of genuine SHIBAURA service parts. These parts are manufactured and carefully inspected to insure high quality and accurate fitting of any necessary replacement parts. Be prepared to give your dealer the model and serial number of the tractor, when ordering parts. Locate these numbers now and record them below. Refer to the "General Information" section of this manual for the location of the model and serial numbers of your tractor.

Model _____

Serial Number _____



⚠ CAUTION ⚠

This safety alert symbol indicates important safety messages in this manual. When you see this symbol, carefully read the message that follows and be alert to the possibility of personal injury or death.

⚠ CAUTION ⚠

Pictures in this manual may show protective shielding open or removed to better illustrate a particular feature or adjustment.

Be certain, however, to close or replace all shielding before operating the machine.

IMPROVEMENTS

SHIBAURA, Corp. is continually striving to improve its products. We reserve the right to make improvements or changes when it becomes practical and possible to do so, without incurring any obligation to make changes or additions to the equipment sold previously.

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SECTION 1

GENERAL INFORMATION AND SAFETY

GENERAL INFORMATION

PLEASE READ CAREFULLY:

For a complete list of the pre-delivery service checks performed by your dealer, refer to the DELIVERY REPORT 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.

A PRODUCT IDENTIFICATION PLATE (Figure 1-1) is located on the right-hand side of the front frame (Figure 1-2). 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.

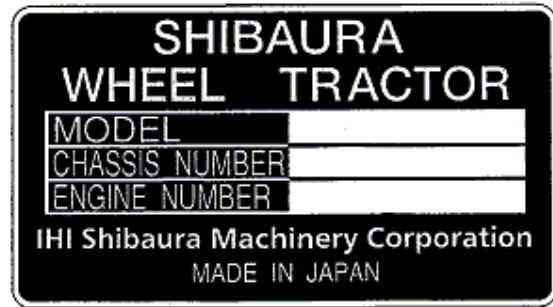


Figure 1-1

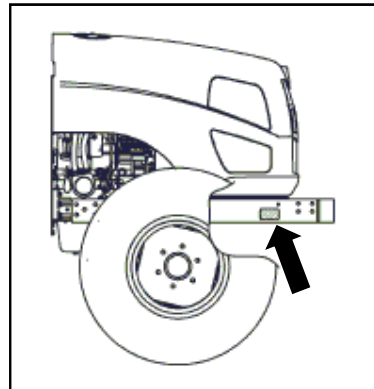


Figure 1-2

ABOUT THIS MANUAL

This manual gives information for use of your machine, as intended and under the conditions foreseen by the manufacturer during normal operation and routine service and maintenance. Read and understand; keep it in good condition and always safely store it in the provided box in the back of your seat for later easy retrieval.

This manual does not contain all the information related to periodical service, converting and repairs to be carried out by professional service personnel.

The Table of Contents page(s) are provided to have an overview of main manual's topics. A detailed alphabetic index is available at the end of this manual for locating specific items.

This manual is written specifically for your tractor so it is important that you make a note of the print number and issue date which can be found on the cover. In the event the manual is lost or damaged it can be replaced with the correct version.

SAFETY

Pages 1 - 4 to 1 - 22 inclusive list the precautions to be observed to ensure your safety and the safety of others. Read the safety precautions and follow the advice offered **before** operating the tractor.

CLEANING THE TRACTOR

Your tractor is a state-of-the-art machine with sophisticated, electronic controls. This should be taken into consideration when cleaning the tractor, particularly if using a high-pressure washer. Even though every precaution has been taken to safeguard electronic components and connections, the pressure generated by some of these machines is such that complete protection against water ingress cannot be guaranteed.

When using a high pressure washer, do not stand too close to the tractor and avoid directing the jet at electronic components, electrical connections, breathers, seals, filler caps, etc. Never direct a cold-water jet at a hot engine or exhaust.

WARRANTY

Your tractor is warranted according to legal rights in your country and the contractual agreement with the selling dealer. No warranty shall, however, apply if the tractor has not been used, adjusted and maintained according to the instructions given in the Operator's Manual.

SERVICE PARTS

It should be pointed out that genuine parts have been examined and approved by the Company. The installation and/or use of 'non-genuine' products could have negative effects upon the design characteristics of your tractor and thereby affect its safety. The Company is not liable for any damage caused by the use of 'non-genuine' parts and accessories. Only genuine SHIBAURA replacement parts should be used. The use of non-genuine parts may invalidate legal approvals associated with this product.

It is prohibited to carry out any modifications to the tractor unless specifically authorized, in writing, by the After Sales Service department of the Company.

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

INTENDED USE OF YOUR TRACTOR



WARNING

Your tractor is designed according to European directives related to health and safety risks; though it has been designed to minimize all the potential risks it is mandatory to carefully read, understand and observe all the decals and labels and to always refer to information and descriptions outlined in this manual to prevent all residual potential risks. In case you may need further assistance please do not hesitate to contact your SHIBAURA dealer.

Your tractor is designed and made solely for use in customary agricultural or similar operations such as to pull, to carry and to power a variety of mounted or towed equipment, although within some physical limits. The working speed and performance may depend on a number of various parameters, such as weather and terrain conditions. Though the tractor is designed to perform in combination with a variety of equipment, there may be a number of combinations of above parameters, for which there is severe degradation of performance of the tractor and/or its mounted or trailed equipment. If you notice degradation of performance, contact your dealer for assistance, he may have useful information for improvements, or a kit may be available to enhance the performance. Please carefully read and consider following precautions:

- Do not use the tractor for another purpose other than that intended by the manufacturer and outlined in this manual
- Do not use the tractor beyond its limits of terrain gradient and stability. Using the tractor beyond these limits may result in roll over or tip over. Observe the recommendations in this manual.
- Do not use the tractor on higher speeds than allowed by the load and the environment. A wet surface or other low adherence conditions may increase the braking distance or result in vehicle instability. Always adapt your traveling speed according to the load of the vehicle and the characteristics of the road
- Do not use the tractor near or on soft verges of canals and brooks or banks and verges that are undermined by rodents. The tractor may sink sideways and roll over.
- Do not use the tractor on brittle bridge – heads and poor bridge floors. These constructions may collapse and cause roll over of the tractor. Always inspect the condition and carrying capacity of bridges and ramps prior to crossing.
- Do not use equipment mounted on the tractor which is not correctly matching and firmly fixed. Such equipment may increase the risk for roll over and hit the tractor when coming loose. Ensure that the dimensions of the three – point linkage interface of both the tractor and the equipment are matching according to the categories defined in ISO 730. Ensure that the dimensions and speed of the PTO shaft on the tractors are matching those of the equipment.
- Do not use the tractor in combination with equipment, without having consulted the specific Operator's Manual provided with the equipment. The tractor is a universal tool to carry, tow and drive a variety of equipment. This manual alone cannot provide you with all the information required for the safe operation of the combination.
- Do not use the tractor for pulling work, in cases where you do not know whether the load will yield, for instance when pulling stumps; the tractor may flip over when the stump is not yielding.
- Be cautious that the center of gravity of the tractor may increase when loads on the front – end loader or the three point linkage are raised. In these conditions, the tractor may roll over earlier than expected.
- Do not leave from the tractor without shutting down the PTO, shifting the transmission to park or neutral and applying the park brake, unless continued PTO operation is required for some equipment, such as pumps or wood chippers. The latter equipment may have an emergency stop device on the equipment itself, as human intervention is needed during operation. But other equipment, engaged and driven by the tractor will have no means to stop the power transmission, other than the PTO clutch of the tractor.

PRECAUTIONARY STATEMENTS

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 “**NOTE**” and “**IMPORTANT**” are followed by specific instructions. These statements are intended for machine safety.

NOTE: *This text stresses a correct operating technique or procedure.*

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.*

INFORMATION

NOTE: *Instructions used to identify and present supplementary information.*



WHENEVER YOU SEE THIS SYMBOL

IT MEANS:

ATTENTION!

BECOME ALERT!

YOUR SAFETY IS INVOLVED!



SAFETY PRECAUTIONS



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

Carefully review the procedures given in this manual with all operators. Note that the list of examples is not exhaustive. It is important that all operators be familiar with and follow safety precautions.

THE TRACTOR

1. Read the Operator's Manual carefully before using the tractor. Lack of operating knowledge can lead to accidents.
2. Only allow properly trained and qualified persons to operate the tractor.
3. Use an approved roll bar for safe operation. Overturning a tractor without a roll bar can result in death or injury. If your tractor is not equipped with a roll bar, see your SHIBAURA Dealer.
4. Always use the seat belt. The only instance when the seat belt should not be used is if the roll bar has been removed from tractor or folding ROPS is in down position.
5. If a front-end loader is to be installed, always use a FOPS (Falling Object Protective Structure) canopy to avoid injury from falling objects.
6. 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.
7. Do not permit anyone but the operator to ride on the tractor. There is no safe place for extra riders.
8. 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.
9. Install all guards before starting the engine or operating the tractor.

DRIVING THE TRACTOR

1. Do not drive the tractor or any attachments while under the influence of alcohol, medication, and controlled substances or when tired.
2. Always sit in the driver's seat while starting or driving the tractor. Do not start the engine or operate controls while standing beside the tractor.
3. When driving on public roads, have consideration for other road users. Pull in to the side of the road occasionally to allow any following traffic to pass. Do not exceed the legal speed limit set in your country for agricultural tractors.
4. Dip the tractor lights when meeting a vehicle at night. Make sure the lights are adjusted to prevent blinding the driver of an oncoming vehicle.
5. Use the flasher/turn signal lights when traveling on public roads both day and night (unless prohibited by law).
6. Reduce speed before turning or applying the brakes. Brake both wheels simultaneously when making an emergency stop. Ensure that both brake pedals are locked together when traveling at road speeds or when on public roads to ensure correct operation of trailer brakes, balanced operation of the tractor brakes.
7. Use extreme caution and avoid hard application of the tractor brakes when towing heavy loads at road speeds.

SECTION 1 – GENERAL INFORMATION AND SAFETY

8. To avoid overturns, drive the tractor with care and at a safe speed. Use extra caution, including but not limited to when operating over rough ground, when crossing ditches or slopes, and when turning corners.
9. Use extreme caution when rise the front-end loader or the three-point linkage implements. In these conditions, the center of gravity of the tractor may transfer to upward and tractor may roll over, earlier than expected.
10. Keep the tractor in the same gear when going downhill as used when going uphill. Do not coast or free wheel down hills.
11. Any towed vehicle with a total weight exceeding that of the towing tractor must be equipped with brakes for safe operation.
12. Never apply the differential lock when turning. When engaged, the differential lock will prevent the tractor from turning.
13. If the tractor becomes stuck or the tires become frozen to the ground, reverse the tractor to prevent overturning.
14. Always check overhead clearance, especially when transporting the tractor. Watch where you are going, especially at row ends, on roads, around trees and low hanging obstacles.
15. Use extreme caution when operating on steep slopes.
3. Always sit in the tractor seat when starting the engine or operating controls. Do not start the engine or operate controls while standing beside the tractor.
4. Do not bypass the neutral start switches. Consult your SHIBAURA dealer if your neutral start controls malfunction.
5. Use jumper cables only in the recommended manner. Improper use can result in tractor runaway.
6. Avoid accidental contact with the gearshift lever while the engine is running. Unexpected tractor movement can result from such contact.
7. Before leaving the tractor, park the tractor on level ground, apply the parking brake, lower the attached implements to the ground, disengage the PTO, and turn the engine off. Never get off the tractor while it is in motion.
8. Do not park the tractor on a steep incline.
9. Do not run the tractor engine in an enclosed building without adequate ventilation. Exhaust fumes can cause death or illness.
10. If the power steering or engine ceases operating, stop the tractor immediately.
11. 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 overturn.

OPERATING THE TRACTOR

1. Do not operate the tractor or any attachments while under the influence of alcohol, medication, and controlled substances or when tired.
2. Before starting the tractor, apply the parking brake, place the PTO control 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.
12. Always set the hydraulic selector lever in position control when attaching or transporting equipment. Ensure hydraulic couplers are properly mounted and will disconnect safely in case of accidental detachment of implement.
13. 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.

14. Depress the HST pedal slowly when driving out of a ditch, gully or up a steep hillside. Depress the HST reverse pedal promptly if the front wheels rise off the ground.
15. Ensure any attached equipment or accessories are correctly installed, are approved for use with the tractor, do not overload the tractor and are operated and maintained in accordance with the instructions issued by the equipment or accessory manufacturer.
16. Remember that your tractor, if abused or incorrectly used, can be dangerous and become a hazard both to the operator and to bystanders. Do not overload or operate with attached equipment which is unsafe, not designed for the particular task or is poorly maintained.
17. Do not leave equipment in the raised position.
18. Do not drive equipment near open fires.
19. This tractor is not provided with protection structure for operating with toxic spray chemicals. Always wear suitable personal protective equipment and clothing to suit the conditions and regulations in your country. This equates but not limited to protection of eyes, lungs, ears, head, hands and feet when working with toxic spray chemicals. Follow the directions on the chemical container.
20. Keep children (person) away from the tractor and farm machinery at all times.
4. To avoid injury, DO NOT clean, adjust, unclog, or service the PTO driven equipment when the tractor engine is running or all movement components have not completely stopped. Ensure that the PTO is disengaged.
5. Ensure the PTO master shield is installed at all times. Always replace the PTO shield cap when the PTO is not in use.

SERVICING THE TRACTOR

1. Before servicing the tractor, park it firm, flat and level surface, set the parking brake, lower all implements to the ground, place the gear shift lever in neutral, stop the engine and remove the key.
 2. To avoid sparks from an accidental short circuit, always disconnect the battery's ground cable (-) first and reconnect it last.
 3. To prevent the serious personal injury or damage to the tractor, DO NOT use the worn tools or inappropriate tools for the required application or job.
 4. 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 turn the cap slowly to the first stop and allow pressure to escape before removing the cap entirely.
 5. Keep any type of open flame away from the tractor and do not smoke while refueling. Wait for the engine to cool before refueling.
 6. Keep the tractor and equipment, particularly brakes and steering, maintained in a reliable and satisfactory condition to ensure your safety and comply with legal requirements.
 7. Keep open flame or cold weather starting aids away from the battery to prevent fires or explosions. Use jumper cables according to instructions to prevent sparks which could cause explosion.
- ### **OPERATING THE POWER TAKE OFF (PTO)**
1. When operating PTO-driven equipment, shut off the engine, disengage the PTO and wait until the PTO stops before getting off the tractor and disconnecting the equipment.
 2. Do not wear loose clothing when operating the power take-off or when near rotating equipment.
 3. When operating stationary PTO driven equipment, always place both gearshift levers in neutral, apply the tractor parking brake, and block the rear wheels front and back.

SECTION 1 – GENERAL INFORMATION AND SAFETY

8. 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 the engine and relieve pressure before connecting or disconnecting lines.
 - Tighten all connections before starting the engine or pressurizing lines.
9. 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.
10. Continuous long-term contact with used engine oil may cause skin cancer. Avoid prolonged contact with used engine oil. Wash the skin promptly with soap and water.
11. Do not modify or permit anyone else to modify or alter this tractor or any of its components or functions without first consulting a SHIBAURA Dealer
12. Do not make adjustments or repairs with the engine running. To prevent serious injury, keep hands and clothing away from rotating fan, drive belt and drive shaft.
13. 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 Dealer. If, however, service operations are to be undertaken on parts that contain asbestos, the essential precautions listed below must be observed:
 - Dust found on the unit or produced during work on the unit 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.
14. Keep the area used for servicing the machine clean and dry. Wet or oily floors are slippery.
15. Do not work under any raised attachment or hydraulically supported devices unless a suitable hoist or floor jack securely supports it and multiple jack stands. They can settle, suddenly leak down, or be accidentally lowered.
16. The ROPS and seat belt must be properly maintained, and must not be modified, drilled, or altered in any way. If the ROPS is damaged, it must be replaced and should not be straightened or welded.
17. Keep equipment clean and properly maintained.
18. Dispose of all drained fluids and removed filters properly.
19. Tractor wheels are very heavy. Handle with care and ensure, when stored, that they can not topple and cause injury.

**CAUTION**

Wear suitable personal protective equipment and clothing to suit the conditions and regulations in your country. This equates but not limited to protection of eyes, lungs, ears, head, hands and feet when operating, servicing or repairing the equipment. Always keep hair and clothing away from moving parts. Do not wear loose clothing, jewelry or other items that could entangle with levers and or moving parts.

PREVENTION OF FIRE OR EXPLOSION

1. Due to the flammable nature of some crop materials, the risk of tractor fire can be high. This risk can be minimised by frequent removal of accumulated crop material from the tractor. If oil leaks appear, correct the fault by re-torquing the bolts or replacing the gaskets as necessary.
2. When operating in flammable crop conditions, check and remove all trash or debris from the tractor each day, especially around the engine area and exhaust system.
3. Sparks or open flame can cause the hydrogen gas in a battery to explode. To prevent an explosion carry out the following:
 - When disconnecting the battery cables, remove the negative (-) cable first. When re-connecting the battery cables, connect the negative (-) cable last.
 - DO NOT short-circuit the battery terminals with a metal object.
 - DO NOT weld, grind or smoke near a battery.
4. Periodically check the tractor electrical system for loose connections or frayed insulation. Repair or replace any damaged parts.
5. Sparks from the electrical system or engine exhaust can cause an explosion and fire. Before you operate the tractor in an area with flammable dust or vapors, use a good ventilation system to remove the flammable dust or vapors.
6. Use a non-flammable cleaning solvent when cleaning parts on the tractor.
7. A fire can cause injury or death. It is advisable to have a fire extinguisher near or on the tractor when operating in conditions where a fire may occur. Ensure fire extinguishers are serviced according to the manufacturers instructions.
8. If a fire extinguisher has been used, always recharge or replace the extinguisher before operating the tractor in conditions where a fire may occur.
9. DO NOT store flammable materials (oil soaked rags etc.) on the tractor.

TRANSPORT THE TRACTOR

1. To prevent the falling accident and serious injury, before loading the tractor must be ensure that;
 - Stop the engine and apply the parking brake of trailer.
 - Place the tractor "Brake pedal lock plate" in the locked position
 - Remove the muddy soil or debris from tractor wheels and tires.
 - Keep the suitable visibility from operator seat for loading.
 - Use the running board or bridge, which have suitable strength, width, and length.
 - Fix the running board or bridge with trailer floor firmly and securely.
2. DO NOT make sharp turn on the running board, bridge or trailer floor when loading the tractor.
3. Keep the tractor in the same gear when loading the tractor. Do not coast or free wheel on the running board or bridge.
4. To prevent the overturn of tractor, use the reverse moving for running on uphill, and use the forward moving for running on the downhill of running board or bridge.
5. Fix the transporting tractor with trailer floor firmly and securely by suitable strength rope, hook, or chains.
6. To avoid traffic accident, Always check the overhead clearance of transporting tractor.

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. Keep any type of open flame away.
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 SHIBAURA approved cap. A non-approved cap may not be safe.
9. Never use fuel for cleaning purposes.
10. Arrange fuel purchases so that winter grade fuels are not held over and used in the spring.

SAFETY FRAME (ROPS)

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:

- ...modify, drill or alter the safety frame in any way. Doing so may render you liable to legal prosecution.

- ...attempt to straighten or weld any part of the safety frame or retaining brackets which have suffered damage. Doing so may weaken the structure and endanger your safety.
- ...secure any parts on the safety frame or attach your safety frame with anything other than FOPS (see page 1-11), OPS and the special high tensile bolts and nuts specified.
- ...attach chains or ropes to the safety frame for pulling purposes.
- ...take unnecessary risks even though your safety frame affords you the maximum protection possible.

SAFETY FRAME (OPS)

This tractor is not provided with OPS (Objects-Penetrating-System) structure; please carefully read the following important information especially when working in a forestry environment.

FORESTRY APPLICATIONS

This tractor is not designed for heavy forestry applications; usage is prohibited unless a certified FORESTRY KIT is installed; contact your SHIBAURA dealer to verify whether a forestry kit exists for this tractor model.

Only a forestry specific kit will provide necessary protection against falling trees (FOPS) and penetrating objects (OPS) such as toppling trees, including but not limited to, in case a rear-mounted tree grab-crane is mounted at the rear of the tractor or penetrating objects in the operator's enclosure, primarily in case a winch is mounted at the rear of the tractor.

Protection against penetrating objects (OPS) can be obtained with additional grid-guard protection installed on the tubular part of ROPS; consult your SHIBAURA dealer to check whether OPS certified KIT exists.

WORKING WITH A FRONT- END LOADER

Do not use the front – end loader, without taking precautions against falling objects. The ROPS (Roll-over Protective Structure) will NOT provide protection against falling objects.

Please consider following precautions when working with a front end loader:

- Install a FOPS (Falling Objective Protection System) structure. Contact your SHIBAURA dealer to check whether FOPS certified KIT exists.
- Do not lift the front – end loader to a height from which objects may fall or roll on the driver.
- Always use the correct attachment (grab forks, buckets etc.) for the specific task to ensure that the load is securely kept in place.
- Only install a front – end loader with a parallel guidance system and use it all the time; this system will ensure that the load in the bucket will remain horizontal, regardless of the height of the lifting booms.
- Do not allow bystanders in the maneuvering zone of the tractor equipped with a front—end loader. Do not allow bystanders to stand near or under the lifted bucket of a front – end loader
- Do not use the front – end loader as a lift for persons for activities that must be done at a certain height. (e.g. cleaning gutters)
- Do not use the front – end loader in an area with overhead power lines. In case of contact with overhead power lines, jump from the tractor without making instant contact between tractor and ground. When possible, disconnect the power lines from the grounds

FIXATION POINTS FOR FRONT- END LOADER

Generally, mount post frames of Front-End Loader are installed on the side of clutch housing in Figure 1-3, with size M16 and grade 7T or more bolts.

Front support frames of Front-End Loader are installed on either of the side of front frame of the tractor in Figure 1-4.

Additional support frames between the rear axle of Tractor in Figure 1-5, and the mount post frames of Front-End Loader should be necessary to obtain solid strength and suitable safety.

Consult your SHIBAURA dealer concerning the fixation points on body of the tractor where and how the Front-End Loader must be installed.



Figure 1-3

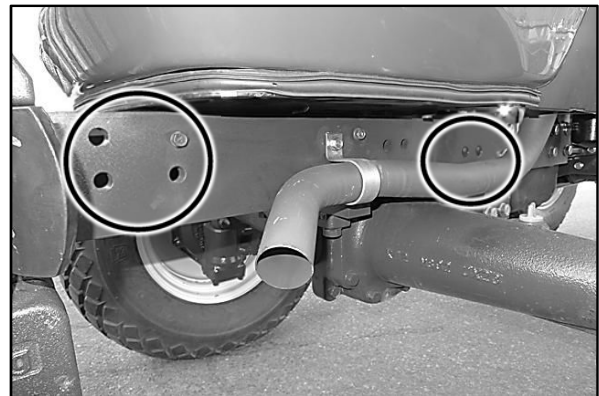


Figure 1-4



Figure 1-5

ECOLOGY AND THE ENVIRONMENT

Soil air, and water are vital factors of agriculture and life in general. When legislation does not yet rule the treatment of some of the substances, which are required by advanced technology, common sense should govern the use and disposal of products of a chemical and petrochemical nature.

The following are recommendations, which may be of assistance:

- Become acquainted with and ensure that you understand the relative legislation applicable to your country.
- Comply with legal regulations and guidelines for disposal of empty containers for fuel, cooling water (coolant), oil, grease; fuel/oil filters; batteries; machine itself; machine accessories; and packaging materials.
- Where no legislation exists, obtain information from suppliers of oils, filters, batteries, fuels, antifreeze, cleaning agents, etc., with regard to their effect on man and nature and how to safely store, use and dispose of these substances. Agricultural consultants will, in many cases, be able to help you as well.

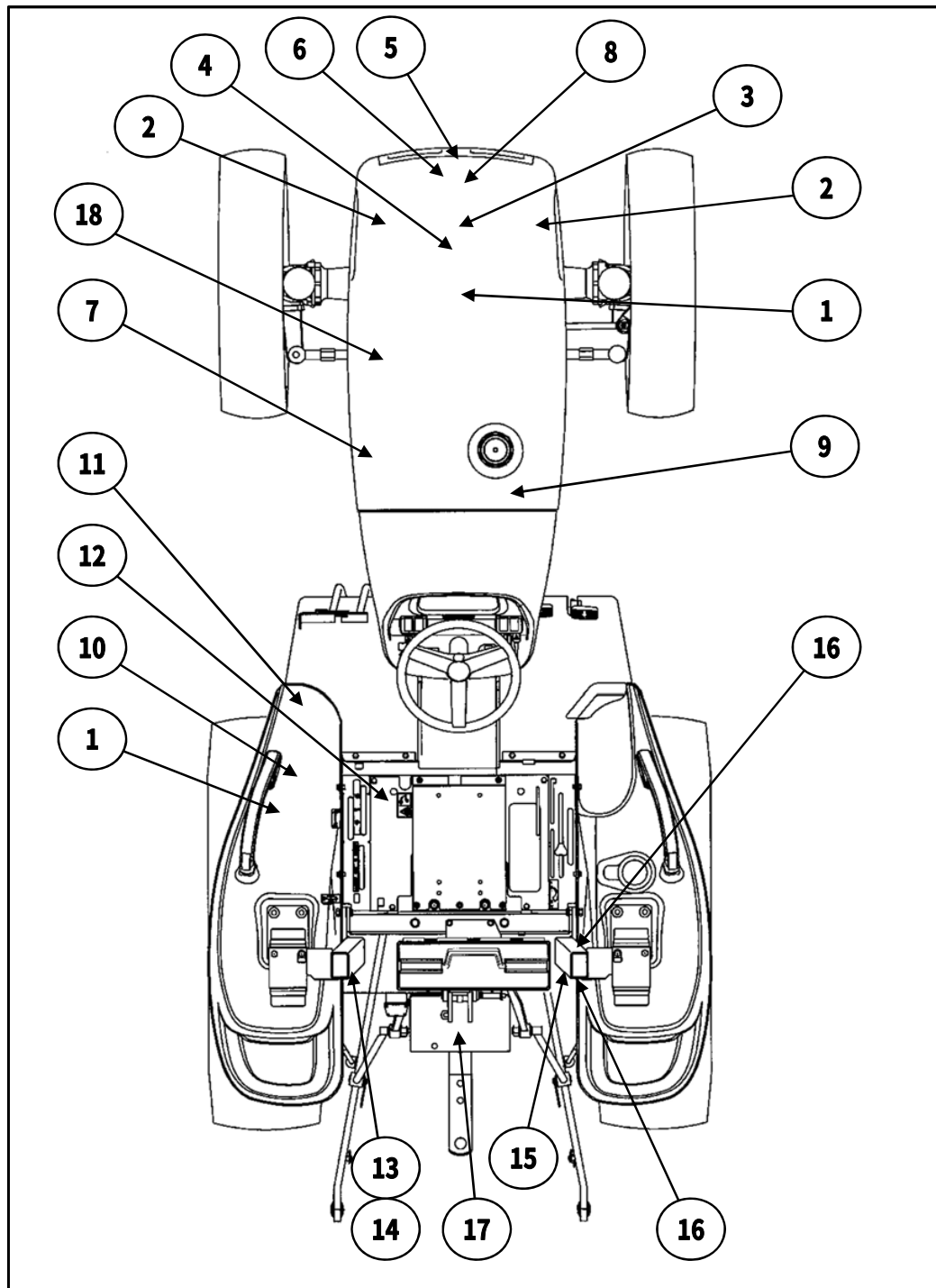
HELPFUL HINTS

1. Avoid filling tanks using cans or inappropriate pressurized fuel delivery systems, which may cause considerable spillage.
2. In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of them contain substances, which may be harmful to your health.
3. Modern oils contain additives. Do not burn contaminated fuels and or waste oils in ordinary heating systems.
4. Avoid spillage when draining off used engine coolant mixtures, engine, gearbox and hydraulic oils, brake fluids, etc. Do not mix drained brake fluids or fuels with lubricants. Store them safely until they can be disposed of in a proper way to comply with local legislation and available resources.
5. Modern coolant mixtures, i.e. antifreeze and other additives, should be replaced every two years. They should not be allowed to get into the soil but should be collected and disposed of safely.
6. Do not open the air-conditioning system yourself. It contains gases, which should not be released into the atmosphere. Your dealer or air conditioning specialist has a special extractor for this purpose and will have to recharge the system properly.
7. Repair any leaks or defects in the engine cooling or hydraulic system immediately.
8. Do not increase the pressure in a pressurized circuit as this may lead to a component failure.
9. Protect hoses during welding as penetrating weld splatter may burn a hole or weaken them, allowing the loss of oils, coolant, etc.

SAFTY DECALS

The decals reproduced on the following pages were installed on your tractor in the positions indicated in the drawings below. They are intended for your safety and for those working with you. Please take this Manual and walk around your tractor, noting the location of the decal and their significance. Review the decals and operating instructions detailed in this Manual with the machine operators. Keep the decals clean and legible. If they become damaged or illegible, obtain replacements from your SHIBAURA dealer.

DECAL PLACEMENT GUIDE



1. Location:
 - Left hand side fender.
 - Inside of hood.

WARNING: Read and understand all the warning notes printed in the Operator's Manual. In particular, read the General Information and Safety section in the Operator's Manual.

Part No. 390197900



2. Location: Left and right-hand side of fan guard

WARNING: To prevent serious injury, keep hands and clothing away from rotating fan and drive belt.

Part No. 390198020



3. Location: On the radiator cap

WARNING: Pressurized cooling system. Allow to cool then remove cap carefully. Using a cloth, turn cap to the first stop and allow pressure to subside before removing cap completely.

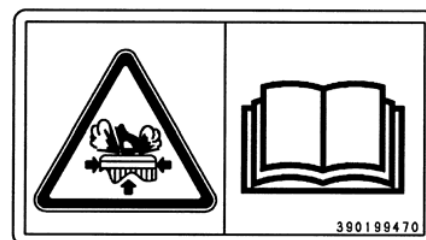
Part No. 490992490



4. Location: Beside of the radiator cap

WARNING: Pressurized cooling system. Allow to cool then remove cap carefully. Using a cloth, turn cap to the first stop and allow pressure to subside before removing cap completely.

Part No. 390199470



5. Location: Front of battery stand.

DANGER: Explosive gas. Avoid any open fires. Corrosive acid. Wear eye protection.

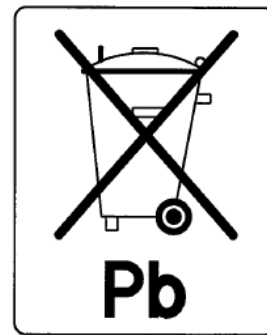
Part No. 390199450



6. Location: Battery.

CAUTION: Comply with legal regulations and guidelines for disposal of battery.

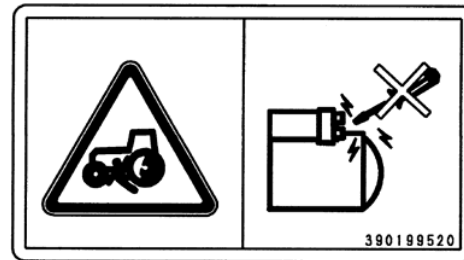
Part No. 390199430



7. Location: Starter Motor.

WARNING: Do not start the engine by shorting across the starter terminals. Tractor will start in gear if normal circuitry is bypassed. **NEVER** start the engine while on the ground. Start engine only from operator's seat, with transmission in neutral.

Part No. 390199520



8. Location: Air cleaner.

DANGER: Do not use ether with the glow plug starting aid or spray. Cause an explosion and fire.

Part No. 390199500



9. Location: Beside of fuel filler cap.

DANGER: Keep any type of open flame away.
Cause an explosion and fire. Diesel fuel only.

Part No. 490992430



10. Location: Left hand side fender.

WARNING: Read the Operator's Manual
before attempting to tow the tractor.

Part No. 390199510



11. Location: Front of Left hand side fender.

CAUTION: Wear close fitting clothing and use
all the Personal Protective Equipment
appropriate for the task.

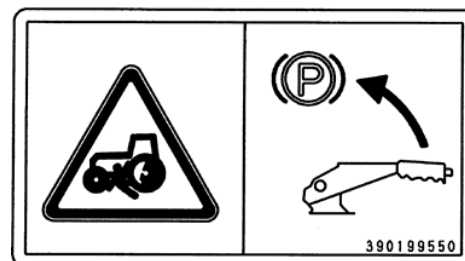
Part No. 390199530



12. Location: Beside of Parking Brake Lever.

WARNING: The parking brake should be
applied whenever the tractor is parked.

Part No. 390199550

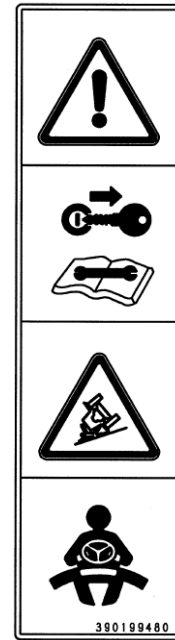


13. Location: Left hand side ROPS.

WARNING: Always turn the key to OFF position and remove it, before performing any intervention or service on the tractor; always refer to the Operator's manual for specific information.

WARNING: Always wear the seat belt when the tractor is equipped with a ROPS with raised locking position.

Part No. 390199480



14. Location: Left hand side ROPS.

WARNING: To avoid serious injury, always raise the ROPS and lock it, when you drive or operate the tractor.

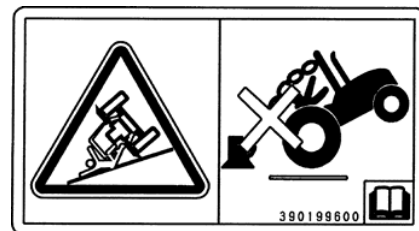
Part No. 390198011



15. Location: Right hand side ROPS.

WARNING: Pull only from the drawbar. Always use the drawbar or the lower links in the lowered position, when performing pull-type work.

Part No. 390199600



16. Location: Right hand side ROPS.

WARNING: To avoid injury, do not stand on the implement, trailed vehicle or between the implement, trailed vehicle and tractor while operating the Hydraulic Power Lift, Rear remote control or PTO controls. Always operate the Hydraulic Power Lift, Rear remote control or PTO controls from operator seat.

Part No. 390199460



17. Location: PTO Guard.

WARNING: To avoid injury, DO NOT clean, adjust, unclog, or service the PTO driven equipment when the tractor engine is running or all movement components have not completely stopped. Ensure that the PTO control lever is disengage positioned.

Part No. 390199490



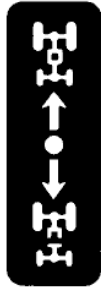
18. Location: Exhaust Muffler.

WARNING: Hot surfaces. To prevent injury, keep hands and body away from hot surfaces.

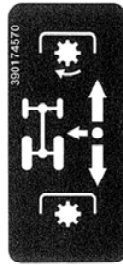
Part No. Printed on muffler body



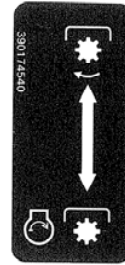
INSTRUCTION DECALS



Front-Wheel
Drive Control Lever
PART NO: 390173871
LOCATION: Lower Left
Side of Operator's
Platform



MID-PTO
Control Lever
PART NO: 390174570
LOCATION: Left Side
Fender



PTO Clutch
Control Lever
PART NO: 390174540
LOCATION: Left Side
Control Panel



Position Control Lever
PART NO: 390372490
LOCATION: In Side of
Right Fender



Range Selector Lever
PART NO: 390174550
LOCATION: Left Side
Control Panel



Rear PTO Speed
Shift Lever
PART NO: 390174110
LOCATION: Left Side
Control Panel



Road Light Switch
PART NO: 390380791
LOCATION: Left Side
of Dash



Road Light High
Beam Switch
PART NO: 390230810
LOCATION: Left Side
of Dash



Turn Signal
PART NO: 390380960
LOCATION: Left Side
of Dash



Throttle
PART NO: 390430290
LOCATION: Right Side
of Dash



Hazard Flasher
Light Switch
PART NO: 390380770
LOCATION: Right Side
of Dash



Horn Switch
PART NO: 390230970
LOCATION: Right Side
of Dash



HST Hi / Lo Speed
Control Switch
PART NO: 390174560
LOCATION: Left Side
of Dash



Hydraulic Manifold
Operation
(See Operator's Manual)
PART NO: SBA390198320
LOCATION: Top of
Hydraulic Manifold Block



Differential Lock
PART NO: 390198301
LOCATION: Above
Pedal Right Side of
Operator's Platform



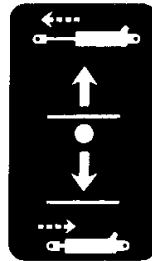
Starter Switch
PART NO: 390197280
LOCATION: Starter
Switch, Right Side of
Instrument Panel



Flow Control Valve
PART NO: 390372471
LOCATION: Top of
Flow Control Knob



Engine Oil
PART NO: 390230220
LOCATION: Engine Oil
Filler Cap



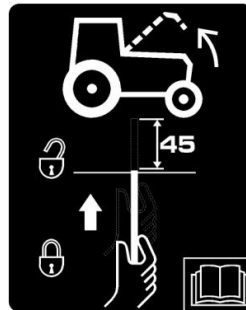
Rear Remote Control
(Optional)
PART NO: 390370300
LOCATION: Right Side
Control Panel



Draft Control Lever
(Optional)
PART NO: 390171300
LOCATION: Right Side
Control Panel



Steering Wheel Tilt
PART NO: 390198970
LOCATION: Left side of
steering column shroud



Hood Latch
PART NO: 390198960
LOCATION: Right side of
Front Frame

UNIVERSAL SYMBOLS

As a guide to the operation of your tractor, various universal symbols have been utilized on the instruments, controls, switches. 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				

AIRBORNE NOISE EMISSION

In accordance with EC directives, the noise levels of tractors covered by this Manual and marketed within the European Union are as follows:

Model	Transmission	Noise level at Operator's ear *		External noise **	
		Closed – dB(A)	Open – dB(A)	Moving dB(A)	Stationary dB(A)
ST450 4WD	HST	N/A	89.4	80	77

* Test results are in accordance with directive 2009/76/EC Annex I.

** Test results are in accordance with directive 2009/63/EC Annex VI.

HAZARDS RELATED TO VIBRATION EXPOSURE



WARNING



The Whole Body Vibration level will depend on a lot of parameters, some of them machine related, others terrain related and many driver related.

The properties of the track or field surface and the driving speed will be the predominant parameters.



WARNING



Machine vibrations cause discomfort to the operator and in some cases his health and safety may be at risk.

Make sure the machine is in good condition and that the service interval work has been carried out correctly.

Check the tyre pressure, the steering and the brake system.

Check that the operator's seat and adjustment controls are in good condition and then adjust the seat to suit the operator's size and weight.

Operate all controls consistently so the machine works smoothly and modify your driving to suit working conditions.

During travel, adjust your speed and slow down if necessary.

	Vibration* m/s ² at (testing mass)	
Seat model	Light weight operator	Heavy weight operator
COBO GT50/M91	1.13	0.75
COBO SC79/M91		
COBO SC250/M91		

* Test results are in accordance with directive 78/764/EEC.

SECTION 2

OPERATION

CONTROLS AND INSTRUMENTS

SEAT AND MIRROR

Adjusting the Tractor Seat

Your SHIBAURA tractor equipped with an adjustable suspension seat.

To adjust the seat fore and aft, move the release lever (1) in Figure 2-1, towards the fender, slide the seat to the desired position, releasing the lever to lock.

The seat height is controlled variable by the knob (2) in Figure 2-1. 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) in Figure 2-1, straight up, turn it clockwise to be for "+" and turn it counter-clockwise to be for less "-".

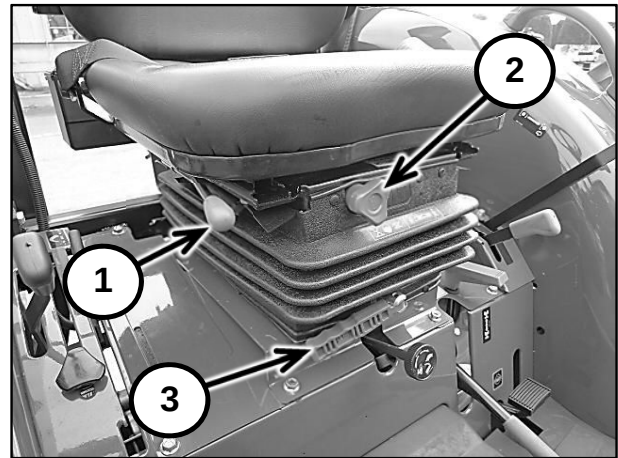


Figure 2-1

Adjusting the seat belt

To lengthen the seat belt (4) in Figure 2-2, tip the buckle end down and pull on the buckle until the ends can be joined. To shorten the belt, buckle it, and then pull on the loose end until the belt is snug.

Use soap and water to clean the seat belt if necessary. Do not use carbon tetrachloride, naphtha, etc., as these substances will weaken the webbing. Additionally, do not bleach or re-dye the webbing, as these products will also weaken the webbing.

Replace the seat belt if it becomes damaged or worn.

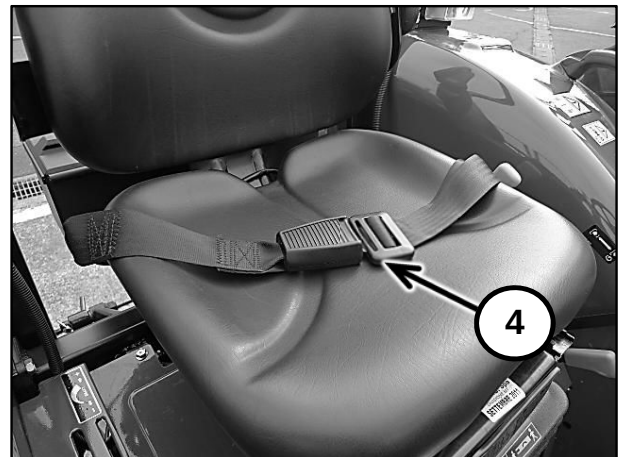


Figure 2-2

Operator Seat Presence Switch

The operator presence switch is located beneath the seat and is connected to the engine start and run systems.

To start the tractor the operator MUST be in the seat to energize the fuel system. If the operator leaves the seat with the engine running, the fuel system will be shut down and the engine will stop.

Adjusting the mirror

Your tractor equipped with a mirror (1) in Figure 2-3. The mirror can be moved fore/aft or outside/inside as desired.

To adjust the mirror, loosen the screw-tightened clamp for repositioning the mirror.

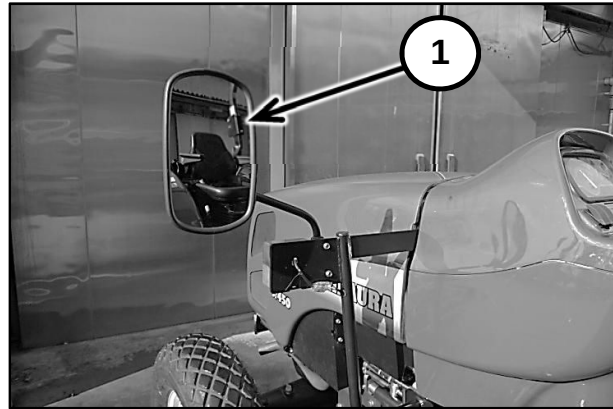


Figure 2-3

STEERING WHEEL

Adjusting the Steering Wheel

The tractor is equipped with an adjustable steering wheel which can tilt.

To tilt the wheel, push forward the lever (2) in Figure 2-4, and move the steering wheel forward or backward to the desired position. If the wheel is not held in position when the lever is raised, the steering wheel will spring to its most forward position. Use this feature to gain additional clearance when mounting and dismounting the tractor.

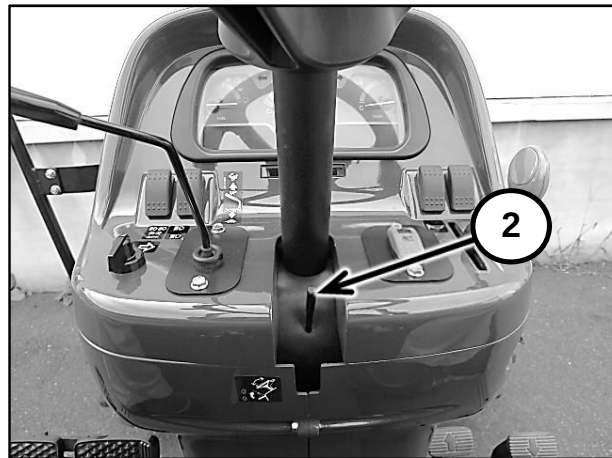


Figure 2-4

ROLLOVER PROTECTIVE STRUCTURE (ROPS)

Your tractor is equipped with a folding Roll Over protective Structure (ROPS). If, for some reason, the ROPS was deleted by the original 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.



Figure 2-5

⚠ 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.

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 (1) in Figure 2-6, lower the upper of the ROPS rearward.

Install two lock pins to anchor the ROPS firmly once in position (Figure 2-7). To rise the ROPS reverse the above procedure.

⚠ WARNING ⚠

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

⚠ WARNING ⚠

Always wear the seat belt when the tractor is equipped with a ROPS. However, if the ROPS has been removed from the tractor, or if the ROPS is in the folded position, the seat belt should not be used.

⚠ WARNING ⚠

Always pull from the tractor the drawbar. DO NOT attach chains or ropes to the ROPS for pulling purposes, as the tractor can tip backwards

⚠ WARNING ⚠

When driving through door openings or under low overhead objects, make sure there is sufficient clearance for the ROPS.

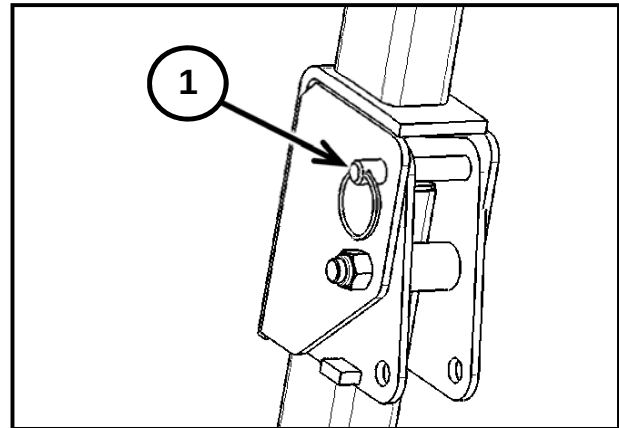


Figure 2-6

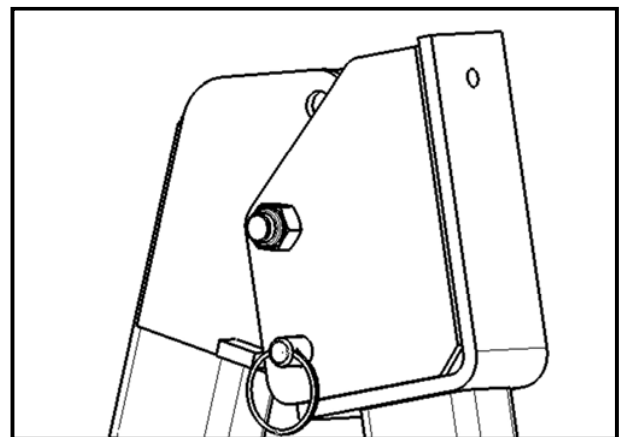


Figure 2-7

INSTRUMENT PANEL

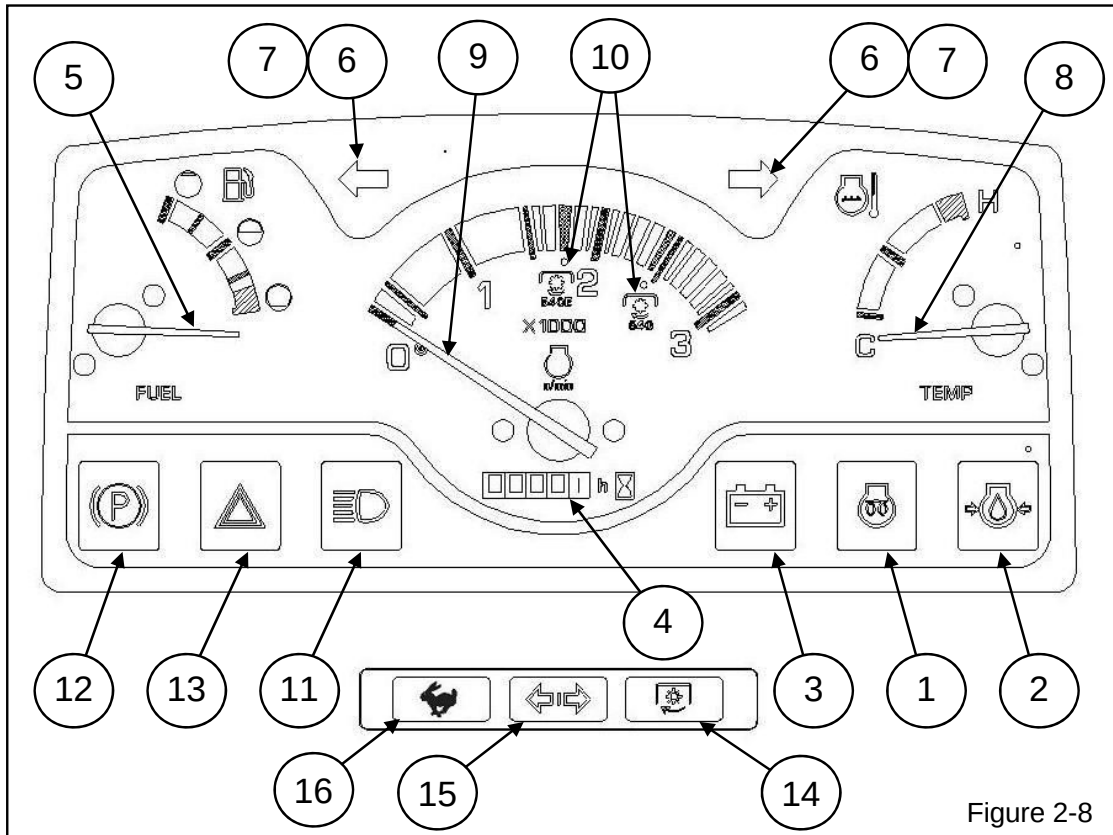


Figure 2-8

1. Cold Starting Indicator Light

Illuminate 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.

2. 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.

3. Battery Charge Warning Light

Illuminates when the key switch is in the "ON" or "HEAT" positions and goes out when the engine is started. If this bulb becomes lit during operation, it indicates that 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 3000 RPM. Engine speeds below 3000 RPM accumulate engine hours at a slower rate than clock hours. Engine speeds above 3000 RPM accumulate engine hours faster than clock hours. Use the proof meter as a guide to determine hourly service and maintenance intervals.

5. Fuel Gauge

Indicates the amount of diesel fuel remaining in the tank. The gauge is activated when the key switch is in the "ON" or "HEAT" positions. It will register empty with the key switch in the "STOP" position.

6. Flasher Hazard Warning Lights

Flash the both allow when the hazard light switch is "ON" positioned.

7. Flasher Turn Signal Lights

Operate when the turn signal switch is activated. Rotate the switch to the right for right turns, the right arrow will flash. Rotate the switch to the left for left turns, the left arrow will flash. The flasher turn lights can be activated with the key switch in any position.

8. 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 of the gauge, 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.

9. 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.

10. Rear PTO Speed

Determined by the position of the needle on the tachometer. The tachometer is marked to indicate 540rpm PTO speed.

Your tractor is equipped with 2-speed PTO so that the symbol of "540" on the proof-meter relates to 540rpm PTO speed with lower PTO speed gear is selected, and "540E" symbol relates to 540rpm PTO speed with higher PTO speed gear is selected.

Engine RPM should remain close to this mark while using the rear PTO; running the engine faster than these results in a dangerous over speed condition.

11. High Beam Indicator

Illuminates when the, head-lights are switched to main beam.

12. Parking Brake Light

Illuminates if the parking brake is engaged when the key switch is turned from "OFF" position.

13. Hazard Indicator Warning Lights

Flash in unison with the flasher hazard warning light when the hazard lights switch is "ON" positioned.

14. PTO Indicator Light

Illuminates with the key switch in the "ON" position and the PTO control switch is "ON" positioned.

15. Trailer Flasher lights burn out indicator

Flash in unison with the flasher turn lights, when burn out or wire breaking the flasher lights of trailer, which connected with ELECTRICAL SOCKET of tractor, and flasher switch is turned on.

Also, flash in unison with the flasher lights, when ELECTRICAL SOCKET of tractor is not connected with trailer, and flasher switch is turned on.

16. HST High Speed Indicator Light

Illuminates with key switch in the "ON" position and when the HST speed control is high positioned.

KEY SWITCH

The key switch (1) in figure 2-9, is located on the right-hand side of the console, just below the hand throttle. Turning the key clockwise, to the "ON" position, activates the warning lights and instruments. The pre-heat system is activated when the key is turned farther clockwise to the "HEAT" position, and the engine starts when the key is turned to the extreme right. The key spring returns to the "ON" position when released.

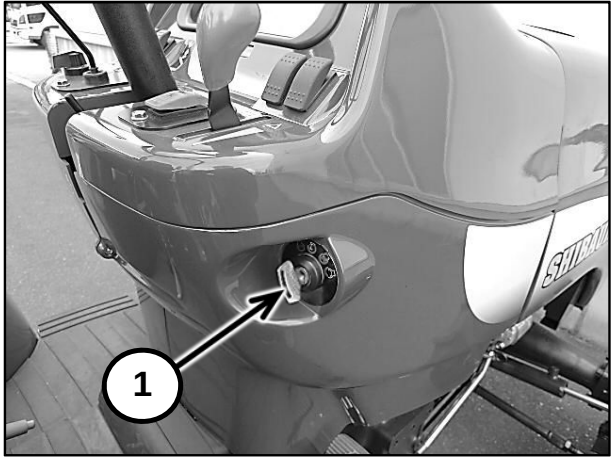


Figure 2-9

PRE-HEATING THE SYSTEM

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

To pre-heat the engine, turn the key switch to the "HEAT" position and hold the key in this position for approximately 5 seconds. The glow plugs heat the pre-combustion chambers during this time, and the engine will start.

NOTE: When ambient temperatures are colder, a longer pre-heat time is 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.

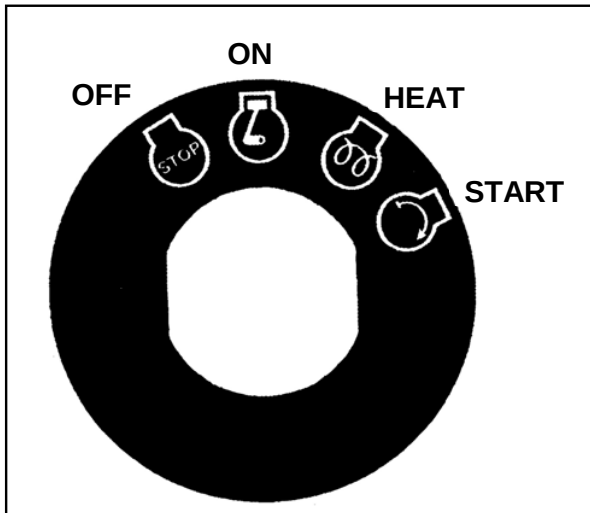


Figure 2-10

WARNING
Do not use ether with the thermostat starting aid.

STARTING THE ENGINE

The key switch (1) in Figure 2-11, allows activation of the starter motor and fuel delivery only when:

- The PTO control lever (2) in Figure 2-12, is in the “OFF” position.
- Range lever (3) in Figure 2-12, is in the “NEUTRAL” position.

NOTE: Always use safe practices when starting your tractor. Turn the key to the extreme right. Position the hand throttle forward so that it is one-fourth to one-third open.

WARNING

Always sit in the operator's seat and apply the parking brake, when starting the tractor. Never attempt to start the engine while standing beside the tractor.

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

The engine will shut off in approximately two seconds if the operator leaves the seat without the range lever in the neutral position.

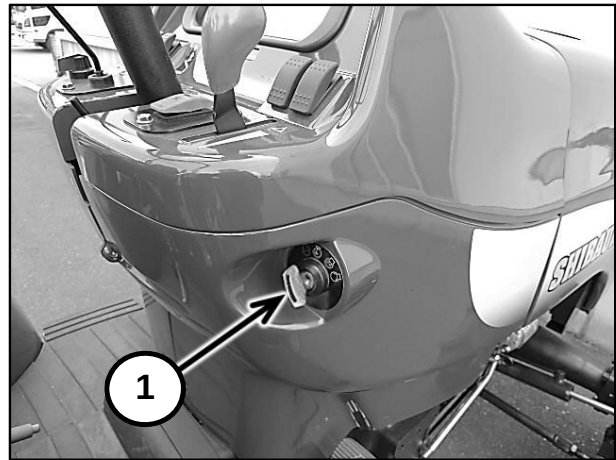


Figure 2-11

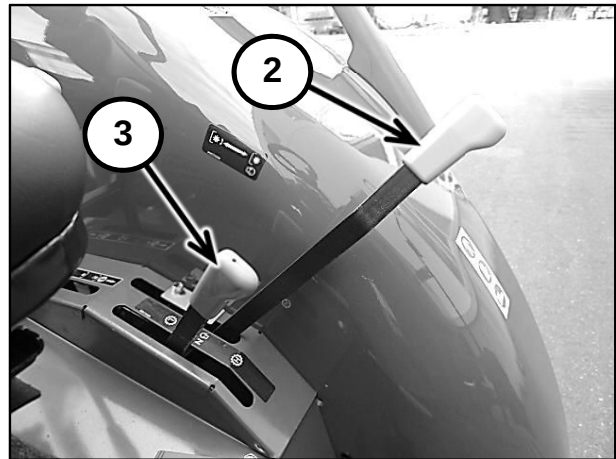


Figure 2-12

STARTING THE TRACTOR WITH JUMPER CABLES



WARNING

Start the engine only from the operator's seat. If safety start switches are bypassed, the engine can start with the transmission and/or PTO in gear.

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

1. Shield eyes.
2. Set the transmission range shift lever in the "NEUTRAL" position and apply the parking brake.
3. Set the PTO control lever in the "OFF" position.
4. Connect one end of the jumper cable to the tractor battery positive ⊕ terminal and the other to the auxiliary battery positive ⊕ terminal. Next, connect one end of the other jumper cable first to the auxiliary battery negative ⊖ terminal, then the other end to the tractor starter ground terminal. Finally, start the tractor by following the safe starting procedures outlined under "Starting the Engine." Idle the engine and turn on all electrical equipment (lights, etc.), then disconnect the jumper cables in the reverse order in which they were connected. This helps protect the alternator from damage due to extreme load changes.



WARNING

Batteries contain sulfuric acid and produce explosive gases. To prevent personal injury:

- ***Wear eye and skin protection.***
 - ***Keep sparks and flame away.***
 - ***Ensure there is adequate ventilation while charging or using the battery.***
 - ***Follow the manufacturer's instructions found on the battery.***
-

STOPPING THE ENGINE

Pull the hand throttle fully rearward and turn the key switch to the "OFF" position to stop the engine.

After full load operation, allow the engine to run at low idle for one minute before engine shutdown. This will allow the turbocharger to reduce RPM and be properly lubricated during shutdown.

IMPORTANT: The battery charge warning lights will remain on and discharge the battery if once the engine has stopped and the key switch is not turned to the "OFF" position.

BREAK-IN PROCEDURES

Your SHIBAURA tractor will provide long and dependable service if given proper care during the first 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 wastes 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 recommended levels. Daily checks include the engine oil level, radiator coolant, and air cleaner.
5. After the first 50 hours of use, be sure to perform the maintenance items listed in the maintenance schedule.

LIGHTING

Your tractor equipped with:

- Headlights (1) in Figure 2-13.

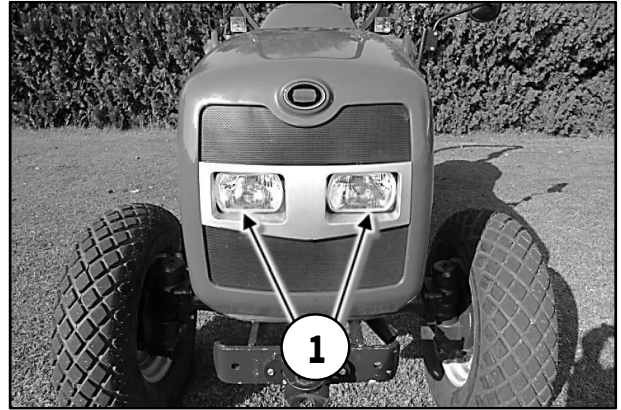


Figure 2-13

- Side and Front Position Lights (2) in Figure 2-14.
- Flasher Warning Lights / Turn Signals (3) in Figure 2-14.

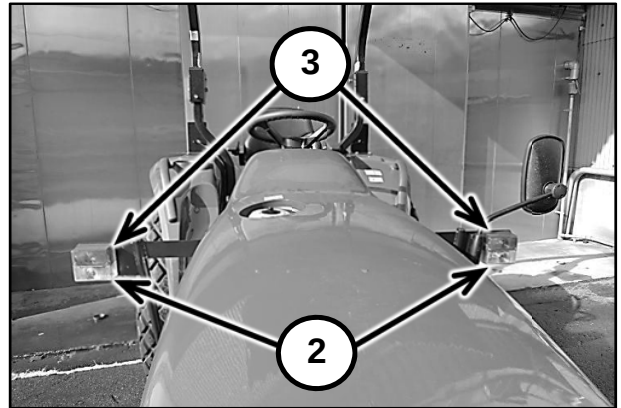


Figure 2-14

- Side and Taillights / Brake Lights (4) in Figure 2-15.
- Flasher Warning Lights / Turn Signals (5) in Figure 2-15.

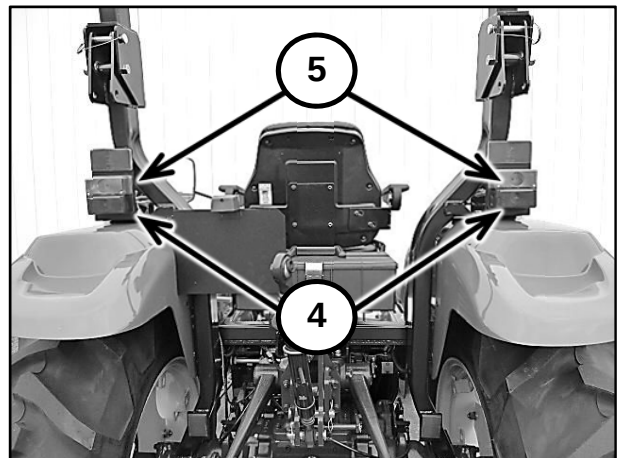


Figure 2-15

Headlights and Taillights

There are headlights located in the front of the tractor hood, dual element road lights (1) in Figure 2-16. The key switch must be in the "ON" position for the lights to operate.

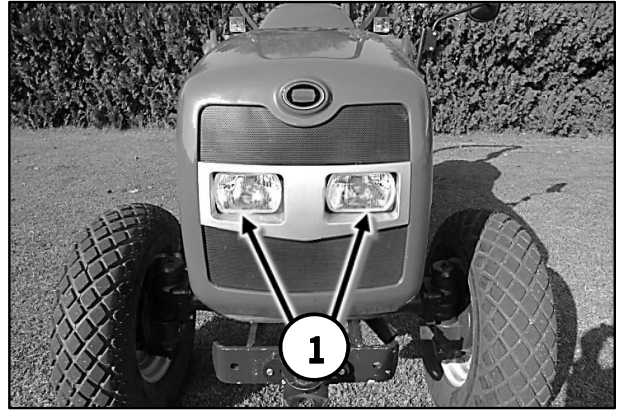


Figure 2-16

Light Switches

Road Lights Switch (2) in Figure 2-16.

- Rear Position "OFF"
- Mid Position "Illumination of Instrument Panel and Taillights".
- Front Position "Illumination of Road lights, Instrument Panel and Taillights".

Road Lights High Beam Switch (3) in Figure 2-16

- Rear Position High Beams "OFF".
- Front Position High Beams "ON".

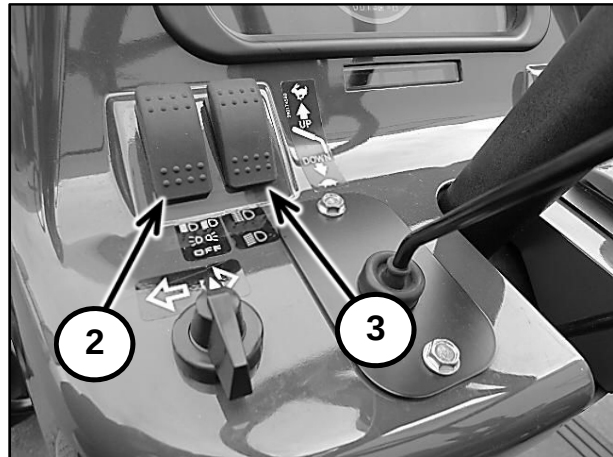


Figure 2-17

NOTE: The ignition key must be in the "ON" position for the lights to operate. For High Beams to be activated, the Road light switch (2) in Figure 2-16, must be in the front position.

Flasher Warning (Hazard) Lights

The flasher warning lights (1) in Figure 2-17, are activated by placing rocker switch (2) in Figure 2-18, in the front position.

The flasher warning lights can be activated with the key switch in any position. For your protection, use the flasher warning lights when traveling on public roads, day or night.

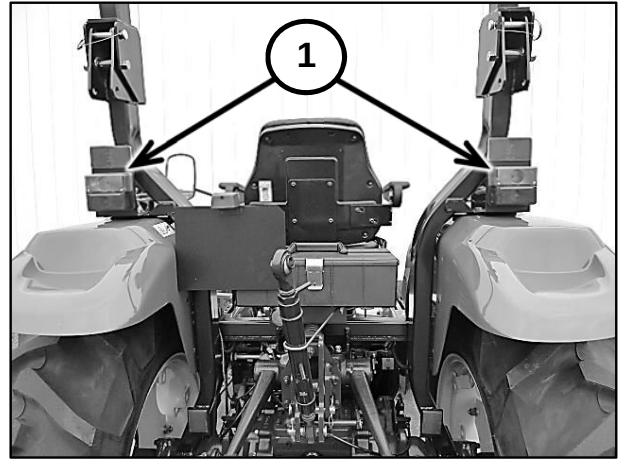


Figure 2-17

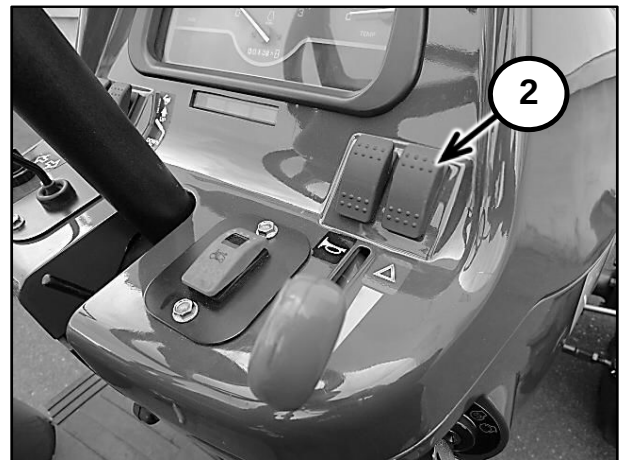


Figure 2-18

Flasher Turn Lights (Turn Signals)

The turn signal lights are activated by moving the turn signal switch (3) in Figure 2-19, to the left for left turns or to the right for right turns with the key switch in any position for the turn signals to operate.

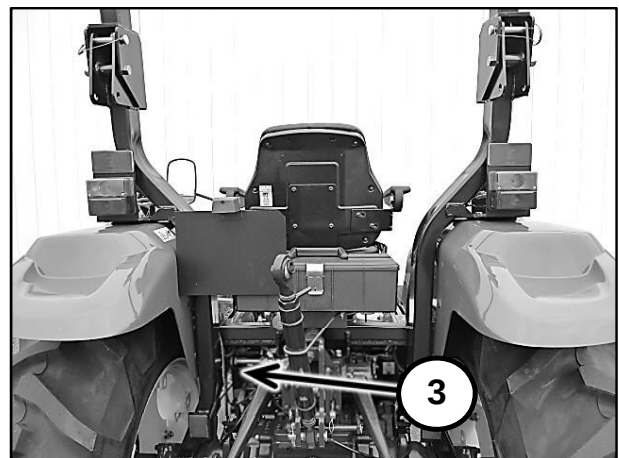


Figure 2-19

Brake Lights

The brake lights (1) in Figure 2-20, are activated when the brake pedals are depressed, with the key switch in any position. The brake lights illuminating, warns anyone following the tractor, the brakes are being applied and the tractor ground speed is being reduced.

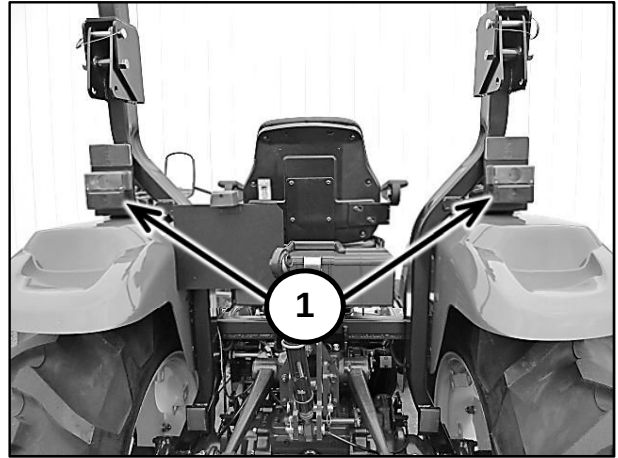


Figure 2-20

Horn

To activate the horn, push the rocker switch (2) in Figure 2-21. Horn can be activated with the key switch in any position.

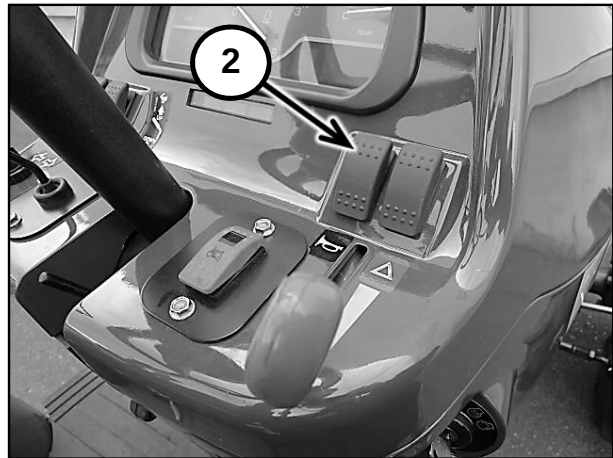


Figure 2-21

ELECTRICAL SOCKET for Trailer

A standard seven pin socket (3) in Figure 2-22, 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 Color	Circuit
L	Green/Red	L.H. Turn Signal
		Not Used
31	Black	Earth (Ground)
R	Green/White	R.H. Turn Signal
58R	Red	R.H. Tail lights
54	Green/Orange	Brake Lights
58L	Red/Black	L.H. Tail lights

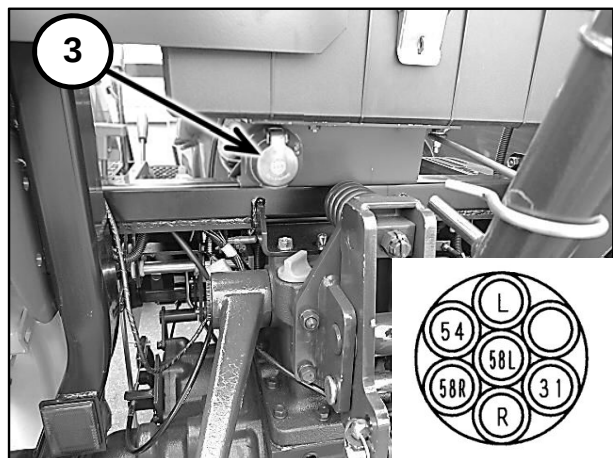


Figure 2-22

THROTTLE CONTROLS

The hand throttle (1) in Figure 2-23, is located on the RH side of the console. Push the throttle forward to increase the engine RPM, Pull the throttle rearward to decrease the RPM.

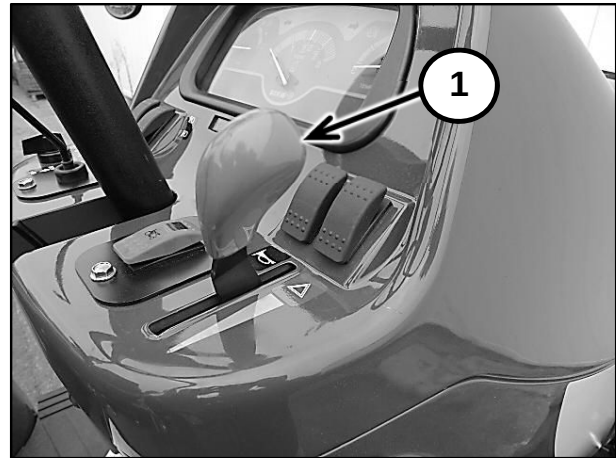


Figure 2-23

FUEL SHUTOFF VALVE

The fuel shutoff valve (2) in Figure 2-24, is located in the fuel line, on top of the fuel filter. The fuel filter is located on the right-hand side of the engine.

To open the fuel shutoff valve, move the handle until it points straight up and down. To close the valve, move the handle to the clockwise horizontal position. Always close the fuel shutoff valve when servicing any part of the fuel system.

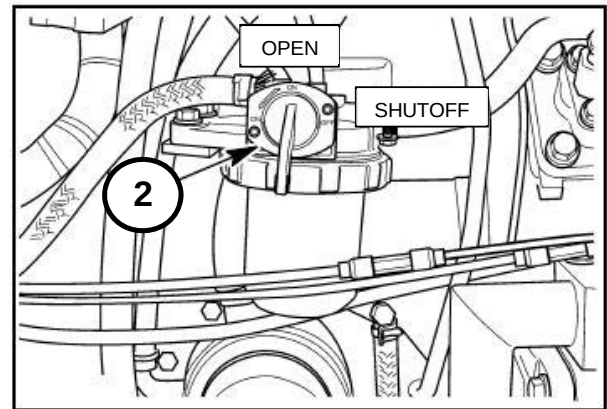


Figure 2-24

BRAKE CONTROLS

Brake Pedals

The right brake pedal controls the braking action of the right rear wheel. The left brake pedal controls the left rear wheel brake.

Depress both pedals (3) in Figure 2-25, simultaneously to stop the tractor. To assist in making sharp turns at slow speed, depress the right or left brake pedal as required.

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

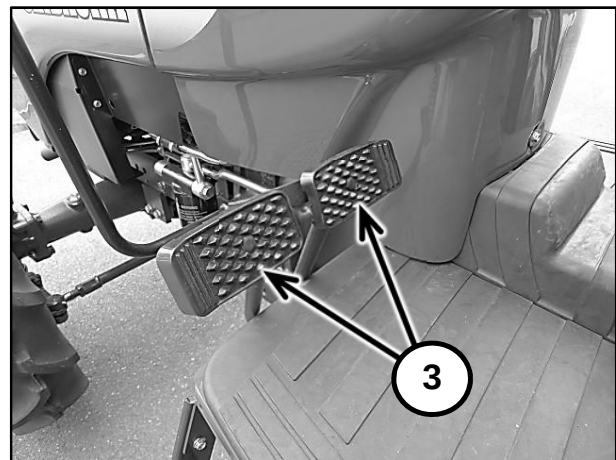


Figure 2-25

Brake Pedal Lock

The brake pedal lock (1) in Figure 2-26, is used to secure the brake pedals together. Lock the pedals together, as shown in the illustration, whenever the tractor is operated at high speeds or when the tractor is used on the highway.

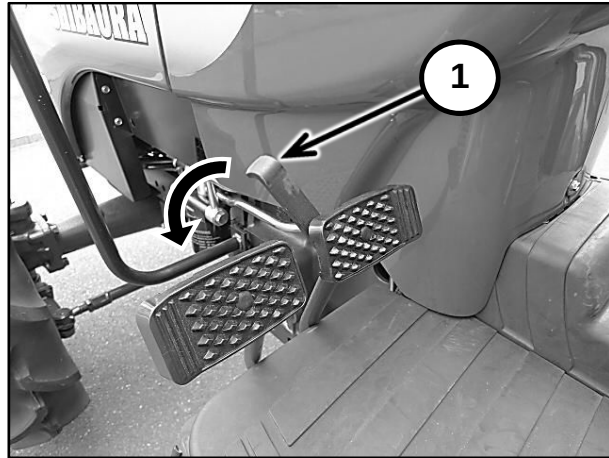


Figure 2-26

PARKING BRAKE CONTROL

The parking brake (2) in Figure 2-27, is used for locking the brake systems in the applied position. The parking brake should be applied whenever the tractor is parked.

To apply the parking brake, pull up the lever.

To release the parking brake, down the lever with pushing the release button.

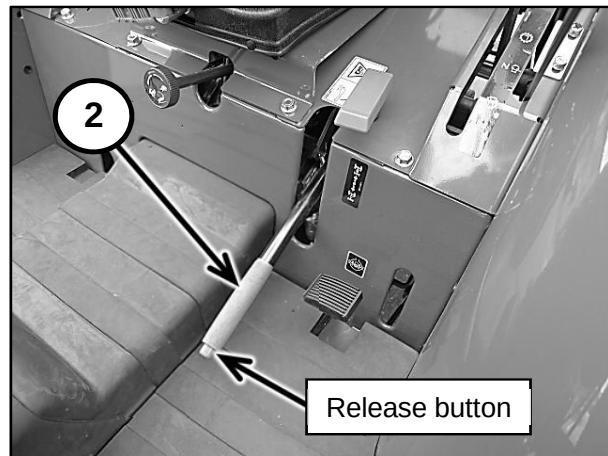


Figure 2-27

FRONT-WHEEL DRIVE

The front-wheel drive is controlled by a lever (3) in Figure 2-28, located on the left side under the seat.

To engage front-wheel drive, pull the lever fully upwards. To disengage front-wheel drive, push the lever fully downward.

IMPORTANT: Use front-wheel drive when additional traction is required while operating on loose soil, in wet, slippery conditions, or on slopes. For normal operation on firm soil, level hard surfaces, or when roading the unit at high speeds, disengage the front-wheel drive to maximize tire and driveline life and to economize on fuel.

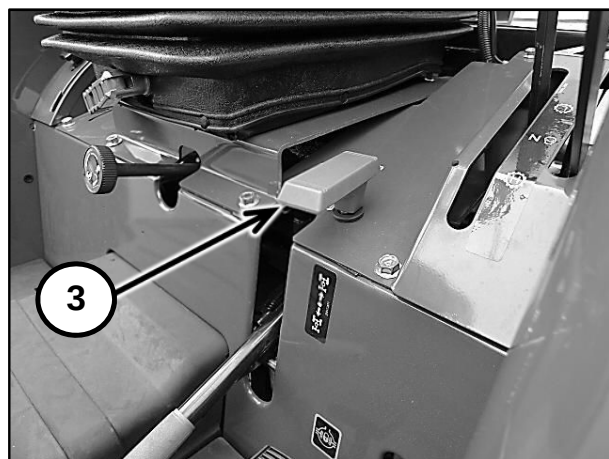


Figure 2-28

HYDROSTATIC TRANSMISSION (HST)

HST FOOT PEDALS

The ground speed of tractors equipped with a hydrostatic transmission is continuously variable, from zero to full rated speed in each range. Speed is controlled by the HST forward (1) in Figure 2-29, and reverse (2) in Figure 2-29, pedals located on the right-hand foot platform.

For forward travel, depress the forward pedal (1) in Figure 2-29, on the until the desired ground speed is reached. For reverse travel, depress the reverse pedal (2) in Figure 2-29. Unless the HST speed control switch is in the “LOCK” position, the transmission returns to neutral and the tractor stops when pedal is released.

NOTE: The tractor may come to a sudden stop when the pedal is released.

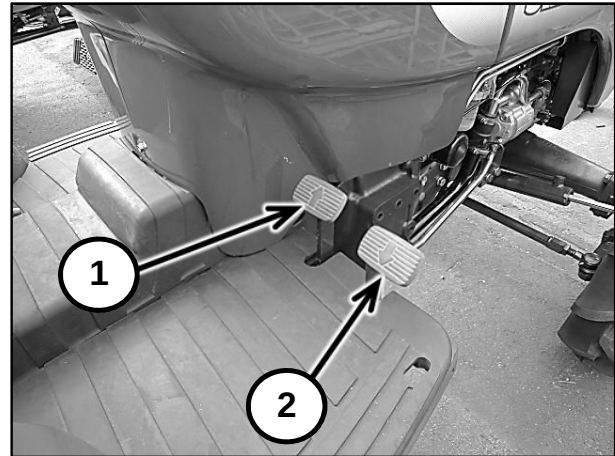


Figure 2-29

TRANSMISSION RANGE LEVER

(Low, High)

The range selector lever (3) in Figure 2-30, is located by the left-hand fender. It has two range positions. “L” low range, “H” high range, and “N” neutral position. The range lever must be in the neutral position to activate the safety start system and allow the engine to start.

To select the desired operating range, The HST foot pedals must be in the neutral position.

IMPORTANT: Never attempt to engage or disengage the range lever when tractor is in motion.

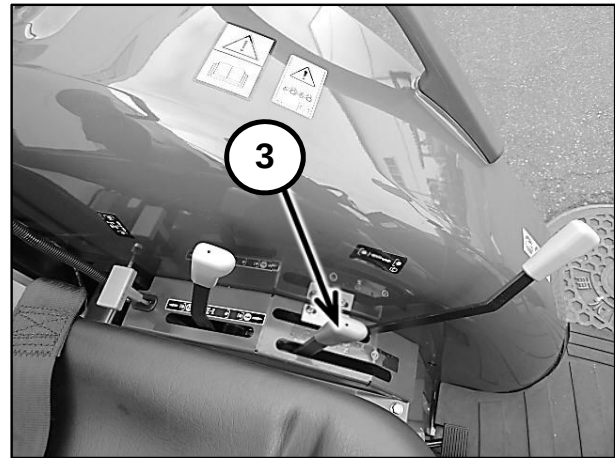


Figure 2-30

HST HI / LO SPEED CONTROL

The HST speed control switch (1) in Figure 2-31, is located on left-hand side of the console. It has two positions. The “Turtle” (Lo) position operates the HST unit at below normal speed. The “rabbit” (Hi) position operated the HST unit at above normal speed. The Hi/Lo speed control can be operated with both ranges of the transmission.

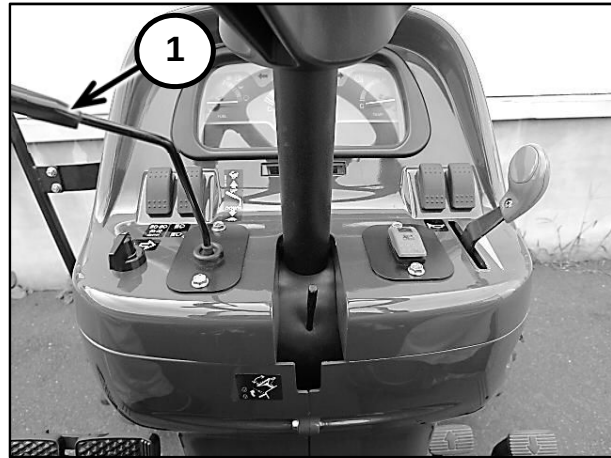


Figure 2-31

HST CRUISE CONTROL SWITCH

The HST cruise control switch (1) in Figure 2-32, is located on the right-hand side of the console. It is used to maintain a constant forward or reverse speed.

When the desired travel speed is reached, depress the top half of the control switch. A green light will illuminate inside the switch indicating the speed control is engaged. To disengage the speed control, depress the bottom half of the switch or depress both brake pedals. The green light will extinguish, indicating the speed control is off.

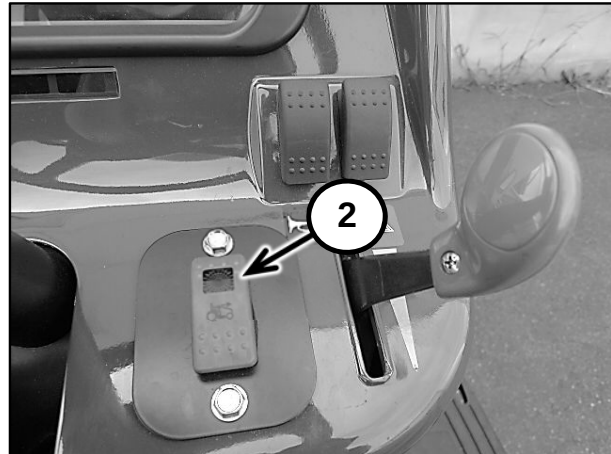


Figure 2-32



CAUTION

To avoid personal injury and maintain optimum control of the tractor, do not use the cruise control at high speeds or when roading the tractor.

DIFFERENTIAL CONTROL

The differential lock pedal (1) in Figure 2-33, is located on the left-hand foot platform. The differential lock is used to obtain additional traction in wet or loose soil. When the differential lock pedal is depressed, both final drive pinion gear shafts are locked together, preventing one wheel from rotating independently of the other. Whenever one wheel begins to slip in wet or loose soil, use the lock to obtain additional traction from the opposite wheel.



WARNING

Steering the tractor is very difficult with the differential locked.

Do not engage the differential lock when driving the tractor on the highway, when ground speed is above 8 km/h, or when turning the tractor. If the lock is engaged when turning, a loss of steering control will result.

To operate the differential lock, depress and hold the pedal down until the lock is positively engaged. It is best to engage the lock while the wheels are turning slowly to minimize shock loads to the driveline. If a wheel spins at high speed, such as on ice, reduce engine speed to idle before engaging the lock or damage may result. Release the pedal to disengage the differential lock.

NOTE: *In some instances, the lock may remain engaged after the pedal is released. This can occur if one rear wheel is turning at a faster speed than the other. The lock can be disengaged in one of two ways if this occurs:*

- Decrease the drawbar pull by raising or disengaging the implement so that neither wheel tends to slip.

--OR--

- Rapidly apply and release a light braking load to the slipping rear wheel.

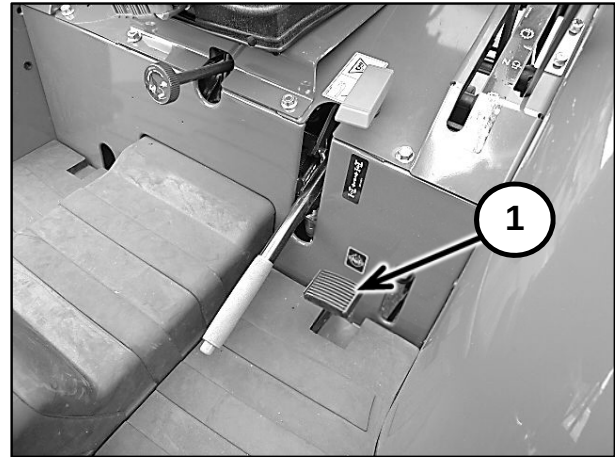


Figure 2-33

POWER TAKE-OFF (PTO)

The power take-off (PTO) on your tractor transfers engine power directly to mounted or trailed equipment.

All models operate through the standard 1 3/8 in. (34.9mm) diameter, 6-spline output shaft rotating at 540rpm, the speed at which most PTO driven equipment is designed to operate.

Your tractor is equipped with 2-speed PTO so that the symbol of “540” on the proof-meter relates to 540rpm PTO speed with lower PTO speed gear is selected, and “540E” symbol relates to 540rpm PTO speed with higher PTO speed gear is selected.

PTO CLUTCH CONTROL LEVER

The PTO clutch control lever (1) in Figure 2-34, is located by the left-hand fender. Your tractor is equipped with an independent PTO and then use always the PTO clutch control lever to engage the PTO.

To engage the PTO clutch, move the PTO clutch control lever to the right, fully rearward then to the left. To disengage the PTO clutch, move the lever to the left and then fully forward.

To engage the selected PTO(s), place the PTO speed shift lever (2) in Figure 2-34, into the desired position or place the MID PTO control lever (3) in Figure 2-34, into the engaged position, then shift the PTO clutch control lever (1) in Figure 2-34, into the engaged position.

NOTE: The PTO clutch must be disengaged to operate the PTO speed shift and MID PTO control levers. The PTO clutch must also be disengaged to start the tractor engine.

IMPORTANT: Most PTO equipment is designed to operate most efficiently at 540 ± 10 RPM. The tachometer has a mark which indicates the correct engine RPM for 540 RPM PTO operation. Operating equipment faster than this decreases efficiency, and may be dangerous.

IMPORTANT: If the operator leaves the seat without the transmission range lever in the “NEUTRAL” position and with the PTO engaged, the engine will shut off in approximately two seconds.

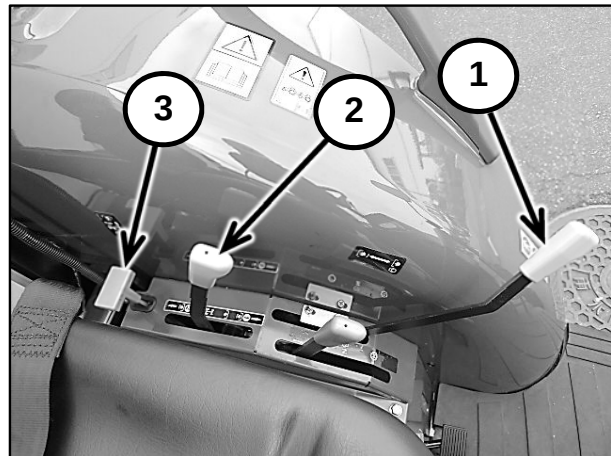


Figure 2-34

PTO SPEED SHIFT LEVER

The PTO speed shift lever (2) in Figure 2-35, is located by the left-hand fender. It has two PTO speed positions. Always “Disengaged” position the PTO clutch control lever and bring the PTO drive to a complete stop before moving the PTO speed shift lever.

IMPORTANT: Do not attempt to change PTO speed shift lever while the PTO is moving. The PTO speed shift gear is non-synchronized. The PTO clutch control lever must be disengaged positioned and the PTO motion stopped to change gear ratios with the PTO speed shift lever.

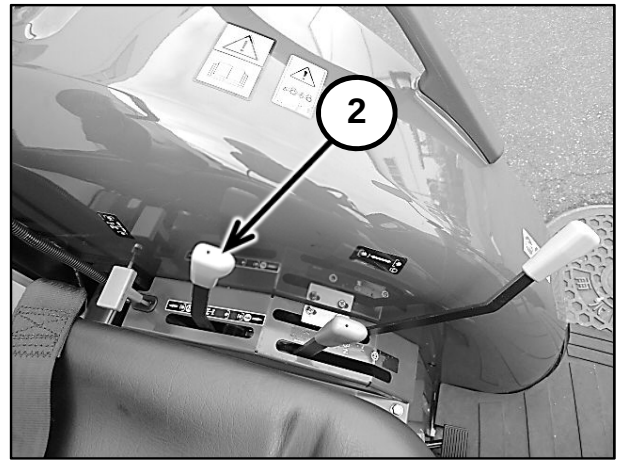


Figure 2-35

MID PTO CONTROL LEVER

The MID PTO control lever (3) in Figure 2-36 is located by the left-hand fender. To engage the MID PTO, pull the lever fully upward. To disengage the MID-PTO, push the lever fully downward.

IMPORTANT: Do not attempt to change MID PTO control lever while the MID PTO is moving. The MID PTO shift gear is non-synchronized. The PTO clutch control lever must be disengaged positioned and the MID PTO motion stopped to change gear ratios with the MID PTO control lever.

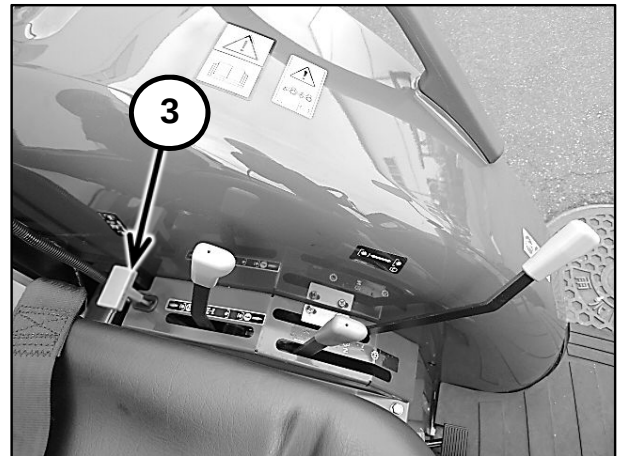


Figure 2-36

PTO SHIELD AND CAP

The PTO shield (1) in Figure 2-37, is standard equipment. The shield is to be used with all PTO equipment. The PTO cap (2) in Figure 2-37, should always be installed when the PTO is not in use.

NOTE: Cycle the PTO drive shaft through the entire lift travel and check for any interference with PTO shield. If interference is present, adjust the height of lift travel as needed.

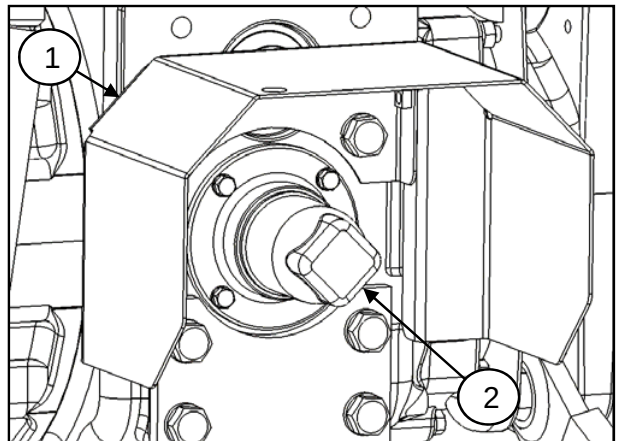


Figure 2-37

POWER TAKE-OFF (PTO) OPERATION

WARNING

• *You shall take the necessary precautions (e.g. assistance) to always be aware of the possible presence of bystanders, certainly when maneuvering in confined areas, such as the farm yard, park field and sheds.*

Keep people away from the tractor during work. Ask bystanders to leave the field. There is not only the risk to be overrun by the tractor, but objects ejected by some equipment mounted on the tractor, such as a rotary mower, may cause harm. Stones may be thrown further than the mowed crop.

Pay the necessary attention while operating next to public roads or footpaths. Thrown objects can get projected outside the field and hit unprotected people like bikers or pedestrians. Wait to cut the edge of the field till it is clear of bystanders

WARNING

To reduce the possibility of personal injury, comply with the following guidelines before attaching or detaching PTO equipment, and before working on or clearing PTO equipment.

1. Attaching the PTO

- Stop the engine.
 - Set the parking brake.
 - Disengage the PTO using the PTO speed selector lever is "NEUTRAL" position.
 - Remove the PTO cap.
 - Wait until the PTO shaft stops turning.
 - Attach the mounted or drawn equipment.
2. Ensure that the equipment-driven shaft is properly aligned and locked to the tractor PTO drive shaft, and that the PTO shield is lowered into the guarded position.
3. With the PTO disengaged, start the engine. For mounted equipment, raise and lower the equipment to ensure there are proper clearances for operation.
4. With the transmission range lever still in neutral (N), move the PTO speed selector to the desired position.

IMPORTANT: *The PTO may be damaged if the PTO speed selector lever is not fully moved to the selected positions.*

5. Engage the PTO by using the PTO clutch control lever.

NOTE: *The PTO indicator light, located in the instrument panel, will illuminate when the PTO is engaged and the key switch is in the "ON" position.*

6. Check the PTO-driven equipment for proper operation by gradually increasing the engine RPM with the manual throttle control.
7. If the equipment is operating properly, shift to the desired operating gear.
8. Control the PTO speed using the throttle. Never operate in an over speed condition.

PTO speeds relative to engine speeds are shown in the following tables:

Speed selector position	PTO Speed (rpm)	Engine speed (rpm)
1	540	2405
2	540	1774
2	630	2070

WARNING

Rear PTO speeds in excess of 630 PTO rpm may damage equipment that is designed for 540rpm operation and could result in personal injury to the operator or bystanders.

9. When making sharp turns with towed equipment, or with mounted equipment in the fully raised position, disengage the PTO using the PTO clutch control lever.
10. When traveling on highways or for any great distance, disconnect the PTO-driven shaft at the tractor PTO shaft.
11. Reinstall the PTO shaft cap whenever PTO-driven equipment is disconnected from the tractor, or when the PTO is not being used.

WARNING

To avoid inadvertent movement of PTO implement, disengage the PTO after each use.

PTO OPERATION (WITHOUT OPERATOR IN SEAT)

To operate the PTO without the operator being in the seat, the following operations must be performed:

- Transmission range lever is in "NEUTRAL" position
- Parking brake is in "applied" position

IMPORTANT: If the operator leaves the seat without the transmission range lever in the "NEUTRAL" position and with the PTO engaged, the engine will shut off in approximately two seconds.

EXTENSION / CLEVIS DRAWBAR

Your tractor is equipped with a extension / clevis type drawbar (1) in Figure 2-38, for towing equipment behind the tractor. This drawbar may be extended by sliding it rearwards, 145 mm and capable of 755daN vertical load and the following permissible towable mass depending on the trailed vehicle brake system.

Unbraked towable mass: 3,000kg

Independently - braked: 4,190kg

Inertia - braked: 3,800kg

Assisted – braked: N/A

IMPORTANT: When transporting equipment on highways, a safety chain with a tensile strength equal to the gross weight of the implement should always be installed between the tractor and the implement hitch.

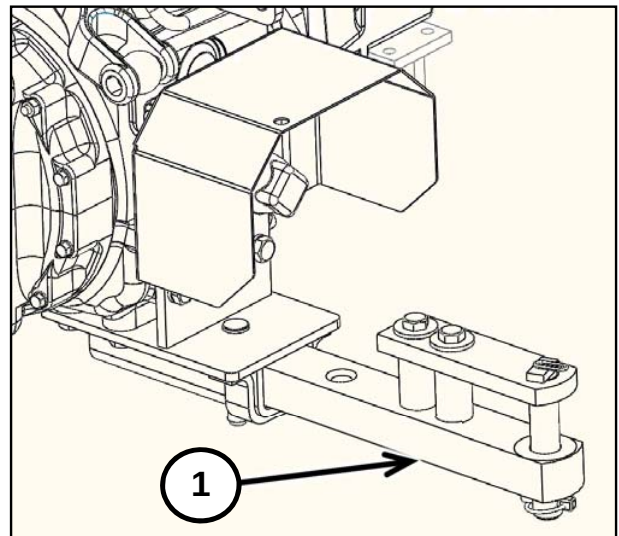


Figure 2-38

⚠ WARNING ⚠
Pull only from the drawbar. Always use the drawbar or the lower links in the lowered position, when performing pull-type work.

Make sure that the weight of a trailed vehicle that is not equipped with brakes does NOT EXCEED one and half times of the Tractor weight.

Stopping distance increases with increased speed as the weight of the towed load increases, especially hills and slopes.

Use extreme caution and keep safe travelling speeds for avoid hard application of the tractor brakes.

TOWING THE TRACTOR

Place the transmission range lever in neutral, and disengage the PTO clutch lever, to tow the tractor. Do not exceed 20 km/h.

⚠ WARNING ⚠
For safety reasons, NEVER attempt to start the engine by towing. Additionally, towing the tractor on highways is NOT recommended, for safety reasons.

HOOD LATCH

As viewed from the front of tractor:

1. To raise the hood, insert the thin stick such as screwdriver, in the hole that located under the front of right side of hood and push up the latch release rod (1) in Figure 2-39, and lift the hood to its fully raised position. A hood prop rod (2) in Figure 2-40, holds the hood in the fully raised position.

⚠ WARNING ⚠
Make sure hood prop rod (2) in Figure 2-40, is fully engaged in the latched position, before servicing any components that are located under the hood.

2. To close, lift hood until prop rod (2) in Figure 2-40, is not holding weight of hood, then pull forward on prop rod and then lower hood until it is retained by the latch mechanism.

IMPORTANT: Do not attempt to lower the hood without moving the support link. Attempting to force the hood down can result in bending or breaking of the hood and support linkage.

NOTE: Keep the latch mechanism free of dirt and debris, so the latch will operate properly.

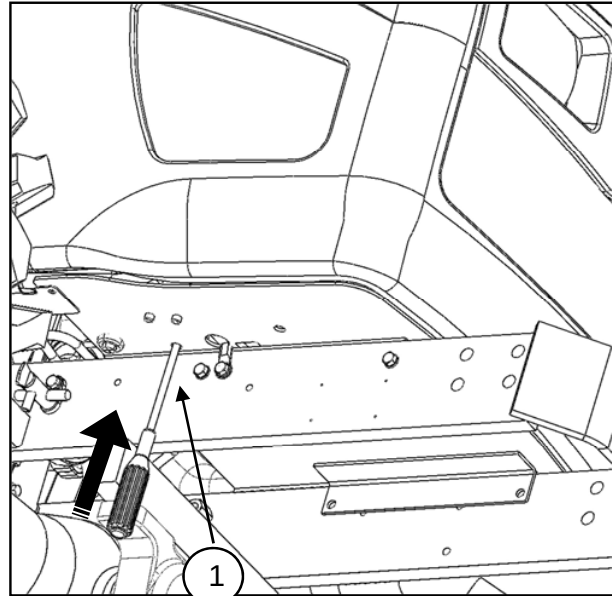


Figure 2-39

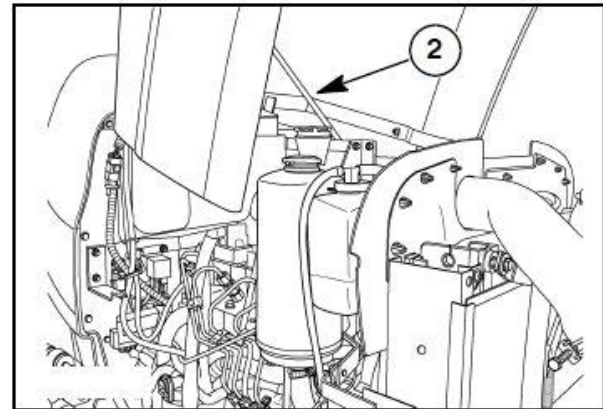


Figure 2-40

THREE-POINT LINKAGE

The tractor's three-point linkage is used to attach three-point mounted equipment which is usually PTO operated, such as rotary mowers, tillers, flail mowers, snow blowers, etc. The three linkage points with Category 1 size are the two lower lift arms (1) in Figure 2-41, and the top link (2) in Figure 2-41.

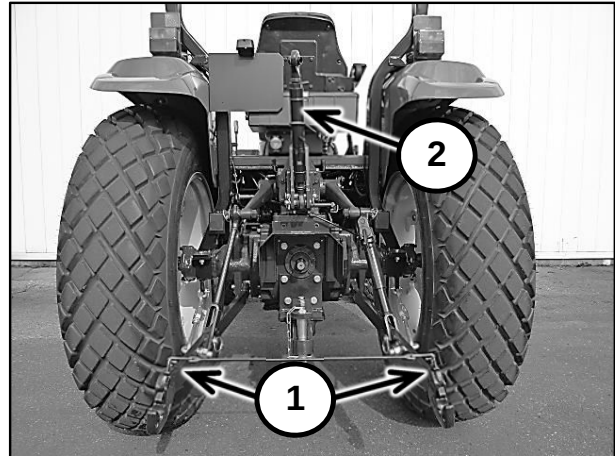


Figure 2-41

Linkage Adjustment

The three point linkage has adjustable stabilizers to control lateral movement of the lower lift arms. Loosen the lock nut and turn the adjuster (2) in Figure 2-42, to shorten or lengthen the stabilizer, then re-tighten the lock nut.

The height of the right-hand lift arm can be adjusted by turning the handle (1) in Figure 2-42, on the lift rod. To adjust the height of the left-hand lift arm re-position the attaching pin (3) in Figure 2-43, in one of the alternative holes in the lift rod.

NOTE: Cycle the three point linkage through the entire travel and check for any interference with rear tires. If interference is present, adjust stabilizers as needed.

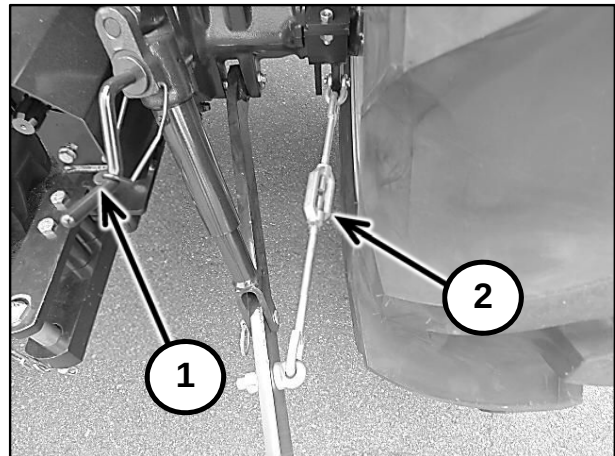


Figure 2-42

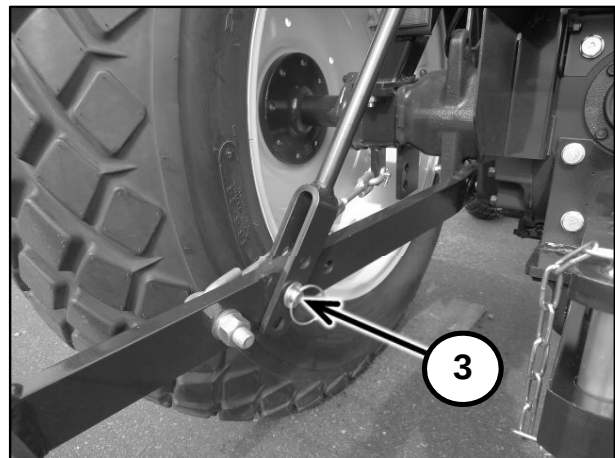


Figure 2-43

TOOL BOX

A tool box (1) in Figure 2-44, with a latching lid, is located behind the seat and between the ROPS uprights. The tool box also incorporates a hanger bracket (2) in Figure 2-44, to support the top link of the three-point hitch, when not attached to an implement

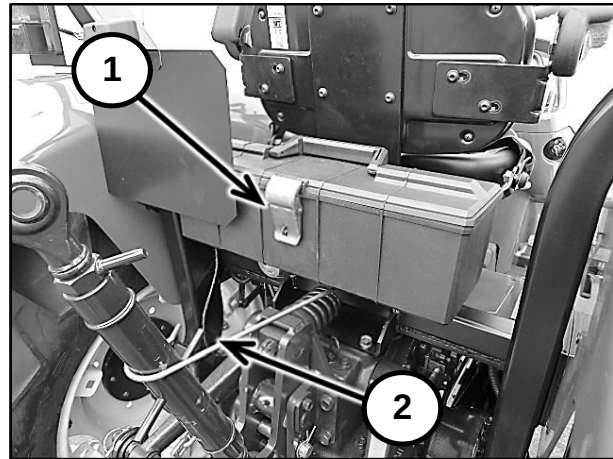


Figure 2-44

DRINK HOLDER

A drink holder (3) in Figure 2-45, is attached to the right side fender, for the operator's drink storage convenience.

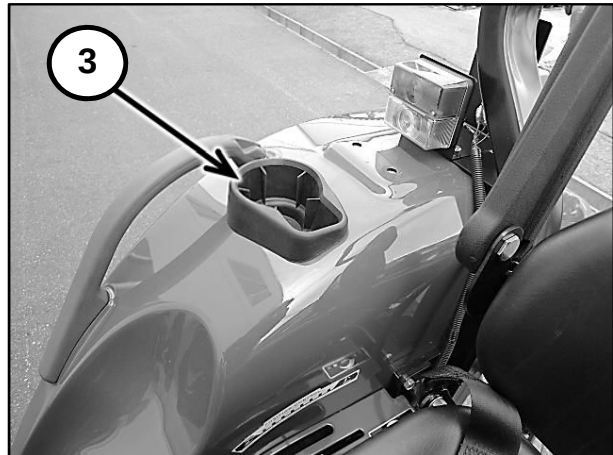


Figure 2-45

TRACTOR HYDRAULICS

HYDRAULIC POWER LIFT (HPL) (3 PT)

The HPL lever (1) in Figure 2-46, is located on the right-hand control pod. The lever controls the position of the two lift arms.

To lower the lift arms, first make sure the drop rate control valve (3) in Figure 2-47 is open, then move the HPL lever forward. To raise the lift arms, move the lever rearward. An adjustable stop (2) in Figure 2-46, is located in this quadrant for returning the lever to a preset position.

The hydraulic lift system provides accurate, smooth, and instant hydraulic power for raising a variety of compatible equipment whenever the engine is running. The system's position control feature 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.

The hydraulic lift system may be equipped with optional draft control.

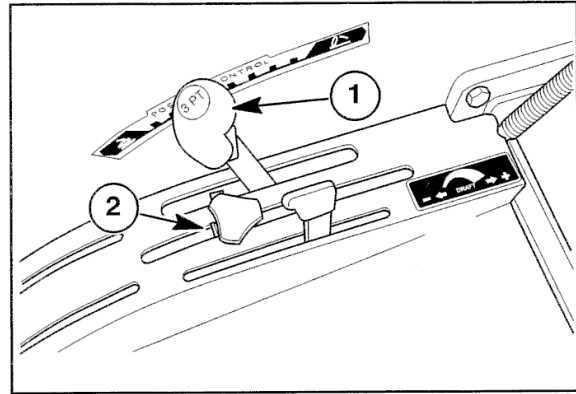


Figure 2-46

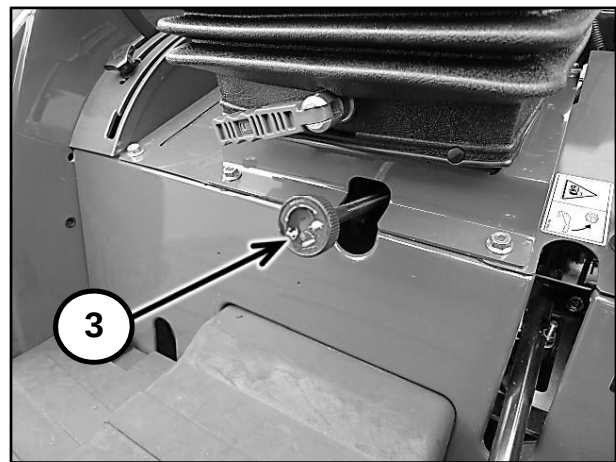


Figure 2-47

⚠ WARNING ⚠
Make sure the area is clear of people before lifting or lowering equipment.

Always lower the hydraulic lift and other hydraulic equipment before stopping and leaving the tractor.

POSITION CONTROL

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

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 (1) in Figure 2-48, 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.

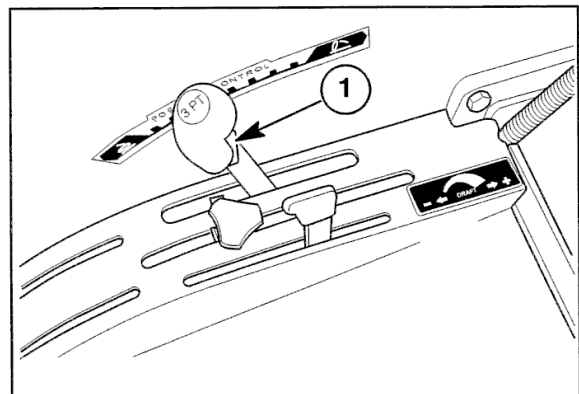


Figure 2-48

DRAFT CONTROL (Optional)

When operating in draft control, the draft control lever (2) in Figure 2-49, 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.

Upper Link Compression Loads: As the equipment is pulled through the soil, the draft caused by 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.

NOTE: Remove lock pin (1) in Figure 2-50, for draft control linkage to be operative.



WARNING

Make sure the area is clear of people before lifting or lowering equipment.

Always lower the hydraulic lift and other hydraulic equipment before stopping and leaving the tractor.

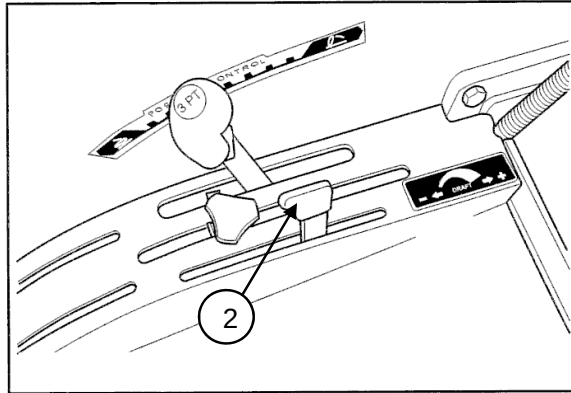


Figure 2-49

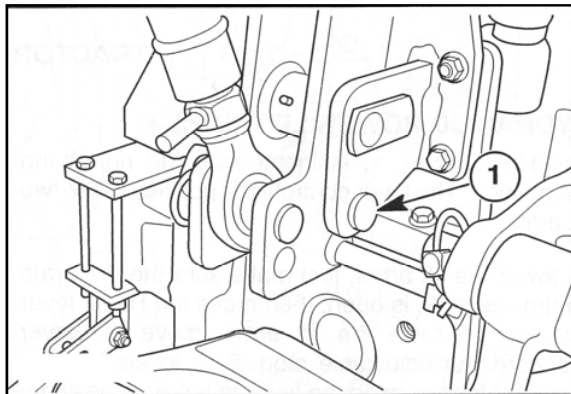


Figure 2-50

TWO LEVER CONTROLS WITH OPTIONAL DRAFT CONTROL

POSITION CONTROL OPERATION

Position control is obtained by placing the draft control lever (2) in Figure 2-51, all the way forward and then moving the outer (Position) control lever (1) in Figure 2-51, to position the equipment as desired. The outer (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 by draft control lever positioning to rearward as desired (the lift system will automatically maintain the selected draft as described above).

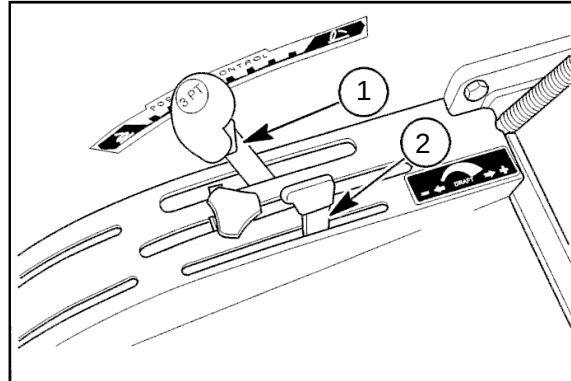


Figure 2-51

OPERATING IN BOTH POSITION AND DRAFT CONTROL

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

1. Set the position control lever (1) in Figure 2-51, at the maximum desired implement depth. The hydraulic system will not lower the implement below the pre-selected depth. (This will also prevent "diving" which may be encountered with light equipment, such as a rear blade, when grading or backfilling.)
2. Position to rearward the draft control lever (2) in Figure 2-51, 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 a more uniform depth while maintaining an even pull in widely varying soil conditions.

⚠ WARNING ⚠

Make sure the area is clear of people before lifting or lowering equipment.

Always lower the hydraulic lift and other hydraulic equipment before stopping and leaving the tractor.

POSITION CONTROL ADJUSTMENT

Linkage Adjustments

The length of the position control rod is critical and careful adjustment must be observed for proper operation. If the control rod is adjusted too short, the control valve spool will remain in the raised position when the lift arms have reached their maximum height and the system relief valve will open to relieve hydraulic pressure. If the control rod is too long, the control valve spool will return to neutral before the lift arms reach their full height.

The position control rod should be adjusted any time the link is disconnected for service to the hydraulic system, or any time the relief valve operation is noticed while the lift arms are at the full raise position.

Adjustment Procedure

1. Set the position control lever (1) in Figure 2-51 (See page 2-27), to the highest position.
2. Loosen the locknut (1) in Figure 2-52, on the position control rod (2) in Figure 2-52.
3. Start the engine. Adjust the length of control rod (2) in Figure 2-52, shorter until relief valve start operate.
4. Then lengthen the control rod (2) in Figure 2-52 until the relief valve ceases operation, and one additional turn and tighten the locknut (1) in Figure 2-52.
5. Check the operation. The relief valve should not operate when the lift arms are in the fully raised position.

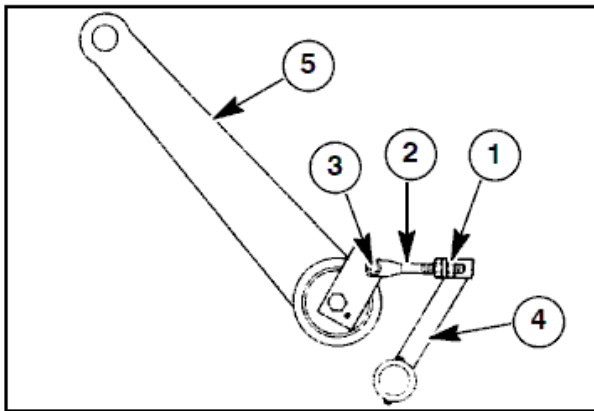


Figure 2-52

DRAFT CONTROL ADJUSTMENT

(For optional draft control only)

NOTE: Adjust the draft rod only after completing the position control adjustment.

1. Set the draft control lever to the most sensitive “+” position of rearward.
2. Loosen the locknut (1) in Figure 2-53, on the draft control rod (2) in Figure 2-53.
3. Remove the cotter pin (3) in Figure 2-53, and disconnect the draft control rod from the draft control arm pin (4) in Figure 2-53.
4. Open the drop rate control valve knob (5) in Figure 2-53, to the full open position.

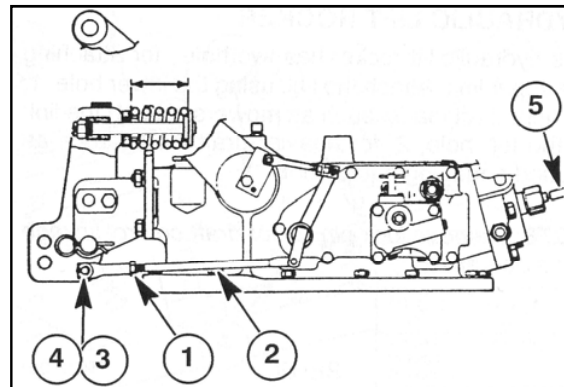


Figure 2-53

NOTICE: The position control lever must be in the raised position and the lift arms up.

5. Start the engine and set at 1000 - 1500 rpm.
6. Move the draft feedback rod (2) in Figure 2-53, rearward until the relief valve stops operating. Adjust the length of the rod to match the rod hole with the draft arm pin (4) in Figure 2-53, then shorten the rod one more turn and connect the rod to the draft arm.
7. Check the adjustments as follows:
 - With the engine running, move both the position control and draft control levers to the full raise position.
 - The move the position control lever to the forward (down) position.

NOTE: If the lift arms do not descend or descend too slowly, shorten the draft control rod one more turn.

TOP LINK MAIN SPRING ADJUSTMENT

(For optional draft control only)

Remove the cotter pin (1) in Figure 2-54, and rotate nut (2) in Figure 2-54, to adjust the main spring length (3) in Figure 2-54, to 77 mm and secure with the cotter pin.

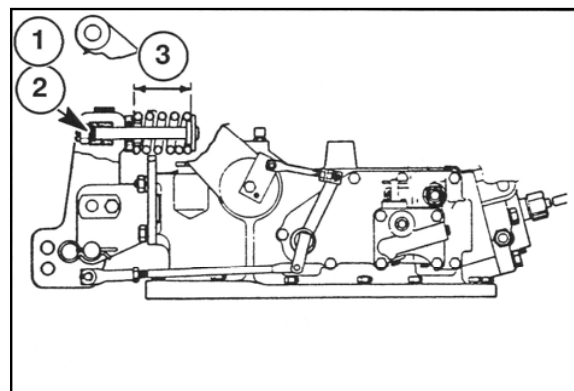


Figure 2-54

HYDRAULIC LIFT ROCKER

(For optional draft control only)

The hydraulic lift rocker has two holes for attaching the upper link. Attach the link using the lower hole (1) in Figure 2-55, for light draft loads, such as mowers. Attach the link to the top hole (2) in Figure 2-55, for heavier draft loads, such as ground engaging equipment.

NOTE: Remove the lock pin (3) in Figure 2-55, for the draft control linkage to be operative.

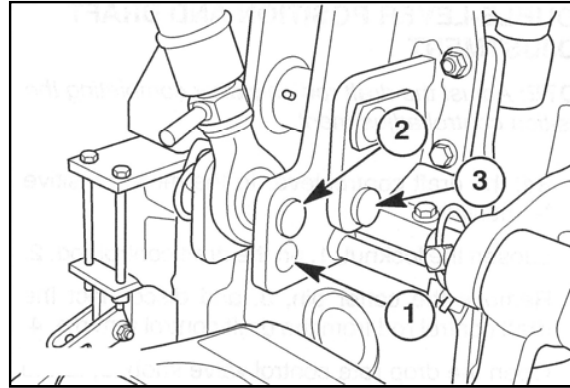


Figure 2-55

HYDRAULIC POWER LIFT (HPL)

DROP RATE CONTROL VALVE

The drop rate control valve (1) in Figure 2-56, provides an adjustment to regulate the flow of oil from the lift cylinder. This allows the operator to slow or increase the rate of drop of the lower links.

Turn the drop rate control valve “IN” (clockwise) to decrease the rate of drop. Turn the valve “OUT” (counter-clockwise) to increase the rate of drop.

The drop rate control valve must be opened before the hydraulic lift control will lower. If the valve is turned all the way “IN” (clockwise), the lower links can be raised to maximum height but cannot be lowered.

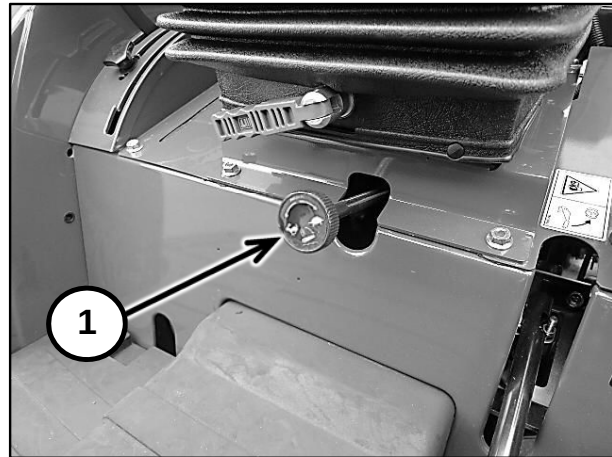


Figure 2-56

HYDRAULIC MANIFOLD BLOCK/DIVERTER VALVE

The hydraulic manifold block/diverter valve is located on the right-hand side of the tractor below the platform. The manifold block distributes pump oil to the HPL (Hydraulic Power Lift) valve, optional rear remote valves, the transmission / rear axle reservoir and the valve for attached implement.

The diverter valve (1) in Figure 2-57, can be turned with a blade screwdriver. In the 1 o'clock position, hydraulic fluid is directed to the HPL valve and rear remotes (optional). When a valve for another attached implement is plumbed to the three ports - (pressure out (2) in Figure 2-57, pressure return (3) in Figure 2-57, and sump or tank (4) in Figure 2-57), the diverter valve must be turned counter-clockwise to 11 o'clock position for hydraulic fluid flow to the implement valve and then to the HPL valve and rear remote valve (optional).

NOTE: The PTO valve and power steering always receives hydraulic flow independent of the manifold block diverter setting.

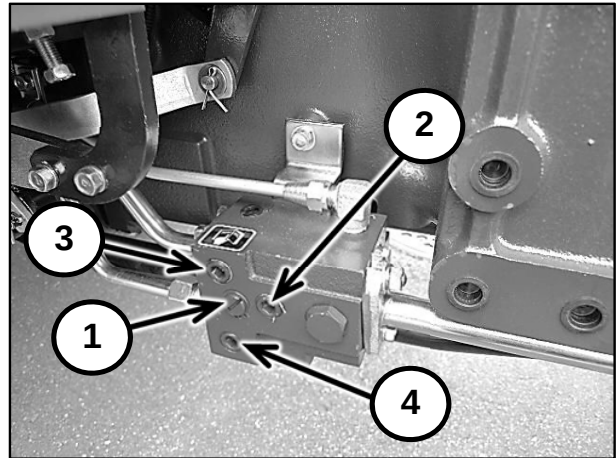


Figure 2-57

REAR REMOTE CONTROL VALVE(S) (OPTIONAL)

Your tractor can be equipped with one, two or three rear remote valves. The control lever(s) are located on the right-hand control pod, #1 remote (1) in Figure 2-58, #2 remote (2) in Figure 2-58.

To operate the single-spool valve, pull the control lever rearward to extend the cylinder. Push the control lever forward to retract the cylinder. Release the control lever to stop the cylinder in any position. The lever automatically returns to neutral.

The rear remotes are equipped with 1/2" quick couplers.

NOTE: The lever automatically returns to neutral, when the cylinder reaches the limit of its stroke in either direction of travel.

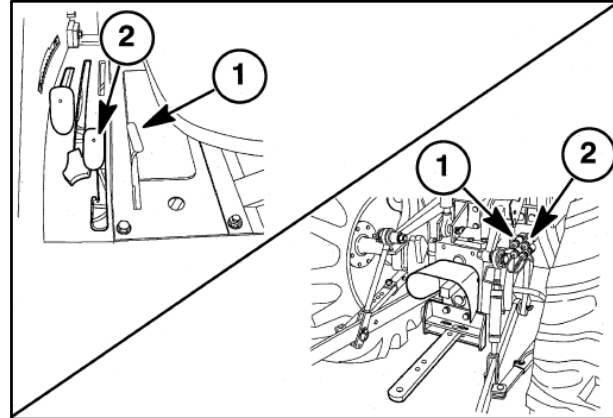


Figure 2-58



WARNING

Before disconnecting cylinders or equipment, make sure that the implement or equipment is supported securely.

Remote couplers must be properly mounted and securely fastened to the tractor-mounting bracket for proper functioning of the safety disconnect feature.

SWITCHING BETWEEN SINGLE AND DOUBLE ACTING CYLINDERS

To switch a single acting cylinder to a double acting cylinder, tighten the switching valve adjustment screw completely. To switch a double acting cylinder to a single acting cylinder, unscrew the adjusting screw.

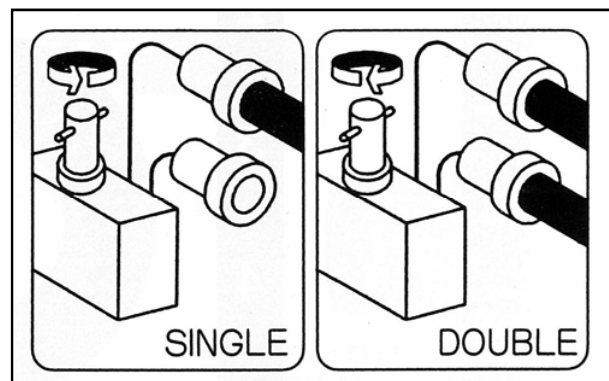


Figure 2-59

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 downhill. 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.
 - Depress the HST pedal slowly when driving out of a ditch, gully or up a steep hillside. Depress the HST reverse pedal promptly if the front wheels rise off the ground.
 - Reduce speed before turning quickly or applying the brakes. 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 such as in Figure 2-60. This will control the implement in the event the hitch pin is lost.

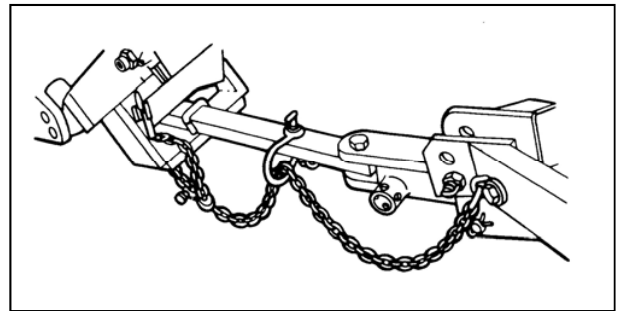


Figure 2-60

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

WHEEL TREAD SETTINGS

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

Front Wheel Settings

Tire Type	Setting	Note
AG 8 - 16	1,151 mm	Not Adjustable
TURF 27 x 10.5 - 15	1,305 mm	Not Adjustable
Large Turf (FD) 8 - 16	1,151 mm	Not Adjustable
Industrial (R4) 10-16.5	1,252 mm	Not Adjustable

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

NOTE: Torque front wheel bolts to 175 N·m.

Rear Wheel Settings

Tire Type	MIN (DISH IN)	MAX (DISH OUT)	NO. OF POSITION
AG 13.6 - 24	1,127 mm	1,477 mm	7
TURF 475/65D20	1,269 mm	1,285 mm	1
Large Turf (FD) 13.6 - 28	1,127 mm	1,477 mm	7
Industrial (R4) 17.5L - 24	1,123 mm	1,331 mm	6

NOTE: Torque rear wheel bolts to 175 N·m. Torque rim to disc bolts to 230 N·m

Position	Rear FWD Tire Dimensions, mm			Tire Type
	Inside To Inside	Tread Setting	Outside To Outside	
A	N/A	N/A	N/A	AG 13.6 - 24
B	840	1,175	1,510	
C	792	1,127	1,462	
D	890	1,225	1,560	
E	994	1,329	1,664	
F	1,092	1,427	1,762	
G	1,044	1,379	1,714	
H	1,142	1,477	1,812	
A	N/A	N/A	N/A	Large Turf (FD) 13.6 - 28
B	820	1,175	1,530	
C	772	1,127	1,482	
D	780	1,225	1,580	
E	974	1,329	1,684	
F	1,072	1,427	1,782	
G	1,024	1,379	1,734	
H	1,122	1,477	1,832	
A	N/A	N/A	N/A	Industrial (R4) 17.5L - 24
B	N/A	N/A	N/A	
C	771	1,223	1,685	
D	869	1,321	1,773	
E	781	1,233	1,685	
F	879	1,331	1,783	
G	1,023	1,475	1,927	
H	1,121	1,573	2,025	
	805	1,269	1,733	TURF 475/65D20

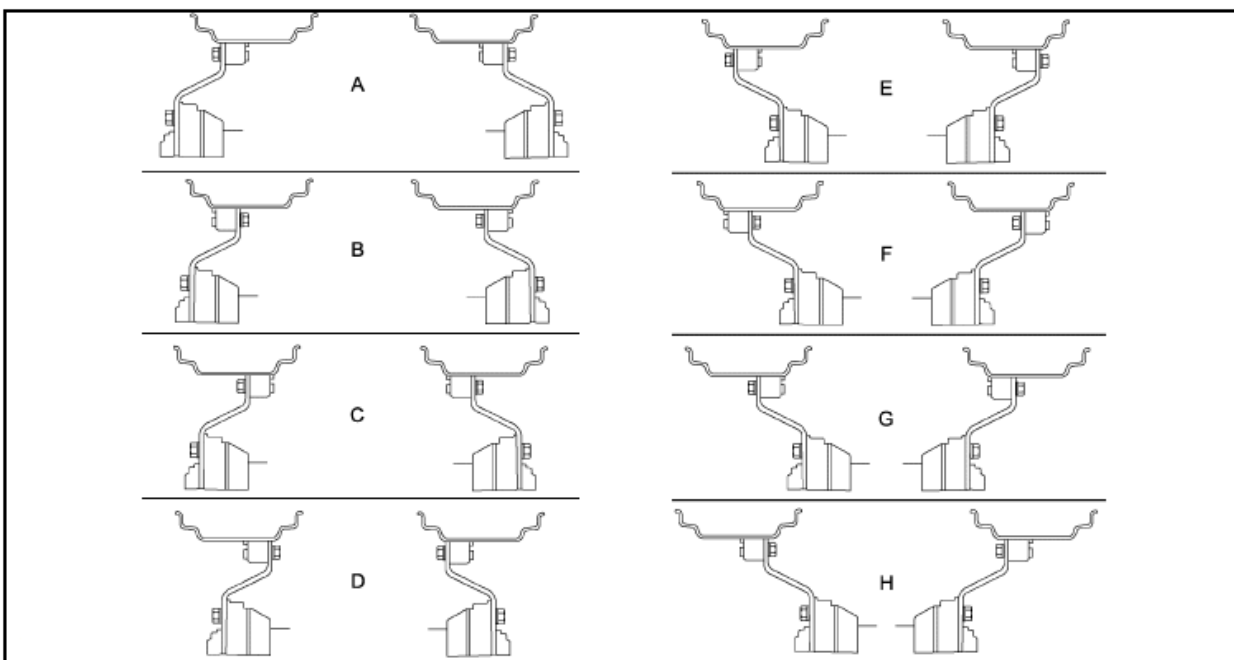


Figure 2-61

TRACTOR WEIGHTING

For sufficient traction and maximum performance in heavy draft operations, and to counterbalance rear-mounted equipment, weight should be added to tractor in the form of liquid ballast, cast iron weights or a combination of both. Only enough weight should be added to provide good traction and stability. Adding more weight than is needed results unnecessary soil compaction, increased rolling resistance, and higher fuel consumption.

NOTE: When adding weight to the tractor, tire pressures may need to be increased. Refer to the Tire Inflation Pressure chart found in page 2-38 of this manual.

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 an implement is raised by the tractor three-point hitch.

As a general guide:

Ballast the tractor (less implement) so that approximately one-third of the tractor weight is on the front wheels. For optimum traction, tractors equipped with front-wheel drive should be ballasted so that 40-45% of machine weight is on the 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 of the tractor to maintain good traction and stability. Front-mounted equipment varies in weight. Refer to equipment manual for ballasting.

WEIGHTING LIMITATIONS

The weighting limitations that follow are limitations only. They do not imply that the tractor should be weighted to attain the weights given. Use only enough weight to obtain good performance.

Permissible Axle Load (Including tractor weight)

Tire Type	Front Axle	Rear Axle	Total
AG	8-16 950kg	13.6-24 1,950kg	2,900kg
Turf	27x10.5-15 1,200kg	475/65D20 1,950kg	3,150kg
Large Turf (FD)	8-16 950kg	13.6-28 1,950kg	2,900kg
Industrial (R4)	10-16.5 1,250kg	17.5L-24 1,950kg	3,200kg

CAST IRON WEIGHTS (OPTIONAL)

Cast iron weights are available as accessories from your SHIBAURA Dealer. Weights can be mounted on the front end of the tractor and on the rearmost wheels.

Front End Weights

Tire Type	Weight(s)
Agricultural Turf R4	Maximum of (5) weights per tractor @ 30 kg each 150 kg total

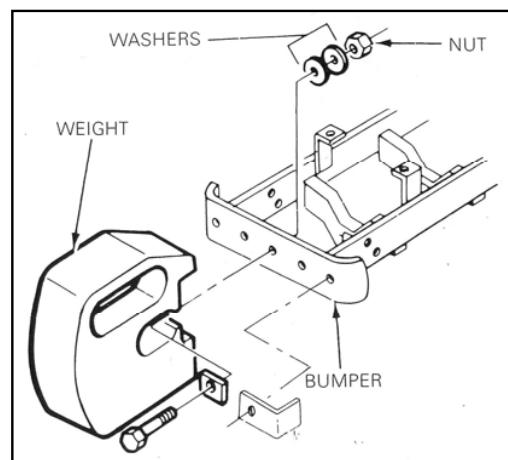


Figure 2-62

Optional Front Weight with Front Hitch

Tire Type	Weight(s)
Agricultural Turf R4	Maximum of (6) weights per tractor @ 30 kg each 180 kg total

If front hitch function or additional front weights are needed for counter-balancing a rear mounted implement, an optional front weight bracket (1) in Figure 2-64, can be installed to the front of the tractor. With the bracket installed, a maximum of (6) 30kg weights can be installed with front hitch function.

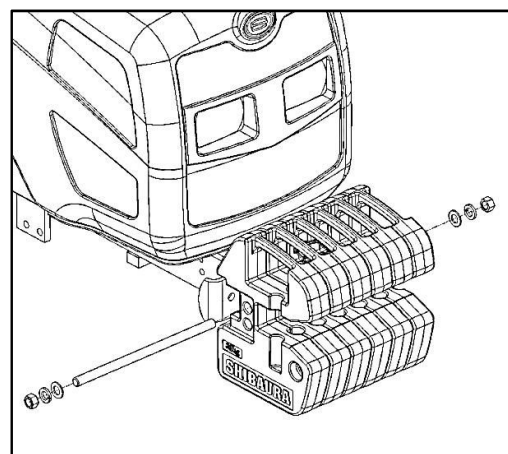


Figure 2-63

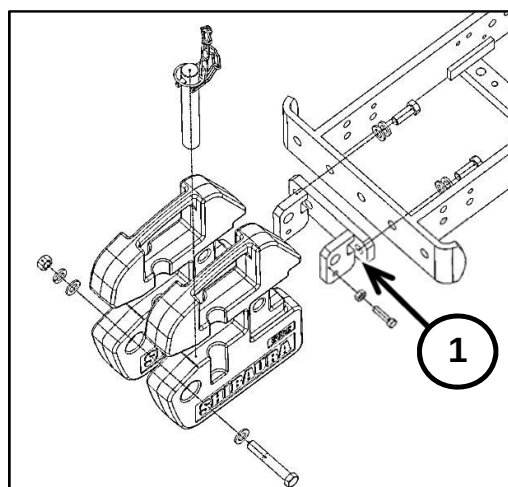


Figure 2-64

Rear Wheel Weights

Tire Type	Weight(s)
Agricultural tire only	Maximum of (4) weights per tractor @ 30 kg each 120 kg total

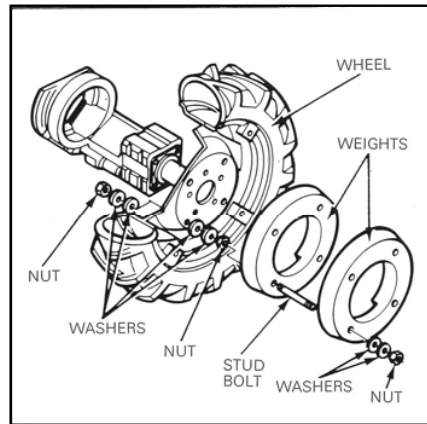


Figure 2-65

LIQUID BALLAST (OPTIONAL)

It is a common practice to add weight to the tractor by filling 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 volume) than pure water.

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

Tires should never be filled beyond 75%. At 75% full, the liquid will come to the valve stem when the valve stem is at its highest point at the top of the wheel.

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 tire inflation pressures.

FRONT TIRE INFLATION PRESSURES			
Tire Type	Tire Size	Inflation Pressure	Load Capacity per Axle
AG	8-16 4PR	100 - 160 kPa	720 – 950kg
TURF	27x10.5-15 4PR	100 - 210 kPa	800 – 1,200kg
Large Turf (FD)	8-16 4PR	100 - 160 kPa	720 – 950kg
Industrial (R4)	10-16.5 6PR	120 - 275 kPa	800 – 1,250kg
REAR TIRE INFLATION PRESSURES			
Tire Type	Tire Size	Inflation Pressure	Load Capacity per Axle
AG	13.6-24 4PR	80 – 100 kPa	1,820 – 1,950kg
TURF	475/65D20 4PR	80 – 140 kPa	1,950kg
Large Turf (FD)	13.6-28 6PR	80 – 160 kPa	1,950kg
Industrial (R4)	17.5L-24 10PR	80 – 220 kPa	1,950kg

NOTE: Do not underinflate or overinflate tires. Do not exceed maximum inflation pressure listed.

SECTION 3

LUBRICATION AND MAINTENANCE

Adequate lubrication and maintenance on a regular schedule is vital to maintaining your equipment. To ensure long service and efficient operation, follow the lubrication and maintenance schedules outlined in this manual. The use of proper fuels, oils, grease and filters, as well as keeping the systems clean, will also extend machine and component life.

IMPORTANT: Always use genuine **SHIBAURA** replacement parts, oils and filters to ensure proper operation, filtration of engine and hydraulic systems. See your **SHIBAURA** dealer for additional oil quantities.

GENERAL INFORMATION

Regular lubrication is the best insurance against delays and repairs. Proper lubrication will extend machine life. Refer to the following charts for lubricants and service intervals.

IMPORTANT: Failure to complete the required maintenance at the recommended intervals can cause unnecessary downtime.

The intervals listed in the Lubrication Chart are guidelines to be used when operating in normal conditions. Adjust the intervals for operating in adverse environmental and working conditions. The intervals should be shortened for sandy, dusty and extremely hot operating conditions.

-
-  **CAUTION** 
- Observe these safety precautions before performing lubrication and maintenance.**
1. **Ensure the unit is on level ground.**
 2. **Disengage all drives.**
 3. **Lower all attachments to the ground or raise and engage all locks**
 4. **Shut off engine and allow to cool for hot components, oil and coolant.**
 5. **Close all shields opened and reinstall any shields removed for lubrication and maintenance proposes.**
-

 **CAUTION** 

Some illustrations in this manual show shields opened or removed to show areas being serviced. Replace all shields before operating this machine.

Always clean the area around dipsticks, fill caps, and check plugs when checking fluid levels. Failure to clean these areas may allow contamination to enter the system. Drain, flush and refill the system anytime you suspect it is contaminated.

Grease Fittings

Wipe dirt from fittings before greasing.

Pump fresh grease into fitting to adequately lubricate the component and force out any contamination from the grease passage.

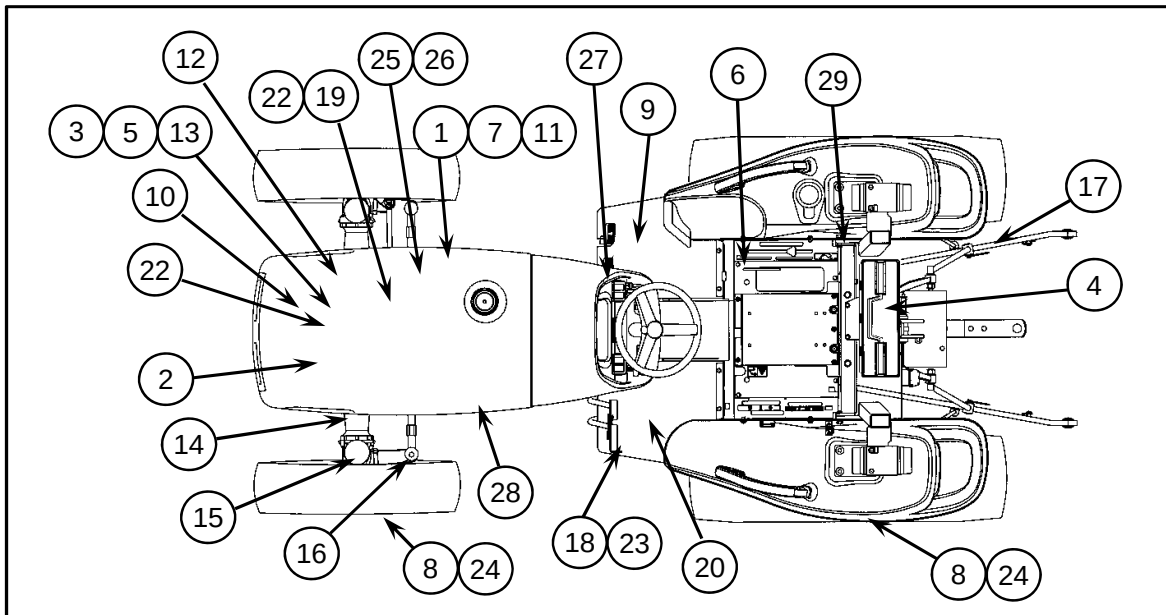
Wipe off excess grease.

Use a grease gun containing clean high grade of multipurpose grease.

Chains

Stop all drives before lubricating chains.

LUBRICATION AND MAINTENANCE CHART SHIBAURA ST450 – FRONT-WHEEL DRIVE



NO.	LUBRICATION & MAINTENANCE ITEMS	CHECK	CLEAN	LUBE	CHANGE	ADJUST	SERVICE INTERVALS
1 2 3 4 5	Engine Oil Level Air Cleaner Radiator Coolant Transmission Oil Level Radiator Prescreen	x x x x x					Every 10 Hours or Daily
6 1, 7 8 11 12 24 - 23 27 28 29	Hydraulic Filter Engine Oil & Filter Tire Pressure Fuel Filter Element Power Steering Hydraulic Hoses Wheel Bolt Torque All Fluid Levels Brake Pedal Free Play HPL Delivery Line Filter HST System Filter ROPS and Mounting Bolts Torque	x x x x x x x x x x x			x x x x x x x x x x x	x x x x x x x x x x x	First 50 Hours
8 9 10 13 14 15	Tires HST Pedal Pivot Battery Fan Belt Front Axle Oil Level Final Reduction Gear Cases Oil Level Lubrication Fittings:	x x x x x x x x		x		x	Every 50 Hours
16 17 18 19 20 22	Steering Linkage 3-Point Linkage Brake Pedal Power Steering Cylinder Pedal Shaft Pivot Shaft			x x x x x x			
1, 7 2 11	Engine Oil & Filter Air Cleaner Element Fuel Filter		x x		x		Every 100 Hours

NO.	LUBRICATION & MAINTENANCE ITEMS	CHECK	CLEAN	LUBE	CHANGE	ADJUST	SERVICE INTERVALS
23 11 12 13 24 29	Brake Pedal Free play Fuel Filter Element Power Steering Hydraulic Hoses Fan Belt Wheel Bolt Torque ROPS and Mounting Bolts Torque		x		x x x x x	x x x x x	Every 200 Hours
4 6 14 15 27 28	Transmission Oil Hydraulic Filter Front Axle Oil Final Reduction Gear Cases Oil HPL Delivery Line Filter HST System Filter				x x x x x x x		Every 300 Hours
25 26	Fuel Injector Valve Clearance	x x			x x	x x	Every 600 Hours
2 3	Air Cleaner Radiator Coolant				x x		Seasonal
2	Safety Air Filter Element				x		Every 3 rd Primary Element Change or Every 1000 Hours, Whichever Comes First
12	Power Steering Hydraulic Hoses				x		Every 2 years

LUBRICATION FITTINGS

NOTE: After every 50 hours of normal operation, apply a good quality grease to the lubrication points listed below (refer to the Recommended Lubricants chart). When operating under extremely dirty conditions, lubricate more frequently than every 50 hours.

- Steering Linkage
- Front Axle Pivot
- Power Steering Cylinder
- Pedal Shaft—HST & Brake Pedals
- 3-Point Linkage

To lubricate these points:

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

DIESEL FUEL

- Use clean, quality No. 1 -D or No. 2-D fuel (ASTM D975).
- Use No. 1-D fuel if the ambient temperature is expected to be lower than 4°C or if the tractor is to be used at an altitude exceeding 1524 m.
- Use No. 2-D diesel fuel with a pour point of at least -12°C below the expected ambient temperature to prevent fuel flow problems in cold weather.
- Keep dirt from entering the fuel tank.
- Sulfur content of the fuel should be no more than 0.5%.
- Sediment and water content should not exceed 0.05%.
- Minimum cetane number is 40. Low temperature or high altitude operation may require use of fuel with a higher cetane number.
- Use properly mixed winter fuel when temperatures are extremely cold. In most areas, diesel fuel is properly blended for summer and winter grades as ambient

temperatures change. In winter, use winter grade diesel fuel only. Otherwise, the fuel may jell and block the fuel system.

Fuel Usage Safety

- UNDER NO CIRCUMSTANCES should gasoline, alcohol, or gasohol be added to diesel fuel. These combinations can create an increased fire or explosive hazard.
- Never remove the fuel cap or refuel the tractor while the engine is running.
- Never smoke while refueling or anywhere near fuel.
- When filling the tank, maintain control of the nozzle.
- Do not fill the fuel tank to capacity. Allow room for expansion.
- Wipe up spills immediately.
- Always tighten the fuel cap securely.
- If the original 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.
- Do not drive equipment near open fires.
- Never use gasoline for cleaning parts.

Biodiesel Fuel

The use of biodiesel blends meeting Specification Standards ASTM 6751 or EN14214 are approved for your engine up to B5 (5%blend ratio). It is highly recommended to use biodiesel fuel from accredited suppliers to maintain quality and consistency of the fuel.

Biodiesel does not have a long-term stability and should not be left in engines or stored for more than four months. If your machine is stored for long term, engine should be flushed, prior to storage, by running for a minimum of 30 minutes with conventional diesel fuel.

Biodiesel fuel has a higher cloud point than conventional diesel fuels and is not recommended in winter months. Consult your fuel dealer for winter fuel requirements for your area.

Biodiesel fuel attracts moisture and may contain a higher content of water. It may be necessary to drain the fuel filter water trap more frequently

⚠ 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.

Refueling the Tractor

The fuel tank filler cap (1) in Figure 3-1, is located at the rear of the front fender. Before removing the cap, wipe all dust and dirt from around the cap to prevent debris from falling into the tank during filling.

Use an approved container and check the inside of the container periodically for cleanliness. The tractor fuel tank capacity is 54 L.

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

If there is no filter on the storage tank or fuel container, filter the fuel through a 100-mesh or finer screen when filling the tractor fuel tank. Keep the tractor tank as full as possible (without overfilling) to minimize condensation.

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

⚠ WARNING ⚠

Keep any type of open flame away from the tractor and do not smoke while refueling. Wait for the engine to cool before refueling.

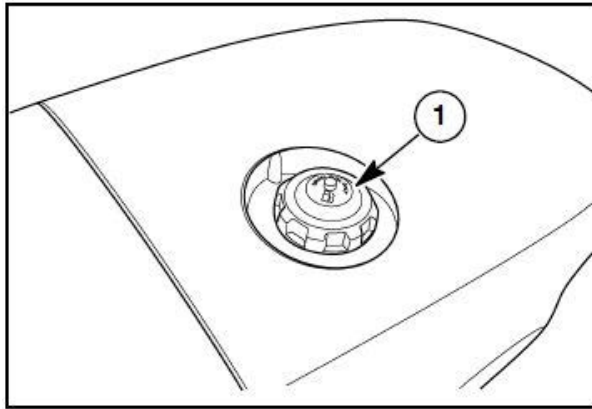


Figure 3-1

LUBRICANTS

Type of lubricant to use,
Transmission, Rear Axle, Final-
reduction, and Hydraulic System..... ISO VG 46
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.

IMPORTANT: Engine crankcase oil drain intervals should be adjusted downward when diesel fuel sulfur content is over 0.5%. Consult your SHIBAURA dealer for details of Engine Crank case Oil usage.

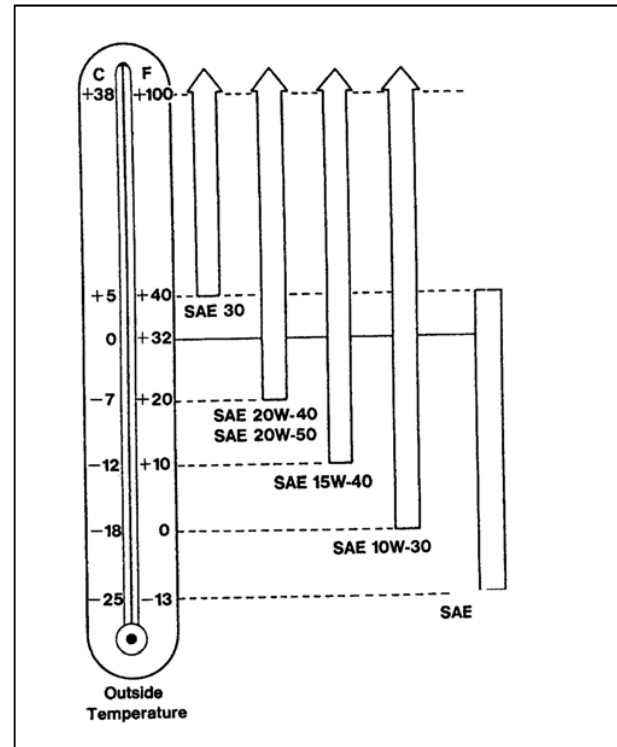


Figure 3-2

FUEL AND LUBRICANT SERVICE PROCEDURES

ENGINE

Checking the engine oil level

NOTE: Check the engine oil level daily, or after every 10 hours of operation.

1. After the engine has been stopped for a period of time, and with the tractor standing level, check the oil level using the dipstick (1) in Figure 3-3.

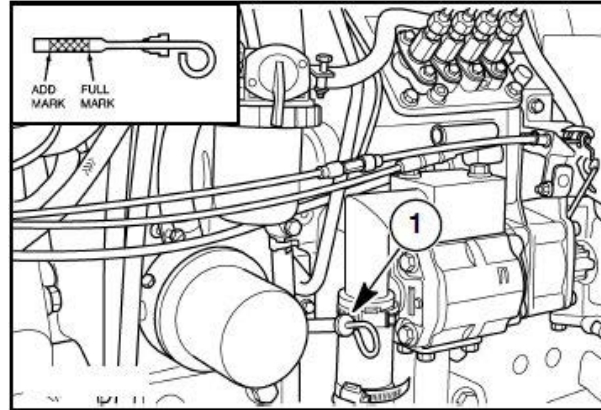


Figure 3-3

2. If the oil level is low, remove the filler cap (2) in Figure 3-4, and add oil through the filler hole. Add enough oil so that the level registers between the two marks on the dipstick. Do not overfill.

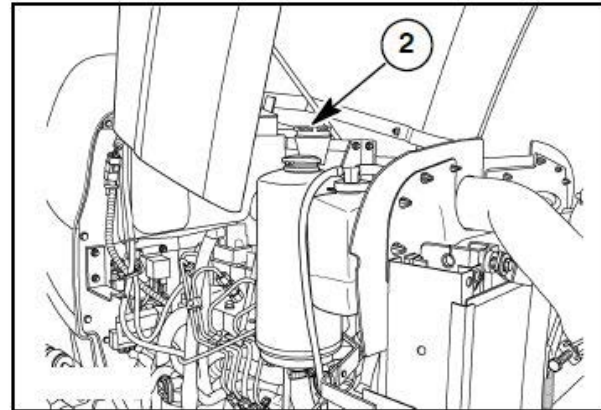


Figure 3-4

Changing the Engine Oil

NOTE: Change the engine oil and filter after the first 50 hours of operation, then every 100 hours thereafter. If the tractor is operated for extended periods of time at maximum rated power and speed, or under other types of continuous, severe operating conditions, the engine oil and filter should be changed at 70-hour Intervals following the initial oil change.

To change the engine oil:

1. Place a suitable container beneath the drain opening to catch the used oil. With the tractor engine off but at normal operating temperature, remove the drain plugs (3) in Figure 3-5. Reinstall the plugs after all of the oil has been drained.

NOTE: Remove both drain plugs to properly drain all oil.

CAUTION
Engine oil could be hot, use caution during draining.

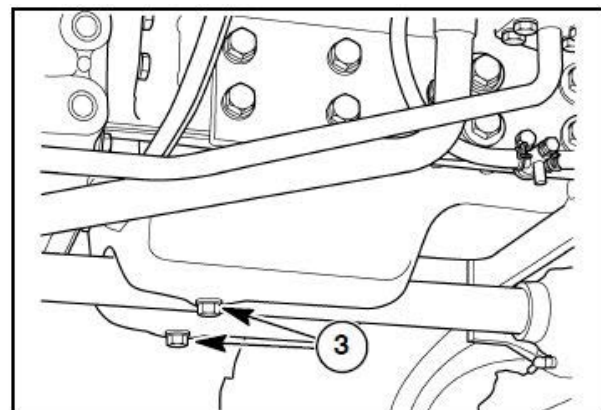


Figure 3-5

2. Next, Place a suitable container below the oil filter (1) in Figure 3-6, to catch the used oil and unscrew the oil filter. Discard the used oil and filter.
3. Coat the gasket on the new filter with a thin film of new oil. Screw the filter into place until the gasket contacts its mating surface, then turn the filter approximately three-quarters of a turn BY HAND. DO NOT over tighten.
4. Add the proper type and amount of new oil, then start the engine and check the filter for leaks. The crankcase capacity (with filter) on these tractor models is 6.0L.

NOTE: Your tractor is originally shipped with 10W-30 engine oil.

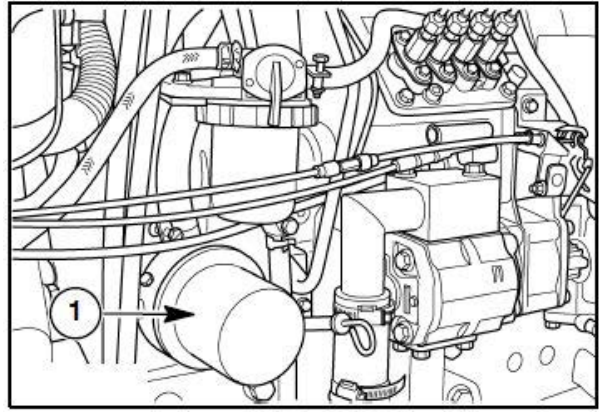


Figure 3-6

FUEL FILTER

Draining the Fuel Filter

NOTE: The fuel filter should be drained after every 100 hours of operation.

1. Make sure there is adequate fuel in the fuel tank and close the fuel shutoff valve (1) in Figure 3-7, (the handle should be pointing to the "OFF" position). Remove the fuel sediment bowl (2) in Figure 3-7.
2. Open the fuel shutoff valve until all water has been removed and only fuel flows from the filter base.
3. Install the fuel sediment bowl and bleed the system as outlined in "Bleeding the Fuel System."

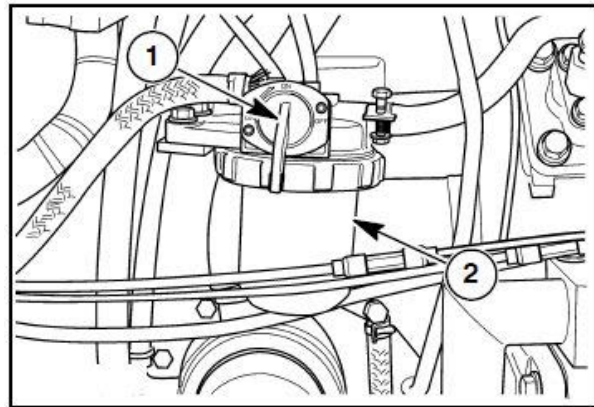


Figure 3-7

Changing the Fuel Filter

NOTE: Change the diesel fuel filter after the first 50 hours of operation, then following every 200 operating hours thereafter.

1. Close the shutoff valve (the handle should be pointing to the "OFF" position).
2. Remove the sediment bowl (1) in Figure 3-8, by rotating the retaining nut (2) in Figure 3-8.
3. Open the fuel shutoff valve (3) in Figure 3-8, to drain any remaining water from the tank.
4. Discard the old element (4) in Figure 3-8, and install a new element.
5. Inspect the O-rings (5) in Figure 3-8, and (6) in Figure 3-8, and replace if necessary.
6. Install spring (7) in Figure 3-8, between bottom of element and bowl.
7. Install and securely tighten the sediment bowl.
8. Open the fuel shutoff valve (the handle should be pointing to the "ON" position) (3) in Figure 3-8, so fuel will flow to the filter.
9. Bleed the fuel filter and injection pump as described next in "Bleeding the Fuel System."

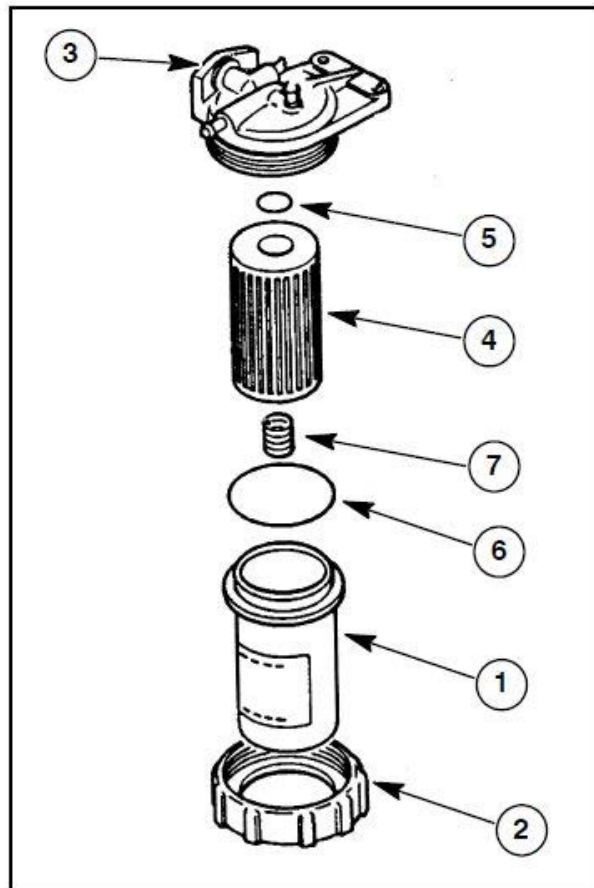


Figure 3-8

Bleeding Air From the Fuel System

The vehicle has an auto-bleed system, which should exhaust all air if the engine is cranking.

The system should bleed with minimal cranking if the sediment bowl is filled with fuel.

If the bowl is slow in filling, there is likely a blockage in the return vent lines.

Manually bleed the fuel system if:

- It has been drained.
- A new filter element has been installed.
- The tractor has run out of fuel.
- The lines leading to or from the filter have been disconnected.
- The injection pump has been removed and reinstalled.

 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.

To bleed the fuel system:

1. Make sure there is adequate fuel in the fuel tank.
2. Open the fuel shutoff valve (1) in Figure 3-9.
3. Remove hose (2) in Figure 3-10, from the top of the bleed fitting. Reinstall hose when air-free fuel starts to flow.
4. Push the hand throttle to the high-speed position. Turn the engine over for a few seconds to bleed the high-pressure fuel tubes.

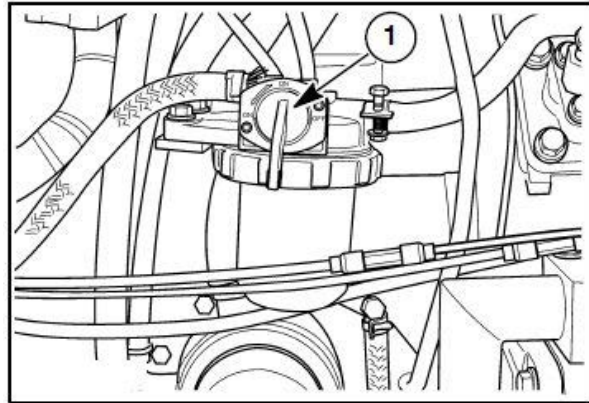


Figure 3-9

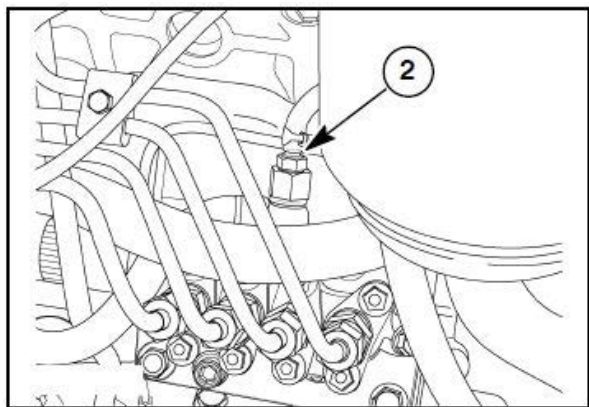


Figure 3-10

Bleeding the Injector Lines

Bleed the injector lines if:

- The tractor has run out of fuel.
- New injectors have been installed.
- The injection pump has been removed for service repairs.

To bleed the injector lines:

1. Loosen the injector line fittings (1) in Figure 3-11, at the injectors.
2. Move the hand throttle control lever to its wide open position.
3. Crank the engine until air-free fuel flows from each connection, then tighten the fittings to 24-29 N·m.

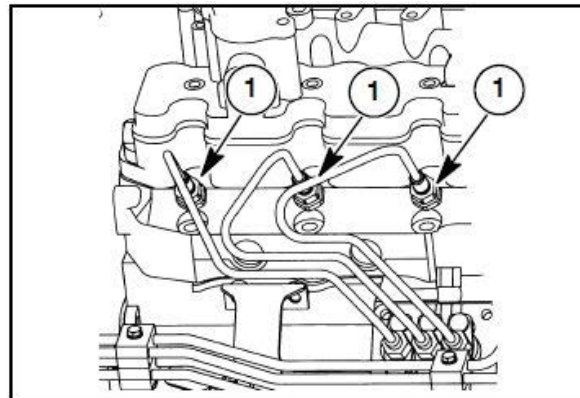


Figure 3-11

IMPORTANT: If air is not purged from the system, repeat the above procedures.

Do not crank the engine continuously for more than 30 seconds as this may cause starter motor failure.

AIR CLEANER

The air cleaner (1) in Figure 3-12, is accessed by opening the tractor hood.

The air cleaner assembly contains two elements: an outer (primary) element, and an inner (safety) element.

To remove the primary element, release the clips (2) in Figure 3-12, on the end cap.

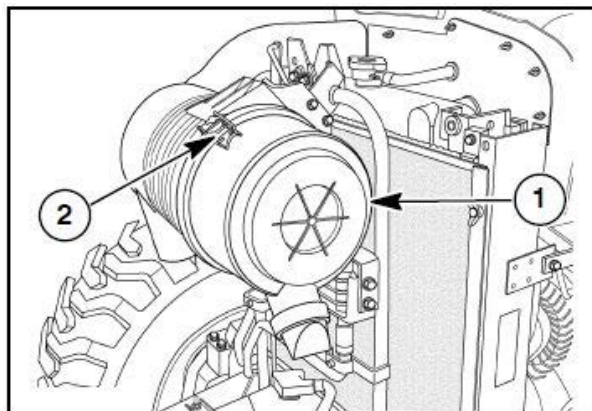


Figure 3-12

Remove the end cap from the air cleaner body to expose the primary element (3) in Figure 3-13.

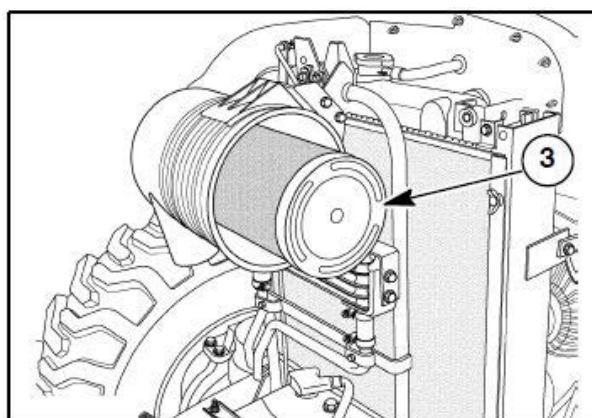


Figure 3-13

Air Cleaner Primary Element

NOTE: Clean the primary element after every 100 hours of service. Extremely dusty conditions may require more frequent service intervals.

1. Pull the primary element (3) in Figure 3-14, from the canister. Clean any loose dirt from the canister and inspect the end of the canister for dirt, which may prevent the new element from sealing properly.
2. Clean the primary element using low air pressure (200kPa or less). Blow dust from the inside to the outside of the element (opposite to normal air flow through element).

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

3. After cleaning the element, check the inner diameter seals for damage. If damage is present, replace the primary element.
4. Reinstall the primary element by inserting it into the canister and pushing on the end of the element until it is seated against the canister.

NOTE: Place a light inside the element to check for paper leaks or for bonding of the paper to the end plate. If any leaks are found, replace the element.

NOTE: If element is not inserted far enough into canister, the end cap cannot be installed.

5. Place the end cap onto the canister body, push in on end cap, and rotate clockwise. Make sure the end cap is locked in place and not loose.

IMPORTANT: Never tap the element with hard objects or against a hard surface. This may dent or break the element end cap seals.

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

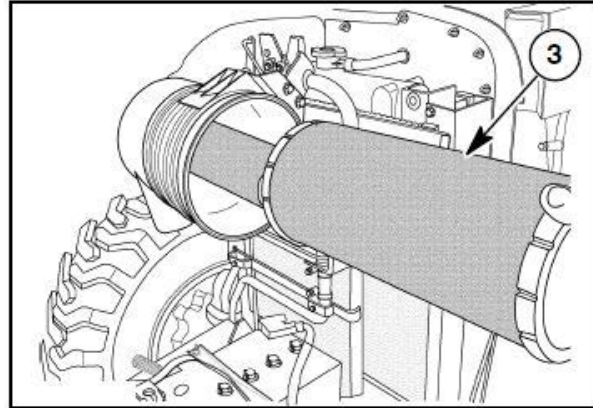


Figure 3-14

Air Cleaner Inner Safety Element

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

The air cleaner inner safety element (4) in Figure 3-15, cannot be cleaned. It must be replaced once it becomes partially clogged. A clogged element will cause an air restriction resulting in a loss of engine power or excessive black exhaust smoke.

NOTE: Conduct a visual inspection of the inner safety element by placing a light inside the element. Little or no light will shine through the element if it is partially clogged.

To remove the inner safety element, pull it out of the canister body.

To install the new element, push it into the canister until seated.

IMPORTANT: Clean any dirt from the canister before installing the inner safety element. Check element inner diameter seals for damage and replace the safety element if seal damage is present.

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

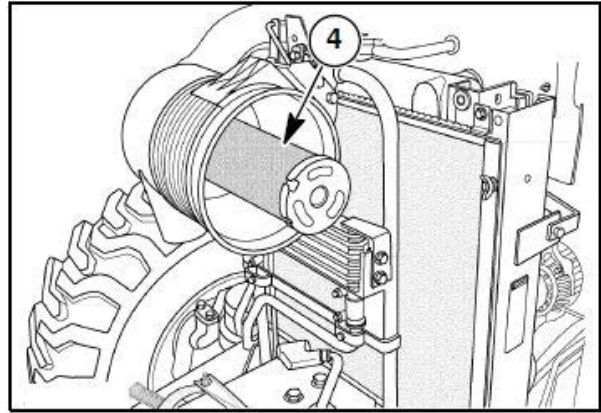


Figure 3-15

TRANSMISSION, REAR AXLE, AND HYDRAULIC SYSTEM

Checking the Transmission, Rear Axle, and Hydraulic System Oil Level

NOTE: Check the transmission, rear axle, and hydraulic system oil level after every 50 hours of operation.

1. With the engine off and the tractor standing level, check the oil level using the dipstick (1) in Figure 3-16.
2. The oil is at the correct level when it reads between the two marks on the dipstick. If the level is low, remove the filler plug (2) in Figure 3-16, and add new oil of the type specified, page 3-5, through the filler hole. Do not fill above the dipstick full mark.
3. Reinstall the filler plug and dipstick.

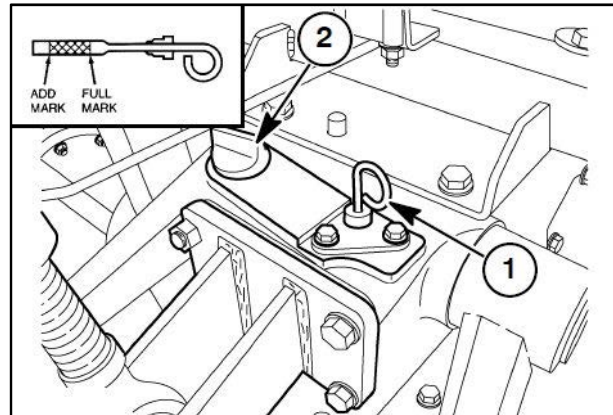


Figure 3-16

HYDRAULIC SYSTEM OIL FILTER

NOTE: Replace the hydraulic system oil filter after the first 50 hours of operation, and then following every 300 hours of operation thereafter.

The hydraulic system uses a spin-on type oil filter. To replace the filter (1) in Figure 3-17:

1. Unscrew the used oil filter and discard.
2. Coat the gasket on the new filter with a film of clean oil. Screw the filter into place until the gasket contacts the sealing surface, then tighten the filter by hand approximately three-quarters of a turn. Do not over-tighten.
3. Start the engine and check the filter for leaks.
4. Stop the engine and check the hydraulic system oil level. Add oil if necessary.

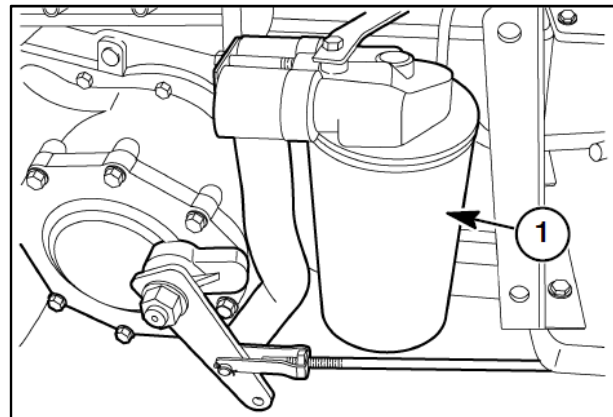


Figure 3-17



CAUTION

**Transmission oil and filters could be hot, use
caution during draining or replacing.**

HST SYSTEM OIL FILTER

NOTE: Change the H.S.T. system oil filter after the first 50 hours of operation, and then following every 300 hours of operation thereafter.

To change the H.S.T. system oil filter (1) in Figure 3-18, follow the procedures found above for changing the hydraulic system oil filter.

NOTE: An optional cold weather H.S.T. filter is available. Part #340501030. This filter is recommended for operation in temperatures at or below -18 °C (0 °F).

Changing the Transmission, Rear Axle, and Hydraulic System Oil

NOTE: Change the transmission, rear axle, and hydraulic system oil after every 300 hours of operation.

1. Place a suitable container beneath the transmission drain plugs (1) in Figure 3-19, to catch the used oil. With the oil at normal operating temperature, drain the system by removing the transmission and rear axle drain plugs. Reinstall the drain plugs after all of the oil has drained out. Discard the used oil properly.
2. Remove the filler plug (2) in Figure 3-20, and fill with new oil of the type specified page 3-5. The transmission is filled to the correct level when the oil registers between the two marks on the dipstick. Do not fill above the dipstick full mark.

Capacity and oil grade: transmission:

HST 36 L / ISO VG46

3. Reinstall the dipstick and filler plug.

IMPORTANT: There is a common sump for the transmission, rear axle, and hydraulic system. Therefore, extra care should be taken to keep the oil clean.

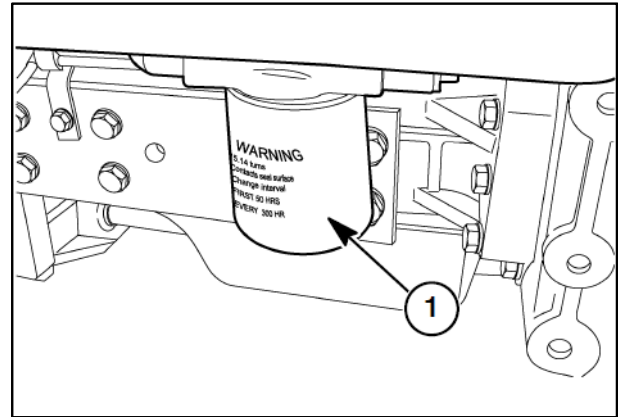


Figure 3-18

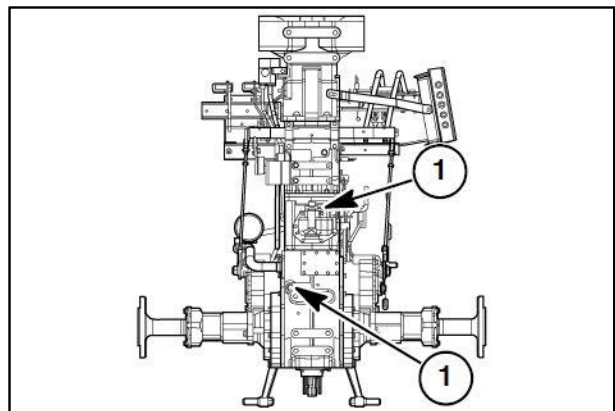


Figure 3-19

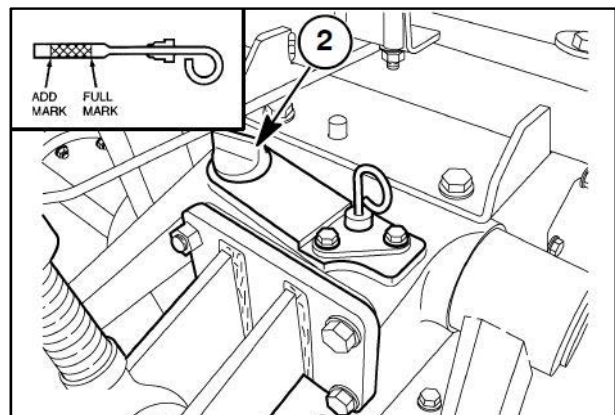


Figure 3-20



Transmission oil and filters could be hot, use caution during draining or replacing.

GENERAL MAINTENANCE

COOLING SYSTEM

The tractor engine must operate at the correct temperature to obtain maximum efficiency and service life. This is dependent on the cooling system. Always fill the system with a 50/50 solution of ethylene glycol antifreeze and water.

Checking the Coolant Level

NOTE: Check the coolant level daily or after every 10 hours of operation. The engine should be cold when coolant level is checked.

1. Visually inspect the coolant level in the overflow tank (1) in Figure 3-21.

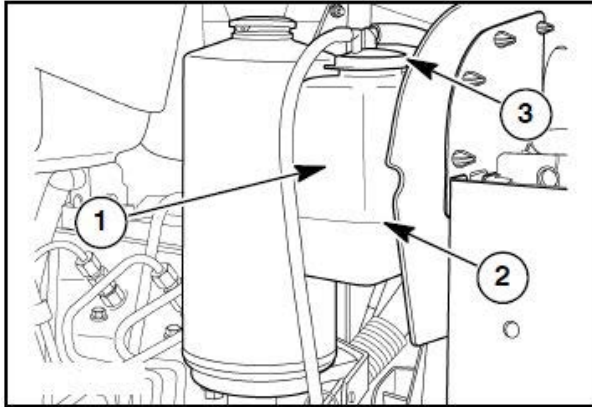


Figure 3-21

⚠ WARNING ⚠

The cooling system operates under pressure 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 it slowly counter-clockwise to the first stop. Allow all pressure to escape before removing the cap completely.

2. If the coolant level is below the cold level line (2) in Figure 3-21, remove overflow tank cap (3) in Figure 3-21, add a 50/50 solution of ethylene glycol anti-freeze and water solution as necessary. Plain water will dilute the solution and weaken its protection.
3. Remove the two wing nuts that retain the front radiator screen and slide the screen (4) in Figure 3-22, out the left side of the tractor.
4. Keep the radiator fins (5) in Figure 3-23, clear of chaff or dirt to allow free air movement.
5. HST transmission only, there is an oil cooler (6) in Figure 3-23, located in front of the radiator and underneath air cleaner. Keep fins of cooler clean of any buildup of material, so that transmission oil can be cooled.

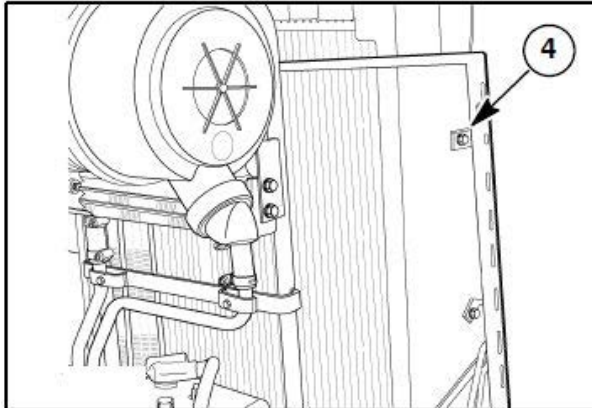


Figure 3-22

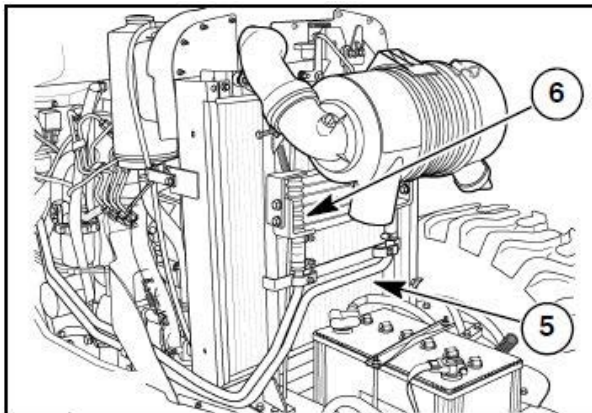


Figure 3-23

Draining and Flushing the Cooling System

NOTE: Drain and flush the radiator and engine block every 12 months. Refill with a 50/50 mixture of ethylene glycol antifreeze and clear water.

To drain the cooling system:

1. Use a suitable receptacle to catch the used coolant. Remove the radiator cap and open the drain valve (1) in Figure 3-24, on the right-hand side of the tractor frame, to drain the radiator and drain valve (2) in Figure 3-25, on right side of engine block to drain engine block.
2. After the coolant has drained, place a water hose in the radiator filler neck and run water through the system. When water is flowing from the block drain valve, start 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 the drain valves.
3. Close the drain valve and slowly refill the system with a 50/50 solution of ethylene glycol antifreeze and water. Fill until the coolant level is same the bottom of the filler neck. Do not fill beyond this level.

Capacity 5.5L

4. Clean the radiator cap and cap seal and install the cap.
5. Run the engine until normal operating temperature is reached, then stop the engine. Recheck the coolant level when the engine is cold and add additional coolant as necessary.

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

WARNING

The cooling system operates under pressure 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 it slowly counter-clockwise to the first stop. Allow all pressure to escape before removing the cap completely.

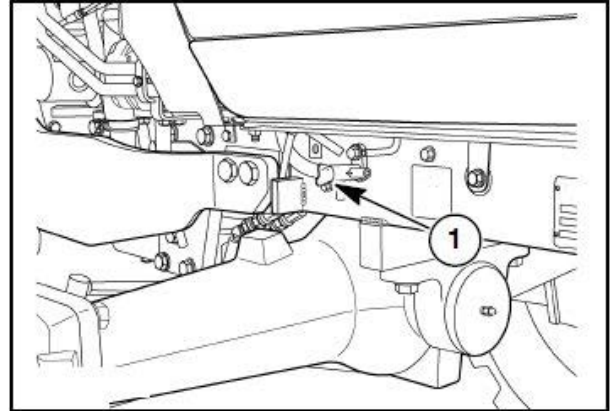


Figure 3-24

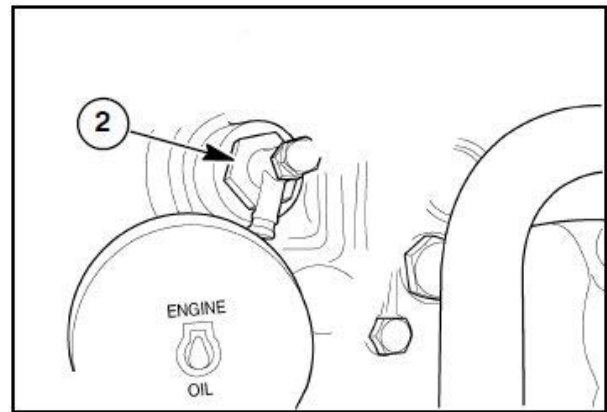


Figure 3-25

Thermostat

The thermostat (1) in Figure 3-26, is a heat-sensitive valve located in the coolant outlet connection in the front of the cylinder head.

When the engine is cold, the thermostat shuts off the flow of coolant to the radiator, allowing for rapid engine warm-up. A recirculating bypass allows coolant to circulate inside the engine whenever the thermostat shuts off flow to the radiator.

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

To install a new thermostat (1) in Figure 3-26, position it in the recess of the water outlet connection so that the heat element (spring end) is in the cylinder head of the engine.

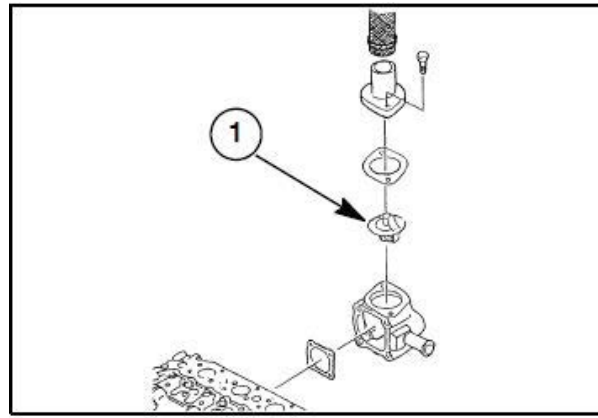


Figure 3-26

Fan Belt

NOTE: Check the condition of the fan belt after every 50 hours of operation. Check fan belt tension after every 200 hours of operation.

A belt-driven fan located at the front of the engine draws air through the fins of the radiator to lower the temperature of the radiator coolant.

When 5 kg of thumb pressure is applied to the belt midway (1) in Figure 3-27, between the belt pulleys, a correctly tightened belt will deflect 5 - 10 mm.

If the fan belt is slipping, fan efficiency is lowered, resulting in the engine running too hot. If the belt is too tight, the life of the alternator bearing will be shortened. If the fan belt shows signs of cracking or fraying, install a new belt.

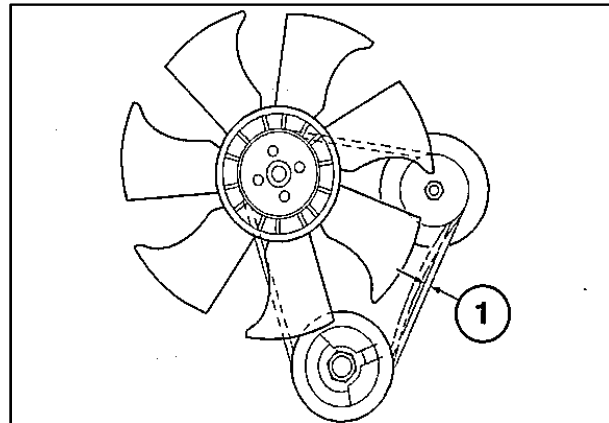


Figure 3-27

To adjust fan belt tension:

⚠ WARNING ⚠
Never attempt to loosen or tighten mounting bolts while the engine is running.

1. Loosen the alternator mounting bolts (1) in Figure 3-28.
2. Pry the alternator away from the engine and tighten the mounting bolts.

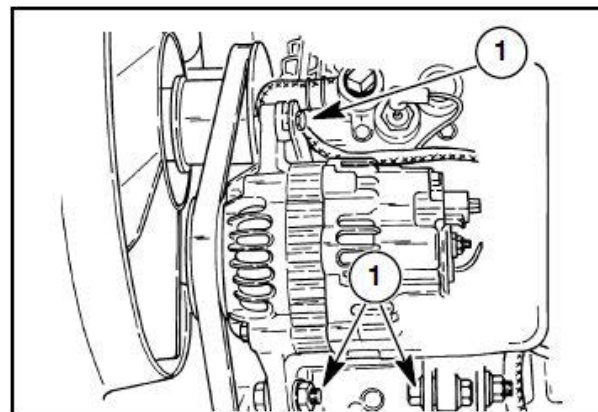


Figure 3-28

MAINTENANCE AND INSPECTION OF THE ROLLOVER PROTECTIVE STRUCTURE (ROPS)

NOTE: Inspect the ROPS after the first 50 hours of operation. Following the initial inspection, check the ROPS after every 200 hours of operation or every six months, whichever comes first.

1. Check the torque of the ROPS mounting bolts, (1) in Figure 3-29, and (2) in Figure 3-30. Tighten the bolts (1) in Figure 3-29, and (2) in Figure 3-30, to the correct torque of 74.5 N·m and nuts.

POSSIBLE DAMAGE TO THE ROPS

If the unit has rolled over or the ROPS has been in some other type of accident (such as hitting an overhead object during transport), the ROPS must be replaced to retain the best protection.

Following an accident, check the ROPS, the operator's seat for possible damage. Before operating the machine, replace all damaged parts.

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

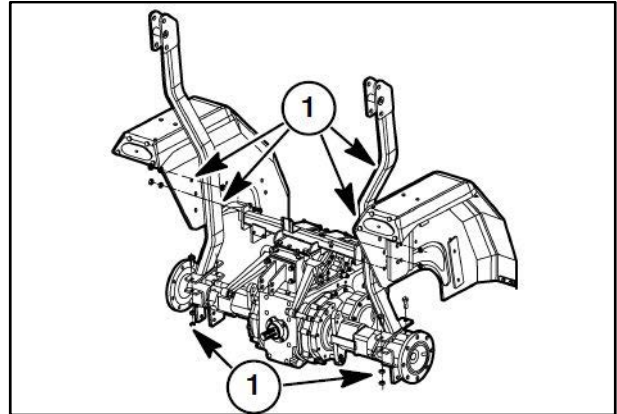


Figure 3-29

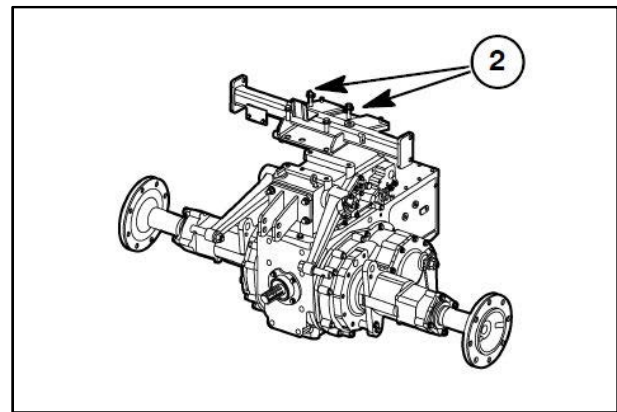


Figure 3-30

⚠ WARNING ⚠
Always pull from the tractor drawbar pin hole. 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.

Always wear your seat belt unless the tractor is not equipped with a ROPS or folding ROPS is in the down position. In this case, the seat belt should not be worn.

BATTERY

The tractor is equipped with a 12-volt battery, with a minimum cold cranking ability of 700 amps at -18°C.

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. 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, a good battery charge must be maintained. If the battery becomes discharged or run down, the electrolyte becomes weak and may freeze, causing damage to the case. If you must add water, use distilled water. Add the water just before using the tractor so that the water will mix with the electrolyte during the charging process, thus preventing the water from freezing.

Checking the Electrolyte Level and Gravity

NOTE: Check the battery electrolyte level after every 50 hours of operation.

To determine the battery charge, check the indicator (Hydrometer) on this battery as following shows.

Blue: Good condition, the level and gravity of electrolyte are good.

Red: Necessary to charge, electrolyte is weak.

White: Add the distilled water, water level is low.

- Never over charge the battery, it could cause an explosion and the battery may be discharged or run down.
- Charge the battery within 10% of the rated 6.5 amps.



WARNING

Always check the electrolyte level and gravity with the tractor engine off, as an explosive gas is produced inside the battery when the alternator is charging. Do not use an exposed flame and do not smoke when checking the battery electrolyte level and gravity.

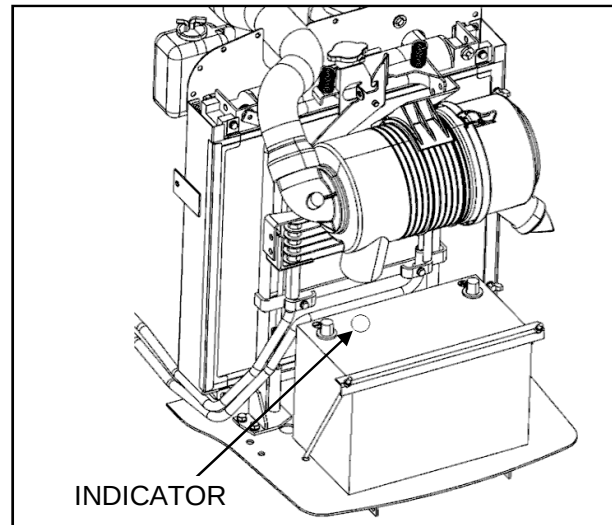


Figure 3-31

To add the distilled water:

1. Clean the top of the battery, then remove the vent plugs.
2. Add distilled water if the electrolyte level is low. The level is correct when the liquid is 6.35 mm above the plates.

NOTE: Keep distilled water in a nonmetallic container that is clean and well-covered.

3. Install the vent plug after making sure the vent holes are not blocked. At below freezing temperatures, run the engine for a period of time after adding water, allowing the battery to charge, which prevents the water from freezing.

ALTERNATOR

The tractor's 55-amp alternator (1) in Figure 3-32, is belt-driven from the engine crankshaft pulley. It is important that belt slippage does not occur, or the charging system will be adversely affected. To adjust the belt, see the instructions previously given under "Fan Belt" section (page 3-19).

Other than belt adjustment, the only alternator maintenance required is to periodically inspect the terminals to ensure they are clean and tight. The alternator-cooling fan should also be cleaned periodically.

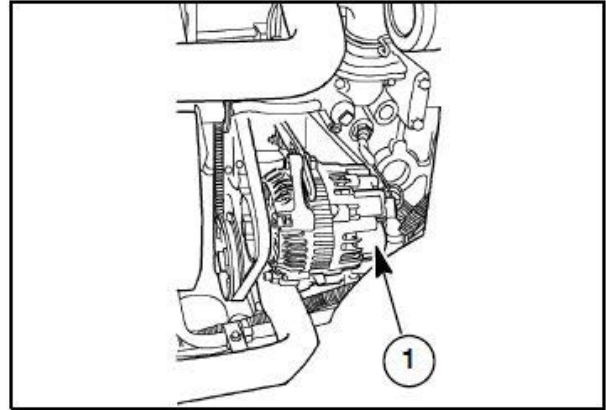


Figure 3-32

When working on or checking the alternator, adhere to following precautions or alternator damage may occur:

- 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. When removing the battery, disconnect the negative (-) cable first.
- To install a battery, MAKE SURE 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.

If the battery charge warning light illuminates, indicating that the alternator is not charging the battery, check the fan belt and the wiring connections. If these items are in satisfactory condition and the warning light continues to indicate no charge, consult your SHIBAURA Dealer.

FUSE BLOCK

The fuse block in Figure 3-33, is located in the engine compartment on the right side of the tractor firewall. Always replace blown fuses with the size specified for that circuit.



WARNING

Always Disconnect the negative (-) battery cable from the negative (-) battery terminal before replace the fuses.

From left to right as viewed from above the tractor, the fuse block contains the following fuses:

Fuse	Fuse Size	Circuit Protected
1	15A	Alternator, Safety Start, Indicator Lamps, Gauges, Road Lights, Tail lights,
2	15A	Horn, Brake Lamp,
3	20A	Turn Signal, Hazard Lights, Brake Lamp,
4	15A	Work Lamp,
5	25A	Road lights, Illumination Lamp of Instrument Panel.

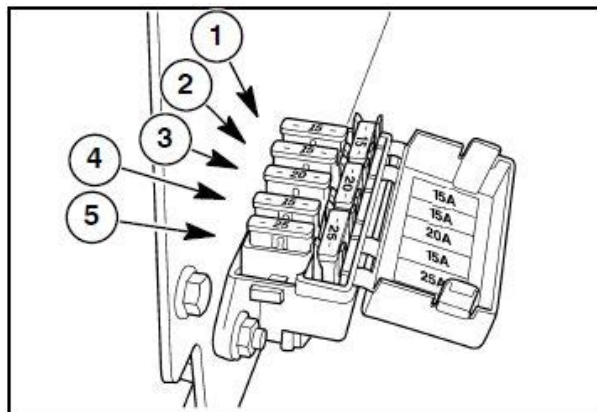


Figure 3-33

MAIN FUSE

The main 40-amp fuse (1) in Figure 3-34, is located on the LH side of the engine, between the starter and the alternator. This fuse protects the tractor's entire electrical system.

To replace the main fuse:

1. Unplug the connector, exposing the fuse.
2. Remove the old fuse from the fuse holder and replace the new one.

IMPORTANT: Always replace this fuse with a similar 40 amp fuse; DO NOT increase the amperage rating.

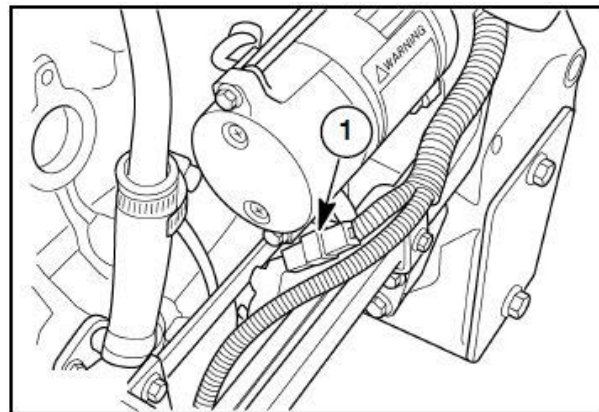


Figure 3-34



WARNING

Always Disconnect the negative (-) battery cable from the negative (-) battery terminal before replace the fuses.

HEAD LAMP

If any of the two head lamps fails to operate, the bulb must be replaced. To change the bulb:

1. Open the tractor hood.
2. Disconnect the negative (-) battery cable from the negative (-) battery terminal before replace the fuses.
3. Remove the connector (1) in Figure 3-35, and rubber (2) in Figure 3-35, from the housing.
4. Take off the spring.
5. Remove the bulb.
6. Install a new bulb and install the spring, rubber and connector.

IMPORTANT: Be careful not to touch the bulb with bare fingers. Oil from the fingers can shorten the life of the bulb. Use a protective cloth or glove when installing the new bulb.

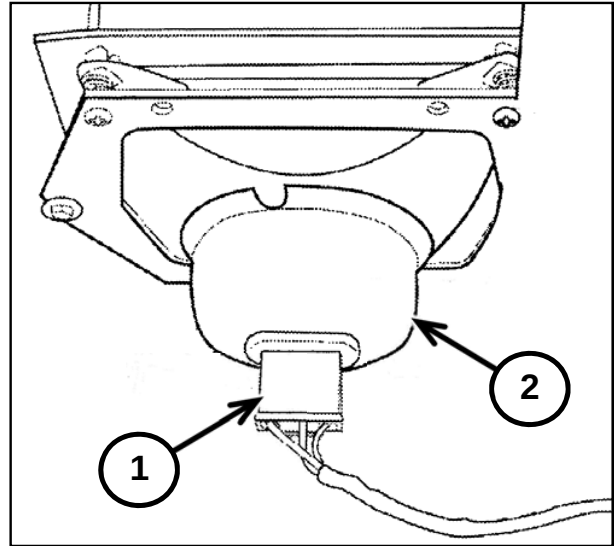


Figure 3-35

TAILLIGHT / FLASHER WARNING LIGHT/SIDE AND FRONT POSITION LIGHT

The tractor is equipped with two taillights (1) in Figure 3-36, and four flasher-warning lights (2) in Figure 3-36, 3-37, and two side-and-front position lights (3) in Figure 3-37, mounted on the ROPS and mirror stay.

To replace the bulbs:

1. Disconnect the negative (-) battery cable from the negative (-) battery terminal before replace the fuses.
2. Remove the two screws securing the lens to the housing.
3. Remove the lens, and then remove the bulb.
4. Install a new bulb and reinstall the lens and/or rim assembly.

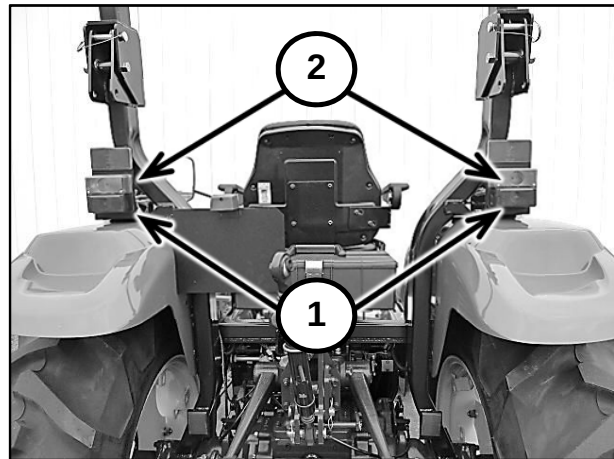


Figure 3-36

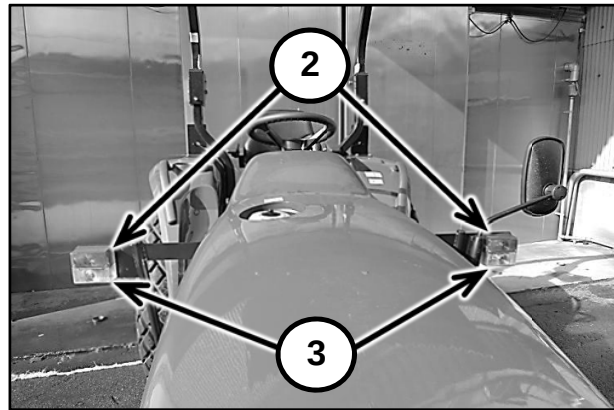


Figure 3-37

INSTRUMENT LIGHTS

To change a burned out instrument panel bulb:

1. Disconnect the negative (-) battery cable from the negative (-) battery terminal before replace the fuses.
2. Remove right rear hood (1) In Figure 3-38, and left rear hood (2) in Figure 3-38, by removing retaining bolts (3), (4), and (5) in Figure 3-38.
3. Remove the two front retaining bolts (6) in Figure 3-39.
4. Remove the left and right underside retaining screw (7) in Figure 3-39 from dash panel.
5. Tilt steering wheel rearward to ease tilting of dash panel.
6. Tilt dash panel rearward to gain access to underside of instrument panel.
7. Rotate bulb 1/4 turn and remove from back of instrument panel.
8. Inspect bulb mating surface of instrument panel for corrosion and clean if necessary. Install correct size bulb and assemble the dash panel and rear hoods.

NOTE: Replace with the appropriate bulb: either a 1.7W bulb for gauge lights, a 3.4W bulb for indicator lights, or a 3.0 W bulb for PTO indicator and Trailer hazard indicator.

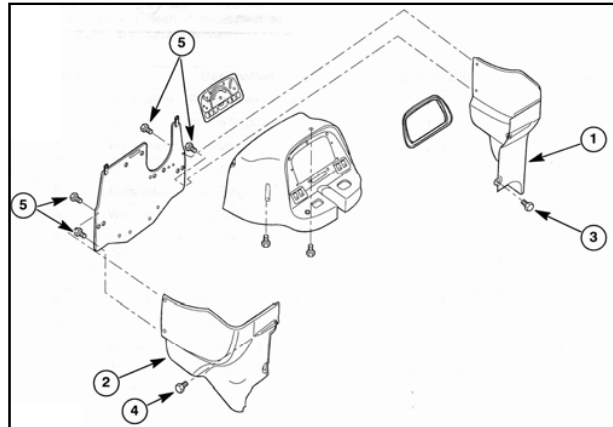


Figure 3-38

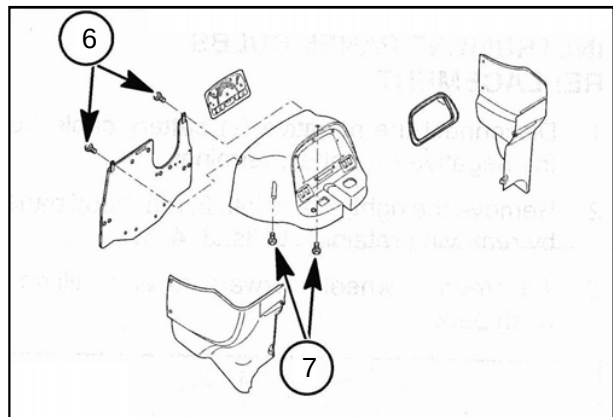


Figure 3-39

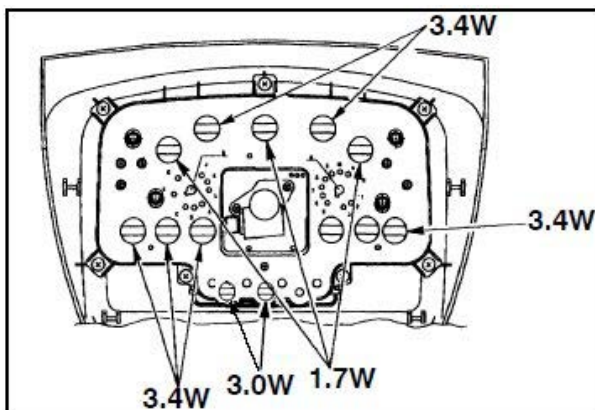


Figure 3-40

JACKS AND JACKING POSITION

CAUTION
Observe these safety precautions before jacking your tractor.

1. Ensure the unit is on level ground.
2. Shut off engine and apply the parking brake and engage front wheel drive.
3. Place wheel locker block (1) in Figure 3-41, firmly where front of both front wheels when jack a rear wheel or rear of both rear wheels when jack a front wheel.
4. Ensure the jack has adequate capacity to lift your tractor.
5. Place jack on a firm, level surface.
6. Place the front axle swing stopper wedge block (2) in Figure 3-41, between the front axle (3) in Figure 3-41, and front frame (4) in Figure 3-41, both side.

Front side jacking point is recommended at center of front frame bumper.

WARNING
Do not place any part of your body beneath the tractor or start the engine while the tractor is on the jack.

Rear side jacking point is recommended at bottom of transmission housing around the lower lift link pivot. Set the rose position for lower lift link before attempt jacking.

WARNING
Do not place any part of your body beneath the tractor or start the engine while the tractor is on the jack.

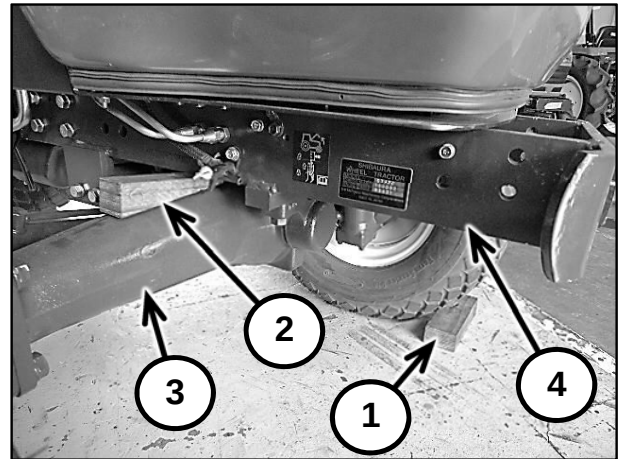


Figure 3-41



Figure 3-42

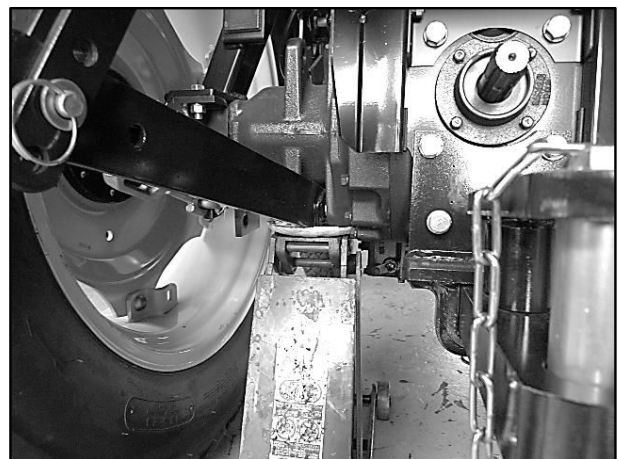


Figure 3-43

TIRES

NOTE: Check tire pressure after every 50 hours of operation or weekly.

Tire inflation pressure affects the amount of weight a tire can carry. Check the air pressure in your tractor tires, then locate the tires in the "Tire Inflation Pressures" chart found in this manual (page 2-38). If necessary, adjust the tire pressure, being careful not to overinflate or underinflate. Observe the following guidelines:

- Do not inflate a tire above the maximum pressure shown on the tire. If the tire is not marked, do not exceed the maximum pressure shown in the Tire Inflation chart found in this manual (page 2-38).
- Do not re-inflate a tire that has been run flat or seriously underinflated until the tire has been inspected for damage by a qualified person.
- When checking tire pressure, inspect the tire for damaged sidewalls and tread cuts. Neglected damage leads to early tire failure.

- 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, 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.
- Ensure the jack has adequate capacity to lift your tractor.
- Place jack on a firm, level surface.
- Do not place any part of your body beneath the tractor or start the engine while the tractor is on the jack.
- Before adding ballast to the tires, refer to the information in this manual on "Tractor Weighting."

**WARNING**

Inflating or servicing tires can be dangerous. Trained personnel should service and/or mount tires whenever possible.

If you must inflate or service tires, follow these safety precautions to avoid injury or fatality:

- Make 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. This allows the operator to stand clear of the tire while inflating.
- NEVER INFLATE TO OVER 240kPa TO SEAT BEADS. If beads have not been seated by the time pressure reaches 240kPa deflate the assembly, reposition the tire on the rim, re-lubricate both tire bead and rim flanges, and re-inflate. Inflation beyond 240kPa with unseated beads may break the bead or rim with explosive force sufficient to cause serious injury.

WHEEL BOLT TORQUE

Tighten the wheel bolts (1) in Figure 3-44, to the specified torque any time the wheel assembly is removed from the tractor or the wheel bolts are loosened.

Front Wheel Torque
175 N·m

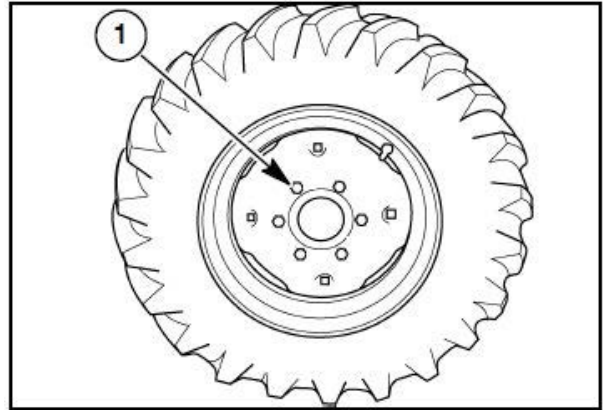


Figure 3-44

Rear Wheel Torque
175 N·m

Check wheel bolt (2) in Figure 3-45, torque daily until torque stabilizes.

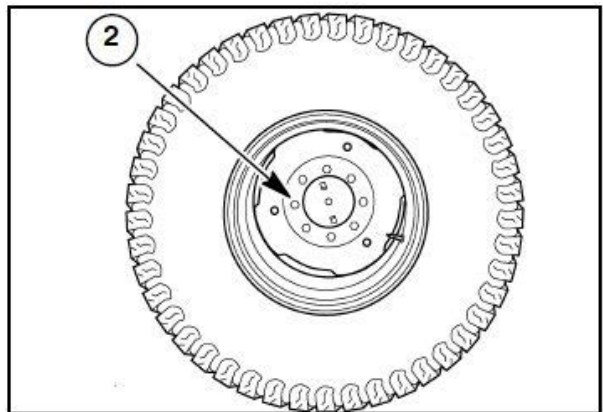


Figure 3-45

RIM TO DISC BOLT TORQUE

Tighten the rim to disc bolts (3) in Figure 3-46, to the specified torque anytime the wheel spacing is changed or bolts have been loosened.

Rear Disc Torque
230 N·m

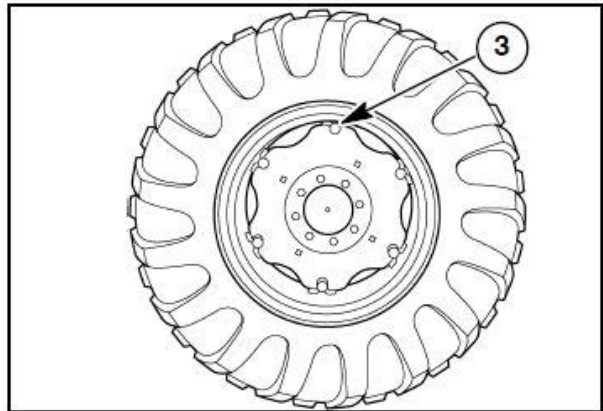


Figure 3-46

IMPORTANT: Check and tighten wheel and disc bolts to proper torque specifications after the following hours of use:

First 5 hours.

First 50 hours.

Every 200 hours.

FRONT WHEEL TOE-IN

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

Checking Toe-In

To check toe-in:

1. With the front wheels in the straight-ahead position, mark the front of the wheels (1) in Figure 3-47, (not the tires) at wheel hub height.
2. Measure and record the distance between the front of the wheels at the marks, then push the tractor forward or backward until the 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 step-3 should give 0 mm – 5 mm toe-in. This means that the distance between the marks on the wheels should be 0 mm – 5 mm greater when the marks are at the rear than at the front.

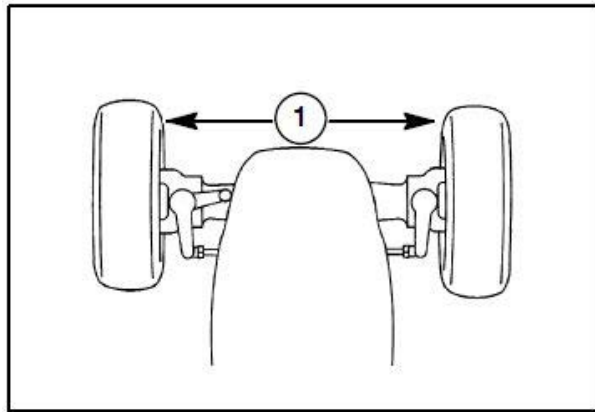


Figure 3-47

Adjusting Toe-In

If toe-in is not correct, adjust as follows:

1. Loosen the tie rod locknuts (1) in Figure 3-48.
2. Adjust the tie rod tubes assemblies (2) in Figure 3-48, as required to give 0 mm – 5 mm toe-in.
3. After the correct toe-in is obtained, tighten the tie rod locknuts.

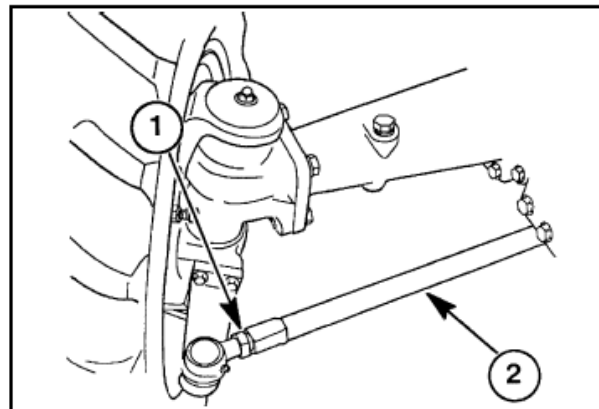


Figure 3-48

Locknuts Torque
190 N·m

BRAKE ADJUSTMENT

Whenever brake pedal travel becomes excessive, or if the travel of one pedal is unequal to that of the other, each pedal should be adjusted.

1. Loosen the locknut (1) in Figure 3-49, and rotate the brake rod (2) in Figure 3-49, until there is 35 - 45 mm of pedal free play. Lengthening the rod increases free play; shortening the rod decreases free play.
2. Test drive the tractor to ensure that the brake pedal travel is within suitable limits.

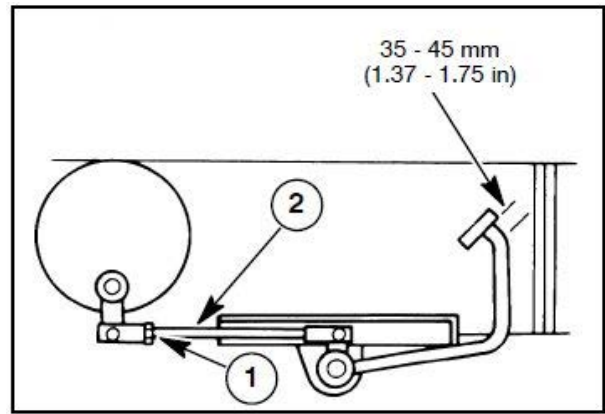


Figure 3-49

IMPORTANT: Adjust left and right brakes evenly.

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, Adjust the lock and adjusting nut in Figure 3-50a, 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 lock and adjusting nut.



Figure 3-50

IMPORTANT: Adjust left and right brakes evenly.

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.

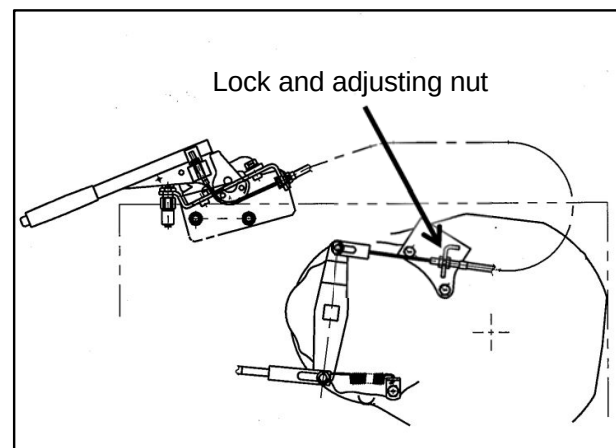


Figure 3-50a

FRONT-WHEEL DRIVE

FRONT AXLE DIFFERENTIAL CASE AND FINAL REDUCTION GEAR CASES

Checking the Front Axle Differential Case and Final Reduction Gear Case Oil Levels

NOTE: Check the front axle differential case and final reduction gear case oil level after every 50 hours of operation.

1. With the tractor standing level and the engine off, check the front axle oil level using the dipstick/filler plug (1) in Figure 3-51.
2. The oil is at the correct level when it reads between the 'full' mark and the lower end of the dipstick. If the oil level is low, add SAE 80 hydraulic oil through the combined dipstick/filler opening. Do not fill beyond the dipstick 'full' mark, or the front axle will be overfilled.

NOTE: To obtain the correct oil level reading, do not screw the dipstick into the axle case, when checking the oil level.

3. Reinstall the dipstick/filler plug.
4. To check the final reduction gear case oil level, remove the filler plug (2) in Figure 3-52. The oil is at the correct level when it is at the bottom of the fill port opening.

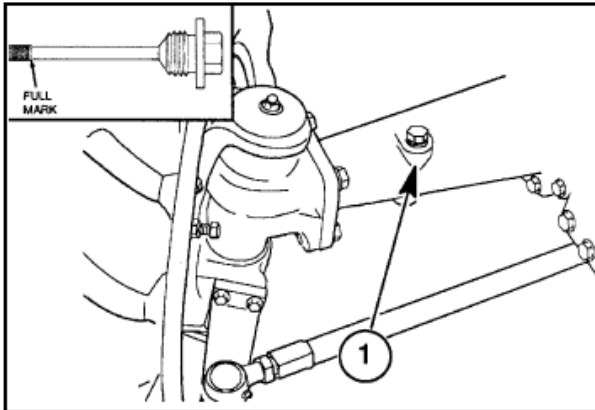


Figure 3-51

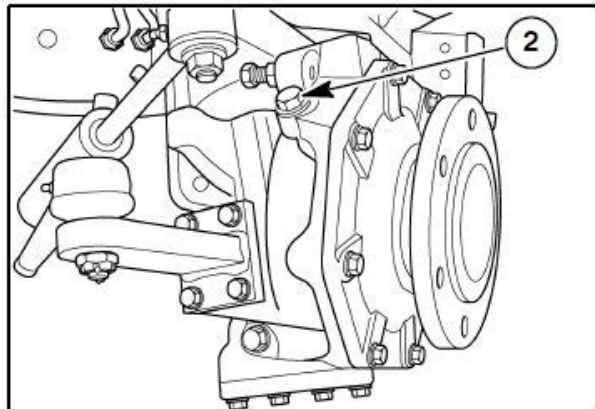


Figure 3-52

Changing the Front Axle Differential Case and Final Reduction Gear Case Oil

NOTE: The front axle differential case and final reduction gear case oil should be changed after every 300 operating hours.

1. Place a suitable container beneath the oil plug. With the oil at normal operating temperature, drain the oil by removing the drain plug (1) in Figure 3-53. After the oil has drained, reinstall the drain plug and discard the used oil.

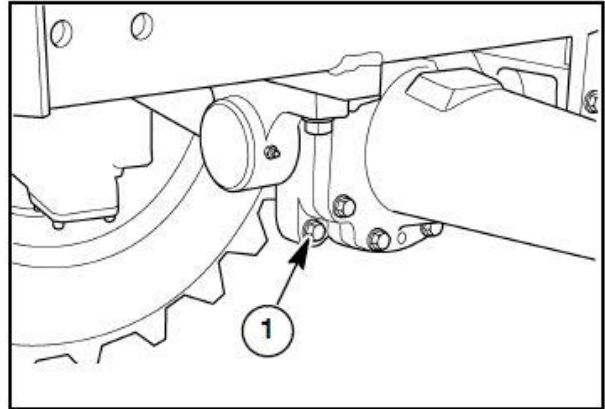


Figure 3-53

2. Remove the dipstick/filler plug (2) in Figure 3-54, on the left-hand side of the axle housing.

NOTE: To obtain correct oil level reading do not screw dipstick into axle housing when checking oil level.

Fill the axle with SAE 80 hydraulic oil until the oil level is between the full mark and the lower end of the dipstick. Reinstall the dipstick/filler plug.

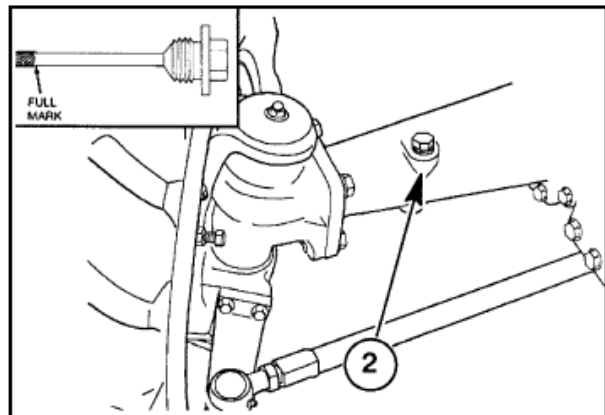


Figure 3-54

NOTE: Approximate fluid capacity for the differential axle housing is 3.7 liters

3. Remove the drain plug (3) in Figure 3-55, from each final reduction gear case. After the oil has drained, reinstall each drain plug and discard the used oil. Remove the filler plug (4) in Figure 3-54, from each final reduction gear case and fill with SAE 80 hydraulic oil so that the oil level is at the bottom of the fill port opening. Reinstall each filler plug.

NOTE: Approximate final reduction gear cases fluid capacity is 0.8 liters each.

NOTE: To ensure correct steering operation, the stop bolt (5) in Figure 3-55, should protrude a minimum of 32mm from the casing (standard FWD axle).

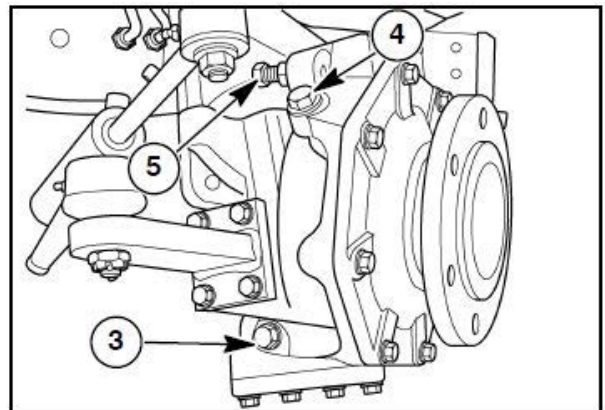


Figure 3-55

FRONT AXLE PIVOT

NOTE: The center housing pivot points (1) in Figure 3-56 (front side) and (2) in Figure 3-57 (rear side) should be greased after every 50 hours of operation under normal conditions. Under extremely dirty conditions, lubrication should be carried out more frequently than every 50 hours. Use a good quality, multipurpose, lithium-base grease.

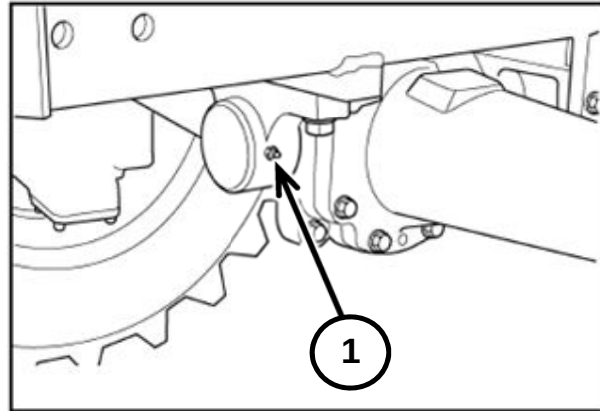


Figure 3-56

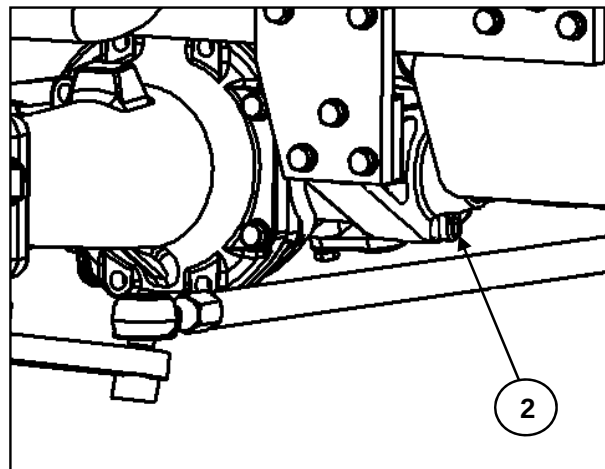


Figure 3-57

TRACTOR STORAGE

Below is a list of protective measures which should be taken if your tractor is to be stored for an extended period of time:

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 fullest raised position so that the lift piston is in a fully extended position. This fills the cylinder with oil and protects the cylinder wall surfaces from corrosion.
4. Lubricate the tractor.
5. Fill the fuel tank with No. 2-D diesel fuel.

IMPORTANT: Do not use No. 1-D diesel fuel for winter storage because of wax separation and setting at low temperature.

6. Open the drain valve of the radiator and engine block. Flush the system, close the drain valves, and fill with a 50/50 solution of permanent antifreeze and clear water.
7. Remove the battery and clean it thoroughly. Be sure that it is fully charged and that the electrolyte is at the proper level. Store the battery in a cool, dry place above freezing temperature, and charge it periodically during storage.

8. Place blocking under the tractor axles to remove the weight from the tires.
9. Cover the exhaust pipe opening.

Tractors, which 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, power steering reservoir, the common sump (for the hydraulic lift, transmission, and rear axle), and the front-wheel drive axle.
3. Install a fully charged battery.
4. Check the cooling system for the proper level (50/50 solution of permanent antifreeze and clear water).
5. Remove the exhaust pipe opening cover.
6. Start the engine and allow it to idle a few minutes. Ensure the engine is receiving lubrication and that each control is functioning correctly.
7. Drive the tractor without a load and check to make sure it is operating satisfactorily.

TROUBLESHOOTING

If you find something is wrong with your tractor, refer to the table below for the possible cause and its correction. In case you may need further assistance please do not hesitate to contact your SHIBAURA dealer.



CAUTION



Before inspecting the tractor, park it firm, flat and level surface, set the parking brake, lower all implements to the ground, place the gear shift lever in neutral, stop the engine, remove the key and allow to cool hot components, oil and coolant.

1. ENGINE

TROUBLE	POSSIBLE CAUSE	CORRECTION
Engine starter motor does not rotate	Transmission range and PTO clutch control levers are not in neutral position.	Set in neutral position. (See page 2-7)
	Insufficient charging or complete discharge of battery	Charge the battery fully (See page 3-20)
	Looseness or corrosion of battery terminals	Tighten and clean battery terminals
	Burned out fuse	Replace fuse (See page 3-22)
Engine does not start	Lack of fuel	Fill fuel tank (See page 3-4)
	Air or water mixed in fuel system	Inspect fuel system for tightness Bleed the fuel system (See page 3-9, 3-10)
	Clogged fuel filter	Replace fuel filter (See page 3-8)
	Improper lubricating oil viscosity	Replace lube oil (See page 3-5, 3-6)
	Clogged air cleaner	Replace air cleaner (See page 3-11, 3-12, 3-13)
Engine rotates irregularly	Air or water mixed in fuel system	Inspect fuel system for tightness Bleed the fuel system (See page 3-9, 3-10)
	Clogged fuel filter	Replace fuel filter (See page 3-8)
	Unsuitable fuel	Replace fuel (See page 3-3)

If you have any questions, contact your SHIBAURA dealer.

TROUBLE	POSSIBLE CAUSE	CORRECTION
Engine stops while operating	Lack of fuel in tank Clogged fuel filter Air or water mixed in fuel system Unsuitable fuel Operator leaves the seat without transmission range lever in neutral	Fill fuel tank (See page 3-4) Replace fuel filter (See page 3-8) Inspect fuel system for tightness Bleed the fuel system (See page 3-9, 3-10) Replace fuel (See page 3-3) Set in neutral position (See page 2-1, 2-7)
Engine overheats	Insufficient amount of coolant in the radiator Loose, worn, or broken fan belt Radiator fins bent or clogged Thermostat operating improperly Insufficient amount of engine oil Overload operation	Fill coolant to proper level (See page 3-16, 3-117) Check the radiator, radiator cap and hoses for leaks or loose connection Adjust fan belt tension or replace belt (See page 3-18) Straighten out fin and clean fin, radiator screen, hood screen (See page 3-16) Replace thermostat (See page 3-18) Fill to proper level (See page 3-6) Decrease load or shift to lower gear
Undesirable exhaust color (black or light grey)	Unsuitable fuel Clogged air cleaner Over loading	Replace fuel (See page 3-3) Replace air cleaner (See page 3-11, 3-12, 3-13) Decrease load or shift to lower gear
Undesirable exhaust color (white or pale)	Excess engine oil Improper lubricating oil viscosity Unsuitable fuel	Drain oil to proper level (See page 3-6) Replace oil with specified viscosity (See page 3-5) Replace fuel (See page 3-3)

If you have any questions, contact your SHIBAURA dealer.

2. BRAKE

Ineffective or uneven braking	Improper pedal adjustment	Adjust to specified (See page 3-29)
Brake does not release	Lack of pedal free travel Lack of brake pedal pivot lubricating Parking brake wire sticking	Adjust to specified free travel (See page 3-29) Lubricate pedal pivot (See page 3-3) Replace brake wire (See page 3-29)

3. STEERING

Front wheel shimmy	Loose tie-rod Loose wheel bolt	Tighten tie-rod (See page 3-28) Tighten wheel bolt (See page 3-27)
Hard steering	Lack of tire pressure Lack of transmission oil	Adjust as specified (See 2-38, 3-26) Fill transmission oil as specified (See page 3-15)

4. HYDRAULIC POWER LIFT

Implement does not rise	Clogged oil filter	Replace oil filter (See page 3-14)
Implement does not lower	HPL drop rate control valve in closed position	Open the drop rate control valve (See page 2-30)

5. ELECTRICAL

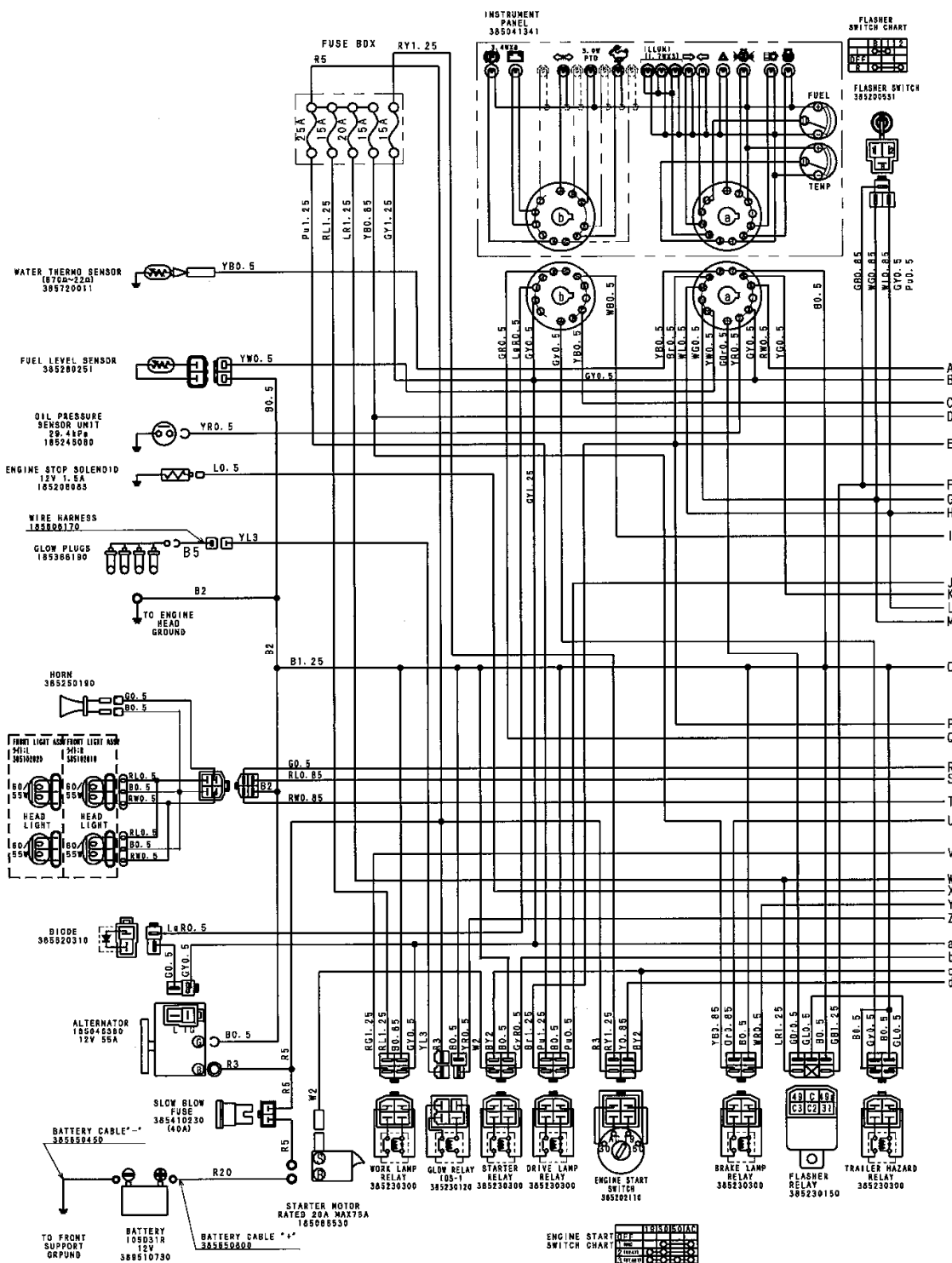
Battery charge warning light remains illuminated	Loose, worn, or broken fan belt Loose wiring connection of alternator	Adjust fan belt tension or replace belt (See page 3-18) Tighten and clean wiring connections (See page 3-21)
Engine oil pressure warning light remains illuminated	Clogged engine oil filter Lack of engine oil Improper lubricating oil viscosity	Replace engine oil filter (See 3-6, 3-7) Fill engine oil to proper level (See page 3-6) Replace oil with specified viscosity (See page 3-5)
Lamps does not illuminate	Burned out fuse Burned out bulb	Replace fuse (See page 3-22) Replace bulb (See page 3-23)

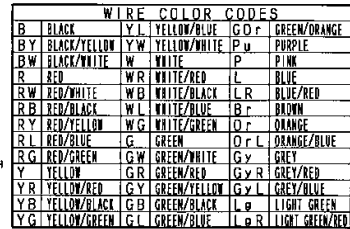
If you have any questions, contact your SHIBAURA dealer.

METRIC BOLT TORQUE SPECIFICATION

Bolt Size	Grade No.	Coarse Thread			Fine Thread		
		Pitch (mm)	Pounds-Feet	Newton Meters	Pitch (mm)	Pounds-Feet	Newton-Meters
M6	4T  	1.0	3.6 – 5.1	4.9 – 6.9	–	–	–
	7T   		6.1 – 8.3	8.3 – 11.3			
	10T  		8.7 – 11.6	11.8 – 15.7			
M8	4T	1.25	9.4 – 12.3	12.7 – 16.7	1.0	11.2 – 14.8	15.2 – 20.1
	7T		16.6 – 21.0	22.6 – 28.4		19.5 – 25.3	26.5 – 34.3
	10T		21.0 – 26.8	28.4 – 36.3		22.4 – 29.7	30.4 – 40.2
M10	4T	1.5	18.8 – 24.6	25.5 – 33.3	1.25	21.0 – 26.8	28.4 – 36.3
	7T		32.5 – 41.2	44.1 – 55.9		36.2 – 46.3	49.0 – 62.8
	10T		39.8 – 51.4	53.9 – 69.6		42.7 – 54.2	57.9 – 73.5
M12	4T	1.75	27.5 – 34.7	37.3 – 47.1	1.25	31.8 – 40.5	43.1 – 54.9
	7T		48.5 – 61.5	65.7 – 83.4		55.0 – 69.4	74.5 – 94.1
	10T		68.0 – 85.4	92.2 – 116		73.1 – 93.3	99.0 – 127
M14	4T	2.0	46.3 – 59.3	62.8 – 80.4	1.5	51.4 – 64.4	69.6 – 87.3
	7T		76.7 – 96.9	104 – 131		86.1 – 109	117 – 148
	11T		102 – 129	139 – 175		108 – 137	147 – 186
M16	4T	2.0	63.6 – 81.0	86.3 – 110	1.5	67.3 – 84.6	91.2 – 115
	7T		110 – 136	149 – 184		116 – 142	157 – 192
	11T		152 – 188	206 – 255		163 – 199	221 – 270
M18	4T	2.0	83.9 – 104	114 – 141	1.5	96.9 – 120	131 – 163
	7T		145 – 174	196 – 235		170 – 206	230 – 279
	11T		203 – 246	275 – 333		221 – 271	299 – 368
M20	4T	2.5	106 – 132	144 – 179	1.5	127 – 156	172 – 211
	7T		177 – 213	240 – 289		203 – 246	275 – 333
	11T		268 – 325	363 – 441		293 – 358	397 – 485

WIRING SCHEMATIC





SECTION 4

SPECIFICATIONS

Model ST450 HST (Hydro Static Transmission)

ENGINE

Type	N844LT Diesel
Engine Gross Horsepower	36.0 kw (49.0PS)
Cylinders	4
Bore 75 mm (2.95")	84 mm
Stroke	100 mm
Displacement	2.216 L with Turbo
Compression Ratio	23.5: 1
Firing Order	1 – 3 – 4 – 2
Low Idle Speed	1,000 ± 50 RPM
Maximum Speed	
High Idle	2,700 ± 25 RPM
Rated	2,500 ± 50 RPM
Valve Clearance (Cold):	
Intake	0.20 mm
Exhaust	0.20 mm

CAPACITIES

Fuel Tank	54 liters
Cooling System	5.5 liters
Engine Crankcase	
With Filter	6.0 liters
Rear Axle & Transmission	36.0 liters
Front Axle Differential/Final Reduction Gear Case	5.3 liters

**Model ST450 HST
(Hydro Static Transmission)**

COOLING SYSTEM

Type	Pressurized Liquid with Recirculating Bypass
Water Pump:	
Type	Centrifugal
Drive	V – Belt
Belt Deflection	10 – 15 mm when 9 – 11 kg thumb pressure is applied midway between pulleys
Fan Diameter	410 mm
Number of Fan Blades	8
Thermostat:	
Start to Open	71°C
Fully Open	82°C
Radiator Cap	110 kPa
Antifreeze	Ethylene glycol

ELECTRICAL SYSTEM

Main system Protection	40A Slow – Blow fuse
Number of fuses for Circuit Protection	5
Alternator	12V / Heavy Duty / 55A
Battery Type	12V, 64 amp. 105D31R
Start HP (kw) Rating	2.7 (2.0)
Starting Motor	Pre-Engaged Reduction

FUEL SYSTEM

Fuel Type	
Type of Fuel to Use if Above 4.5°C	No.1-Diesel, Cetane Rating: Minimum 40
Type of Fuel to Use if Below 4.5°C	No.2-Diesel, Cetane Rating: Minimum 40
Injection Pump	
Type	In-Line
Timing	18° BTDC

**Model ST450 HST
(Hydro Static Transmission)**

BRAKES

Type	Wet Disc
3 Discs per Side	175 mm × 143 mm Diameter

STEERING

Type	Power
Pump Flow @ Rated RPM	18.6 liters/min
Steering Relief Valve Setting	12.3 MPa
Turns, Lock-to-Lock:	
FWD	3.6 / 2.9
Front Wheel Toe-In	0 – 5 mm
Turning Radius w/o Brakes:	
FWD	3,150 mm
Max Turn Angle: FWD	56°
Front to Rear Axle Ratio	1.6260

POWER TAKE-OFF (PTO)

Type	Independent
Shaft:	
Rear PTO	35 mm
Mid PTO	25.4 mm
Engine Speed for 540 RPM	2406 RPM (PTO Speed ①)
Rear PTO Operation	1774 RPM (PTO Speed ②)
Engine Speed for 2000 RPM	2,480 RPM
MID PTO Operation	
Horsepower PTO Observed	28.5 kw (38.8 PS)

HYDRAULIC LIFT SECTION

Type	Open Center
Pump Type	Gear
Pump Flow @ Rated RPM	35.5 L/min
System Relief Valve Setting	17.2 MPa
Number of Remotes Available	2 (Optional)

**Model ST450 HST
(Hydro Static Transmission)**

TRANSMISSION

Type	HST (Hydrostatic)
Pump Displacement	28.1cc
Number of Motor Speeds	2
Number of Transmission Ranges	2
Motor Displacement Hi	37.2
Lo	22.0
Motor Hi/Lo Speed Shift	Electric Switch

**TRANSMISSION SPEEDS
FORWARD**

	AG	Turf	Large Turf (FD)	Industrial (R4)
	13.6-24	475/65D20	13.6-28	17.5L-24
Range Low, Motor Lo	0 – 5.5	0 – 5.1	0 – 5.9	0 – 5.9
Range Low, Motor Hi	0 – 9.3	0 – 8.7	0 – 10.0	0 – 10.0
Range High, Motor Lo	0 – 16.6	0 – 15.5	0 – 17.9	0 – 17.8
Range High, Motor Hi	0 – 28.1	0 – 26.2	0 – 30.3	0 – 30.1

REVERSE

	AG	Turf	Large Turf (FD)	Industrial (R4)
	13.6-24	475/65D20	13.6-28	17.5L-24
Range Low, Motor Lo	0 – 3.9	0 – 3.6	0 – 4.1	0 – 4.1
Range Low, Motor Hi	0 – 6.5	0 – 4.6	0 – 7.0	0 – 7.0
Range High, Motor Lo	0 – 11.6	0 – 10.9	0 – 12.5	0 – 12.4
Range High, Motor Hi	0 – 19.8	0 – 18.3	0 – 21.2	0 – 21.1

**Model ST450 HST
(Hydro Static Transmission)**

CAST IRON WEIGHTS

Front End:	(5) weights @ 30 kg (6) weights @ 30 kg with optional weights bracket
Rear Wheel (per wheel)	(4) weights @ 30 kg each

DRAWBARS

Extension / Clevis	Standard
--------------------	----------

3-POINT HITCH

Category Type	I
Position Control Type	Mechanical
Draft Control Type	Top Link Sensing (Optional)
Drop Rate Control	Standard
Lift Capacity @ lower-link end	1,486 kg
@ 610mm (24") behind	1,059 kg

TIRES

FRONT:

AG:	8 – 16
Turf:	27 x 10.50 – 15
Large Turf (FD)	8 – 16
Industrial (R4)	10 – 16.5

REAR:

AG:	13.6 – 24
Turf:	475/65D20
Large Turf (FD)	13.6 – 28
Industrial (R4)	17.5L – 24

WHEEL BOLT TORQUES

Front Wheel-Disc-to-Hub:	
FWD	175 N·m
Rear Wheel-	
Disc-to-Axle	175 N·m
Disc-to-Rim	230 N·m

ROPS ATTACHING BOLT TORQUES

ROPS to Rear Axle	74 N·m
ROPS to	74 N·m
Lower and Center Frame	

GENERAL DIMENSIONS

Model ST450 HST (Hydro Static Transmission)

1 – LENGTH, Overall:

STD 4WD (Less 3-pt hitch and tires, to end of drawbar)	2,957 mm
STD 4WD (With 3-pt hitch in Horizontal position)	3,295 mm

2 – WHEEL BASE:

FWD	1,866 mm
-----	----------

HEIGHTS

3 – Top of Steering Wheel:

AG. Tires	Variable
TURF. Tires	Variable
Large Turf. Tires	Variable
Industrial (R4). Tires	Variable

4 – Top of ROPS – FOLDING

Ag. Tires - UP	2,473 mm
Ag. Tires - Down	1,844 mm
Turf Tires - UP	2,434 mm
Turf Tires - Down	1,805 mm
Large Turf (FD) Tires - UP	2,517 mm
Large Turf (FD) Tires - Down	1,888 mm
Industrial (R4) Tires	2,512 mm
Industrial (R4) Tires	1,883 mm

5 – Hood Height (Top of Instrument cluster)

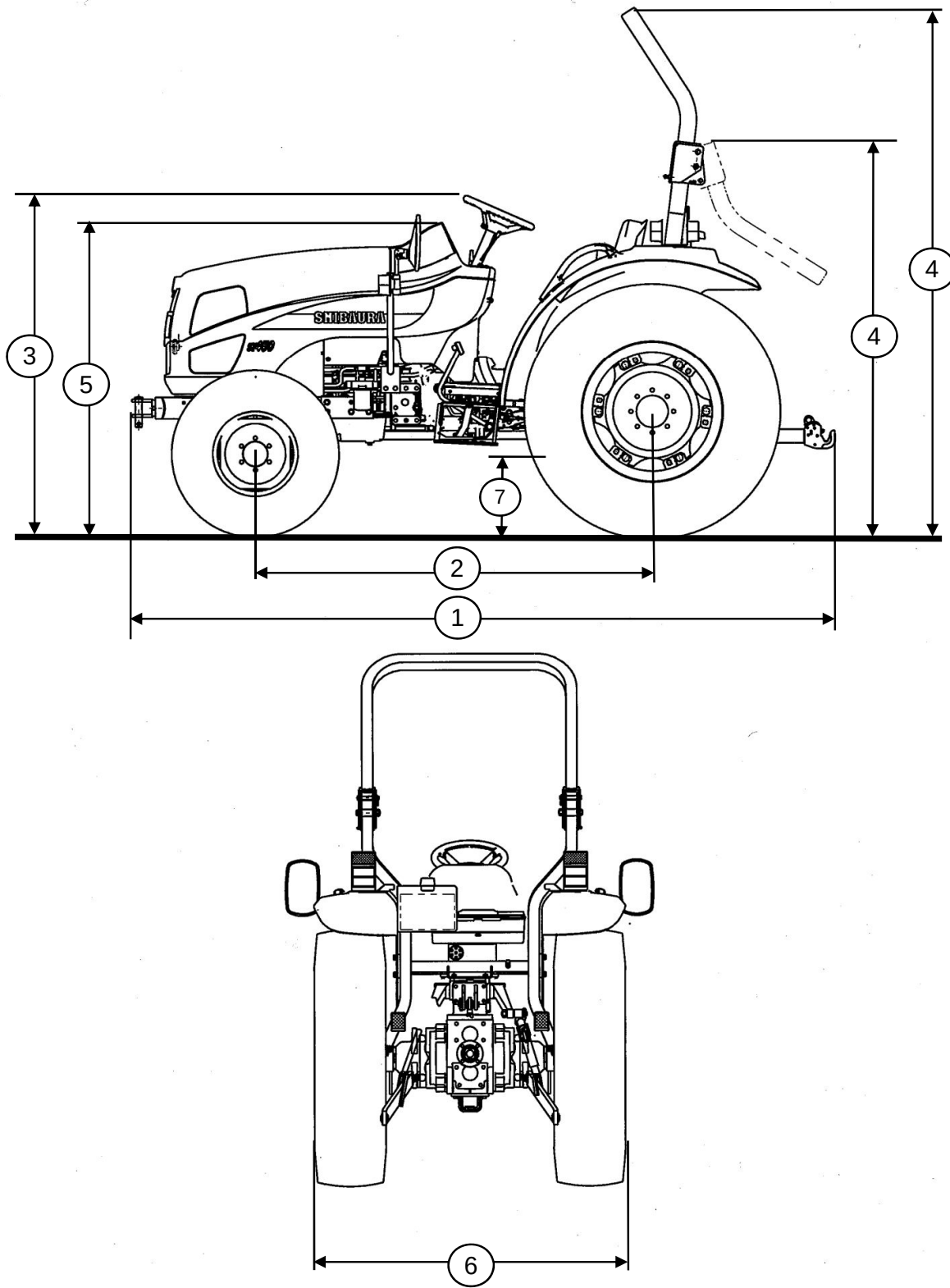
Ag. Tires	1,455 mm
Turf Tires	1,409 mm
Large Turf (FD) Tires	1,463 mm
Industrial (R4) Tires	1,458 mm

6 – WIDTH (Rear Tires – Outside to Outside)

Ag. Tires	1,462 to 1,812 mm
Turf Tires	1,733 mm
Large Turf (FD) Tires	1,482 to 1,832 mm
Industrial (R4) Tires	1,685 to 2,025 mm

7 – MINIMUM GROUND CLEARANCE (Under MID PTO Gear Box)

Ag. Tires	311 mm
Turf Tires	272 mm
Large Turf (FD) Tires	355 mm
Industrial (R4) Tires	350 mm



**Model ST450 HST
(Hydro Static Transmission)**

WEIGHT (With ROPS)

Ag. Tires	1,545 kg
Turf Tires	1,545 kg
Large Turf Tires	1,565 kg
Industrial (R4) Tires	1,635 kg

WHEEL TREAD SETTINGS

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

Front Wheel Settings

Tire Type	Setting	Note
(AG) 8 – 16	1,151 mm	Not Adjustable
(TURF) 27 x 10.5 – 15	1,305 mm	Not Adjustable
(TURF) 8 – 16	1,151 mm	Not Adjustable
(R4) 10-16.5	1,252 mm	Not Adjustable

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

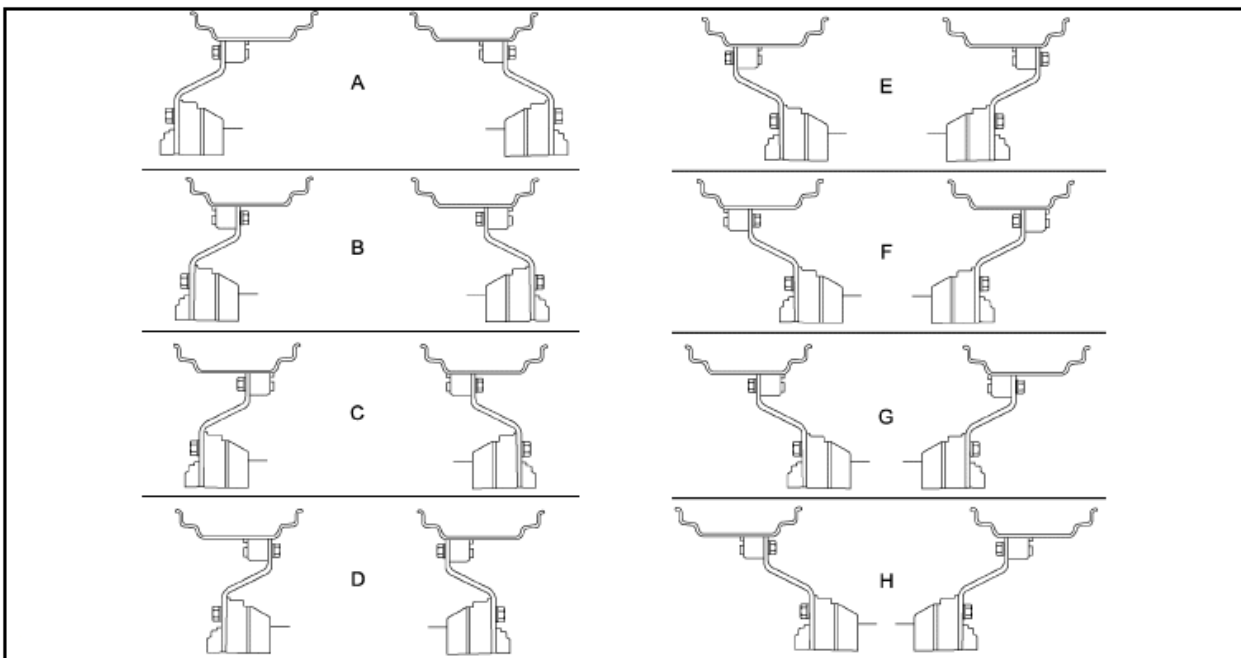
NOTE: Torque front wheel bolts to 175 N·m.

Rear Wheel Settings

Tire Type	MIN (DISH IN)	MAX (DISH OUT)	NO. OF POSITION
(AG) 13.6 - 24	1,127 mm	1,477 mm	7
(TURF) 475/65D20	1,269 mm	1,285 mm	1
(TURF) 13.6 - 28	1,127 mm	1,477 mm	7
(R4) 17.5L - 24	1,123 mm	1,331 mm	6

NOTE: Torque rear wheel bolts to 175 N·m. Torque rim to disc bolts to 230 N·m

Position	Rear FWD Tire Dimensions, mm			Tire Type
	Inside To Inside	Tread Setting	Outside To Outside	
A	N/A	N/A	N/A	(AG) 13.6 - 24
B	840	1,175	1,510	
C	792	1,127	1,462	
D	890	1,225	1,560	
E	994	1,329	1,664	
F	1,092	1,427	1,762	
G	1,044	1,379	1,714	
H	1,142	1,477	1,812	
A	N/A	N/A	N/A	(TURF) 13.6 - 28
B	820	1,175	1,530	
C	772	1,127	1,482	
D	780	1,225	1,580	
E	974	1,329	1,684	
F	1,072	1,427	1,782	
G	1,024	1,379	1,734	
H	1,122	1,477	1,832	
A	N/A	N/A	N/A	(R4) 17.5L - 24
B	N/A	N/A	N/A	
C	771	1,223	1,685	
D	869	1,321	1,773	
E	781	1,233	1,685	
F	879	1,331	1,783	
G	1,023	1,475	1,927	
H	1,121	1,573	2,025	
	805	1,269	1,733	(TURF) 475/65D20



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Tractor Serial Number _____ Delivery Date _____

Owner's Name _____ Address _____

Dealer's Name _____ Address _____

Dealer representative signature _____ Date _____

I have been instructed in the operation, maintenance and safety features of this machine as detailed in the operator's manual.

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DEALER COPY

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NOTES



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