

Operators Manual

820

860/880SX & ELITE

970/980 ELITE

TX760B, TX860B

TX970B

CE 6110221M9 - English

Original Instructions

September 2011

CALIFORNIA

Proposition 65 Warning

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. **Wash hands after handling.**

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Proposition 65 Warning

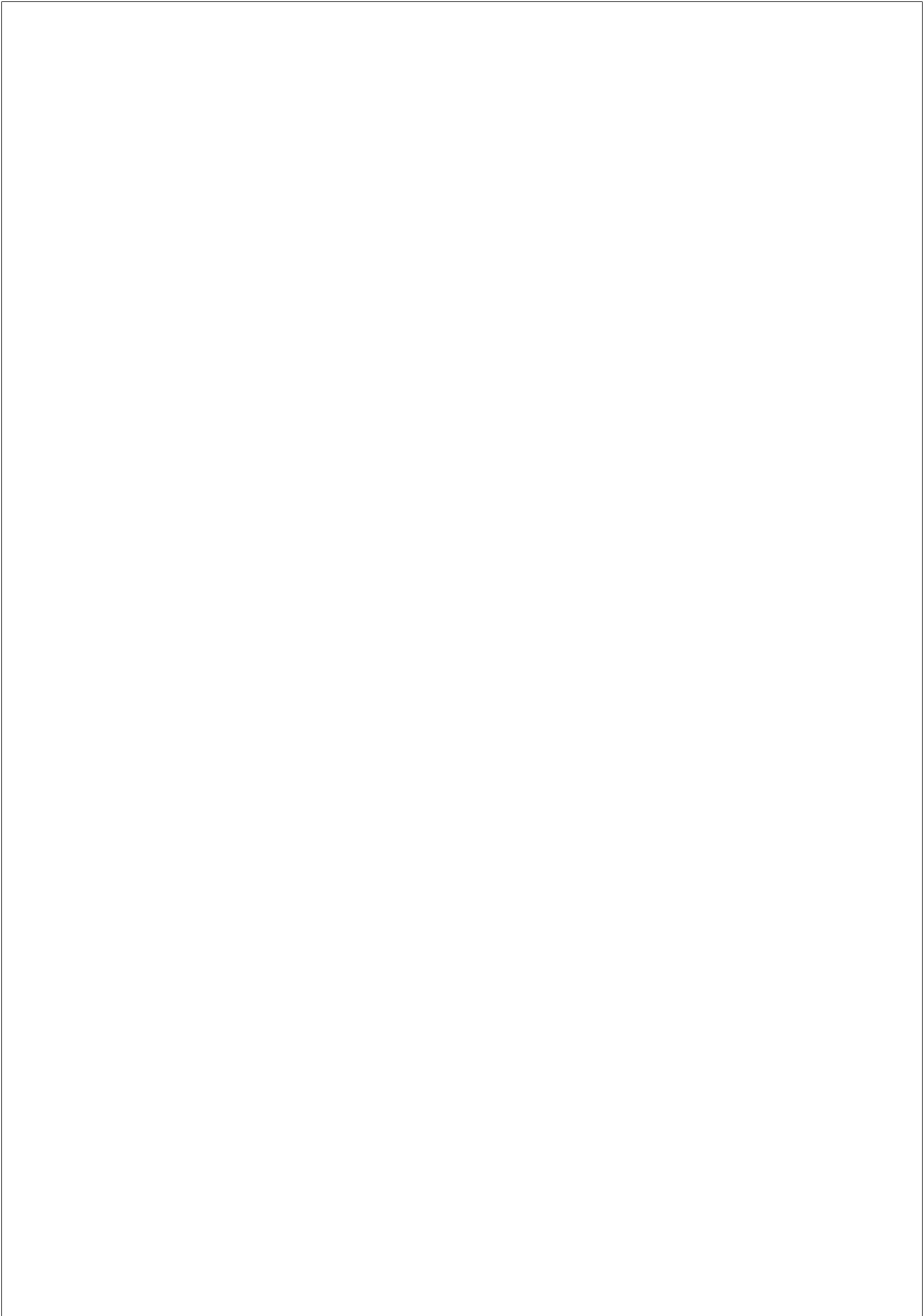
Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm

Dealer Stamp

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2 - Introduction

820

860/880 SX & ELITE

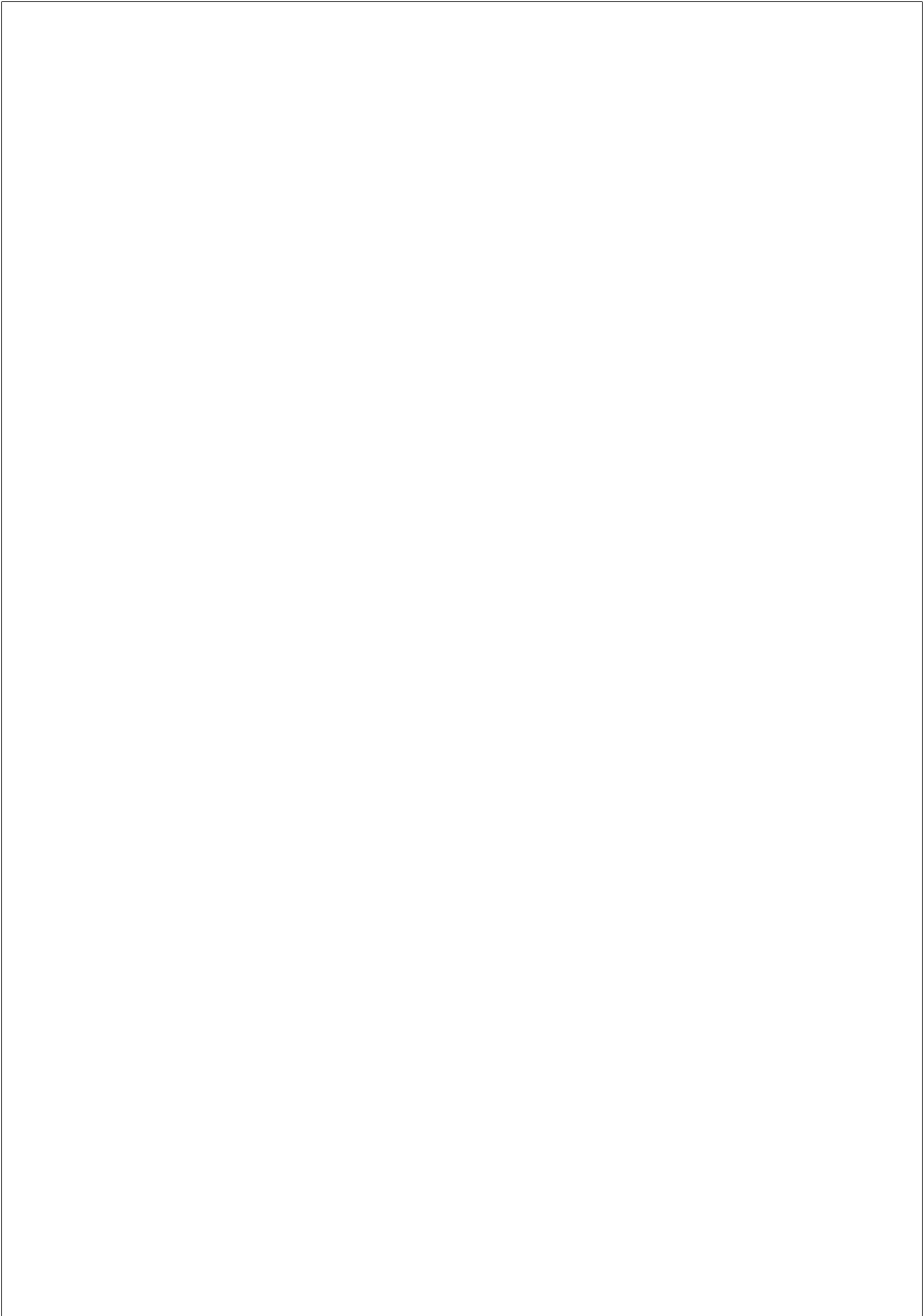
970/980 ELITE

TX760B

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TX970B

Backhoe Loader



Introduction

Terex appreciates your choice of our product for your application. Our number one priority is user safety which is best achieved by our joint efforts. We feel you can make a major contribution to safety if, you as the machines user:

- **Comply** with all the relevant National Laws and Local Regulations.
- **Read, Understand and Follow** the instructions in this and any other manuals supplied with this machine.
- **Use Good, Safe Work Practices** in a common sense way.
- **Only Use Trained Operators** to operate the machine who are directed by informed and knowledgeable supervision.

If there is anything in this manual which is not clear or there is information which you think should be added, contact the Manufacturers Service Department who will deal with your problem or request.

We reserve the right to make improvements to these machines without incurring any need to change these operating instructions.

Any modification to this machine which has not been approved by the Manufacturer in writing immediately invalidates the Manufacturers warranty.

Safety Alert Symbol



The Safety Alert Symbol is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

Intended Use

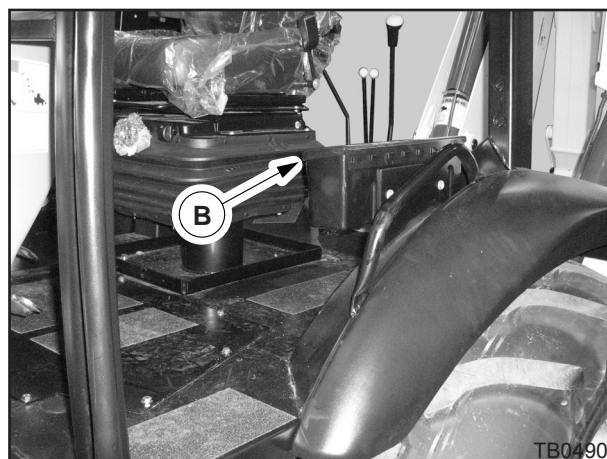
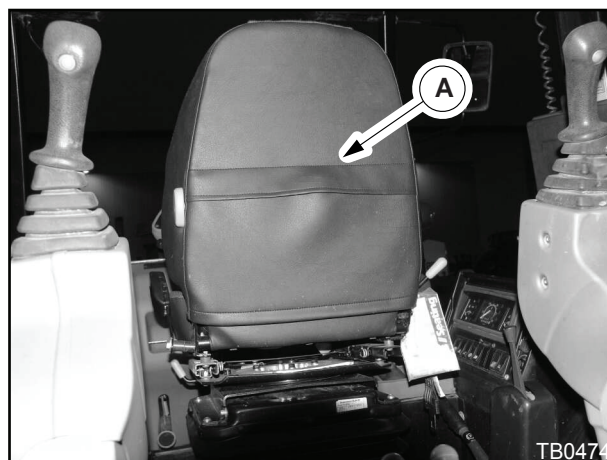
The machine has been designed and tested to carry out the function of transporting various free flowing materials. If used correctly, it will provide an effective means of transportation and meet the appropriate performance standards and regulations.

Use of this product in any other way than described in this instruction manual is prohibited and contrary to its intended use.

Instruction Manual

Immediately on taking delivery of your new backhoe and before putting it into service:

- Read this handbook completely -- it could save a great deal of unnecessary expense. Put this Instruction Manual in the storage compartment (A) on the rear of the drivers seat.
- For ROPS machines there is a lockable tool box (B) located on the left-hand side of the machine which can be used for secure document storage if required.



Introduction

760B/820/860/880SX/ELITE/860B/870B Loader Backhoes



Models shown: **760B** (centremount (axial) backhoe version) and **860 Elite** (sideshift (offset) backhoe version)

970/980 ELITE Loader Backhoes



Model shown: **970 Elite** (sideshift (offset) backhoe version)

To the Owner

The purpose of this Operator's Manual is to enable the owner or the operator to maintain the machines efficiently. If these instructions are followed carefully they will contribute to years of efficient and profitable operation of the machine.

The installation procedure ensures that these instructions are understood. Observe the recommendations and make daily maintenance a routine.

The variations in operating conditions make it impossible for the company to make comprehensive or definite statements in its publications regarding performance and methods of use of its machines or to accept any liability for any loss or damage which may result from these statements, or from any errors or omissions. IT IS THE DUTY OF THE USER WHEN TRAVELLING ON THE PUBLIC HIGHWAY TO ENSURE THAT THE VEHICLE ATTACHMENTS (IF ANY) CONFORM WITH THE LOCAL ROAD TRAFFIC REGULATIONS. Users are strongly advised to make use of the widespread network of local dealers in connection with any service problems and adjustments which may arise. Local dealers are trained and equipped for the purpose of advising users on any special problems arising as a result of local conditions, and are able to call on the Manufacturers Technical Staff for advice.

When replacements are required, insist on genuine Aftercare[®] parts from your Dealer, as extensive damage is liable to result from the use of inferior quality parts.

If you require the name and address of local dealer, in any particular area, write to Fermecc/Terex, Customer Service Department, Central Boulevard, Prologis Park, Coventry, CV6 4BX, United Kingdom.

General

In accordance with the Company's policy of continuous improvements to its machines, alterations to the specifications of machines may be made at any time without notice and the Company accepts no responsibility for any discrepancies which may occur between the specifications of its machines and the descriptions thereof contained in its publications.

This Operator's Manual has been written to include all factory fitted options and specifications for world-wide use, but this does not imply that all or any of these options are included in the standard machine configuration. Therefore Local dealers must always be consulted about machine specifications.

Official documents (European Community only)

CE mark

The Machinery Safety directive is intended to harmonise all the machinery safety regulations throughout the community so that there will be no technical barriers to trade.

Compliance with the essential safety requirements of the EEC directives 2006/42/EC (machinery), 2000/14/EC (Noise) and 2004/108/EC, permits companies to CE mark their products.

The directive affects almost every equipment supplier and user in the community and in particular, applies to this type of machine.

The regulations require that potential hazards from machinery are properly addressed and guarded against.

EC declaration of conformity

The EC declaration of conformity is a requirement of CE marking. The declaration for this machine follows.

TEREX

Contents of the EC Declaration of Conformity

2006/42/EC Machinery Directive

Manufacturer: Terex United Kingdom Limited
Central Boulevard
Prologis Park
Keresley End
Coventry
CV6 4BX
United Kingdom

Name of Person to Compile Technical File: David Maslin

Address of Person to Compile Technical File: Terex United Kingdom Ltd

Generic Denomination:	Backhoe Loader
Machine Function:	Earth-moving machinery
Model / Type :	820 860/880 SX & ELITE 970/980 ELITE TX760B, TX860B TX970B
Serial/VIN number:	
Commercial Name:	same as model type

Terex United Kingdom Limited hereby declares that the above piece of machinery is in conformity with the relevant provisions of Machinery Directive 2006/42/ EC

Terex United Kingdom Limited hereby declares that the above piece of machinery is in conformity with the provisions of the following other EC-directives: Noise - Equipment Used Outdoors (2000/14/EC), Emissions - Non-Road Engines (97/68/EC) and Electromagnetic Compatibility (2004/108/EC).

Terex United Kingdom Limited hereby declares that the following European harmonised Standards have been used:

EN474-1 & EN474-4

Place of Issue: Coventry, United Kingdom

Date of Issue:

Empowered signatory:

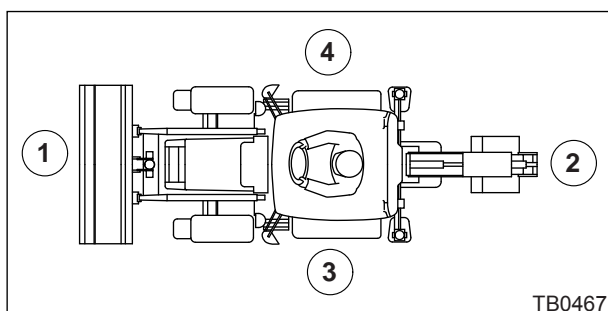
Wayne Berry
Sales Administration Manager

Right, Left, Front, and Rear of the Machine

The terms “right”, “left”, “front” and “rear”, when used in this manual, indicate the sides of the machine as seen from the operators seat.

Operator seat in the loader attachment position

1. FRONT
2. REAR
3. LEFT-HAND SIDE
4. RIGHT-HAND SIDE



3 - Safety

820

860/880 SX & ELITE

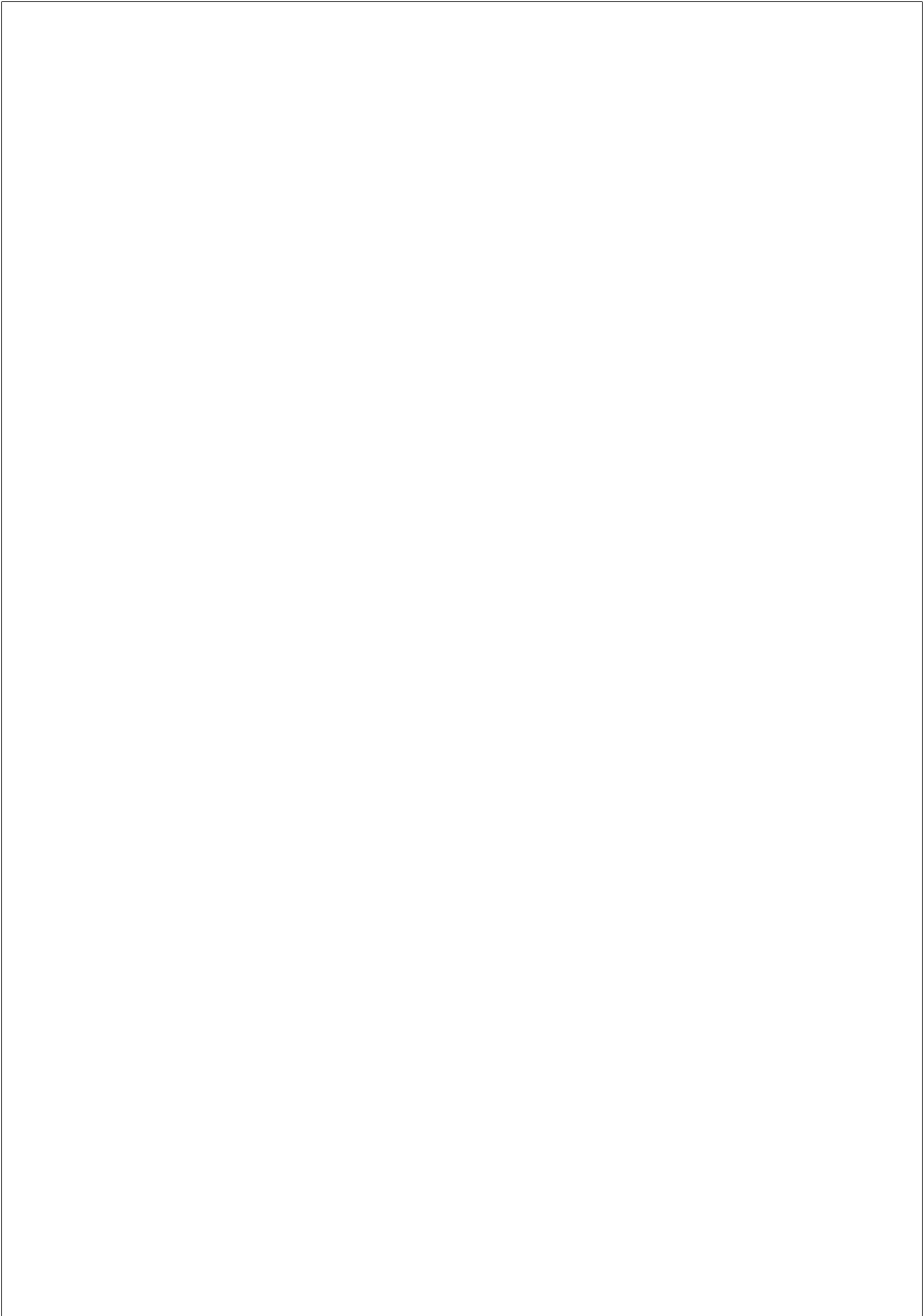
970/980 ELITE

TX760B

TX860B

TX970B

Backhoe Loader



General Safety

This manual is designed as a guide to the Machines Controls, Operation and Maintenance.

It Is NOT A Training Manual

Safety Alert Symbol

The Safety Alert Symbol is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



Hazard Classification

A multi-tier hazard classification system is used to communicate potential personal injury hazards.

The following signal words used with the safety alert symbol indicate a specific level of severity of the potential hazard.



DANGER - Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING - Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION - Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.



NOTICE - Indicates a property damage message. This signal word shall not be used with a safety message. The safety alert symbol shall not be used with this signal word.

Signal words used without the safety alert symbol relate to property damage and protection only.

All are used as attention getting devices throughout this manual as well as on decals and labels fixed to the machinery to assist in potential hazard recognition and prevention.

General Safety Notes

Consult manufacturers or dealers for details of training courses.

All the time you are working on or with the machine you must be thinking what hazards there may be and how to avoid them.

This manual is designed as a guide to the Machines Controls, Operation and Maintenance

IT IS NOT A TRAINING MANUAL



This manual must not be removed from the machine and should be kept in the place provided in a useable condition. If the manual becomes unusable new copies may be ordered from the manufacturer by quoting the Publication Number



ALL Operators of the machine must be authorised, mentally and physically capable of operating this machine and fully trained in its operation. The Operator must have read and understood this manual before operating this machine.



Only authorised persons should be allowed to operate this machine. Unauthorised use of this machine may invalidate the insurance.














If you are unsure of anything concerning the machine or job-
ASK

Safety

Personal Protective Equipment (PPE)

The following symbols indicate the personal protective equipment that must be used as necessary

 <p>Protective Helmet</p> <p>A protective helmet must be worn to prevent injury from falling objects</p>	 <p>Face Mask</p> <p>A face mask must be worn when conditions dictate to prevent eye or facial injury from flying objects</p>
 <p>Protective Gloves</p> <p>Wear protective gloves to prevent injury from sharp objects</p>	 <p>Dust Mask</p> <p>A dust mask must be worn when site conditions dictate</p>
 <p>Respirator</p> <p>A respirator must be worn when site conditions dictate</p>	 <p>Protective Clothing</p> <p>Protective clothing must be worn when site conditions dictate</p>
 <p>Safety Glasses</p> <p>Safety glasses must be worn at all times to prevent eye injury from flying objects</p>	 <p>High Visibility Clothing</p> <p>High visibility clothing must be worn when operating this equipment.</p>
 <p>Ear Defenders</p> <p>Ear protection must be worn when operating or near this equipment</p>	 <p>Safety Harness</p> <p>A seat belt must be worn at all times when operating this equipment</p>
 <p>Safety Boots</p> <p>Safety boots must be worn when operating this equipment</p>	

Safety Instructions

Your safety and that of people around you depends on you. It is essential that you understand this manual for the correct operation, inspection, lubrication and maintenance of this machine.

Read this manual carefully and check that:

You understand fully the symbols on the controls and the safety signs used in this manual and on the machine.

You understand fully the speed, stability, braking and steering characteristics of the machine. If you are in any doubt, consult your local dealer.

The safety messages in this section concern situations which may arise during normal machine operation and servicing. These safety messages also indicate the different ways of coping with these situations. Other safety messages are used throughout the manual to indicate specific dangers.

Whatever type of work is concerned (earth moving, handling, etc.), the safety arrangements applicable to private or public job sites are those which correspond to the regulations in force in the country and in the trade concerned (example: mining, quarries, underground work).

The information given in this chapter is a summary of the basic rules to respect at all times and does not exempt you from observing traffic regulations or the requirements of insurance companies.

Always keep this manual in the storage compartment provided for it. Make sure that it is always complete and in good condition. Consult your local dealer to obtain extra manuals.

Before Using the Machine

On road and job site

- Read and ensure that you understand the instructions and warnings given in this manual before operating the machine.
- The presence of grease, oil, mud or ice on the steps and access handles can cause accidents. Make sure they are always clean.
- Remove anything which might hinder visibility. Clean the wind shield, windows (cab version) and rear view mirrors.
- Before travelling or working at night, check that the lighting and signalling systems are operating correctly.
- Make sure the doors (cab version) and the engine bonnet are correctly fastened before undertaking any travel.
- Make sure that no loose object or tool is left on the machine or in the operator's compartment.
- The operator should be the only person on the machine. Make sure there is nobody on or near the machine. Passengers should not be carried.
- When mounting or dismounting from the machine always face the machine and use the steps and access handles on the left-hand side of the machine. The right-hand side is to be used only in case of emergency.
- Be prepared for emergencies. Always keep a first aid kit and a fire extinguisher close at hand on the machine. Make sure that the fire extinguisher is serviced in accordance with the manufacturer's instructions.
- Make sure that you fully understand the location and function of every control. Operating the controls wrongly can cause serious physical injury.
- Always fasten your seat belt before starting the engine. The machine is equipped with a roll over protection structure (ROPS) which ensures your safety. The seat belt will protect you efficiently if you attach it correctly and if you always wear it. The seat belt should not be too loose. It must not be twisted or caught in the seat.
- Make sure you know ways of getting out of the machine (emergency exit via the right-hand side) in case the machine falls over or if access via the left-hand side is not possible. Make sure that the right-hand door (cab version) is not locked.
- Check the condition and pressure of the tyres regularly.
- The integrity of the vehicle electrical installation is paramount to the machines performance, hence in no uncertain terms should the electrical system be modified without written consent from the manufacturers engineering. Fitment of any auxiliary loads is restricted to the available power sockets only
- Before operating the machine the operator should carry out the daily inspection as outlined in the General Inspection, see "General Inspection Before Operating Machine" section on page 6-1.

Road operation

- Check that both the cab doors (cab version) are closed correctly before undertaking any road travel.
- Before undertaking any road travel, lock the working attachments and install the safety systems required by regulations. Raise the stabilizers completely.
- On Four Wheel Steer (4WS) machines do not undertake any road travel unless the steering mode switch is locked in the Two Wheel Steer (2WS) position



Warning: Travel at on road speeds in 4WS mode can result in loss of control or unexpected swing-out of the rear end. Travel in crab mode will prevent the normal negotiation of bends, corners and intersections

On the job site

- Operating the machine requires your full attention. Caution on the part of the operator can prevent accidents. Make sure you know the capabilities and limits of the machine and the space needed for it to operate. There are areas of poor visibility in the machine's working range. Have someone guide you for all jobs which have poor visibility.
- Check all around the machine every day to ensure there are no oil leaks or hydraulic fluid leaks. Tighten connections as necessary and replace any parts as required.
- Make sure you know the hand signals used on your job site so that you can be guided when making delicate manoeuvres or for work where direct visibility is not available.
- Check that all the controls and all the safety devices operate correctly in a safe, clear area before beginning work.
- Keep away from dangerous areas such as ditches, over-hangs, soft areas, etc. Walk around the work site before using the machine and look for hazards.
- Inspect and note all possible risks before driving the machine into a new working area. Holes, obstacles, debris and other hazards in the working area can cause serious physical injury.

! Operating the machine

On road and job site

- Do not allow anyone to climb onto the machine. A passenger can fall or cause an accident.
- Never operate any of the machine's controls unless you are seated correctly in the operator's seat.
- Adapt your driving style to suit the conditions of work (sloping ground or rough ground), the state of the road and weather conditions.
- Use all the controls gradually so that the machine works smoothly.
- Stop the engine, engage parking brake and remove the starter switch key even for stops of short duration.
- Never leave the operator's compartment when the engine is running.
- When entering or leaving the operator's compartment, it is essential that the loader attachment controls (if equipped) are locked. Never try to by-pass this basic safety requirement. Dust, smoke or fog can reduce visibility and cause an accident. Stop the machine or slow down until visibility returns to normal.
- Never jump down from the machine. When dismounting from the machine always face the machine and use the steps and access handles.
- Whenever parking the machine on sloping ground, use wheel chocks to immobilize the machine (specific to certain countries).
- Never leave the loader bucket raised without installing the safety support strut to the left hand loader cylinder.
- Never travel at full speed with the loader attachment completely raised.
- Never travel at high speed if the loader bucket hinders visibility. You could drive into a hidden object.

Road operation

- It is mandatory to make sure that the brake pedals are locked together before any road travel or travel in 3rd or 4th gear. If this instruction is not observed an accident may occur.

On the job site

- On job sites on the public highway, use regulation signals, taking into account the working range of the machine. National or local regulations define the number, type and location of reflector strips.
- Avoid running the engine in an enclosed space. If it cannot be avoided, ensure good ventilation under all circumstances.
- Do not work close to live overhead electric lines without first making sure that the minimum distances are observed:

! DANGER

Electrocution Hazard
Death or injury can result from contacting electric power lines.

Always contact the electric power line owner. The electric power shall be disconnected or the power lines moved or insulated before machine operations begin.

Maintain required clearance.	
Line voltage	Required clearance
0 to 50 kv	10 ft (3 m)
50 to 200 kv	15 ft (4.6 m)
200 to 350 kv	20 ft (6.1 m)
350 to 500 kv	25 ft (7.6 m)
500 to 750 kv	35 ft (10.7 m)
750 to 1000 kv	45 ft (13.7 m)

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- Make sure you know the location of pipes and cables before starting work. Electrical cables, gas pipes, water pipes or other underground installations can cause serious physical injury.
- Do not allow anyone to stand in the machine working area. If the operator uses the swing or attachment controls wrongly, this could cause an accident. Stop all movement until the person has moved away.
- Before moving the stabilizers make sure that no person is within the working range of the stabilizers.
- When moving the machine onto a trailer, place the gear change lever in first gear. Keep the loader bucket 20 cm (8 inch) from the ground.
- Load lifting must be carried out in accordance with the instructions shown in this manual and in accordance with current regulations.
- Before using the backhoe attachment make sure that the machine is clear of the ground by means of the stabilizers and the loader attachment.
- Any uncontrolled movement of the machine can cause an accident. Before turning the operator's seat to the backhoe attachment working position, it is essential to place the direction of travel control lever and the gear change lever (synchroshuttle machines) or the transmission control lever (Powershuttle machines) in the neutral position and to immobilize the machine by means of the parking brake lever.

- If you are using the backhoe attachment or if you are carrying out maintenance operations, use the engine throttle lever. The use of the lever for any other operations can cause accidents.
- In case of any operational problem or damage, move the machine to a place of safety, lower the loader attachment and the backhoe attachment to the ground, stop the engine, engage parking brake, and remove the starter switch key. Find the cause of the defect or inform responsible personnel. Take measures to prevent the use of the machine.
- When the machine is being lifted, nobody must be allowed to remain in the area surrounding the machine.

Parking the machine

When you park the machine, proceed in the following manner:

1. Park the machine on a flat, level surface away from any soft ground, excavations or poorly shored cavity.
 2. Lower the loader bucket until it is pressing on the ground.
 3. Place the backhoe attachment in the road travel position.
 4. Place the direction of travel and gear change levers (synchroshuttle machines) or the transmission control lever (Powershuttle machines) in the neutral position.
 5. Immobilize the machine by means of the parking brake.
 6. Raise the stabilizers completely.
 7. Stop the engine and remove the starter switch key.
 8. Release the hydraulic pressure by operating the control levers in both directions.
 9. Lock the loader attachment controls (if equipped).
 10. Make sure that the windows (cab version), and the engine bonnet are correctly fastened and lock the operator's compartment doors (cab version).
 11. Check that no part of the machine is protruding onto the public highway. If this cannot be avoided, install signs in accordance with regulations.
 12. Remove battery isolator key if leaving the backhoe unattended.
- maintenance or adjustment procedure, consult your local dealer.
 - If the attachment is raised or the machine moves when there is no operator, serious injury can result. Before carrying out any maintenance on this machine, proceed in the following manner:
 1. Park the machine on flat, level ground.
 2. Lower the loader and backhoe attachments until they are resting on the ground.
 3. Stop the engine and remove the starter switch key.
 4. Engage the parking brake.
 5. Lock the loader attachment controls (if equipped).
 6. Block the wheels to prevent any machine movement. If a servicing operation requires the loader attachment to be raised (e.g. working on the engine), install the loader attachment support strut.
 7. Removing the battery isolator key from the switch is recommended, especially when carrying out work on the electrical system
 - Unauthorized modifications of the machine can cause serious injuries. Do not carry out any modification on this machine without obtaining prior authorization from your local dealer. Any modification carried out must be in conformity with the machine's technical specifications and must conform to current safety regulations.
 - Do not carry out any welding operation on the machine without prior authorization from your local dealer.
 - Some of the machine's components are subject to type approvals. It is mandatory when replacing those components to ensure that they are in conformity with regulations. For safety's sake, always use genuine Aftercare[®] parts.
 - Hydraulic fluid or grease under pressure which penetrates the skin can cause serious injury. Take the necessary safety precautions (protective clothing and face and hand protection) to prevent all such risks. In addition, before handling these products, read the manufacturer's specific instructions for their use. If hydraulic fluid penetrates the skin a doctor must be called immediately.
 - When carrying out a welding operation on the machine, as authorized by the manufacturer and in accordance with his specifications. Disconnect the alternator plug, battery and connect the welding set earth lead to the component on which the welding is to be carried out. Never connect the earth lead to a hydraulic system component.
 - A burst tyre can cause serious injury. Regularly check the condition of tyres and always observe the inflation pressures defined in accordance with the type of tyre and ground concerned.
 - When checking tyre pressures or during an inflation operation, never stay facing the tyre but always facing the tread surface. Always use an inflation cage when the wheel is removed from the machine. Keep all other persons away from the area. Never weld near a tyre. It

Maintenance and Adjustments

- Do not carry out any maintenance operations until you have read and understood the instructions and warnings given in this manual.
- Wear suitable clothing when servicing the machine.
- When servicing the machine, place a "Do not start up" label on the instrument panel.
- Always wear eye protection when using a tool which might project metal particles. Use a hammer with a soft face, such as copper, for installing pins.
- Incorrectly performed maintenance or adjustments can cause serious injury. If you do not understand a

is essential to remove the tyre before any welding operation.

- Take the necessary safety measures to protect your face when using compressed air.
- The machine's structure is in conformity with the "FOPS" and "ROPS" protection standards. Any modification (drilling, welding, etc.) may cause that conformity to be invalidated

Prevention of fire or explosions

- Engine fuel can cause an explosion or a fire.
- Never re-fuel when the engine is running.
- Do not smoke during re-fuelling.
- Take all the necessary safety measures when welding, grinding or when working near a naked flame.
- Use a non-inflammable product for cleaning parts.
- A spark or flame can cause the hydrogen in a battery to explode. To prevent any risk of explosion, observe the following instructions:
 - Remove the battery master switch key (optional).
 - When disconnecting the battery cables, always disconnect the negative (-) cable first.
 - To reconnect the battery cables, always connect the negative (-) cable last.
 - Never short-circuit the battery terminals with metal objects.
 - Do not weld, grind or smoke near a battery.
- The electrical system or the engine exhaust may produce sparks. Before using the machine in an area which may contain inflammable vapours, ensure that there is good ventilation.
- Always keep a fire extinguisher available on the machine. Make sure that it is properly maintained in conformity with the manufacturer's instructions.
- Clean the machine regularly, remove all debris and material which may catch fire.
- Check for leaks. Replace damaged hoses, pipes and unions. Clean the machine after any repair work before operating it.

Prevention of Burns

- Battery electrolyte causes severe burns. The battery contains sulphuric acid. Avoid any contact with the skin, eyes or clothing.
 Antidote:
 EXTERNAL: Rinse with water.
 INTERNAL: Drink large quantities of water or milk. Then drink milk of magnesia, a beaten white of an egg or vegetable oil. Call a doctor immediately.
- EYES: Rinse with water for 15 minutes and consult a doctor quickly.

- When the electrolyte of a battery is frozen, it can explode if you attempt to charge the battery or if you try to start the engine using a booster battery. Always keep the battery charged to prevent the electrolyte freezing.
- Batteries produce explosive gases. Keep all flames, sparks and cigarettes away. Provide good ventilation when changing a battery or using a battery in an enclosed space. Always protect your eyes when working near a battery.
- Boiling coolant solution can spray out if the radiator cap is removed while the system is still hot. To remove the cap: allow the system to cool down, turn the cap to the first notch and wait until there is no more pressure. Then remove the cap.

ROPS/FOPS cab (or protective frame)

- Do not try to weld or straighten the ROPS/FOPS cab (or frame).
- Do not modify the ROPS/FOPS cab (or frame) in any manner. Unauthorized modification, such as welding, drilling, cutting and adding attachments, as well as any damage resulting from collisions or the machine rolling over, could weaken the structure and reduce your protection. Replace the ROPS/FOPS cab (or frame) if subjected to roll over or damage. Do not attempt to repair it.
- If you operate this machine without a ROPS/FOPS cab (or frame) and the machine rolls over, you can be seriously injured or killed. Remove the ROPS/FOPS cab only for service or replacement. Do not operate the machine with the ROPS/FOPS cab (or frame) removed.
- Do not install accessories (fixed or otherwise) which can increase the weight of the machine. This could cause serious accidents. Do not exceed the maximum weight shown on the ROPS/FOPS cab (or frame) (identification plate).
- Improper ROPS/FOPS cab (or frame) inspection or maintenance can cause serious injury. Carry out the recommended ROPS/FOPS cab (or frame) inspection procedure shown in this manual. If it is necessary to replace ROPS/FOPS parts or the ROPS/FOPS cab (or frame), use only the replacement parts shown in the Parts Catalogue for your machine

Ride control system (optional)

- Never operate the ride control system when the machine is raised off the ground by means of the loader beams and the loader bucket. The machine could fall to the ground and cause serious or fatal injury.
- If the ride control system is operated when the starter switch key is in the "ON" position, the loader beams may rise or lower slightly due to the effect of the hydraulic accumulator.

Safety

- Never use the ride control system during precise levelling operations or when using the backhoe attachment.

Servo control system (optional)

- Never reposition the backhoe server controls while the backhoe is in operation.
- Do not reposition the backhoe servo controls using the joysticks, always use provided handles.
- Do not use the backhoe servo controls as a footrest.

Ride control and Servo control Accumulators (optional)

- Release pressure completely in the hydraulic system before disconnecting hydraulic piping or hoses. Hydraulic oil squirting under pressure can cause serious injury.
- Use only dry inert gas to pre-load the accumulator, such as pure nitrogen.
- Completely release pressure in the accumulator before attempting to disassemble the accumulator.
- If the accumulator does not function correctly, replace the accumulator. Never try to carry out any servicing operation on the accumulator to avoid replacing it. If these instructions are not followed, serious or fatal injury can result.

Fluid Levels

Ensure Machine is on level Stable Ground, gear lever is in neutral and the engine is stopped when checking ALL fluid levels.

Frozen Battery Electrolyte

- Batteries with frozen electrolyte may explode if used or charged..
- Never 'jump start' a machine with a frozen battery.
- To help prevent freezing, keep the battery fully charged.



Warning: Do not use a machine with frozen battery electrolyte.

Fires

Using water to extinguish an oil fire could spread the fire or give you a shock from an electrical fire.

Use a carbon dioxide, dry chemical or foam extinguisher whilst waiting for the fire brigade.

Keep fire extinguisher serviceable and have it checked regularly.



Warning: Do Not Use Water to Extinguish a Machine Fire

Water Cooled Engines

Water cooled systems operate under pressure to increase the boiling point of the coolant. Therefore, the coolant temperature may be greater than boiling water at standard atmospheric pressure (100°C).



Warning: Never Maintain Cooling System when the engine is HOT

Lubricants

It is essential that anyone concerned with lubricants read and understand the following text.

Hygiene

Lubricants are not a health risk when used correctly for their intended purposes.

However, excessive or prolonged skin contact can remove the natural fats from the skin, causing dryness and irritation.


Low viscosity oils are more likely to do this, therefore particular care is necessary in handling used oils which have been diluted by fuel contamination.

Whenever handling oil products, maintain good standards of care plus personal and plant hygiene.

For details of these precautions we advise you to read the relevant publications issued by your local health authority.

 **Storage**

ALWAYS keep lubricants out of reach of children.
NEVER store lubricants in open or unlabelled containers.


Warning: Do Not Use Water to Extinguish a Machine Fire


 **Handling Oil**

See also First Aid - Oil, on Page 3 - 9.

New Oil

There are no special precautions needed for the handling or use of new oil other than the normal care and hygiene practices.

Old Oil


Warning: Used crankcase lubricants contain harmful contaminants. In laboratory tests it was shown used petrol engine oils can cause skin cancer.

Observe the following precautions.

- Avoid prolonged, excessive or repeated skin contact with used engine oil.
- Apply a barrier cream to the skin before handling used engine oil.
- Note the following when removing engine oil from the skin.
 - Wash skin thoroughly with soap and water. Using a nail brush will help.
 - Use special hand cleansers to help clean dirty hands.
 - Never use petrol, diesel fuel or kerosene.
 - Avoid skin contact with oil soaked clothing.
 - Do not keep oily rags in pockets.
 - Wash dirty clothing before reuse.
 - Throw away oil soaked shoes.

 **First Aid - Oil**

Swallowing Oil

If oil is swallowed, do not induce vomiting.

Get Medical Advice

Skin Contact

In the case of excessive skin contact, wash with soap and water.

Eye Contact

In the case of eye contact, flush with water for 15 minutes. If the irritation persists, get medical attention.

Oil or Fuel Spillage

Absorb with sand or a locally approved brand of absorbent granules. Scrape up and dispose of in a chemical disposal area.

 **Fires**

Extinguish with carbon dioxide, dry chemical or foam.

Inspection of ROPs

Although ROPS seem to be relatively maintenance-free, regular periodic inspections to ensure ROPS are damage free and thus capable of functioning in a rollover cannot be over emphasized.

Through periodic inspections, cracks, loose bolts, damage, and other normal wear and tear related problems can be eliminated before they become serious.

Proper inspection and maintenance procedures can ensure that ROPS will perform the life saving function they are designed for and expected to do.

Introduction

There are in-service factors which tend to degrade a ROPS/FOPS systems energy absorbing or load carrying capability.

A few of these factors are:

- Structural damage from vibrations and/or loadings during some operations.
- A corrosive environment.
- Continued use of the machine after rollover or accident involving structural damage.
- Unauthorized modification.
- Worn or deteriorated isolation mounts.
- Bolt replacement with less than the correct grade or neglect in maintaining proper bolt torque.
- Improper installation.

Any of these factors may cause a dangerous condition to exist. The following guidelines will be helpful if followed.

Attachments and/or Modifications

Generally ROPS/FOPS structures are not intended as external load carrying members and must not be used to mount attachments such as pull hooks, winches, side booms, etc. without the manufacturers approval.

Non external load transmitting attachments such as mirrors, fans, heaters, lights, etc. should be installed following the manufactures guidelines. Typically these attachments are located in non critical areas such as roof sheets, enclosure sheet metal, or the middle portion of the ROPS legs.

Modifications to basic design such as increasing canopy height, or relocating ROPS legs is not permitted.

Maintenance

Inspection - A scheduled, frequent visual check of mounting hardware by operation or service personnel is recommended. As most ROPS are different and function in different service environments, no specific inspection interval can be recommended. Inspection in conjunction with regular service intervals is suggested. The inspection should check for:

Worn, damaged or missing resilient mounts. Excessive motion or rattling during operation are indications of a problem. The mounts should be disassembled and repaired if required.

Missing or damaged mounting hardware (bolts, nuts, washers, etc.) should be replaced. Bolts should be checked for correct torque settings.

Cracks in ROPS/FOPS structure and mounting system. The machine should be cleaned and disassembled as necessary to allow inspection for cracks in the structure and mounting system. Cracks are usually associated with weld details and usually show as a line of rust before it will be clear as a crack. Rust lines should be taken as indications of cracks and verified by inspection following the manufacturers procedures. Only some cracks will badly affect the ROPS/FOPS function. Cracks in enclosure sheet metal generally are not structurally important. The manufacturer can identify the appropriate measures. If in doubt, consult the manufacturer.

Water drainage paths. The check should verify clear water drainage paths so that entrapped water will not freeze and crack or deform the structure.

Corrosion. Extensive paint peeling and rusting should be noted and corrective action taken.

Other Inspection. The structure must be inspected following a rollover, collision or fire.

Repair

Replace all missing or damaged hardware with the manufactures specified hardware. Re-torque all threaded fasteners to the manufacturers specifications.

Replace worn or damaged resilient mounts to prevent further damage and vibration problems.

Determine the reparability of cracks in ROPS/FOPS structures on the basis of the crack details and effect on the particular design. The manufacturer must be consulted at this step. Some general guidelines which may be helpful are:

Enclosure sheet metal cracks are repairable.

Small cracks may be repairable. Consult the manufacturer.

If damaged by a rollover, collision or fire consult the manufacturer.

In all cases, when doubt exists, consult manufacturer.



Warning: Failure to properly inspect and maintain a seat belt can cause serious injury or loss of life in the event of an accident

Warning: It is critical that any time the machine is involved in an accident, the entire seat belt system must be replaced.

Warning: The seat belt should be considered to have a finite life and must be replaced as needed throughout the life of the machine.

Warning: The seat belt must be inspected daily for needed maintenance.

Warning: If replacement of any part of the seat belt is indicated through maintenance guidelines below, the entire belt must be replaced, both retractor and buckle sides.



Important Facts about Seat Belts

The potential exposure of this seat belt to severe environmental conditions make it crucial to inspect the seat belt system regularly.

It is recommended that the seat belt system is inspected at least once a year or more often if the vehicle is exposed to severe environmental or vocational conditions,

Any seat belt system that shows cuts, fraying, extreme or unusual wear, significant discoloration due to UV exposure, dusty-dirty conditions, abrasion to the seat belt webbing, or damage to the buckle, latch plate, retractor, hardware or any other obvious problem should be replaced immediately.

Once replacement of the seat belt has been determined, be certain that it is only replaced with the original equipment manufacturer recommended replacement seat belt. See your authorized spares and service centre for replacement. Your restraint system has been developed and tested specifically for your machine.

If the inspection indicates that any part of the seat belt requires replacement, the entire belt must be replaced. It is vitally important that all components be mounted back in the same position as the original components which were removed. This will maintain the design integrity of the mounting points for the seat belt assembly.



Seat Belt Maintenance Guidelines

Follow Maintenance Guidelines 1-4 to properly inspect seat belt and tethers to determine if replacement is necessary.

The following maintenance guidelines detail how to Inspect seat belt for "cuts, fraying, extreme or unusual wear of the webbing, etc., and damage to the buckle, retractor, hardware or other factors" which indicate that seat belt replacement is necessary,

1. Check the webbing. Pull the webbing completely out of the belt retractor and inspect the full length of the webbing for cuts, wear, fraying, dirt and stiffness. If a belt shows any cuts, fraying, extreme or unusual wear, the system should be replaced.
2. Check the buckle and latch for proper operation and to determine if latch plate is excessively worn, deformed or buckle is damaged or casing broken.
3. Check retractor web storage device operation by extending webbing to determine it locks properly and that it spools out and retracts webbing properly - fitted.
4. Check web in areas exposed to ultraviolet rays from the sun or extreme dust or dirt. If the original colour of the web in these areas is extremely faded and/or the web is packed with dirt, the physical strength of this web may have deteriorated. If this condition exists replace the system.

Description of Symbols and Pictorials Used on Safety Signs



Read and understand Operators Manual and all safety messages before operating or maintaining the machine.



Fasten the seat belt before operating the machine and keep it secure at all times



Falling Hazard. Falling from machine result in serious injury or death.



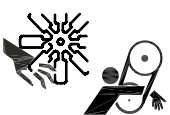
Crush Zone. machine movement can cause serious injury or death.



No passengers/hangers on machine. Do not allow passengers hold on to, stand or ride on the machine.



Danger, possibility of death, serious burns or blindness due to contact with corrosive acid.



Entanglement Hazard. Contact with rotating parts can result in serious injury. keep away from fan and belt when engine is running.



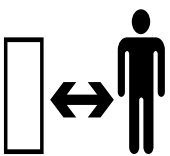
Danger, possibility of death, serious burns or blindness due to explosive gasses.



Loader Prop. Secure loader arm locking device before service.



Oil Injection Hazard. Escaping fluid under pressure can penetrate skin.



Stay away from machine. Contact with moving machine can cause serious injury or death.



Do Not Use Hand to Check For Leaks. Use a piece of paper or cardboard.

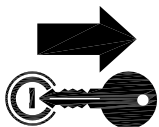
?000KG



Lift Point.



Crush Hazard. Crushing can result in serious injury or death.



Stop Engine and Remove Start Key before servicing



Burn Hazard, contact with hot surfaces may cause burns.

Description of Symbols and Pictorials Used on Safety Signs



Burn Hazard, contact with hot surfaces may cause burns.



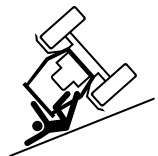
Danger of entanglement in rotating drive lines and rotating shafts.



Crush Hazard, Machine movement can cause serious injury or death.

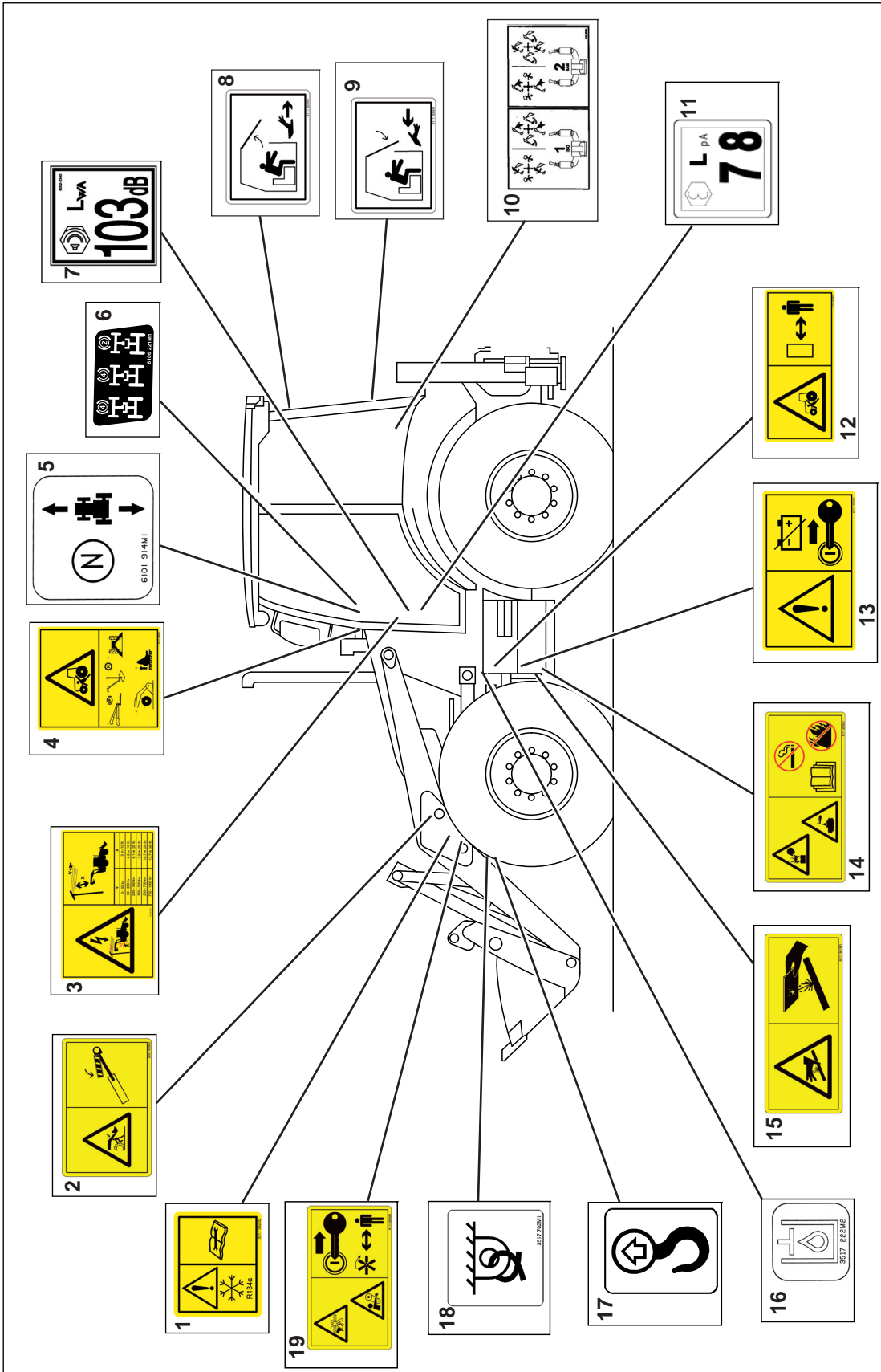


Keep clear of rotating parts. Contact with rotating parts will result in injury or death.



Rollover Hazard. Incorrect loader position when operating can result in serious injury or death.

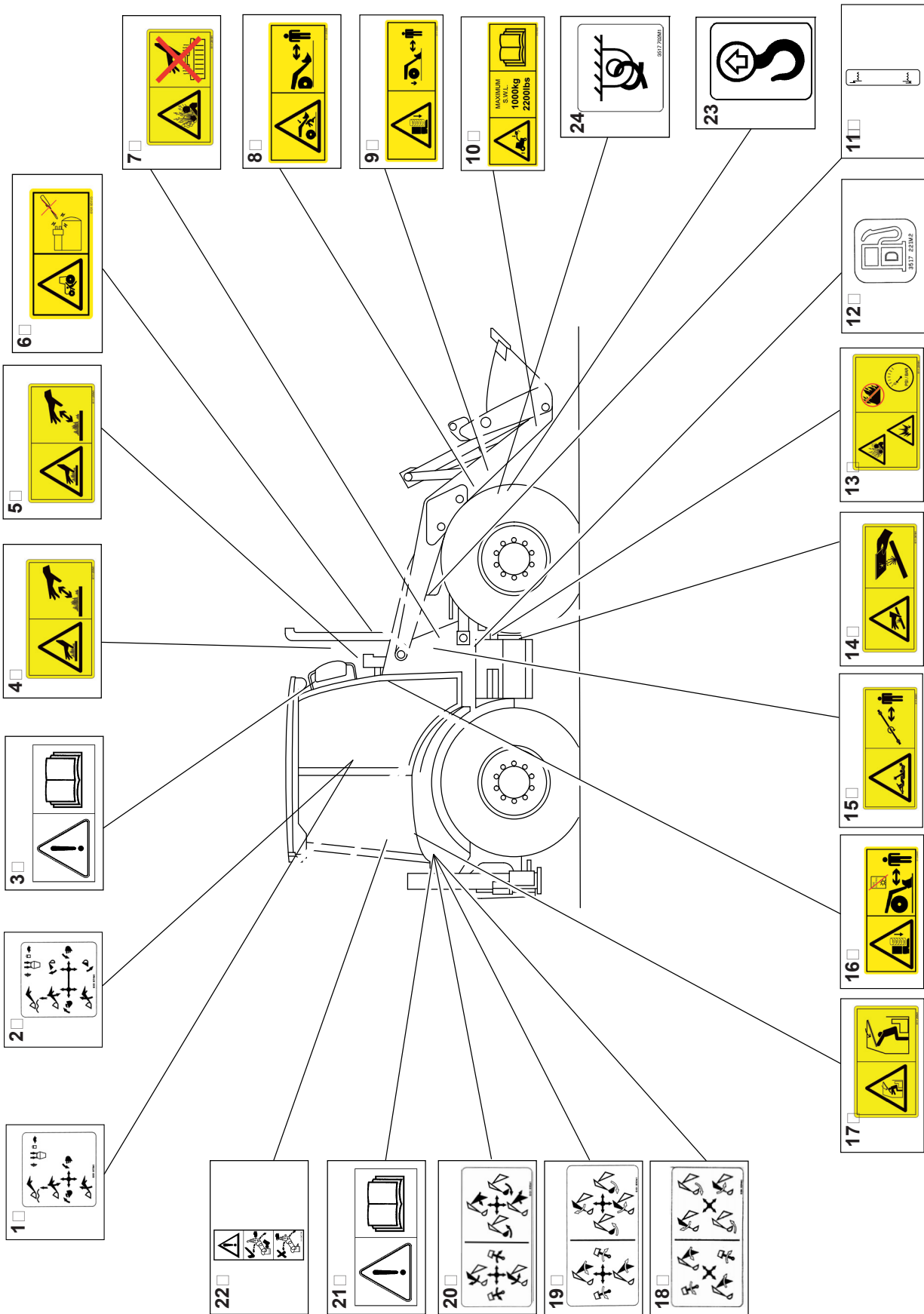
Safety Sign Location (Machine Left-Hand Side ISO)



Safety Sign - Description (Machine Left-Hand Side ISO)

Item	Decal Description	Notes
1	Air Conditioning only - Read the Operators Manual before performing maintenance on the air conditioning system.	-
2	Use the safety strut when working in the loader attachment area with the bucket raised.	-
3	Stay clear of overhead power cables.	-
4	Apply parking brake and place the transmission in neutral before operating the backhoe	-
5	Operation of direction of travel lever (synchroshuttle only), or transmission control lever (Powershuttle only).	-
6	3 position braking and drive decal.	-
7	The guaranteed sound power level of the machine, per EN2000/14/EC.	-
8	Push out to open the window.	-
9	Pull in to close the window.	-
10	Servo Controls only - Operation of the backhoe attachment levers in both ISO and SAE configurations.	-
11	The continuous A-weighted sound pressure level at the operators station.	-
12	Crush hazard - keep away from the machine.	-
13	Remove the battery master switch key after use or before maintenance.	-
14	Danger, possibility of death, serious burns or blindness due to explosive gasses or contact with corrosive acid.	-
15	Danger pressurised hydraulic oil can penetrate the skin, do not use hands to check for leaks.	-
16	Location of the hydraulic oil reservoir filler orifice.	
17	Location of the tie-down points to be used when transporting the machine.	
18	Location of the lifting points to be used when lifting the machine.	
19	Danger of entanglement, the engine should be stopped and the start key removed before attempting maintenance.	

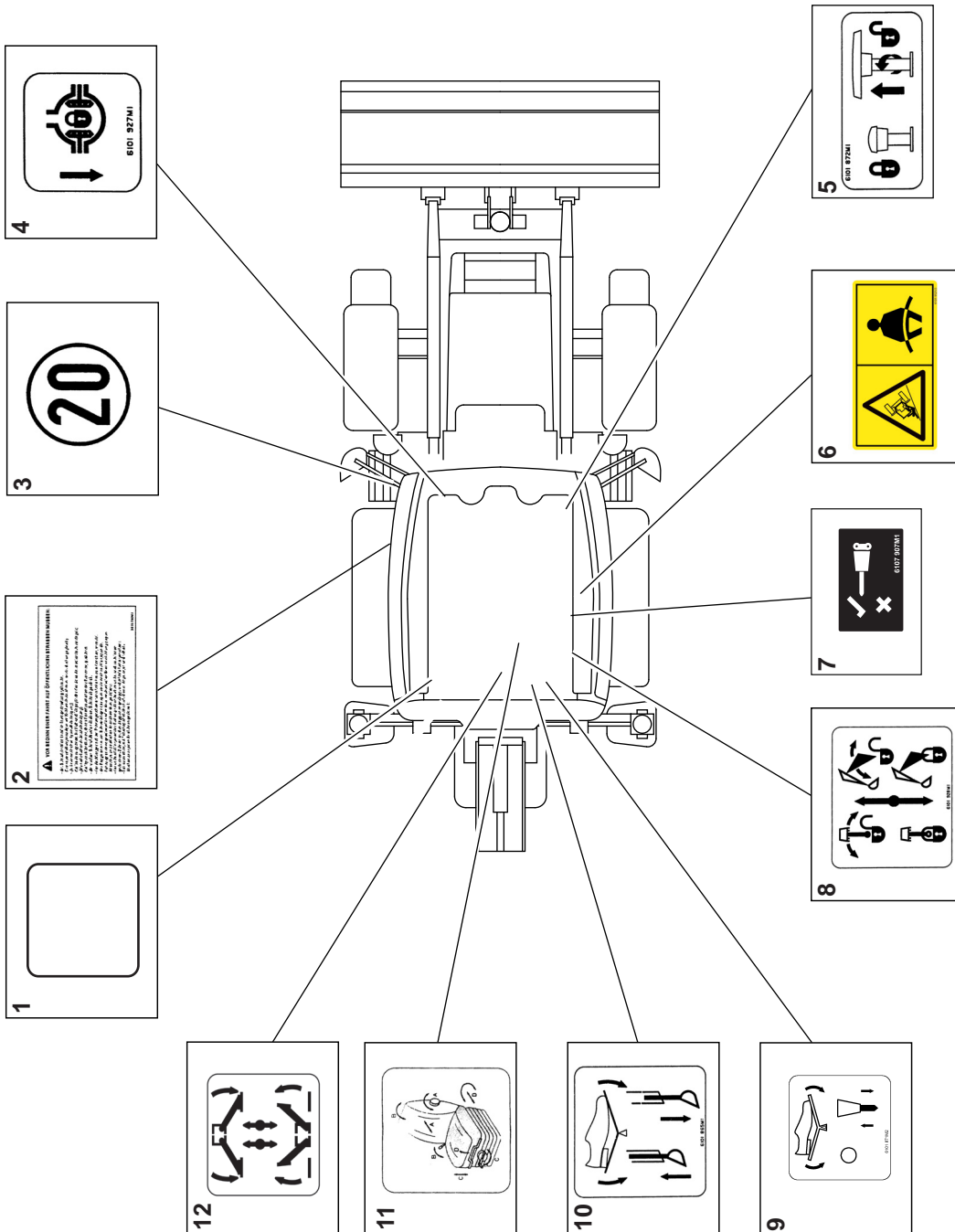
Safety Sign Location (Machine Right-Hand Side - ISO)



Safety Sign - Description (Machine Right-Hand Side - ISO)

Item	Decal Description	Notes
1	Loader attachment operation with standard bucket.	-
2	Loader attachment operation with 7 in 1 bucket.	-
3	Read the Operators Manual before using the machine.	-
4	Burn hazard - contact with hot surfaces may cause burns.	-
5	Burn hazard - contact with hot surfaces may cause burns.	-
6	It is forbidden to start the machine by any other means than the starter switch key.	-
7	Burn hazard - the radiator and cap should not be touched while the cooling system is still hot.	-
8	Crush hazard - keep clear of moving loader arm or bucket.	-
9	Crush hazard - keep clear of loader when wheels are raised.	-
10	Maximum living capacity of the arms.	-
11	Indicates the upper and lower coolant levels.	-
12	Location of the fuel tank filler orifice.	-
13	Pressure accumulator explosion hazard resulting in death or injury.	Ride Control Only
14	Danger pressurised hydraulic oil can penetrate the skin, do not use hands to check for leaks.	-
15	Danger of entanglement in rotating drive lines and rotating shafts.	-
16	Crush hazard - do not turn Ride Control on if the loader arms and bucket are hold the machine off the ground.	
17	Support the glass when releasing the catch.	
18	'X' Pattern controls - operation of the backhoe attachment levers.	Optional
19	ANSI controls - operation of the backhoe attachment levers.	Optional
20	ISO controls - operation of the backhoe attachment levers.	Optional
21	Read the Operators manual before switching control configurations.	
22	The foot pedal must be depressed before repositioning the servo controls. Do not reposition the controls using the joysticks, use the handles provided	
23	Location of the lifting points to be used when lifting the machine.	
24	Location of the tie-down points to be used when transporting the machine	

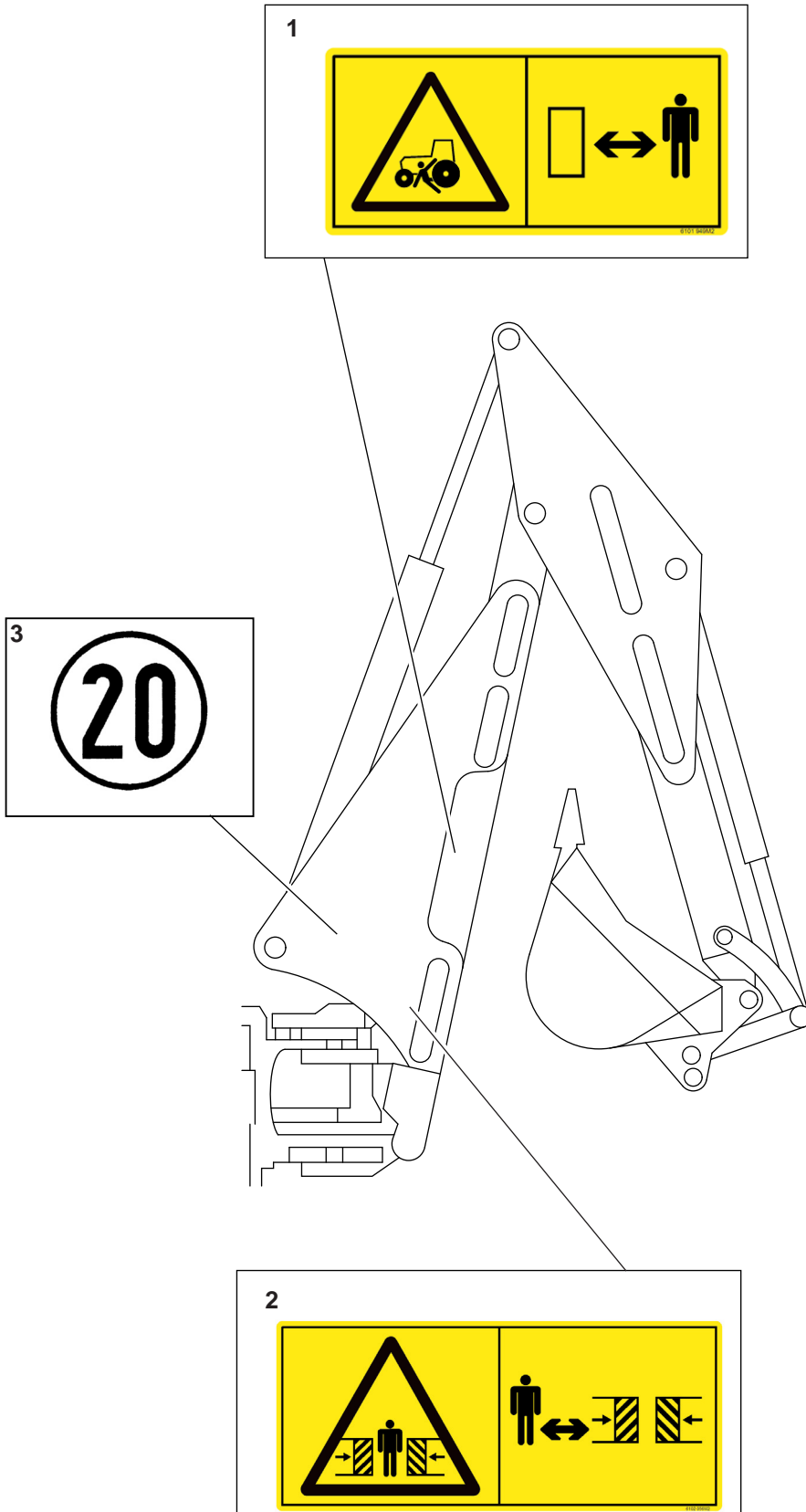
Safety Sign Location (Machine Top - ISO)



Safety Sign - Description (Machine Top - ISO)

Item	Decal Description	Notes
1	Sideshift stabilizer controls operation.	-
2	Operating instructions specific to certain countries.	-
3	Specific to certain countries - maximum speed authorised on the road.	-
4	Operation of the differential locking pedal.	-
5	Lever must be pushed and turned to lock the loader controls.	-
6	Seat belt must be worn at all times.	-
7	Switch position to select auxiliary / extender hydraulic control via the rear pedal.	Optional
8	Operation of the Backhoe attachment boom lock.	-
9	Auxiliary hydraulic controls - press the front of the pedal to operate the hydraulic tool if equipped.	Optional
10	Extendable Dipper - press the front of the pedal to extend the extendable dipper or the rear of the pedal to retract the extendable dipper.	-
11	Adjusting the operators seat.	-
12	Centremount stabilizer controls operation.	-
Safety Signs	<p><u>IMPORTANT</u> ALL safety signs listed must be fitted to the machine and must be legible. Use mild soap and water to clean safety signs - DO NOT use solvent based cleaners because they may damage safety sign material. Safety signs are fitted to the machine to warn of possible dangers and MUST be replaced immediately if they become unreadable or lost. If the machine is repaired and parts have been replaced on which safety signs were fixed, ensure new safety signs are fitted before the machine is put into service.</p>	

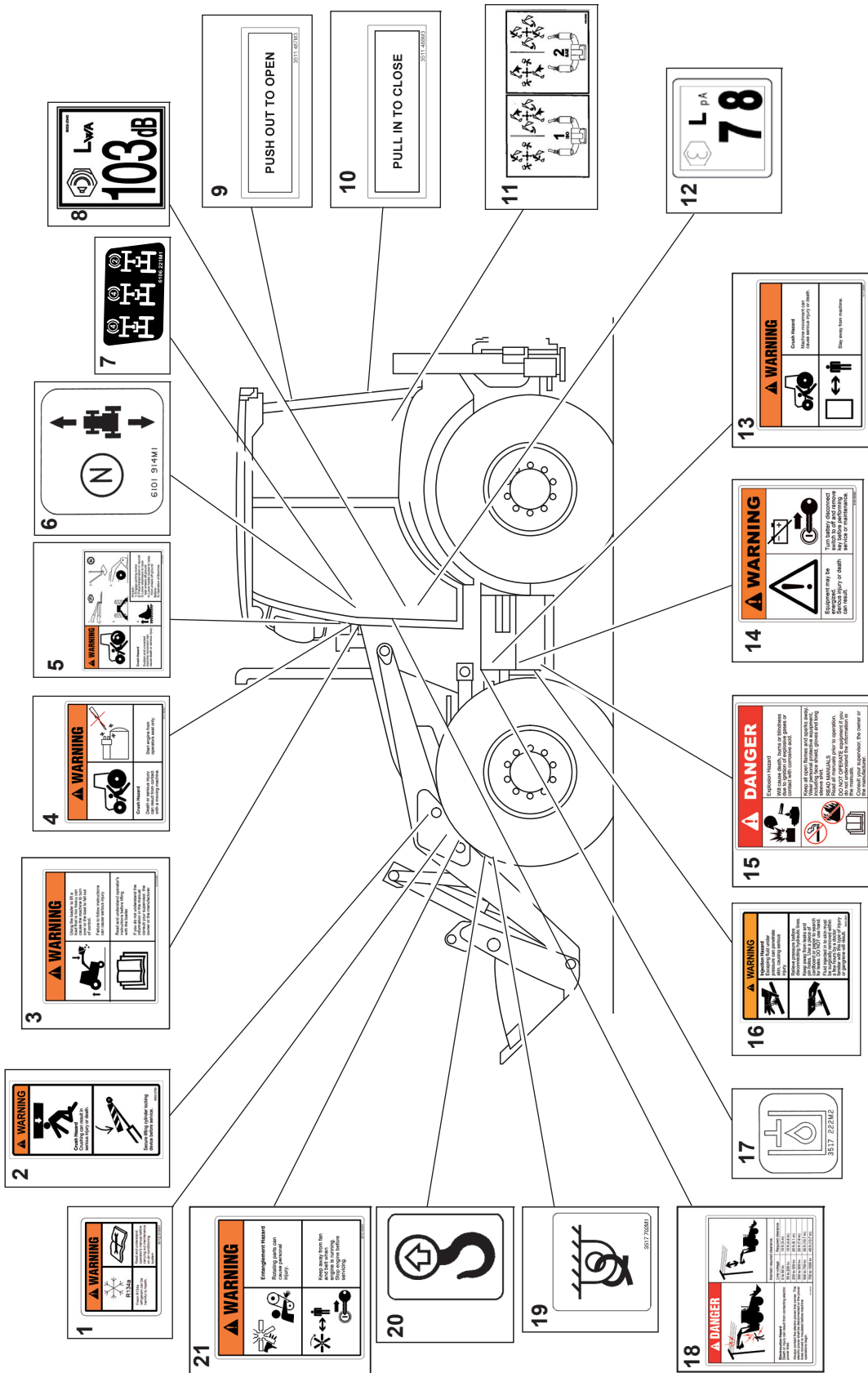
Safety Sign Location (Machine Boom - ISO)



Safety Sign - Description (Machine Boom - ISO)

Item	Decal Description	Notes
1	Crush hazard - keep away from the machine.	-
2	Crush hazard - the operator must not permit any person to remain within the working area of the backhoe attachment.	-
3	Specific to certain countries - maximum speed authorised on the road.	-
Safety Signs	<p><u>IMPORTANT</u> ALL safety signs listed must be fitted to the machine and must be legible. Use mild soap and water to clean safety signs - DO NOT use solvent based cleaners because they may damage safety sign material. Safety signs are fitted to the machine to warn of possible dangers and MUST be replaced immediately if they become unreadable or lost. If the machine is repaired and parts have been replaced on which safety signs were fixed, ensure new safety signs are fitted before the machine is put into service.</p>	

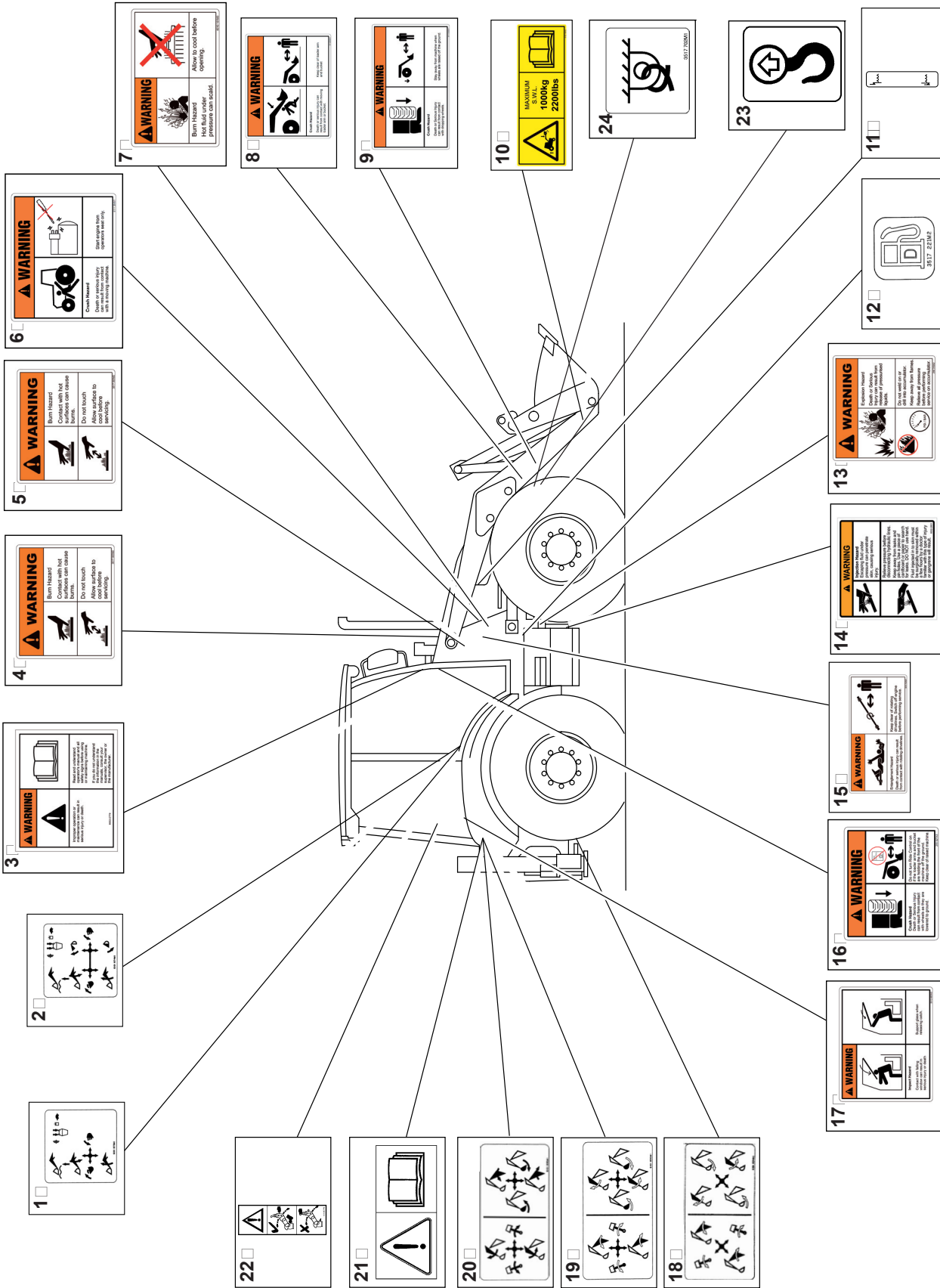
Safety Sign Location (Machine Left-Hand Side ANSI)



Safety Sign - Description (Machine Left-Hand Side ANSI)

Item	Decal Description	Notes
1	Air Conditioning Only - Read the Operators Manual before performing maintenance on the air conditioning system.	-
2	Use the safety strut when working in the loader attachment area with the bucket raised.	-
3	Warns of the dangers of using the backhoe to lift excessive loads.	-
4	It is forbidden to start the machine by any other means than the starter switch key.	-
5	Apply parking brake and place the transmission in neutral before operating the backhoe	-
6	Operation of direction of travel lever (synchroshuttle only), or transmission control lever (Powershuttle only).	-
7	3 position braking and drive decal.	-
8	The guaranteed sound power level of the machine, per EN2000/14/EC.	-
9	Push out to open the window.	-
10	Pull in to close the window.	-
11	Servo Controls only - Operation of the backhoe attachment levers in both ISO and SAE configurations.	-
12	The continuous A-weighted sound pressure level at the operators station.	-
13	Crush hazard - keep away from the machine.	-
14	Remove the battery master switch key after use or before maintenance.	-
15	Danger, possibility of death, serious burns or blindness due to explosive gasses or contact with corrosive acid.	-
16	Danger pressurised hydraulic oil can penetrate the skin, do not use hands to check for leaks.	
17	Location of the hydraulic oil reservoir filler orifice.	
18	Stay clear of overhead power cables.	
19	Location of the tie-down points to be used when transporting the machine.	
20	Location of the lifting points to be used when lifting the machine.	
21	Danger of entanglement, the engine should be stopped and the start key removed before attempting maintenance.	

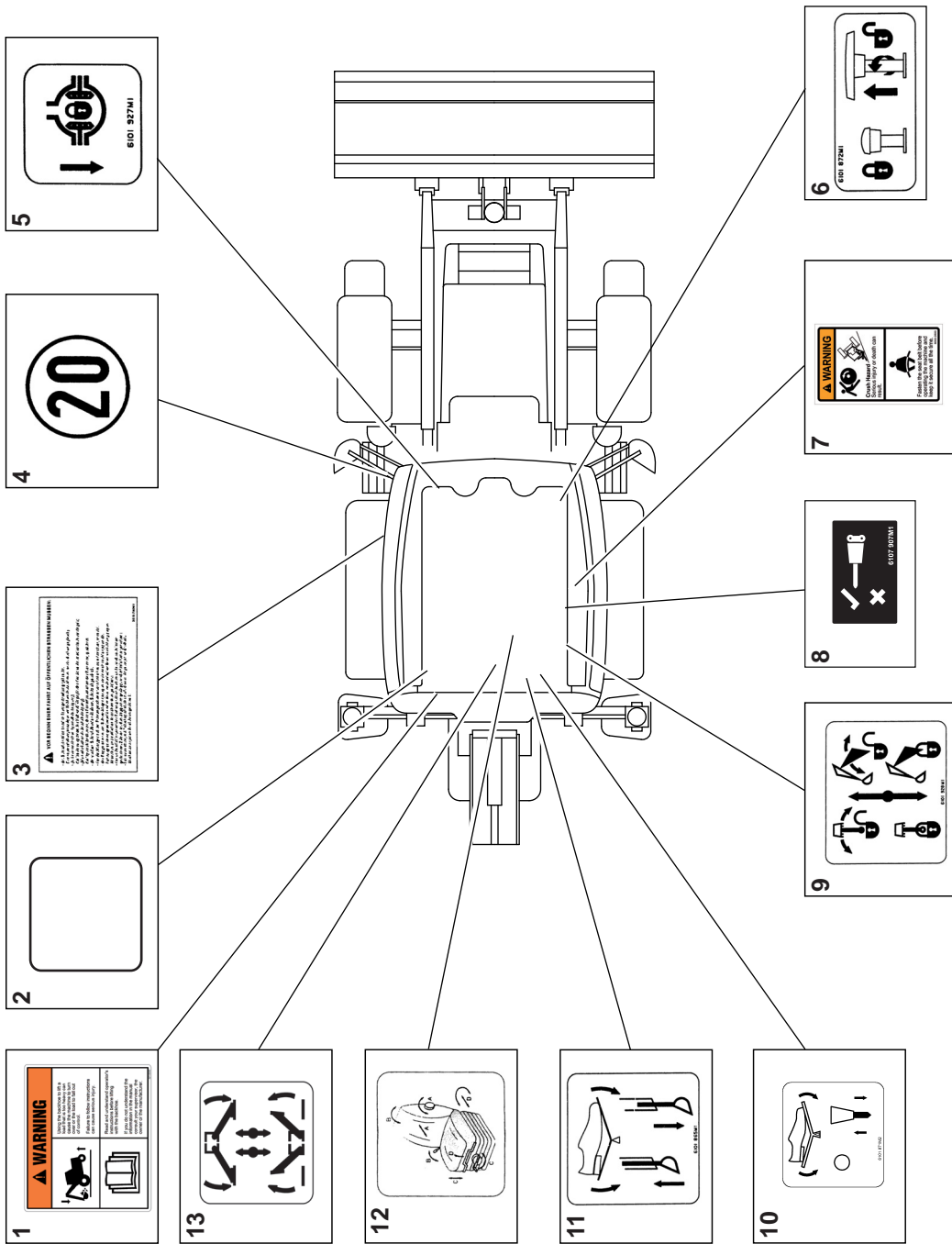
Safety Sign Location (Machine Right-Hand Side - ANSI)



Safety Sign - Description (Machine Right-Hand Side - ANSI)

Item	Decal Description	Notes
1	Loader attachment operation with standard bucket.	-
2	Loader attachment operation with 7 in 1 bucket.	-
3	Read the Operators Manual before using the machine.	-
4	Burn hazard - contact with hot surfaces may cause burns.	-
5	Burn hazard - contact with hot surfaces may cause burns.	-
6	It is forbidden to start the machine by any other means than the starter switch key.	-
7	Burn hazard - the radiator and cap should not be touched while the cooling system is still hot.	-
8	Crush hazard - keep clear of moving loader arm or bucket.	-
9	Crush hazard - keep clear of loader when wheels are raised.	-
10	Maximum lifting capacity of the arms.	-
11	Indicates the upper and lower coolant levels.	-
12	Location of the fuel tank filler orifice.	-
13	Pressure accumulator explosion hazard resulting in death or injury.	-
14	Danger pressurised hydraulic oil can penetrate the skin, do not use hands to check for leaks.	-
15	Danger of entanglement in rotating drive lines and rotating shafts.	-
16	Crush hazard - do not turn Ride Control on if the loader arms and bucket are hold the machine off the ground.	-
17	Support the glass when releasing the catch.	-
18	'X' Pattern controls - operation of the backhoe attachment levers.	Optional
19	ANSI controls - operation of the backhoe attachment levers.	Optional
20	ISO controls - operation of the backhoe attachment levers.	Optional
21	Read the Operators manual before switching control configurations.	-
22	The foot pedal must be depressed before repositioning the servo controls. Do not reposition the controls using the joysticks, use the handles provided	Optional
23	Location of the lifting points to be used when lifting the machine.	-
24	Location of the tie-down points to be used when transporting the machine.	-

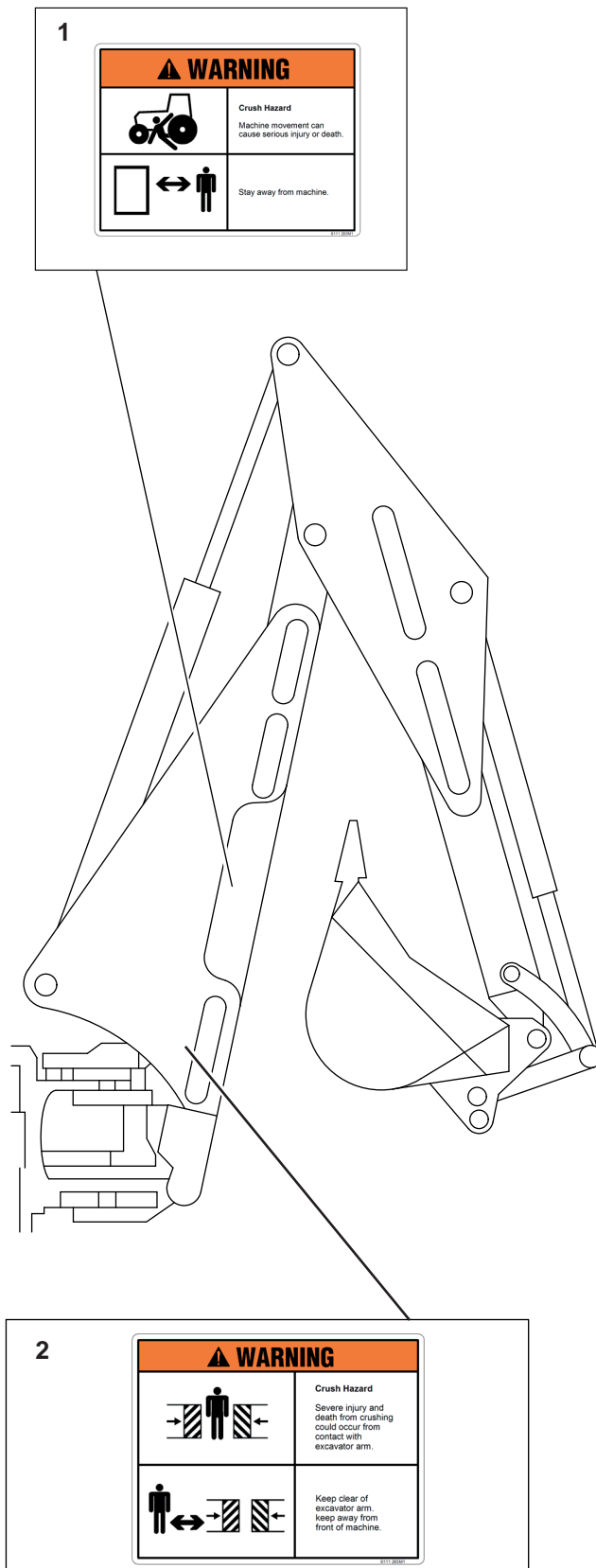
Safety Sign Location (Machine Top - ANSI)



Safety Sign - Description (Machine Top - ANSI)

Item	Decal Description	Notes
1	Warns of the dangers of using the backhoe to lift excessive loads.	-
2	Sideshift stabilizer controls operation.	
3	Operating instructions specific to certain countries.	-
4	Specific to certain countries - maximum speed authorised on the road.	-
5	Operation of the differential locking pedal.	-
6	Lever must be pushed and turned to lock the loader controls.	-
7	Seat belt must be worn at all times.	-
8	Switch position to select auxiliary / extender hydraulic control via the rear pedal.	Optional
9	Operation of the Backhoe attachment boom lock.	-
10	Auxiliary hydraulic controls - press the front of the pedal to operate the hydraulic tool if equipped.	Optional
11	Extendable Dipper - press the front of the pedal to extend the extendable dipper or the rear of the pedal to retract the extendable dipper.	-
12	Adjusting the operators seat.	-
13	Centremount stabilizer controls operation.	-
Safety Signs	<p><u>IMPORTANT</u> ALL safety signs listed must be fitted to the machine and must be legible. Use mild soap and water to clean safety signs - DO NOT use solvent based cleaners because they may damage safety sign material. Safety signs are fitted to the machine to warn of possible dangers and MUST be replaced immediately if they become unreadable or lost. If the machine is repaired and parts have been replaced on which safety signs were fixed, ensure new safety signs are fitted before the machine is put into service.</p>	

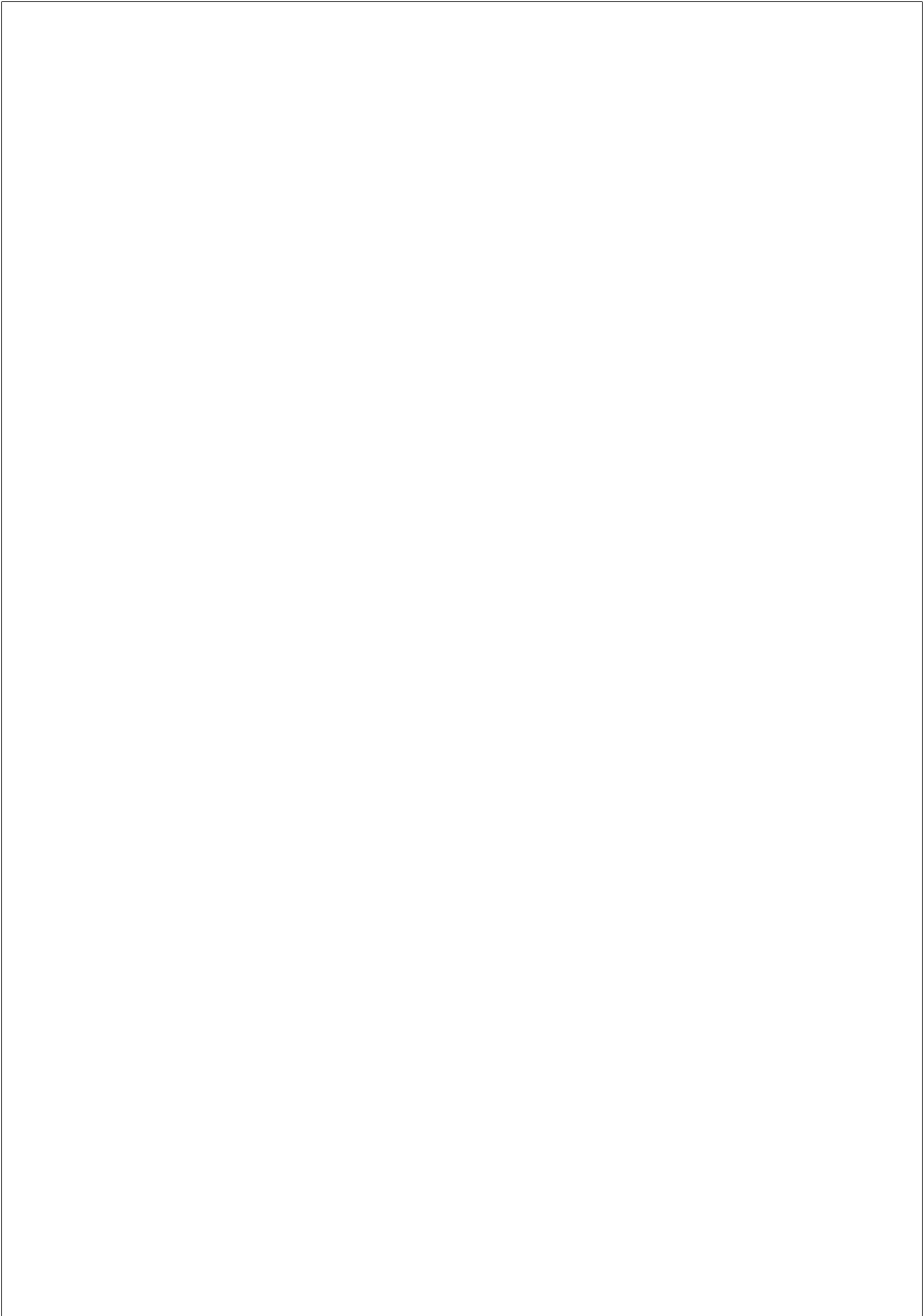
Safety Sign Location (Machine Boom - ANSI)



Safety Sign - Description (Machine Boom - ANSI)

Item	Decal Description	Notes
1	Crush hazard - keep away from the machine.	-
2	Crush hazard - the operator must not permit any person to remain within the working area of the backhoe attachment.	-
3	Specific to certain countries - maximum speed authorised on the road.	-
Safety Signs	<p><u>IMPORTANT</u> ALL safety signs listed must be fitted to the machine and must be legible. Use mild soap and water to clean safety signs - DO NOT use solvent based cleaners because they may damage safety sign material. Safety signs are fitted to the machine to warn of possible dangers and MUST be replaced immediately if they become unreadable or lost. If the machine is repaired and parts have been replaced on which safety signs were fixed, ensure new safety signs are fitted before the machine is put into service.</p>	

4 - Installation
820
860/880 SX & ELITE
970/980 ELITE
TX760B
TX860B
TX970B
Backhoe Loader



Service or Spares Enquiries

Please state the vehicle type and the Vehicle Identification Number when making enquiries or orders and in all written correspondence.

The Vehicle Identification Number is stamped on a plate located on the front of the right hand wing.

Warranty and Maintenance

The warranty period for the machine, under normal circumstances, covers the **first 1000 operating hours or the first 12 months** - whichever comes first. These periods begin the day the machine is handed over or put into operation.

The machine must be used correctly and serviced to the manufacturers recommendations.

The correct grades of fuels, lubricants and coolants must be used at all times and must be new and clean when added to the machine. Failure to follow these rules may lead to failure of the machine.

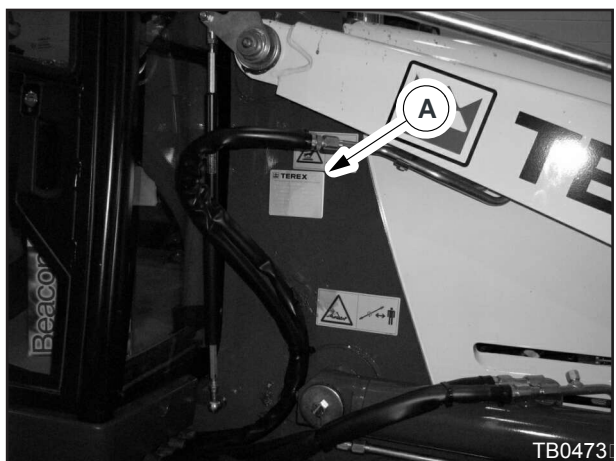
Servicing and repairs should be carried out by the dealers staff who will be trained and experienced in the necessary skills for successful maintenance of the machine.

Only genuine Terex spare parts must be used when the machine is serviced or repaired.

All claims during the warranty period will only be accepted if the recommended maintenance and service work has been carried out at the specified intervals.

It is important regular maintenance and service work is carried out after the warranty period has expired to ensure the machine is in good working condition and does not cause unnecessary downtime and expense.

Modifications to this machine and/or changes to the specification which have not been approved by the factory, will invalidate the machines warranty and possibly your own insurance cover.



Delivery Checks

Immediately on taking delivery of your new backhoe and before putting it into service:

- Read this handbook completely -- it could save a great deal of unnecessary expense.
- Check general condition of the machine, - has it been damaged during delivery?
- Check fluid levels - See "Pre-Start Checks" section on page 4-2.

Pre-Start Checks

Before putting the machine into service:

- Check the following fluid levels:
 - Oil levels in engine and both axles.
 - Hydraulic oil and fuel levels using tank top level gauges.
 - Brake fluid level in reservoir located under floor plate.
 - Battery electrolyte level.
 - Coolant level in radiator.

Recommended lubricants are detailed in the Maintenance section of this manual.

- Check tyres are inflated to correct pressure.
- Check all instruments alarm buzzers and warning lights function correctly.
- Check all lights and road traffic indicators (if fitted) function correctly.

Note: When filling fuel tank make sure the tank is filled when the engine is cold and the machine is in a well ventilated area, with the engine stopped using clean fuel and container. It is advisable to fill the tank at the end of a working session to prevent condensation forming in the tank during long periods of inactivity, e.g. overnight.



When Refuelling Beware of Naked Flames, Grinding Sparks etc.

Check for adequate ventilation if the machine is to be started or run in a building etc.

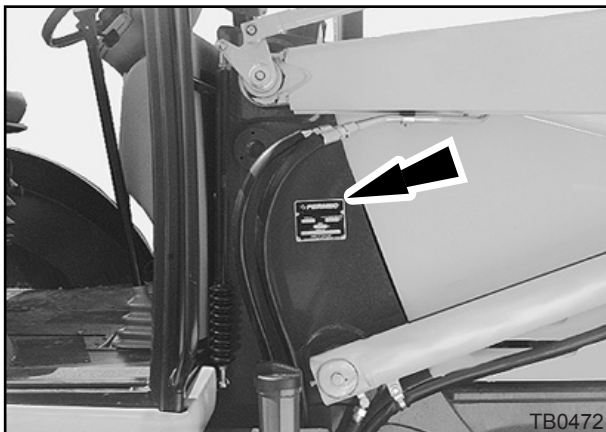
Type, Vehicle Identification Number (Serial) Number and Year of Manufacture of the Machine

When ordering parts, requesting information or assistance, always give your local dealer the model/type and VIN (vehicle identification number) (serial) number of your machine.

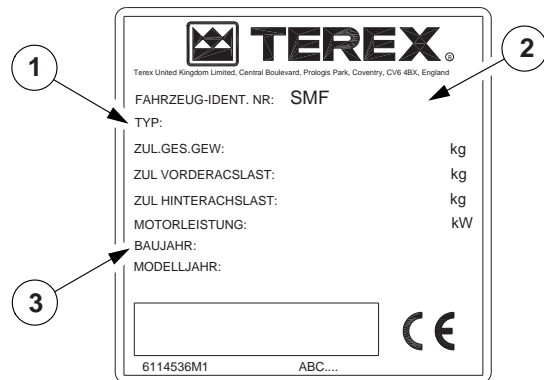
Write the model/type, VIN number and year of manufacture of your machine and the serial numbers on the various hydraulic and mechanical components in the spaces provided below.

Machine

VIN plate located on right-hand side of machine (with the seat in loader attachment position).

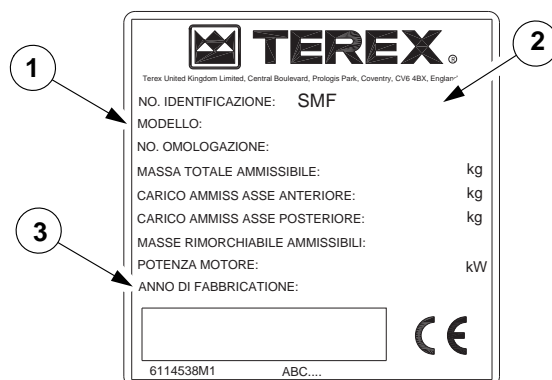


Germany & Austria



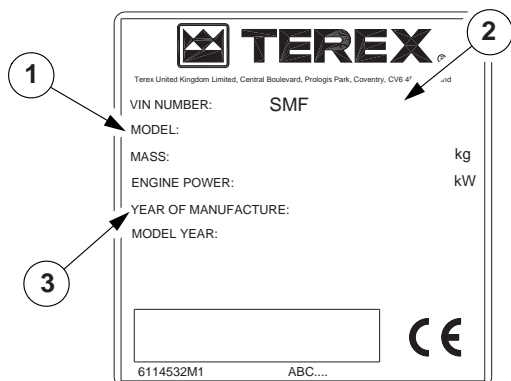
6114536M1

Italy



6114538M1

General CE



6114532M1

- (1) Model/Type.....
-
- (2) VIN (Serial) number
-
- (3) Year of manufacture
-

Installation

France

1 → **TEREX**
Terex United Kingdom Limited, Central Boulevard, Prologis Park, Coventry, CV6 4BX, England

2 → NUMERO DE SERIE: SMF

TYPE: _____

POIDS: _____ kg

PUISSANCE DU MOTEUR: _____ kW

3 → NIVEAU SONORE MAXIMAL: _____ dB(A)

DESIGNATION: CHARGEUSE - PELLETEUSE

ANNEE DE FABRICATION: _____

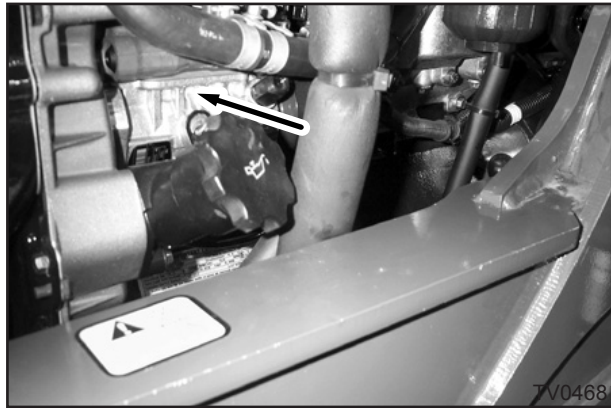
ANNEE MODELE: _____

6114534M1 ABC...

CE

6114534M1

Engine



General

1 → **TEREX**
Terex United Kingdom Limited, Central Boulevard, Prologis Park, Coventry, CV6 4BX, England

2 → VIN NUMBER: SMF

MODEL: _____

MASS: _____ kg

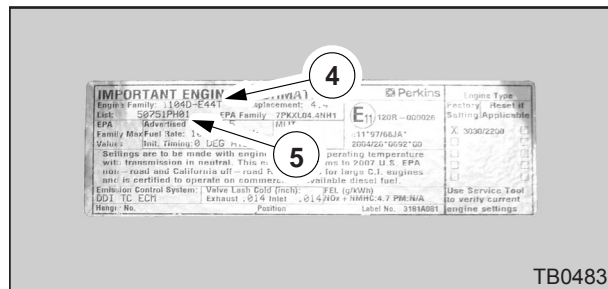
ENGINE POWER: _____ kW

YEAR OF MANUFACTURE: _____

MODEL YEAR: _____

6114533M1 ABC...

6114533M1



(4) Make and model/type

(5) Serial number

Component serial numbers

Hydraulic pump

Front drive axle (4 wheel drive)

Rear axle

Gearbox

Loader attachment control valve

Backhoe attachment control valve

Costa Rica

1 → **TEREX**
Terex United Kingdom Limited, Central Boulevard, Prologis Park, Coventry, CV6 4BX, England

2 → VIN NUMBER: SMF

MODEL: _____

MASS: _____ kg

6114749M1 ABC...

6114749M1

(1) Model/Type

(2) VIN (Serial) number

(3) Year of manufacture

ROPS/FOPS Cab (or Frame)

NOTE: Cab machine shown, for ROPS machines the serial number plate is located on the front of the ROPS.



ROPS/FOPS serial number

.....

Maximum machine weight

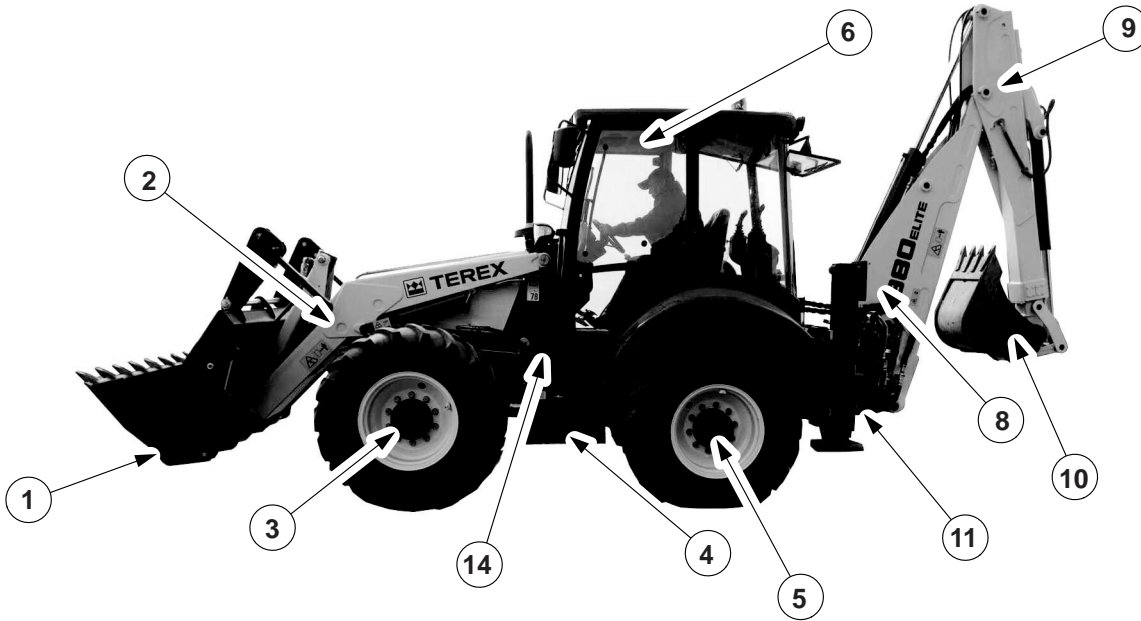
.....

In conformance with: ISO 3471/1 1996

.....

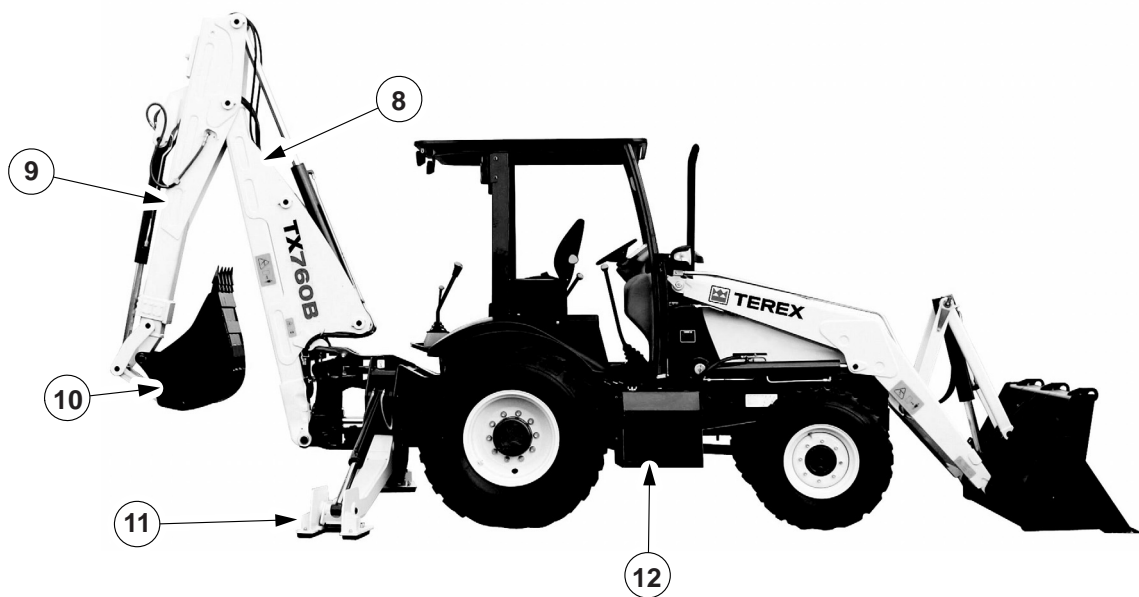
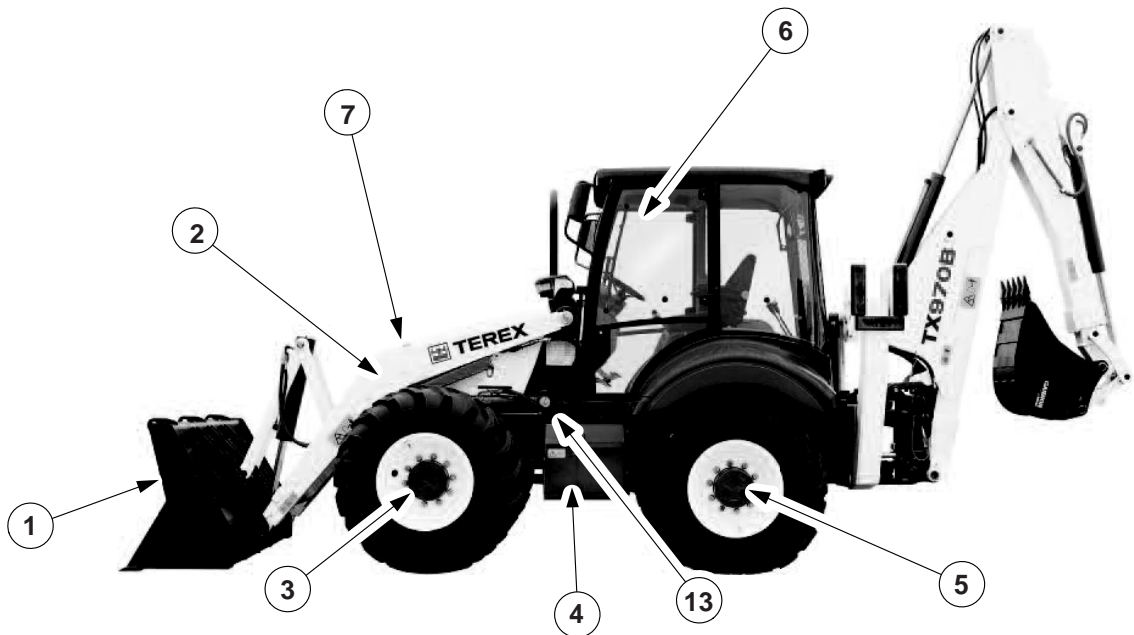
Identification of Main Components

Sideshift (offset) backhoe version



- | | |
|--|---|
| 1. Loader bucket | 8. Backhoe boom |
| 2. Loader beam | 9. Backhoe dipper or extendable dipper |
| 3. Front axle (2 wheel drive)/Front drive axle (4 wheel drive) | 10. Backhoe bucket |
| 4. Battery box | 11. Backhoe attachment sideshift carriage |
| 5. Rear axle | 12. Stabilizers |
| 6. Operator's compartment | 13. Fuel tank |
| 7. Engine bonnet | 14. Hydraulic oil tank |

Centremount (axial) backhoe version



- | | |
|--|--|
| 1. Loader bucket | 7. Engine bonnet |
| 2. Loader beam | 8. Backhoe boom |
| 3. Front axle (2 wheel drive)/Front drive axle (4 wheel drive) | 9. Backhoe dipper or extendable dipper |
| 4. Battery box | 10. Backhoe bucket |
| 5. Rear axle | 11. Stabilizers |
| 6. Operator's compartment | 12. Fuel tank (right hand side of cab) |
| | 13. Hydraulic oil tank |

5 - Description

820

860/880 SX & ELITE

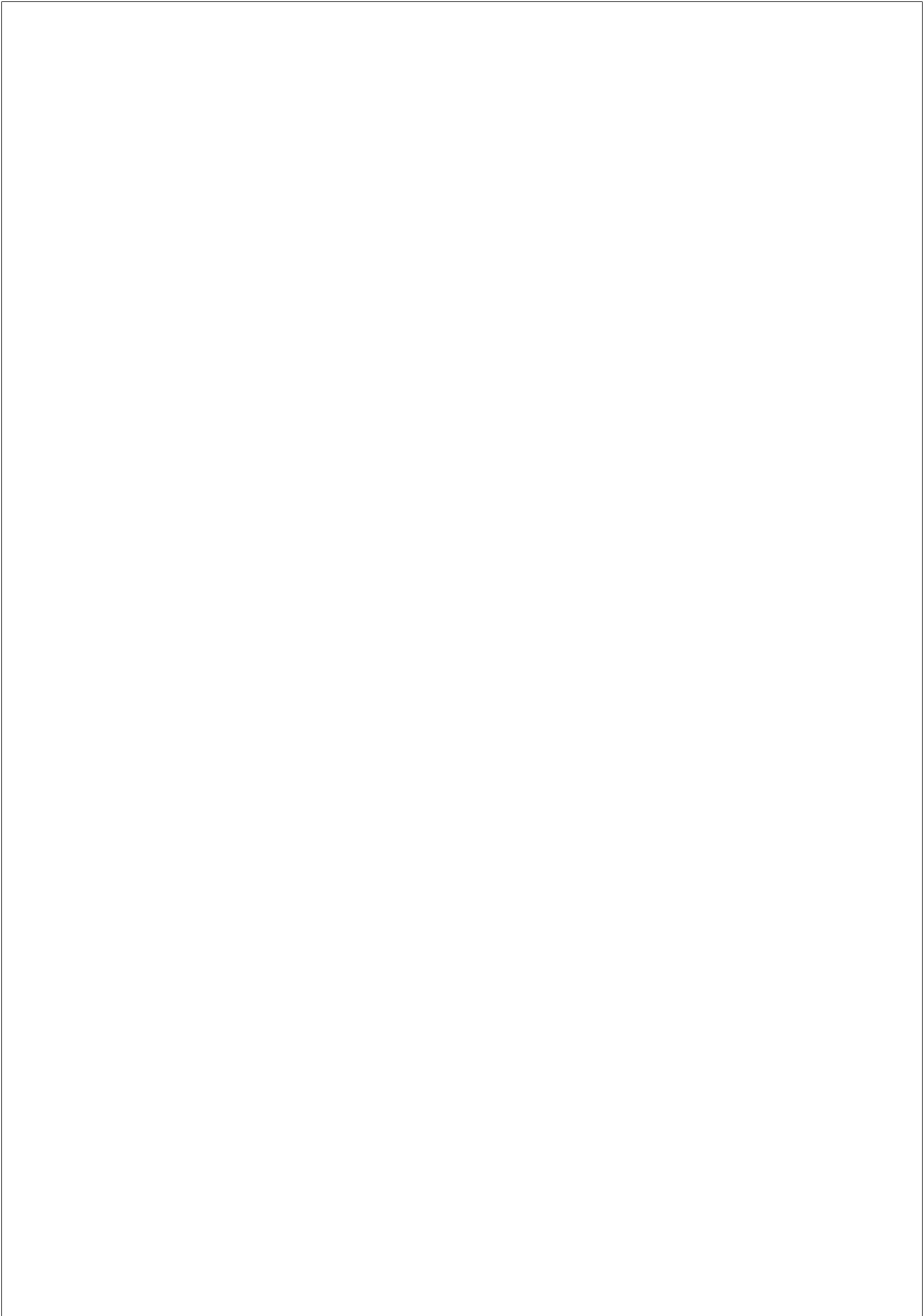
970/980 ELITE

TX760B

TX860B

TX970B

Backhoe Loader



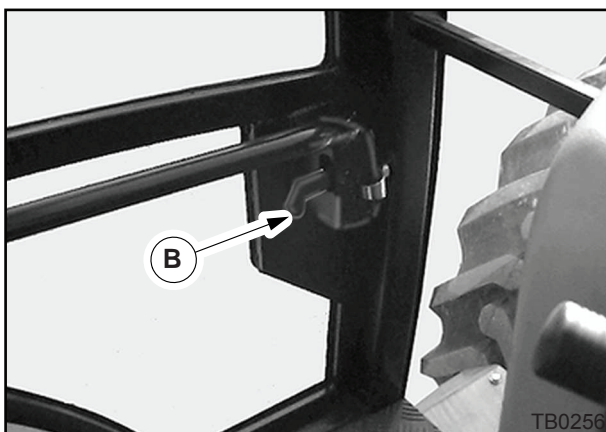
Cab Doors (cab version)



WARNING: Make sure that the doors are correctly closed before any travel.

The doors are opened with the handle (A) from the outside and with the handle (B) from the inside.

NOTE: To lock the doors, use the key.



Description

Steps and Access Handles



WARNING: Never use the steering wheel or the control levers to help yourself entering or leaving the operator's compartment.



WARNING: Clean the steps and access handles and remove all traces of grease, oil, mud and ice (winter).



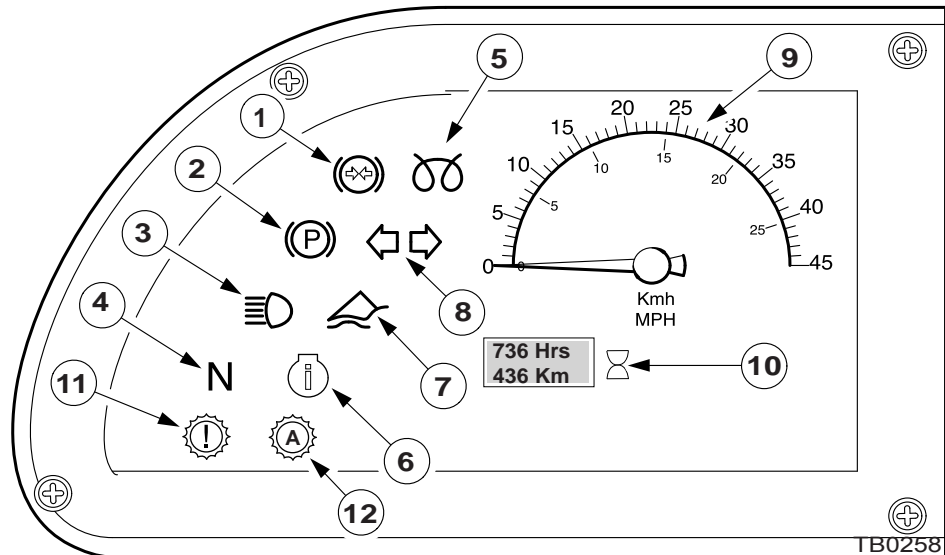
WARNING: Never jump down from the machine. When dismounting from the operator's compartment always face the machine and use the steps and access handles.

NOTICE

NOTICE: Use the left-hand side for entering or leaving the operators compartment. the right hand-side is only for use in emergency

Use the steps (C) and access handles (C) when entering or leaving the operator's compartment.



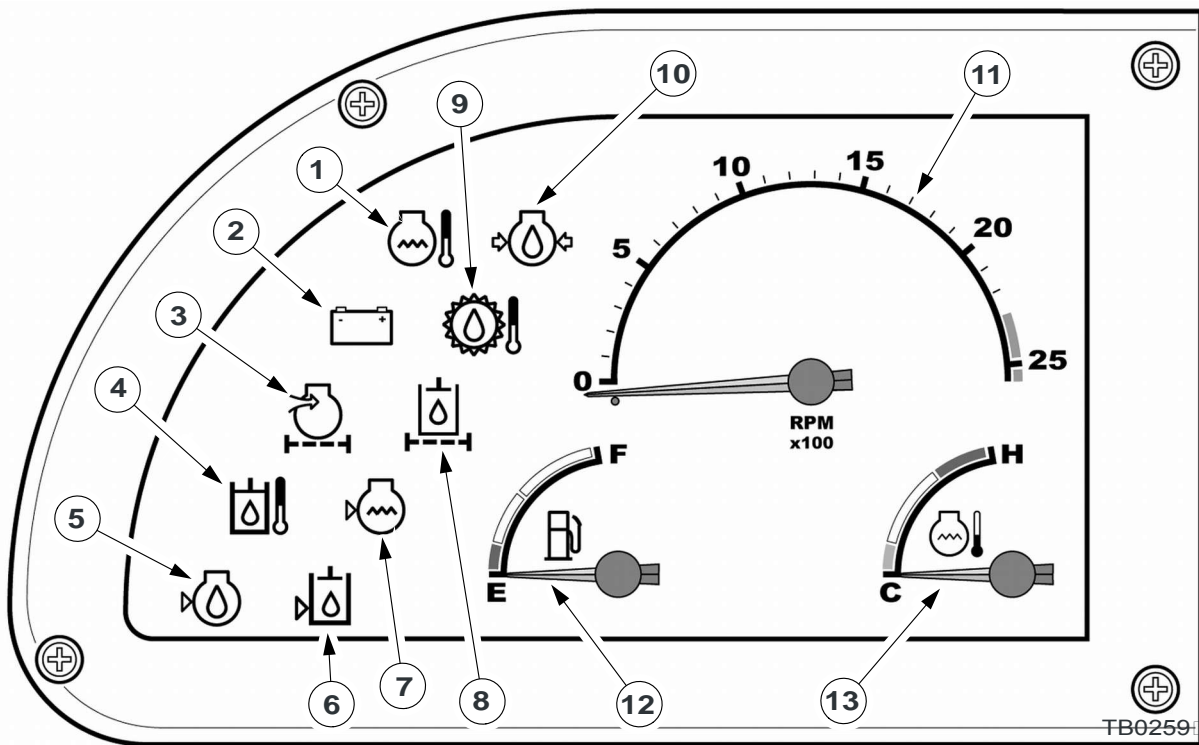
Instrument Panel**Front control panel**

All indicators shown above, depending on the machine's specification, not all may be present on the machine.

1. Not used.
2. PARKING BRAKE INDICATOR LAMP - This indicator lamp comes on when the parking brake lever is engaged (wheels braked). See "Parking the Machine" section on page 7-26.
3. MAIN BEAM INDICATOR LAMP - This indicator lamp comes on when head lights are on main beam.
4. INDICATOR LAMP FOR, DIRECTION OF TRAVEL LEVER (SYNCHROSHUTTLE MACHINES) OR TRANSMISSION CONTROL LEVER (POWERSHUTTLE) - This indicator lamp comes on when the lever is in neutral position.
5. PRE-HEAT INDICATOR LAMP - This indicator lamp comes on when the starter switch key is in the Pre-heat position.
6. ENGINE FAULT WARNING LAMP - This warning lamp comes on when an engine fault occurs. If the lamp comes on when the machine is working, move the machine to a place of safety, stop the engine, engage parking brake, remove the starter switch key and find the cause of the problem.
7. BUCKET FLOAT - This indicator lamp comes on when the 'bucket float mode' is selected.
8. DIRECTION INDICATOR LAMP - This indicator lamp flashes when the direction indicator lever is moved
NOTE: The lamp flashes at the same speed as the indicators. If the lamp flashes at a different speed from that of the direction indicators the bulb of one of the direction indicators is defective and must be replaced. See "Replacing a Bulb" section on page 9-79.
9. SPEEDOMETER (optional) - The speedometer shows the forward machine speed. The big numbers at the top are the Km/h and the ones at the bottom are in m.p.h.
10. HOURMETER - The hour meter shows the hours for which the engine has been operated. It also enables servicing operations to be scheduled. See "Hourmeter" section on page 6-4.
11. GEARBOX FAULT WARNING LAMP - (Carraro Powershuttle Machines only) This indicator lamp will be constantly lit when a gearbox fault occurs. If the lamp comes on when the machine is working, move the machine to a place of safety, stop the engine, engage parking brake, remove the starter switch key and find the cause of the problem.
12. GEARBOX AUTOMATIC WARNING LAMP (Carraro Powershuttle Machines only) This indicator lamp comes on when 'Gearbox Automatic Mode' is selected.

Description

Side control panel



1. ENGINE COOLANT TEMPERATURE WARNING LAMP - This warning lamp comes on when the engine cooling system reaches an abnormally high temperature. If the lamp comes on when the machine is working, move the machine to a place of safety, stop the engine, engage parking brake, remove the starter switch key and find the cause of the problem.
2. ALTERNATOR CHARGE WARNING LAMP - This warning lamp comes on when the alternator/fan belt is broken or when the alternator is not charging the battery. If the lamp comes on when the machine is working, move the machine to a place of safety, stop the engine, engage parking brake, remove the starter switch key and find the cause of the problem.
3. AIR FILTER RESTRICTION WARNING LAMP - This warning lamp comes on when the air filter primary element needs to be cleaned or replaced. See "Air Filter" section on page 9-37.
4. HYDRAULIC OIL TEMPERATURE WARNING LAMP - This warning lamp comes on when the hydraulic oil temperature is too high. If the lamp comes on when the machine is working, move the machine to a place of safety, stop the engine, engage parking brake, remove the starter switch key and find the cause of the problem.
5. Not used.
6. Not used.
7. Not used.
8. HYDRAULIC FILTER RESTRICTION WARNING LAMP - This warning lamp comes on when the hydraulic filter needs to be replaced. See "Hydraulic System" section on page 9-32.
9. TRANSMISSION OIL TEMPERATURE WARNING LAMP - This warning lamp comes on when the transmission oil temperature is too high. If the warning lamp comes on when the machine is working, move the machine to a place of safety, stop the engine, engage parking brake, remove the starter key and find the cause of the problem.
10. ENGINE OIL PRESSURE WARNING LAMP - This warning lamp comes on when the engine oil pressure is too low. If the lamp comes on when the machine is working, move the machine to a place of safety, stop the engine, engage parking brake, remove the starter switch key and find the cause of the problem.
11. ENGINE TACHOMETER - The tachometer shows the engine speed in revolutions per minute. The figures indicated must be multiplied by 100.
12. FUEL LEVEL GAUGE - This gauge shows the quantity of fuel in the fuel tank.
13. ENGINE COOLANT TEMPERATURE GAUGE - This gauge shows the temperature of the engine coolant. When the temperature is normal the needle is in the white area. If the needle is in the red area, move the machine to a place of

safety, leave engine running at idle for 2 to 3 minutes, then stop the engine, engage parking brake, remove the starter switch key and check the engine coolant level. Make sure that the radiator and oil cooler are perfectly clean. See "Cooling System" section on page 9-23.

NOTE: When the starter switch key is in the "On" position the warning lights (2) and (10) come on. If one or more do not come on, the bulbs must be replaced. See "Replacing a Bulb" section on page 9-79.

Description

Operator's Compartment Controls



WARNING: Before starting the engine, make sure you are fully aware of the location and the function of each control. Operating the controls wrongly can cause serious physical injury.

Starter switch

Located on the right of the operator's seat (with seat in loader attachment position), this switch has four positions :

Key position:

Position (0): Off.

Position (1): On.

Position (2): Pre-heat.

Position (3): Start.

See "Starting the Engine" section on page 7-3.



Gear change lever and transmission dump button (synchroshuttle only)

Located to the right of the steering wheel, the lever (A) enables four forward and four reverse gears to be selected. See "Transmission" section on page 9-41:

Position (0): Neutral.

Position (1): First gear.

Position (2): Second gear.

Position (3): Third gear.

Position (4): Fourth gear.

All four gears are synchronized. All the ratios can be selected without stopping the machine.

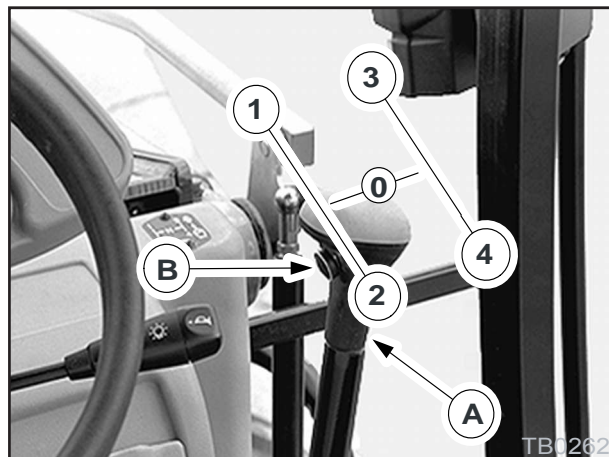
Before changing gear, press and hold the transmission dump button (B) located on the left-hand side of the lever. After changing the gear, release the button (B) to engage the clutch.

NOTE: (Specific to certain countries), position (4), 4th gear, does not exist since speed is limited to 20 Kph on public highways.

NOTE: (Specific to certain countries) 4th gear in reverse does not exist.

NOTE: Forward and reverse travel depends on the position of the direction of travel control lever. See "Direction of travel control" section on page 5-9.

NOTE: Reduce engine speed before changing into a lower gear.



NOTICE

NOTICE: Before stopping or starting the engine, make sure that the lever is in the neutral position (0).

NOTICE

NOTICE: Before using the backhoe attachment controls, make sure that the lever is in neutral position (0).



WARNING: Any uncontrolled movement of the machine can cause an accident. Before turning the operator's seat to the backhoe attachment working position, it is essential for the direction of travel lever and the gear change lever to be placed in the neutral position and the parking brake engaged.

Description

Direction of travel control lever (synchroshuttle only)

Located to the left of the steering wheel, this lever (A) has three positions to select the direction of travel of the machine.

Neutral (0): In this position the machine cannot travel.

Forward (1): Raise and push the lever completely forward. In this position, the machine can travel forwards.

Reverse (2): Raise and pull the lever completely backwards. In this position the machine can travel in reverse and the audible warning device sounds.

NOTE: If the gear change lever is in the neutral position, the machine cannot move forward or in reverse. See "Operating the Machine" section on page 7-1.



WARNING: Any uncontrolled movement of the machine can cause an accident. Before turning the operator's seat to the backhoe attachment working position, it is essential for the direction of travel lever and the gear change lever to be placed in the neutral position and the parking brake engaged.

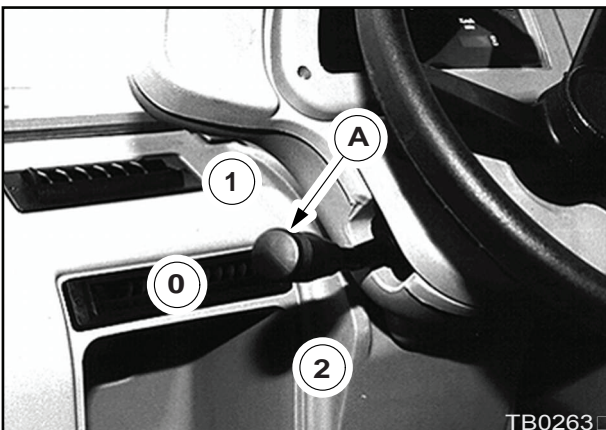
NOTICE

NOTICE: Before using the backhoe attachment controls, make sure that the lever is in neutral position (0).

NOTICE

NOTICE: Before stopping or starting the engine, make sure that the lever is in the neutral position (0).

NOTE: If the lever is operated in forward or reverse travel while the parking brake is engaged (wheels braked), the audible warning device will sound. The parking brake lever must be released. See "Parking the Machine" section on page 7-26.



Transmission control lever (powershuttle only)

Located to the left of the steering wheel, this lever is used to control:

- The direction of travel.
- Four speed powershuttle selection.
- Powershuttle 2nd gear kickdown function.

Direction of travel control

Neutral (0): In this position the machine cannot travel.

Forward (1): Raise and push the lever completely forward. In this position, the machine can travel forwards.

Reverse (2): Raise and pull the lever completely backwards. In this position the machine can travel in reverse and the audible warning device sounds.



WARNING: Any uncontrolled movement of the machine can cause an accident. Before turning the operator's seat to the backhoe attachment working position, it is essential for the direction of travel lever and the gear change lever to be placed in the neutral position and the parking brake engaged.

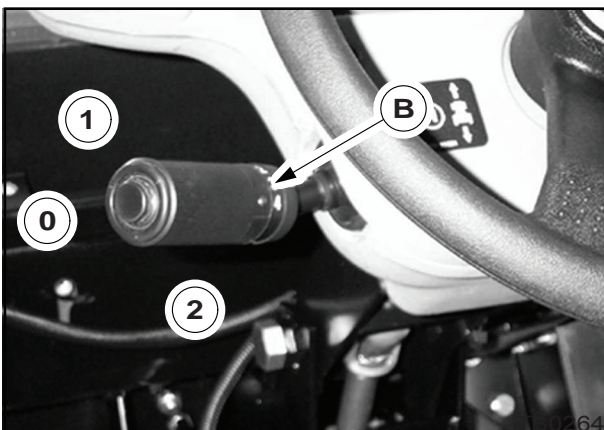
NOTICE

NOTICE: Before using the backhoe attachment controls, make sure that the lever is in neutral position (0).

NOTICE

NOTICE: Before stopping or starting the engine, make sure that the lever is in the neutral position (0).

NOTE: If the lever is operated in forward or reverse travel while the parking brake is engaged (wheels braked), the audible warning device will sound. The parking brake lever must be released. See "Parking brake lever" section on page 5-18.



Description

Four speed Powershuttle control

The transmission control lever (A) is used to select the desired powershuttle gear. Turn the lever away from you to select a higher gear or turn the lever toward you to select a lower gear.

Any Powershuttle gear can be selected without stopping the machine.

Carraro Powershuttle

There are four (4) forward gears (1st, 2nd, 3rd and 4th), and three (3) reverse gears (1st, 2nd and 3rd).

Semi-Automatic feature



WARNING: Any uncontrolled movement of the machine can cause an accident. Before turning the operator's seat to the backhoe attachment working position, it is essential for the direction of travel lever and the gear change lever to be placed in the neutral position and the parking brake engaged.

The machine can begin travel with any Powershuttle gear selected. However if 4th gear is selected, the transmission will begin travel in 2nd gear and automatically shift to 3rd then 4th as the travel speed increases. With 4th gear selected, if travel speed decreases the transmission will automatically shift to 3rd gear. To obtain 2nd gear the control lever must be manually shifted.

NOTE: (Specific to certain countries), position (4), 4th gear, does not exist since speed is limited to 20 Kph on public highways in forwards and reverse.

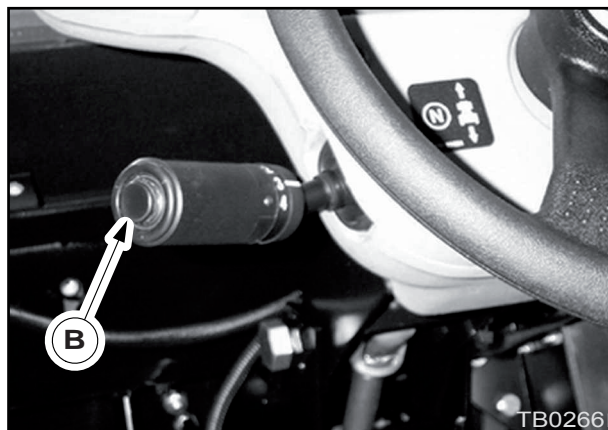
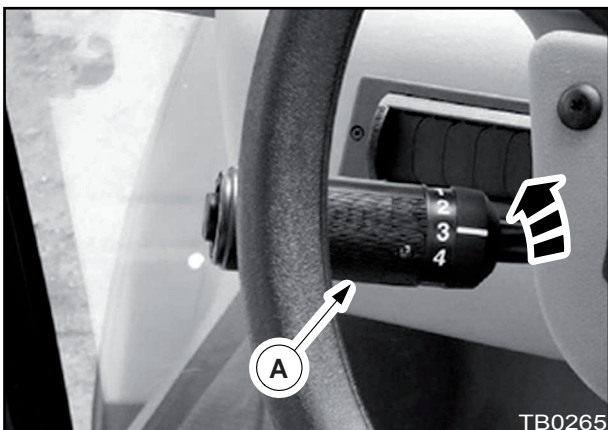
NOTE: Reduce engine speed before changing to a lower gear.

Powershuttle kickdown button

Located on the end of the transmission control lever (B), press and release this button to instantly shift from 2nd to 1st gear.

When the transmission control lever is moved to select neutral or reverse the transmission will automatically shift back to 2nd gear.

NOTE: This function can only be used with 2nd gear selected.



Direction indicator lever, horn and lighting switch

Located to the right of the steering wheel (A), this lever has eight positions.

Position (0): The lever is in a neutral position.

Position (1): Rotate switch 90° towards operator, the side lights come on and the indicator lamp on the front control panel comes on.

Position (2): Rotate a further 90°, the dipped headlights come on, with the side lights.

Position (3): With the switch in position (2), pull towards operator, the main beam comes on and the indicator lamp on the front control panel comes on. Pull again to turn main beam off.

Position (4): With the switch in positions (0) and (1), pull towards operator to flash main beam.

Position (5): Push the end of the lever to operate the horn.

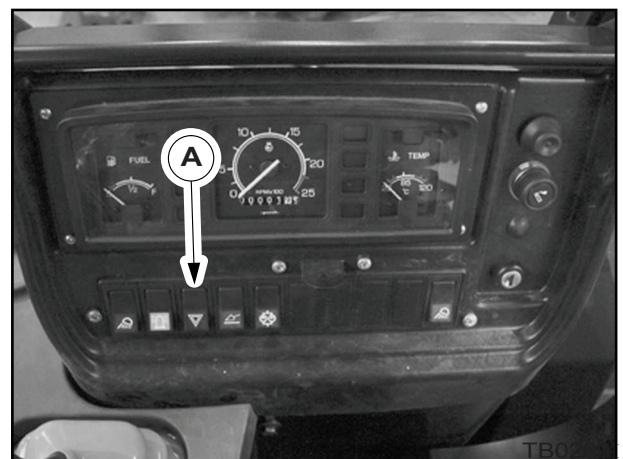
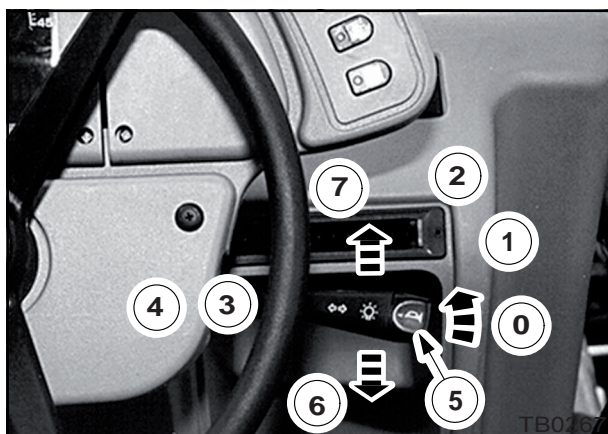
Position (6): Pull the lever down to operate the right direction indicators and the indicator lamp on the front control panel.

Position (7): Push the lever up to operate the left direction indicators and the indicator lamp on the front control panel.

Hazard warning switch

Located on the side control panel, press the switch, all the direction indicators flash simultaneously and the indicator lamp (A) comes on.

Press again the switch, all the direction indicators go out.

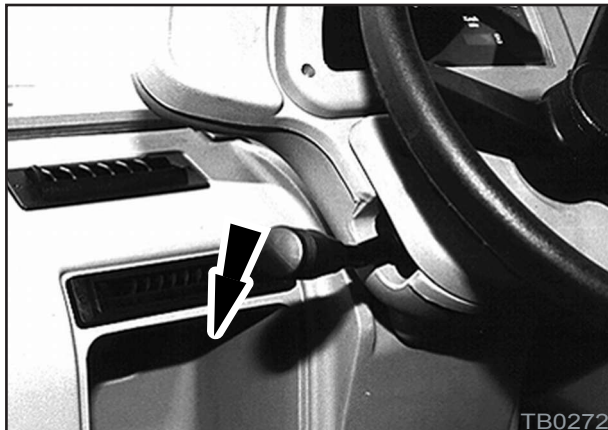
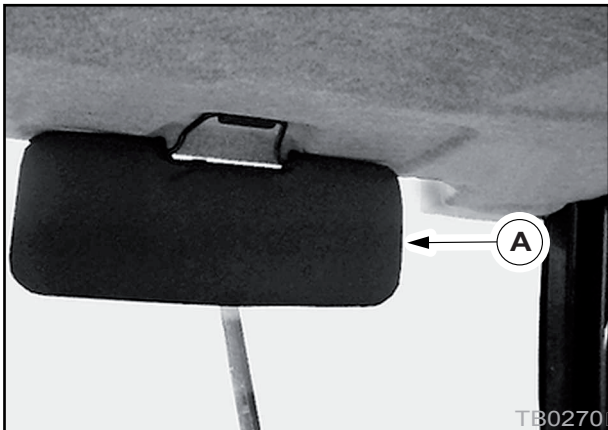


Description

Sun visor (if equipped)

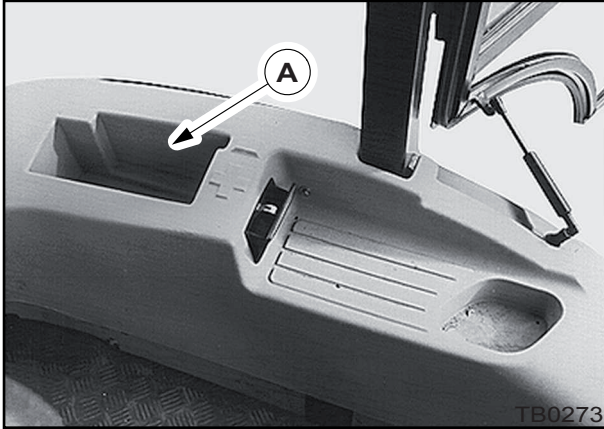
Attached to the cab roof, the sun visor (A) can easily be positioned as required.

Storage areas and compartments



First aid kit and documentation pack storage compartment (cab version only)

Located on the left-hand side of the cab, this storage compartment (A) is intended to contain a first aid kit.



Steering column tilting lever

Located under the steering column, this lever (C) enables the steering column to be tilted forwards and backwards as required by the operator. Raise the lever, place the steering column in the desired position and release the lever.

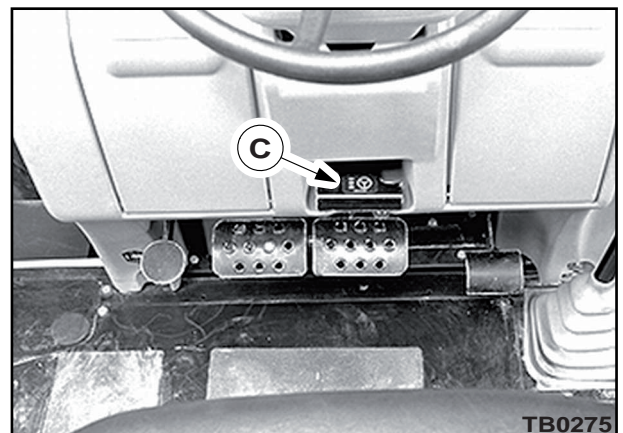
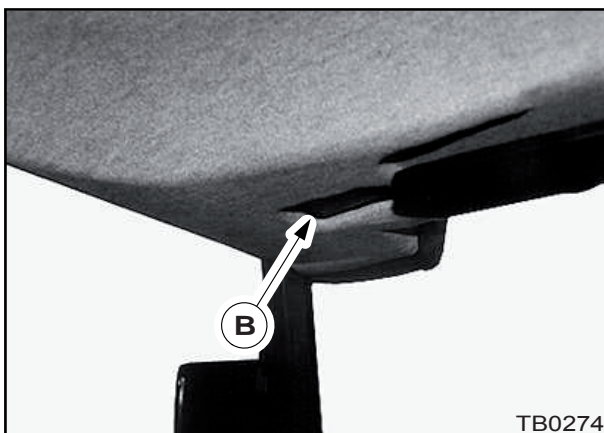
NOTICE

NOTICE: It is essential that the machine to be brought to a complete halt before attempting to adjust the steering column tilt position. If this instruction is not observed an accident may occur.

Cab interior light (cab version only)

Located on the roof lining, this light (B) is controlled by a switch incorporated in the lamp base.

NOTE: To replace a cab interior light bulb, see "Replacing a Bulb" section on page 9-79.



Description

Engine accelerator pedal



WARNING: Never use this pedal when working with the backhoe attachment

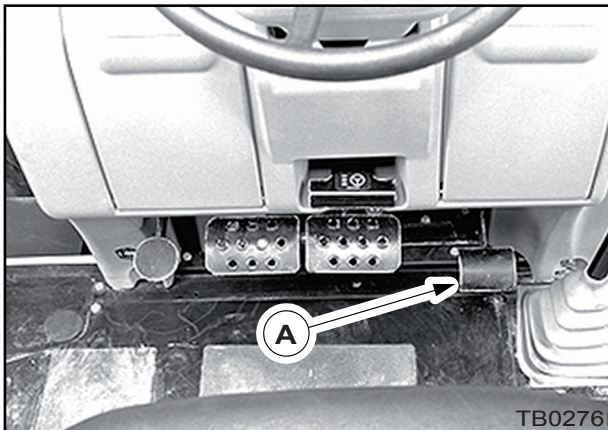
Located under the steering wheel, this pedal enables the engine speed to be increased or decreased.

Maximum speed: press the pedal fully down.

Idle speed: release the pedal.

This pedal is used for travel and for operating the loader attachment.

NOTE: This pedal is coupled with the engine throttle lever. Before using the pedal, make sure that the throttle lever is in the minimum speed position. See "Operator's Compartment Controls" section on page 5-6.



Brake pedals



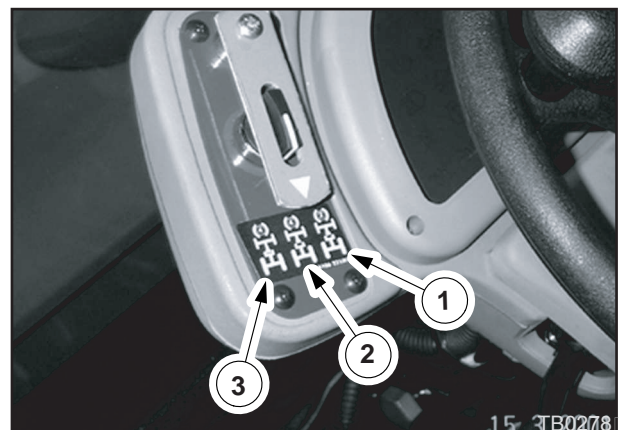
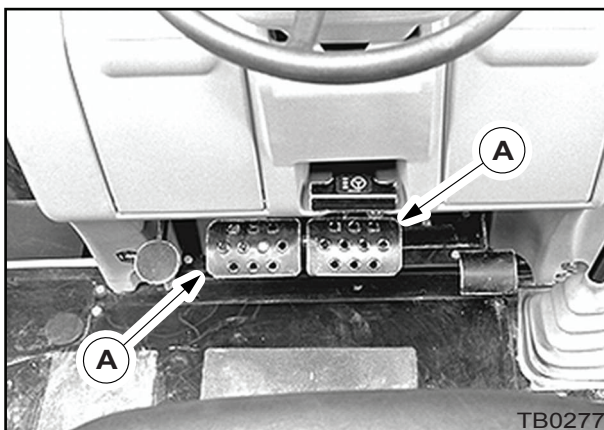
WARNING: It is mandatory to make sure that the brake pedals are locked together before any road travel or travel in 3rd or 4th gear. If this instruction is not observed an accident may occur.

Located under the steering wheel, these two pedals (A) are equipped with a system which enables them to be locked together or unlocked. This enables the machine either to be braked (pedals locked) by pressing either of the pedals or to be turned (pedals unlocked) to the right by pressing on the right-hand pedal or to the left by pressing on the left-hand pedal. See "Operator's Compartment Controls" section on page 5-6.

NOTE: (4 wheel drive only), when braking: braking will depend upon the position of the "3 Position" brake selector switch (if equipped). There are three positions as follows:

- (1) 2 wheel drive/2 wheel braking.
- (2) 2 wheel drive/4 wheel braking.
- (3) 4 wheel drive/4 wheel braking.

NOTE: Check the correct braking of the machine regularly. See "ROPS/FOPS Cab (or Protective Frame)" section on page 9-65.



Description

Locking and unlocking the brake pedals



WARNING: It is mandatory to make sure that the brake pedals are locked together before any road travel or travel in 3rd or 4th gear. If this instruction is not observed an accident may occur.

Locking and unlocking of the pedals is done by means of a link (A) which pivots about the left-hand side pedal, which locks the pedals together or unlocks them.

Locking the brake pedals.

Rotate the bar (A) clockwise so that it locks into the right-hand side pedal (B). It is mandatory to use this position for road travel or when travelling in 3rd or 4th gear.

Unlocking the brake pedals.

Rotate the bar counter-clockwise to separate the brake pedals. The two pedals are now independent. This position must be used only on the job site.

Differential locking pedal

NOTICE

NOTICE: This pedal should never be used during travel on a public highway.

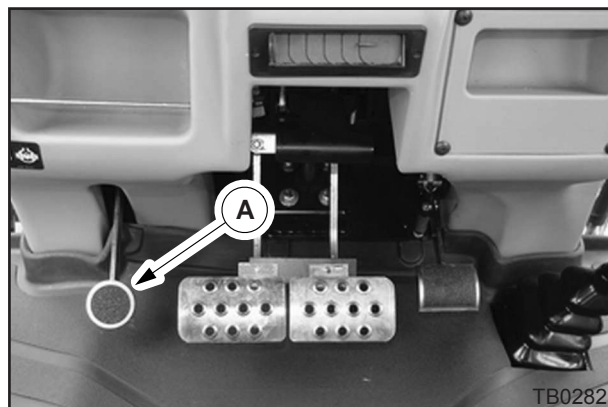
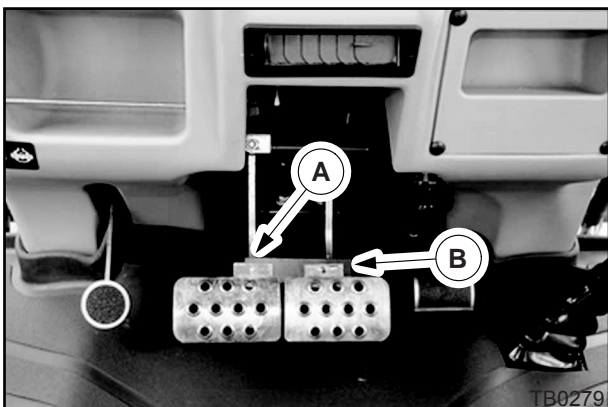
NOTICE

NOTICE: Do not engage differential lock with wheels spinning.

NOTICE

NOTICE: (970/980 only) Do not engage the differential lock when 4 wheel steering or crab steering have been selected.

Located under the steering wheel, this pedal (A) enables equal power to be transmitted to both rear wheels. See "Differential Lock" section on page 7-18.

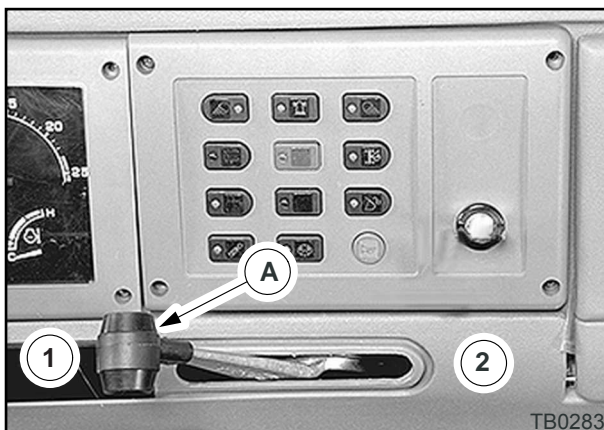


Engine throttle lever

Located under the side control panel. This lever (A) enables the engine speed to be increased or decreased.

Position (1): Idle speed.

Position (2): Maximum speed.



Description

Parking brake lever



WARNING: Any uncontrolled movement of the machine can cause an accident. Before turning the operator's seat to the backhoe equipment working position, it is essential for the direction of travel lever and the gear change lever (synchroshuttle only) or the transmission control lever (Powershuttle only) to be placed in the neutral position and the parking brake engaged.

NOTICE

NOTICE: When the parking brake is engaged, the audible warning device sounds if the direction of travel control lever (synchroshuttle only) or the transmission control lever (Powershuttle only) is not in the neutral position.

NOTICE

NOTICE: Never try to move the machine when the parking brake is engaged.

NOTICE

NOTICE: Before stopping the engine make sure the parking brake is engaged.

NOTICE

NOTICE: Before using the backhoe attachment controls, make sure that the parking brake is engaged.

NOTICE

NOTICE: The parking brake can also be used as an emergency brake in the event of a main brake system failure.

Located on the right of the operator's seat (with the seat in the loader attachment position), this lever (A) enables the machine to be parked securely.

Raise the lever to engage the parking brake. In this position, the indicator lamp lights up on the front control panel. Lower the lever to free the machine (wheel brakes released). In this position, the indicator lamp on the front control panel goes out.



Three position, 4 wheel drive switch

(4WD models only)

Position (1): The switch will select 2 wheel drive, 2 wheel braking.

Position (2): The switch will select 2 wheel drive, 4 wheel braking.

NOTE: The switch can be locked in this position. This position will produce the most efficient braking and should be utilised for roading the machine.

Position (3): The switch will select 4 wheel drive, 4 wheel braking.

Steering mode switch (970/980 only)**NOTICE**

NOTICE: Before undertaking any road travel, select two wheel steer position and place the tab over the switch to lock it in this position.

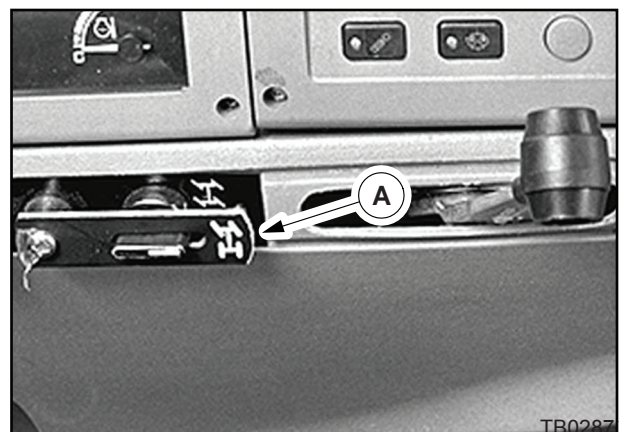
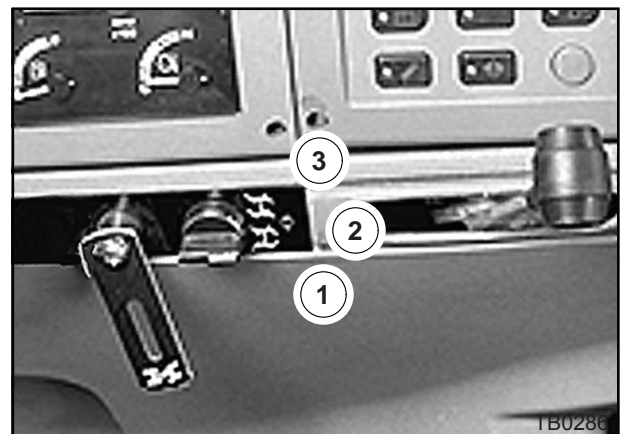
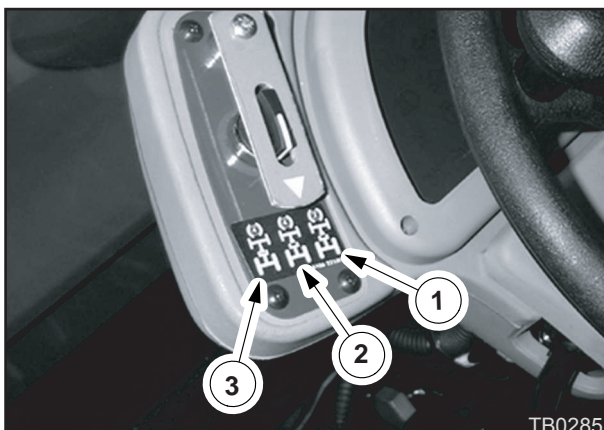
Located under the side control panel, this switch makes it possible to select 4 wheel steering, two wheel steering or crab steering. The switch has three positions:

Position (1): 4 wheel steering.

Position (2): 2 wheel steering.

Position (3): crab steering.

The tab (A) is used to lock the switch in 2 wheel steer position.



Description

Front and Rear working light switches

1. Front Working Light Switch.

1a Front Working Light indicator lamp.

2. Rear Working Light Switch.

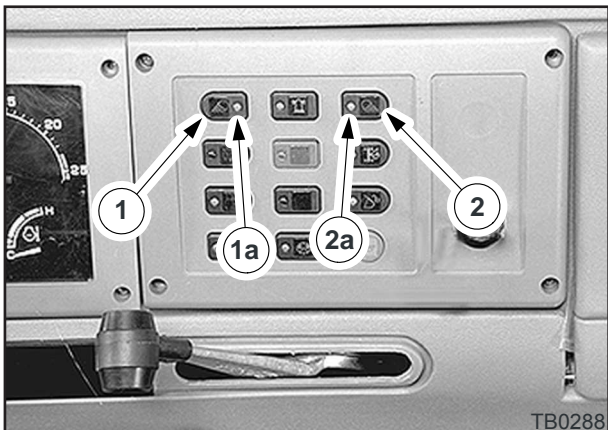
2a Rear Working Light indicator lamp.

Located on the side control panel: press the desired switch, the two outer worklights (and inner worklights if equipped) and the indicator lamp come on.

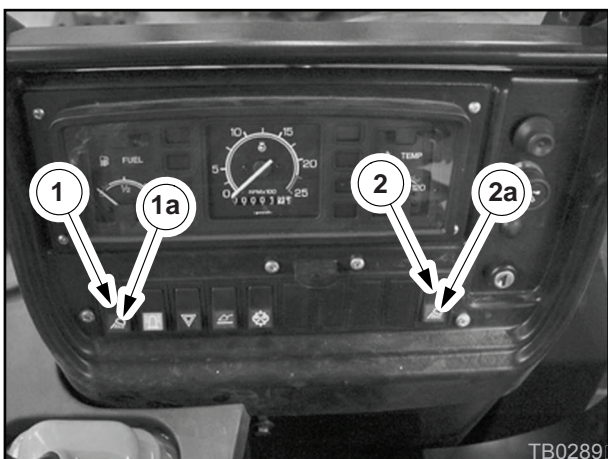
Press the switch once more, the worklights and the indicator lamp go out.

NOTE: To replace the front and rear working light bulbs, see "Replacing a Bulb" section on page 9-79.

With Cab

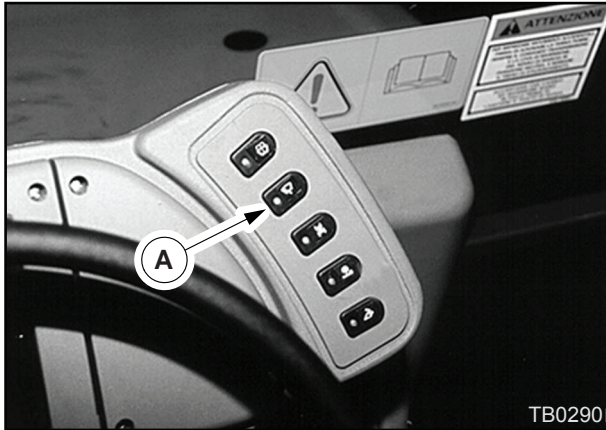


Without Cab



Front wind shield wiper control (cab version)

Located on the right of the steering wheel. Press the switch (A) to operate the front wind shield wiper and the indicator lamp (1) comes on. Press the switch again and the front wind shield wiper will stop.



TB0290

Rear wind shield wiper control (cab version)

Located on the side control panel. Press the switch (A) to operate the rear wind shield wiper and the indicator lamp (1) comes on. Press the switch again and the rear wind shield wiper will stop.



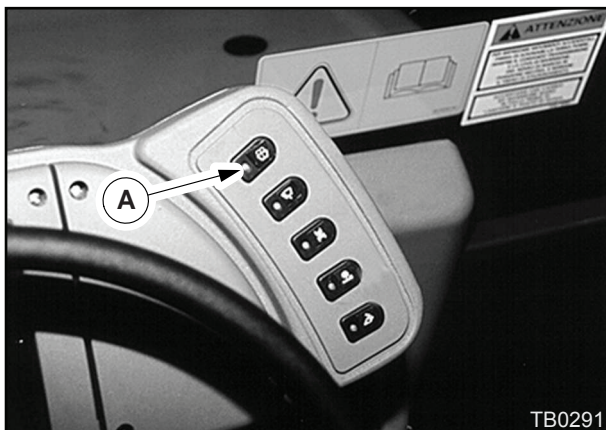
TB0292

Front wind shield washer control (cab version)

NOTICE

NOTICE: Never operate the wind shield washer switch when the wind shield washer reservoir is empty, since this may cause damage to the electric pump. See "Front and Rear Wind shield Washer Reservoir" section on page 5-50.

Located on the right of the steering wheel. This momentary action switch (A) operates the front wind shield washer.



TB0291

Rear wind shield washer control (cab version)

NOTICE

NOTICE: Never operate the wind shield washer switch when the wind shield washer reservoir is empty, since this may cause damage to the electric pump. See "Front and Rear Wind shield Washer Reservoir" section on page 5-50.

Located on the side control panel. This momentary action switch (A) operates the rear wind shield washer.



TB0293

Description

Rotating beacons switch

Located on the side control panel:

NOTE: To install the rotating beacons, see “Rotating Beacons” section on page 5-44 .

NOTE: To replace a rotating beacon bulb, see “Replacing a Bulb” section on page 9-79.

With Cab

Press the switch, the two rotating beacons and the indicator lamp (A) come on. Press the switch again and the two rotating beacons go out.



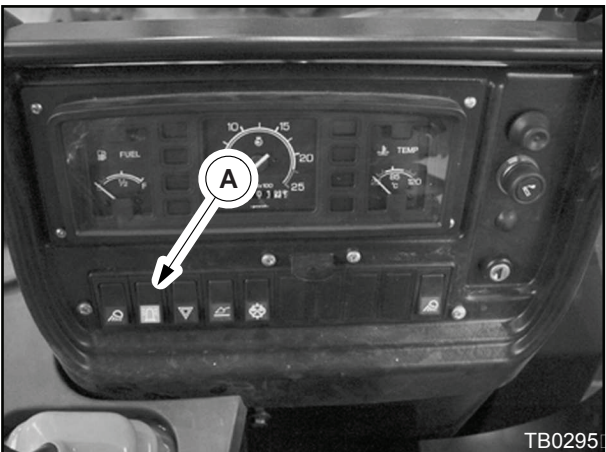
Return-to-dig switch

Located on the side control panel.

Press the switch to enable the return to dig function and the indicator lamp (A) comes on. Press the switch again to disable the return to dig function.

Without Cab

Press the bottom of switch, the two rotating beacons and the indicator lamp (A) come on. Press the top of switch, the two rotating beacons go out.

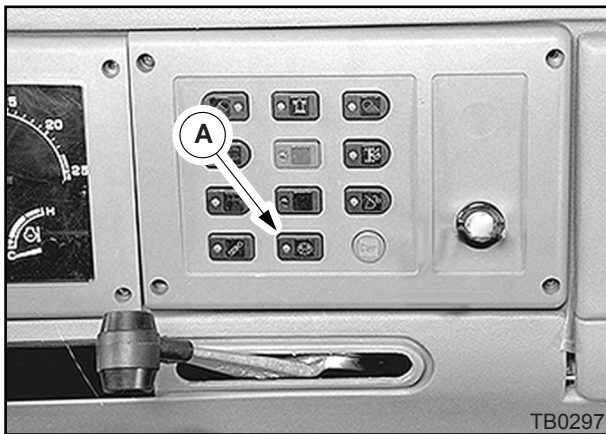


Hydraulic pumps flow control

Located on the side control panel.

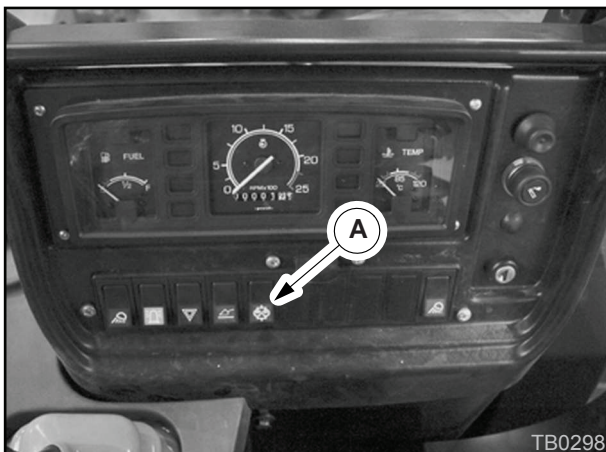
With Cab

Press the switch and the indicator lamp (A) comes on. In this position the flow is from one pump only. Use this position for more precise control of the loader attachment and backhoe attachment, also used for roading. Press the switch again to provide full flow from both pumps. To aid starting, the pump switch indicator lamp (A) will come on during cranking.



Without Cab

Press the bottom of switch and the indicator lamp (A) comes on. In this position the flow is from the larger pump only. Use this position for more precise control of the loader attachment and backhoe attachment, also used for roading. Press the top of switch to provide full flow from both pumps. To aid starting, the pump switch indicator lamp (A) will come on during cranking.



Backhoe quick attach locking/unlocking switch (optional)

Located on side control panel. Press and hold the switch, the backhoe quick attach is unlocked and the indicator lamp (A) comes on. Release the switch, the backhoe quick attach is locked. See "Removal and Installation of Quick Attach Backhoe Bucket (optional)" section on page 7-14.

NOTE: It may be necessary to increase engine rpm to give suitable pump flow for quick attach to function.



Description

Backhoe attachment boom lock switch (craning valve) (centremount (axial) backhoe version)

Located on the side control panel.

Located on the side panel, the boom lock switch (A) operates a craning valve which hydraulically locks the boom cylinder enabling the load to be moved with the dipperstick.

- Raise the boom to the required position.
- Press the switch to illuminate the lamp and apply the lock.
- Press the switch again to extinguish the lamp and release the lock.

NOTE: Ensure the load being craned by the backhoe has been safely lowered to the ground before the boom lock is released.

Backhoe attachment sideshift carriage locking and unlocking switch (sideshift (offset) backhoe version)

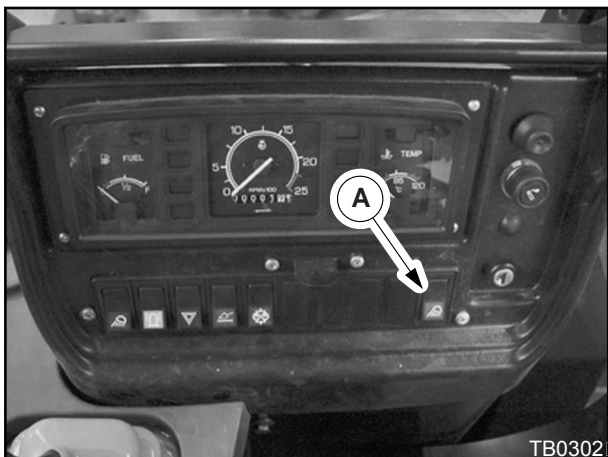
Located on the side control panel. Press the switch to unlock the sideshift carriage and the indicator lamp (A) comes on. To lock the sideshift carriage press the switch again and at the same time dead head any hydraulic service (e.g. end stroke a hydraulic cylinder).

NOTE: For sideshift operation, see “Backhoe Attachment Sideshift (Sideshift (offset) Backhoe version)” section on page 7-11.

With Cab



Without Cab

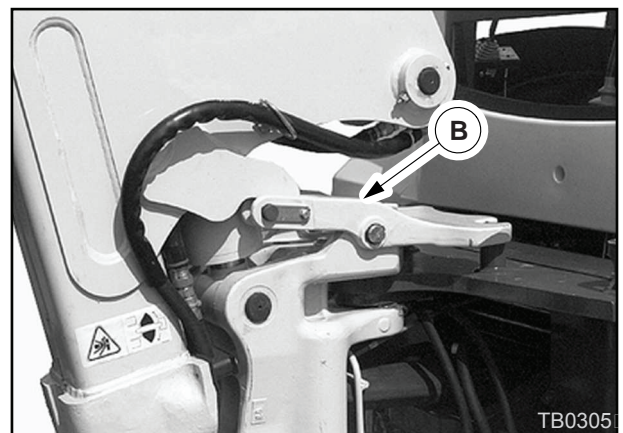
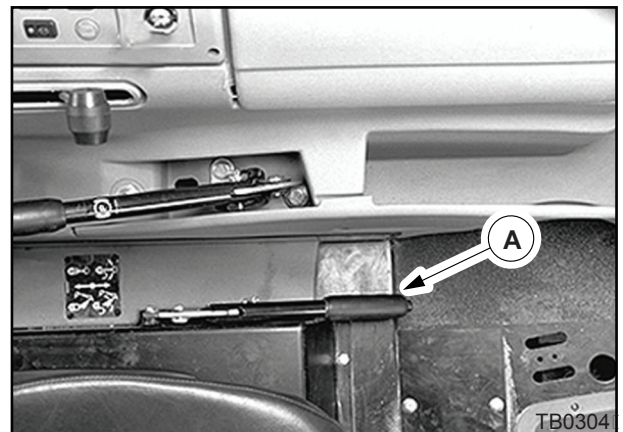


Loader quick attach locking/unlocking switch (optional)

Located on the right of the steering wheel. Press and hold the switch, the loader quick attach is unlocked and the indicator lamp (A) comes on. Release the switch, the loader quick attach is locked. See "Removal and Installation of Quick Attach Backhoe Bucket (optional)" section on page 7-14.

Backhoe attachment boom unlocking lever

Located to the left of the floor (with the operator's seat in the backhoe attachment position). This lever (A) enables the backhoe boom (B) locking stop to be unlocked after road travel. See "Setting the Backhoe Attachment in the Road Travel Position" section on page 7-12.



Description

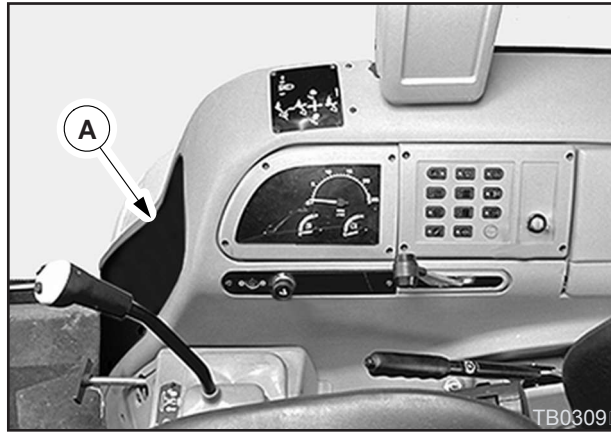
Horn switch (backhoe attachment)

Located on the side control panel. This momentary action switch (A) operates the horn. The switch is to be used when working with the backhoe attachment.



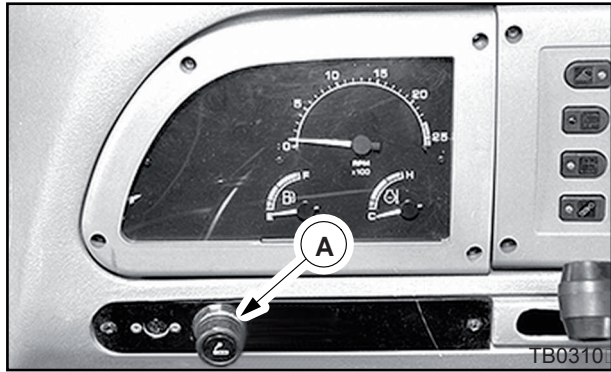
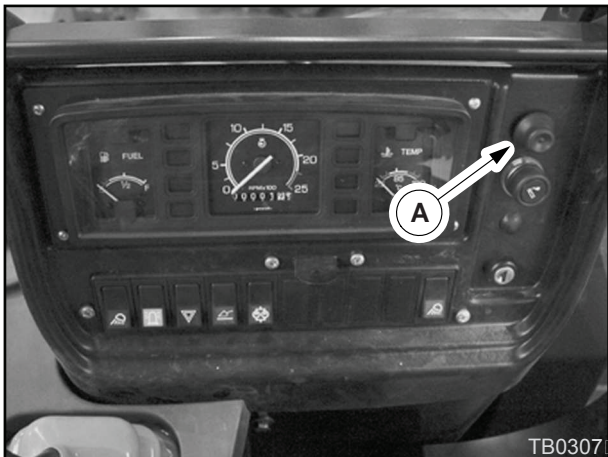
Fuses and relays location

(A) Located behind side console front panel. See "Battery" section on page 5-59.



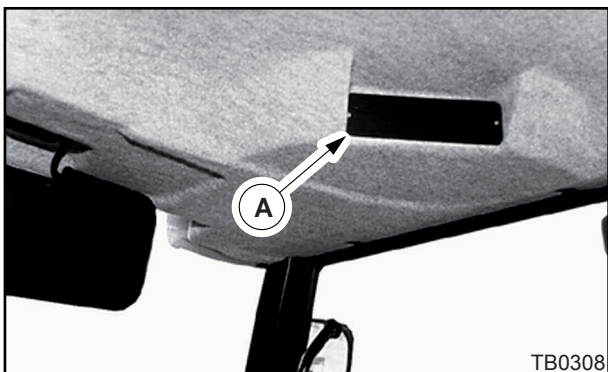
Cigar lighter

(A) Located under the side control panel.



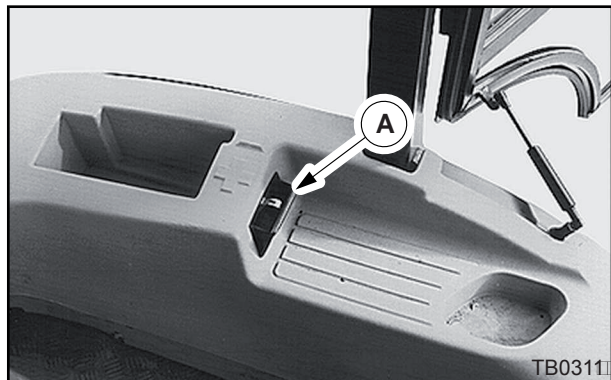
Radio compartment (cab version)

Located on the roof lining, this pre-equipped compartment (A) is intended for installing a 12 volt radio.



Ashtray (cab version)

(A) Located on the left-hand side of the cab (with the operator's seat in the loader attachment position).



Operator's Seat

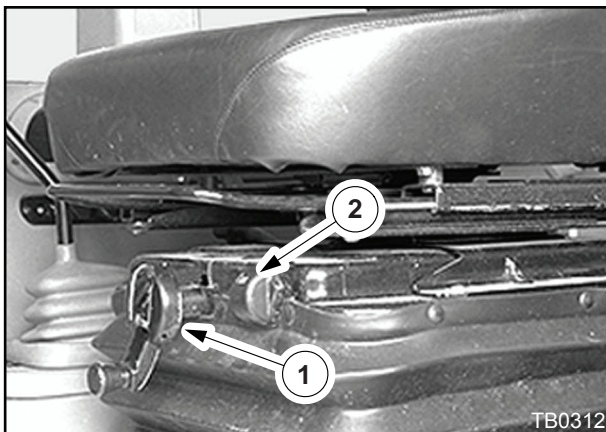
To operate the machine correctly with maximum efficiency and comfort, the seat should be correctly adjusted to suit the height and weight of the operator.



WARNING: Before using the controls, make sure that the seat is adjusted and positioned correctly.

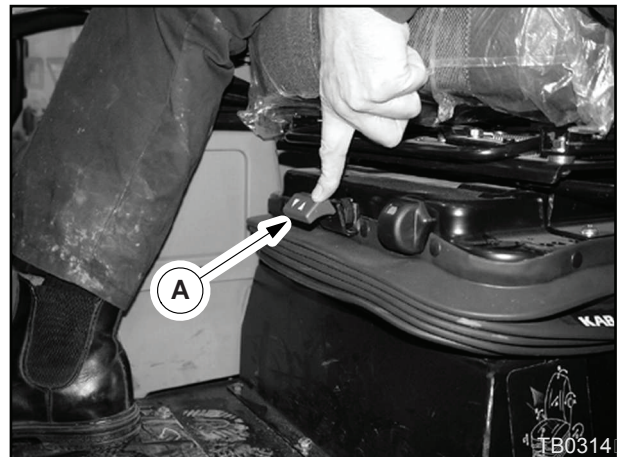
Suspension adjustment

Sit on the seat. Turn handle (1) to adjust seat height. Clockwise to raise seat. Anti-Clockwise to lower seat. Check ride indicator (2) shows green. If red, readjust seat height. Within the green band of the ride indicator there is 75 mm of height adjustment for any driver.



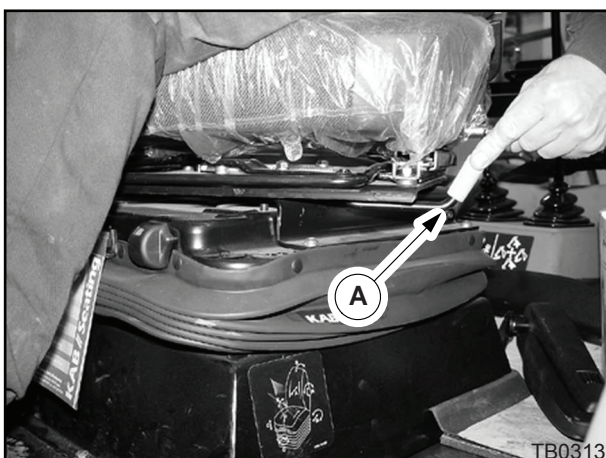
Air suspension

Lever up (A) raises the seat, lever down lowers the seat. For optimum comfort ensure there is sufficient upwards and downwards movement after the seat is adjusted. This is achieved when the ride indicator is showing green.



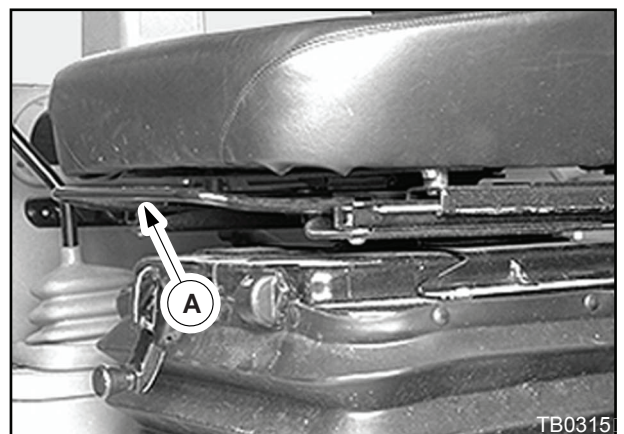
Swivel adjustment

To turn the seat, hold the lever to the top (A), slide the seat to the rear and turn it. Release the lever and make sure that the seat is correctly locked in position.



Forward and rear

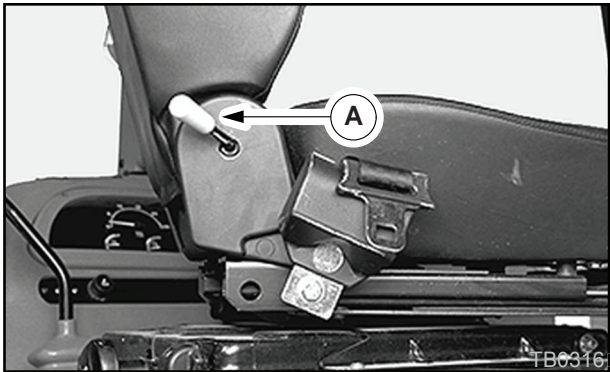
Hold the lever to the top (A), slide the seat until the desired position is reached and then release the lever.



Description

Seat back angle adjustment

To adjust the seat back angle, hold the lever downwards, move the seat back to obtain the desired position and then release the lever.



Seat belt

Sit comfortably on the seat. Pull a generous amount of belt out of the reel, and buckle it at (2). Allow the excess belt to retract back into the reel.



WARNING: Always fasten your seat belt before starting the engine. The machine is equipped with a roll over protection structure (ROPS) which ensures your safety. The seat belt will protect you efficiently if you attach it correctly and if you always wear it. The seat belt must not be too loose. It must not be twisted or caught in the seat.

Lumbar support adjustment

Turn the knob (1) to obtain good back support from the seat back.

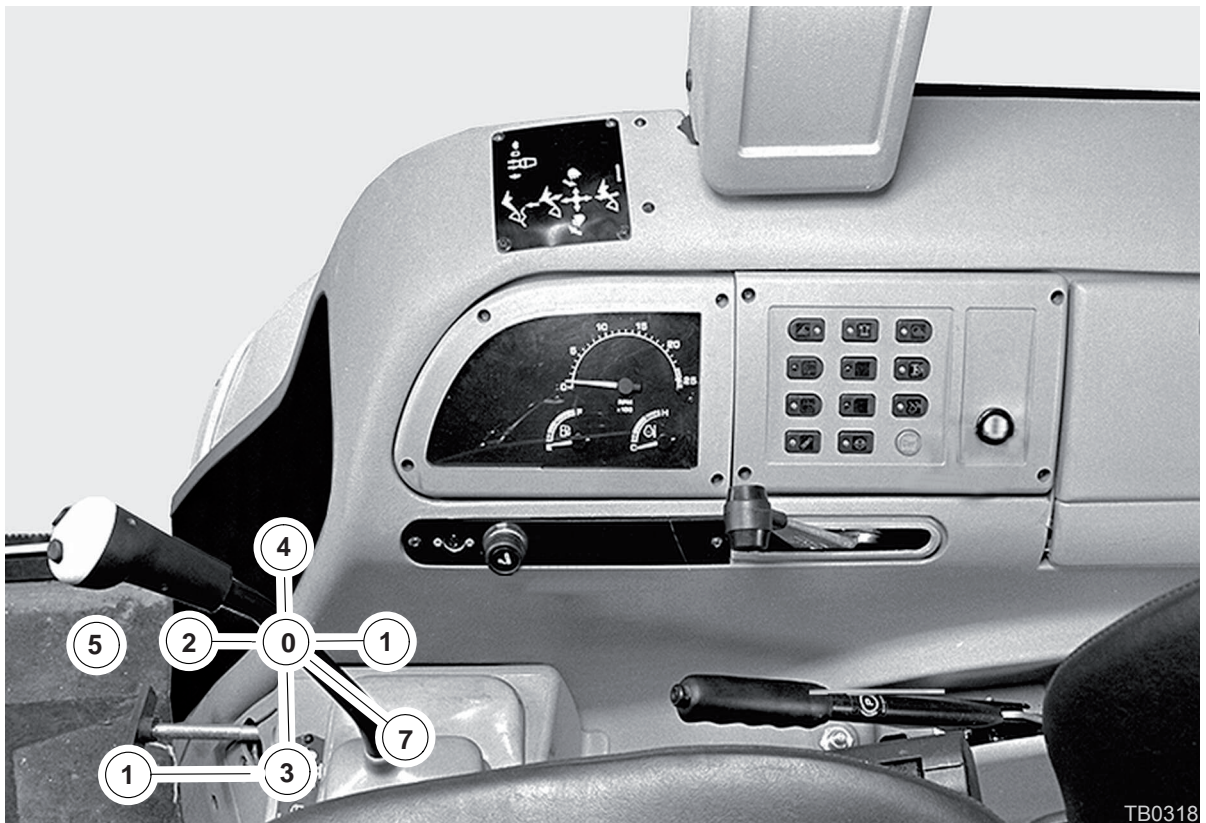


Loader Attachment Controls

WARNING: Before starting the engine, make sure you are fully aware of the location and the function of each control. Operating the controls wrongly can cause serious physical injury.



WARNING: Before using the controls make sure that the operator's seat is correctly adjusted in the loader attachment position

With standard loader bucket

Located on the right-hand side of the cab (with the operator's seat in the loader attachment position), this eight position lever operates the loader attachment controls. The speed of movement of each control depends on the tilting angle of the lever.

NOTE: A decal located to the right of the lever explains the function of each control.

NOTE: See "Operation of the Loader Controls" section on page 5-30.

Description

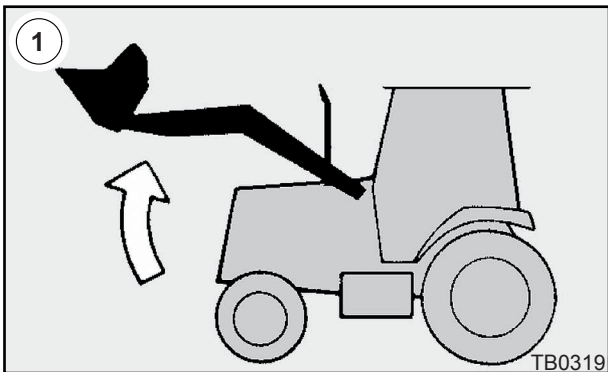
Operation of the Loader Controls

Neutral

When the lever is in neutral position (0) the loader beam and bucket will not move. The lever is spring loaded to neutral position (0) and will automatically return to this position when released, movement of the loader beam and/or bucket will stop.

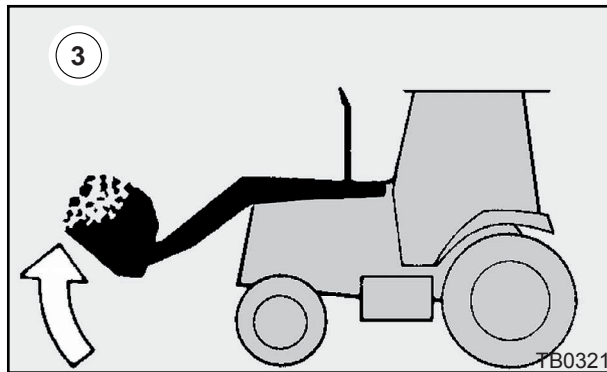
Raising the loader beam

With the lever in position (1), the loader beam rises and the bucket automatically self levels.



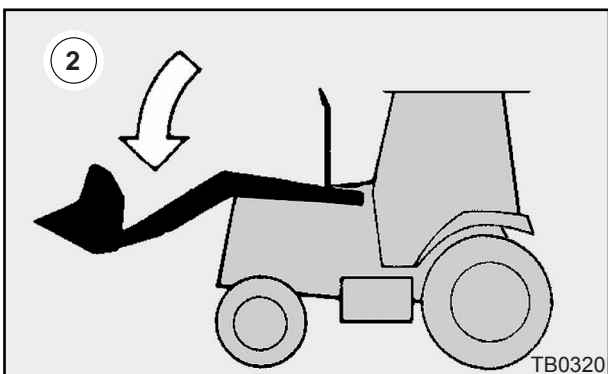
Filling the loader bucket

With the lever in position (3), the bucket rolls back (crowds).



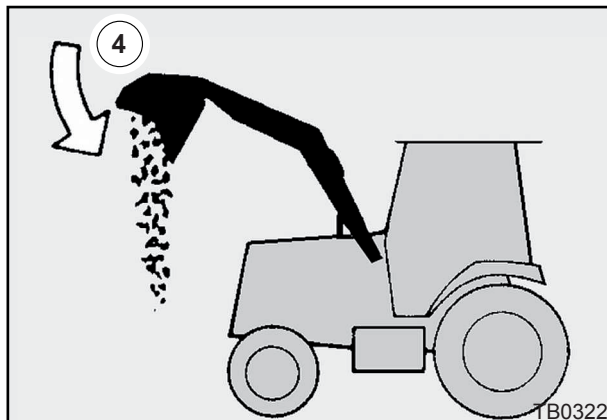
Lowering the loader beam

With the lever in position (2), the loader beam lowers. The bucket will not automatically level as the loader beam lowers.



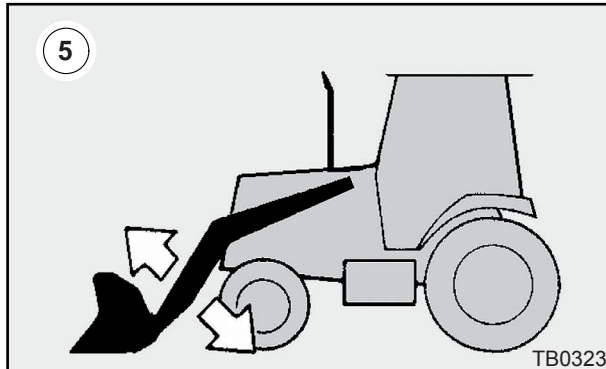
Dumping the loader bucket

With the lever in position (4), the bucket dumps.



Loader bucket float control

With the lever in position (5), the bucket follows the contours of the ground without it being necessary to operate the lever.



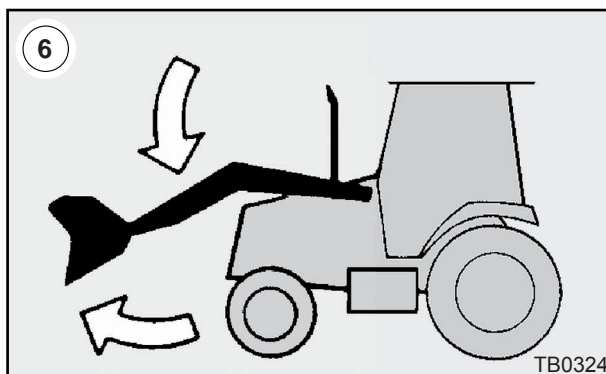
In this position the lever does not automatically return to neutral when it is released. It is necessary to move it manually.

Loader beam automatic return to dig (RTD)

Press the return to dig switch on the side console and pull the lever towards the operator through detent to enable RTD. The loader bucket places itself in the digging position.

To simultaneously lower the loader beam, either manually lower loader beam or select float (position (6)).

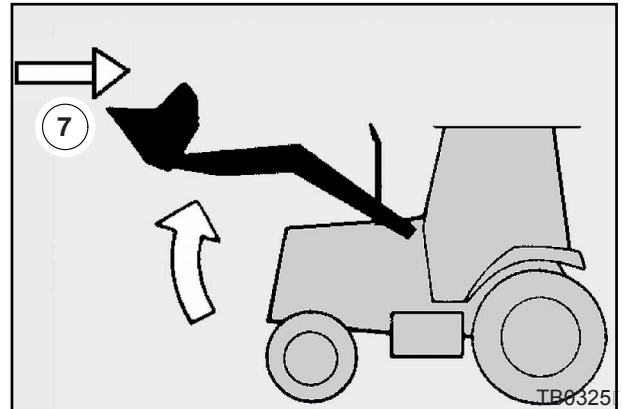
To disable RTD either press the RTD enable switch again or push the lever away from the operator.



NOTE: It is possible to adjust the tilt angle for bucket dig. See "Loader Bucket Return-To-Dig Adjustment" section on page 9-57.

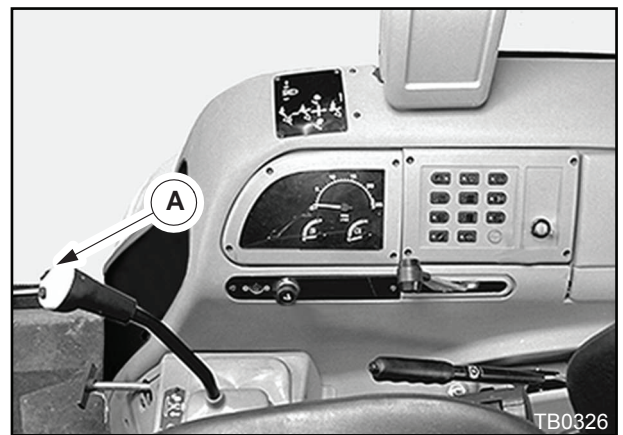
Automatic loader bucket levelling

With the lever in position (7), the loader beam raises and simultaneously the loader bucket remains in the level position.



Hydraulic unload button

Located on the right end of the lever (A), press and hold the button to disengage the secondary hydraulic pump for added traction effort. Release the button to re-engage the pump.



Description

Locking the loader attachment controls (if equipped)



WARNING: Before dismounting from the operator's compartment, when travelling on the road or when using the backhoe attachment, place the lever in the locked position.

Located at the right-hand side of the cab (with the operator's seat in the loader attachment position), this lever (A) enables the attachment controls to be locked.

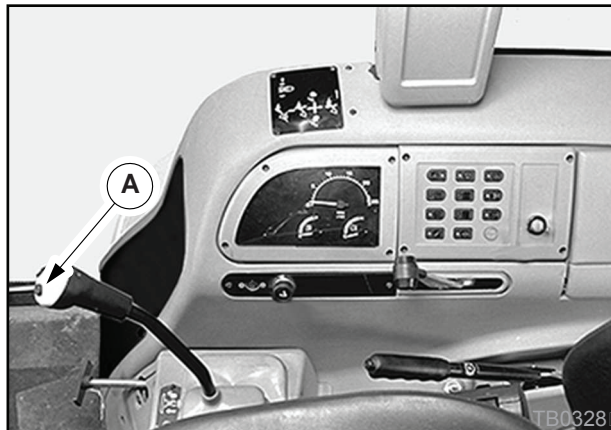
To lock the controls, push the handle and turn it anti-clockwise. To unlock the controls, push the handle in then turn it clockwise.

Transmission dump button

All models

Located on the left-end of the lever.

Press and hold the button (A) to disengage the transmission drive and speed up loader performance. Release the button to re-engage the drive.



7 in 1 loader bucket clamshell control (if equipped)

All models

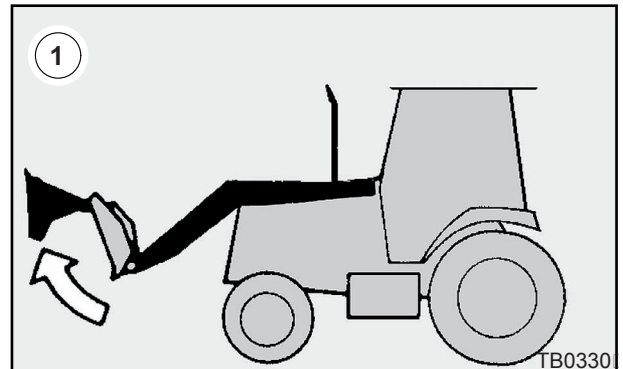
Located at the right-hand side of the cab (with the operator's seat in the loader attachment position), this three position lever operates the opening and closing of the 7 in 1 loader bucket clam.

Neutral and hold

Position (0): Neutral/hold. As soon as the lever/switch is released, it automatically returns to the neutral position (0) and the clam remains in the position where it was when movement stopped.

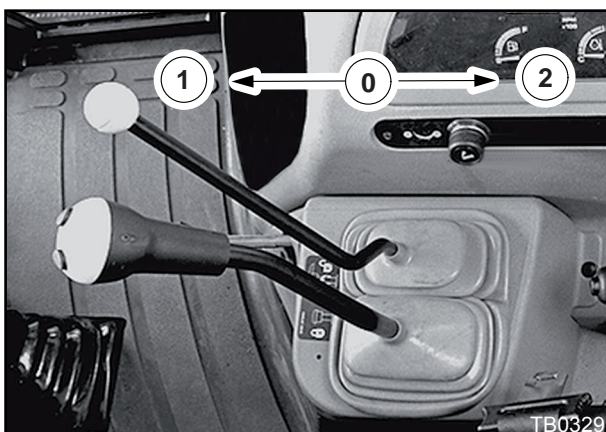
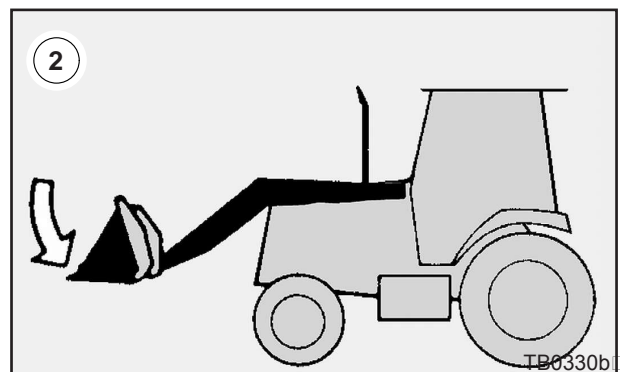
Open clamshell

With the lever/switch in position (1), clamshell opens.



Close clamshell

With the lever in position (2), clamshell closes.



Description

Backhoe Attachment Controls



WARNING: Before starting the engine, make sure you are fully aware of the location and the function of each control. Operating the controls wrongly can cause serious physical injury.



WARNING: Any uncontrolled movement of the machine can cause an accident. Before turning the operator's seat to the backhoe attachment working position, it is essential to place the direction of travel control lever and the gear change lever in the neutral position (synchroshuttle only) or the transmission control lever in the neutral position (Powershuttle only), the parking brake engaged and lock the loader attachment controls (if equipped).



WARNING: Before using the backhoe controls, make sure that the operator's seat is correctly adjusted in the backhoe attachment position.

Control levers are used to operate the backhoe attachment. The speed of movement of each control depends on the angle to which the lever is tilted.

NOTICE

NOTICE: Whenever the backhoe attachment is used, it is mandatory for the machine to be resting on the stabilizers. See "Stabilizer Controls" section on page 5-42 and see "Setting the Machine in the Backhoe Attachment Working Position" section on page 7-8.

NOTICE

NOTICE: Three backhoe attachment control configurations exist, depending on market requirement:

- (1) SAE (Society of Automotive Engineers). Non-European Community.
- (2) ISO (International Organisation for Standardisation). European Community only.
- (3) 'X' Pattern.

The operating pattern of the control levers is different. Check which configuration you have on your machine.

NOTE: A decal located in front of levers explains the function of the controls.

Servo control position

NOTICE

NOTICE: Do not reposition the backhoe servo controls using the joysticks. Use the handles provided.

NOTICE

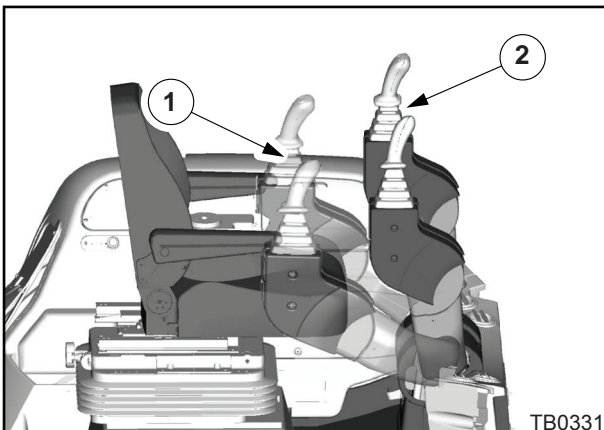
NOTICE: Once locked in the working position, the joysticks will remain inactive until either of the override buttons is depressed to re-activate the system.

The servo controls have two operating positions:

The backhoe can only be controlled with the controls in either of the following positions.

Position (1): Working position.

Position (2): Transport position (with override button depressed)



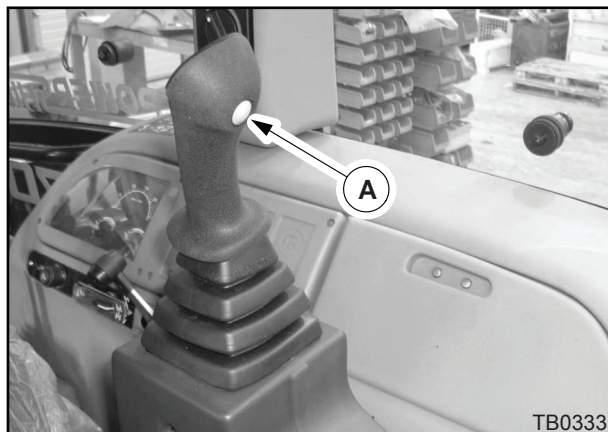
To adjust the operating position, depress the pedal (A) and move the servo controls into the desired position using the handles provided, release the pedal to lock in place.



Override buttons

Located on the reverse of the servo control joysticks are override buttons (A). When the servo controls are in the transport position press and hold the override button to activate the joysticks.

The override buttons are also used to re-activate the joysticks after re-positioning.



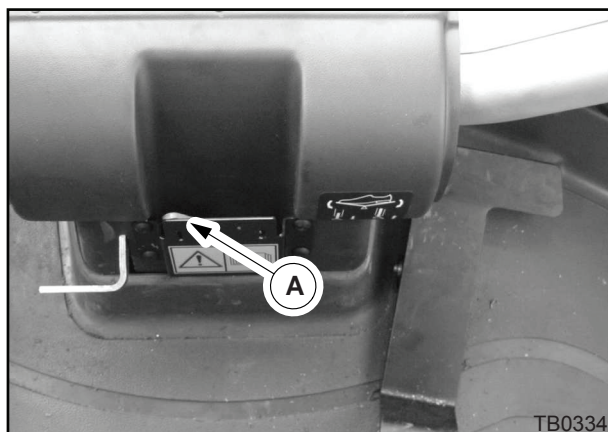
Configuration change over valve

To switch between control configurations use the lever (A) located in the centre of the servo controls.

The lever has two positions:

Position (1): ISO (European community only).

Position (2): SAE (Non - European community).



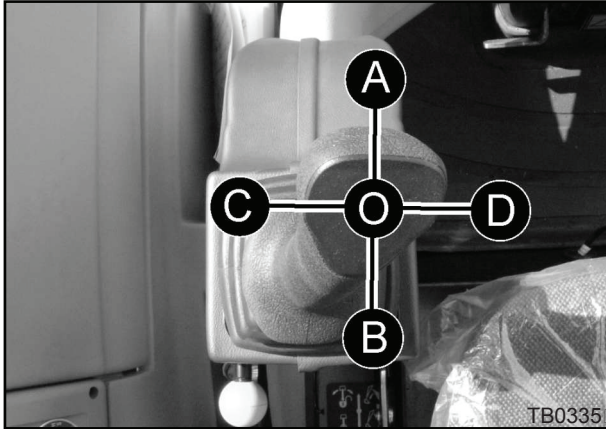
Description

ISO Configuration - Servo controls

Backhoe dipper and backhoe attachment swing left-hand control lever

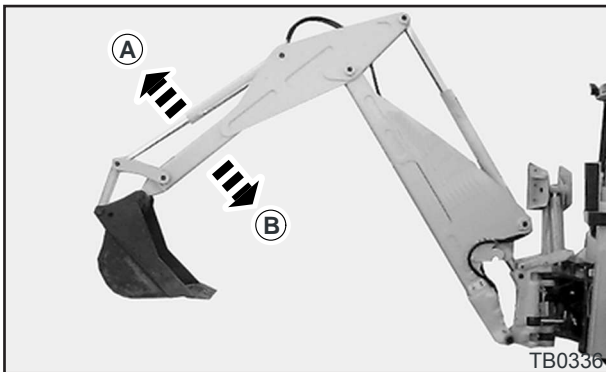
This lever has five positions:

Position (0): Neutral/hold. This position enables the attachment movement to be stopped. As soon as the lever is released, it automatically returns to the neutral position (0) and the attachment remains in the position where it was when movement stopped.



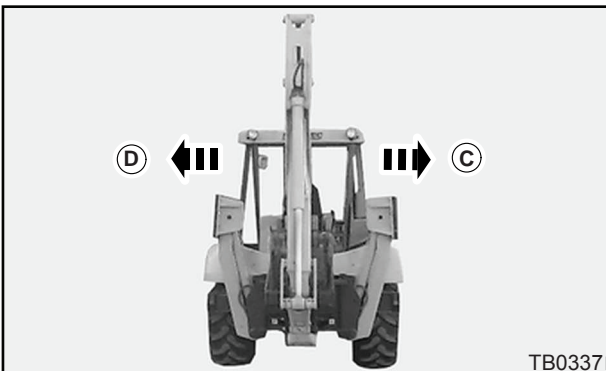
Position (A): The backhoe dipper extends.

Position (B): The backhoe dipper retracts.



Position (C): The backhoe attachment swings to the left.

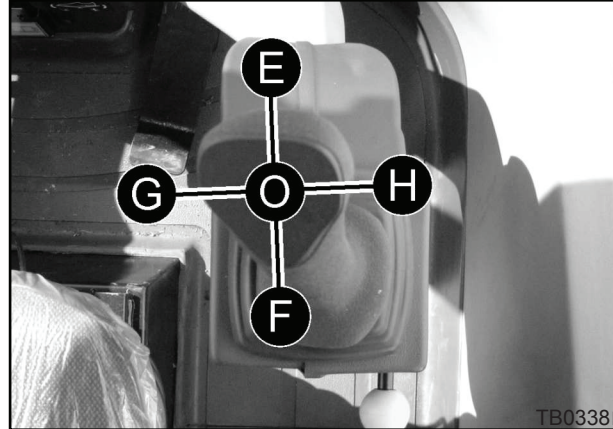
Position (D): The backhoe attachment swings to the right.



Backhoe boom and backhoe bucket right-hand control lever

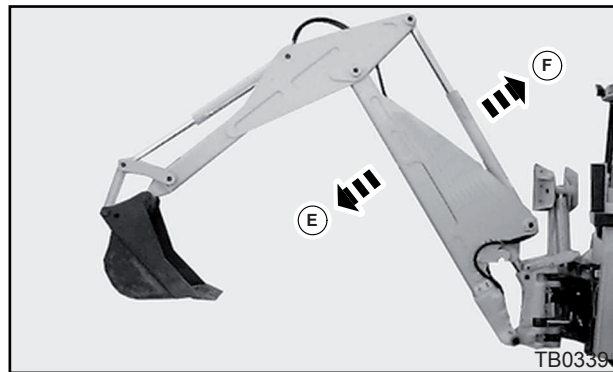
This lever has five positions:

Position (0): Neutral/hold. This position enables the attachment movement to be stopped. As soon as the lever is released, it automatically returns to the neutral position (0) and the attachment remains in the position where it was when movement stopped.



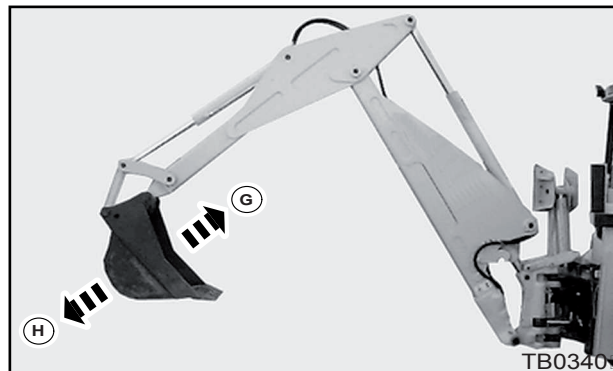
Position (E): The backhoe boom lowers.

Position (F): The backhoe boom rises.



Position (G): The backhoe bucket digs (crowds).

Position (H): The backhoe bucket dumps

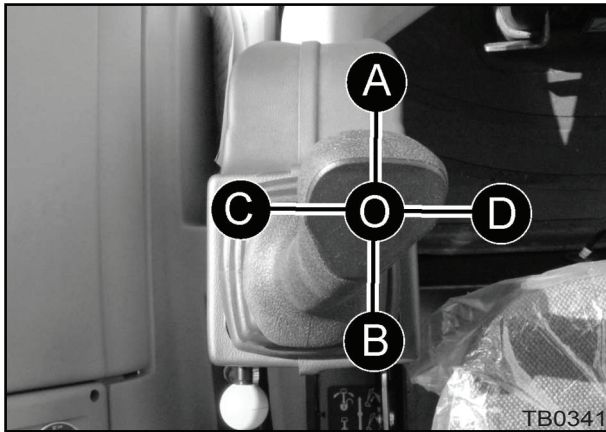


SAE Configuration - Servo controls

Backhoe dipper and backhoe attachment swing left-hand control lever

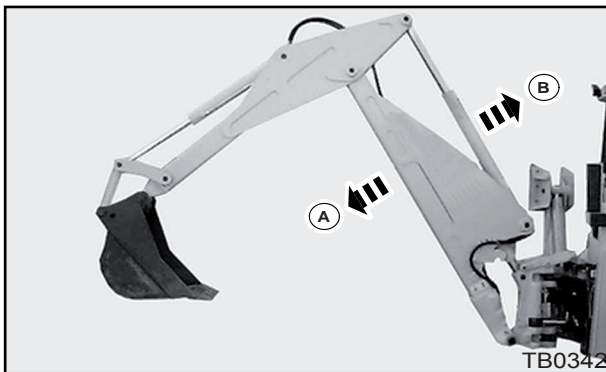
This lever has five positions:

Position (0): Neutral/hold. This position enables the attachment movement to be stopped. As soon as the lever is released, it automatically returns to the neutral position (0) and the attachment remains in the position where it was when movement stopped.



Position (A): The backhoe boom lowers.

Position (B): The backhoe boom rises.



Position (C): The backhoe attachment swings to the left.

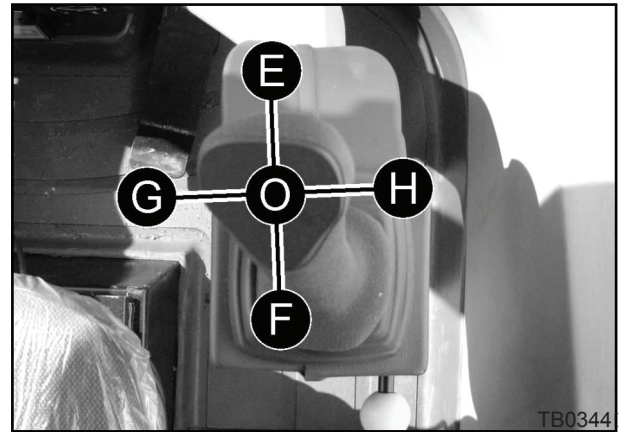
Position (D): The backhoe attachment swings to the right.



Backhoe boom and backhoe bucket right-hand control lever

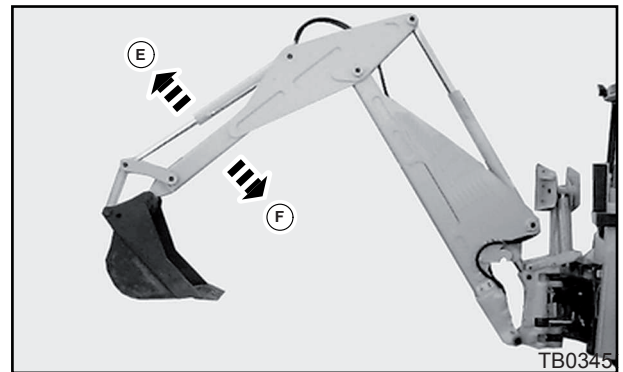
This lever has five positions:

Position (0): Neutral/hold. This position enables the attachment movement to be stopped. As soon as the lever is released, it automatically returns to the neutral position (0) and the attachment remains in the position where it was when movement stopped.



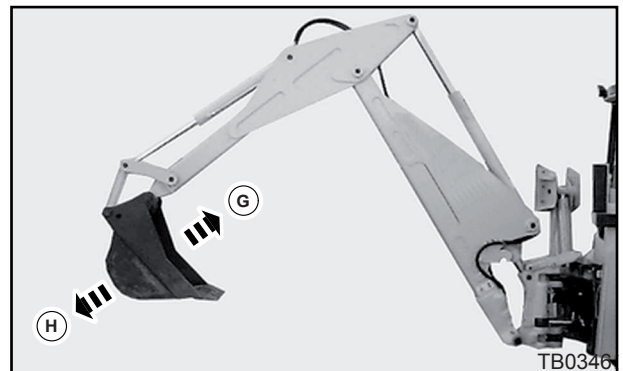
Position (E): The backhoe dipper extends.

Position (F): The backhoe dipper retracts.



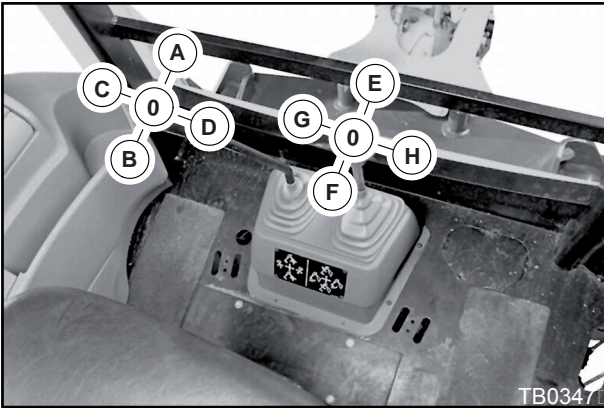
Position (G): The backhoe bucket digs (crowds).

Position (H): The backhoe bucket dumps.



Description

ISO Configuration - Mechanical controls



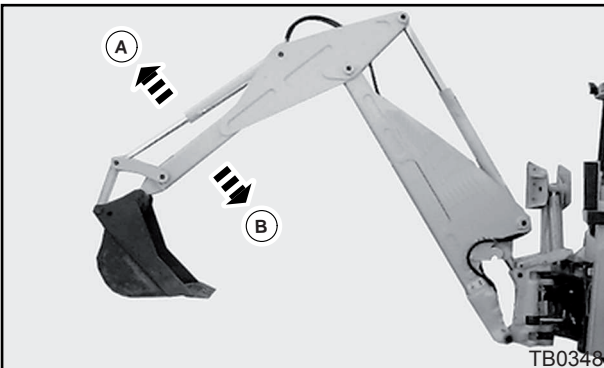
Backhoe dipper and backhoe attachment swing left-hand control lever

This lever has five positions:

Position (0): Neutral/hold. This position enables the attachment movement to be stopped. As soon as the lever is released, it automatically returns to the neutral position (0) and the attachment remains in the position where it was when movement stopped.

Position (A): The backhoe dipper extends.

Position (B): The backhoe dipper retracts.



Position (C): The backhoe attachment swings to the left.

Position (D): The backhoe attachment swings to the right.



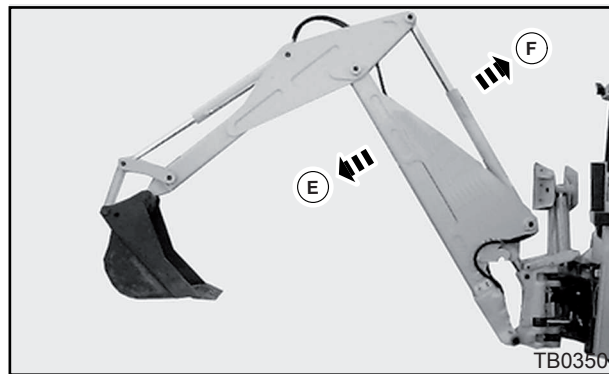
Backhoe boom and backhoe bucket right-hand control lever

This lever has five positions:

Position (0): Neutral/hold. This position enables the attachment movement to be stopped. As soon as the lever is released, it automatically returns to the neutral position (0) and the attachment remains in the position where it was when movement stopped.

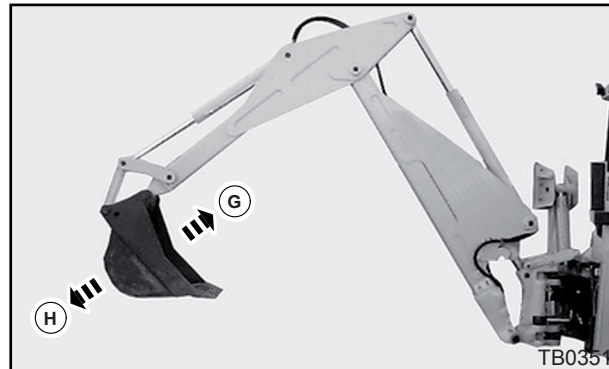
Position (E): The backhoe boom lowers.

Position (F): The backhoe boom rises.

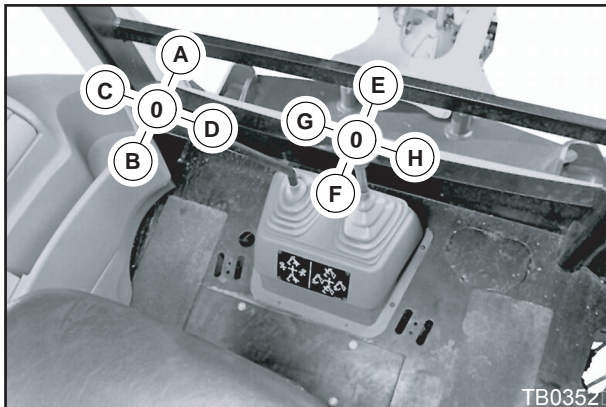


Position (G): The backhoe bucket digs (crowds).

Position (H): The backhoe bucket dumps.



SAE Configuration - Mechanical controls



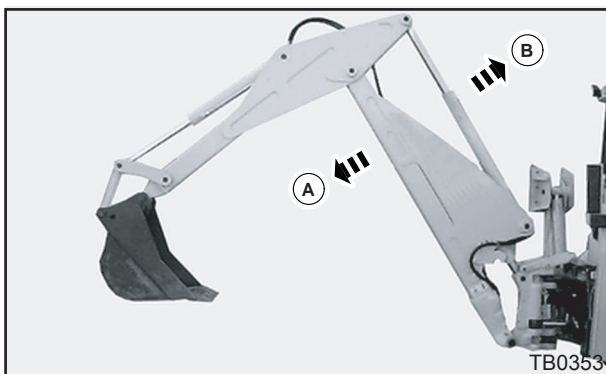
Backhoe boom and backhoe attachment swing left-hand control lever

This lever has five positions:

Position (0): Neutral/hold. This position enables the attachment movement to be stopped. As soon as the lever is released, it automatically returns to the neutral position (0) and the attachment remains in the position where it was when movement stopped.

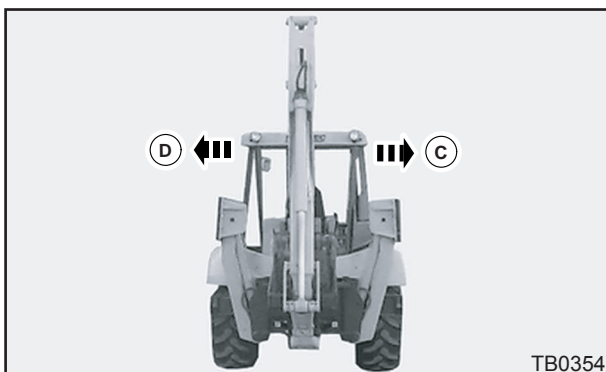
Position (A): The backhoe boom lowers.

Position (B): The backhoe boom rises.



Position (C): The backhoe attachment swings to the left.

Position (D): The backhoe attachment swings to the right.



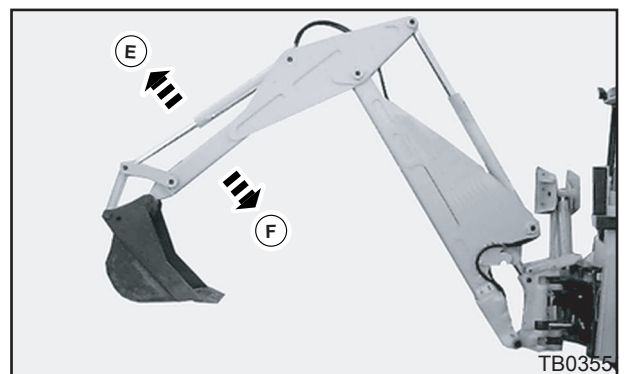
Backhoe dipper and backhoe bucket right-hand control lever

This lever has five positions:

Position (0): Neutral/hold. This position enables the attachment movement to be stopped. As soon as the lever is released, it automatically returns to the neutral position (0) and the attachment remains in the position where it was when movement stopped.

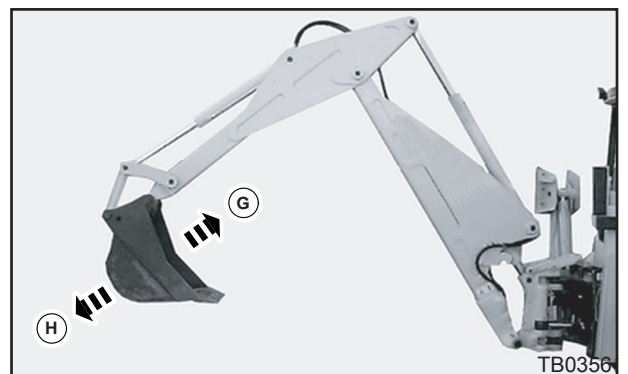
Position (E): The backhoe dipper extends.

Position (F): The backhoe dipper retracts.



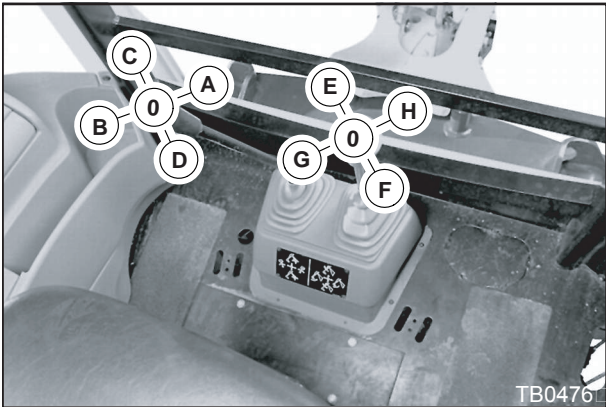
Position (G): The backhoe bucket digs (crowds).

Position (H): The backhoe bucket dumps.



Description

X - Pattern Configuration - Mechanical controls



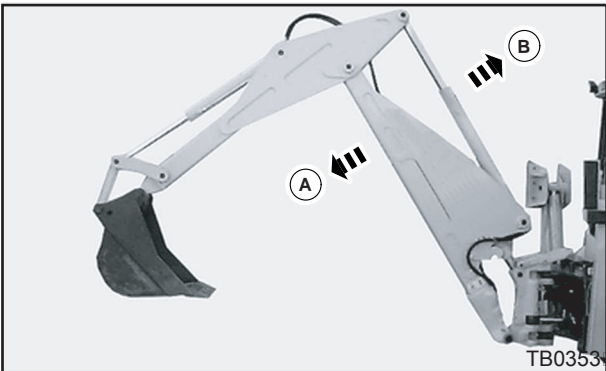
Backhoe boom and backhoe attachment swing left-hand control lever

This lever has five positions:

Position (0): Neutral/hold. This position enables the attachment movement to be stopped. As soon as the lever is released, it automatically returns to the neutral position (0) and the attachment remains in the position where it was when movement stopped.

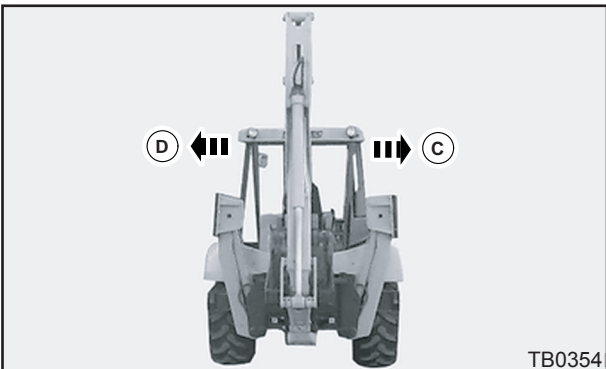
Position (A): The backhoe boom lowers.

Position (B): The backhoe boom rises.



Position (C): The backhoe attachment swings to the left.

Position (D): The backhoe attachment swings to the right.



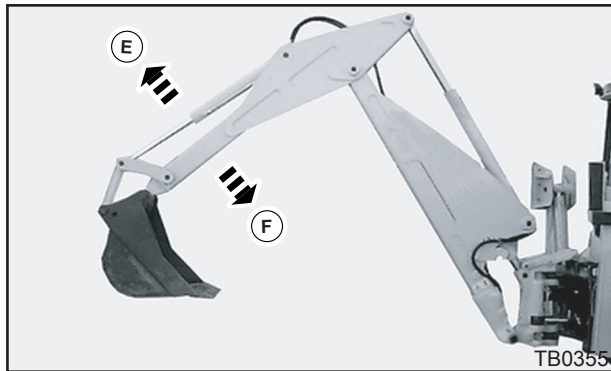
Backhoe dipper and backhoe bucket right-hand control lever

This lever has five positions:

Position (0): Neutral/hold. This position enables the attachment movement to be stopped. As soon as the lever is released, it automatically returns to the neutral position (0) and the attachment remains in the position where it was when movement stopped.

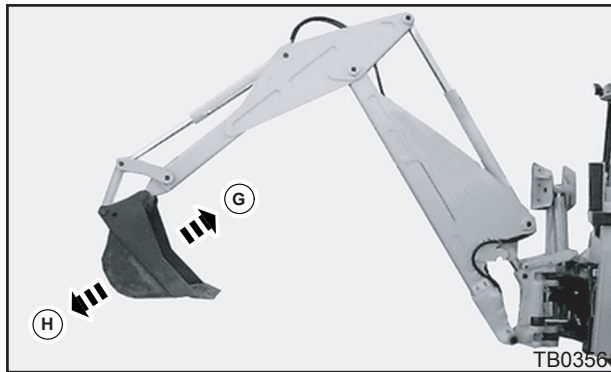
Position (E): The backhoe dipper extends.

Position (F): The backhoe dipper retracts.



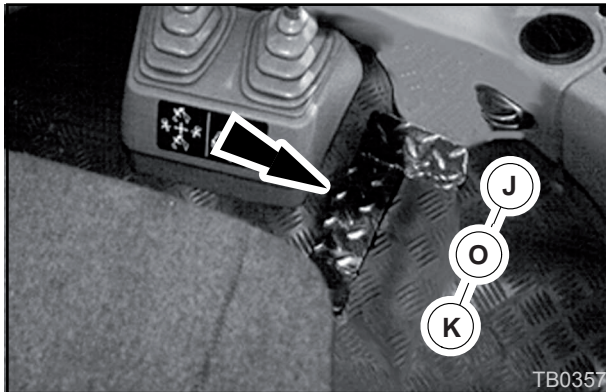
Position (G): The backhoe bucket digs (crowds).

Position (H): The backhoe bucket dumps.

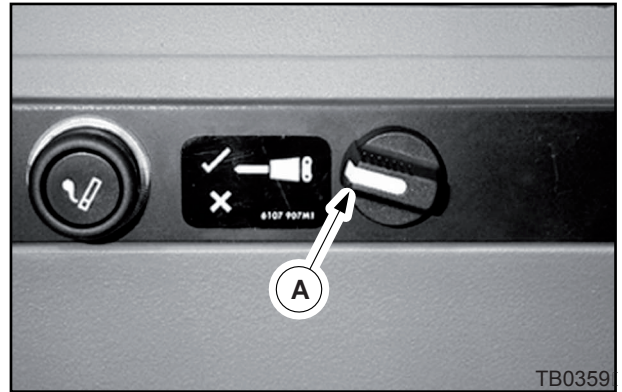


Extendable dipper/ auxiliary hydraulic control pedal (if equipped)

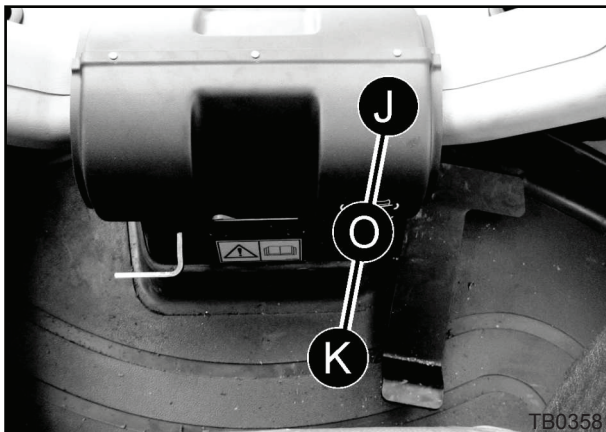
Mechanical control



All models



Servo control



To operate the extendable dipper use the rotary switch on the side console, select the "X" symbol.

To operate the auxiliary hydraulics, select the hydraulic hammer attachment.

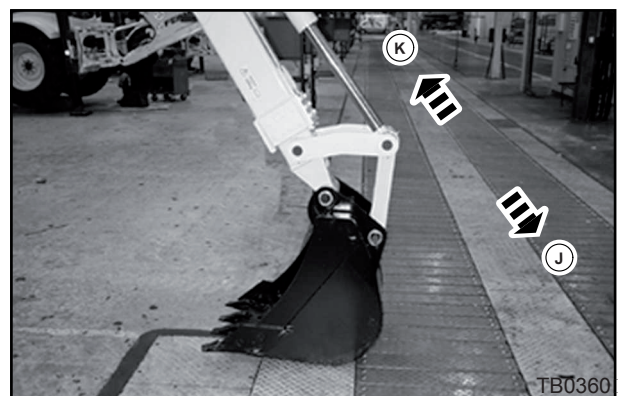
This pedal has three positions:

Position (0): Neutral. This position enables the movement of the extendable dipper/auxiliary hydraulic control to be stopped.

Position (J): The extendable dipper extends or auxiliary hydraulics operate.

Position (K): The extendable dipper retracts.

Before using this pedal make sure that the extendable dipper is mechanically unlocked. See "Setting the Machine in the Backhoe Attachment Working Position" section on page 7-8.



Description

Stabilizer Controls



WARNING: Any uncontrolled movement of the machine can cause an accident. Before turning the operator's seat to the backhoe attachment working position, it is essential to place the direction of travel control lever and the gear change lever in the neutral position (synchroshuttle only), or the transmission control lever in neutral position (Powershuttle only), the parking brake engaged and lock the loader attachment controls (if equipped).



WARNING: Before using the stabilizer controls, make sure that the operator's seat is correctly adjusted in the backhoe attachment position.



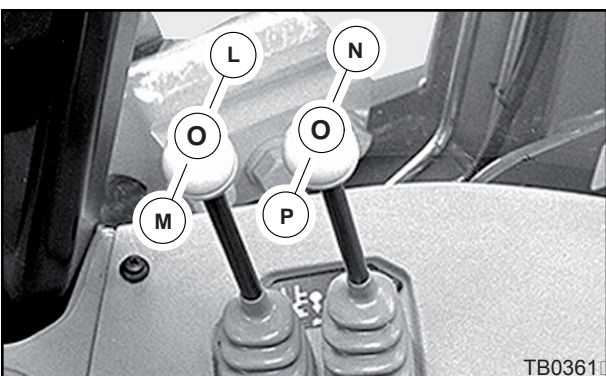
WARNING: Before moving the stabilizers make sure that no person is within the working range of the stabilizers

NOTICE

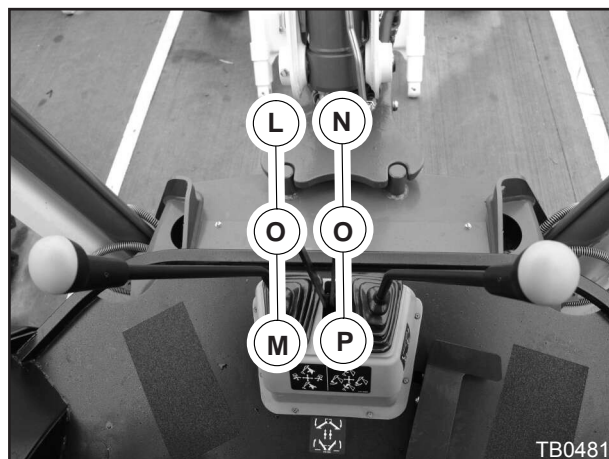
NOTICE: Whenever the backhoe attachment is used the machine must be resting on the stabilizers.

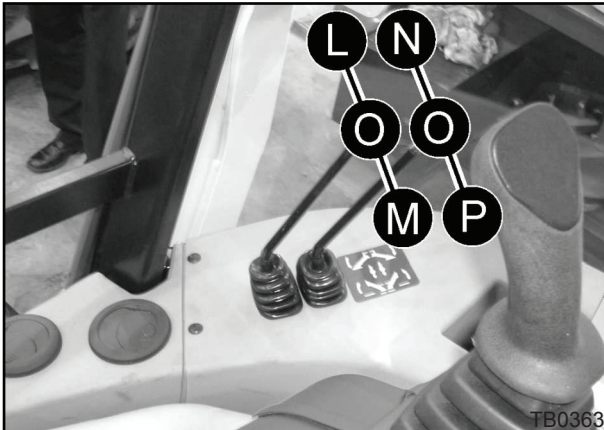
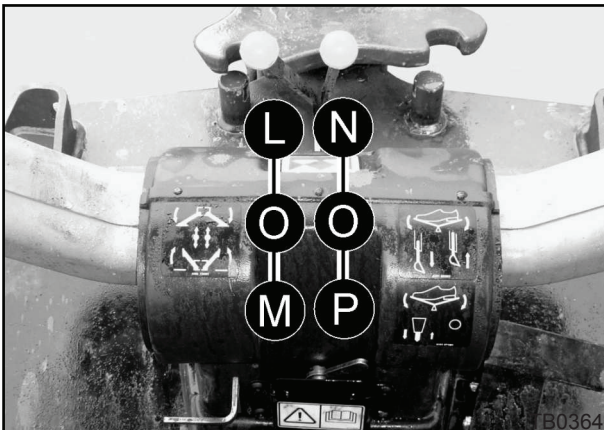
NOTE: Two decals explain the function of the controls.

Stabilizer controls (sideshift (offset) backhoe version)



Stabilizer controls (centremount (axial) backhoe version)



Stabilizer controls (servo control backhoe version) with cab**Stabilizer controls (servo control backhoe version) without cab****Left-hand stabilizer left-hand control lever**

This lever has three positions:

Position (O): Neutral. This position stops the movement of the left-hand stabilizer. As soon as the lever is released, it automatically returns to the neutral position (O) and the left-hand stabilizer stops raising or lowering.

Position (L): The left-hand stabilizer lowers.

Position (M): The left-hand stabilizer rises.

Right-hand stabilizer right-hand control lever

This lever has three positions :

Position (O): Neutral. This position stops the movement of the right-hand stabilizer. As soon as the lever is released, it automatically returns to the neutral position (O) and the right-hand stabilizer stops raising or lowering.

Position (N): The right-hand stabilizer lowers.

Position (P): The right-hand stabilizer rises.

NOTE: To raise or lower the stabilizers at the same time, operate the two levers simultaneously.

NOTICE

NOTICE: Before machine travel or before using the loader attachment, make sure that the stabilizers are completely raised.

NOTICE

NOTICE: During road travel, the stabilizers must be completely raised. See "Road Travel" section on page 8-5.

Description

Rotating Beacons

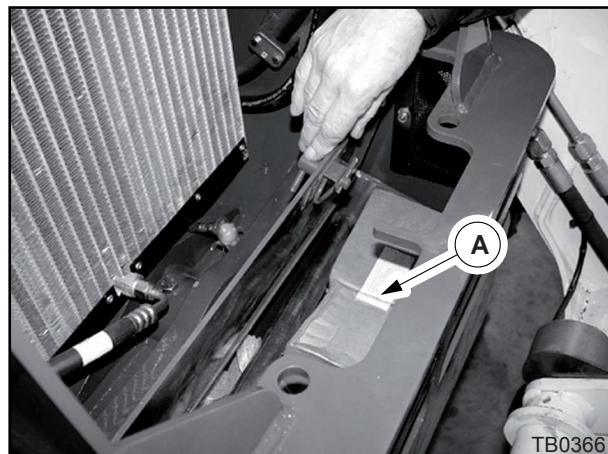
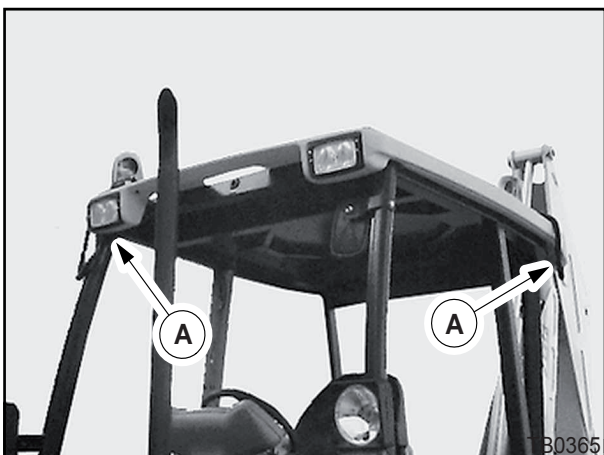
Place the rotating beacons on the roof of the cab and connect the cable to the sockets located under the roof of the cab (A).

The rotating beacons must be installed and functioning when undertaking road travel. See "Road Travel" section on page 8-5.

To replace the bulb, see "Replacing a Bulb" section on page 9-79.

Tool Box

Located under the engine hood, the tool box (A) is used for storing essential parts and tools required for servicing operations.



Heating, Ventilation (cab version) and Air Conditioning (optional) Controls

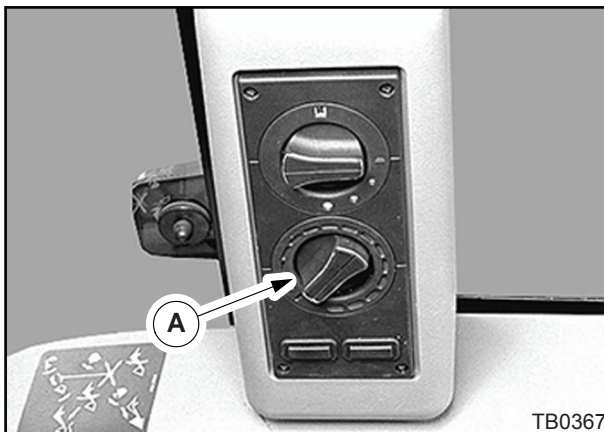
The heating, ventilation and air conditioning (optional) controls are located on the right-hand cab upright (with the operator's seat in the loader attachment position).

Heater control (cab version)

This knob (A) enables the air temperature to be adjusted in the operator's compartment.

To increase the temperature, turn the knob clockwise.

To reduce temperature, turn the knob anti-clockwise.



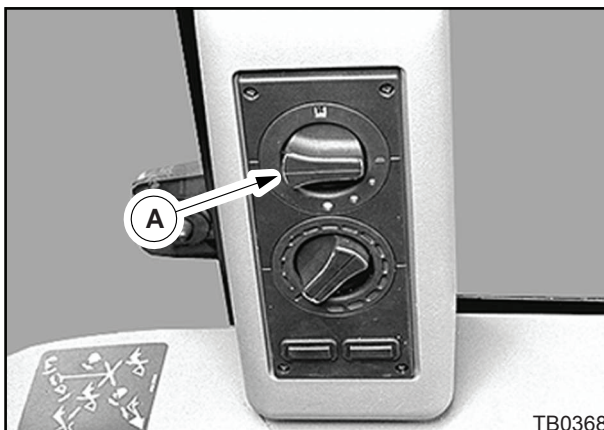
Fan control (cab version)

This knob (A) enables air flow to be adjusted in the operator's compartment.

To increase the air flow, turn the knob clockwise.

To reduce the air flow, turn the knob anti-clockwise.

The air will be hot or cold depending on the position of the heater control.



Air conditioning control (optional)

NOTICE

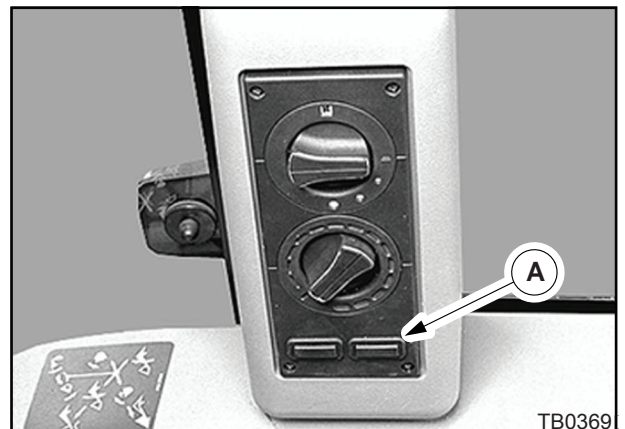
NOTICE: When using the air conditioning, it is essential that all the windows of the operator's compartment are completely closed.

This control (A) is used to turn on or stop the air conditioning system.

NOTE: The air conditioning can only be switched on if the blower control is not on the stop position.

Use the heater control and the fan control to adjust the air temperature.

NOTE: To ensure correct operation and full efficiency of the air conditioning system, it must be used at least once a week, even for a short time.



Description

Air vents (cab version)

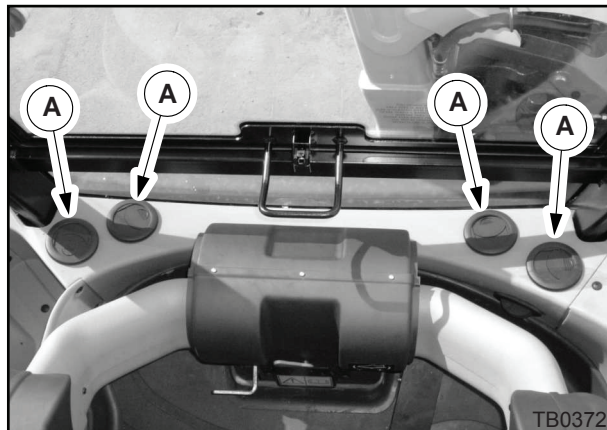
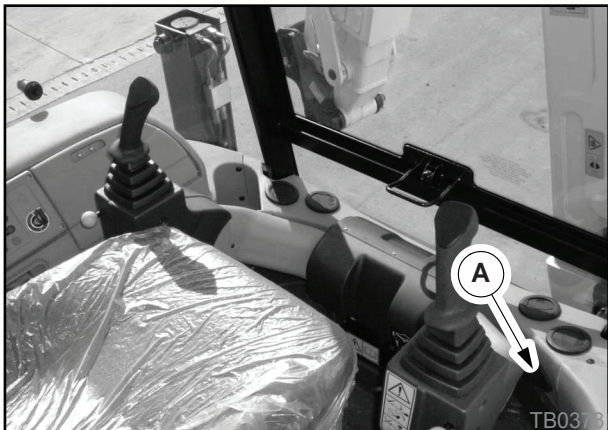
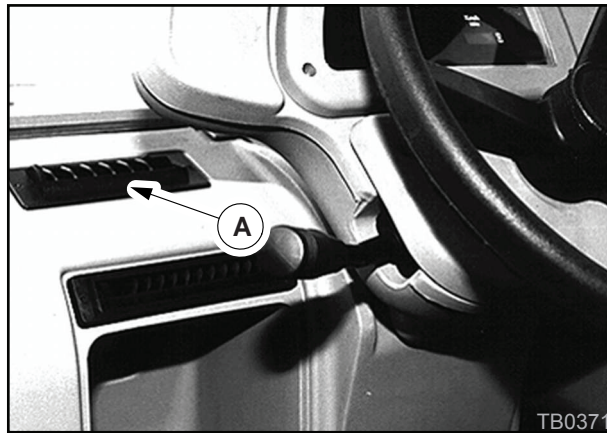
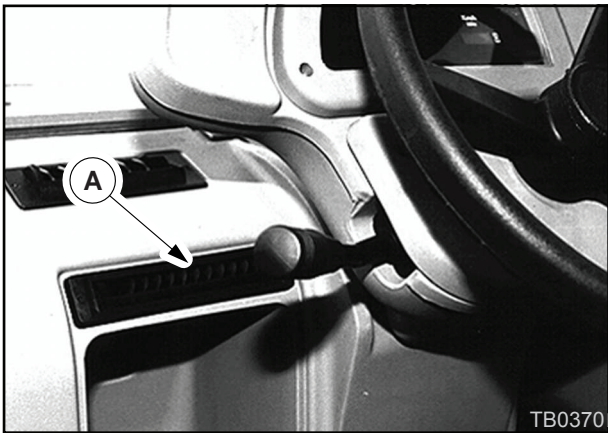
The flow of air can be directed by means of the knurled knob and the louvres. To close the air vents, push the louvres completely inwards.

When using air conditioning (optional) the louvres must be in the open position.

Main air vents

Defrosting vents

NOTE: To obtain maximum air flow, close the main vents (A).

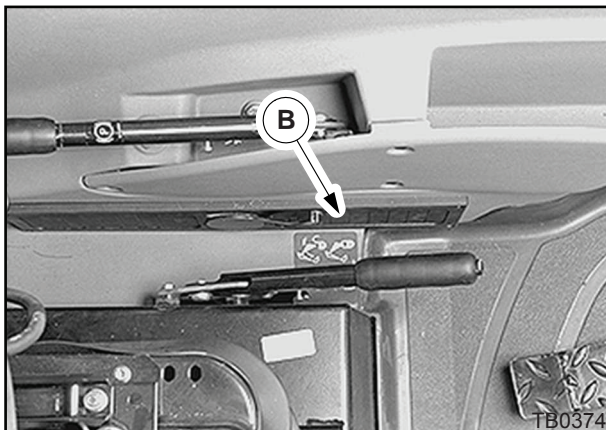


Two re-cycling vents (B) located in the right-hand side of the cab (with the operator's seat in the loader attachment position) are controlled by the central lever.

To obtain maximum heat or cooling, open these vents.

NOTE: When using the machine with the windows open, close the recycling vents to avoid sucking in dust which may damage the system.

NOTE: The cab is equipped with filter which must be cleaned regularly. See "Air Intake Filter Cab Heater" section on page 9-62.



Description

Operator's Compartment Windows (cab version)

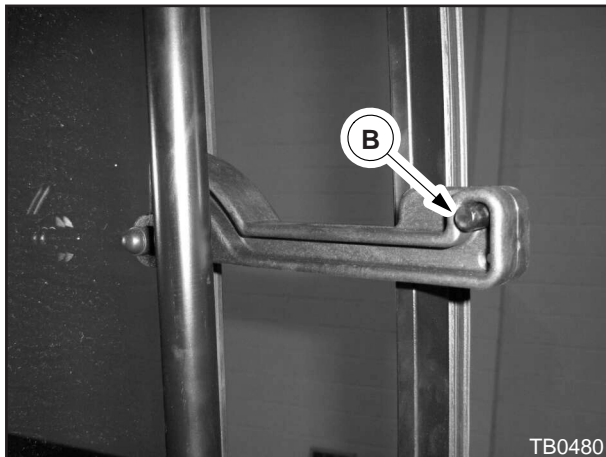
Cab door windows

Partial opening

1. Lift the handle and push out and down

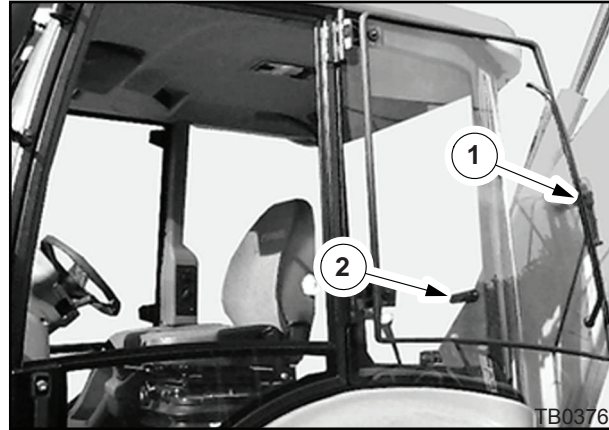


2. Make sure the slot in the handle is fully inserted into the striker pin (B) to lock the glass in this position and prevent damage to the glass.



Full opening

From the closed position, lift the handle (1) horizontally, then swing it backwards to disengage it from the striker pin, open the window and secure it in the rubber (2).



Closing

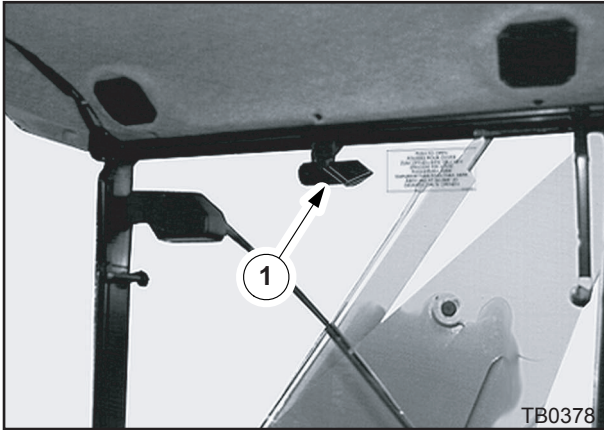
Ensure the handle fully engages the striker pin, pull the window closed, then push the handle down.



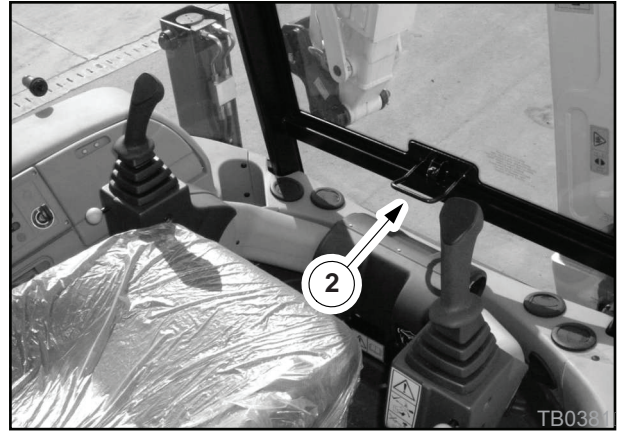
Rear window

Opening

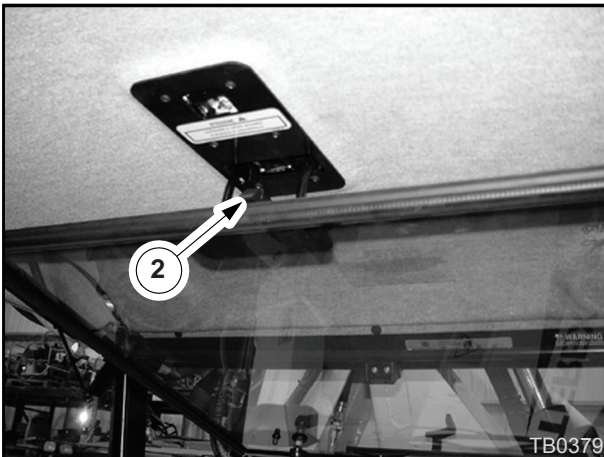
1. Turn the handle (1) and push the window outwards, retain hold of the lower handle.



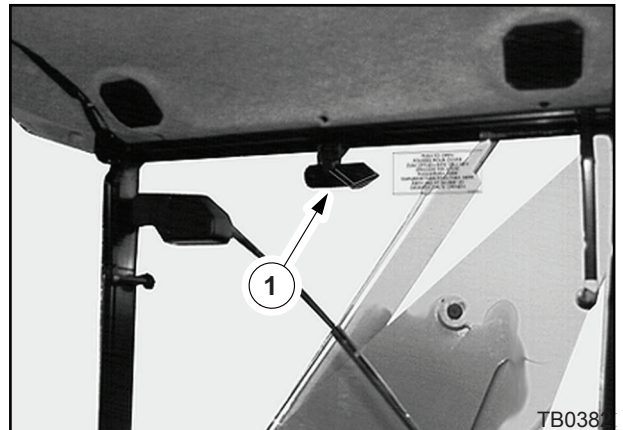
2. Lower the window until it is hanging freely, supported by the gas struts.
3. Pull the handle (2) down to engage in the lower latch. This action will bring the top of the window hard against the seal.



2. Pull the bottom handle (2) inwards and upwards and secure the handle into the roof latch.



4. Turn the handle (1) to lock the window closed.



Closing

1. Hold the window and release the roof lock by pulling it back.



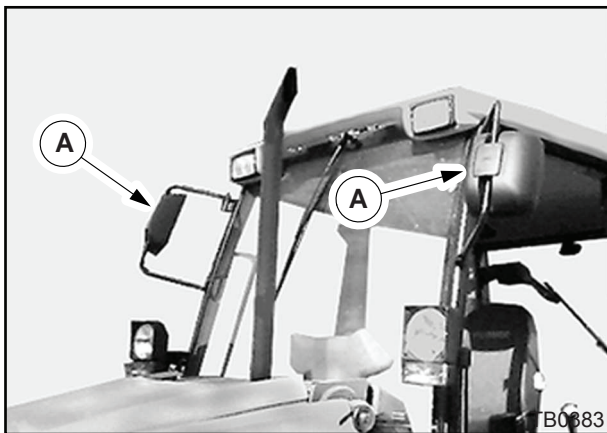
NOTICE

NOTICE: It is only possible to open/close the rear window when the servo controls are in the working position.

Description

Rear View Mirrors

Make sure the rear view mirrors (A) are correctly adjusted before driving the machine.



Front and Rear Wind shield Washer Reservoir

NOTICE

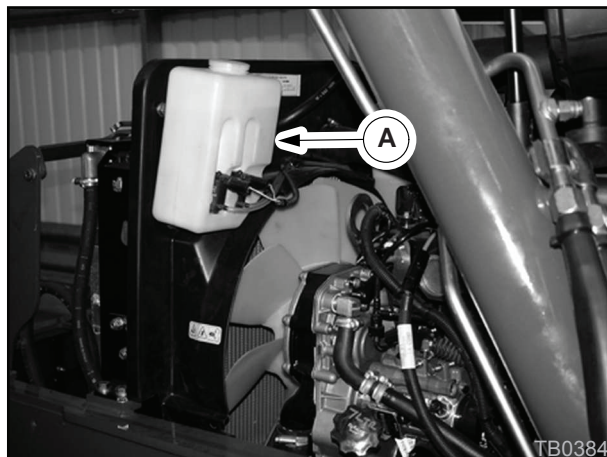
NOTICE: Never operate the wind shield washer switch when the reservoir is empty, since this may damage the electric pump.



WARNING: Before checking the reservoir, raise the loader attachment fully and install the support strut, see "Loader Attachment Support Strut" section on page 5-53.

NOTE: In cold weather, add anti-freeze to the wind shield washer water.

Located on the left of the engine (A), this reservoir is equipped with an electric pump which is controlled by two switches located in the operator's compartment. See "Front wind shield wiper control (cab version)" section on page 5-21 and see "Front wind shield washer control (cab version)" section on page 5-21.



Brake Fluid Reservoir - 'Safim' Brakes

NOTE: Clean around the filler cap (A) before refilling.

NOTE: Use a suitable brake fluid. See "Fluids and Lubricants" section on page 9-3.

To fill the reservoir, see "Brake System - 'Safim'" section on page 9-27.

Level marks on the reservoir show the level of fluid in the reservoir. See "Brake System - 'Safim'" section on page 9-27.

Fuel Tank

WARNING: Never refill the tank when the engine is running. Do not smoke during re-fuelling..

NOTICE

NOTICE: In cold weather, fill the tank after each working day, to prevent the formation of condensation.

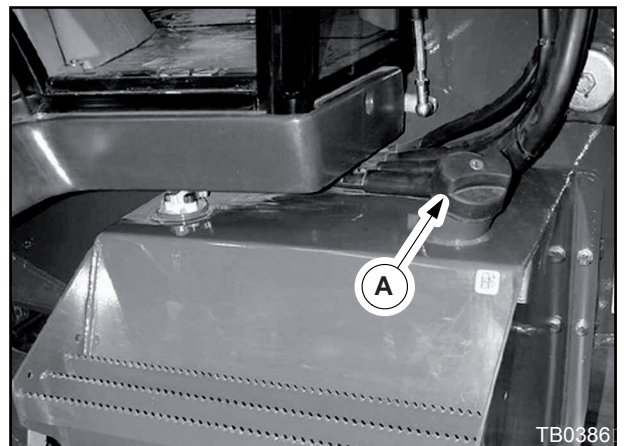
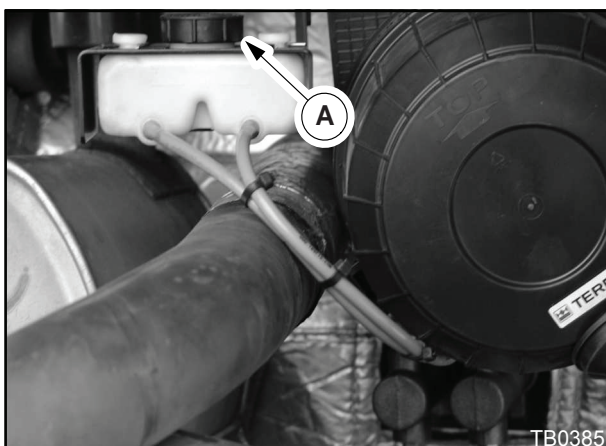
NOTE: Clean around the filler cap before re-fuelling.

NOTE: When installing the cap, make sure that it is correctly placed in the notches and then lock it by tightening up to the stop.

NOTE: The fuel cap can be locked by a key.

Located on the right-hand side of the machine, the tank capacity is 130 litres (34.2 US gals).

In cold weather, use fuel corresponding to the ambient temperature, see "Fluids and Lubricants" section on page 9-3.



Description

Hydraulic Reservoir

NOTICE

NOTICE: Use a suitable hydraulic fluid. See “Fluids and Lubricants” section on page 9-3.

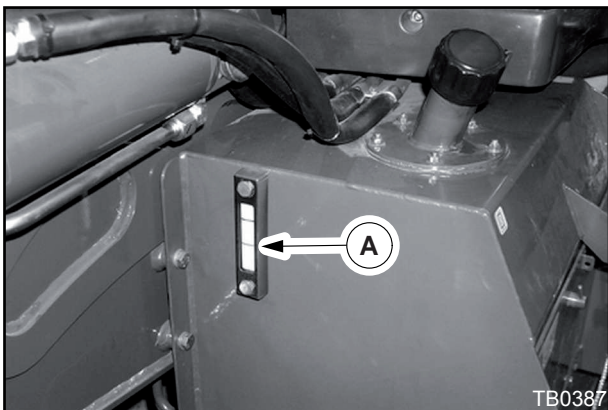
NOTE: Clean around the filler cap before refilling.

To refill the reservoir, see “Hydraulic System” section on page 9-32.

Use a suitable hydraulic fluid. See “Fluids and Lubricants” section on page 9-3.

When installing the cap, make sure that it is correctly placed in the notches and lock it by turning clock-wise until it stops.

The sight glass shows the level of fluid in the reservoir. See “Hydraulic System” section on page 9-32.



Loader Attachment Support Strut

Located on the left-hand side of the loader attachment (A), this safety strut enables the loader attachment to be secured in the raised position during inspection, service or repair.

Locked position

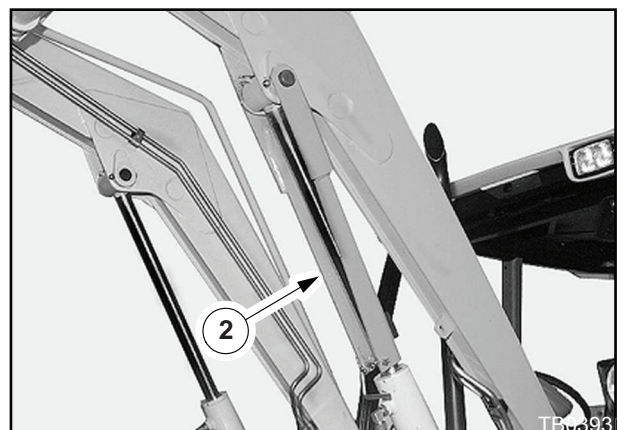
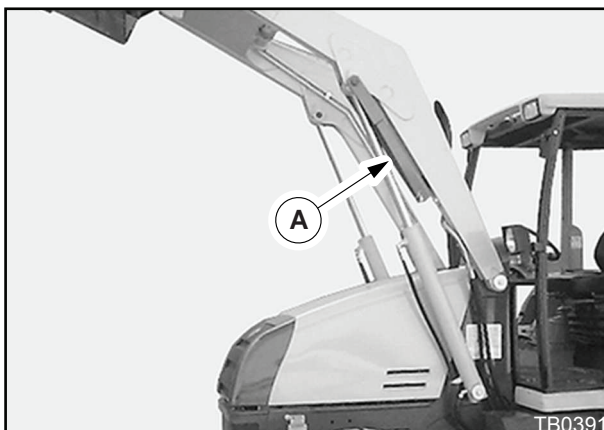
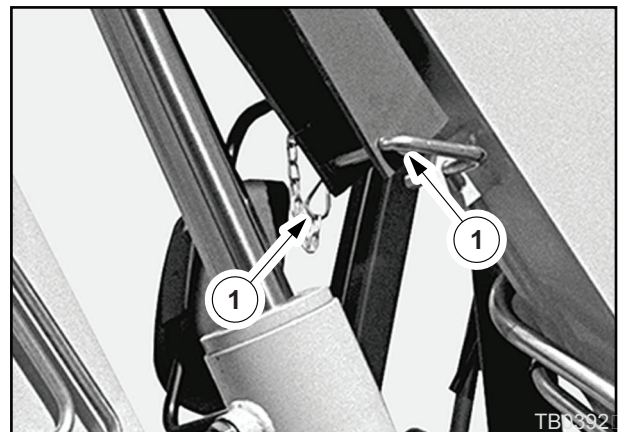


WARNING: It is essential to support the safety strut before removing the "U" bar.



WARNING: It is essential to install the safety strut when carrying out any operation requiring the loader attachment to be in the raised position.

1. Raise the loader attachment completely, stop the engine, engage parking brake and remove the starter switch key.
2. Remove the retaining pin (1) and "U" bar (2).
3. Place the strut on the cylinder rod and install the pin and "U" bar in the holes in the strut.



Description

Unlocked position

1. Remove the retaining pin (1) and "U" bar (2).
2. Swing the strut (A) against the lift arm and install the pin and "U" bar in the holes in the strut and the retaining lug.
3. Start the engine and lower the loader attachment.

NOTICE

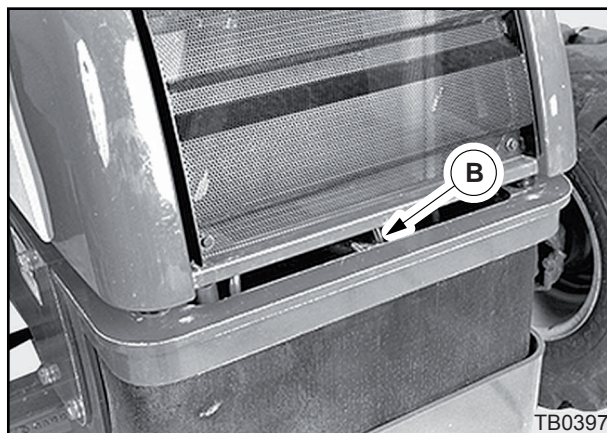
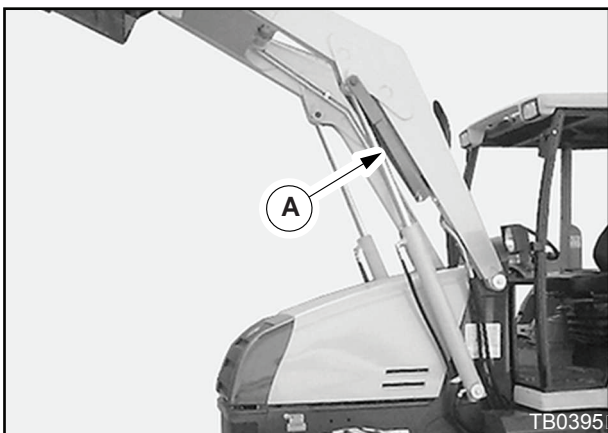
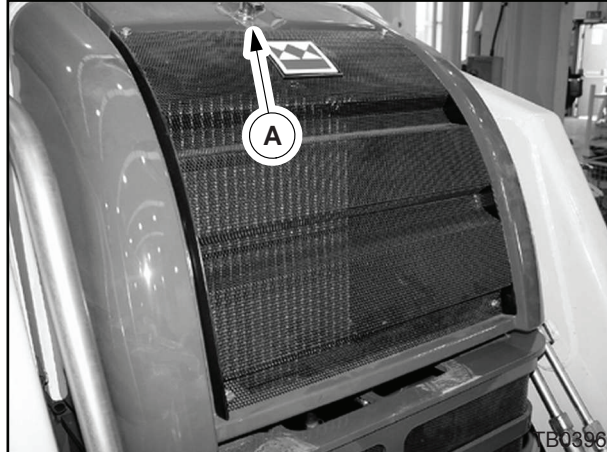
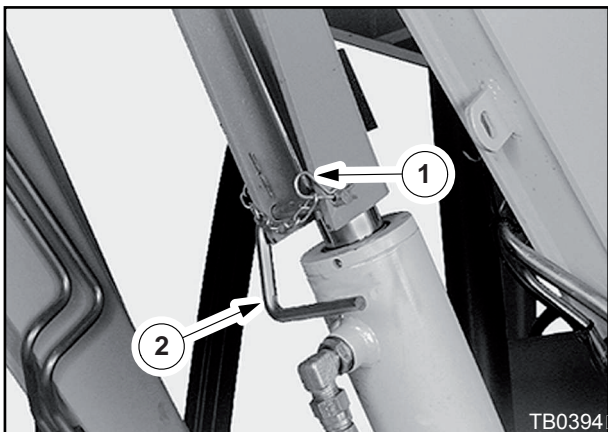
NOTICE: Before lowering the loader attachment, make sure that the engine bonnet is closed.

Engine Bonnet



WARNING: It is essential to install the loader attachment support strut before any servicing work is done on the engine.

1. Release the catch by means of the key. (A)
2. Move the safety catch (B) sideways to open the engine bonnet.
3. To close the bonnet, lower it and then lock it.



Ride Control System (optional)

WARNING: Never use the ride control system when using the backhoe attachment.



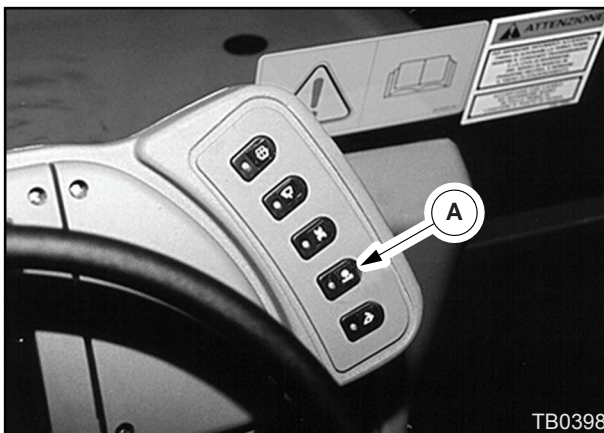
WARNING: Never operate the ride control system when the front wheels are raised off the ground. The machine could fall and cause serious injury.

NOTICE

NOTICE: Consult your dealer for any checking required on the ride control system.

The ride control system improves the machine behaviour during travel, regardless of the type of terrain and with the loader bucket full or empty. It reduces forward and rearward pitching when moving rearwards or forwards and when carrying loads, at the same time increasing productivity and operator comfort. It also minimises impact forces to which the machine may be subjected.

1. Press the switch (A). The indicator lamp comes on.

With cab**Without cab**

NOTE: The loader beams may rise or lower slightly when the control is operated.

When the system is no longer required, press the switch again. The indicator lamp goes out.

When the ride control system is operating, the loader beam is subject to hydraulic shock absorption while the machine is travelling.

The ride control system should not be used during precise levelling operations or when an exact loader bucket position has to be maintained.

Description

Wheel Chock (specific to certain countries)



WARNING: Whenever parking the machine on sloping ground, use the wheel chocks to immobilize the machine (specific to certain countries).

The wheel chock (A) is located on the right-hand stabilizer (with the operator's seat in the loader attachment position).

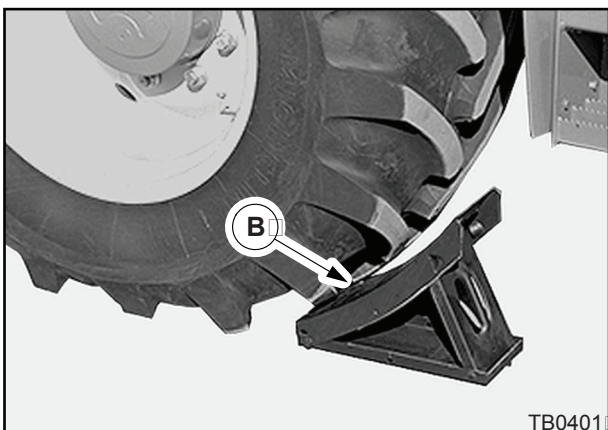
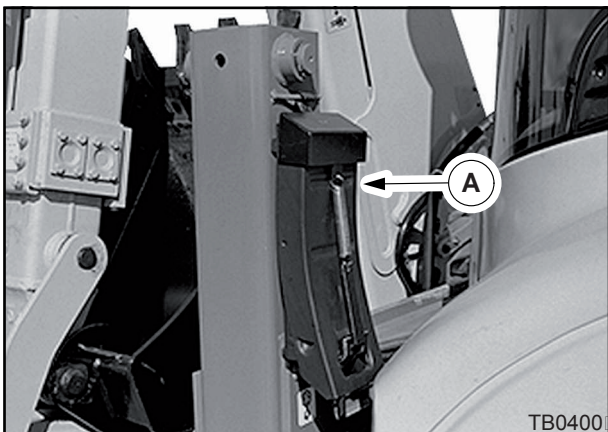
Unfold the wheel chock and place the chock under a wheel (B).

After use, fold up the chock again and replace it in this housing.

Tooling

The machine is supplied with these tools which are located in the tool box:

- 1 Grease gun
- 1 Wheel brace

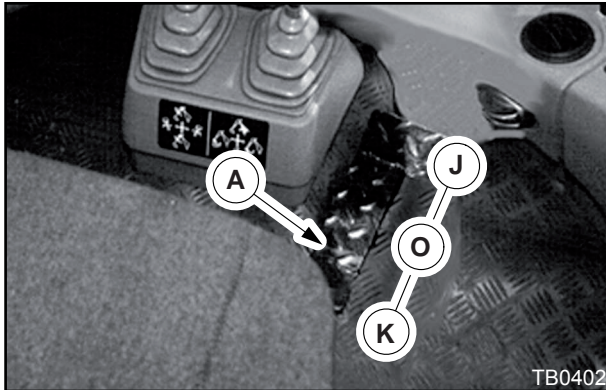


Backhoe Attachment Auxiliary Hydraulic Tool Controls (optional)

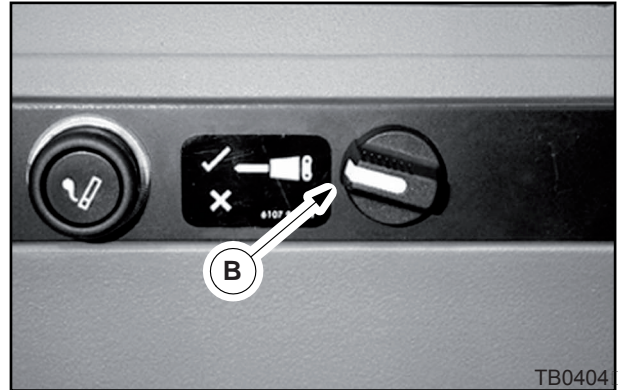
For instructions on how to use these controls, see “Backhoe Attachment Auxiliary Hydraulic Tools (optional)” section on page 7-20.

Operating control pedal

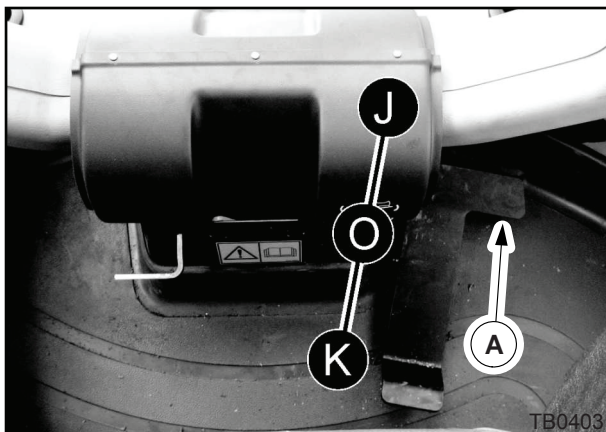
Mechanical control



All models



Servo control



To operate the auxiliary hydraulics, use the rotary control on the side console, select the hydraulic hammer symbol.

This pedal has three positions:

Position (0): Neutral. This position enables the movement of the auxiliary hydraulic tool to be stopped.

Position (J): The auxiliary hydraulic tool operates.

Position (K): The auxiliary hydraulic tool operates. This position also operates hydraulic hammer.

Description

Auxiliary Hydraulic Circuit

Hydraulic oil flow from the tandem hydraulic pumps.

MODEL	760/820	860/880	870	970/980
HYDRAULIC FLOW Litres/min. at 2200 rpm.	142	160	160	160

It is essential that operators match both the flow and the pressure characteristics of the attachments (such as a hammer) fitted by a dealer. This will prevent damage due to either excessive flow or excessive pressure.

Regulating oil flow to an attachment

Before operating an attachment fitted to any machine referenced above, the oil flow to the attachment must be regulated to it by setting the engine rpm, using the hand throttle. Please refer to the following table and match the correct engine rpm, with the corresponding oil flow requirement of the attachments, for the appropriate model.

For example, a 860 machine with a hammer attachment, must not be operated at above 1200 engine rpm, if the hammer attachment has a maximum flow requirement 90 litres/min.

Maximum Operating Speed Setting of Engine (RPM)	FLOW REQUIREMENT OF ATTACHMENT (Litres/min.)			
	760/820	860/880	870	970/980
800	50	57	57	57
900	57	65	65	65
1000	63	72	72	72
1100	70	80	80	80
1200	78	89	89	89
1300	83	95	95	95
1400	88	101	101	101
1500	96	110	110	110

Backpressure

When selecting an attachment to connect to the machines hydraulic circuit, check the maximum hydraulic return line back pressures, to ensure it is compatible with the attachment. This check is to be carried out by an authorised dealer

Engine at 1000rpm - 5 bar

Engine at 2200 rpm - 13 bar



CAUTION: Exceeding the correct engine rpm will result in:-

- Overheating of the hydraulic oil.
- Excessive fuel consumption.
- Excessive noise levels.
- Damage to the attachment.

Before any person connects any attachment, they must also refer to the attachments Operator's Manual.

Battery



WARNING: Remove the battery master switch key (disconnected) before carrying out any servicing work on the Electrical System.



WARNING: Battery electrolyte causes severe burns. The battery contains sulphuric acid. Avoid any contact with the skin, eyes or clothing.

Antidote:

EXTERNAL: Rinse with water.

INTERNAL: Drink large quantities of water or milk. Then drink milk of magnesia, a beaten egg or vegetable oil. Call a doctor immediately.

EYES: Rinse with water for 15 minutes and consult a doctor quickly.



WARNING: A spark or flame can cause the hydrogen in a battery to explode. To prevent any risk of explosion, observe the following instructions:

- Remove the battery master switch key (disconnected).
- When disconnecting the battery cables, always disconnect the negative cable (-) first.
- When reconnecting the battery cables, always connect the negative (-) cable last.
- Never short-circuit the battery terminals with metal objects.
- Do not weld, grind or smoke near a battery.



WARNING: Batteries produce explosive gases. Keep away any flame, spark or cigarettes. Always provide good ventilation when charging a battery or using a battery in an enclosed space. Always protect your eyes when working near a battery.

Description

Accessing the Battery

NOTICE

NOTICE: Before carrying out any service work on the battery, see "Battery" section on page 5-59.

NOTICE

NOTICE: Remove the battery master switch key (optional) before carrying out any service work on the battery.

Release the retaining catch (A) and swing down cover plate.

NOTE: These batteries do not require the addition of distilled water.

Battery Master Switch

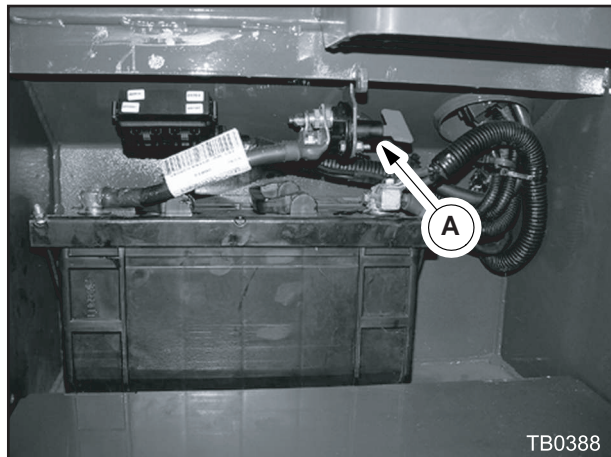


WARNING: The battery master switch key must not be removed with the engine running. As this can cause serious damage to the electrical system including the alternator.

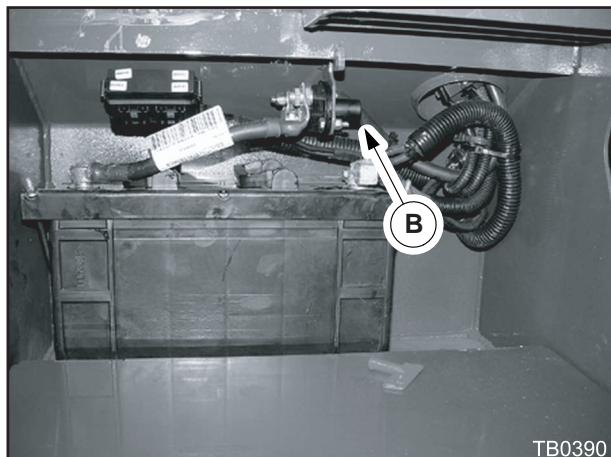
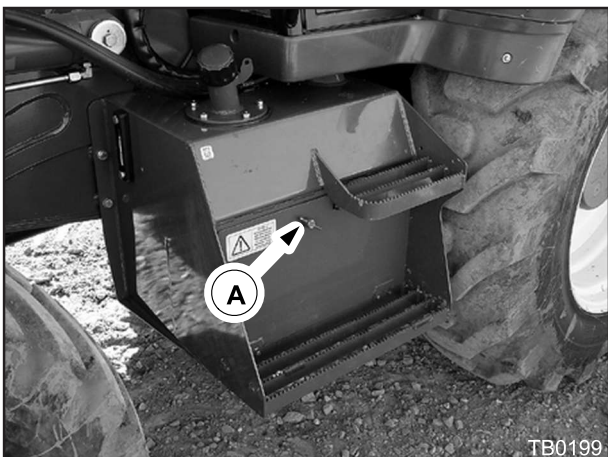


WARNING: The battery master switch key must be removed after each working day, during maintenance operations, for any service work on the electrical system and when leaving the machine unattended.

Located on the left-hand side of the machine, the battery master switch (A) is used to disconnect the battery completely from the electrical system.



When the battery master switch key is in position, the circuit is connected. When the battery master switch key is removed (B), the circuit is disconnected.



Fuses and Relays

NOTICE

NOTICE: Before replacing fuses, remove the battery master switch key (optional).

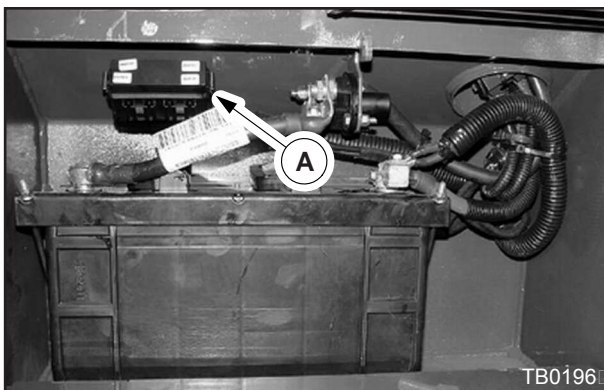
NOTICE

NOTICE: Never replace a fuse with one of a different amperage.

The main fuse box is located next to the battery (A), and the secondary fuse/relay board is located at the front of the side console (B). Remove the cover plate to gain access to the fuses and relays.

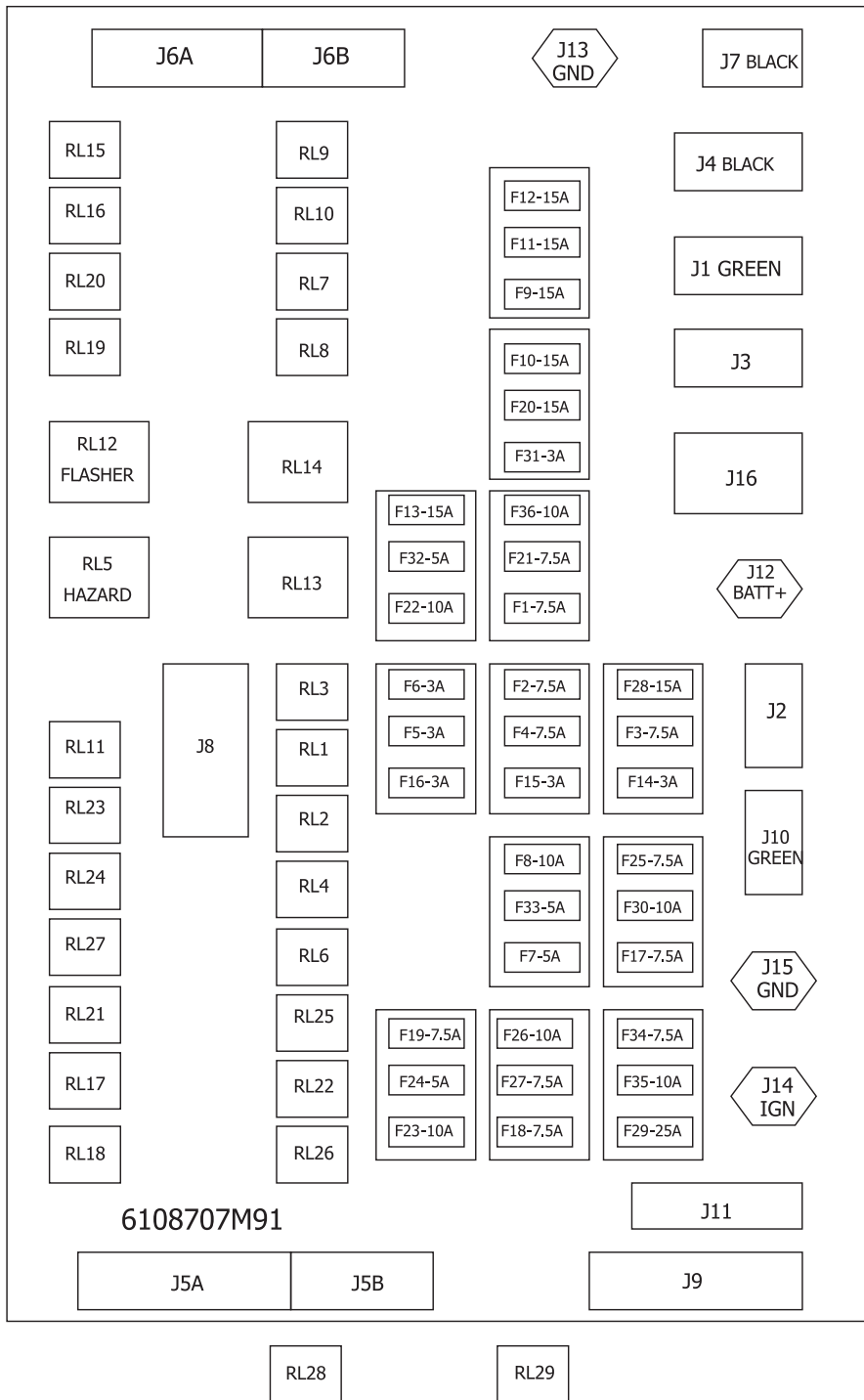
Servo Control

The servo control inline fuse (C) (if equipped) is located under the secondary fuse/relay board cover.



Description

Powerboard fuses and relays



Relays

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Headlight - Main. 2. Headlight - Dip. 3. Sidelights/Number Plate/Illum Inst. Pack. 4. Brake Lights. 5. Hazard enable. 6. Indicator/hazard enable. 7. Front Wiper. 8. Rear Wiper. 9. Front Washer. 10. Rear Washer. 11. Front Horn/Rear Horn. 12. Indicators flasher unit. 13. Front Worklights. 14. Rear Worklights. 15. Rotating Beacon. | <ol style="list-style-type: none"> 16. Float enable relay. 17. Clamp (Ride control solenoids on TX760B axial ROPS). 18. Digger Quick Attach. 19. Return To Dig (RTD). 20. Unloader. 21. Loader Quick Attach. 22. Ride Control Solenoids (Excluding TX760B axial ROPS). 23. Gearbox - Forward. 24. Gearbox - Reverse. 25. 4WD Switch. 26. Hose Burst. 27. Gearbox - neutral. 28. Ignition relay (70A). 29. Starter motor relay. |
|--|--|

Fuses

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Headlight - Main - Left 7.5 A 2. Headlight - Main - Right 7.5 A 3. Headlight - Dip - Left 7.5 A 4. Headlight - Dip - Right 7.5 A 5. Sidelights - Left/Number Plate 3 A 6. Sidelights - Right 3 A 7. Indicators 5 A 8. Hazard 10 A 9. Worklights - Front 15 A 10. Worklights - Front 15 A 11. Worklights - Rear 15 A 12. Worklights - Rear 15 A 13. Rotating Beacon 15 A 14. Brake Light - Left 3 A 15. Brake Light - Right 3 A 16. Instrument Pack Illumination 3 A 17. Difflock/4WD 75 A 18. Clamp/Q/A Digger/Q/A Loader (Ride control on TX760B axial ROPS) 7.5 A | <ol style="list-style-type: none"> 19. Return To Dig (RTD)/Unloader Valve 7.5 A 20. Wipers/Washers 15 A 21. Interior Light/Radio 7.5 A 22. Front Horn/Rear Horn 10 A 23. Ride Control Solenoids (Excluding TX760B axial ROPS) 10 A 24. Gearbox - Forward/Reverse 5 A 25. Fuel Solenoid/Fuel Enrich 7.5 A 26. 4WS/Crab 10 A 27. Air Conditioning Switch 7.5 A 28. Cigar Lighter 20 A 29. Heater 25 A 30. Switch Pack & I Pack - Ignition 10 A 31. Switch Pack & I Pack - Battery 3 A 32. Battery Relay Coils 5 A 33. Ignition Relay Coils 5 A 34. Powershuttle Ignition 7.5 A 35. Air Seat 15 A 36. Powershuttle Battery 10 A |
|---|--|

Main fuse box

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Alternator 125 A 2. Cab (Ignition) 80 A 3. Cab (Battery) 80 A | <ol style="list-style-type: none"> 4. Ignition Feed (Thermostat) 20 A 5. Starter Relay and Solenoid 40 A |
|--|--|

Inline fuses

1. Servo control 10 A

Description

6 - Inspection

820

860/880 SX & ELITE

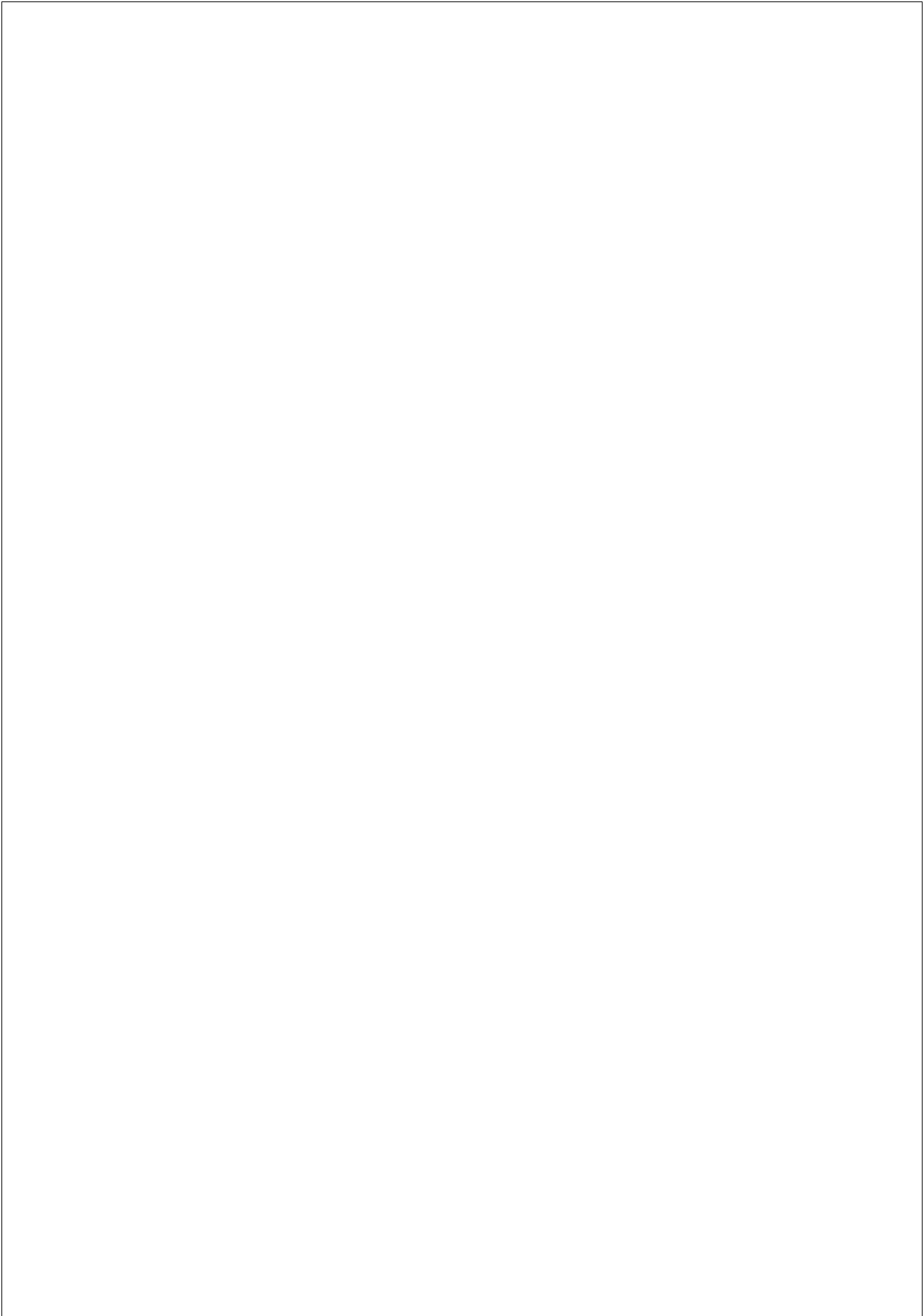
970/980 ELITE

TX760B

TX860B

TX970B

Backhoe Loader



General Inspection Before Operating Machine



WARNING - Read and ensure that you understand the instructions and warnings shown in this manual before operating the machine.

Before each days operation of the Backhoe the operator must perform the General Inspection as outlined in the Check List on the following page.

The purpose of the Operators Inspection is to keep the Backhoe in proper working condition and to detect any signs of malfunction during normal operation between scheduled maintenance intervals.

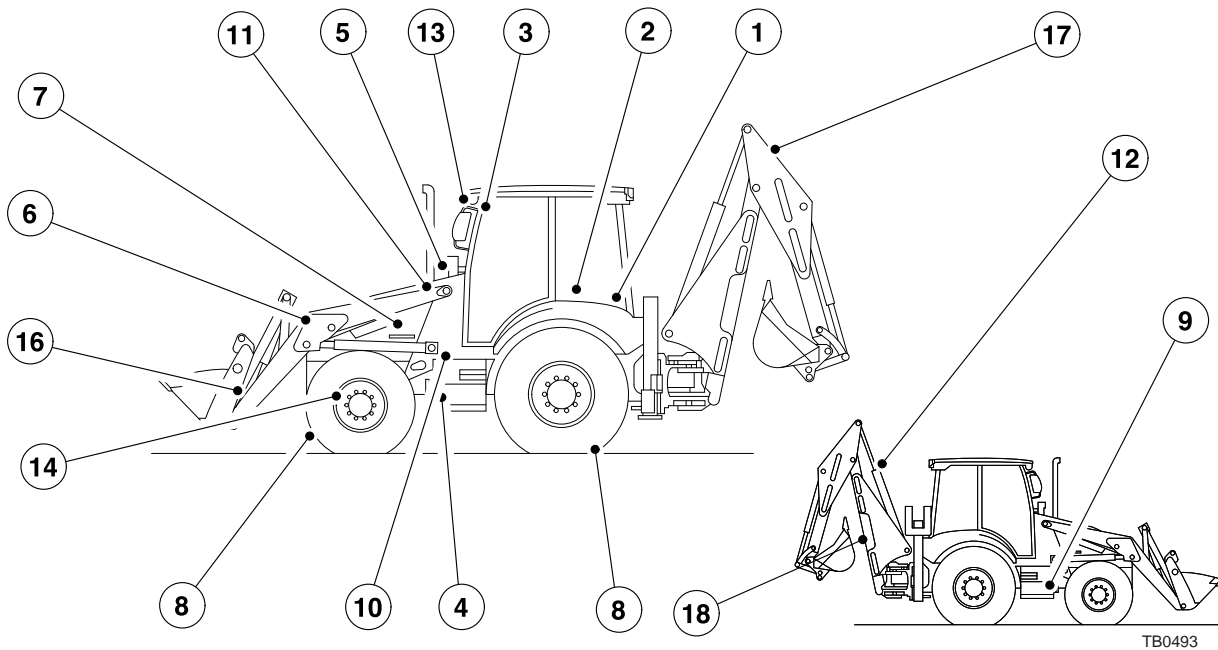
Read the Safety Section of this manual before performing the inspection.

While it may not be the operators responsibility to perform mechanical maintenance the operator must be thoroughly familiar with the machine and its proper care since their own safety is involved

Before operating the machine, observe the following instructions :

- Check the levels (engine oil, transmission oil, hydraulic fluid, brake fluid and engine coolant) and make sure that the various fluids correspond to the conditions of use. See “Operating the Machine in Cold Weather” section on page 7-7 and see “Fluids and Lubricants” section on page 9-3.
- Carry out the daily maintenance operations, see “Service Information” section on page 6-3.
- Walk round the machine, look for any leaks and inspect the hoses. Tighten or replace any items as required, see “Maintenance and Lubrication” section on page 9-1.
- Before undertaking any road travel, lock the attachments, raise the stabilizers completely and install the safety systems required by regulations. See “Road operation” section on page 7-27.
- Before any road travel or job site work at night, check that the lighting and signalling systems are operating correctly.
- Check the condition and pressure of the tyres. See “Wheels and Tyres” section on page 9-55.
- Clean the steps and access handles. The presence of oil, mud or ice (winter) can cause accidents. Make sure they are always clean.
- Clean or replace safety decals which are no longer legible. See “Description of Symbols and Pictorials Used on Safety Signs” section on page 3-12.
- Make sure that the engine bonnet is closed and latched correctly.
- Make sure that the cab doors (cab version) are closed correctly.
- Remove anything which might hinder visibility. Clean the windiest windows (cab version) and rear view mirrors.
- Make sure that no objects or tools are left on the machine or in the operator’s compartment.
- Make sure you know how to evacuate the machine (emergency exit via the right-hand side) in case access by the left-hand side is impossible.
- Make sure that the right-hand door (cab version) is not locked.
- Make sure that nobody is under or on the machine. The operator should be the only person on the machine.
- Make sure that nobody is within the working range of the machine.
- Ensure operators floor is clear of loose items.
- Check the machine for loose, worn or damaged pins.
- Check the machine structure for cracks or damage.

Daily Operator Checks



TB0493

1	Instruction Manual	Present and Legible	-
2	Seat Belt	Working and Undamaged	-
3	ROP's Frame	Check for Damage	-
4	Battery	Check Electrolyte Level	-
5	Air Cleaner	Clear and unobstructed	-
6	Engine Coolant	Check Level (ONLY with Engine Cold)	-
7	Engine Oil	Check Level	-
8	Tyres	Check for Correct Inflation and Damage	-
9	Fuel	Check Level	-
10	Hydraulic Tank	Check Level	-
11	Brake fluid	Check Levels	-
12	Hydraulic Rams and Hoses	Check Condition and Signs of Leakage	-
13	Lighting (If Fitted)	Check Operation	-
14	Front axle pivots	Grease	1 Point
15	Loader attachment pivots	Grease	14 Points
16	7 in 1 loader bucket (if equipped)	Grease	4 Points
17	Backhoe attachment pivots (Sideshift (offset) backhoe)	Grease	24 Points
18	Backhoe attachment pivots (Centremount (axial) backhoe)	Grease	23
Various	Safety Decals	Check if Present and Legible	-

Service Information

Observe the servicing intervals by the checking the hourmeter every day. Before starting maintenance, park the machine on flat, firm ground, away from any obstacles, with the loader bucket and the backhoe bucket on the ground. All maintenance operations must be carried out with the engine stopped and the key removed

from the starter switch. It is preferable to wait for all circuits to cool down before starting work.

Clean the grease fittings before lubrication. Clean around plugs and filler holes before adding oil. No dust or dirt must enter the components or the circuits.



WARNING: There is a risk of serious injury if maintenance or repairs are not performed correctly. If you do not understand the maintenance procedures, consult your local dealer.



WARNING: If the attachment is raised or the machine moves when there is no operator, serious injury can result. Before carrying out any servicing operator on this machine, proceed as follows :

1. Park the machine on a flat, level ground.
2. Lower the loader and backhoe attachments until they are resting on the ground.
3. Stop the engine and remove the starter switch key.
4. Engage the parking brake.
5. Lock the loader attachment controls (all models, if equipped).
6. Block the wheels to prevent any machine movement.

For all service work on the engine, install the loader attachment support strut.



WARNING - Never leave the operator's compartment when the engine is running.

When performing maintenance work on the machine, place a "Do not start up" label on the instrument panel.

Any modification to this machine without prior authorization could cause serious injury. Do not make any modifications without authorization. Consult your local dealer.

If you use your machine under particularly severe conditions (dusty or corrosive atmosphere, etc.) reduce the interval between servicing operations.

Observe the Servicing Intervals for all the machine's filters. The life of the engine depends on clean filters.

Do not drain used oil into the ground or down a drain. Stock the oil in sealed containers for collection by a company which recycles or disposes of it.

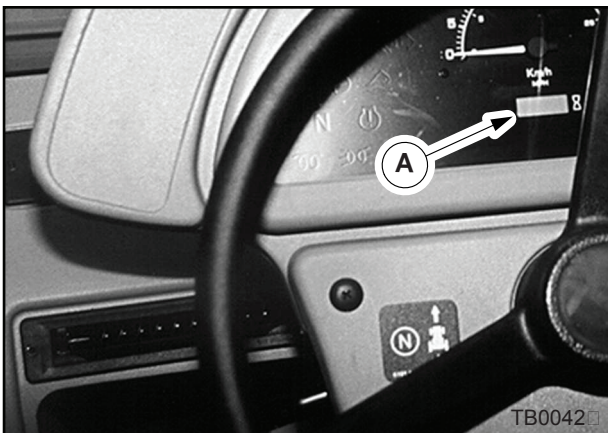
Inspection

Hourmeter

The hourmeter (A) enables servicing operations to be scheduled. It works in the same way as a clock when the ignition is turned on.

Servicing Intervals are properly calculated to guarantee safe and efficient machine operation.

Be sure to carry out all the servicing operations properly, as defined in this manual.



7 - Operating Instructions

820

860/880 SX & ELITE

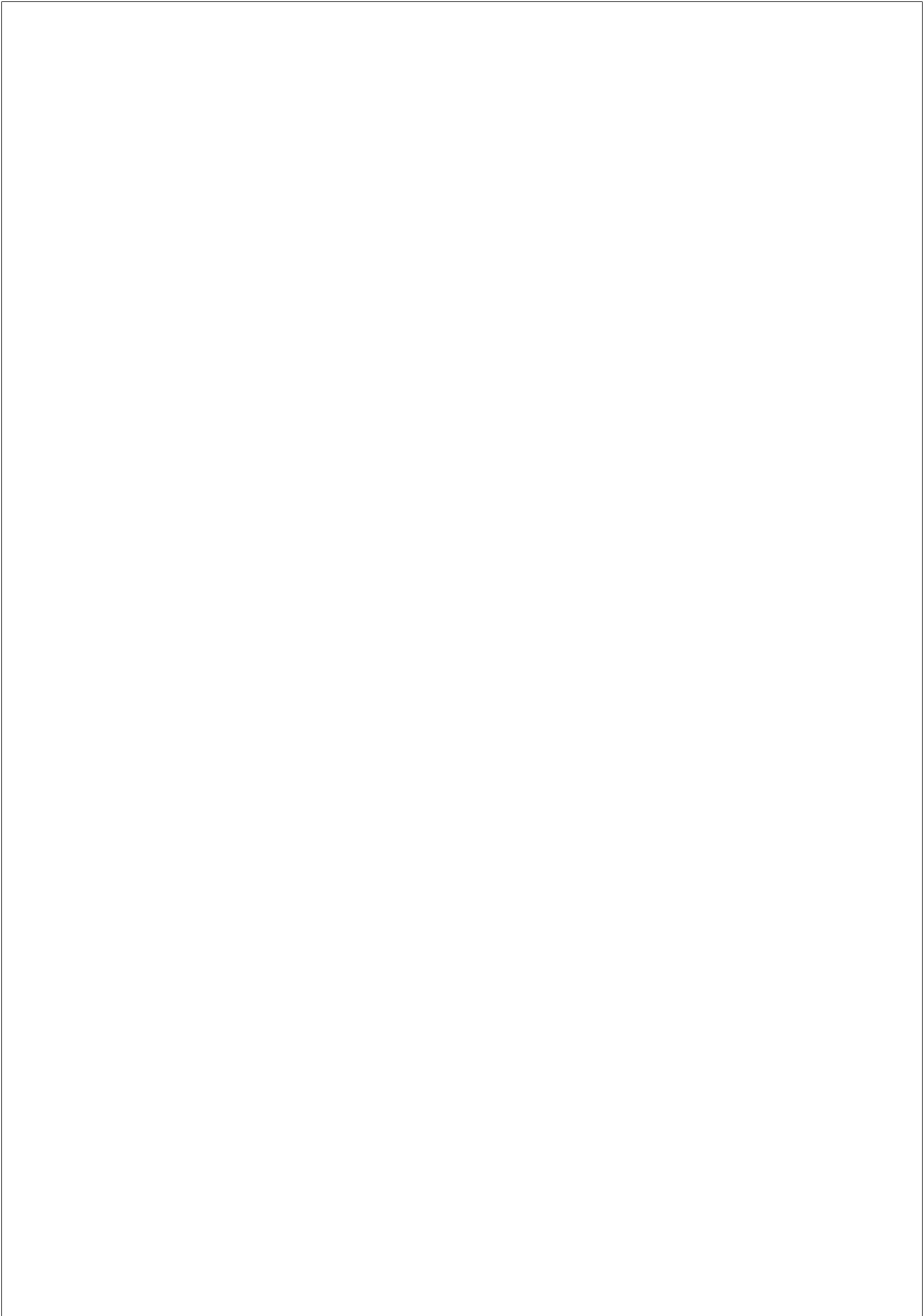
970/980 ELITE

TX760B

TX860B

TX970B

Backhoe Loader



Operating the Machine



WARNING: Check that all the controls and all the safety devices operate correctly in a safe, clear area before beginning work.

When operating the machine the following instructions must be observed :

- Start the engine taking into account weather conditions. See "Starting the Engine" section on page 7-3.
- Regularly consult the hourmeter to ensure Servicing intervals are observed. See "Service Intervals" section on page 6-5.
- If you use the machine under particularly severe conditions (dusty or corrosive atmosphere, etc.), the Servicing Intervals should be reduced.
- If this machine is new or if the engine has been re-conditioned. See "Running-In Period" section on page 7-2.
- Make sure that you know the location of underground services such as gas, electricity, telephone or mains water before starting work.
- Do not work near overhead high-voltage electrical cables without checking beforehand that all necessary measures have been taken to respect the minimum distances:
Under 57,000 volts: 3 metres (118 inch).
Over 57,000 volts: 5 metres (197 inch).
- On job sites on the public highway, use regulation signals, taking into account the working range of the machine. Local regulations define the number, type and location of reflective strips.
- Make sure that the operator's seat is correctly adjusted and positioned.
- Never operate any control or driving component unless you are seated correctly in the operator's seat with the seat belt adjusted and attached correctly.
- Adapt your operating style to the type and conditions of work. See "Loader Attachment Operating Instructions" section on page 7-34.
- Do not allow anyone to stand in the machine working area. Stop all movement until the person has moved away.
- Use all the controls gradually so that the machine works smoothly.
- If the machine has to work in water, see "Operating the Machine in Water" section on page 7-30.
- When loading the machine onto the trailer of an articulated vehicle, see "Transporting the Machine" section on page 8-1.
- When towing the machine, see "Towing the Machine" section on page 8-4.
- Load lifting should be carried out in accordance with the instructions given in this manual and in accordance with prevailing regulations. See "Lifting the Machine" section on page 8-3.
- Avoid running the engine in an enclosed space. Ensure good ventilation under all circumstances.
- Dust, smoke or fog can reduce visibility and cause an accident. Stop or slow down the machine until normal visibility is restored.
- If there is any operating problem or damage move the machine to a place of safety, stop the engine, engage parking brake, remove the starter switch key. Find the cause or contact your local dealer and take the necessary measures to prevent the use of the machine. Place a "Do not start up" label on the instrument panel.
- When stopping the engine take account of weather conditions. See "Stopping the Engine" section on page 7-6.
- When parking the machine, see "Parking the Machine" section on page 7-30.

Running-In Period

Your machine will last longer and give better and more economical performance if you pay particular attention to the engine during the first twenty hours of operation.

During this period:

Keep a close watch on the instrument panel.

Check the oil and engine coolant levels frequently.

Operate the machine at normal speeds during the first eight hours. Do not run the engine too much at stalling speeds (with the wheels turning slowly or stopped and the engine at full speed).

Maintain the engine at the normal operating temperature.

Do not run the engine at idle speed for long periods.

During the running-in period, the following inspections and maintenance operations must be carried out in addition to the operations shown in the Maintenance Programme:

After the First 50 Operating Hours

1. Check engine oil and filter. See "Engine" section on page 9-21.
2. Check hydraulic oil filter. See "Hydraulic System" section on page 9-32.
3. Check air filter. See "Air Filter" section on page 9-37.
4. Change transmission oil and filter. See "Transmission" section on page 9-41.
5. Clean transmission strainer. See "Transmission" section on page 9-41.
6. Change front (4 wheel drive) and rear axle oils. See "Front and Rear Drive Axles and Reduction Gears" section on page 9-47.
7. Check front reduction gear oil level (2 wheel drive). See "Front and Rear Drive Axles and Reduction Gears" section on page 9-47.
8. Check road wheel nuts for tightness daily until stabilised. See "Wheels and Tyres" section on page 9-55.
This wheel nut checking procedure must be applied also for any wheel which is removed and replaced, for any reason.
9. Check fan belt tension. See "Engine Alternator and Fan Belt" section on page 9-59.
10. Check the brake fluid level. See "Brake System - 'Safim'" section on page 9-27.
11. Check brake adjustment. See "Parking Brake Inspection" section on page 9-63.
12. Check bolt torques on cardan shafts to front and rear axles. See "Steering and Axles" section on page 9-67.
13. Check bolt torques on transmission mounting bolts. See "Transmission" section on page 9-67.
14. Check loader control lever lock (if equipped). Engage the loader control lever lock and attempt to move the loader control levers.
15. Check the automatic loader bucket levelling for correct adjustment and operation.

Running-in

NOTICE

NOTICE: Do not operate the engine at high speeds without a load.

NOTICE

NOTICE: Do not overload the engine.

A gradual running-in of a new engine or an exchange engine is not necessary. Prolonged operation at light loads during the early life of the engine can cause lubricating oil to enter the exhaust system. Maximum load can be applied to a new engine as soon as the engine is put into service and when the coolant temperature has reached a minimum of 60°C (140°F).

The engine will benefit if the load is applied as soon as possible after the engine is put into service.

Starting the Engine

NOTE: After the machine has not been operated for an extended period, see “Storing the Machine” section on page 9-90.

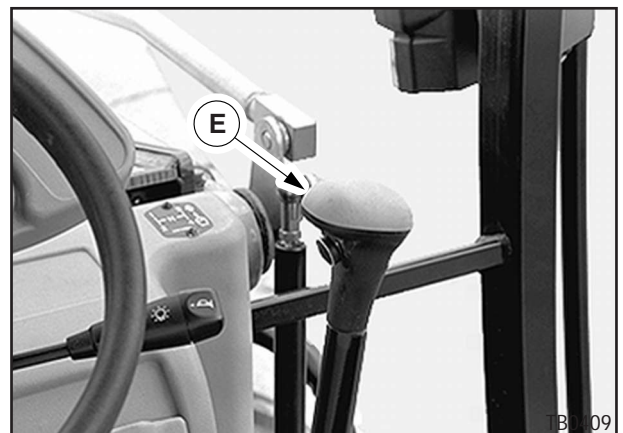
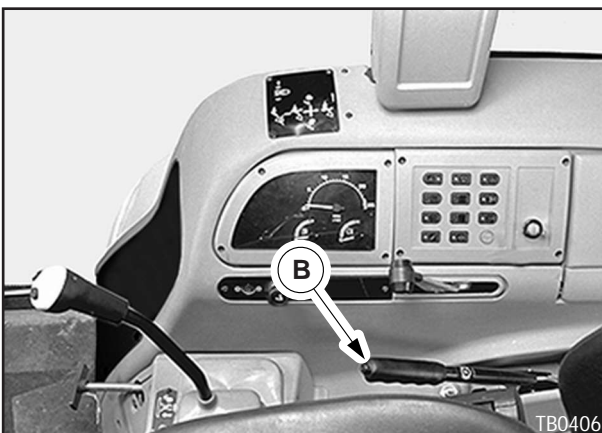
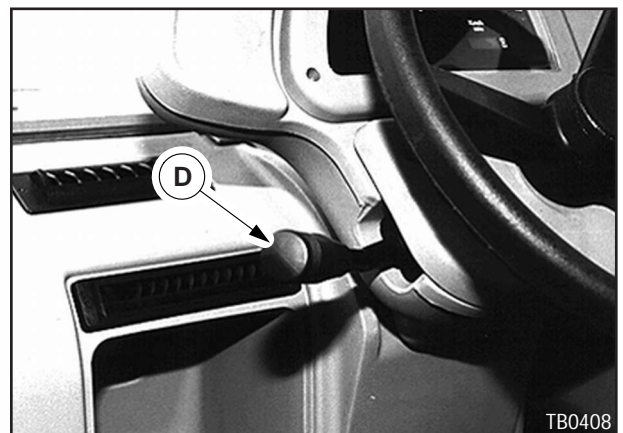
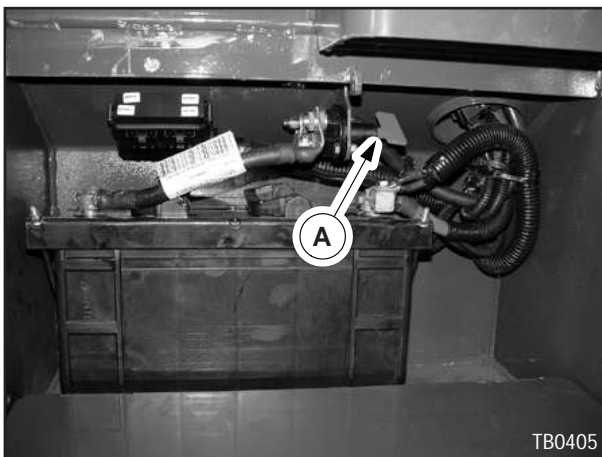
NOTE: If you have to start the engine by means of a booster battery, see “Connecting a Booster Battery” section on page 9-78.

1. Connect the electrical system by means of the battery master switch key (A) (optional).
2. Check that the parking brake (B) is engaged.

3. Check the engine throttle lever (C) is in low idle position.
4. Check that the direction of travel lever (D) (synchroshuttle only) or transmission control lever (Powershuttle only) is in the neutral position.

NOTE: If this is not done the audible warning device will sound and it will be impossible to start the engine.

5. Check that the gear change lever (E) is in the neutral position (synchroshuttle only).



Operating Instructions

6. How to start a cold engine with the glow plug starting aid.



WARNING: Do not use aerosol-type starting aids such as ether. Such use could result in an explosion and personal injury.

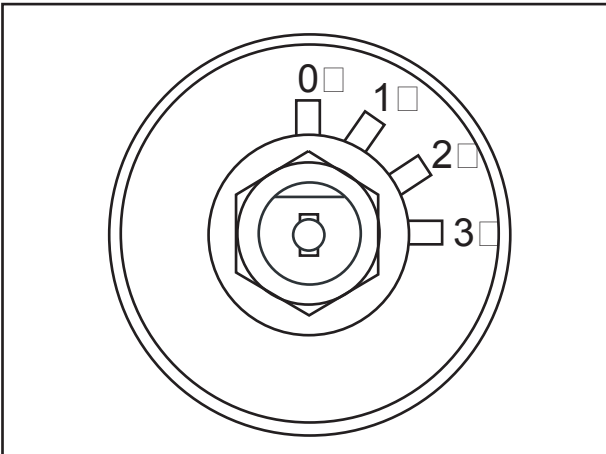


WARNING: Engine exhaust contains products of combustion which may be harmful to your health. Always start and operate the engine in a well ventilated area and, if in an enclosed area, vent the exhaust to the outside.

1. Turn the start key to the "2" position (B) and keep it there for 20 seconds.
2. Adjust the engine speed control to the maximum speed position.
3. Turn the start key to the "3" position (B) to engage the starter motor. Allow the start key to return to the "1" position (B) when the engine starts. Then adjust the engine speed control to give an even idle speed.
4. If the engine does not start in 30 seconds, turn the start key to the "0" position (B) and wait 90 seconds. Turn the start key to the "2" position (B) and hold it there for 20 seconds. Then engage the starter motor again, for a maximum period of 30 seconds.

How to start a warm engine

1. Adjust the engine speed control to one quarter of maximum speed.
2. Turn the start key to the "3" position (B) to engage the starter motor.
3. If the engine does not start in 30 seconds, turn the start key to the "0" position (B) and wait 90 seconds. Then engage the starter motor again for a maximum period of 30 seconds.



Turbo charged engines

Because of the power characteristics of the turbo charged engines, when fitted in vehicles, it is necessary to maintain a high engine speed when you need full load. To ensure that the engine is not overloaded at low engine speeds engage a lower gear.

970/980 Steering Selection

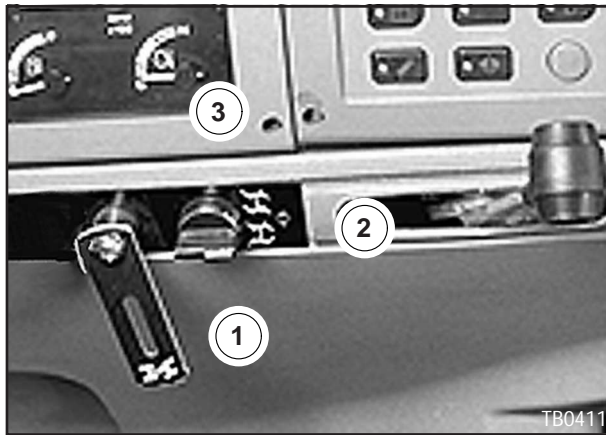
Steering mode switch

Located under the side control panel, this switch makes it possible to select 4 wheel steering, two wheel steering or crab steering. The switch has three positions:

Position (1): 4 wheel steering (4WS)

Position (2): 2 wheel steering (2WS)

Position (3): crab steering



To select 4WS

Turn the steering mode switch to the 4WS position (1), bring front wheels to centre position. Both LEDS will illuminate when the wheels are in the straight ahead

position and then they extinguish when the steering wheel is turned.

To select 2WS

Turn steering mode switch to the 2WS position (2), bring front wheels to centre position. Front and rear LEDS will illuminate and stay on, and 4WS will disengage.

To select crab

Turn selector switch to the crab position (3) and bring front wheels to centre position.

Crab position cannot be selected from 4WS and vice versa, 2WS must be selected first.

Resetting the steering

This operation should be carried out at the start of each day and any other time drift is noticed.

In the event of major misalignment or steering locking up in 4WS or crab position:

- Select 2WS.
- Press and HOLD reset button.
- Turn wheels onto same lock as rear wheels (as in 4WS).
- Select 4WS - then release button.
- Press and HOLD reset button.
- Turn front wheels until they pass through the centre position, then release the button.
- Re-select 2WS and turn the front wheels until 2WS is engaged.



WARNING: Any malfunction must be reported to your local dealer immediately.



WARNING: Travel at on-road speeds in 4WS mode can result in loss of control or unexpected swing-out of the rear end. Travel in crab mode will prevent the normal negotiation of bends, corners and intersections.

Operating Instructions

Stopping the Engine

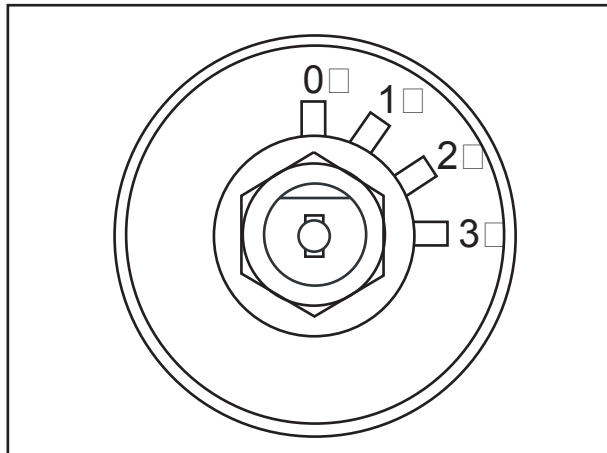
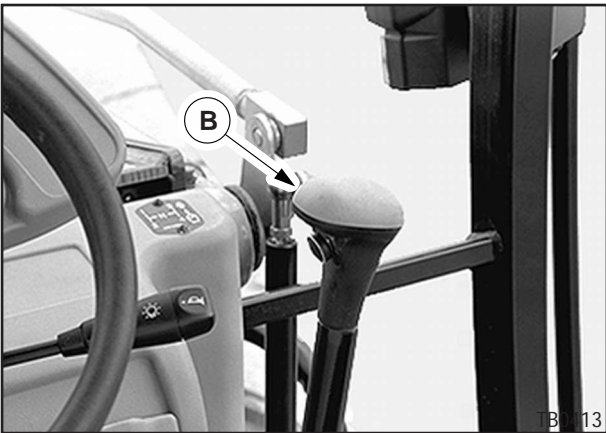
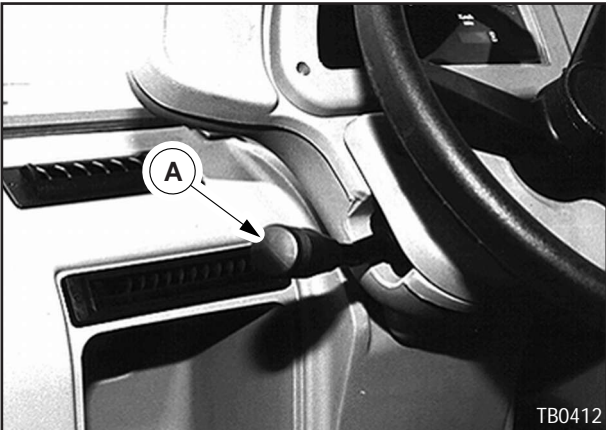
1. Place the direction of travel control lever (synchroshuttle only) or transmission control lever (Powershuttle only) in the neutral position.
2. Place the gear change lever in the neutral position (synchroshuttle only).
3. .Apply parking brake securely.

4. How to stop the engine

Turn the engine start key to the "0" position.

NOTICE

NOTICE: It is recommended that a turbo charged engine is run at approximately 1000 rev/min. at reduced load for 2 to 3 minutes before it is shut down. This allows the turbocharger to cool.



Operating the Machine in Cold Weather

Observe the following recommendations:

Battery

It must be fully charged.

Fuel

1. Refill the fuel tank after each working day to prevent the formation of condensation and the entry of water into the fuel system.
2. To prevent the formation of crystals use a low temperature fuel or mix a protective fluid with your fuel. See "Fluids and Lubricants" section on page 9-3.

Engine oil

The engine oil must have a viscosity corresponding to the ambient temperature. See "Fluids and Lubricants" section on page 9-3.

Engine coolant

It must have a specification corresponding to the ambient temperature. It must contain a minimum of 50% of ethylene glycol solution. See "Fluids and Lubricants" section on page 9-3.

Operating the Machine in Hot Weather

Observe the following recommendations:

1. Maintain the correct level of engine coolant in the engine coolant reservoir.
2. Check the condition of the radiator cap before starting. Replace the cap if necessary.
3. Clean the radiator, the oil cooler and the engine carefully.
4. Check the condition of the alternator and fan belt.
5. Use lubricants with the recommended degree of viscosity. See "Fluids and Lubricants" section on page 9-3.
6. Use an appropriate engine coolant (a mixture of ethylene glycol and water at the required concentration). See "Fluids and Lubricants" section on page 9-3.

Operating Instructions

Setting the Machine in the Backhoe Attachment Working Position

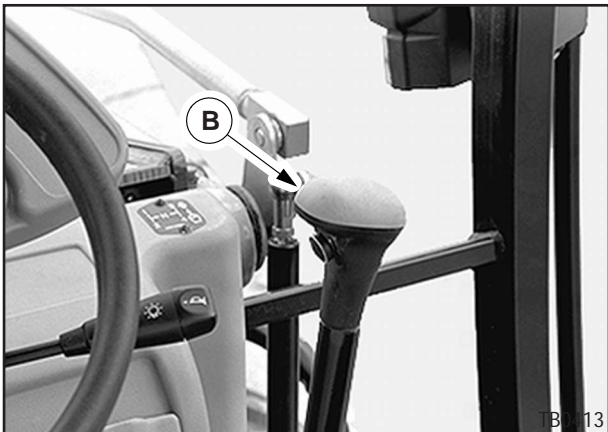
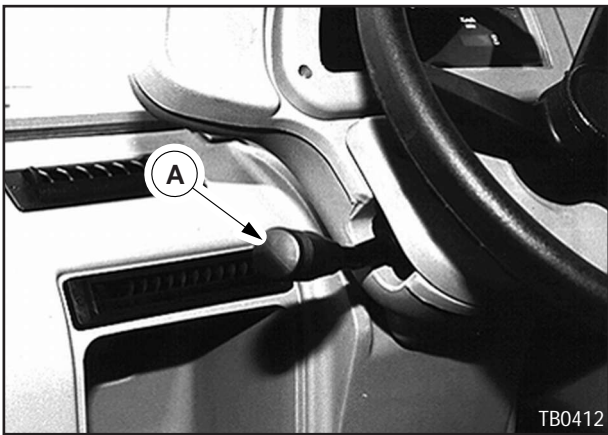


WARNING: Any uncontrolled movement of the machine can cause an accident. Before turning the operator's seat to the backhoe attachment working position, it is essential to place the direction of travel control lever and the gear change lever (synchroshuttle only) or the transmission control lever (Powershuttle only) in the neutral position, the parking brake engaged and lock the loader attachment controls (If equipped).



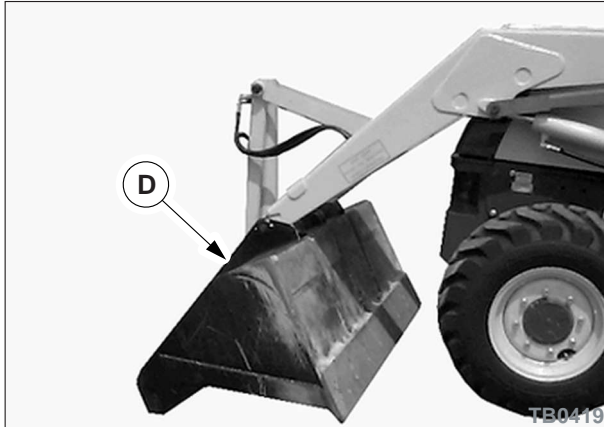
WARNING: Before using the backhoe attachment, place the seat in the backhoe attachment position. Always sit in the seat and attach the seat belt. Serious injury can result if these instructions are not observed.

1. Check that the direction of travel control lever (A) (synchroshuttle only) or the transmission control lever (Powershuttle only) is in the neutral position.
2. Make sure that the gear change lever (B) is in the neutral position (synchroshuttle only).
3. Make sure that the parking brake (C) is engaged.



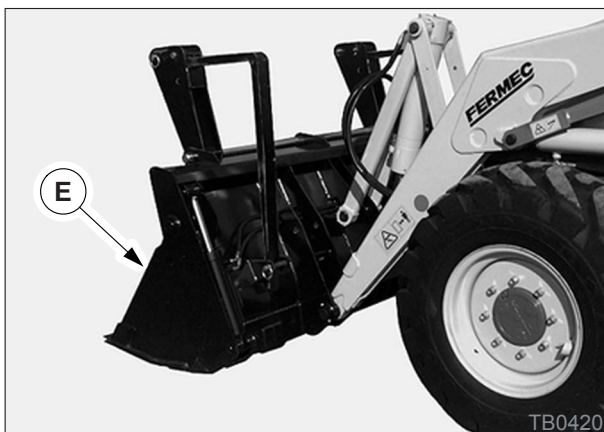
4. Machine with standard loader bucket

Start the engine. Place the loader bucket (D) in the dumping position. Lower the bucket to the ground until the front wheels are about 10 cm (4 inch) above the ground.



Machine with 7 in 1 loader bucket

Start the engine. Place the loader bucket (E) in the level position. Lower the bucket to the ground until the front wheels are about 10 cm (4 inch) above the ground.



5. Turn the seat (F) round to the backhoe attachment position and adjust if necessary.



NOTE: Adjust the servo controls (if equipped) to the working position.

6. Lower the stabilizers. The rear wheels must be about 10 cm (4 inch) off the ground and the machine must be in a horizontal position.



CAUTION: Whenever the backhoe attachment is used the machine must be resting on the stabilizers



WARNING: Before operating the backhoe, ensure that no person is within its working range.

7. Run the engine (G) at about 1800 rpm.



Operating Instructions

8. Raise the backhoe boom. Pull the backhoe attachment boom lever (H) up to release the lock (J).

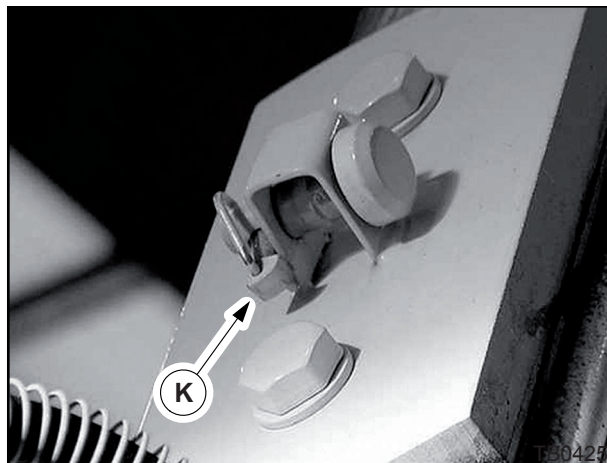
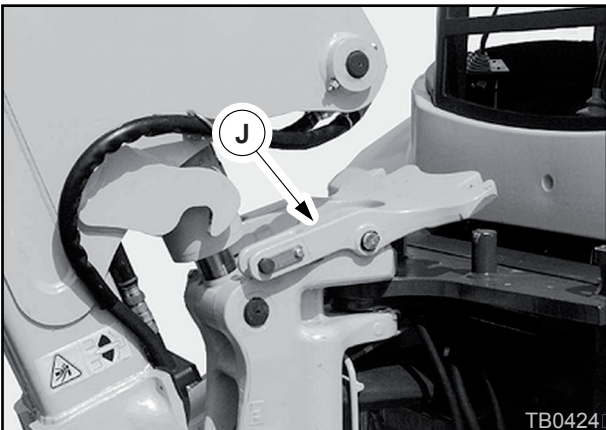
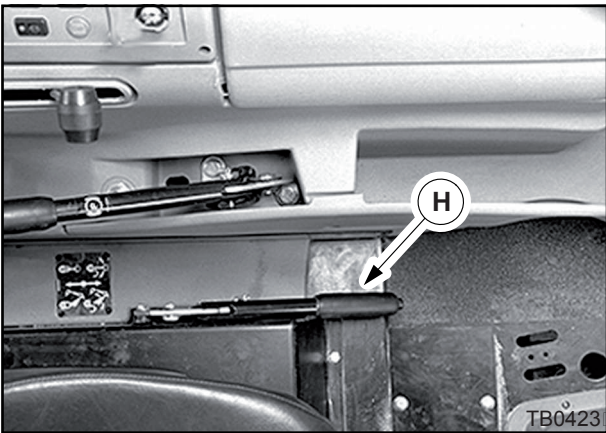
9. When using the extendable dipper (if equipped) make sure that the pin (K) is placed in the external stowage bracket.



WARNING: Before starting work, make sure that no person is within the working range of the machine.



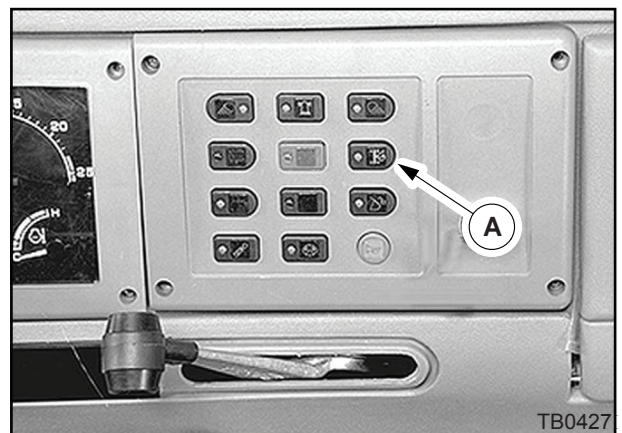
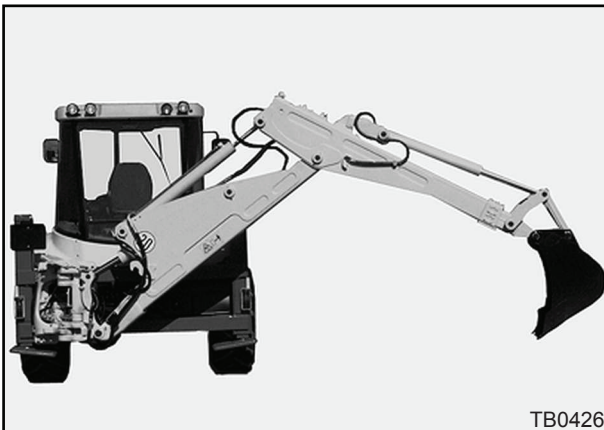
WARNING: Before starting work, check that all the backhoe controls operate correctly.



Backhoe Attachment Sideshift (Sideshift (offset) Backhoe version)

To dig alongside a building or fence, etc., it is possible to shift the backhoe equipment sideways to the right or the left.

1. The machine must be in the backhoe attachment position, see "Setting the Machine in the Backhoe Attachment Working Position" section on page 7-8.
2. Place the backhoe attachment on the left if you want to shift the attachment to the right or place it on the right if you want to shift it to the left, then place the attachment on the ground in the position shown.
3. Press the sideshift unlocking switch (A). The indicator comes on.
4. Operate the backhoe attachment controls alternately so as to slide the sideshift carriage sideways.
5. Once the attachment is in the side position required, swing it round into alignment with the machine.
6. Press the sideshift locking switch (A) again to lock the sideshift. The indicator lamp will go out.

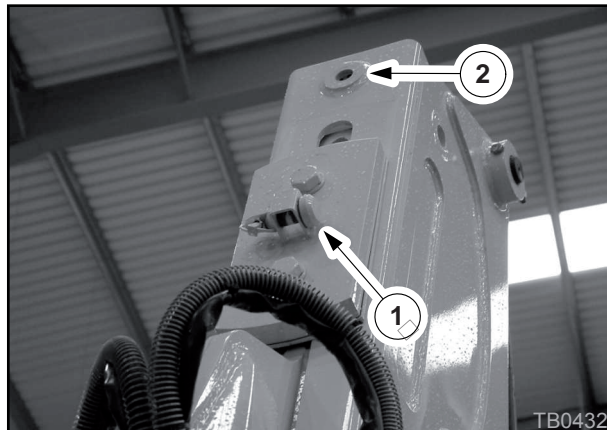
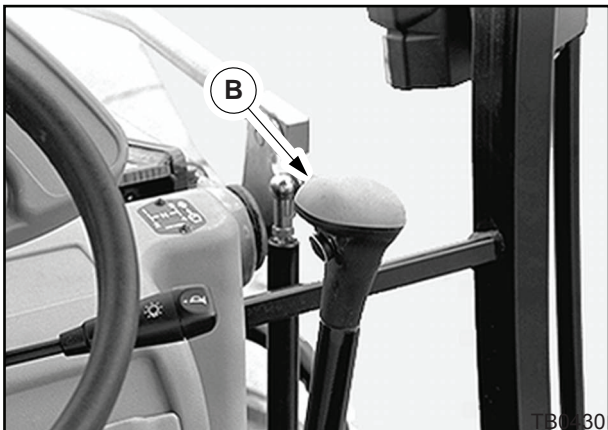
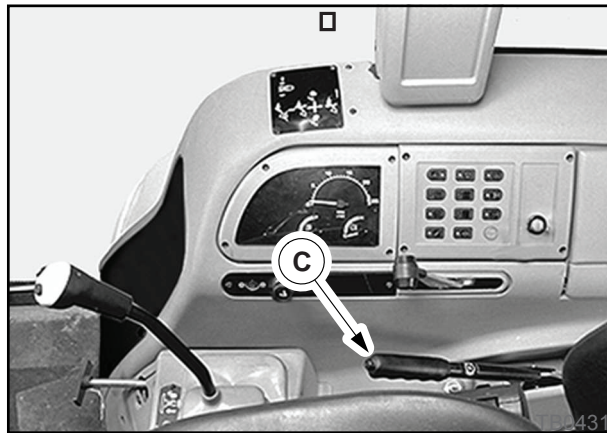
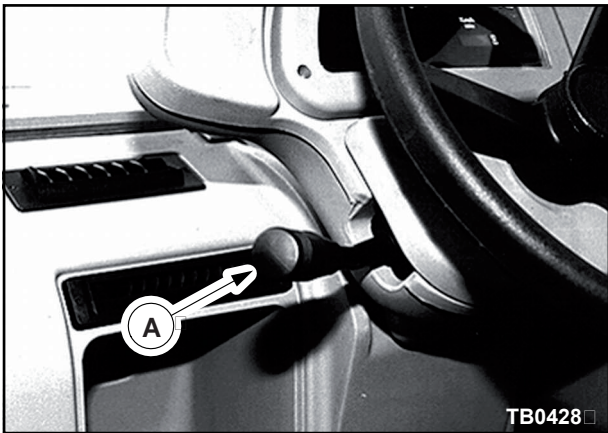


Setting the Backhoe Attachment in the Road Travel Position

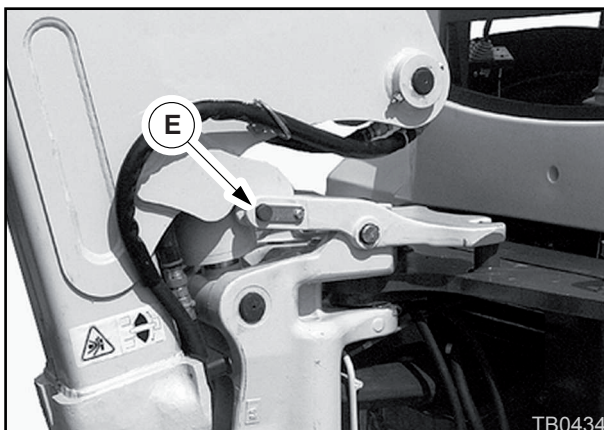
NOTICE

NOTICE: This procedure must be used for road travel, securing the loader attachment and when parking the machine.

1. Check that the direction of travel control lever (A) (synchroshuttle only) or transmission control lever (Powershuttle only) is in the neutral position.
2. Make sure that the gear change lever (B) is in the neutral position (synchroshuttle only).
3. Make sure that the parking brake (C) is engaged.
4. Make sure that the operator's seat is correctly positioned.
5. Make sure that the machine is resting on the stabilizers and the loader bucket.
6. Retract the extendable dipper (if equipped) completely and place the pin (1) in the extendable dipper locking hole (2).
7. (Sideshift (offset) backhoe version), position the backhoe attachment sideshift carriage completely to the right. See "Backhoe Attachment Sideshift (Sideshift (offset) Backhoe version)" section on page 7-11.
8. Place the backhoe attachment in line with the machine.



9. Run the engine (D) at about 900 rpm.
10. Completely retract the backhoe bucket, dipper and boom.
11. (Sideshift (offset) backhoe version), swing the backhoe attachment completely to the left.
12. Release the boom lock lever (E) by depressing the button and lowering the lever. It may be necessary to make small adjustments to the boom position before the lock will fully engage.
13. Raise the stabilizers completely.
14. Run the engine at low idle speed.
15. Adjust the servo controls (if equipped) to the transport position.
16. Turn the seat round to the loader attachment position.
Raise the loader bucket.



Operating Instructions

Removal and Installation of Quick Attach Backhoe Bucket (optional)



WARNING: Never place your hands inside the quick coupler if the engine is running.

NOTE: It may be necessary to increase engine rpm to give suitable pump flow for quick attach to function.

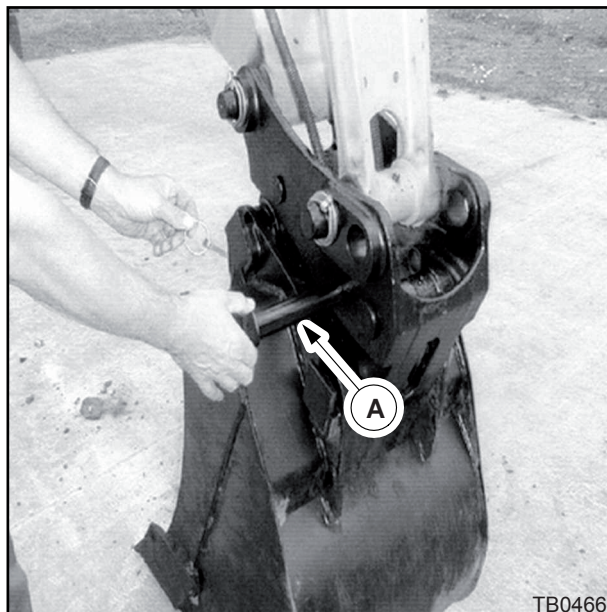
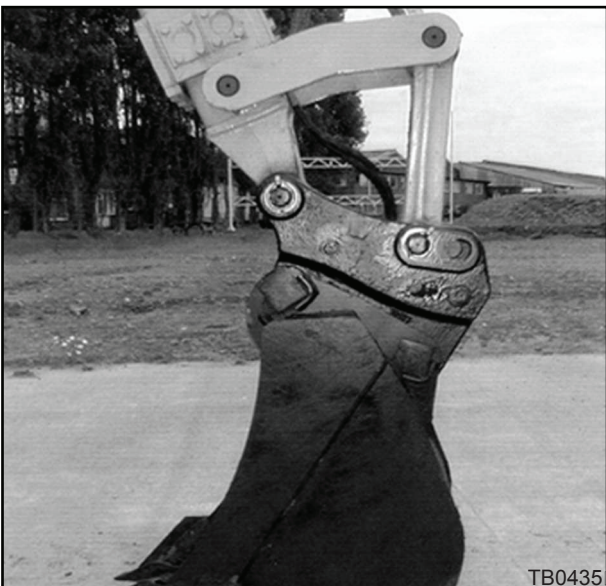
Quick Attach

Safety

- Never place your hands inside the quick coupler if the engine is running.
- The quick hitch coupler is able to work with all Ferrec/Terex recommended buckets and attachments.
- The coupler should not be used over long periods without a periodical inspection of all working parts.
- When operating a hammer, always crowd the hammer towards the machine.
- Never use a hammer as a lever, this puts excessive load on the coupler cylinder and hydraulics.
- Do not use the coupler where excessive vibration is endured, remove coupler to reduce premature wear.

Operation - To release bucket or attachment

1. Crowd the bucket or attachment close to the ground.
2. Remove the safety pin (A) from the coupler.



3. Press and hold the quick hitch switch (B) in the cab to release the coupler hook. The hook will retract after 5 - 10 seconds and will remain retracted until the switch is released. Visually inspect to make sure the hook is fully retracted.
4. Slowly dump the bucket (C) to release the bucket or attachment.
5. Release the switch (B) in the cab.

Operation - To pick up bucket or attachment

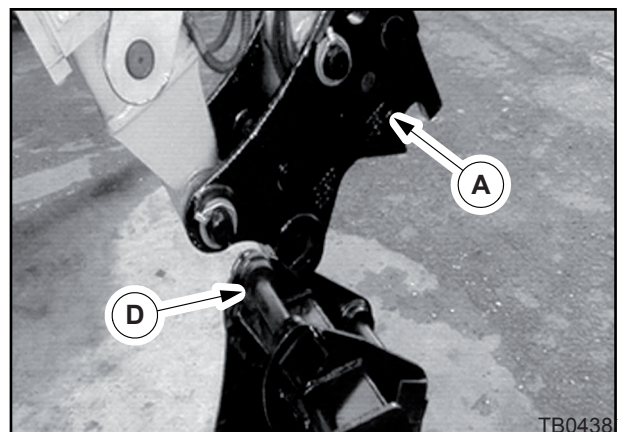
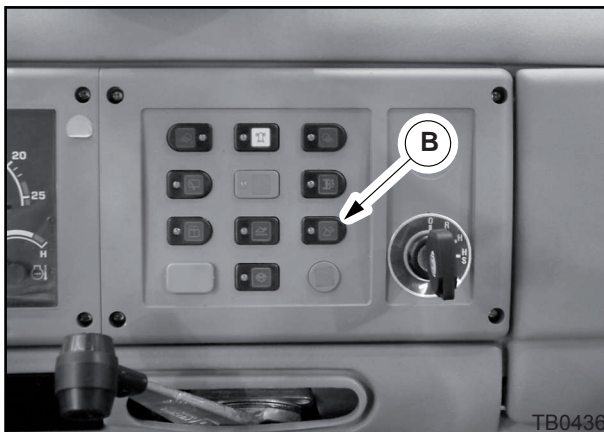
1. Remove the safety pin from the coupler.
2. Make sure the pins are correctly installed in the bucket or attachment.
3. Press and hold the quick attach switch in the cab to release the coupler hook.
4. Position the coupler with the fixed open jaw over the bucket's front pin (D). Crowd the coupler down until the bucket pin is fully engaged in the coupler jaw. Crowd the bucket until the bucket teeth are in an approximate vertical position.
5. Release the quick attach switch to engage the coupler. The hook powers forward and will secure the bucket or attachment pin in the coupler. Visually inspect the coupler for correct engagement.
6. Refit safety pin to the coupler (A).



NEVER Use Machine With Safety Pin Missing

Recommended weekly checks

- Check the coupler for damage or missing parts, loose or missing pins and chaffed or frayed hydraulic hoses. Repair or replace as necessary.
- Check the hook jaw for wear on the connecting pin face, which would increase pin opening dimension (gap maximum 2 mm). Repair or replace as necessary.
- Grease all grease points with general purpose grease. See "Fluids and Lubricants" section on page 9-3.



Operating Instructions

Removal and Installation of Backhoe Bucket - Fully Automatic Quick Attach Coupler (optional)

The fully automatic quick attach coupler is a factory fitted option.



NEVER place your hands on or inside the coupler or attempt to make adjustments or repairs while the engine is running or the machine switched on.

Safety

- The operator must be familiar with the correct use of the coupler before operation.
- NEVER place the switch to the **release** or **off** position while the coupler is in use.
- Keep all people well clear when removing or attaching buckets.

Operation - To Release bucket or attachment

Choose a suitable flat area and crowd the bucket or attachment away from the machine and close to the ground ready to disengage the front bucket pin (A).

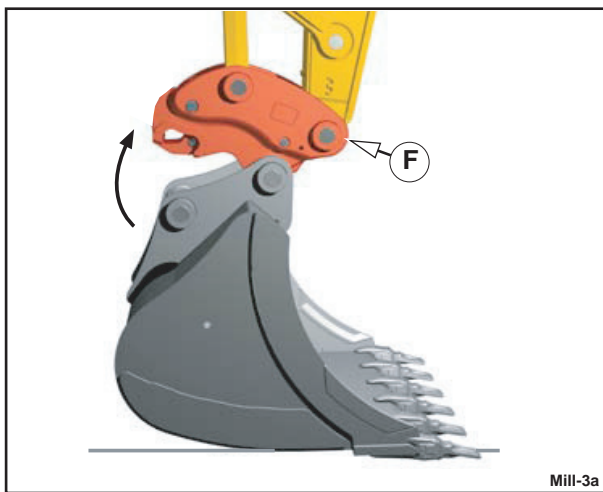
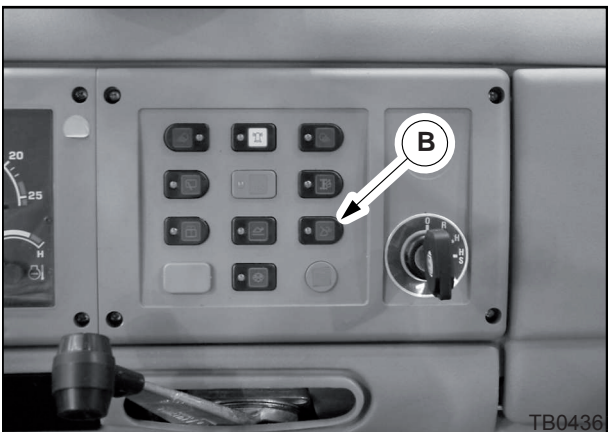
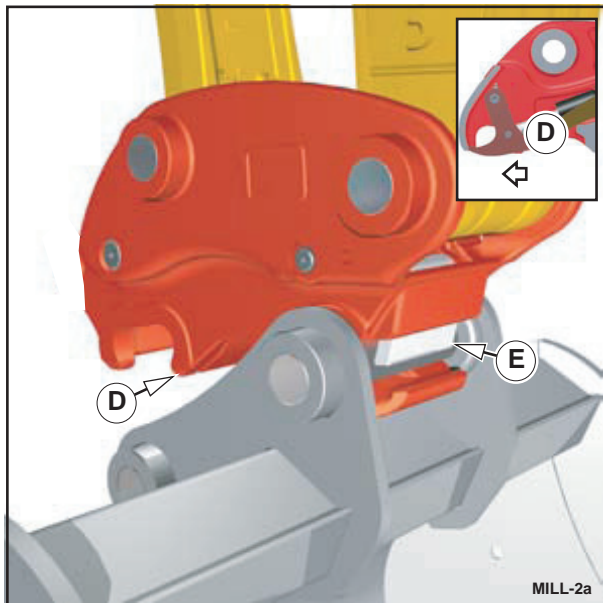
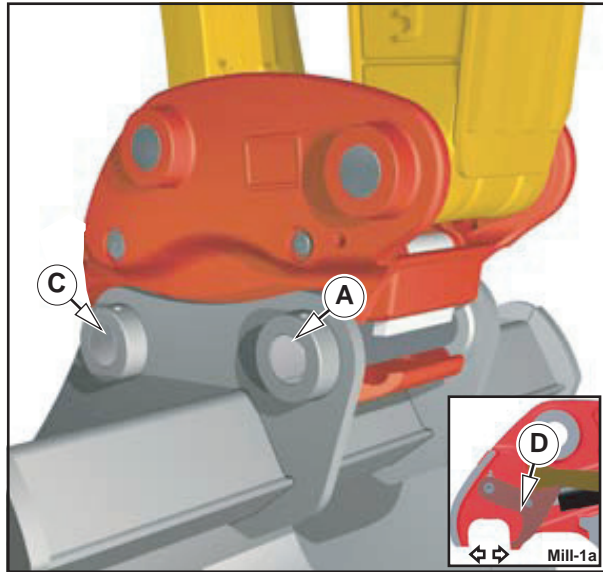
Press the switch (B) in the cab to "off". The rear bucket pin (C) should no longer be engaged by the hook (D).

Once the hook (D) has released the rear bucket pin the front latch (E) will be visible. This confirms that the hook (D) is open and not securing the rear bucket pin.

Press the switch (B) a second time to "on" and allow the hook (D) to close.

When the hook is closed the front latch (E) retracts up into the coupler frame opening the front jaw enabling the front pin to be released.

Lower the bucket to the ground and rotate the coupler (F) away from the bucket to disengage.



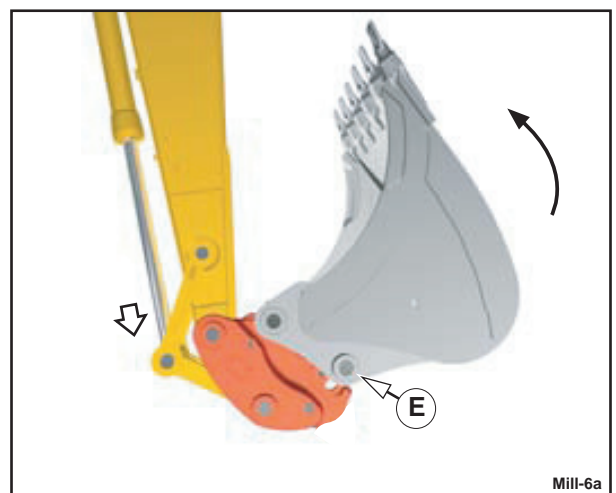
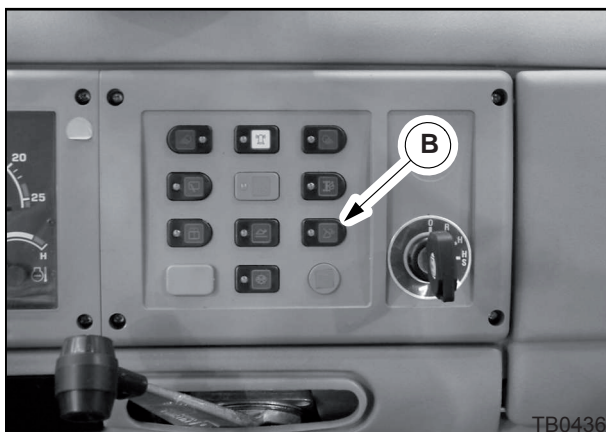
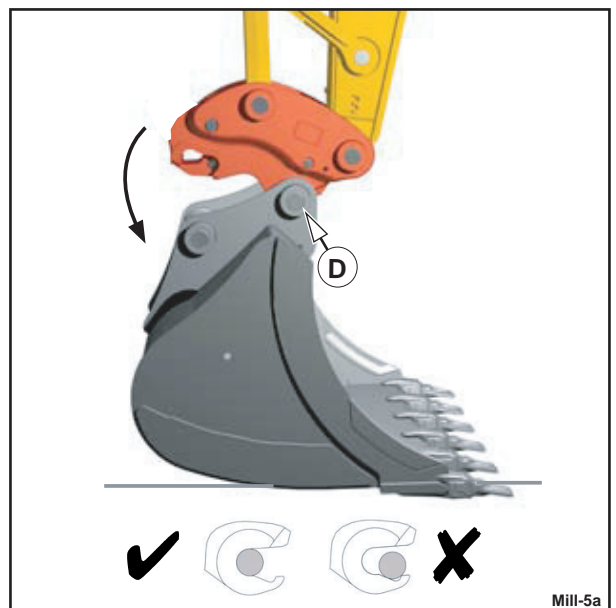
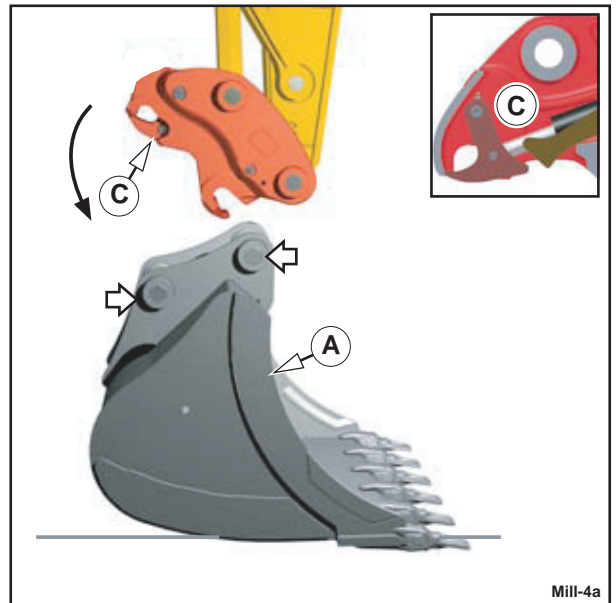
Operation - To attach the bucket or attachment

Ensure the pins are correctly installed in the bucket (A) or attachment.

Move the coupler to engage the front bucket pin. The hook (C) needs to be closed to lift the front latch. If the hook is open set the switch (B) to "On" to close the coupler hook so that the front latch lifts and hold the bucket crowd lever for about 5 - 10 seconds.

When the hook (C) has closed and the latch has retracted the coupler should be positioned to engage with the front bucket pin. Ensure the jaws are clear of debris before engaging the front bucket pin.

With the dipper arm approximately vertical engage the front bucket pin (D) into the back of the jaw and pivot the coupler towards the machine while the hook is still closed and the rear bucket pin (E) is not engaged.



Operating Instructions

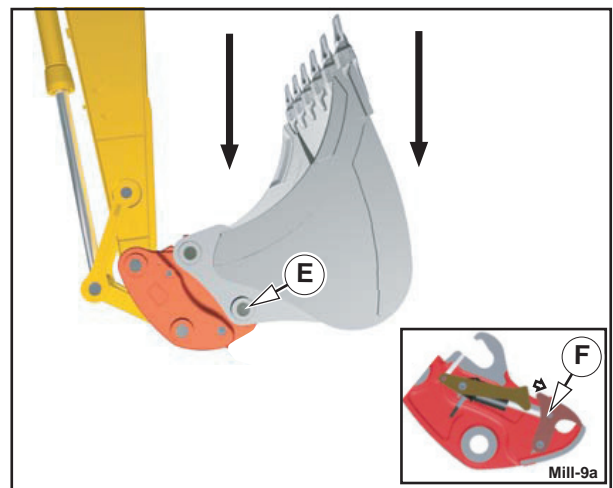
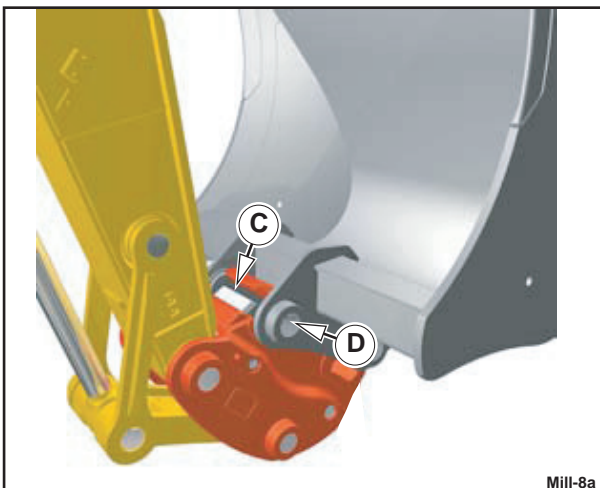
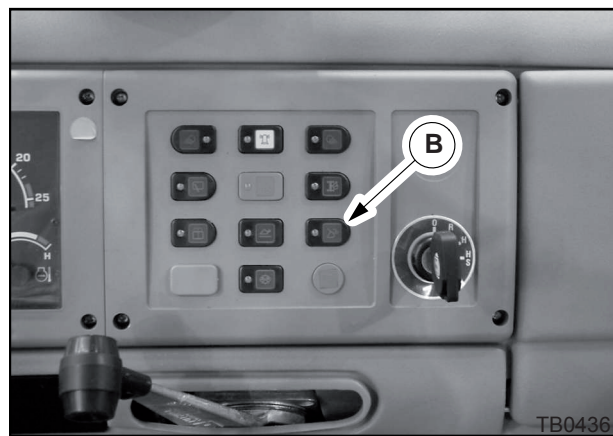
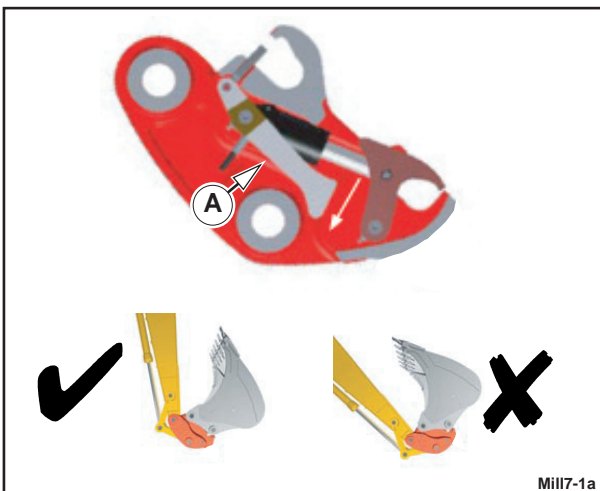
Continue to pivot the coupler towards the machine until it is in a position that allows the mechanical stops (A) to fall out of position.

The front latch (C) will then move into place securing the front bucket pin (D).

Set the switch (B) to the "Off" position.

Once the hook is opened the rear bucket pin (E) falls into position and is seated in the horseshoe area of the coupler frame. By observing the bucket it should be clear when this movement has occurred.

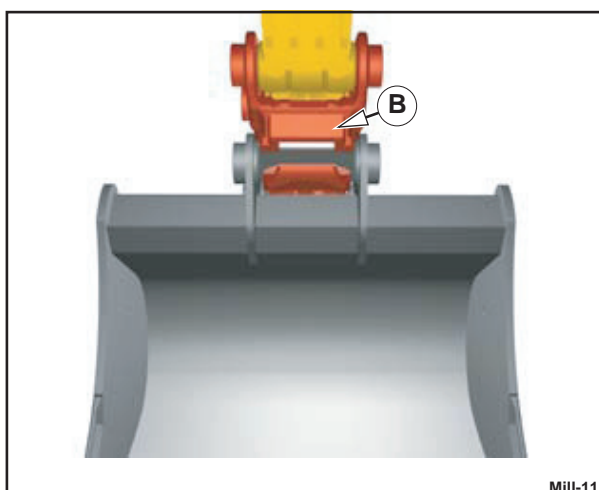
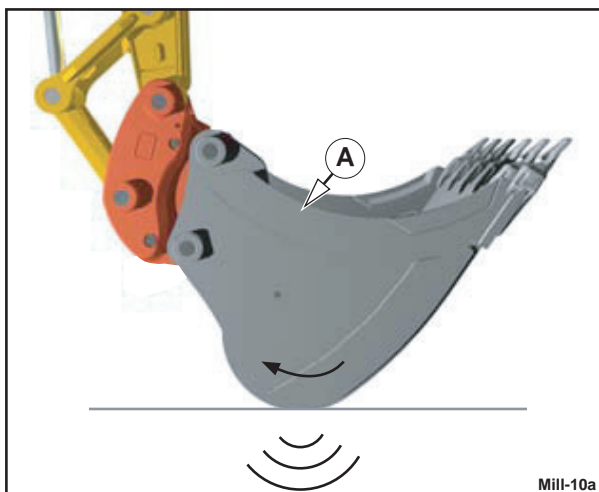
Set the switch (B) to the "On" position. This will close the hook (F) again and secure the rear bucket pin in position with a positive force.



To verify that the bucket (A) has attached correctly apply pressure to the bucket by rotating it against the ground and away from the machine.

If the quick attach coupler remains securely attached continue to operate otherwise start the procedure again.

To further verify that the coupler has worked correctly the front latch (B) will be visible when the bucket (A) is moved away from the machine.

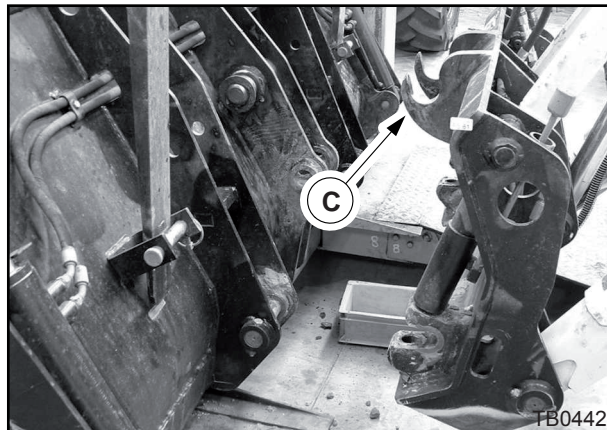
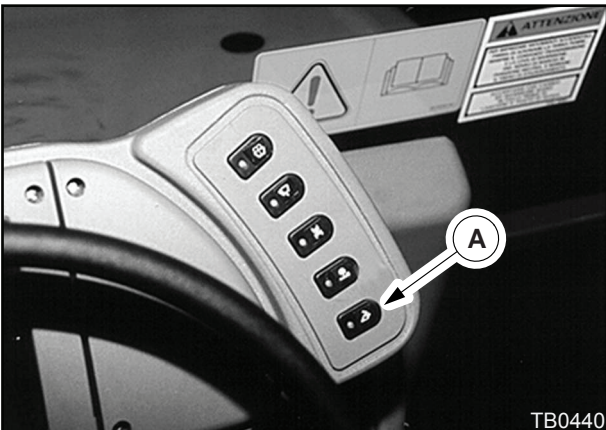
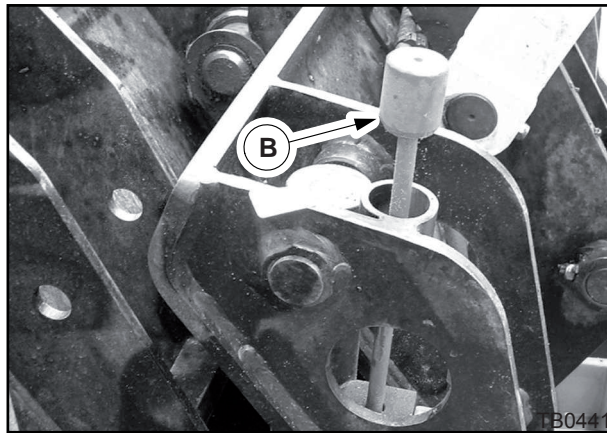
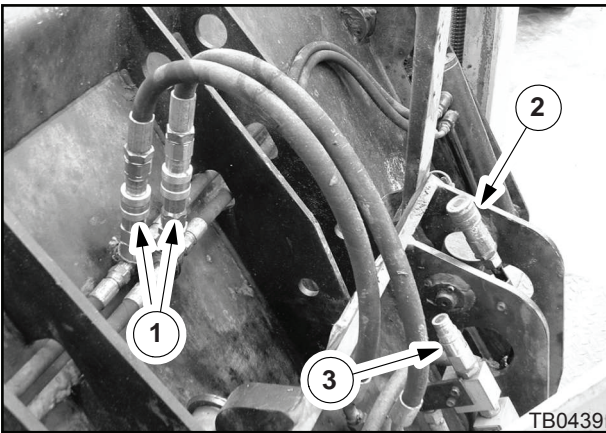


Operating Instructions

Removal and Installation of Quick Attach Loader Bucket (optional)

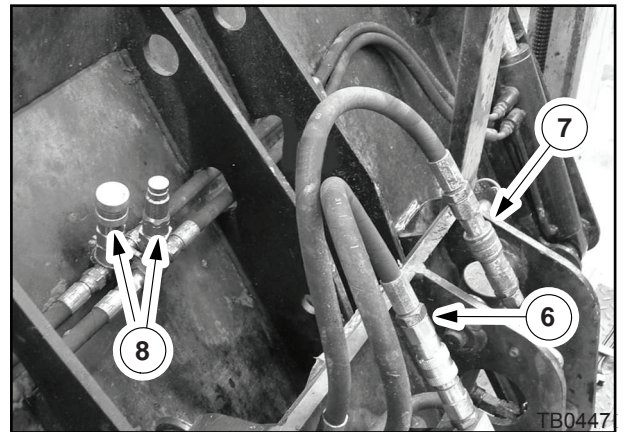
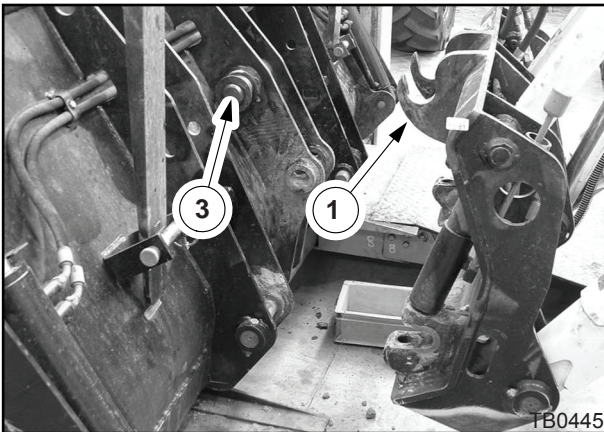
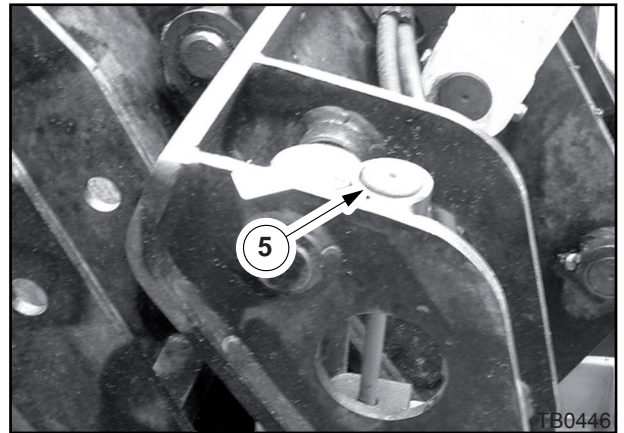
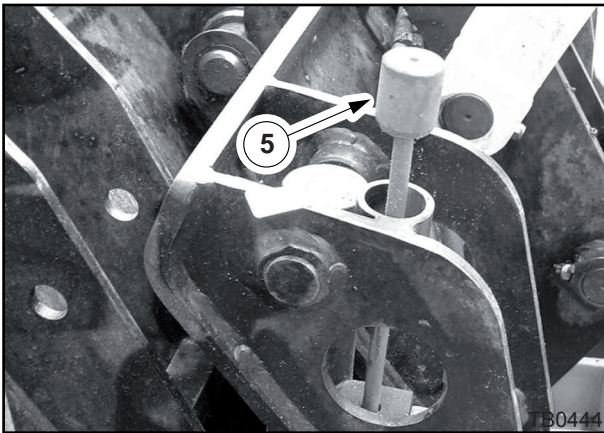
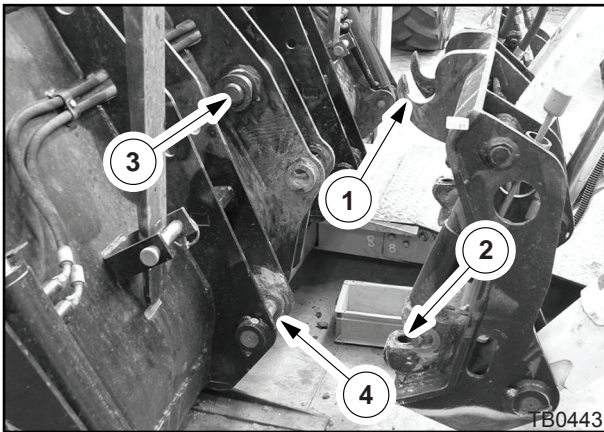
Removal

1. Place the loader bucket on firm, level ground, stop the engine, engage parking brake, release pressure in the hydraulic system. See "Releasing the Pressure in the Hydraulic System" section on page 9-31.
2. Clean quick couplers.
3. Disconnect the hoses from the bucket couplers (1) and connect to the tube (2) and solenoid valve (3).
4. Start the engine, press and hold the switch down to unlock the loader quick attach. See "Loader quick attach locking/unlocking switch (optional)" section on page 5-25.
5. Push the clamshell operating lever forward until the clamp pins on the quick-attach are fully retracted (indicator (B) raised clear of the tube).
6. With the bucket on the ground, slowly drive the machine in reverse whilst dumping the bucket to disengage the quick-attach hooks (C) from the bucket pins.



Installation

1. Position the hooks (1) and (2) in alignment with the bucket pins (3) and (4). The quick-attach must be slightly dumped.
2. Press and hold the switch, then push the clamshell operating lever forward until the clamp pins on the quick-attach are fully retracted (indicator (5) raised clear of the tube). Move the clamshell lever to the neutral position and release the switch.
3. Slowly drive the machine forward to engage the top hooks (1) with the top pins (3) then fully crowd the bucket.
4. Press and hold the switch, then pull back the clamshell operating lever to lock the bucket onto the quick-attach (indicator (5) retracted into the tube). Allow sufficient time for both pins to lock.
5. Place the bucket onto the ground, stop the engine, engage parking brake, release pressure in the hydraulic system. See "Releasing the Pressure in the Hydraulic System" section on page 9-31.
6. Disconnect the hoses from the solenoid valve (6) and tube (7) and connect them to the bucket couplers (8).



Operating Instructions

Differential Lock

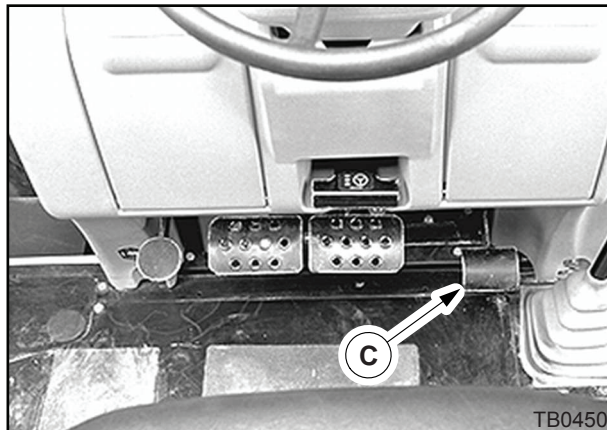
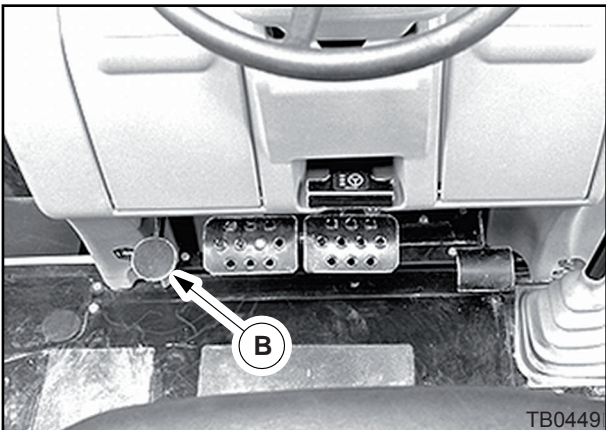
The differential lock gives equal power to both rear wheels. It is particularly useful when the wheels have insufficient adhesion, as in the following situations:

NOTICE

NOTICE: Never use the differential lock during travel on a public highway.

When the machine is stuck

1. Make sure that the rear wheels are not turning.
2. Press the transmission dump button (A).
3. Push down the differential lock pedal (B) and hold it down.
4. Engage a gear and release the transmission dump button.
5. Use the accelerator pedal (C) to increase the engine speed and free the machine.
6. Stop the machine. Once free, push down the transmission dump button and then release the differential lock pedal.



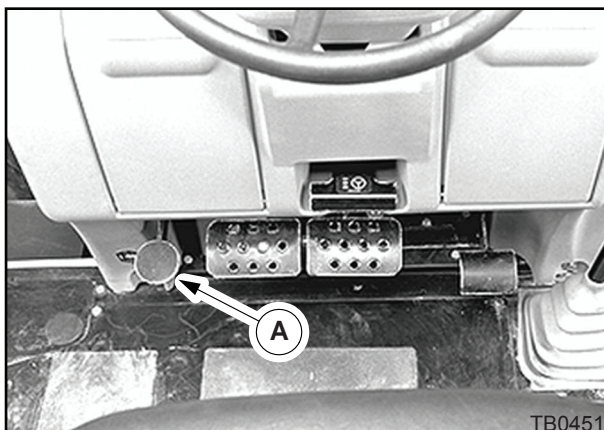
Before crossing a soft or muddy area

NOTICE

NOTICE: You can cause damage to the transmission if you try to engage the differential lock when the machine is turning or if one rear wheel is rotating faster than the other rear wheel.

NOTE: You can engage the differential lock when the machine is moving in a straight line.

1. Make sure that the machine is moving in a straight line and that both rear wheels are turning at the same speed.
2. Push down the differential lock pedal (A) and hold it down while you move the machine through the soft or muddy area.
3. After you have moved through the area, stop the machine push down the transmission dump button and then release the differential lock pedal.



Operating Instructions

Backhoe Attachment Auxiliary Hydraulic Tools (optional)

Before using auxiliary tools, it is necessary to proceed as follows:

- Place the direction of travel control lever (synchroshuttle only) or the transmission control lever (Powershuttle only) in neutral position.
- Place the gear change lever in neutral (synchroshuttle only).
- Lower the loader bucket until it is pressing on the ground.
- Stop the engine, engage parking brake, release hydraulic pressure and remove the starter switch key. See "Releasing the Pressure in the Hydraulic System" section on page 9-31.

1. Connect the tool hoses to (1) and (2) couplers located on the backhoe dipper.

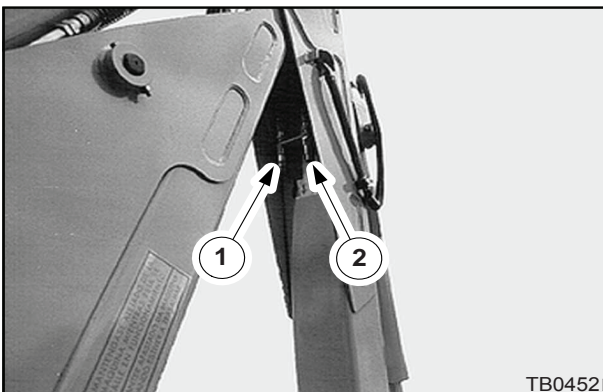
NOTE: The coupler is used to supply percussion tools, such as hydraulic hammers, compaction tools, tampers, etc.

NOTE: Oil delivery to the attachment must be through the male coupler.

2. To operate the auxiliary hydraulics, use the rotary control (A) on the side console, select the hydraulic hammer symbol.

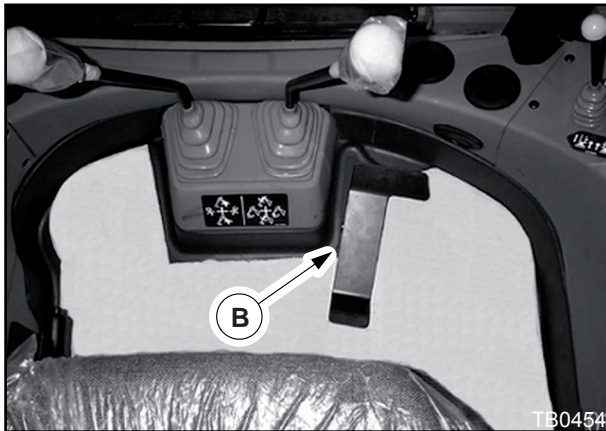
NOTICE

- Only single acting hydraulic tools can be fitted. If in doubt consult your local dealer.
- Move the switch to the "X" position when the auxiliary hydraulic circuit is not used

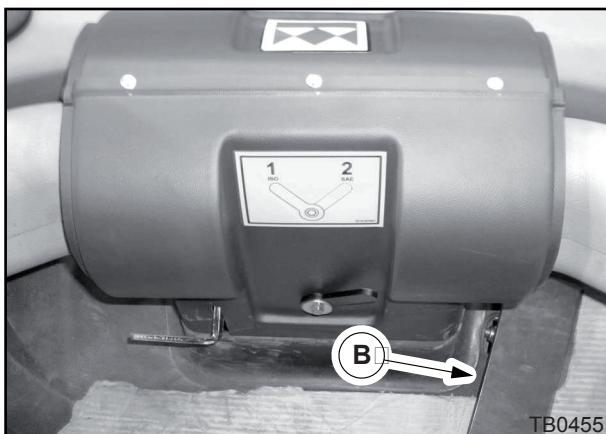


3. Press the toe of the pedal (B) to supply oil through coupler (1).

Mechanical controls



Servo controls



Flow mode selection

The operator must decide how much flow should be used by consulting the manufacturer's operating instructions. Be sure to select the flow recommended. Excess flow can damage some equipment.

Flow rate setting depends on the engine speed (A).

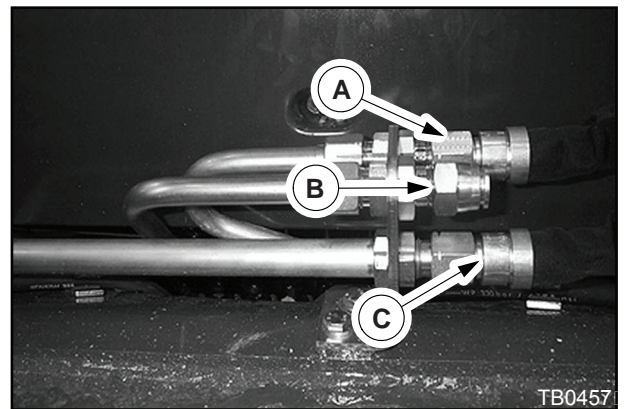


Single and double acting hydraulics

Hoses located as shown in the picture below. If in doubt, consult your dealer.

Located at the top of the back frame:

- For single acting hydraulics (e.g. hammer), connect pipes using (A) and (C).
- For double acting hydraulics (e.g. auger), connect pipes using (A) and (B) only.



No adjustment is necessary at the valve.

Load Lifting



WARNING: Load lifting must be carried out in accordance with the instructions shown in this manual and in accordance with current regulations.

For load lifting, it is essential that the machine is equipped with a load fixing point.

To lift a load, the following instructions must be followed:

- Check the condition of the load fixing point for damage, wear or loose fasteners and correct as necessary.
- Place the machine on flat, hard, level ground.
- Lower the loader attachment until the front wheels just touch the ground without supporting the weight of the machine.
- Lower the stabilizers until the rear wheels just touch the ground without supporting the weight of the machine.
- It is mandatory for the backhoe attachment to be in line with the machine and the sideshift carriage to be locked hydraulically in the centre position (sideshift (offset) backhoe version).
- If the machine is equipped with an extendable dipper, it is mandatory for it to be completely retracted and mechanically locked.
- It is essential for the backhoe bucket cylinder rod to be completely extended.
- Use the load fixing point (never use other load fixing points). See "Maximum Working Loads" section on page 7-27. It is forbidden to weld hooks or lugs to the bottom of buckets.
- Use slings and chains in perfect condition, able to support the load to be lifted and with an effective device preventing the slings or chains becoming un-hooked.
- When fitted, check that the safety valves operate correctly. A pressure setting check must be carried out every six months in accordance with the manufacturer's instructions. Consult your local dealer.
- Do not allow any person within the machine's working range.
- Use the controls gradually so as to move the attachment accurately.

Note:

Maximum stabilizer leg reaction loads with the load directly behind the machine is 4500kg on each leg.

Maximum Working Loads



WARNING: Before lifting a load refer to the "Load Lifting" instructions.

Backhoe attachment

Loader attachment

NOTICE

NOTICE: The Safe Working Load of the backhoe is calculated using a standard bucket, therefore, when using any other bucket or attachment for "lifting" or "craning" the weight of the bucket or attachment must be taken into account when calculating the rated load of the backhoe.

NOTICE

NOTICE: The Safe Working Load of the loader is calculated using a standard bucket, therefore, when using any other bucket or attachment for "lifting" or "craning" the weight of the bucket or attachment must be taken into account when calculating the rated load of the loader..

Safe Working Load

All models = 1000 kg (2204 lbs)

Note - for European Markets (EU) only:

Static Load Test Coefficient for this machine type is 1.25. E.G. 1.250kg test load.

Safe Working Load

All models = 1000 kg (2204 lbs)

Operating Instructions

Loader Bucket Mounted Forks (optional)



WARNING: The forks are heavy, so use extreme caution when swinging them into their working and stowage position.

NOTICE

NOTICE: The forks must be lying against the cutting edge, not against the bucket teeth. The clam must also be closed (if fitted).

NOTICE

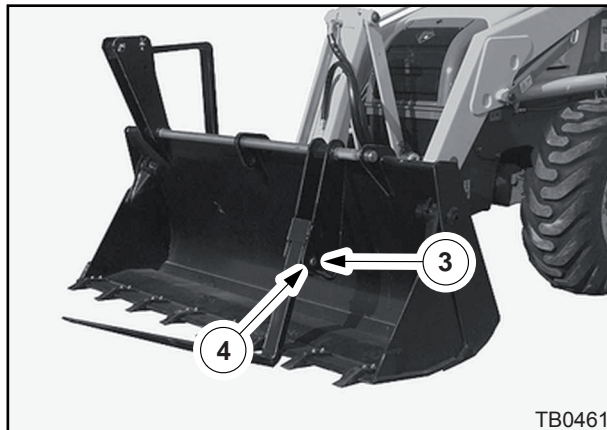
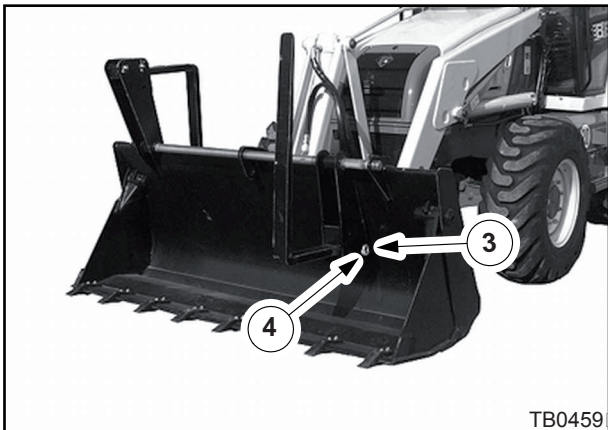
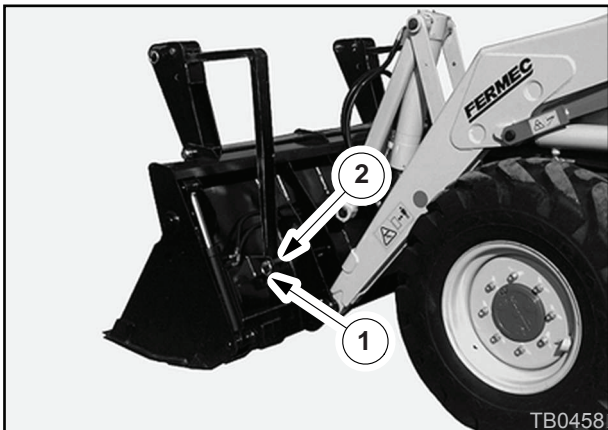
NOTICE: That both forks must be spaced equally each side of the centre of the bucket.

NOTICE

NOTICE: When working with forks do not allow bucket to crowd back such that the forks can drop back over bucket and damage machine.

Install forks in working position

1. Place the loader bucket onto the flat level ground stop the engine, engage parking brake and remove the starter switch key.
2. Remove the retained pin (1) and the pin (2), then lower the bracket.
3. Hold the fork and remove the retained pin (3) and the pin (4).
4. Lower the fork into position against the bucket cutting edge.
5. Install the pin (4) and the retained pin (3).
6. Repeat steps 2 to 6 for the other fork.
7. Slide the forks until they are suitably spaced for the intended job.

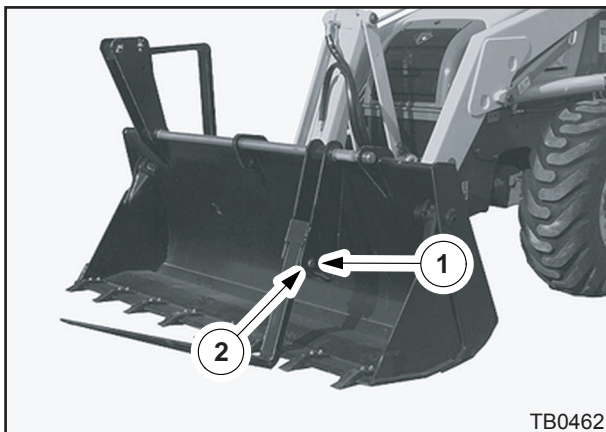


Install the forks in the rest position

1. Place the bucket onto firm level ground, stop the engine, engage parking brake and remove the starter switch key.
2. Support the fork. Remove the retained pin (1) and the pin (2).
3. Raise the fork and install the pin (2) and the retained pin (1).
4. Raise the fork and the bracket.
- NOTE:** If necessary slide the fork to bring it into its housing.
5. Install the pin (3) and the retained pin (4).
6. Repeat steps 2 to 5 for the other fork.



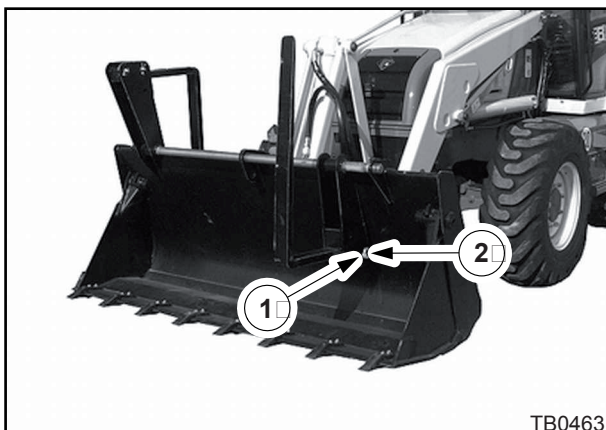
WARNING: The forks must be securely retained in their proper transport positions using the correct pins and lynch pins. Improperly stowed forks may cause serious injury.



TB0462



TB0465



TB0463



TB0464

Operating Instructions

Operating the Machine in Water



WARNING: Never work in water if the water level is higher than the centre of the front wheels.



WARNING: Never work in fast-flowing water.

1. Make sure that the bed of the stream or stretch of water can support the weight of the machine.
2. Before taking the machine into the water, pump plenty of new grease into the machine's attachment linkages.

Parking the Machine



WARNING: Check that no part of the machine is protruding onto the public highway. If this cannot be avoided, install signs in accordance with regulations.

1. Park the machine on firm, level ground away from any soft ground or excavations.
2. Lower the loader bucket to the ground.
3. Lock the loader attachment by means of the control locking lever (if equipped).
4. Engage the parking brake and place the direction of travel control lever and gear change lever in neutral position (synchroshuttle only), or the transmission control lever in neutral (Powershuttle only).
5. Place the backhoe attachment in the road travel position. See "Setting the Machine in the Backhoe Attachment Working Position" section on page 7-8.
6. Release the hydraulic pressure. See "Releasing the Pressure in the Hydraulic System" section on page 9-31.
7. Lock the operator's compartment doors (cab version).
8. Disconnect the electrical system by means of the battery master switch key (optional).
9. If the machine is parked outdoors, cover the exhaust pipe so as to protect the engine against damp.

Instructions for Use



WARNING: Observe the instructions for use shown in this chapter. Any other practice without the prior approval of the manufacturer is considered as being forbidden.

Road operation

Road speed is subject to restrictions in certain countries. It is the operator's responsibility to limit the machine speed accordingly.

- Before carrying out any road travel, lock the attachments and install the safety systems required by regulations. The machine must be within the maximum dimensions permitted on the road in accordance with local road traffic regulations.
- Raise the stabilizers completely.
- Check that the lighting and signalling systems operate correctly.
- Check that the brakes and steering operate correctly.
- Check the condition and pressure of the tyres.
- Never leave the operator's compartment with the engine running.
- Never use the differential lock.
- All road travel should be undertaken with the front drive axle (4 wheel drive) disengaged.

Job site operation

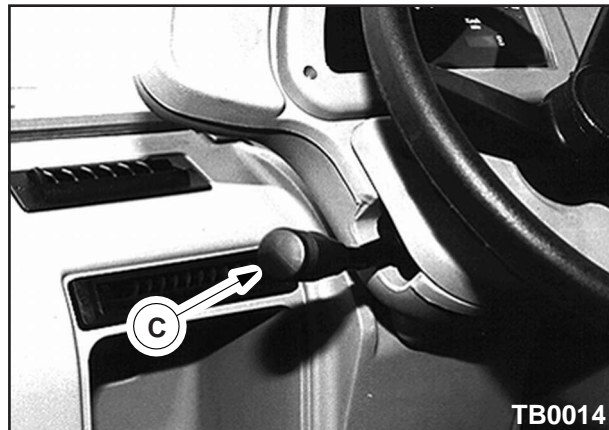
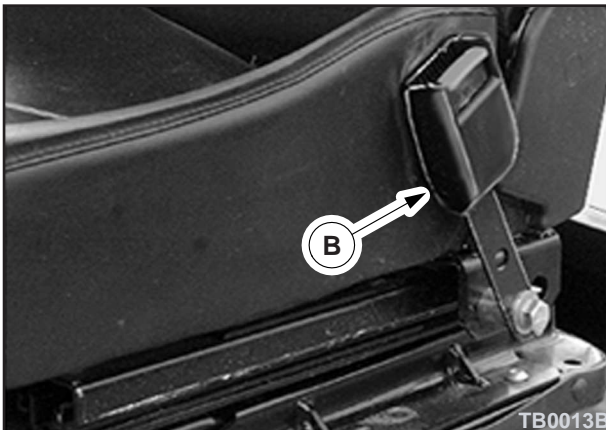
- Be vigilant, be aware of places where other persons are working close to your working area. Keep other persons away from the machine. Serious physical injury can result if these instructions are not observed.
- Make sure you know the location of underground pipes or cables before beginning work. Electrical cables, gas pipes, water pipes or other underground installations can cause serious physical injury.
- Adapt your driving style to suit the conditions of work (sloping ground or rough ground), the state of the road and weather conditions.
- When travelling at right angles to the slope keep the loader bucket at ground level.
- When travelling in the same direction as the slope, move onto the slope in 1st gear. Never travel down slopes with the gear change lever (synchroshuttle only) in the neutral position.
- When working on a slope, engage the front drive axle (4 wheel drive).
- Holes, obstacles, debris and other hazards in the working area can cause serious physical injury. Always walk around and identify all possible hazards before operating the machine in a new working area.
- Do not work close to live overhead electric lines without first making sure that the minimum distances are observed:
Under 57,000 volts: 3 metres (9.8ft).
Over 57,000 volts: 5 metres (16.4 ft).

Operating Instructions

Job Site Travel

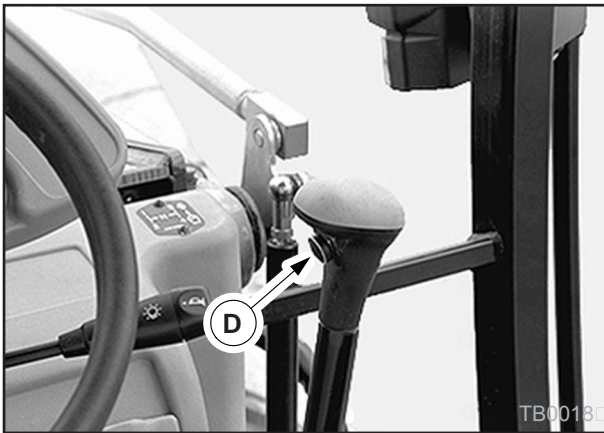
NOTE: After road travel, remove all the road safety devices before carrying out any job site travel.

1. Make sure the engine throttle lever (A) is in the low idle position.
2. Make sure the stabilizers are completely raised.
3. Make sure the doors (cab version) are closed correctly and the engine bonnet is fastened.
4. Adjust the operator's seat correctly and fasten the seat belt (B).
5. Make sure the direction of travel control lever (synchroshuttle only) or the transmission control lever (powershuttle only) is in the neutral position (C).
6. Start the engine.
7. Raise the loader attachment about 20 cm (8 inch) off the ground.



8. **Synchroshuttle only**

Press the clutch transmission dump button (D) and then place the gear change lever in 1st or 2nd gear. Release the button.



Powershuttle only

Select 1st or 2nd gear (E).



9. Press the brake pedals down and release the parking brake.



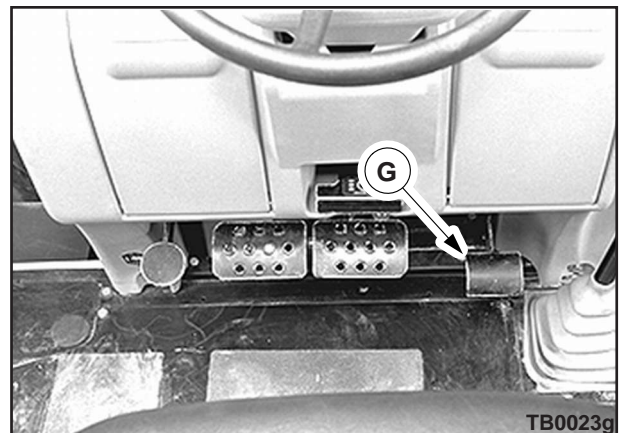
10. Move into forward position, the direction of travel control lever (synchroshuttle only) or transmission control lever (powershuttle only).

NOTE: Wait for the machine to stop completely before changing the direction of travel. The life of the transmission clutch will be shortened if changes of direction are made while the machine is moving.

11. Release the brake pedals and control the travel speed by means of the accelerator pedal.



WARNING: While travelling, check all gauges and indicator/warning lamps frequently.



Operating Instructions

Loader Attachment Operating Instructions

The instructions contained in this chapter do not cover all possible conditions of use of the loader attachment. They only constitute basic information to enable the machine to be operated correctly.

The first time it is operated, manoeuvre the machine in a clear area, at low speed.

To operate the controls, see "Loader Attachment Controls" section on page 5-29.



WARNING: Automatic loader bucket levelling only operates when raising the attachment; it does not operate when lowering the attachment. You must take care to keep the bucket level during attachment lowering to avoid the load being dumped.

Safety instructions

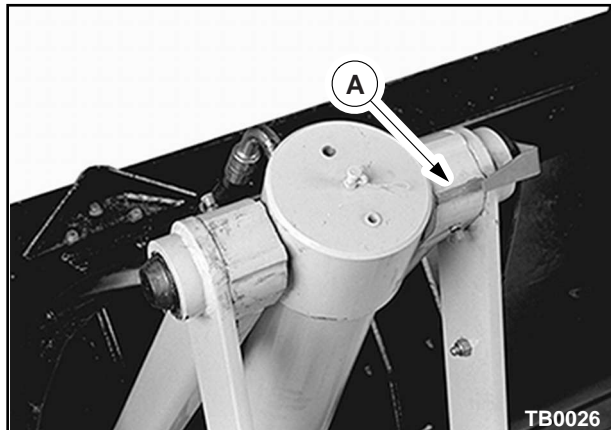
- Be careful.
- Make sure that the operator's seat is correctly adjusted in the loader attachment position.
- Use the seat belt.
- Make sure that no other person is in the working range of the machine.

Transmission dump button

Release the transmission dump button (A) to engage the transmission once more.

Standard bucket level indicator

Located on the bucket cylinder, this indicator (A) enables the loader bucket to be positioned flat when the pointer is opposite the red pointer.

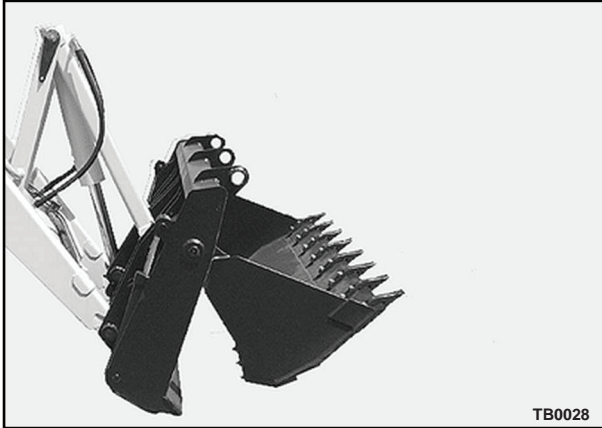


7 in 1 loader bucket (if equipped)

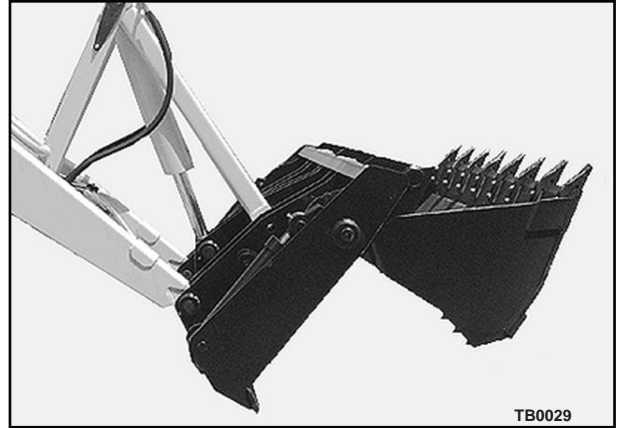
NOTE: Raise the attachment so that the bucket is about 20 cm (8 inch) above the ground.

NOTE: Ensure lifting or handling weight does not exceed 1000 kg (2204 lbs).

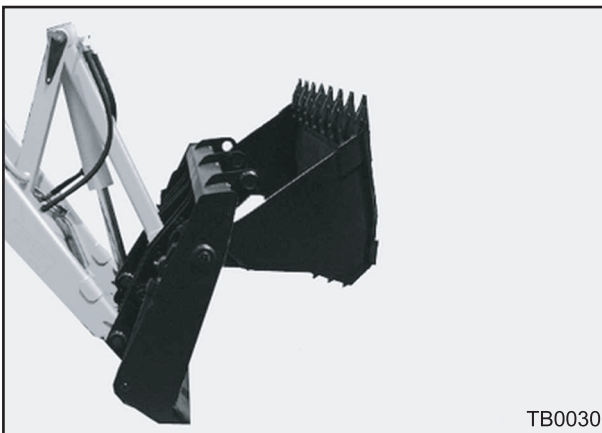
Scraper position



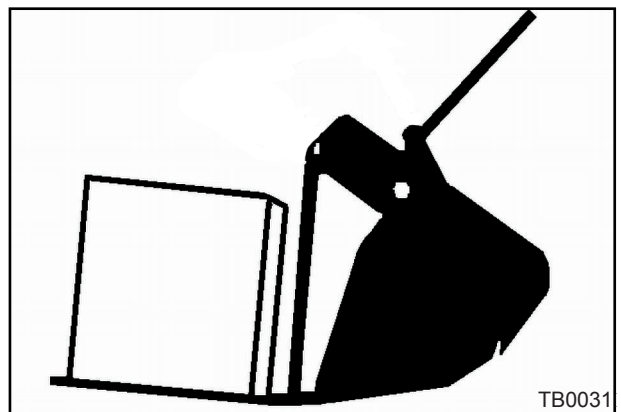
Clamshell configuration



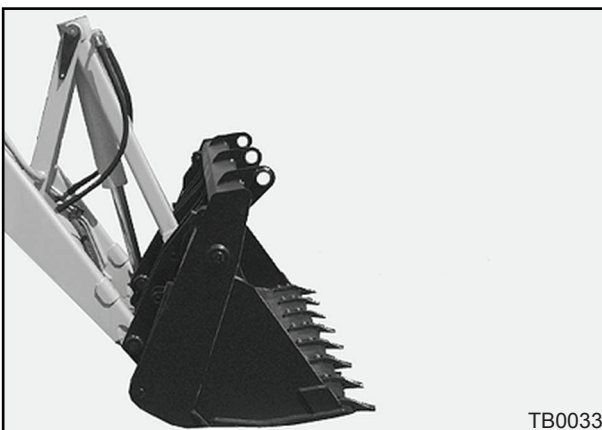
Dozer blade configuration



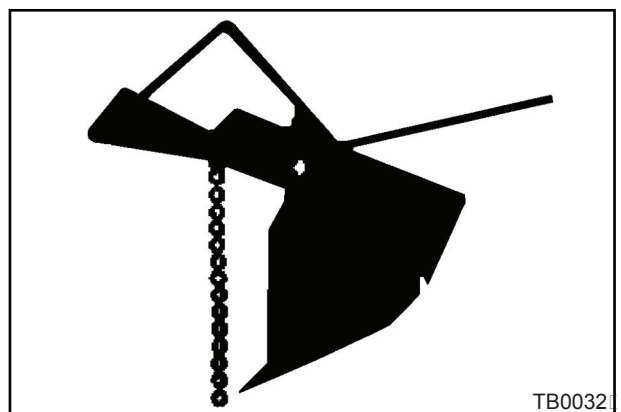
Load handling configuration



Loader bucket configuration



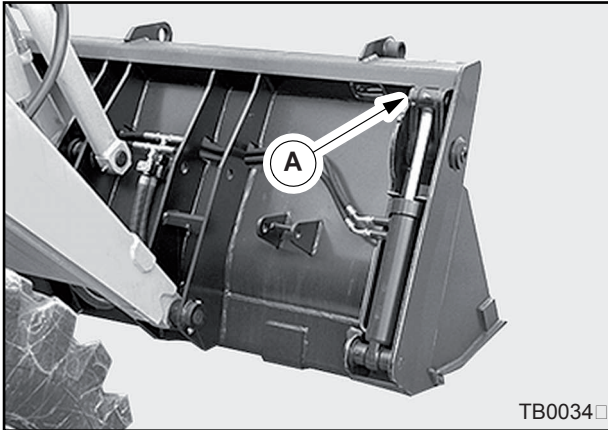
Load lifting configuration



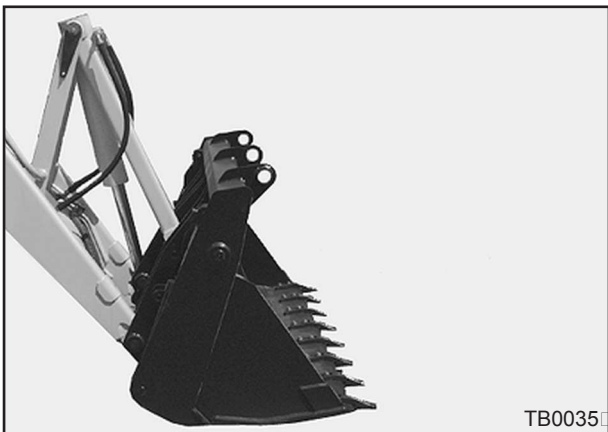
Operating Instructions

7 in 1 loader bucket clam opening indicator (if equipped)

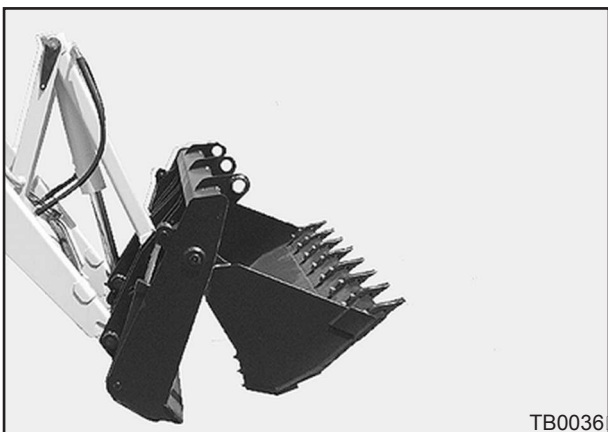
Located on the cylinders of the clam, this indicator (A) enables the clam opening and depth of penetration of the bucket to be selected when the bucket is in the scraper configuration.



Clam closed.



Clam opening.



Return-to-dig

After dumping the load, use this function to bring the bucket back into digging position and to renew the digging cycle automatically.



Move the control lever in position (1) and release. The bucket will tilt backwards until the bottom of the bucket is level, then it will stop.

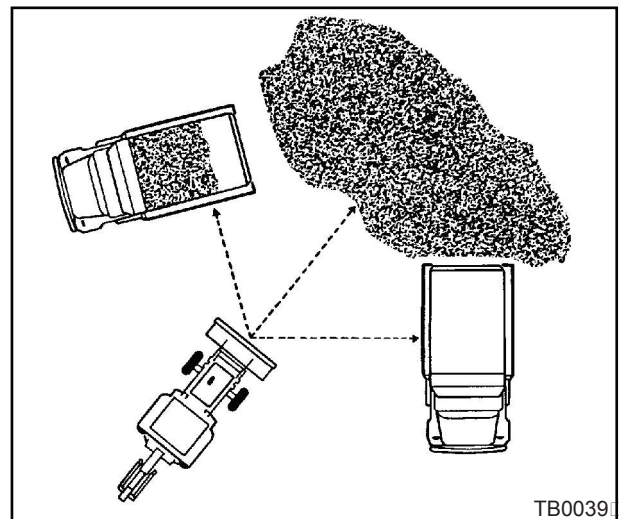


Organising the job site

!
WARNING: Operating the loader attachment with a full bucket on sloping ground can cause the machine to turn over. If possible avoid turning the steering wheel and always travel forwards when climbing a slope and in reverse when travelling down a slope. Keep the bucket as close as possible to the ground. There is a risk of accident if these instructions are not observed.

!
WARNING: On the job site, always keep the bucket as close as possible to the ground so as to increase the machine's stability to the maximum and to ensure perfect visibility.

!
WARNING: On rough or slippery ground, when the bucket is full, drive the machine as slowly as possible. If these instructions are not observed there is a risk of accident.



Use the shortest possible work cycle. The location provided for the trucks is an all important element. Spend a little time levelling the work area.

A smooth working surface facilitates the work of the machine and moving and parking the trucks. It gives a shorter work cycle.

Operating Instructions

Heaped material

Using the indicator, check that the bottom of the bucket is in the horizontal position.

Drive the machine into the heap of material. When the speed of the machine starts to decrease, raise the attachment and crowd the bucket backwards.

Backhoe Attachment Operating Instructions

The instructions contained in this chapter do not cover all possible conditions of operation for the backhoe attachment. They only constitute basic information to enable the machine to be operated correctly.

NOTE: The first time it is operated, manoeuvre the machine in a clear area, at low speed.

NOTE: For the operation of the controls, see “Backhoe Attachment Controls” section on page 5-34.

Safety instructions

- Be careful.
- Make sure that the operator's seat is correctly adjusted in the backhoe attachment position.
- Use the seat belt.
- Make sure that no other person is in the working range of the machine and be aware of people entering the working range of the machine during operation.
- Place the attachment in the working position. See “Setting the Machine in the Backhoe Attachment Working Position” section on page 7-8.
- Never dig near or under the stabilizers, since the machine could fall into the excavation.
- When working in an area of reduced visibility, for example next to a building, place a safety barrier and sign panels to prevent anyone coming near the machine.

General

The backhoe attachment will dig more quickly if the work cycle is short and uninterrupted. Organize your work site so as to obtain a smooth work cycle.

If you try to take a very big cut with the backhoe bucket, you may cause a hydraulic stall situation (where the dipper control lever is pulled towards the operator but nothing happens). The hydraulic system main relief valve makes a noise when a hydraulic stall occurs. This overload causes the work cycle to be prolonged and it increases the hydraulic temperature.

Moving the machine forwards when working on flat ground

It is possible to use the backhoe attachment to push the machine forward whilst excavating.

1. Make sure that no other person or obstacles are in the working range of the machine.
2. Make sure that the front wheels are straight.
3. Set the engine speed to 1000 rpm.
4. Release the machine's brakes by means of the parking brake.
5. Make sure that the direction of travel and gear change levers are both in the neutral position (synchroshuttle only), or the transmission control lever is in neutral position (Powershuttle only).
6. Raise the boom and retract the dipper, then move the boom so as to place the backhoe bucket teeth on stable ground.
7. Raise the stabilizers and the loader bucket about 20 cm (8 inch) from the ground.
8. Use the boom and dipper to move the machine.
9. After moving the machine, lower the stabilizers and place the loader bucket on the ground, then level the machine.
10. Use the parking brake to brake the machine.

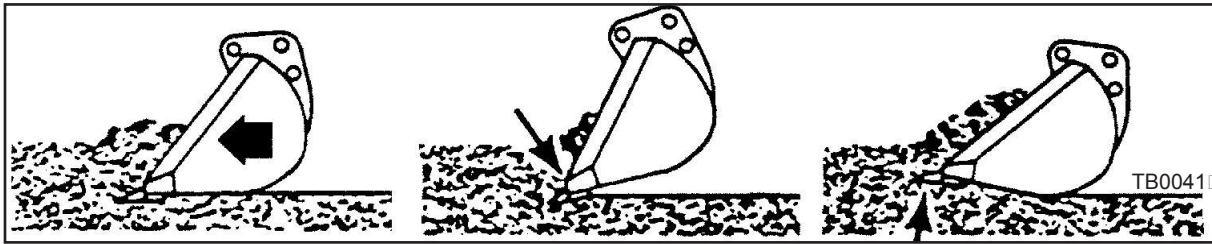
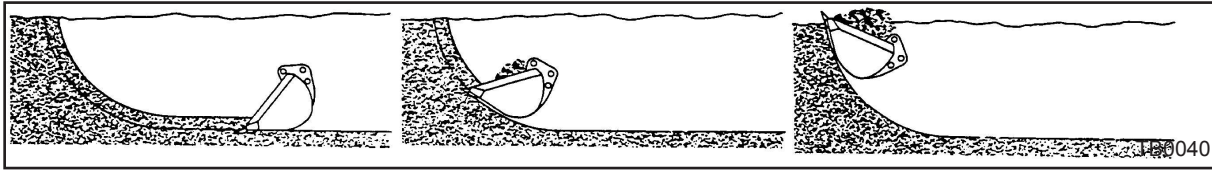
NOTE: This procedure can only be used on flat ground. Never use it on sloping ground. On sloping ground it is essential to turn the operator's seat to the loader attachment position to move the machine by the normal procedure.

Filling the backhoe bucket

Fill the backhoe bucket by manoeuvring the boom and dipper. Keep the bottom of the backhoe bucket parallel to the cut. The backhoe bucket teeth and blade must cut the ground like the blade of a knife. The depth of dig varies depending on the type of material.

Operating Instructions

Excavating method



CORRECT

WRONG

The backhoe bucket will dig in and cause a stall.

WRONG

The bucket is pushed upwards. This will also increase the cycle time.

8 - Transportation

820

860/880 SX & ELITE

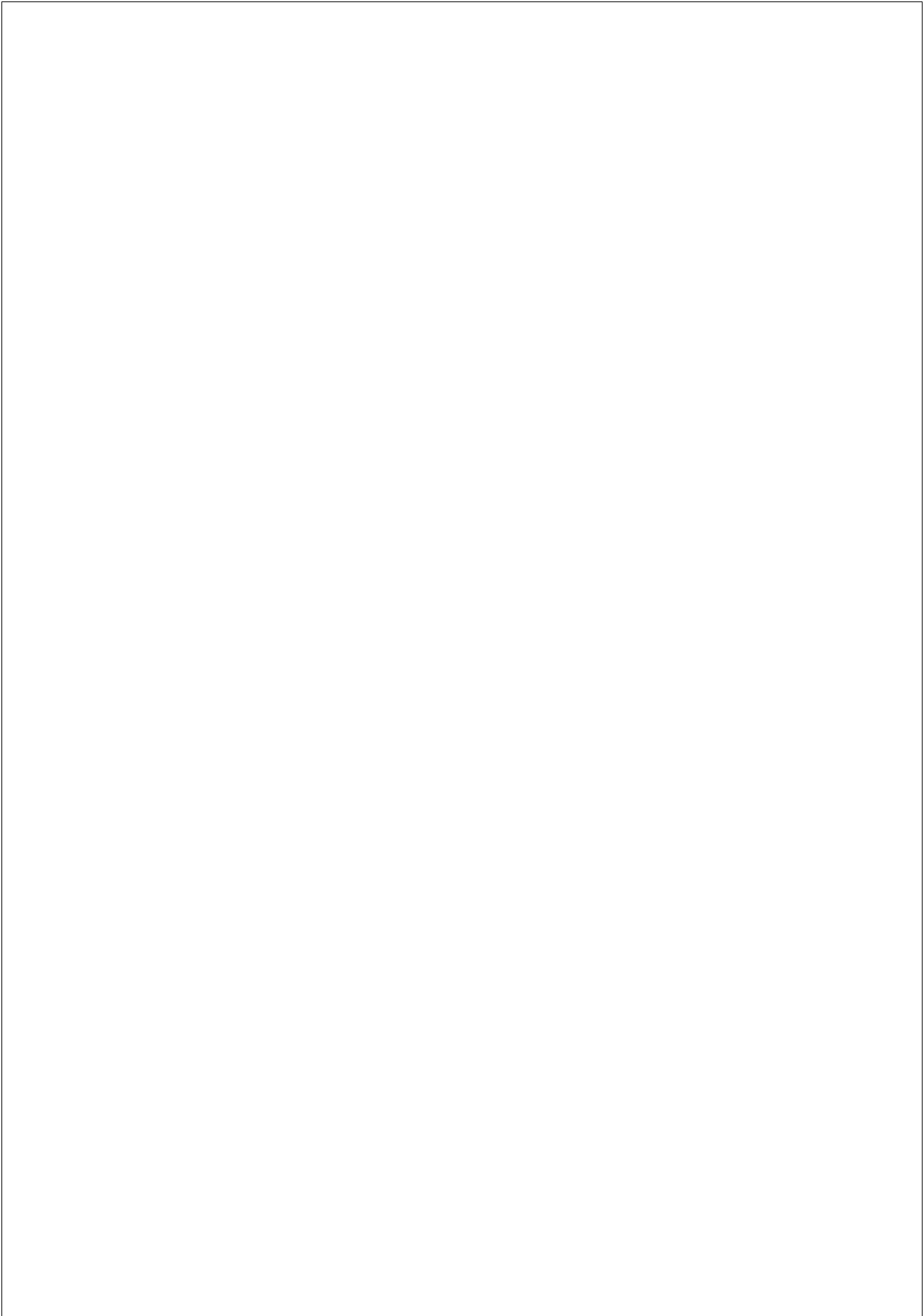
970/980 ELITE

TX760B

TX860B

TX970B

Backhoe Loader



▲ Transporting the Machine

On a railway wagon

Since railway transport is subject to special regulations, please consult an approved organization.

On the trailer of an articulated vehicle

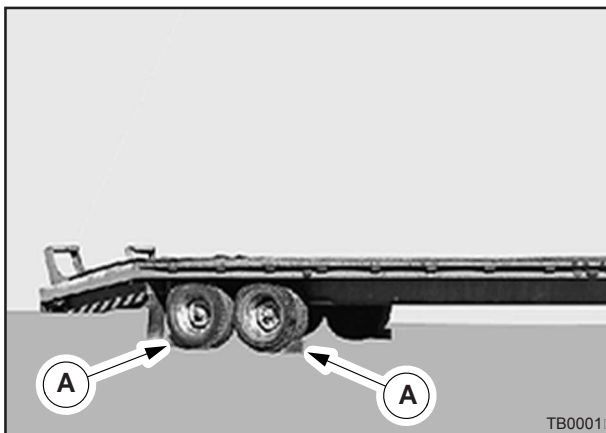


WARNING - It is mandatory to observe the instructions for use of the various fluids and lubricants.

Make sure you know the safety rules and regulations before transporting this machine. Make sure that the articulated vehicle and the machine are fitted with the correct safety equipment.

Loading

1. When loading the backhoe onto a trailer or lorry, strong loading ramps should be used. See "General Dimensions and Weights" on page 10 - 13.
2. Place chocks (A) behind the wheels of the trailer. Install the trailer side extensions (if equipped).
3. Place the backhoe attachment in the road travel position. See "Setting the Backhoe Attachment in the Road Travel Position" on page 7 - 12.
4. Raise the loader bucket approximately 20 cm (8 inch) above the ramps.
5. Select 1st gear and load the machine carefully onto the trailer
6. Lower the loader attachment so that the bucket is resting on the bed of the trailer.
7. Engage the parking brake (B) and place the direction of travel control lever and gear change lever in the neutral position (synchroshuttle only) or the transmission control lever in the neutral position (Powershuttle only).
8. Stop the engine and remove the starter switch key (C).
9. Lock the loader attachment controls by means of the control locking lever (D) (if equipped).



Transportation

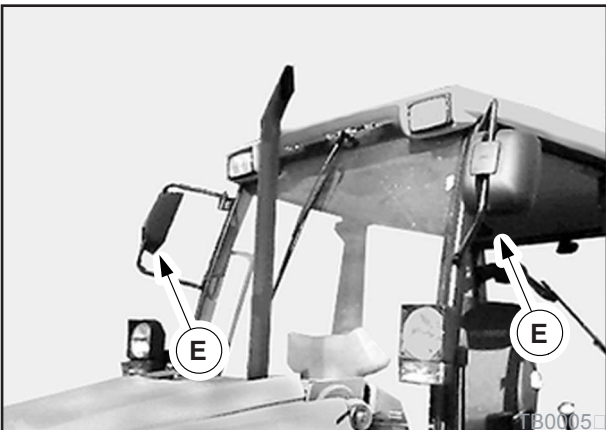
10. Make sure the windows, doors (cab version) and engine bonnet are closed and correctly fastened.
11. Turn the rear view mirrors inwards (E).
12. Use chocks and chains to secure the machine and the loader attachment on the trailer.
13. Measure the distance between the ground and the highest point. You must know the total height.



WARNING - After a short distance, check that the machine has not moved and that the chains are still under tension..

Unloading

1. Remove the chocks and the retaining chains.
2. Return the rear view mirrors to their correct position.
3. Unlock the loader attachment controls by means of the control locking lever (if equipped).
4. Raise the loader attachment to bring the bucket clear of the bed of the trailer.
5. Release the parking brake and select 1st gear.
6. Slowly reverse the machine, so as to keep the loader attachment permanently a few centimetres above the bed of the trailer and the ramps.



Lifting the Machine

NOTICE

NOTICE - Before lifting the machine, it is essential to place the backhoe attachment in the road travel position. See "Setting the Machine in the Backhoe Attachment Working Position" on page 7 - 8.



WARNING - Never use any other lifting points than those shown by the decals.



WARNING - Do not allow anybody within the machine's working range. Never swing the machine over people who are in close proximity.

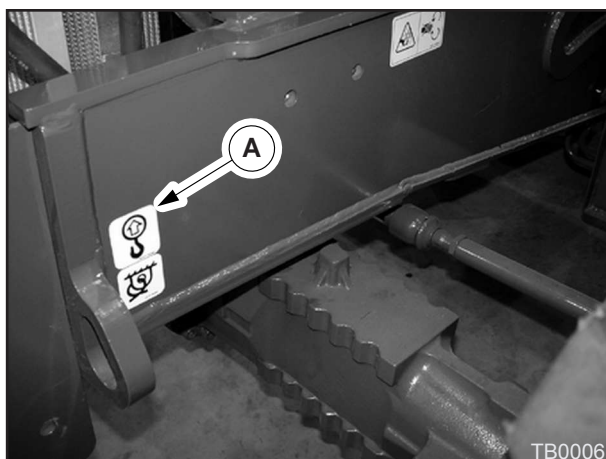
NOTICE

NOTICE - See "General Dimensions and Weights" section on page 10-13.

Use suitable slings to lift the machine.

Make sure that the slings are in perfect condition and that they can take the weight of the machine. See "General Dimensions and Weights" on page 10 - 13.

The lifting points for the machine are shown by decals (A). See "Safety Sign Location (Machine Left -Hand Side - ISO)" on page 3 - 14.



Transportation

Towing the Machine

The machine should only be towed when it is undriveable.

First of all make sure that it can be towed without causing further damage.

Whenever possible carry out the repair at the site or consult your local dealer.

If the machine is on the public highway, make sure that no component of the machine projects onto the highway. If this cannot be avoided, install signs in accordance with regulations.



WARNING - Towing is a delicate operation which is always performed at the risk of the user. The manufacturer's guarantee does not apply to incidents or accidents occurring during towing. Whenever possible, carry out the repair at the location, without towing the machine.



WARNING - It is essential for a tow bar to be used for towing the machine.



WARNING - The machine must be towed very slowly (15 kph (9 m.p.h.) maximum), over a short distance and only if it is really necessary. Allow plenty of time to turn with the engine stopped, as with no power assistance much more effort is required.



WARNING - With engine stopped, the braking operation requires much more effort.



WARNING - When towing, the operator must be alone on the machine. Make sure that no other person is on the machine or within the machine's working range.

Road Travel



WARNING - Always fasten your seat belt before travelling on the road.



WARNING - It is essential to lock the attachments and install the safety systems required by regulations before travelling on the road.



WARNING - Check that the lighting and signalling systems are operating correctly before travelling on the road.



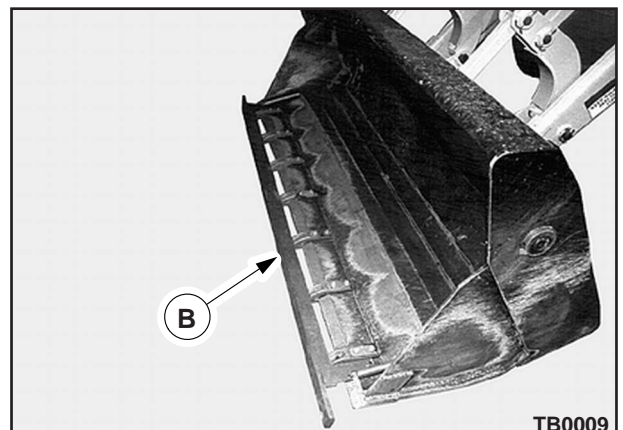
WARNING - Before undertaking any road travel, make sure that the backhoe attachment is in the road travel position and mechanically immobilized.

NOTICE

NOTICE: Operating the Hydraulic pumps flow control switch, for long road journeys will improve the machines performance and fuel consumption, see "Hydraulic pumps flow control", page 5-23.

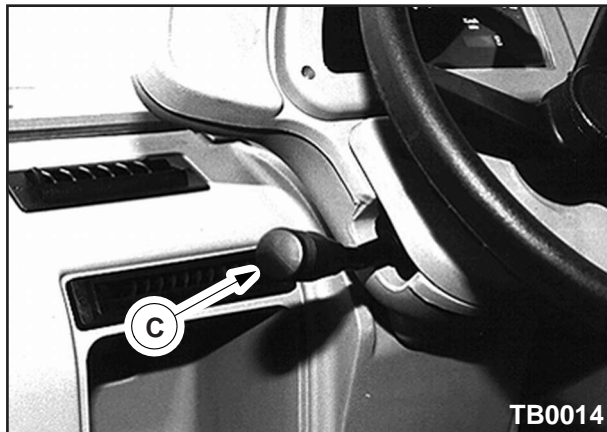
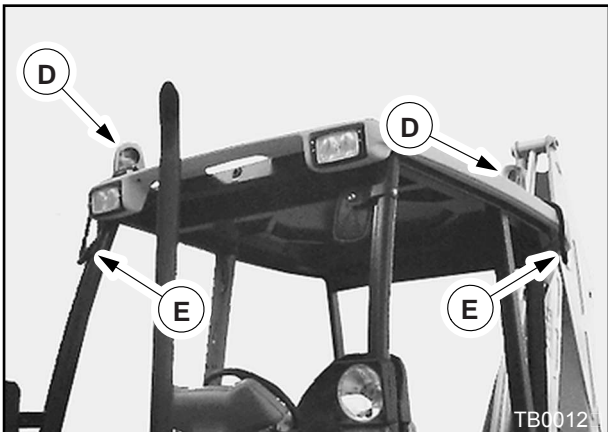
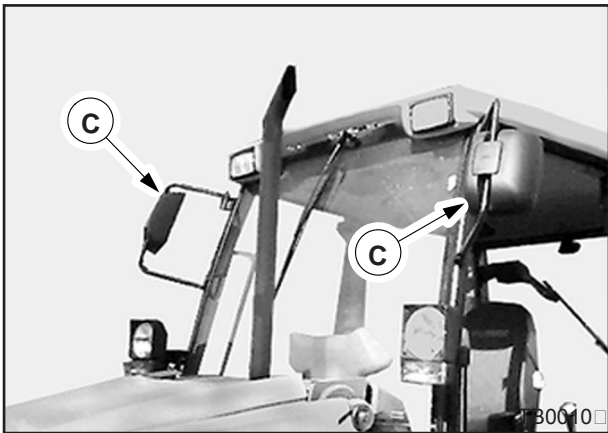
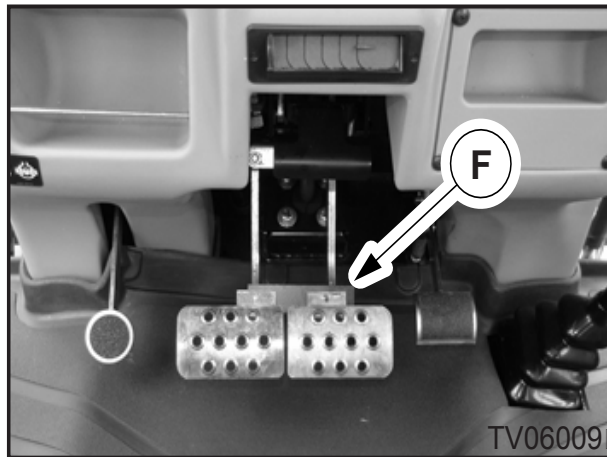
1. Place the backhoe attachment in the road travel position. See "Setting the Machine in the Backhoe Attachment Working Position" on page 7 - 8.
2. Make sure that the engine throttle (A) lever is in the low idle position.
3. Make sure that the stabilizers are completely raised.
4. Place the seat in the loader attachment position.
5. Select 1 pump when travelling.

6. Raise the loader attachment about 20 cm (8 inches) above the ground and roll back the loader bucket completely. Stop the engine, engage the parking brake and remove the starter switch key.
7. Install the tooth-cover (B) and the warning panels on the loader bucket (optional or specific to certain countries).



Transportation

8. Adjust the rear view mirrors (C) correctly.
9. Place the rotating beacons (D) on the cab roof and connect the cables (E) .
10. Make sure that the doors (if equipped) are closed correctly and that the engine bonnet is fastened.
11. Make sure that the two brake pedals are locked together (F).
12. Adjust the operators seat correctly and fasten the seat belt (G).
13. Make sure the direction of travel control lever (H) (synchroshuttle only) or the transmission control lever (Powershuttle only) is in the neutral position and start the engine.



14. Lock the loader attachment controls by means of the control locking lever (j) (if equipped).
15. Make sure the steering mode switch (K) is in two wheel steering position and it is locked with the tab (970/980).
16. Make sure that 4 wheel drive is disengaged.

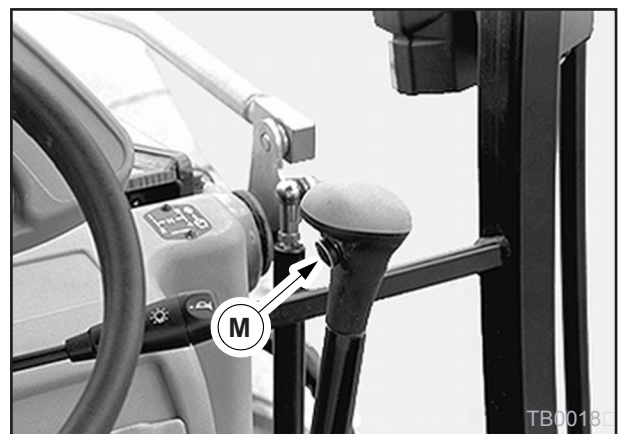
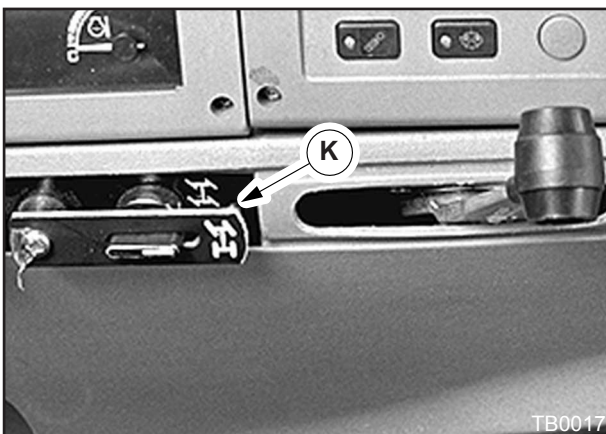
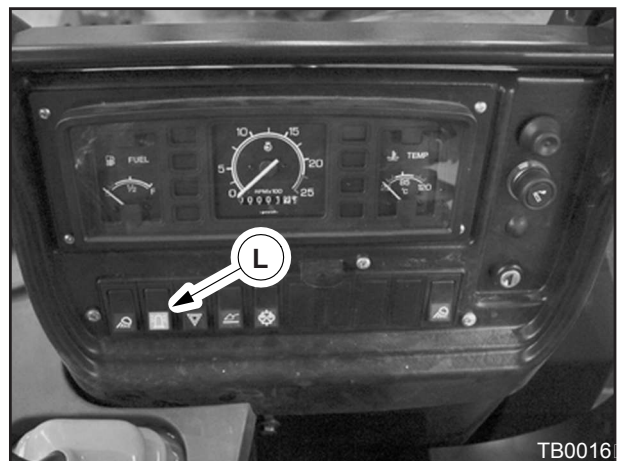
17. Turn on the rotating beacons (L).

Synchroshuttle only

18. Press the clutch transmission dump button (M) and then place the gear change lever in 3rd or 4th gear. Release the button.

Powershuttle only

19. Select 3rd or 4th gear (N). **NOTE:** (Specific certain countries) there is no 4th gear.



Transportation

20. Press the brake pedal down and release the parking brake (P).
21. Move into forward position, the direction of travel control lever (Q) (synchro shuttle only) or transmission control lever (Powershuttle only).

22. Release the brake pedals and control the travel speed by means of the accelerator pedal (R).



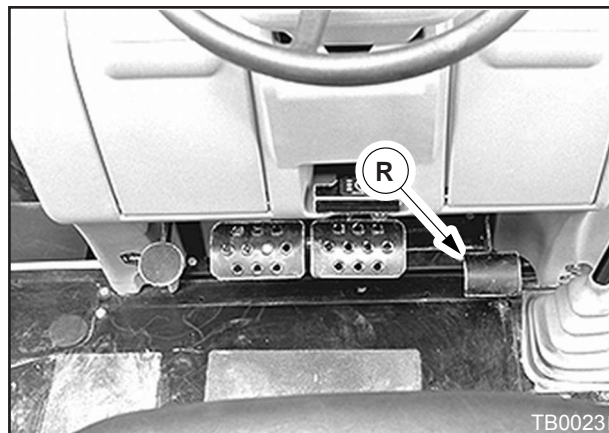
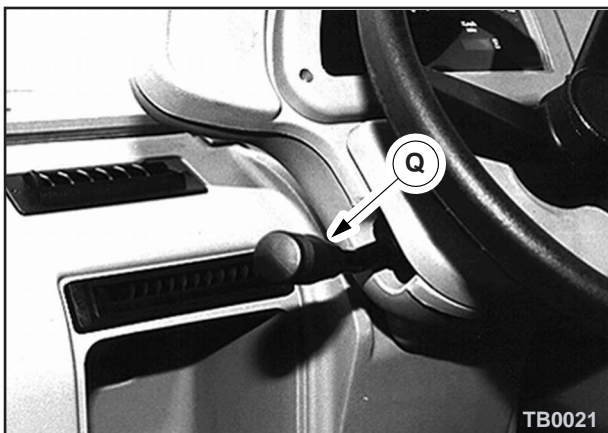
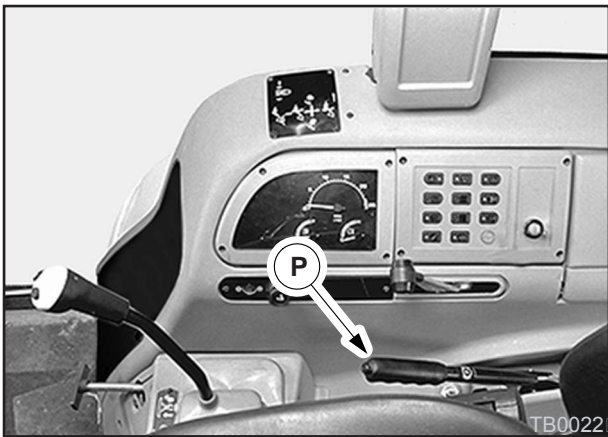
WARNING - Check all gauges and indicator/warning lamps frequently.



WARNING - in the event of a brake system failure, immediately engage the parking brake.



WARNING - Never use the differential lock pedal.



9 - Maintenance

820

860/880 SX & ELITE

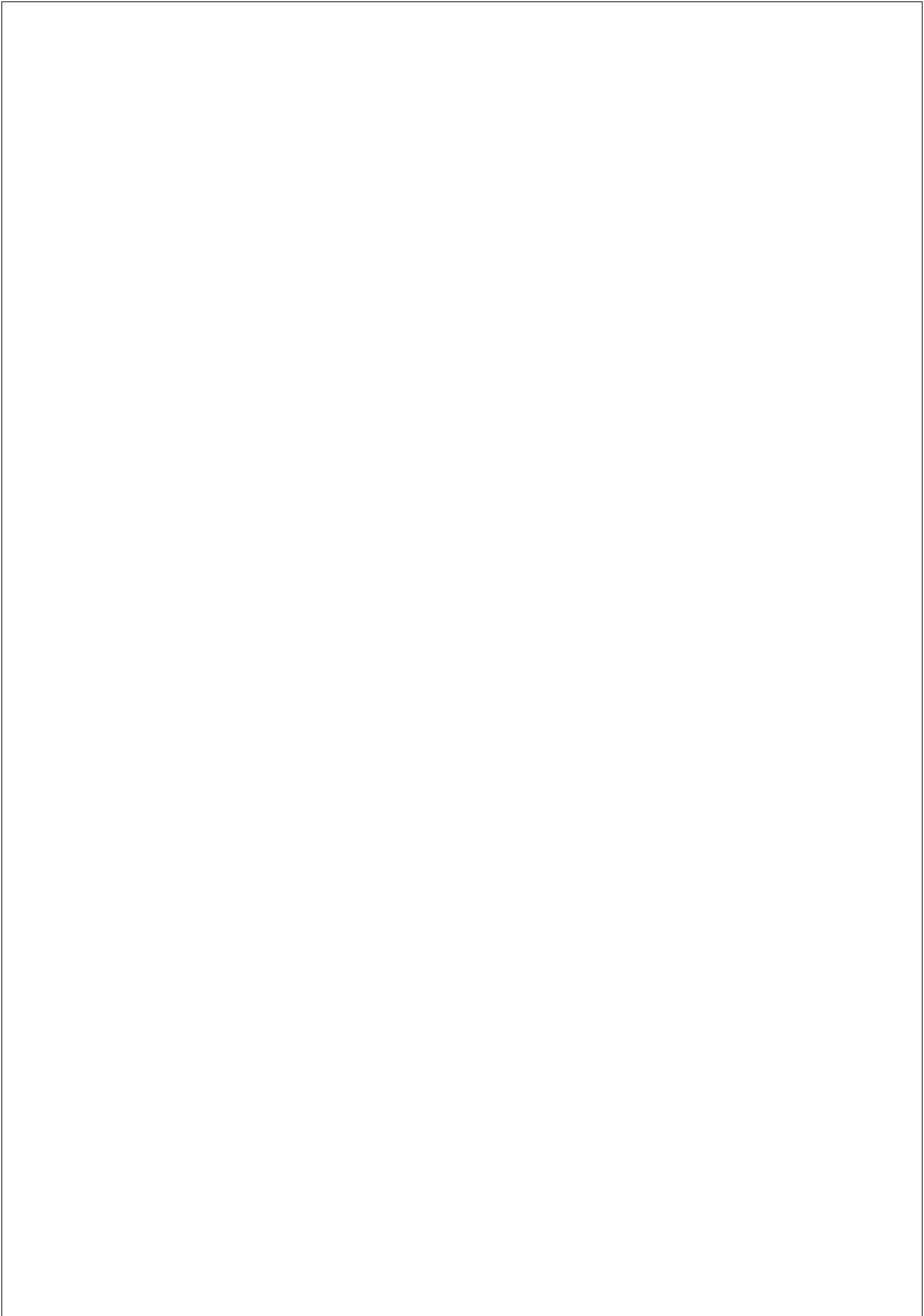
970/980 ELITE

TX760B

TX860B

TX970B

Backhoe Loader



Maintenance and Lubrication

Before carrying out any service or maintenance work ensure that the following precautions have been taken.

- Place the machine on firm level ground.
- Stop engine and chock the wheels.
- Remove Start key to prevent accidental starting.
- Place a warning tag on the machine to prevent accidental start up.
- Only jack or raise the backhoe using the correct equipment.



WARNING - Always use Axle stands or other acceptable rigid support of ample capacity to support the backhoe when raised clear of the floor.

- Refer to Service Schedules on Page 9 - 90.
- When checking fluid levels the machine must be placed on a firm, level surface, in a well ventilated position away from naked flames, grinding sparks etc.
- Ensure strict cleanliness is observed especially when dealing with hydraulic systems.
- Isolate electrical system by using the isolator switch or by disconnecting the battery.
- Ensure all guards and covers removed during maintenance are replaced before the machine is put back into work.



WARNING - Never work under a raised bucket unless the safety props are LOCKED in position.



WARNING - Refer to the SAFETY section of this manual before performing any maintenance tasks on this machine.

Safety Signs

All safety signs fitted to the machine must be legible. Use mild soap and water to clean safety signs -DO NOT use solvent based cleaners because they may damage the safety sign material. All safety signs MUST be replaced immediately they become damaged or unreadable.

Hydraulic Oil Under Pressure

- Release any pressure in the hydraulic circuit before carrying out any repairs to the hydraulic system or components.
- Fine jets of hydraulic fluid under pressure can penetrate the skin.
- Do not use your fingers to check for small leaks or expose uncovered areas of your body to leaks.
- Check for leaks using a piece of cardboard.



WARNING - If skin is penetrated with Hydraulic Fluid, Get immediate Medical Help.

Maintenance

Cleaning

- Clean the backhoe thoroughly, this will make it easier to find oil leaks and loose fittings etc.
- Take care to clean the oil, fuel and water tank filler necks.
- Drain plugs should also be cleaned.

NOTICE

NOTICE - Avoid Spraying Electrical Equipment with Pressure Washers.

- Using water or a pressure washer to wash down the exterior of the backhoe with or without detergent is generally all that is required.
- When cleaning the backhoe it is preferable to use a biodegradable cleaner. Do not use solvents or like products which can damage rubber and plastics

NOTICE

NOTICE - Contaminated Water / Fluids / Oils Must Be Disposed of Legally.

Vehicle/Machine Battery - End of Life Disposal

When the battery reaches the end of its useful life it must be removed from the machine and recycled in an approved way in accordance with local environmental regulations.

This service is usually offered by battery vendors.

Machine users that cannot find a suitable battery recycling facility should contact Terex for assistance.

Fluids and Lubricants

Fluids and lubricants must have the correct properties for each application.



WARNING - It is mandatory to observe the instructions for use of the various fluids and lubricants.

Hydraulic fluid

Hydraulic fluid is specially designed for high pressure applications and for hydraulic system. The type of fluid to be used depends upon the ambient temperature.

Fluid type: ISO VG 46

Hot climates

Up to +50°C (122°F)

Temperate climates

Up to +30°C (86°F)

Fluid type: ISO VG 68

Brake fluid - 'Safim' Brake System Only

Type of oil to be used: Mobiloil LHM (Mineral brake fluid)

Transmission component oil

Synchroshuttle

- Texamatic 7045E
- ATF Type A Suffix A
- Dextron II D
- Dextron III G
- Allison C4

Powershuttle

- Texamatic 7045E
- ATF Type A Suffix A
- Dextron II D
- Dextron III G
- Allison C4

Grease

General:

Extreme pressure grease EP NLGI grade 2.Rear axle oil

Type of oil to be used: API GL4 grade 80W

- Prop. shafts
- Drive shafts U.J.
- Axle(s) king pins

Components

- Backhoe swing

Extreme pressure grease EP NLGI grade 2 with molybdenum disulphide.

Rear axle oil

Type of oil to be used: API GL4 grade 80W

Front axle oil (4 Wheel drive)

Type of oil to be used: API GL5 grade 80W-90

Engine oil

The engine oil to be used depends on the ambient temperature.

NOTICE

NOTICE: Do not put any performance additive or other additive in the sump. Oil change intervals shown in this manual are based on tests carried out on lubricants.

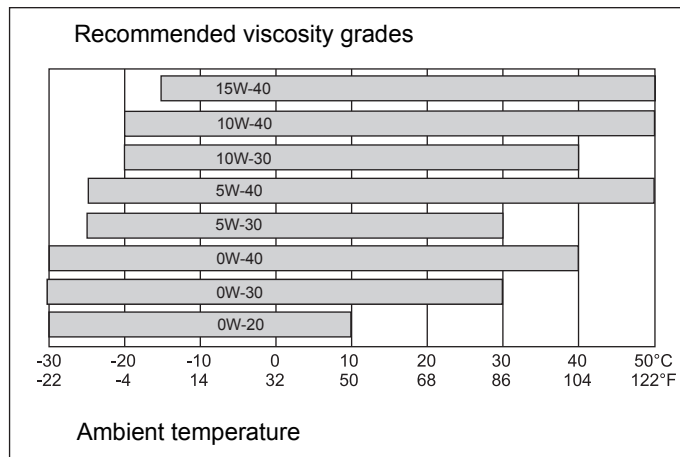
Maintenance

Lubrication oil specification

Always make sure that the correct viscosity grade of lubricating oil is used for the ambient temperature range in which the engine will run as shown in the chart (A).

Use only a good quality lubricating oil to the minimum specification of:

- ENA DHD-1 Multi grade (preferred oil)
- API CH-4 Multi grade (preferred oil)
- ACEA E3
- API CG-4
- ACEA E5



Coolant specification

The quality of the coolant that is used can have a great effect on the efficiency and life of the cooling system. The recommendations indicated below can help to maintain a good cooling system and to protect it against frost and/or corrosion.

NOTICE

NOTICE: An anti-freeze which contains the correct inhibitor must be used at all times to prevent damage to the engine by corrosion, because of the use of aluminium in the coolant circuit.

NOTICE

NOTICE: If frost protection is not necessary, it is still extremely important to use an approved anti-freeze mixture because this gives a protection against corrosion and also raises the boiling point of the coolant.

NOTICE

NOTICE: If combustion gases are released into the coolant circuit, the coolant must be renewed after repair of the fault.

If it is possible, use clean soft water in the coolant.

The quality of the anti-freeze coolant must be checked at least once a year, for example, at the beginning of the cold period. The coolant must be renewed every two years.

Maintenance

Anti-freeze/anti-corrosion

Use anti-freeze in all seasons to protect the cooling system from corrosion and all risk of freezing.

For areas where ambient temperatures are over -36° C (-33° F), use a blend of 50% ethylene-glycol based anti-freeze.

For areas where temperatures are below -36° C (-33° F), it is advisable to use a blend of 40% water and 60% anti-freeze.

Fuel

The fuel to be used must be in conformity with the D975-91 Class 2-2DA, US DF1, US DF2, US DFA standard of the American Society for Testing and Materials (ASTM).

The use of other fuels may cause loss of engine power, excessive fuel consumption and may reduce the life of the fuel injection equipment.

In cold weather, a mixture of fuel no. 1 and no. 2 is temporarily permitted. Consult your fuel supplier.

If the temperature falls below the fuel cloud point (point at which wax appears), wax crystals in the fuel will cause a loss of engine power or make it impossible to start the engine.

In cold weather, fill the fuel tank after each day's work, to prevent the formation of condensation.

Fuel Storage

Prolonged fuel storage causes foreign bodies or condensation water to accumulate in the storage tank. Many engine failures are caused by the presence of water in fuel.

Condensation water should be drained off at regular intervals.

Low sulphur fuel

% of sulphur in fuel	Oil change interval
< 0.2%	Normal
> 0.2%	0.50 of normal

Environment

Before carrying out any maintenance operation on the machine and before disposing of used fluids or lubricants, always think of the environment. Never throw oil or fluid on the ground and never put them in leaky receptacles.

Consult a local recycling or environmental centre, or a local dealer to obtain information on the correct method of disposing of these materials.

Plastic and Resin Parts

When cleaning plastic windows, the console, the instrument panel, the gauges, etc., avoid the use of petrol, paraffin, paint solvents, etc. Use only water, soap and a soft cloth.

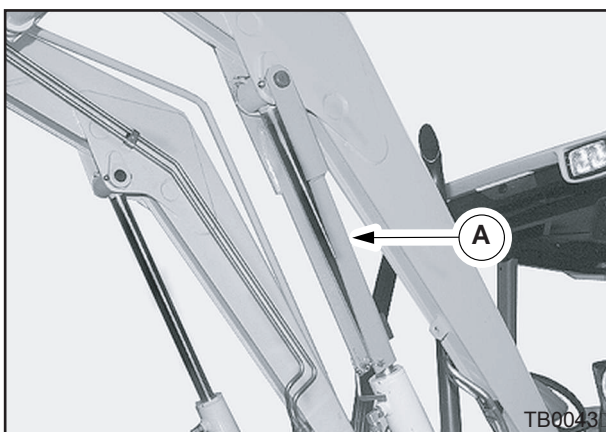
The use of petrol, paraffin, paint solvents, etc. will cause discoloration, cracks or deformation of these parts.

Engine Access



WARNING: Many of the checks and operations referred to in this section require access to the engine. Take the following steps to safely gain access to the engine.

1. Park the machine on flat level ground.
2. Raise the loader attachment, stop the engine, engage parking brake, remove the starter switch key and install the support strut (A). See "Loader Attachment Support Strut" section on page 5-53.
3. Unlock the engine bonnet (B) and swing it open.



Grease Points

Machine

Tool required

- Grease gun (delivered with machine)

Grease specification	See "Fluids and Lubricants" section on page 9-3.
----------------------	--

Note - The figures shown in brackets indicate the number of grease points.

Every 10 hours

- Front axle pivot (A) (1)
- Front axle swivel (B) (both sides) (2)
- Front axle swivel (C) (both sides) (2)

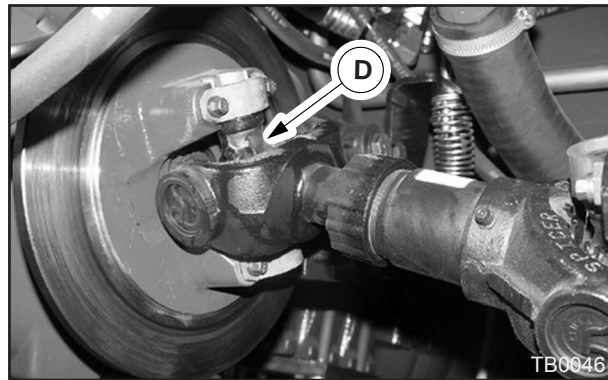
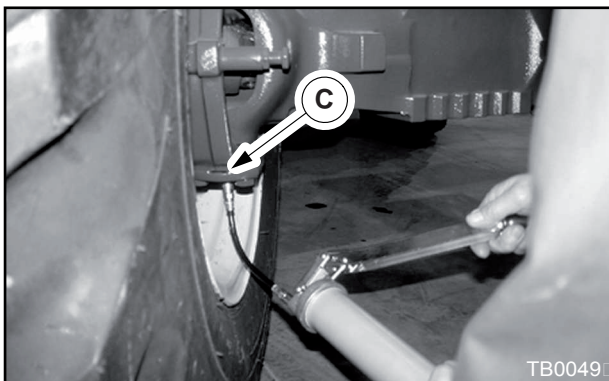
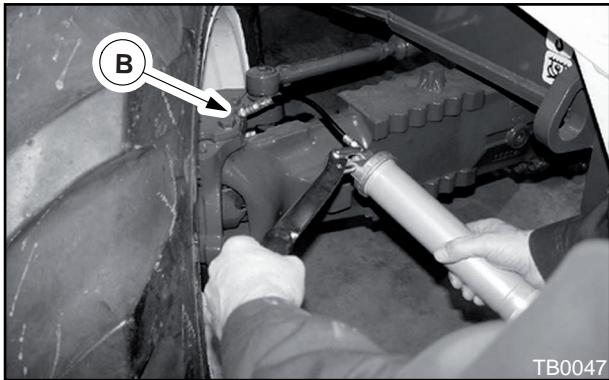
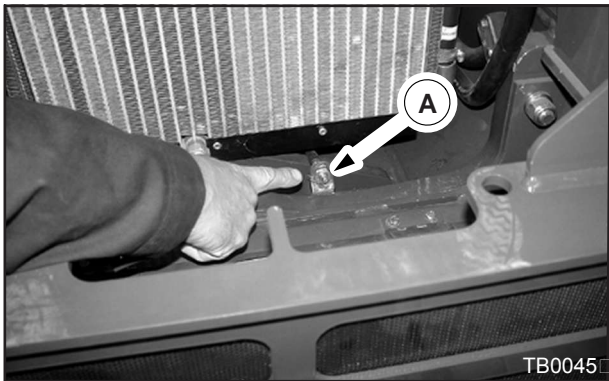
Every 50 hours

- Rear cardan shaft joints (D) (3)
- Front cardan shaft joints (E) (3)

Note - Make sure grease comes out of all four seals of each joint. This flushes abrasive contaminants from each bearing and makes sure all bearings are lubricated.

If grease fails to discharge from any seal move the shaft from side to side and then re-apply pressure from the grease gun.

Should grease still fail to be discharged from the seals it will be necessary to remove and dismantle the bearing assembly to determine the cause of the blockage.



Pedal pivot

Tool required

- One oil can

Every 250 hours

- Pedal pivots (A)..... (4)



Maintenance

Loader attachment

Tool required

- Grease gun (delivered with machine)

Grease specification	See "Fluids and Lubricants" section on page 9-3.
----------------------	--

Note - The figures shown in brackets indicate the number of grease points.



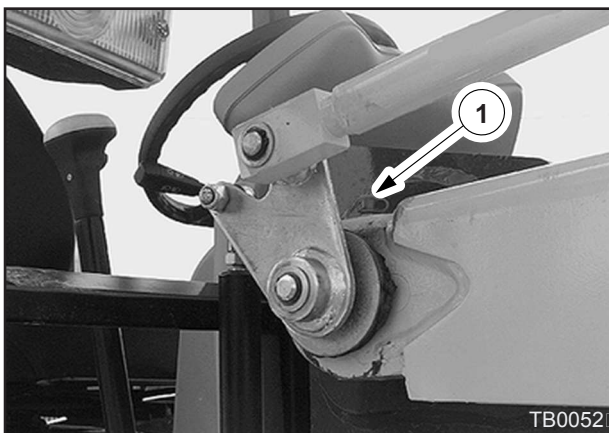
TB0051

Every 10 hours

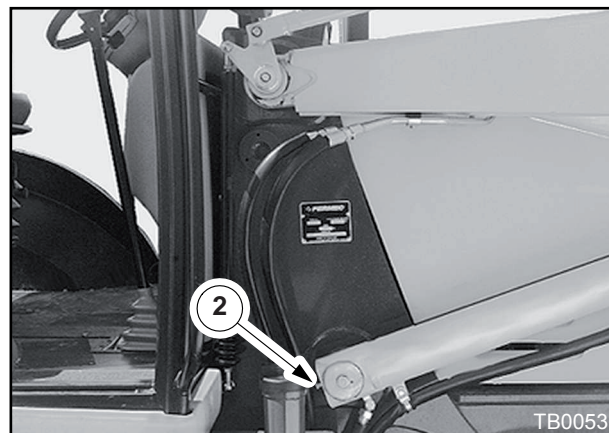
1 Beam linkage (all models) (2)

Every 10 hours

2 Beam cylinder bottom pins (2)



TB0052



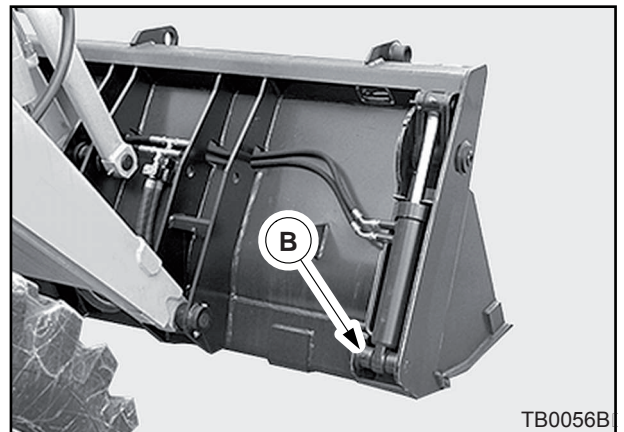
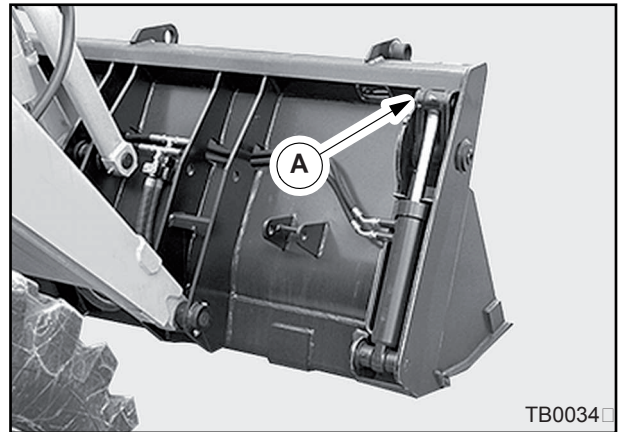
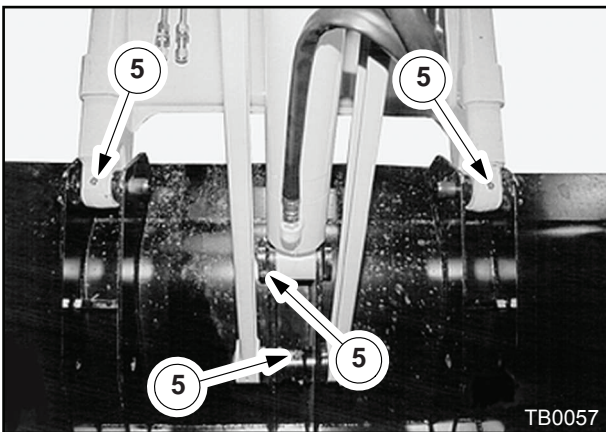
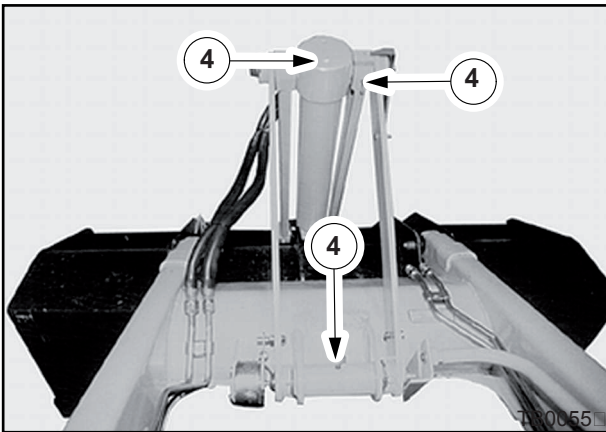
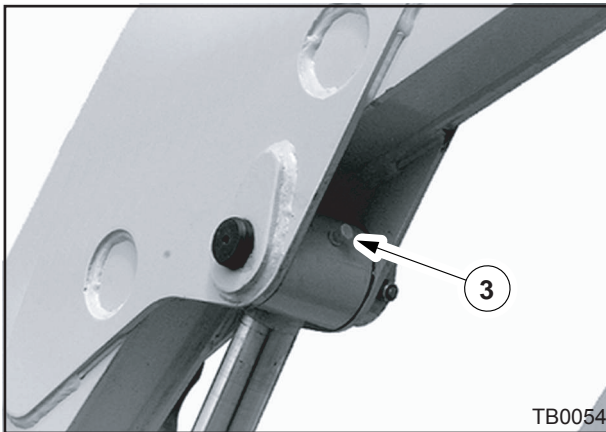
TB0053

Every 10 hours

- 3 Beam cylinder top pins..... (2)
- 4 Bucket connecting rods..... (4)
- 5 Bucket linkage..... (4)

Every 10 hours

- A Clam cylinder to 7 in 1 bucket (A) (if equipped)..... (2)
- B 7 in 1 clam cylinder bottom pins (B) (if equipped)... (2)



Maintenance

Feedback linkage of the loader attachment

All models

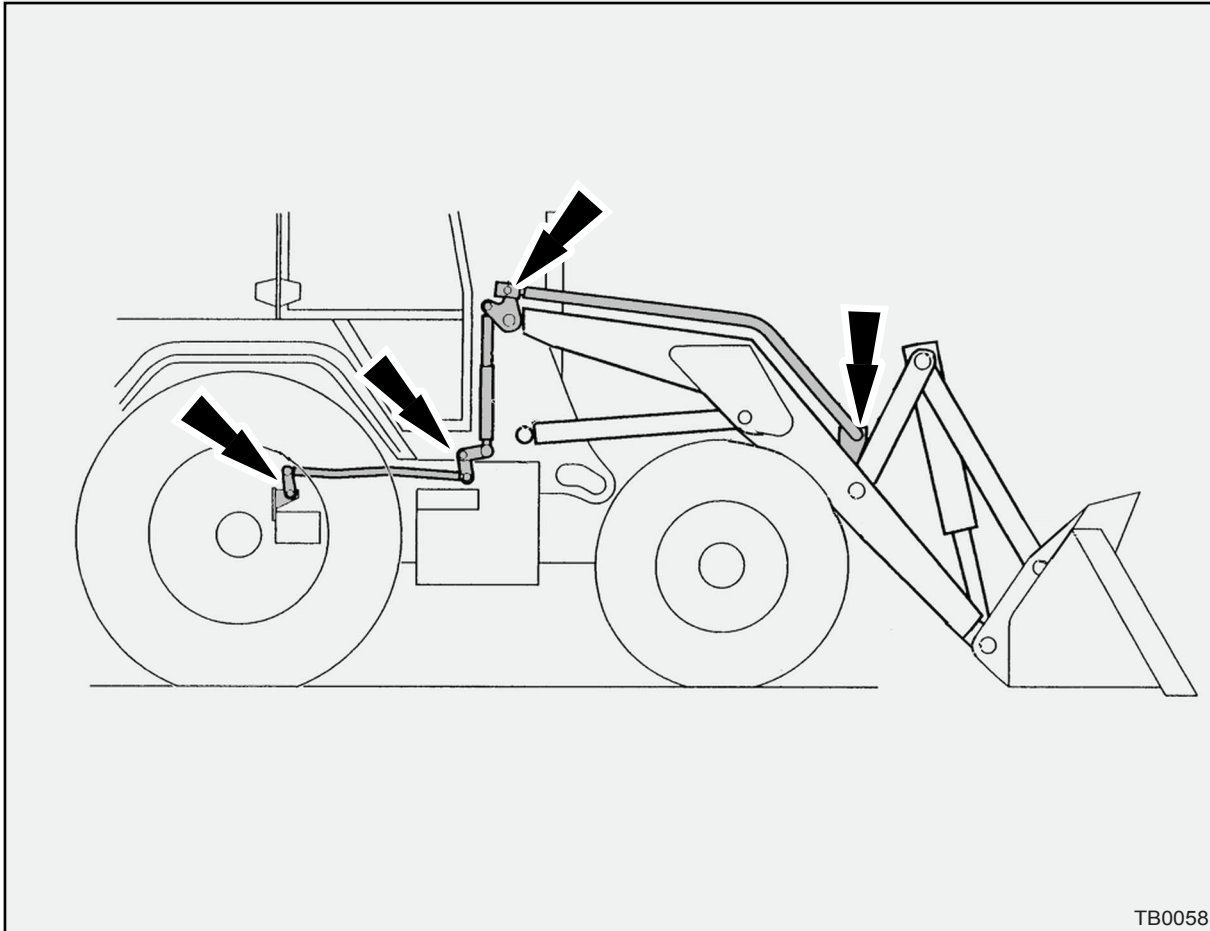
Tool required

- One oil can

Note - The figures shown in brackets indicate the number of grease points.

Every 250 hours

- Pivots (4)



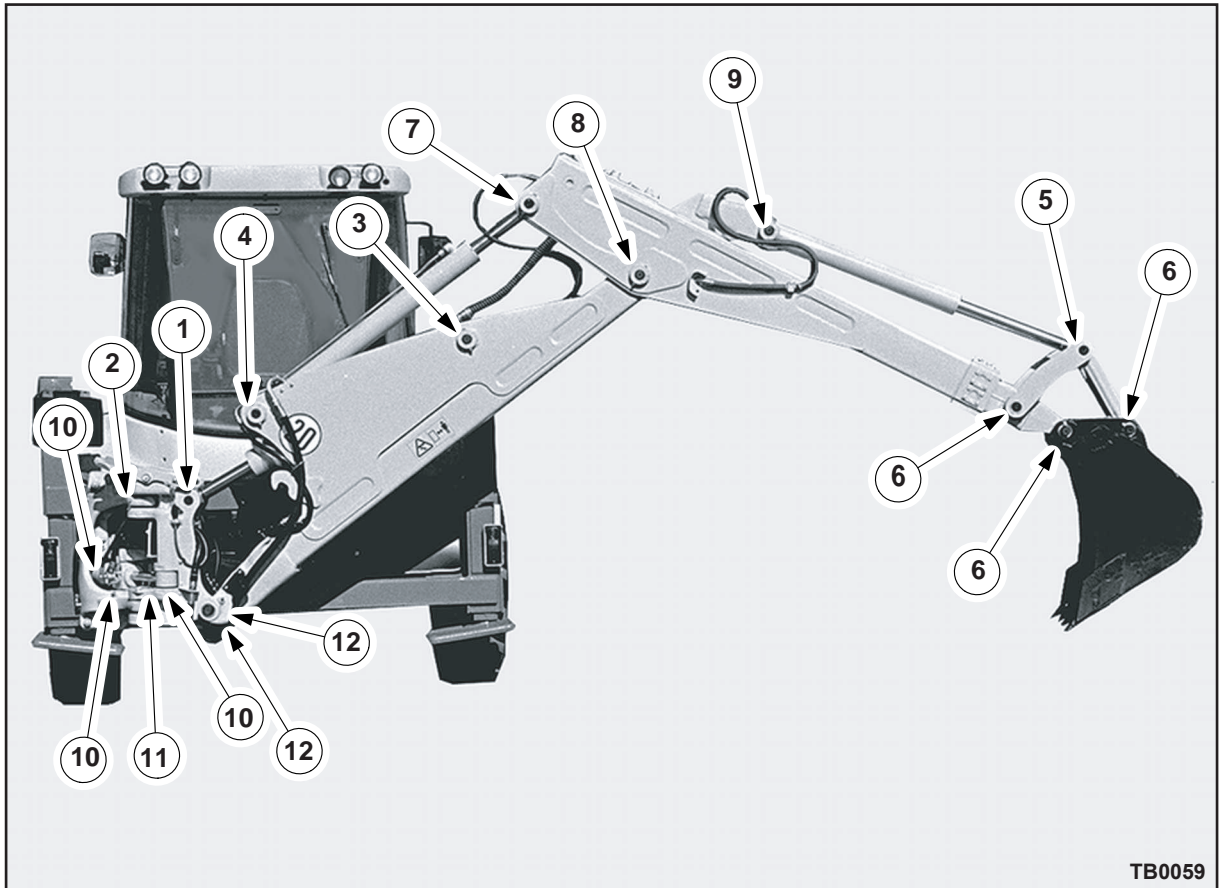
Backhoe attachment (sideshift (offset) backhoe version)

Tool required

- Grease gun (delivered with machine)

Grease specification	See "Fluids and Lubricants" section on page 9-3.
----------------------	--

Note - The figures shown in brackets indicate the number of grease points.



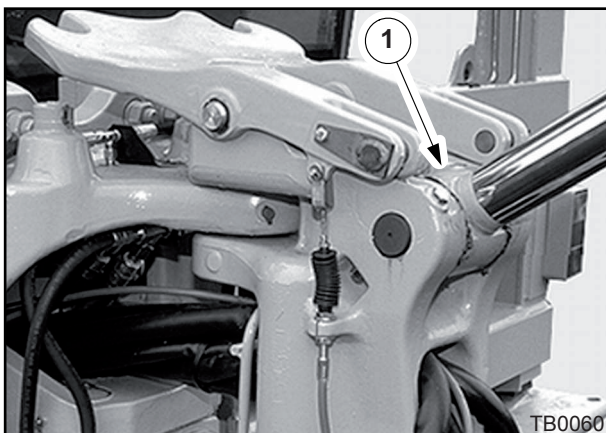
TB0059

Every 10 hours

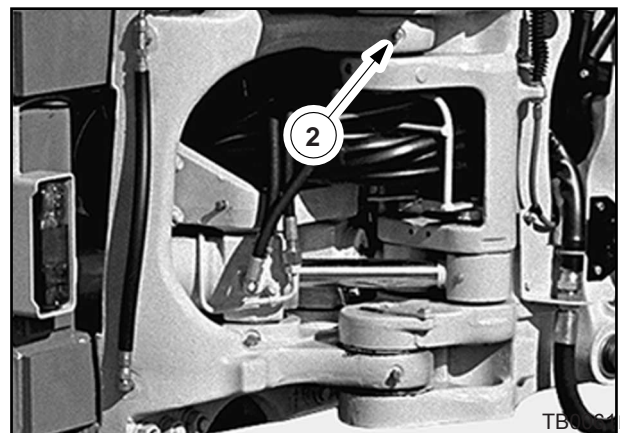
1 Boom cylinder top pin..... (1)

Every 10 hours

2 Upper swing pin..... (1)



TB0060



TB0061

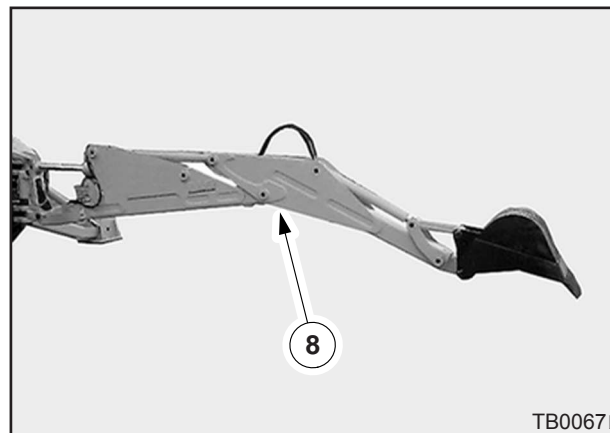
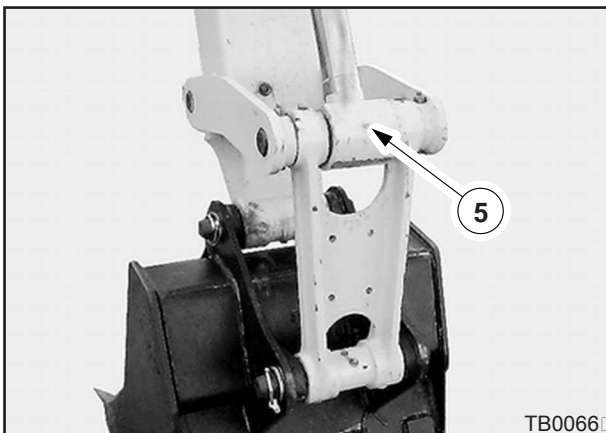
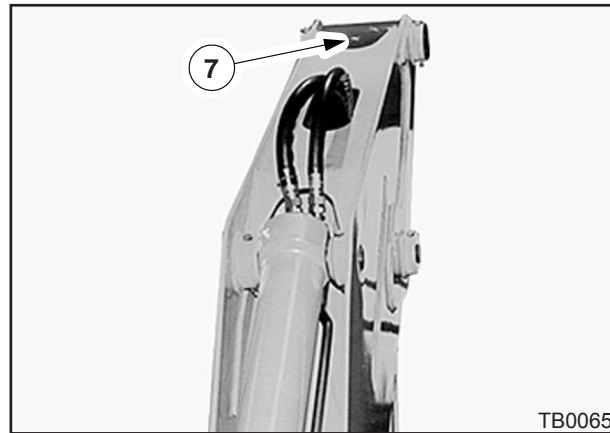
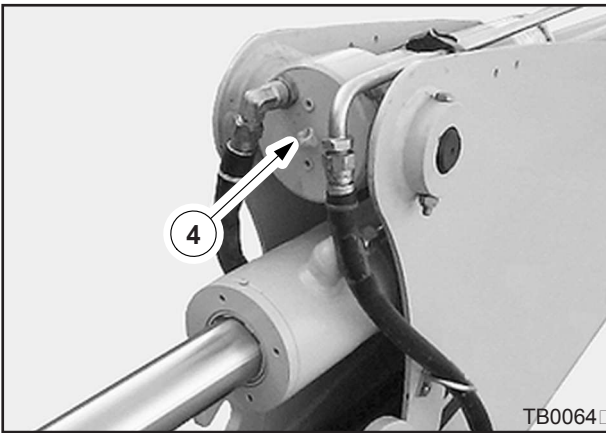
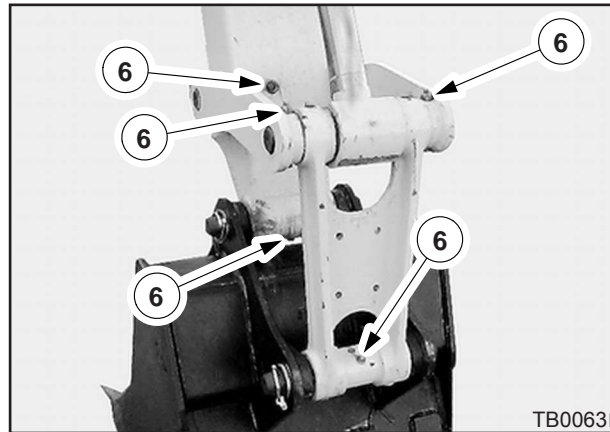
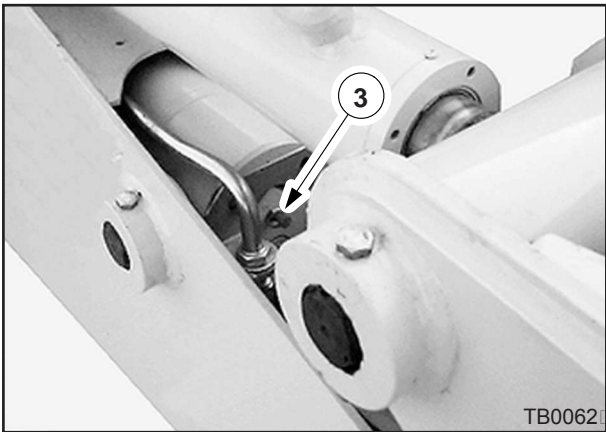
Maintenance

Every 10 hours

- 3 Boom cylinder bottom pin..... (1)
- 4 Dipper cylinder bottom pin (1)
- 5 Bucket cylinder top pin (1)

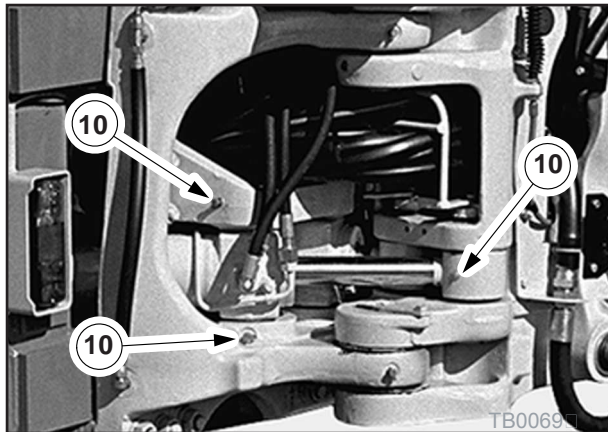
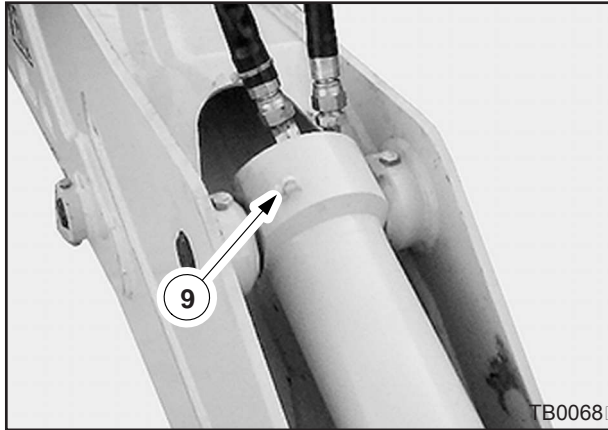
Every 10 hours

- 6 Bucket linkage (5)
- 7 Dipper cylinder top pin..... (1)
- 8 Boom/dipper linkage..... (1)



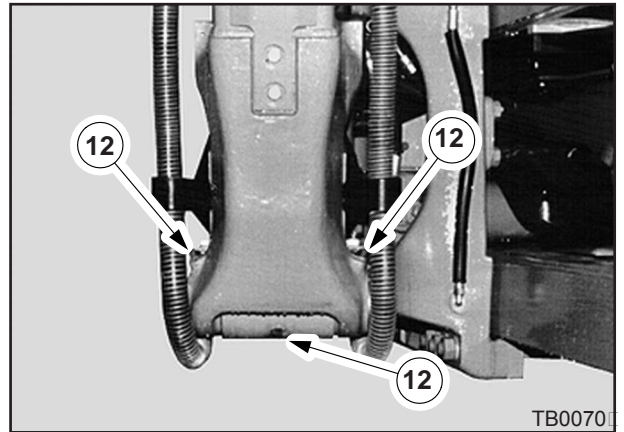
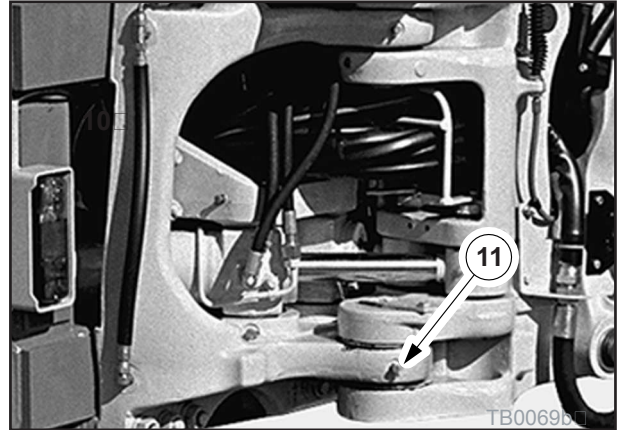
Every 10 hours

- 9 Bucket cylinder bottom pin..... (1)
- 10 Swing cylinders (both sides (6)



Every 10 hours

- 11 Lower swing pin (1)
- 12 Boom bottom pin..... (3)



Sideshift version

!

WARNING - Do not grease the chassis rail faces..

!

WARNING - Do not grease the stabiliser legs.

Sideshift and centremount versions

!

WARNING - Do not grease the external faces of the extendable dipper (if fitted)..

Maintenance

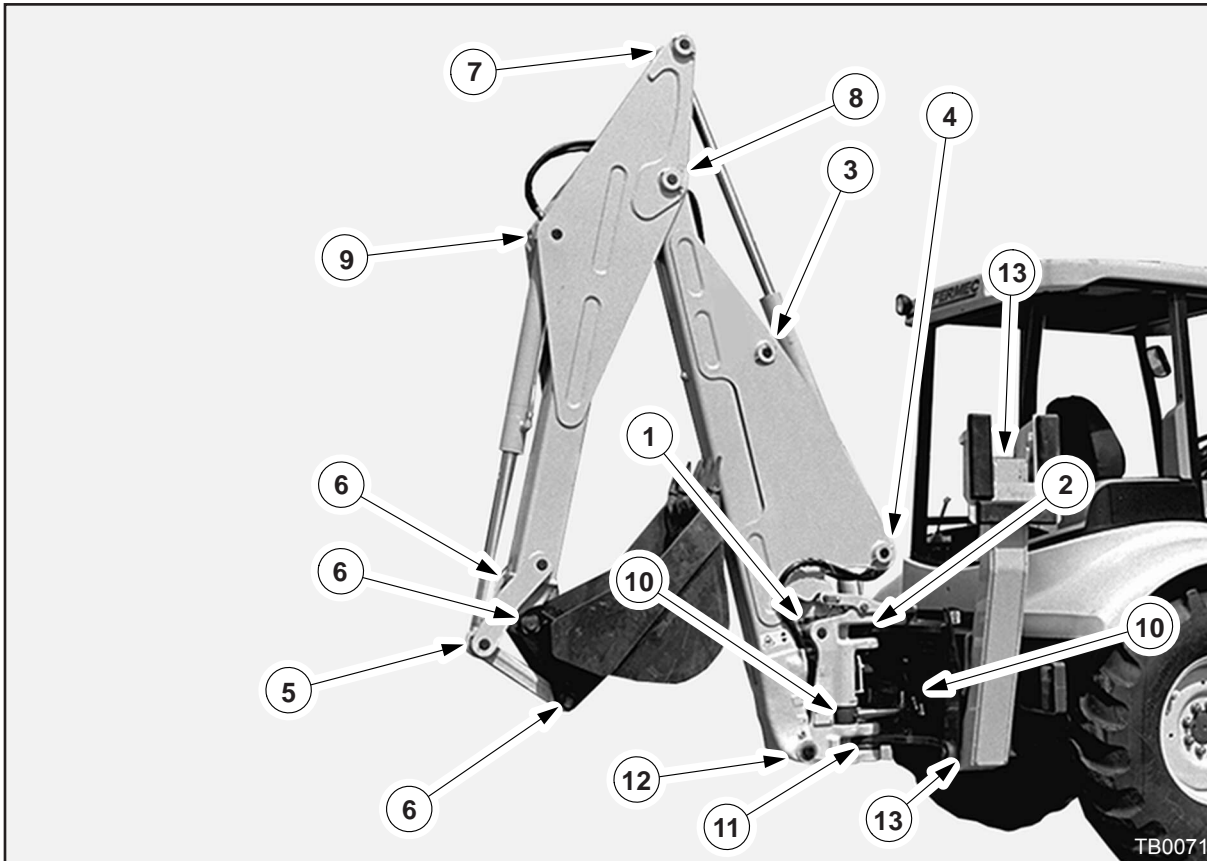
Backhoe attachment (centremount (axial) backhoe version)

Tool required

- Grease gun (delivered with machine)

Grease specification	See "Fluids and Lubricants" section on page 9-3.
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Note - The figures shown in brackets indicate the number of grease points.

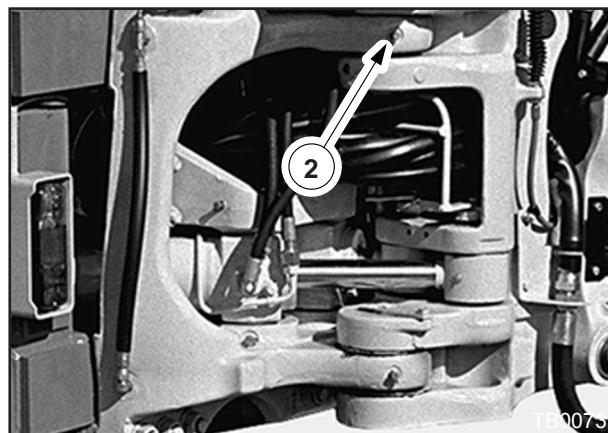
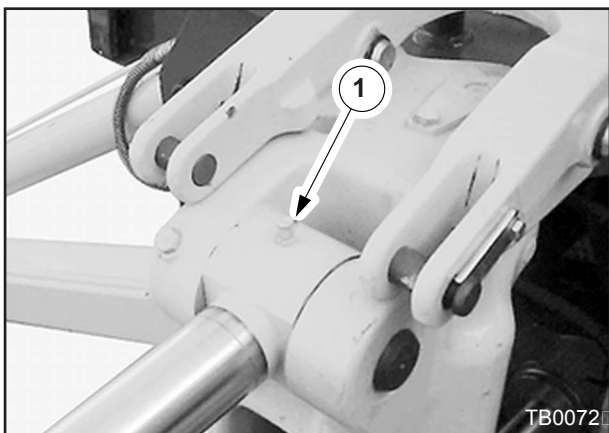


Every 10 hours

1 Boom cylinder top pin (1)

Every 10 hours

2 Upper swing pin..... (1)

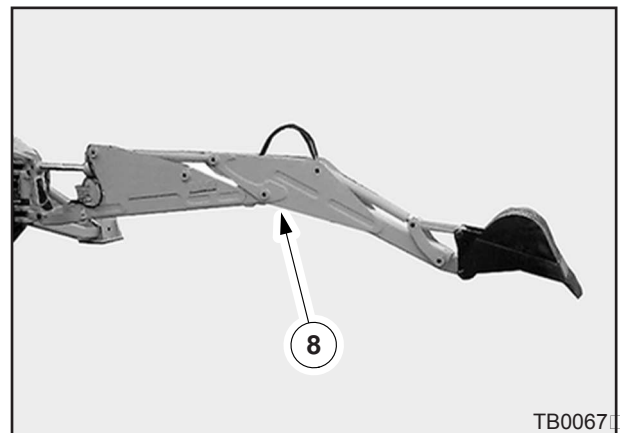
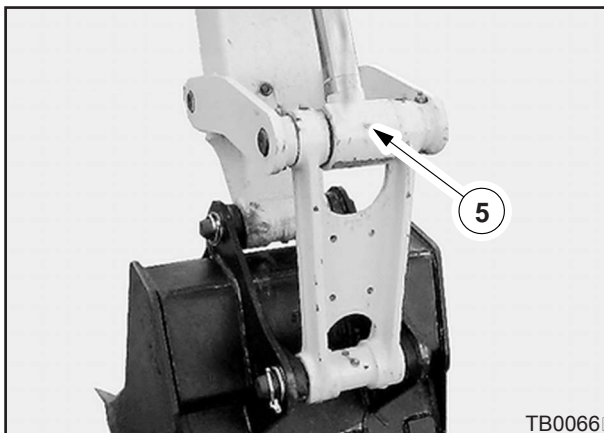
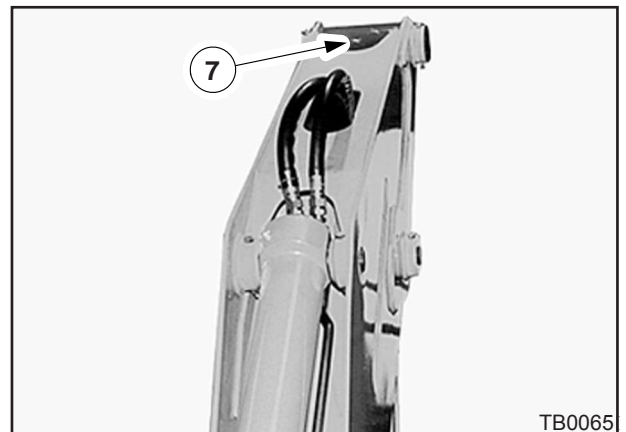
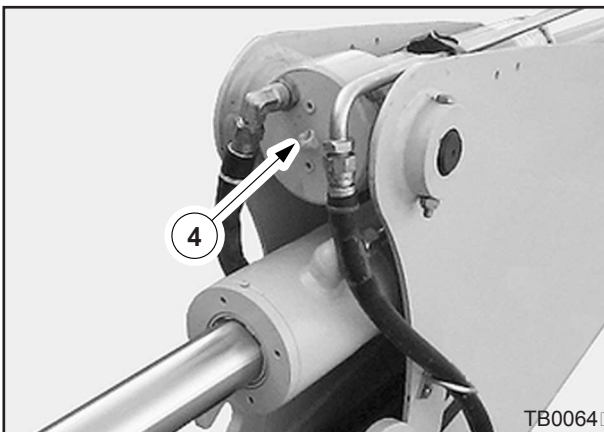
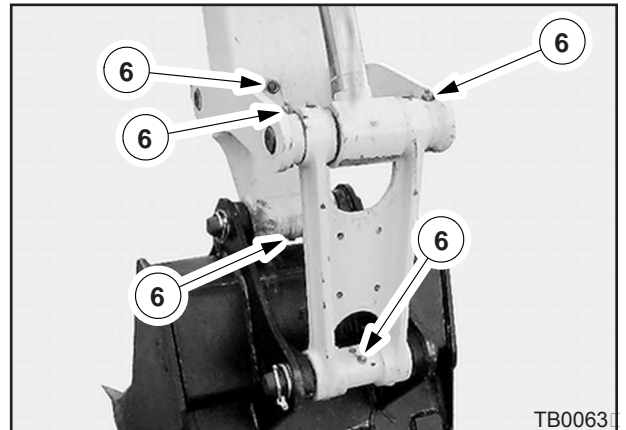
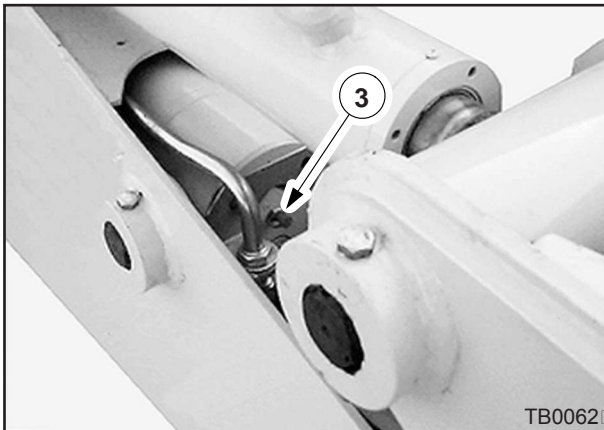


Every 10 hours

- 3 Boom cylinder bottom pin (1)
- 4 Dipper cylinder bottom pin (1)
- 5 Bucket cylinder top pin (1)

Every 10 hours

- 6 Bucket linkage (5)
- 7 Dipper cylinder top pin (1)
- 8 Boom/dipper linkage (1)



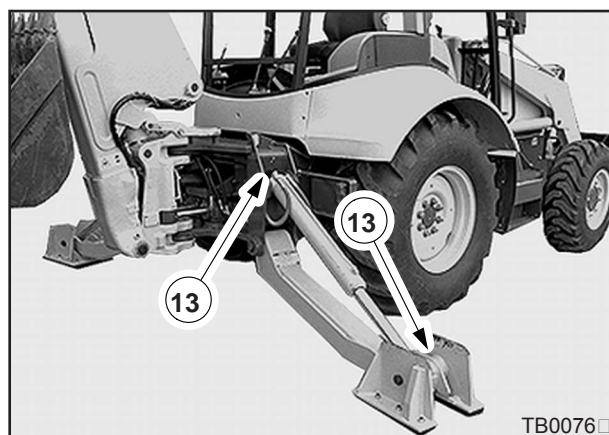
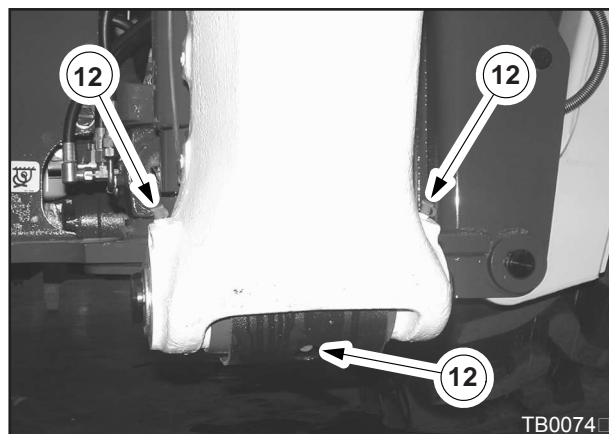
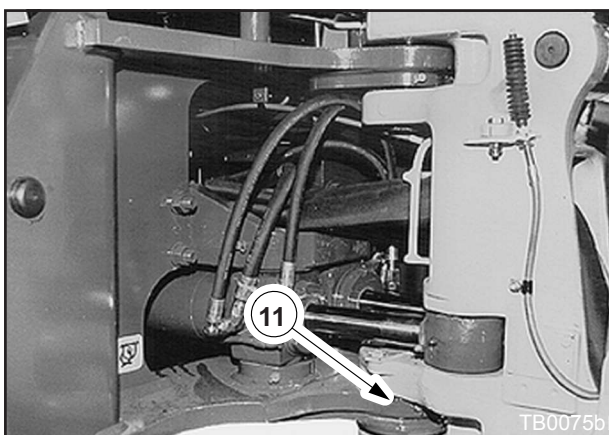
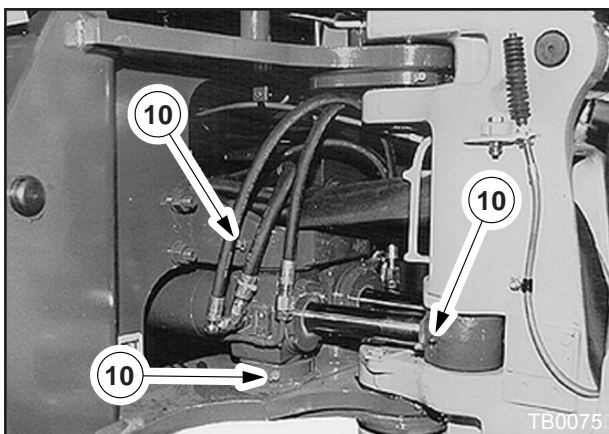
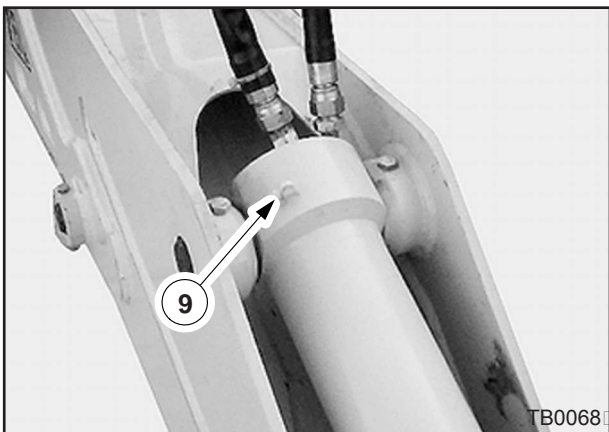
Maintenance

Every 10 hours

- 9 Bucket cylinder bottom pin (1)
- 10 Swing cylinders (both sides) (6)
- 11 Lower swing pin (1)

Every 10 hours

- 12 Boom bottom pin (3)
- 13 Stabiliser cylinders (4)



Levels

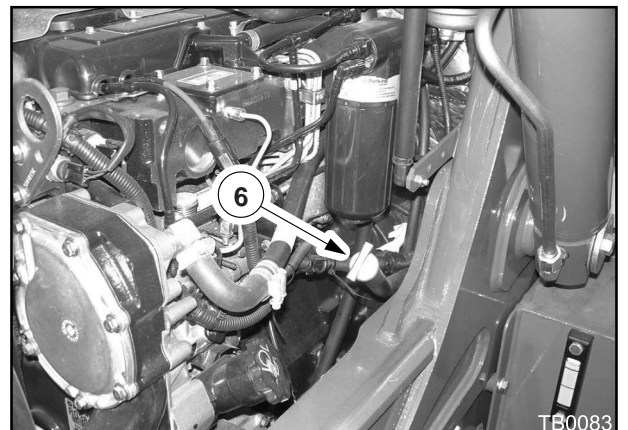
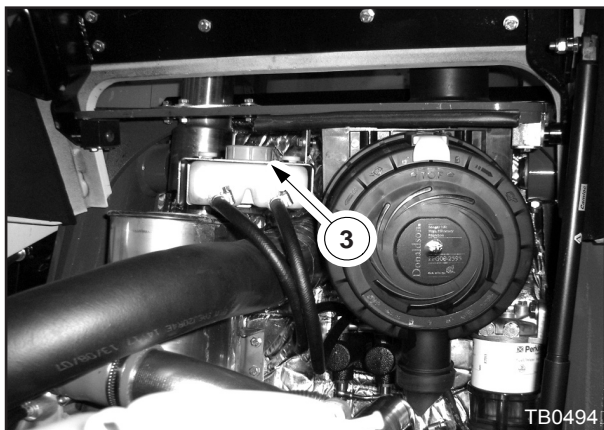
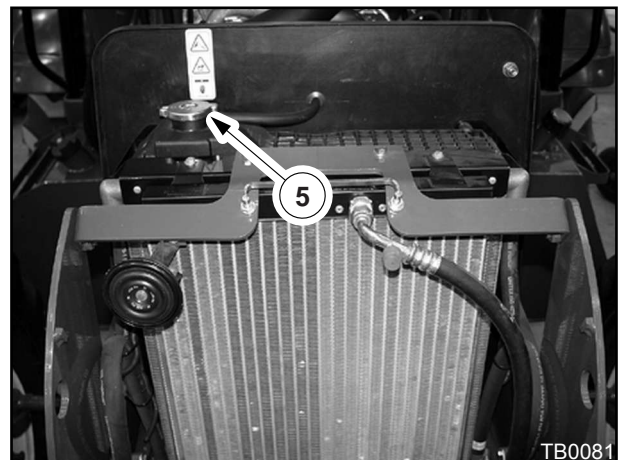
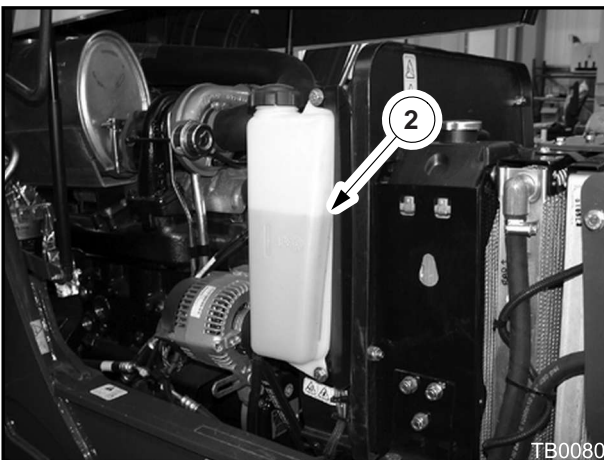
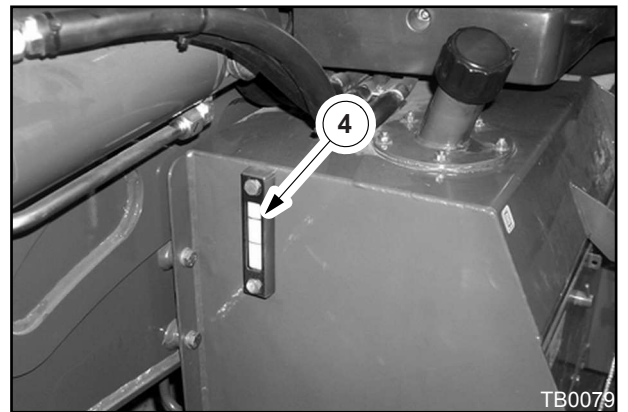
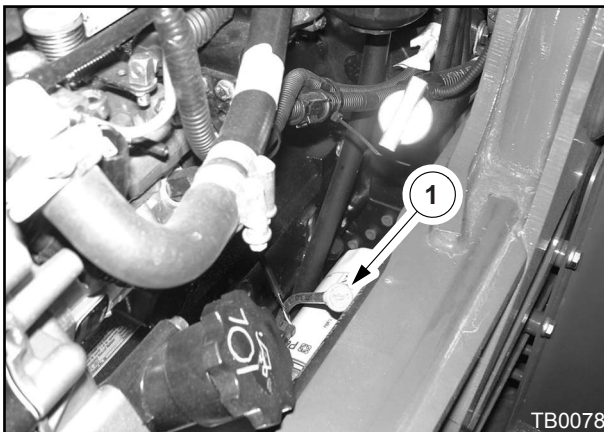
NOTE - The figures shown in brackets indicate the number of level points.

Every 10 hours

- 1 Engine oil (1)
- 2 Engine coolant reservoir (1)
ETHELYNE GLYCOL AND WATER
- 3 Brake fluid level (1)

Every 50 hours

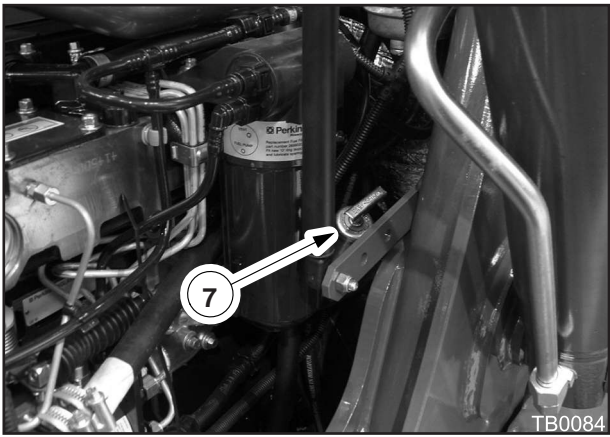
- 4 Hydraulic reservoir (1)
- 5 Radiator (1)
ETHELYNE GLYCOL AND WATER
- 6 Synchroshuttle machines
Transmission oil (**engine running**) (1)



Maintenance

Every 50 hours

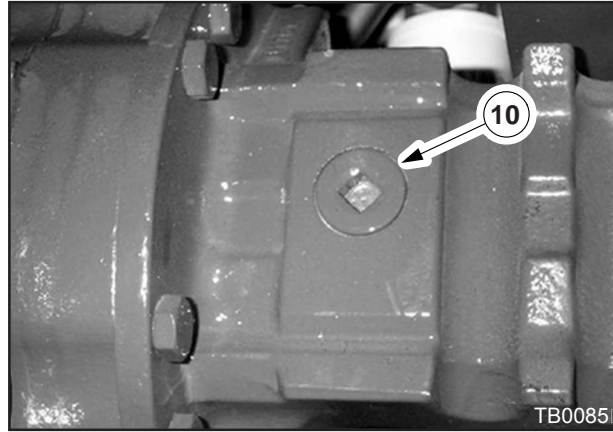
- 7 Powershuttle machines
Transmission oil (**engine running**) (1)



TB0084

Every 250 hours

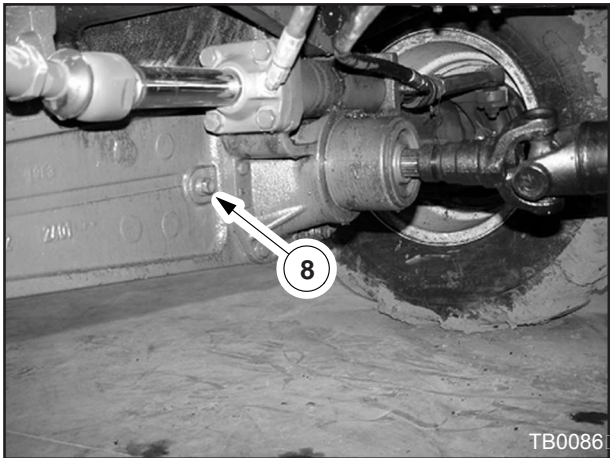
- 10 Rear axle (1)
- 11 Reduction gears (4)



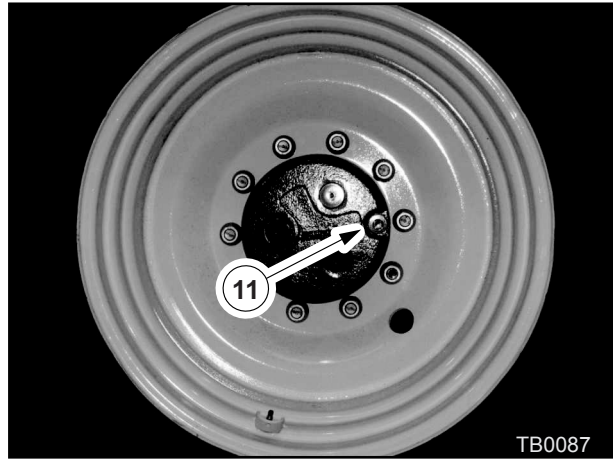
TB0085

Every 250 hours

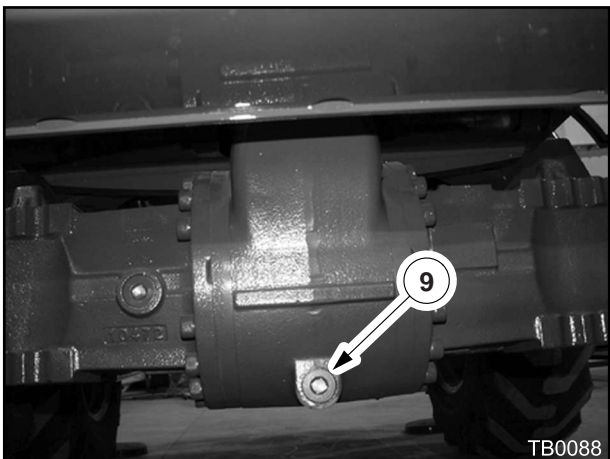
- 8 Front drive axle (4 Wheel drive)
760/820/860/870/880 (1)
- 9 Front drive axle
(970/980) (1)



TB0086



TB0087



TB0088

Engine

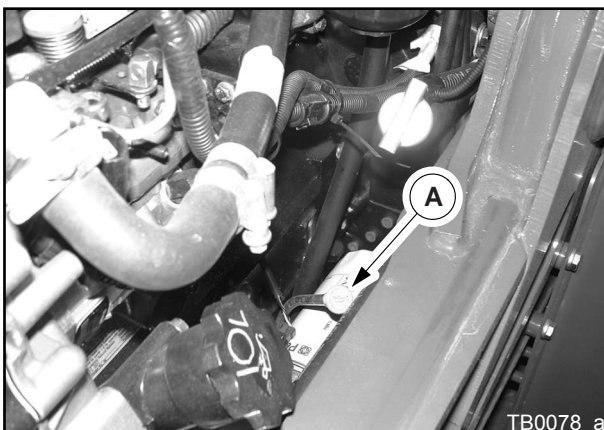
Service specifications

Oil level check	Every 10 hours or every day
Oil change	Every 500 hours (Every 250 hours if sulphur content in fuel exceeds 0.2% of mass)
Oil filter replacement	Every 500 hours (Every 250 hours if sulphur content in fuel exceeds 0.2% of mass)
Type of oil	See "Fluids and Lubricants" section on page 9-3.
Oil capacity	See "Capacities" section on page 10-11.

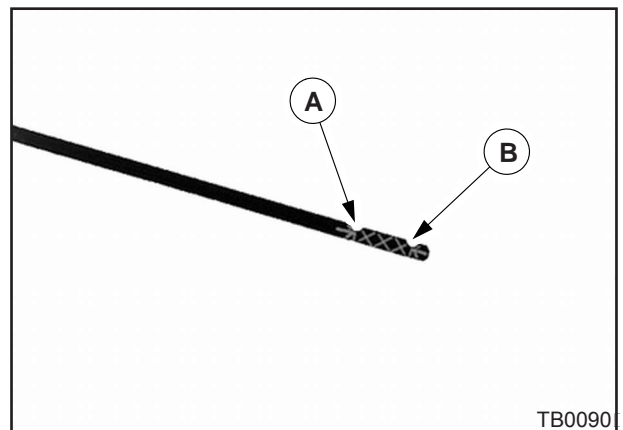
Oil level

NOTE: the machine must be parked on flat, level ground.

1. To access the engine, see "Engine Access", page 9-7.
2. After the engine has been stopped for 15 minutes, remove the dipstick (A), clean it with a clean cloth, replace it in the guide tube as far as it will go and then remove it again.
3. If the oil level is below the (C) mark, remove the filler cap and add oil up to the (B) mark on the dipstick. Then replace the filler cap. The level should not be higher than the (B) mark on the dipstick.
4. Close and lock the engine bonnet.
5. Remove the support strut and lower the loader attachment. See "Loader Attachment Support Strut" section on page 5-53.



TB0078_a



TB0090

Oil change and oil filter replacement

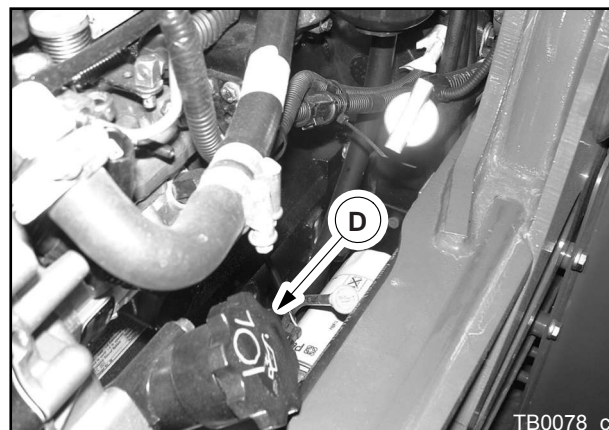
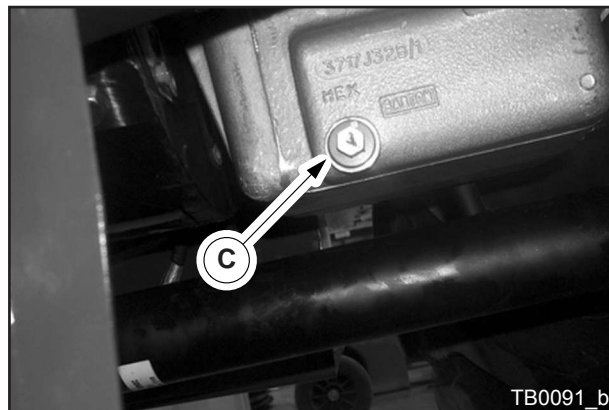
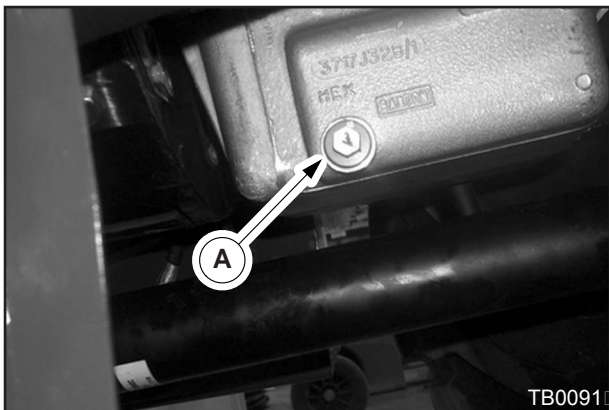
NOTE: Drain the engine when it is still hot. The oil will flow more easily.

NOTE: The machine must be parked on flat level ground.

1. To access the engine, see "Engine Access", page 9-7.
2. Place a receptacle of a suitable capacity under the drain plug from the sump (A), remove the drain plug and allow the oil to flow out. Discard the "O" ring.
3. Clean around the filter (B) and remove it, using the filter wrench.

NOTE: The filter contains a valve and a special tube to ensure that lubricating oil does not drain from the filter when the lubricating oil is changed.

4. Apply clean oil to the new filter seal.
5. Install the new filter. Turn the filter until the seal is in contact with the filter head and then tighten it half a turn more by hand.
6. Install a new "O" ring and the drain plug (C), tighten the plug to 34 Nm (25 lbf ft).



NOTICE

NOTICE: Do not use the filter wrench to install the filter. Excess tightening can damage the seal and the filter.

7. Fill the engine with new oil (D) to the mark on the dipstick.
8. Run the engine for a few minutes and check for leaks. Then check the level again.

NOTE: Always wait 15 minutes to allow the oil to return to the engine sump before checking the oil level.

9. Close and lock the engine bonnet.
10. Remove the support strut and lower the loader attachment. See "Loader Attachment Support Strut" section on page 5-53.

Cooling System

Service specifications

Coolant reservoir level check	Every 10 hours or every day
Radiator level check	Every 50 hours
Cooling system hose and clamp tightness check	Every 250 hours
Draining	Every year
Cooling system capacity	See "Capacities" section on page 10-11.
Radiator cap pressure	0.7 bar (10 lbf/in ²)
Coolant specification	See "Fluids and Lubricants" section on page 9-3.



WARNING: Boiling engine coolant can spray out if the radiator cap is removed while the system is still hot. To remove the cap: allow the system to cool down, turn the cap to the first notch and wait until there is no more pressure. Then remove the cap.



WARNING: Check and service the cooling system according to the instructions given in this manual.

Engine coolant

Only put ethylene-glycol engine coolant in the cooling system. Use good quality ethylene-glycol that has a high boiling point, with no additives to prevent leakage. Do not use non-approved anti-rust additives. Anti-rust additives and ethylene-glycol can mix and work against each other, thereby reducing anti-corrosion protection, forming deposits in the cooling system and causing damage to the cooling system and radiator.

Consult your local dealer for suitable engine coolant.

Engine coolant level in coolant reservoir

The level of engine coolant should be checked when the engine is cold.

NOTE: The machine must be parked on firm level ground.

1. To access the engine, see "Engine Access", page 9-7.



WARNING: Do not remove the radiator cap.

2. The level (A) in the coolant reservoir should be between the "FULL" and "ADD" marks. If necessary, remove the reservoir cap and add coolant to the reservoir until the level reaches the "FULL" mark on the coolant reservoir.

NOTICE

NOTICE: On no account must the coolant reservoir level be higher than it was the day previously. If it is, check the level in the radiator. See "Levels" section on page 9-19.

3. Close and lock the engine bonnet.
4. Remove the support strut and lower the loader attachment. See "Loader Attachment Support Strut" section on page 5-53.

Radiator level

The level of engine coolant should be checked when the engine is cold.

NOTE: The machine must be parked on firm level ground.

1. To access the engine, see "Engine Access", page 9-7.
2. Remove the radiator cap (B). The engine coolant should be level with the filler orifice. If not, see "Levels", page 9-19.

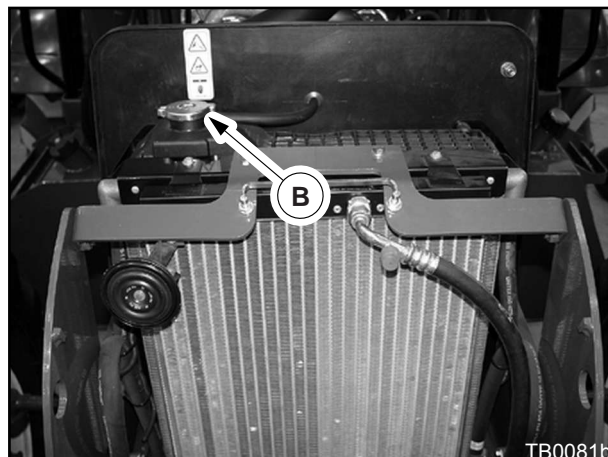
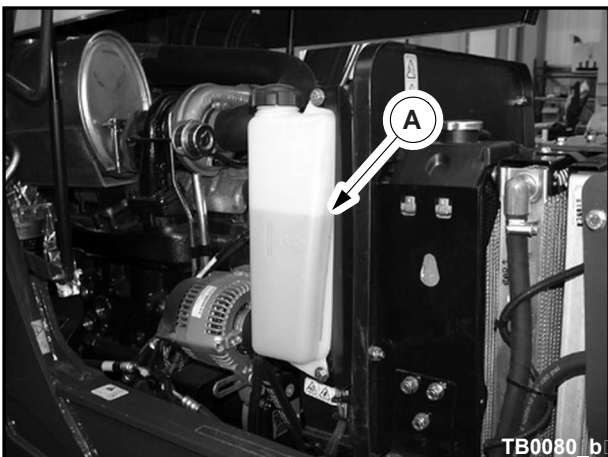


WARNING: Do not remove the cap when the engine is hot. The circuit is still under pressure and you could be scalded..

NOTICE

NOTICE: If the level in the radiator is low, but full in the coolant reservoir, check for an air leak in the hose connecting the radiator to the coolant reservoir. If the problem persists, consult your local dealer.

3. Close and lock the engine bonnet.
4. Remove the support strut and lower the loader attachment. See "Loader Attachment Support Strut" section on page 5-53.



Draining the cooling system

NOTE: The machine must be parked on firm level ground.

1. To access the engine, see "Engine Access", page 9-7.
2. Remove the radiator cap (A).



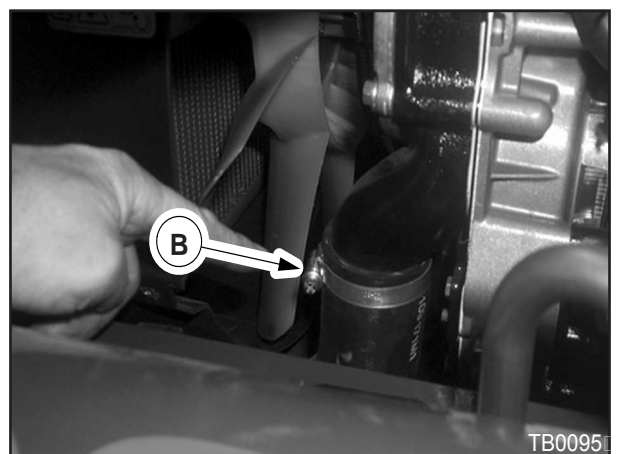
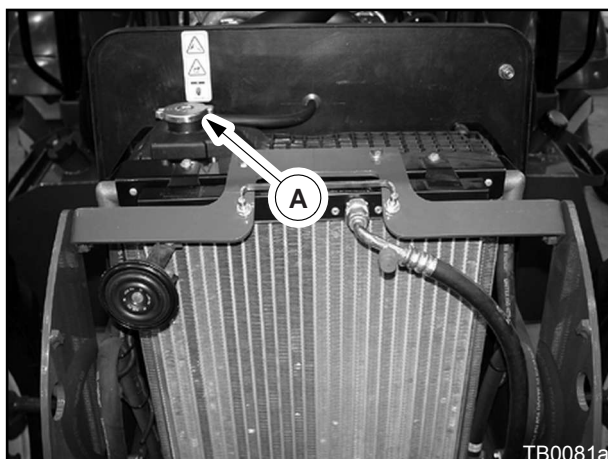
WARNING: Do not remove the cap when the engine is hot. The circuit is still under pressure and you could be scalded..

NOTE: Prepare a receptacle of suitable capacity.

3. Release the connection on the radiator bottom hose (B) and allow the engine coolant to flow out.
4. After the system is completely drained, install the bottom hose.
5. Rinse the system through with fresh water, drain again and fill the system as shown below.

NOTE: If you use a detergent solution for rinsing, follow the instructions for preparing the solution. After draining the detergent solution, rinse again with fresh water.

6. Check the condition of the hoses, connections and the water pump. Make sure that the external surfaces of the engine and the radiator are clean.



Filling the cooling system

1. Fill the radiator with engine coolant until it is level with the filler orifice. Then install the cap (C).
2. Completely fill the coolant reservoir with engine coolant.

NOTICE

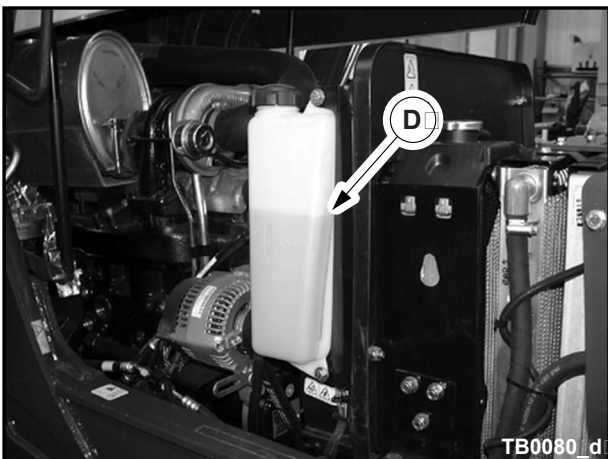
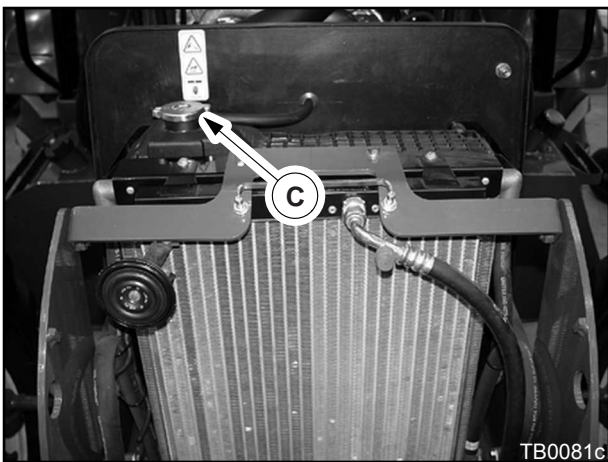
NOTICE: Use the correct engine coolant.

3. Run the engine for a few minutes then check the level in the coolant reservoir (D) again. Top up if necessary until the "FULL" mark is reached. Then install the reservoir cap.

NOTICE

NOTICE: Do not remove the radiator cap to check the level.

4. Close and lock the engine bonnet.
5. Remove the support strut and lower the loader attachment. See "Loader Attachment Support Strut" section on page 5-53.



Brake System - 'Safim'**Service specifications**

Fluid level check	Every 10 hours or every day
Fluid change	Every 500 hours
Type of oil	See "Fluids and Lubricants" section on page 9-3.
Oil capacity	See "Capacities" section on page 10-11.

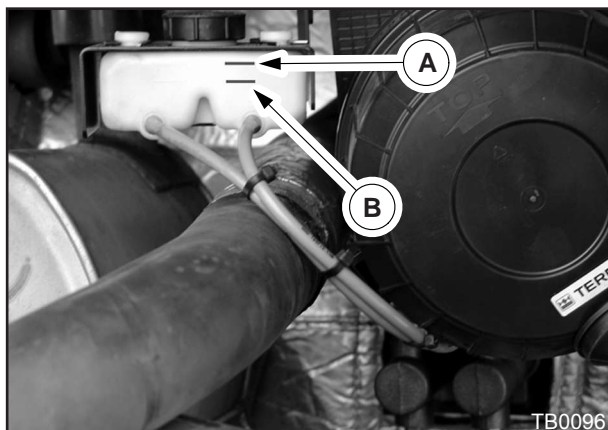
Fluid Level

NOTE: The machine must be parked on firm level ground.

1. To access the engine, see "Engine Access", page 9-7.
2. The level in the brake reservoir should be between the minimum (B) and maximum (A) marks. If necessary, remove the reservoir cap and add brake fluid to the reservoir until the level reaches the maximum (A) mark on the brake reservoir.
3. Replace the brake reservoir cap.

NOTE: The level should not be higher than the maximum mark (A) on the reservoir.

4. Close and lock the engine bonnet.
5. Remove the support strut and lower the loader attachment. See "Loader Attachment Support Strut" section on page 5-53.



Maintenance

Fuel System

Service specifications

Fuel filter replacement	Every 500 hours (After the first 50 hours during the running-in period)
Clean the gauze strainer in the fuel lift pump	Every 500 hours
Drain primary water separator	As required
Fuel filter sediment removal	As required
Fuel tank sediment removal	As required
Fuel tank capacity	See "Capacities" section on page 10-11.
Type of fuel	See "Fluids and Lubricants" section on page 9-3.

Replacing the filter



WARNING: The combustible material of some components of the engine (for example certain seals) can become extremely dangerous if it is burned. Never allow this burnt material to come into contact with the skin or with the eyes.



CAUTION: It is important that only genuine Perkins parts are used. The use of an element that is not a genuine Perkins part may damage the fuel injection pump and the warranty.



WARNING: Discard the used element and fuel oil in a safe place and in accordance with local regulations.



CAUTION: The pre-filter canister and main filter elements must be renewed at the same time.



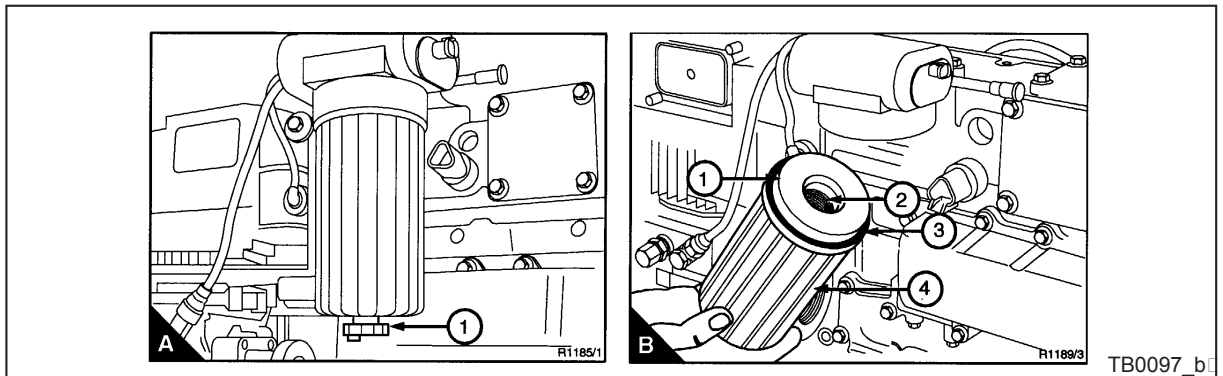
WARNING: Ensure that the starter switch is in the off position before servicing or repairs are made to the fuel system, because fuel will be released if the lift pump has power.



CAUTION: Do not allow dirt to enter the fuel system. Before a connection is disconnected, clean thoroughly the area around the connection. After a component has been disconnected fit a suitable cover to all open connections. To access the engine, see "Engine Access", page 9-7.

1. Place a suitable container below the fuel filter assembly to retain spilt fuel oil.
2. Thoroughly clean the outside surfaces of the fuel filter assembly. Open the drain tap (A1) at the bottom of the filter casing to drain the fuel from the filter.
3. Loosen the filter casing. Remove the casing and element from the fuel filter head.
4. Remove the filter element from the casing. Press down on the filter element (B1), against the spring pressure, and rotate it to the left to release it from the filter casing (B4).
5. Put the new filter element inside the casing and press it down against the spring pressure, rotate it to the right to lock it into the casing.
6. Fit a new seal (B3) to the casing and lightly lubricate the seal face with clean fuel oil.
7. Check that the thread (B2) on the inside of the element is not damaged.
8. Fit the filter assembly to the fuel filter head and tighten by hand until it contacts the filter head. Tighten the assembly a further 1/4 of a turn by hand. Do not use a strap wrench.

9. Close the drain tap (A) and remove the container.
10. Before the starter motor is engaged, operate the lift pump for one minute to eliminate air from the filter.



Bleeding the system

It is necessary to bleed the fuel system when:

- The tank has been completely emptied.
- Parts of the fuel system have been removed for servicing or repair work.
- The machine has been in storage for a fairly long period.



CAUTION: Do not operate the engine until the air is eliminated from the fuel injection pump



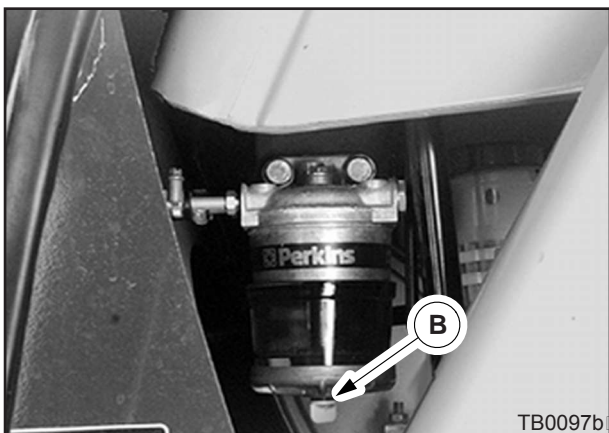
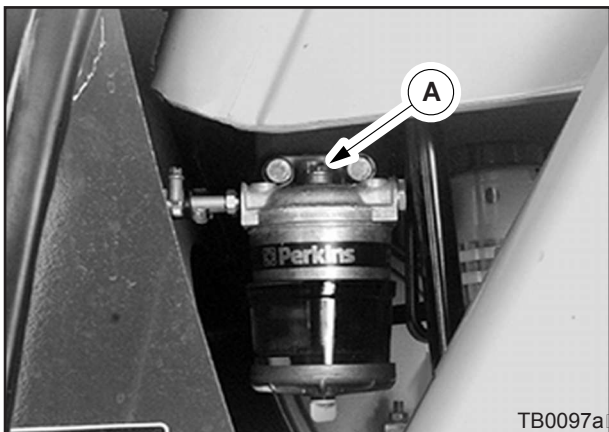
CAUTION: After the air is eliminated, operate the engine at low idle for two minutes.

The Delphi DP210 fuel injection pump will vent automatically when the start key is turned from the off position to the first (ignition position) for three minutes.

Maintenance

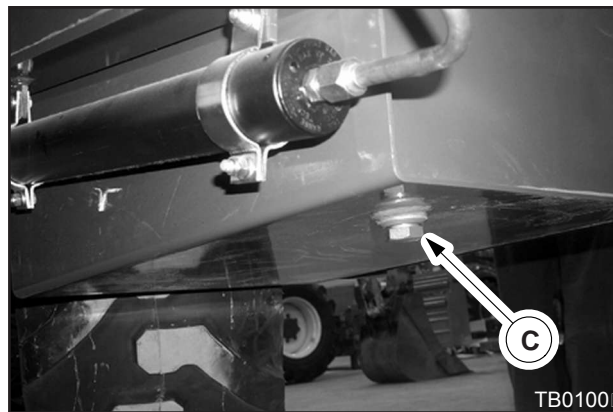
Bleeding the pre-filter

1. To access the engine, see "Engine Access", page 9-7.
2. Remove the bleed screw (A). Discard the washer.
3. Place a receptacle of a suitable capacity under the tap (B) of the primary water separator, open the tap and allow the soiled fuel to flow out.
4. Re tighten the tap (B) and install a new washer and the bleed screw (A).



Fuel tank sediment removal

Place a receptacle of a suitable capacity under the fuel tank, unscrew the drain plug (C) located behind the fuel tank one or two turns and allow the soiled fuel to flow out. Then re tighten the plug.



Releasing the Pressure in the Hydraulic System

Before carrying out any service operation on the hydraulic system, it is first necessary to release the pressure in all the circuits.

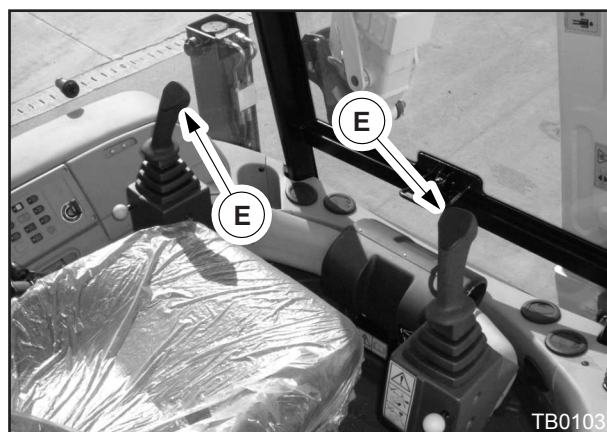
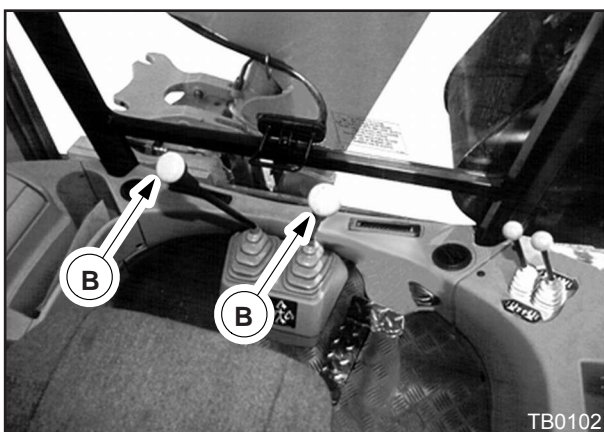
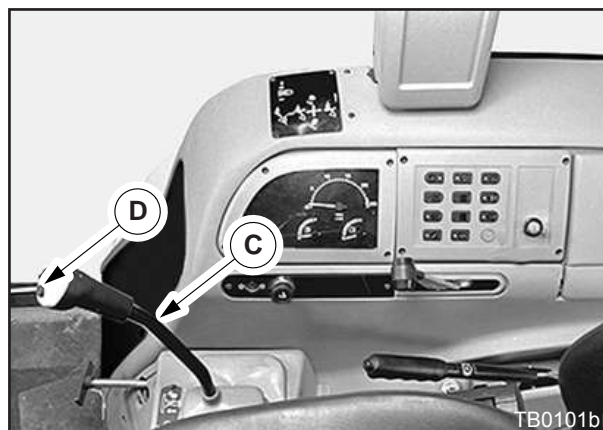
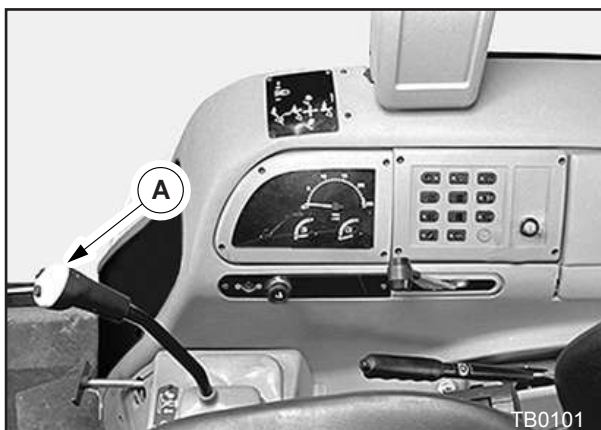
Before doing this, make sure that the ride control function (optional) is not operating.

Mechanical controls

1. Lower the loader attachment and the backhoe attachment until they are resting on the ground.
2. Stop the engine, engage parking brake.
3. Remove the starter switch key
4. Operate the loader attachment controls (A) and 7 in 1 loader bucket (if equipped) in all directions.
5. Operate the backhoe attachment controls (B) in all directions to release the pressure.
6. Operate the backhoe attachment controls (B) in all directions to release the pressure.

Servo controls

1. Lower the loader attachment and the backhoe attachment until they are resting on the ground.
2. Stop the engine, engage parking brake.
3. Turn the ignition to the 'ON' position.
4. Operate the loader attachment controls (C) and 7 in 1 loader bucket (if equipped) in all directions.
5. Depress the hydraulic unload button (D).
6. Operate the backhoe attachment controls (E) in all directions to release the pressure.



Maintenance

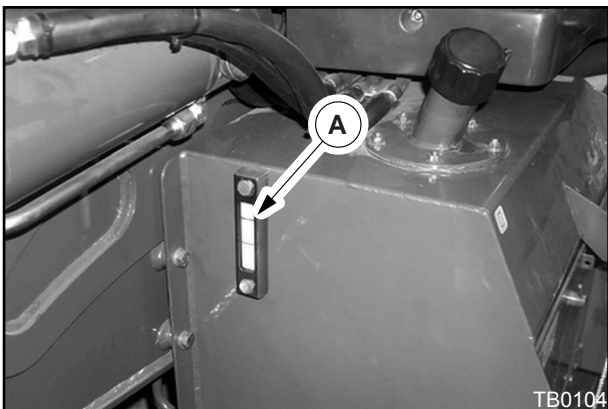
Hydraulic System

Service specifications

Hydraulic reservoir level check	Every 50 hours or every week
Hydraulic fluid return filter replacement	Every 1000 hours or when the warning light on the instrument panel comes on (after the first 50 hours during the running-in period)
Draining the circuit	Every 1000 hours
Cleaning the intake strainer	Every 1000 hours
Reservoir capacity	See "Capacities" section on page 10-11
Type of fluid	See "Fluids and Lubricants" section on page 9-3

Reservoir level

1. Park the machine on flat, level ground.
2. Lower the loader bucket flat on the ground.
3. Make sure that the backhoe attachment is in the road travel position. See "Setting the Backhoe Attachment in the Road Travel Position" section on page 7-12.
4. Stop the engine, engage parking brake, remove the starter switch key and wait until the fluid reaches ambient temperature.
5. The fluid level should be in the middle of the sight gauge (A). Top up if necessary. See "Filling" section on page 9-35.



Replacing the hydraulic fluid return filter

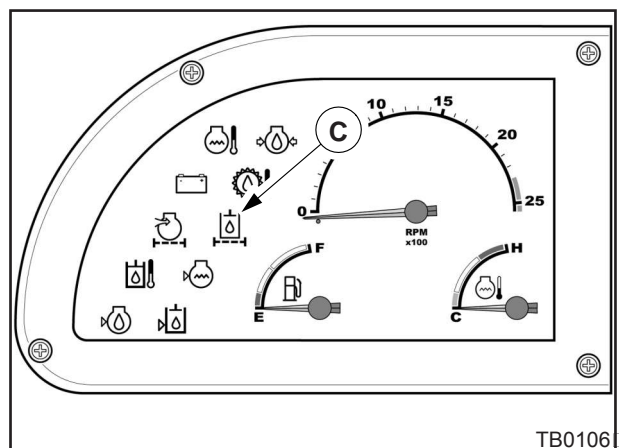
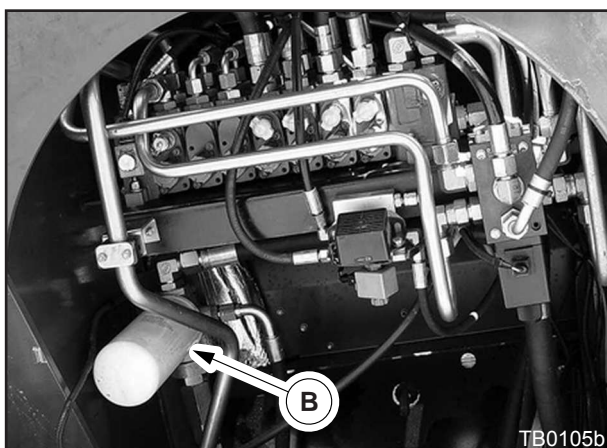
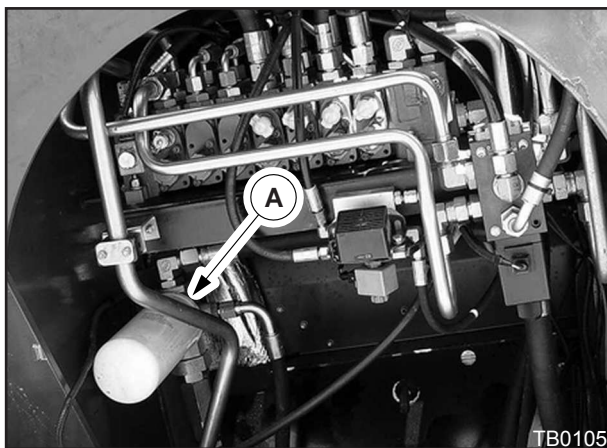
1. Lower the loader bucket flat on the ground, engage parking brake, stop the engine and remove the starter switch key.
2. **NOTE:** Viewed from underside of machine. Clean around the filter head (A).
3. Place a receptacle of a suitable capacity under the filter, loosen the filter by means of the filter wrench and then unscrew it by hand.
4. Apply a thin layer of oil on the new filter seal.
5. **NOTE:** Viewed from underside of machine. Install the new filter (B). Turn the filter until the seal is in contact with the filter head and tighten the filter a further half turn by hand.

6. Start the engine, run it at low idle speed and make sure that the filter restriction warning light (C) on the instrument panel is not on.

NOTE: After using the machine, check that there are no leaks.

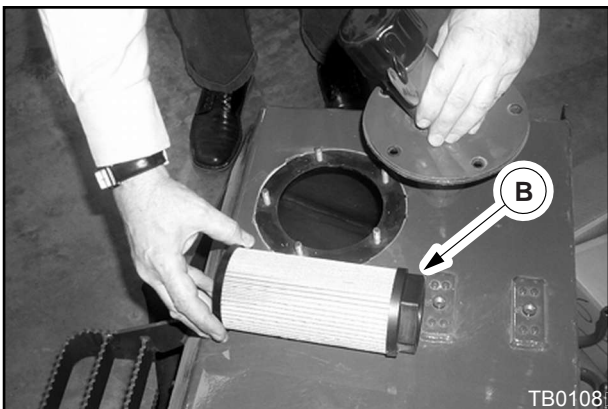
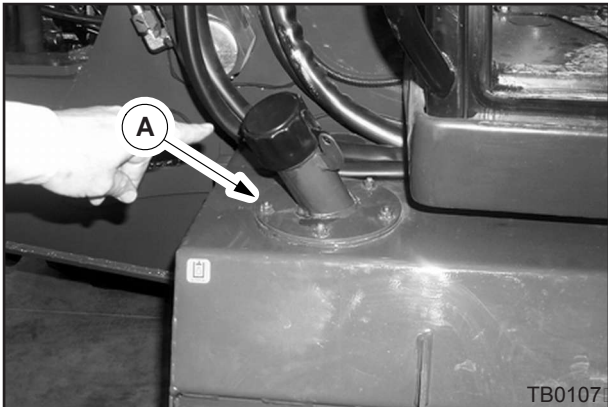
NOTICE

NOTICE: Do not use the filter wrench to tighten. Over tightening can damage the seal and the filter



Cleaning the intake strainer

1. Lower the loader bucket flat on the ground, engage parking brake, stop the engine and remove the starter switch key.
2. Clean around the filler tube (A).
3. Remove the bolts securing the filler tube and remove it.
4. Remove by hand the intake strainer (B) from intake pipe clean and dry it.
5. Refit and tighten by hand, careful to avoid straining the pleats.
6. Renew the gasket. Apply Loctite 'Form-a-gasket' No. 2 or equivalent to both sides of gasket before fitting. Fit filler tube and torque bolts to 6 Nm (4.42 ft/lbs).



Replacing the hydraulic fluid

Replacing the hydraulic fluid requires the fluid to be systematically drained from the main components (reservoir, pumps, cylinders, control valves, hydraulic motors and oil cooler).

We recommend you to consult your local dealer.

Draining

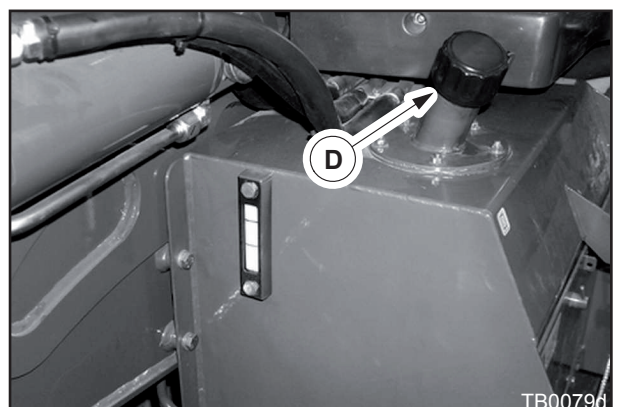
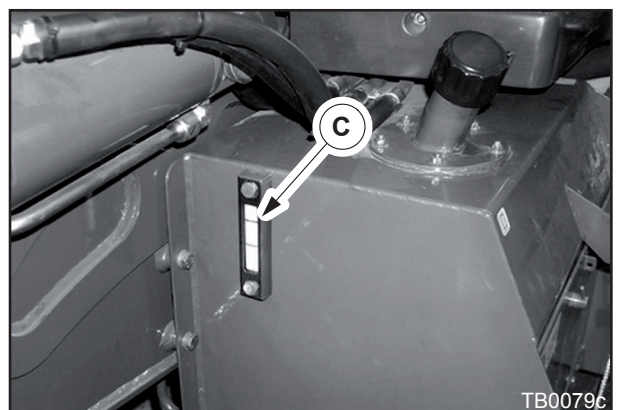
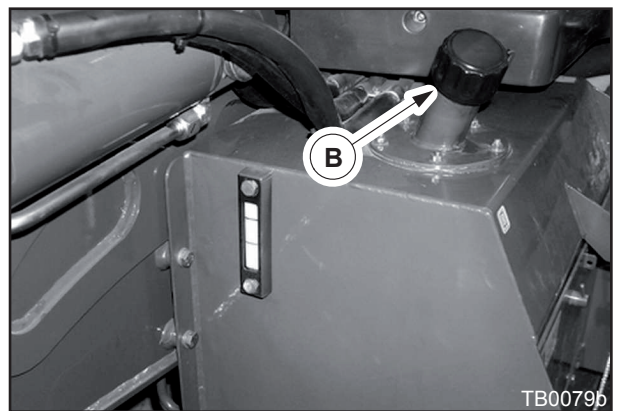
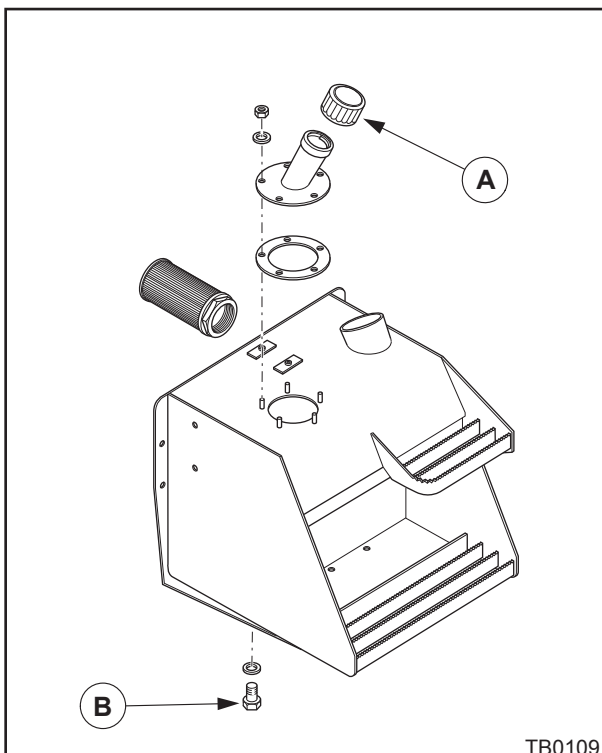
NOTE: When carrying out draining, the hydraulic fluid must be at operating temperature.

1. Park the machine on firm, level ground.
2. Lower the loader bucket flat on the ground.
3. Make sure that the backhoe attachment is in the road travel position. See "Setting the Backhoe Attachment in the Road Travel Position" section on page 7-12. Engage parking brake, stop the engine and remove the starter switch key.
4. Place a receptacle of suitable capacity under the reservoir and remove the filler cap (A) and the drain plug (B). Discard the washer. Allow the fluid to flow out.
5. Install a new washer and the reservoir drain plug.

NOTE: See "Replacing the hydraulic fluid return filter" section on page 9-33 if the filter has to be replaced.

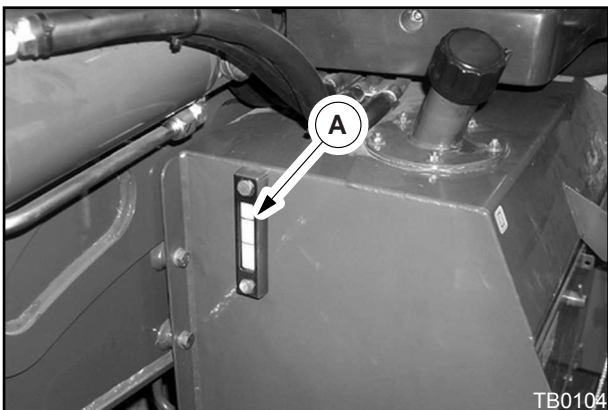
Filling

6. Clean around the filler cap (B) and fill the reservoir with the correct hydraulic fluid.
7. The fluid level should be in the middle of the sight gauge (C).
8. Install the filler cap (D).



Maintenance

9. Start the engine. Do not touch the controls for 1 or 2 minutes, then operate the loader attachment and backhoe attachment functions for 3 to 4 minutes.
10. Once again place the loader bucket flat on the ground and the backhoe attachment in the road travel position. Stop the engine, engage parking brake and remove the starter switch key.
11. Check the level. The fluid level should come up to the middle of the sight gauge (A). Top up if necessary.



Air Filter

Service specifications

Primary element maintenance	Clean or replace when the warning lamp on the instrument panel comes on (After the first 50 hours during the running-in period)
Primary element replacement	Every 1000 hours or after six cleanings
Secondary element replacement	Once a year or after cleaning the primary element three times

NOTICE

NOTICE: Carefully observe the air filter service intervals. The life of the engine depends on the cleanliness of the air filter.

Inspection

Be sure to carry out regular checks on the air filter, intake manifold, gaskets and seals. At the same time, check the intake manifold screws and hose clamps for tightness.

The hoses should be replaced before they are worn.

Check frequently that the air filter restriction warning lamp on the instrument panel is in good working order.

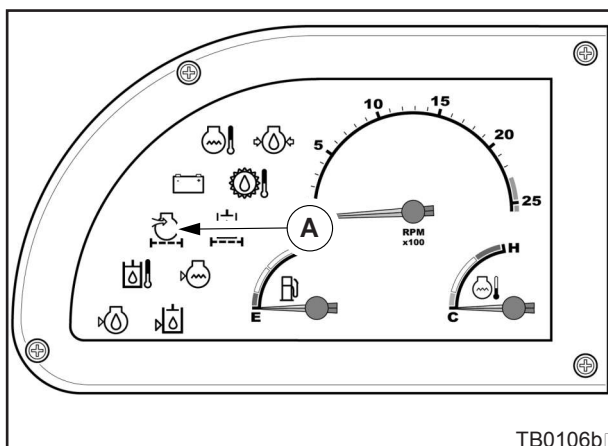
Air filter restriction warning lamp

If the air filter restriction warning lamp (A) comes on when the engine is running, the air filter elements must be checked.

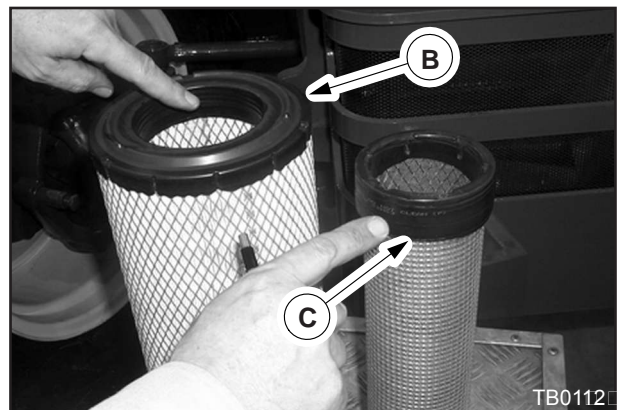
Air filter elements

Your machine is fitted with a two-stage air filtering system, consisting of a high capacity primary element (B), designed to provide optimal protection of the engine, plus a secondary element (C) which provides extra engine protection.

The large outer primary element can be cleaned. The smaller inner secondary element can not be cleaned and should be replaced when dirty.



TB0106b



TB0112

Maintenance

Removing the elements

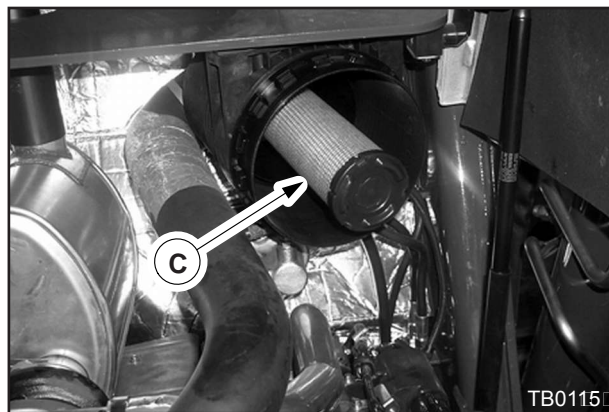
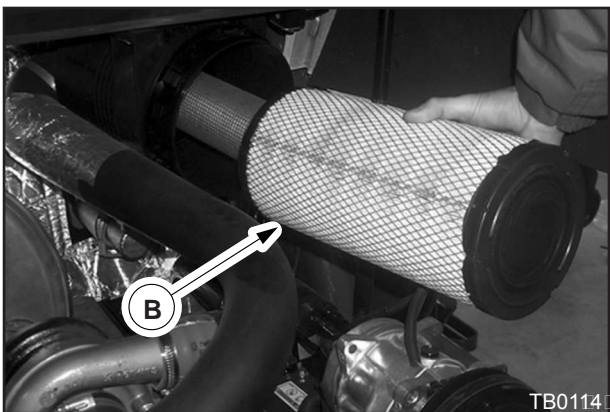
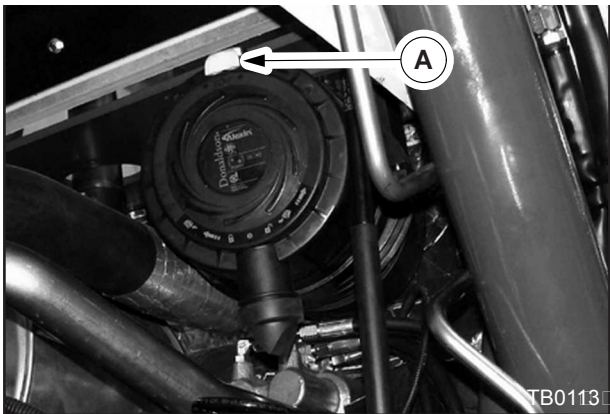
1. To access the engine, see "Engine Access", page 9-7.
2. Pull the yellow tang (A), rotate the cover anticlockwise and remove it.
3. Carefully remove the primary element (B).
4. If the secondary element (C) has to be replaced, take care whilst removing.

NOTICE

NOTICE: The secondary element must not be cleaned. It must be replaced every year or after the primary element has been cleaned 3 times.



CAUTION: Make sure you protect your face before using compressed air.



Cleaning the primary element

Tool required

- A compressed air line



CAUTION: When using compressed air, take the necessary precautions to protect your face.



CAUTION: Compressed air pressure should not exceed 7 bar (101lbf/in²).

If the primary element is dry:

Blow compressed air from the inside towards the outside at very low pressure. The compressed air nozzle should be held at least three centimetres from the inside wall of the primary element. Cleaning is completed once no more dust comes out of the primary element.

NOTE: Do not use compressed air if there is oil or soot in the element.

If the primary element is oily :

Clean it in water with a suitable detergent (e.g. a typical household detergent). Instructions for using the detergent are printed on the packaging.

The primary element must be completely dry before installing. We advise you to keep a spare, clean primary element for installation while the other primary element is drying.

Inspecting the primary element

Check the primary element for damage by placing an inspection lamp inside.

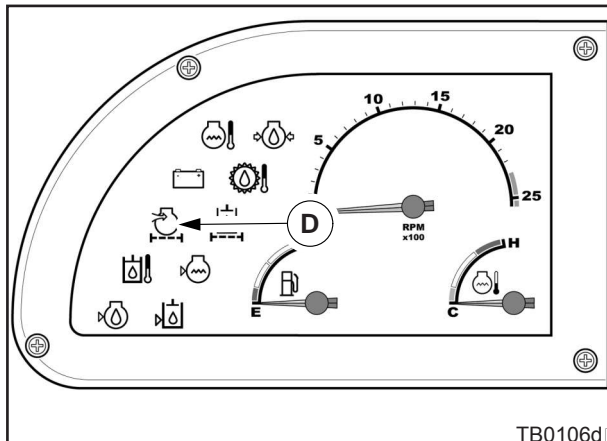
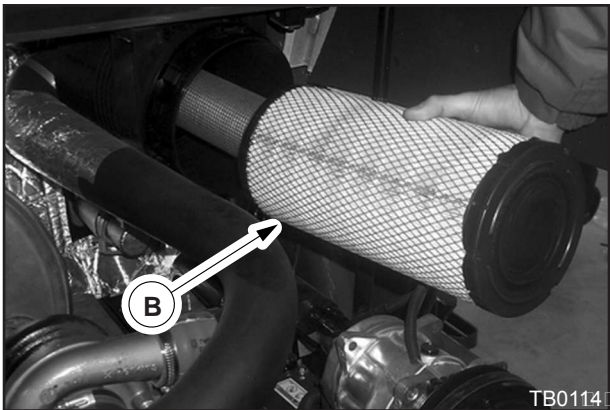
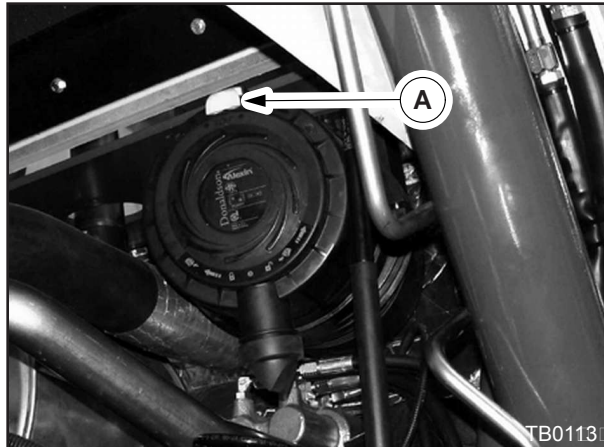
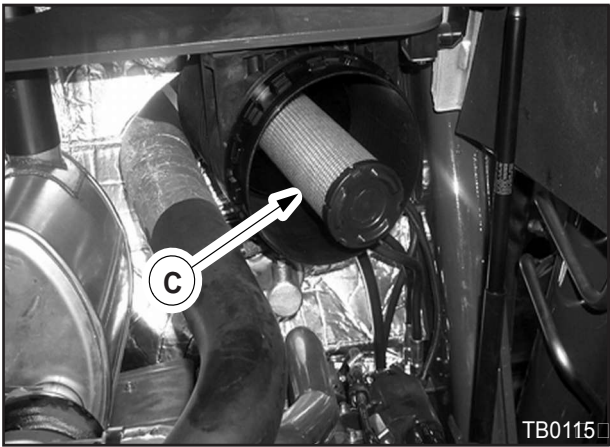
NOTICE

NOTICE: Replace the element if light can be seen through a hole, however small. Replace inner element as well.



Installing the elements

1. Clean the inside of the filter body by means of a clean damp cloth.
2. Apply a thin layer of oil on the rubber lip and carefully install a secondary element (C) if the old element had to be replaced.
3. Apply a thin layer of oil on the rubber lip and carefully install the primary element (B).
4. Install the cover, rotate it clockwise and push the locking tang (A).
5. Start the engine, run it at low idle speed and make sure that the filter restriction warning light (D) on the instrument panel is not on.
6. Close and lock the engine bonnet.
7. Remove the support strut and lower the loader attachment, see "Loader Attachment Support Strut", page 5-53.



Transmission

Service specifications

Oil level check	Every 50 hours (After the first 50 hours during the running-in period)
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NOTE: On synchroshuttle machines the transmission oil level must be checked with the engine running.
NOTE: On powershuttle machines the transmission oil level must be checked with the engine running and set to low idle.

Filter replacement (synchroshuttle and powershuttle)	Every 500 hours (After the first 50 hours during the running-in period)
Cleaning the screen filter (synchroshuttle only)	Every 1000 hours (After the first 50 hours during the running-in period)
Oil change	Every 1000 hours (After the first 50 hours during the running-in period)
Type of oil	See "Fluids and Lubricants" section on page 9-3.
Capacities	See "Capacities" section on page 10-11.

Oil Level

1. To access the engine, see "Engine Access", page 9-7.
2. With the engine running at idle and the transmission oil at working temperature, remove the dipstick (A), clean it with a clean cloth and replace it in the guide tube up to the stop. Then remove it again.

NOTICE

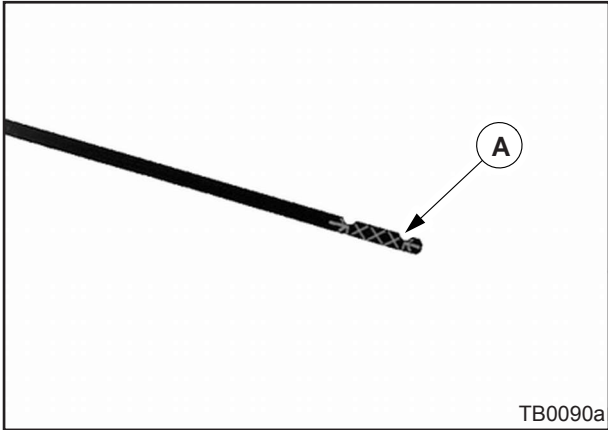
NOTICE: If combustion gases are released into the coolant circuit, the coolant must be renewed after repair of the fault.

All models

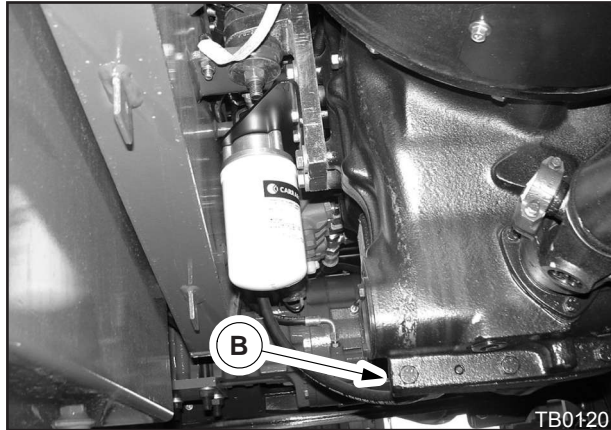


Maintenance

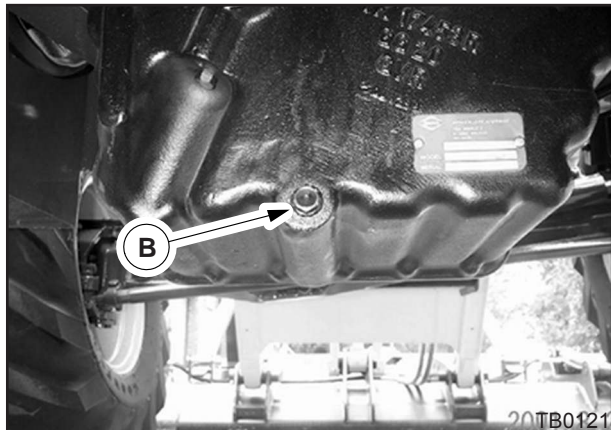
3. If the oil level is below the mark (A), top up. See "Filling" section on page 9-46.
4. Close and lock the engine bonnet.
5. Remove the support strut and lower the loader attachment. See "Loader Attachment Support Strut" section on page 5-53.



Synchroshuttle (Carraro)



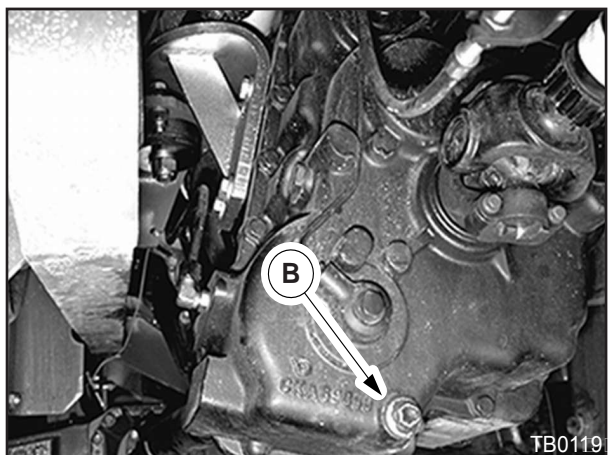
Powershift (Dana)



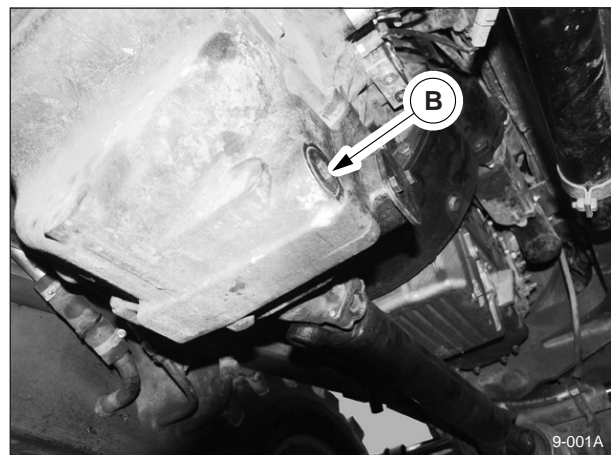
Draining

1. To access the engine, see "Engine Access", page 9-7.
2. Place a receptacle of a suitable capacity under the drain plug and remove the drain plug (B).

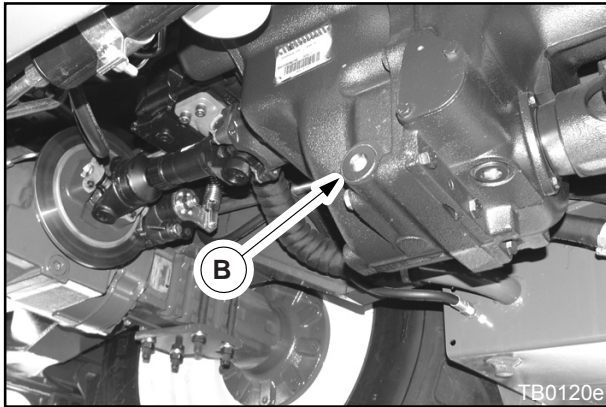
Synchroshuttle (Turner)



Powershuttle (SPS)

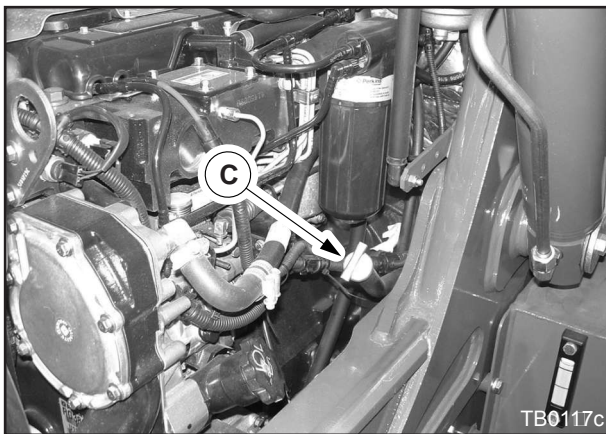


Powershuttle (Carraro)

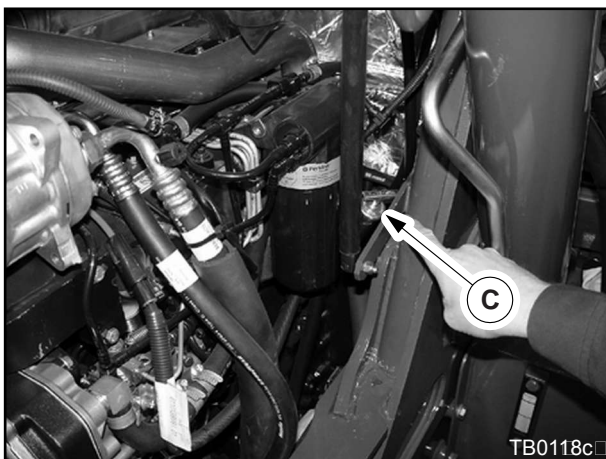


3. Remove the dipstick (C) and allow the oil to flow out..

Synchroshuttle only



Powershuttle only



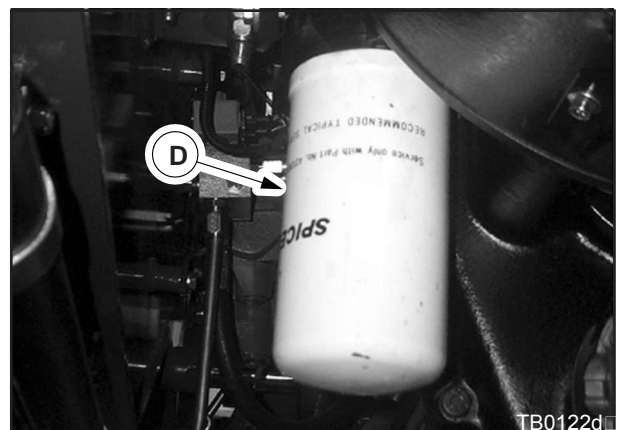
4. Install the drain plug and the filler cap

Replacing the Synchroshuttle (Turner) filter

1. Clean around the filter head.
2. Place a receptacle of a suitable capacity under the filter (D), loosen the filter by means of the filter wrench and then unscrew it by hand.
3. Apply a thin layer of oil on the new filter seal.
4. Install the new filter (D). Turn the filter until the seal is in contact with the filter head and tighten the filter a further half turn by hand.

NOTICE

NOTICE: Do not use the filter wrench to tighten. Over tightening can damage the seal and the filter.



Replacing the Synchroshuttle (Carraro) filter

1. Clean around the filter head.
2. Place a receptacle of a suitable capacity under the filter (A), loosen the filter by means of the filter wrench and then unscrew it by hand.
3. Apply a thin layer of oil on the new filter seal.
4. Install the new filter (A). Turn the filter until the seal is in contact with the filter head and tighten the filter a further half turn by hand.

NOTICE

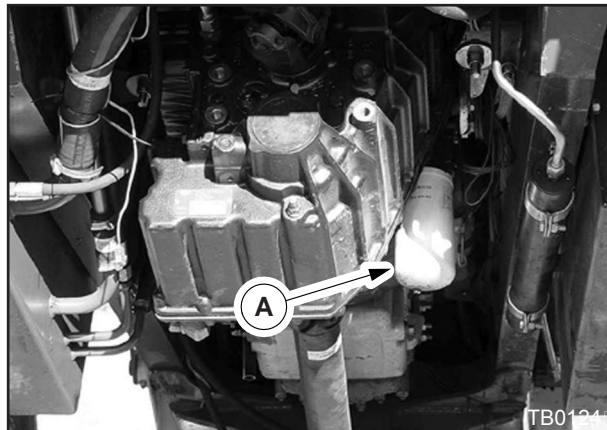
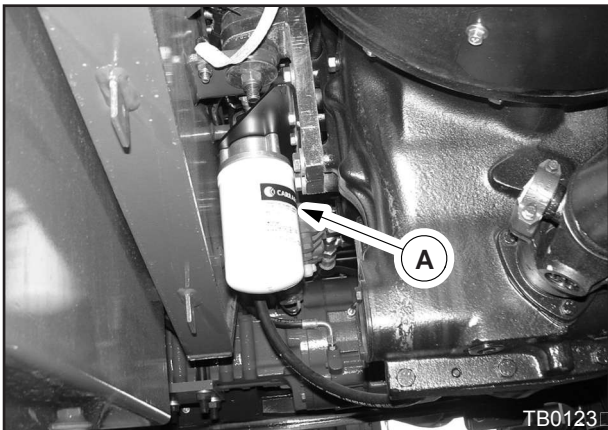
NOTICE: Do not use the filter wrench to tighten. Over tightening can damage the seal and the filter.

Replacing the Powershift (Dana) filter

1. Clean around the filter head.
2. Place a receptacle of a suitable capacity under the filter (A), loosen the filter by means of the filter wrench and then unscrew it by hand.
3. Apply a thin layer of oil on the new filter seal.
4. Install the new filter (A). Turn the filter until the seal is in contact with the filter head and tighten the filter a further half turn by hand.

NOTICE

NOTICE: Do not use the filter wrench to tighten. Over tightening can damage the seal and the filter.



Replacing the Powershuttle (SPS) filter

1. Clean around the filter head.
2. Place a receptacle of a suitable capacity under the filter (A), loosen the filter by means of the filter wrench and then unscrew it by hand.
3. Apply a thin layer of oil on the new filter seal.
4. Install the new filter (A). Turn the filter until the seal is in contact with the filter head and tighten the filter a further half turn by hand.

NOTICE

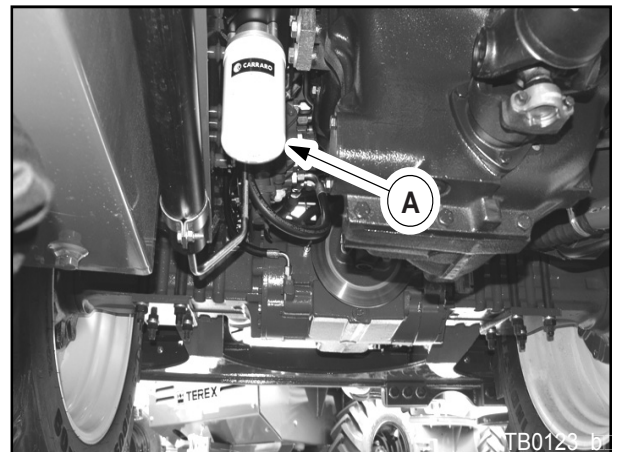
NOTICE: Do not use the filter wrench to tighten. Over tightening can damage the seal and the filter.

Replacing the Powershuttle (Carraro) filter

1. Clean around the filter head.
2. Place a receptacle of a suitable capacity under the filter (A), loosen the filter by means of the filter wrench and then unscrew it by hand.
3. Apply a thin layer of oil on the new filter seal.
4. Install the new filter (A). Turn the filter until the seal is in contact with the filter head and tighten the filter a further half turn by hand.

NOTICE

NOTICE: Do not use the filter wrench to tighten. Over tightening can damage the seal and the filter.



Cleaning the screen filter (Carraro Synchroshuttle only)

NOTICE

NOTICE: Follow the instructions for the detergent solution.



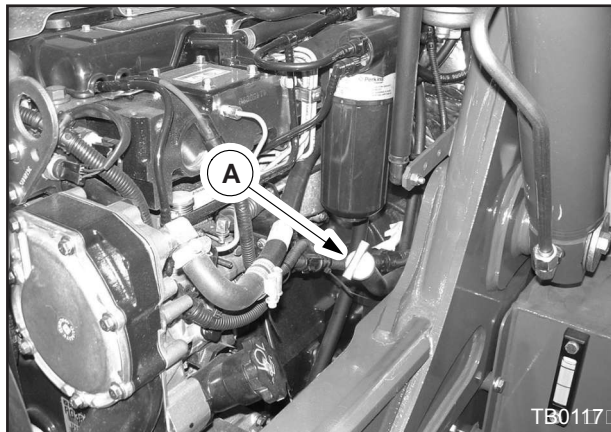
CAUTION: Make sure you protect your face before using compressed air.

1. Clean around the cover plate and remove it (A). Check the condition of the O-ring and replace it if necessary. Remove the screen filter and clean it in a detergent solution.
2. Dry the screen filter carefully with compressed air and install it.
3. Install the cover plate.

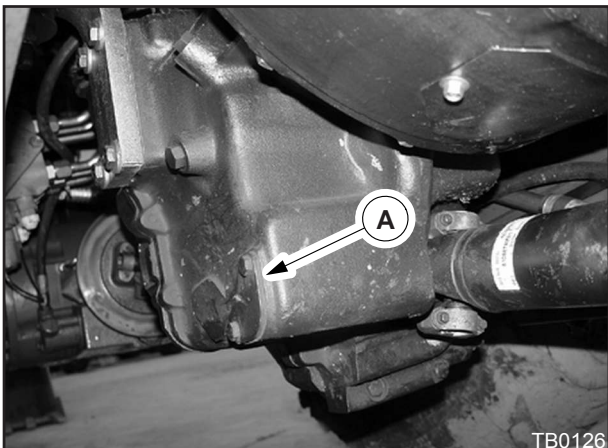
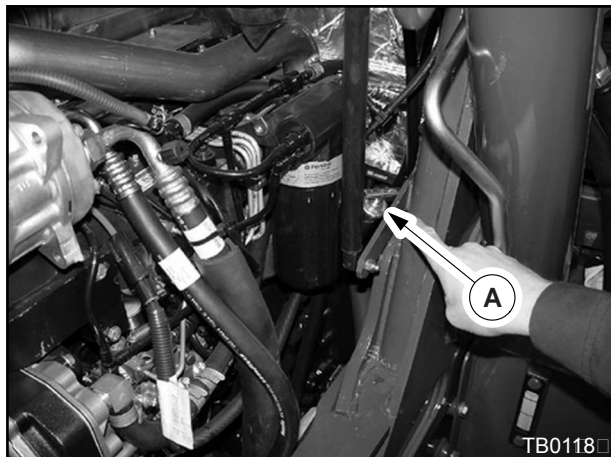
Filling

1. Remove the combined filler/dipstick (A) and fill with the correct oil to the oil level mark on the dipstick. Then replace the filler/dipstick.
2. Start the engine and check for leaks.
3. Drive the machine for a few minutes in 1st and 2nd gear then stop the engine.
4. Check the oil level by means of the dipstick. Top up if necessary. See "Oil Level" section on page 9-41.
5. Close and lock the engine bonnet.
6. Remove the support strut and lower the loader attachment. See "Loader Attachment Support Strut" section on page 5-53.

Synchroshuttle



Powershuttle



Front and Rear Drive Axles and Reduction Gears

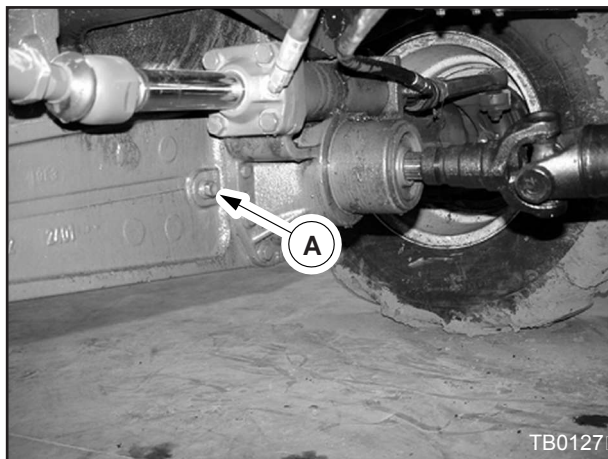
Service specifications

Oil level check	Every 250 hours (After the first 50 hours during the running-in period)
Oil change	Every 1000 hours (After the first 50 hours during the running-in period)
Cleaning the breathers	Every 250 hours
Type of oil	See "Fluids and Lubricants" section on page 9-3.
Capacities	See "Capacities" section on page 10-11.

Front drive axle oil level

1. Park the machine on firm, level ground, stop the engine, engage parking brake and remove the starter switch key.
2. Remove the plug (A) and check that the oil is level with the orifice. If necessary, top up via this orifice.
3. Install the plug (A). Tighten to 60 Nm.

Front axle (760/820/860/870/880 only)

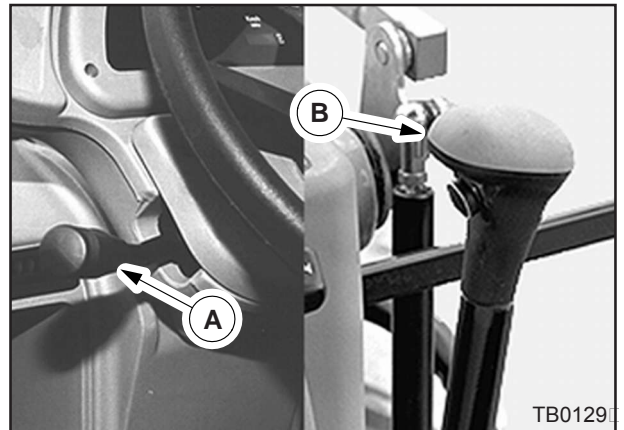


Front axle (970/980 only)

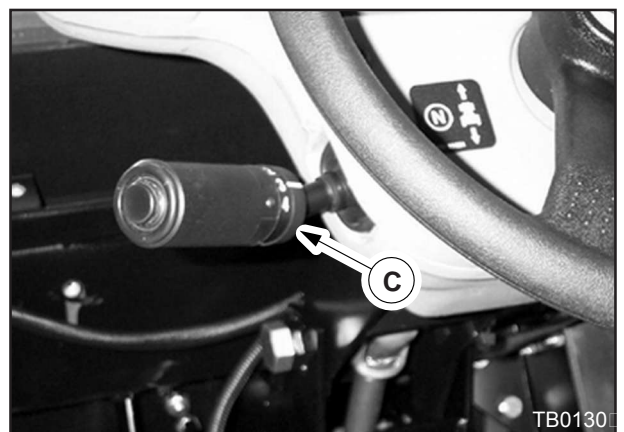


Front axle reduction gear oil level

1. Park the machine on firm, level ground.
2. **Synchroshuttle only.** Make sure that the direction of travel control lever (A) and gear change lever (B) are in neutral position.



- **Powershuttle only.** Make sure the transmission control lever (C) is in neutral position.

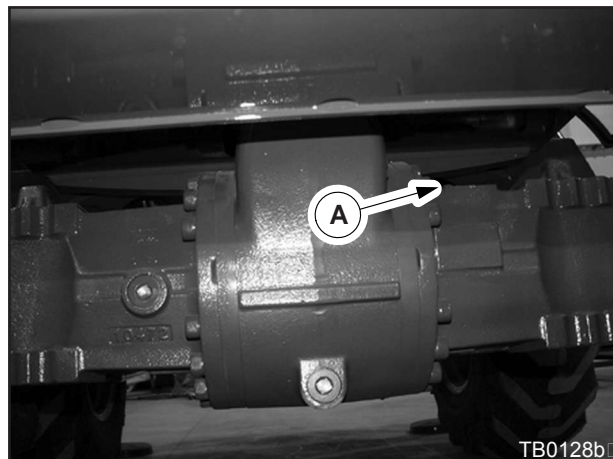
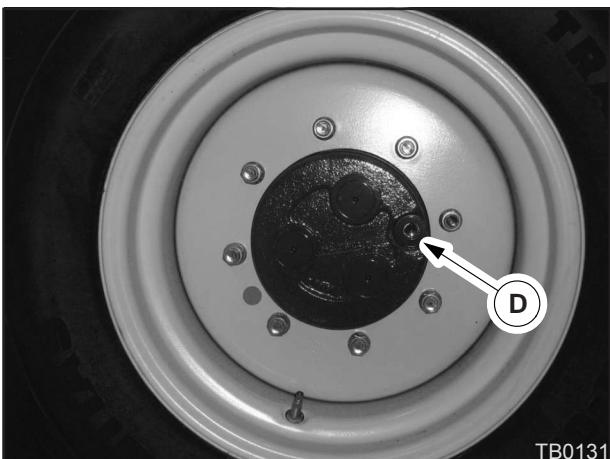


Maintenance

3. Use the loader attachment to raise the front of the machine slightly so that the front wheels are no longer in contact with the ground and place blocks under the front drive axle. Chock rear wheels.
4. Stop the engine, engage parking brake and remove the starter switch key.
5. Manually turn the wheel until the orifice is in the horizontal position and remove the plug (D).
6. The oil should be level with the orifice. If necessary, top up via this orifice.
7. Install the plug (D). Tighten to 60 Nm.
8. Repeat Steps 5 to 7 for the other reduction gear.
9. Lower the machine to the ground.

Cleaning the breather

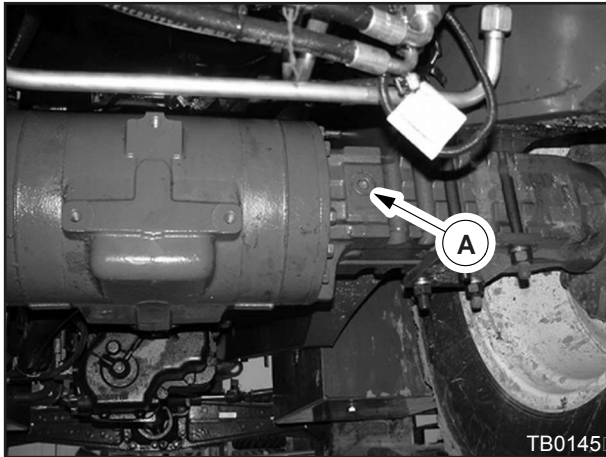
Check that the front axle breather (A) is not blocked or damaged (970/980 only).



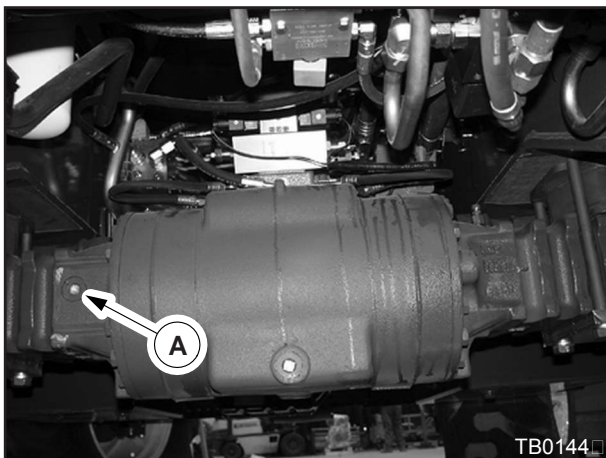
Rear drive axle oil level

1. Park the machine on firm, level ground, stop the engine, engage parking brake and remove the starter switch key.
2. Remove the plug (A) and check that the oil is level with the orifice. If necessary, top up via this orifice. 760/820 and 970/980 plugs are located at the rear of the axle housing. The 860/880 filler plug is located on the front side.

Front axle (760/820/860/870/880 only)



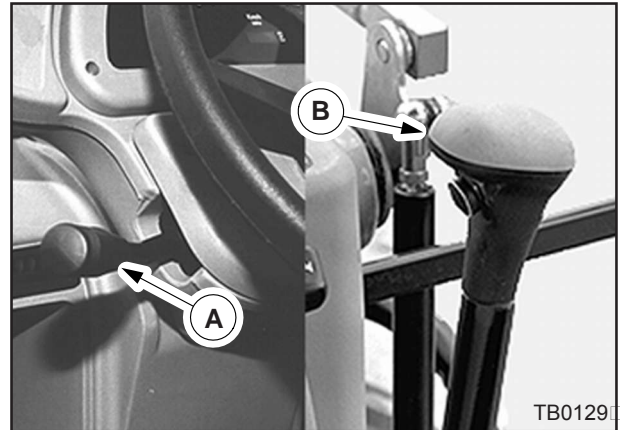
Front axle (970/980 only)



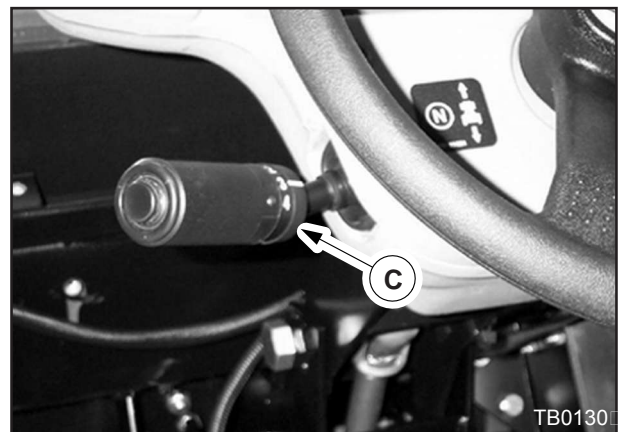
3. Install the plug. Tighten to 60 Nm.

Rear axle reduction gear oil level

1. Park the machine on flat, level ground.
2. **Synchroshuttle only.** Make sure that the direction of travel control lever (A) and gear change lever (B) are in neutral position.



- **Powershuttle only.** Make sure the transmission control lever (C) is in neutral position.



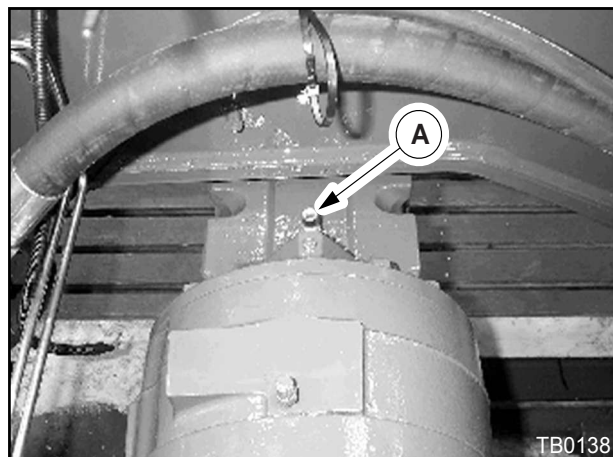
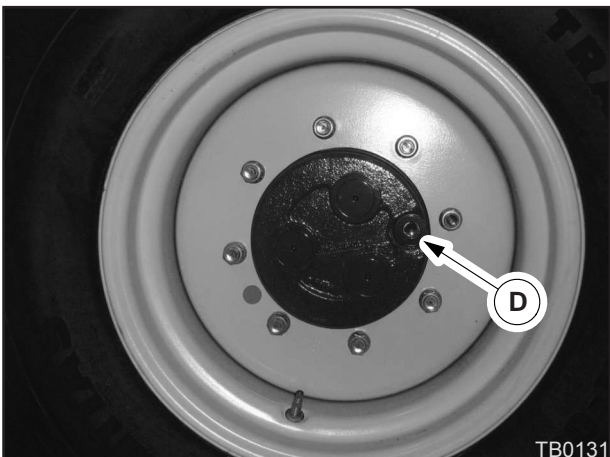
3. Use the stabilizers to raise the rear of the machine slightly so that the rear wheels are no longer in contact with the ground and place blocks under the rear axle. Chock front wheels.
4. Stop the engine, engage parking brake and remove the starter switch key.

Maintenance

5. Manually turn the wheel until the orifice is in the horizontal position and remove the plug (D).
6. The oil should be level with the orifice. If necessary, top up via this orifice.
7. Install the plug (D). Tighten to 60 Nm.
8. Repeat Steps 5 to 7 for the other reduction gear.
9. Lower the machine to the ground.

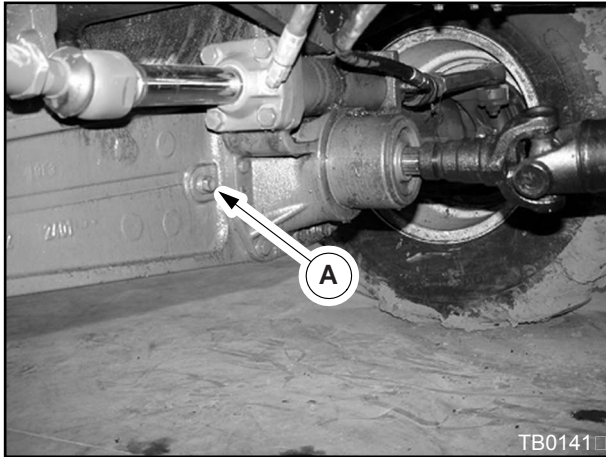
Cleaning the breather

Check that the rear axle breather (A) is not blocked or damaged.

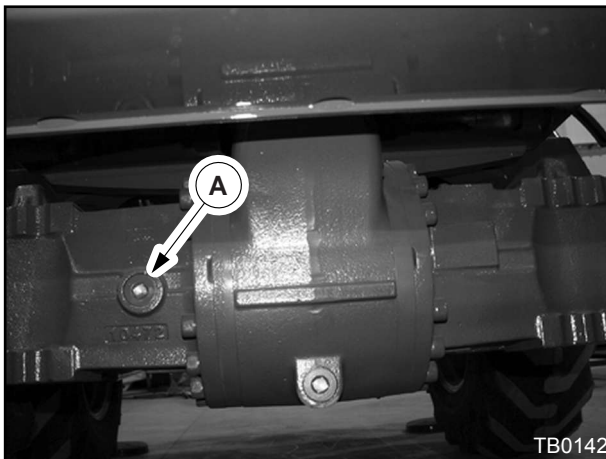


Draining and filling the front drive axle

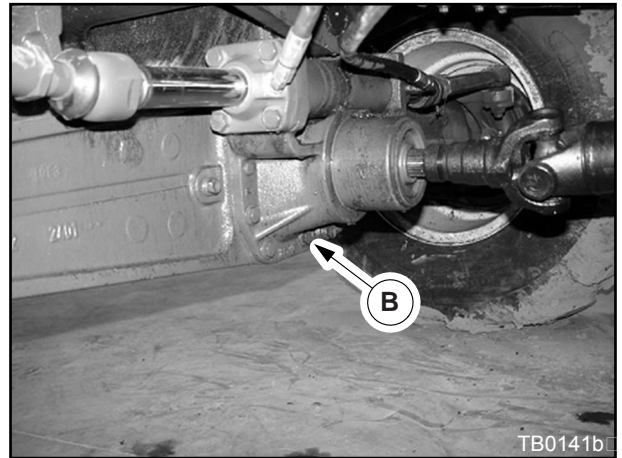
1. Park the machine on firm, level ground, stop the engine, engage the parking brake and remove the starter switch key.
 2. Remove the plug (A).
- (760/820/860/870/880)



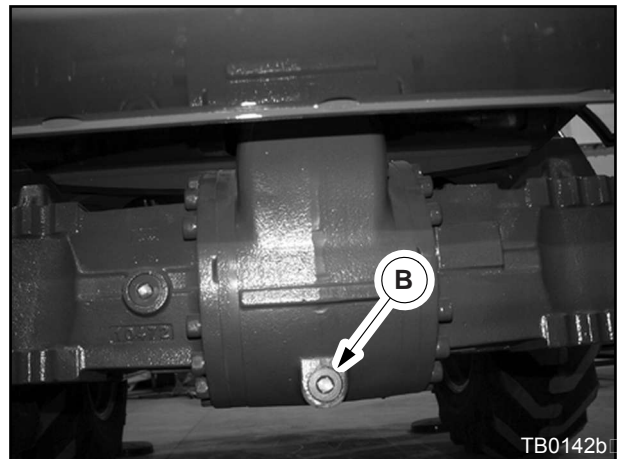
- (970/980 only)



3. Place a receptacle of a suitable capacity under the drain plug (B) and remove the plug (B). Allow the oil to flow out.
- (760/820/860/870/880)



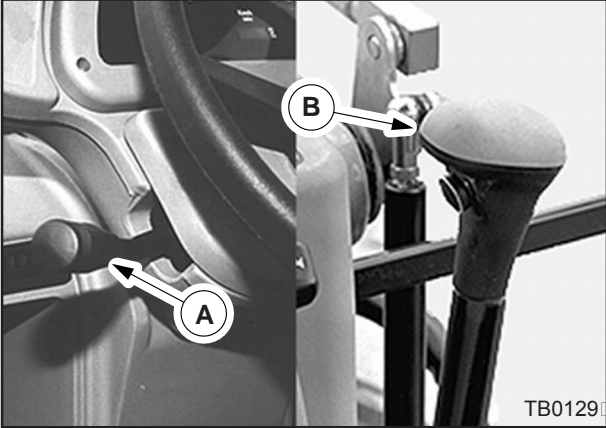
- (970/980 only)



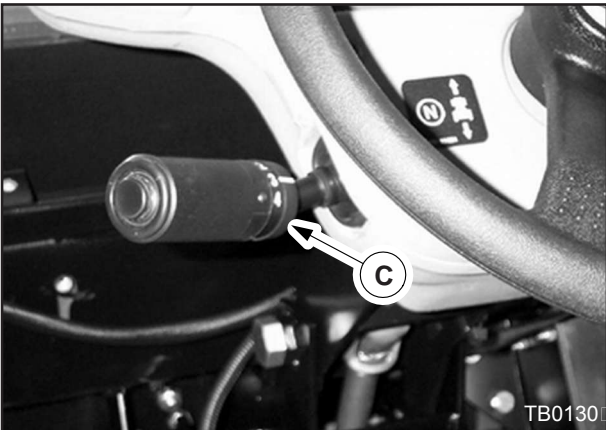
4. Install the drain plug (B). Tighten to 60 Nm.
5. Fill with oil via the filler orifice (A) until the oil is level with the orifice. Then install the plug (A). Tighten to 60 Nm.

Draining and refilling the front axle reduction gears

1. Park the machine on flat, level ground.
2. **Synchroshuttle only.** Make sure that the direction of travel control lever (A) and gear change lever (B) are in neutral position.

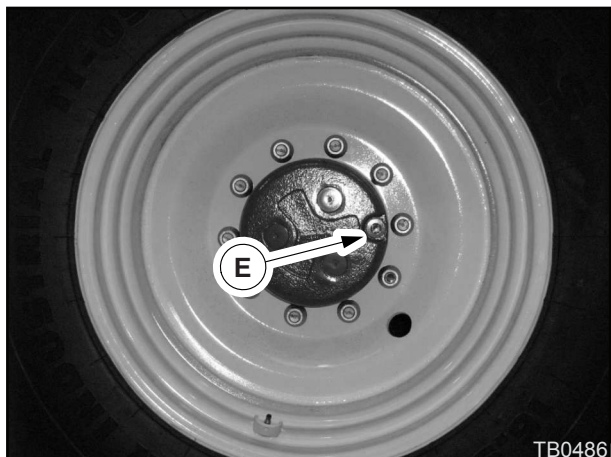
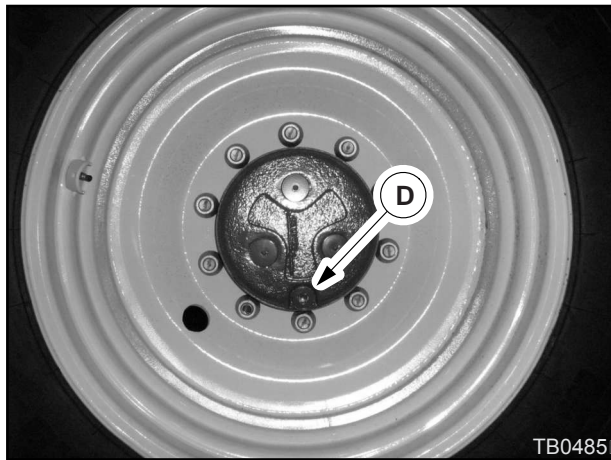


- **Powershuttle only.** Make sure the transmission control lever (C) is in neutral position.



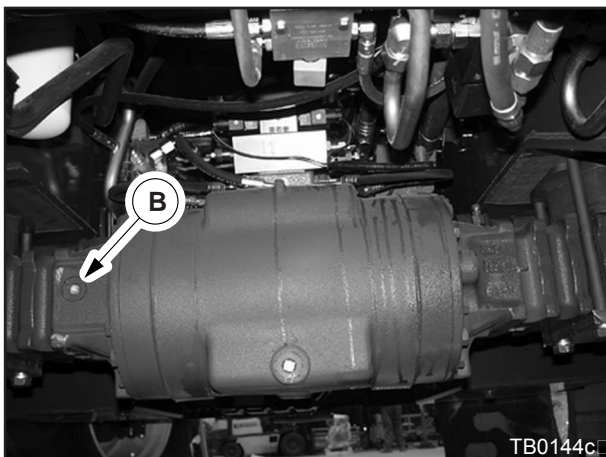
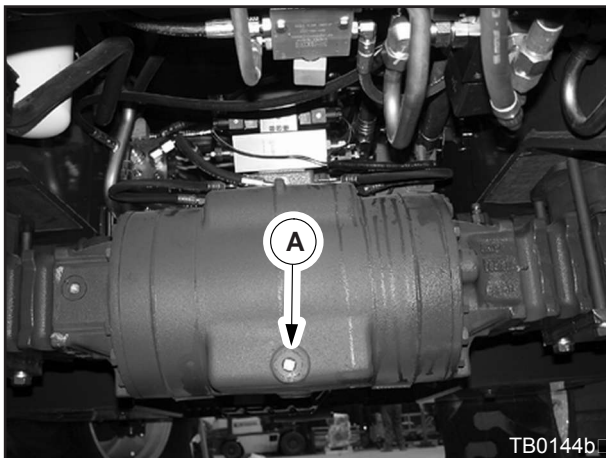
3. Use the loader attachment to raise the front of the machine slightly so that the front wheels are no longer in contact with the ground and place blocks under the front drive axle. Chock rear wheels.
4. Stop the engine, engage parking brake and remove the starter switch key.

5. Turn the wheel by hand until the orifice (D) is in the lowest position.
6. Place a receptacle of a suitable capacity under the reduction gear, remove the plug and allow the oil to flow out.
7. Turn the wheel by hand until the orifice (E) is in the horizontal position and then fill via that orifice until the oil is level with the orifice.
8. Install the plug.
9. Repeat Steps 5 to 8 for the other reduction gear.
10. Start engine and lower the machine to the ground.



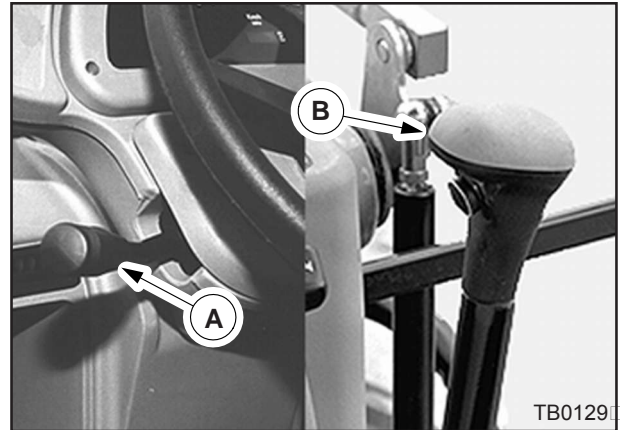
Draining and filling the rear axle

1. Park the machine on firm, level ground, stop the engine, engage the parking brake and remove the starter switch key.
2. Place a receptacle of a suitable capacity under the drain plug (A), remove the drain plug (A) and allow the oil to flow out.
3. Install the drain plug. Tighten to 60 Nm.
4. Fill with oil via the filler orifice (B) until the oil is level with the orifice. Then install the plug (A). Tighten to 60 Nm.

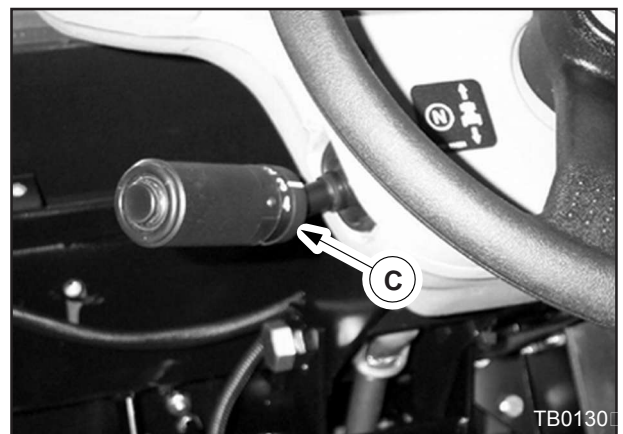


Draining and refilling the rear reduction gears

1. Park the machine on flat, level ground.
2. **Synchroshuttle only.** Make sure that the direction of travel control lever (A) and gear change lever (B) are in neutral position.



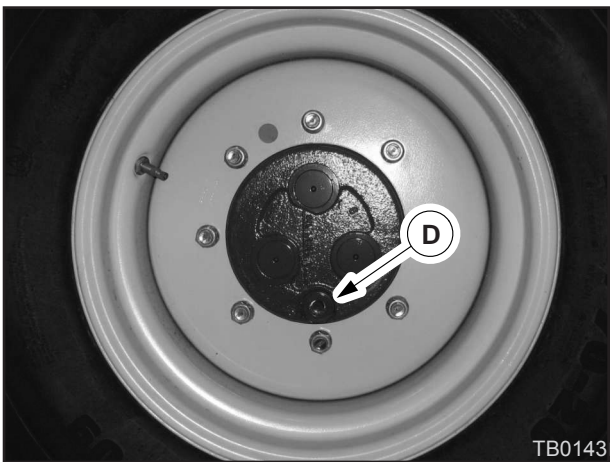
- **Powershuttle only.** Make sure the transmission control lever (C) is in neutral position.



3. Use the stabilizers to raise the rear of the machine slightly so that the rear wheels are no longer in contact with the ground and place blocks under the rear axle. Chock front wheels.
4. Stop the engine, engage parking brake and remove the starter switch key.

Maintenance

5. Turn the wheel by hand until the orifice (D) is in the lowest position.
6. Place a receptacle of a suitable capacity under the reduction gear, remove the drain plug and allow the oil to flow out.
7. Turn the wheel by hand until the orifice (E) is in the horizontal position and then fill via that orifice until the oil is level with the orifice.
8. Install the plug. Tighten to 60 Nm.
9. Repeat Steps 5 to 8 for the other reduction gear.
10. Start engine and lower the machine to the ground.



Wheels and Tyres



WARNING: A burst tyre can cause serious injury. Regularly check the condition of tyres and always observe the inflation pressures defined in accordance with the type of tyre and ground concerned.



WARNING: When checking tyre pressures or during an inflation operation, never face the tyre. Always use an inflation cage when the wheel is removed from the machine. Keep all other persons away from the area.



WARNING: Never weld near a tyre. It is essential to remove the tyre before any welding operation.

Wheel or tyre service



WARNING: The servicing of wheels and tyres for this machine should only be entrusted to a qualified mechanic, who will know how to inflate the tyres while observing safety instructions. To avoid any accident, use a protective device (an inflation cage for tyres), suitable tools and respect the procedure. Serious or fatal injury can result from a tyre suddenly flying off a rim (one piece rim) or from the tyre and/or the wheel components (a wheel consisting of several parts).



CAUTION: When renewing worn or damaged tyres, always install tyres of the same make, model and size as those removed to prevent transmission gearing problems in 4WD. Failure to fit the correct tyre combinations may result in excessive tyre wear and severe damage to drive line components etc. when the machine is used in 4 wheel drive mode. Damage caused due to the wrong tyre combinations will not be covered by machine warranty. If in doubt consult your Dealer or manufacturer.

Tyre pressures



CAUTION: Make sure you protect your face before using compressed air.

Service specification

Pressure check	Every 50 hours
Pressure values	See "Tyres" section on page 10-6

Maintenance

Wheel Nut Torque Settings

Service specifications

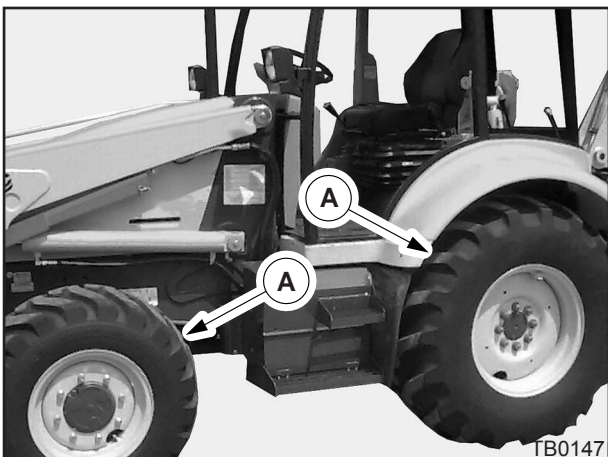
Torque tightening check	Every 250 hours (Every day for five days, after removing a wheel)(After the first 50 hours during the running-in period)
Torque values	See "Wheel Tightening Torque" section on page 10-6

Replacing a wheel



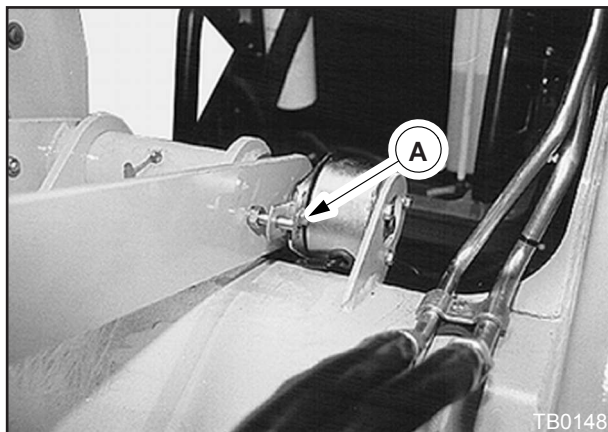
CAUTION: Make sure you protect your face before using compressed air.

1. Park the machine on firm, level ground, with no obstacles in the area.
2. Loosen the retaining nuts from the wheel which is to be removed.
3. Start the engine and use the loader attachment and the stabilizers to lift the machine until the wheels are no longer in contact with the ground.
4. Stop the engine, engage the parking brake and remove the starter switch key.
5. Place blocks under the axle for the wheel which is to be removed.
6. Remove the nuts and remove the wheel.
7. Install a new wheel (A), observing the orientation of the tread pattern.
8. Install the nuts and tighten them to correct torque, see "Wheel Tightening Torque", page 10-6.
9. Remove the blocks from under the axle.
10. Lower the machine to the ground.



Loader Bucket Return-To-Dig Adjustment

1. Place the machine on firm, level ground and engage the parking brake.
2. Lower the loader bucket to the ground and make sure that the bottom of the bucket is at the required digging angle.
3. Stop the engine and remove the starter switch key.
4. Unscrew the return-to-dig switch lock nut (A) and slide the switch in the groove until the switch contact roller is resting on the loader beam cam, then tighten the nut.
5. Start the engine, raise the loader attachment completely and dump the bucket.
6. Press the return to dig override switch (B) to illuminate the light.
7. Place the control lever in the return to dig position to enable the bucket to re-set.
8. Lower the arms to the ground and check digging angle. Adjust if necessary.



Radiator and Oil Cooler

Service specifications

Checking for leaks	Every 10 hours or every day
Cleaning	As required

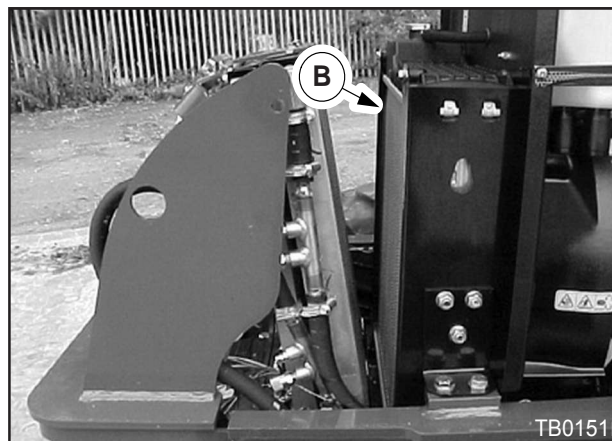
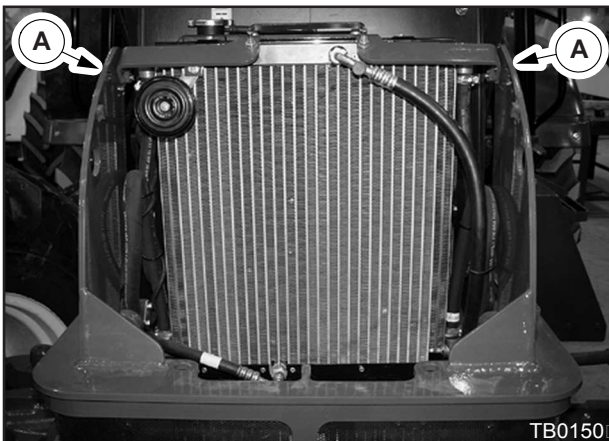
Cleaning

1. To access the engine, see "Engine Access", page 9-7.
2. Remove the two bolts (A) securing the radiator and cooler assembly, and pivot the assembly forward.
3. Clean area (B):
 - Dry dust: use compressed air.
 - Mud: use a water jet.
 - Oily dust: use perchloroethylene.



WARNING: The use of trichlorethylene is strictly forbidden.

4. Re-position the cooler assembly and replace the two bolts (A).
5. Close and lock the engine bonnet.
6. Remove the support strut and lower the loader attachment, see "Loader Attachment Support Strut", page 5-53.



Engine Alternator and Fan Belt

Service specification

Check	Every 250 hours (After the first 50 hours during the running-in period)
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Checking the drive belt(s)

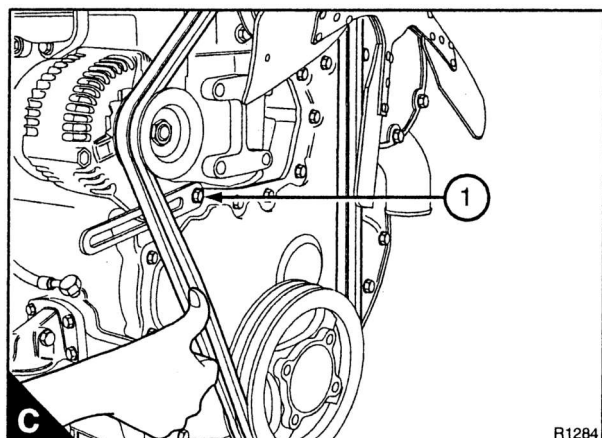
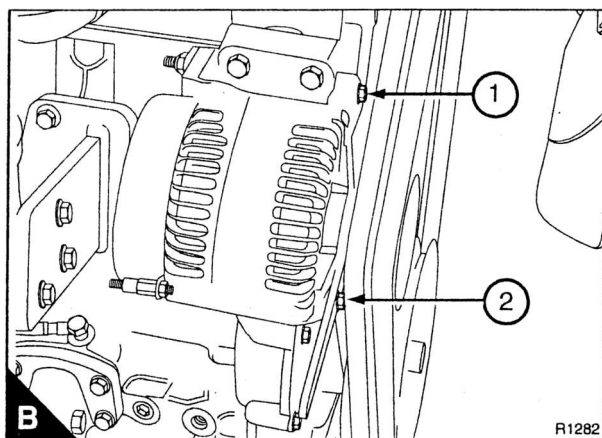
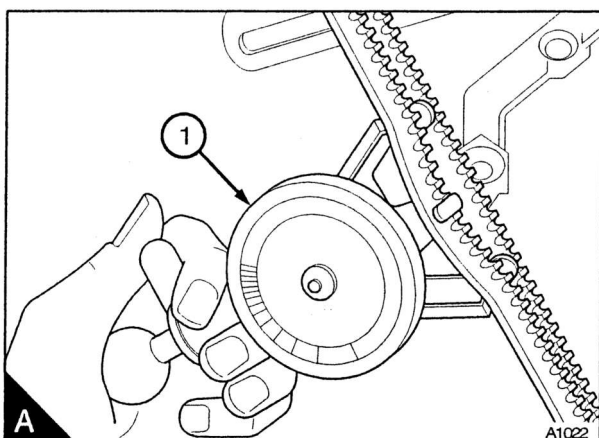
Renew a belt if it is worn or damaged. If twin belts are fitted, they must be renewed together.

To ensure maximum belt life, it is recommended that a belt tensioner gauge is used to check the belt tension. Fit the gauge (A) at the centre of the longest free length and check the tension. The correct tension is 535 N (120 lbf) 54 kgf. If the tension is 250 N (56 lbf) 25 kgf or below, adjust the belt to 535 N (120 lbf) 54 kgf as indicated below:

If twin belts are fitted, check and if necessary adjust the tension on both the belts.

Adjusting the belt tension

1. Loosen the pivot fastener (B1) of the alternator and the adjustment link fasteners (B2) and (C1).
2. Change the position of the alternator to give the correct tension. Tighten the pivot fastener of the alternator and the adjustment link fasteners to 22 Nm (16 lbf ft) 2,2 kgf m.
3. Check the belt tension again to ensure that it is still correct. If a new belt is fitted, the belt tension must be checked again after the first 20 hours of operation.



Maintenance

Machine Inspection and Cleaning

Service specifications

Inspection and cleaning	As required.
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Whenever oil or grease has been spilt on the machine; clean such deposits off with steam or high pressure water.

Take advantage of this operation to make a visual check of all the welded components (possible appearance of cracks), and the attachment linkage. Mark any leaks, check the condition of pipes and hoses.

Cylinder Leak Inspection

A cylinder rod should be slightly oily. Check for leaks after a working period, when the entire hydraulic system is at normal operating temperature.

1. Clean the rod and the gland of the cylinder which is to be inspected.
2. Work normally for 5 to 10 minutes.
3. Extend the cylinder rod.
4. Check for leaks.

ROD APPEARANCE	TEST	CONCLUSION
Dry	Slight traces of oil when a sheet of paper is rubbed over 20 cm of the rod.	Normal
Slightly oily	The paper remains stuck when run over the rod.	Normal
Oily	A sheet of paper placed on the rod stays stuck to it.	Normal
Very oily or weeping	A ring of oil is visible on the rod after each rod extension.	Consult your local dealer
Leak	Oil drips from the gland every time the cylinder rod is retracted.	

Air Conditioning (optional)

The air conditioning system components require maintenance at regular intervals. Observe these intervals to ensure correct operation and full efficiency of the air conditioning. The air conditioning system contains a gas which is subject to strict regulations. Any problem with the system must be resolved quickly.



WARNING: Never perform any service operation on the air conditioning circuit. For any operation, consult an approved specialist.

NOTE: Run the air conditioning at least once a week, even for a short time.

Service specifications

Compressor lubrication	Every 250 hours
Compressor drive belt inspection	Every 250 hours

Compressor lubrication

Using the air conditioning controls in the operator's compartment, run the compressor (A) so as to lubricate the internal seal. See "Heating, Ventilation (cab version) and Air Conditioning (optional) Controls" section on page 5-45.

In cold weather, run the engine for a few minutes and then start the compressor.

NOTICE

NOTICE: Never unscrew the plug located on the top of the compressor since that would discharge the entire circuit.

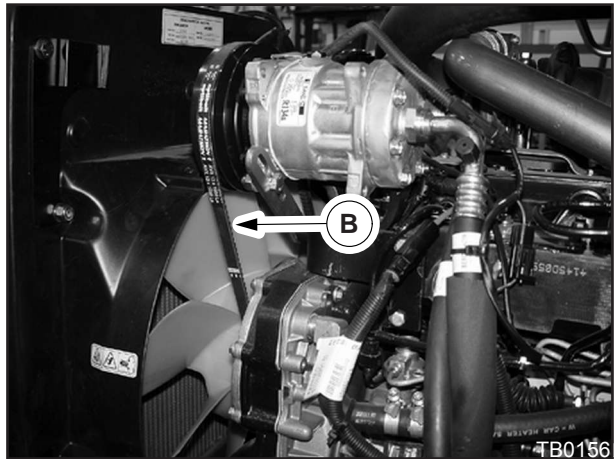
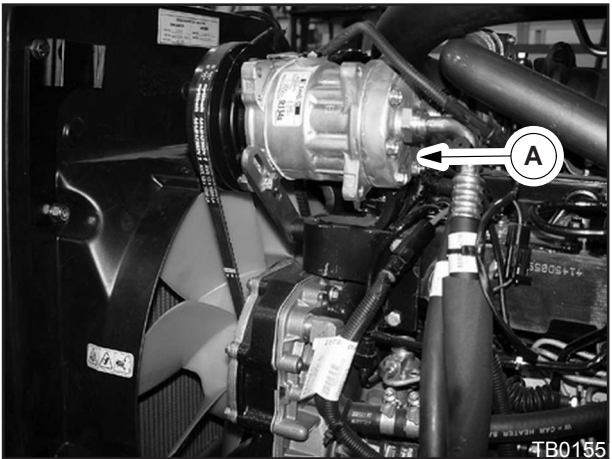
Compressor drive belt inspection

1. To access the engine, see "Engine Access", page 9-7.
2. Check the condition of the compressor drive belt (B). Replace it if it is worn or damaged and adjust the tension.

NOTICE

NOTICE: After replacing the drive belt, make an adjustment after the first 20 operating hours.

3. Check the drive belt tension. If necessary, adjust the tension. Unscrew the retaining hardware, tighten the drive belt and re-tighten the hardware. The deflection should be 13 - 19 mm (1/2 - 3/4 inch).



NOTICE

NOTICE: The drive belt should not be over tightened (premature bearing wear) or too slack (premature belt wear).

4. Close and lock the engine bonnet.
5. Remove the support strut and lower the loader attachment. See "Loader Attachment Support Strut" section on page 5-53.


Air Intake Filter Cab Heater


Service specifications

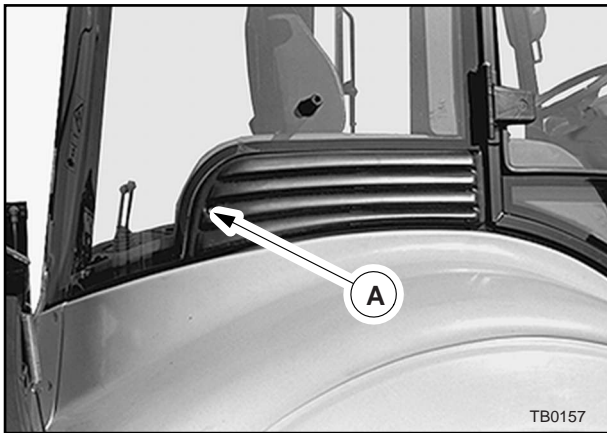
Filter cleaning	Every 500 hours, or in case of reduced air circulation.
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1. Remove the screw (A) and the cab grille.
2. Remove the filter (B).
3. Check the condition of the filter. Replace it or clean it if necessary.

4. Blow the filter through with compressed air.


WARNING: Make sure you protect your face before using compressed air..

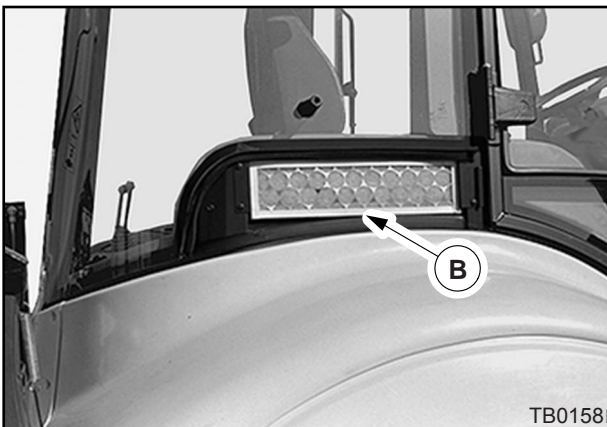

WARNING: The air pressure used must be a maximum of 2 bar.



5. Clean the filter in water using a suitable detergent (e.g. a typical household detergent). Instructions for using the detergent are printed on the packaging.
6. Allow the filter to dry completely.
7. Check the condition of the filter by placing an inspection lamp behind the filter.

NOTICE
NOTICE: The filter must be replaced if light can be seen through a hole.

8. Clean around the filter housing.
9. Install the new or cleaned filter (B).
10. Install the cab grille and the screw (A).



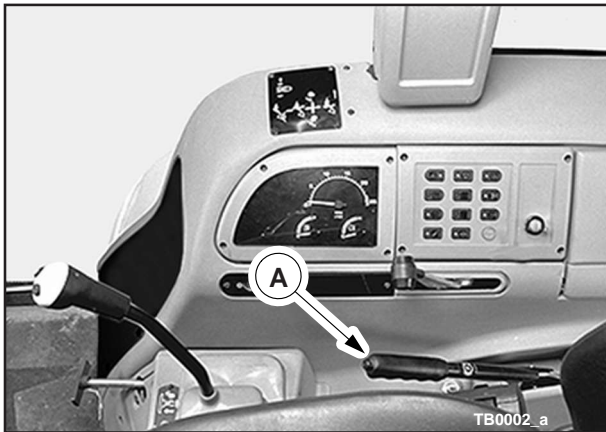
Parking Brake Inspection

Service specification

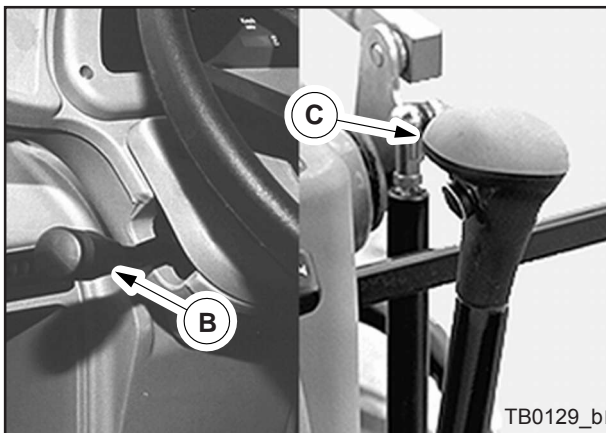
Check	Every 50 hours
Check and adjustment	Every 2000 hours

Parking Brake Check (all models)

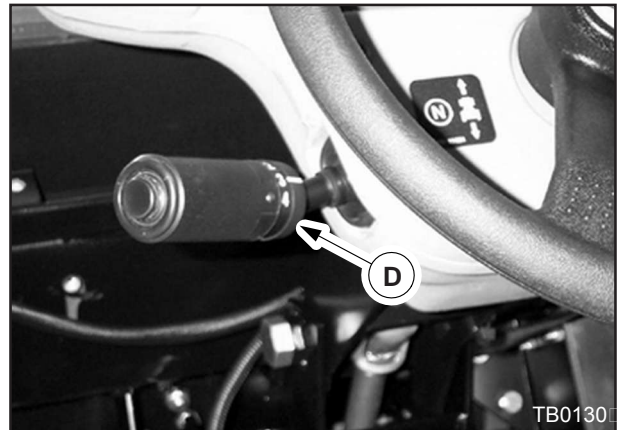
1. Engage the parking brake (A) and start the engine.



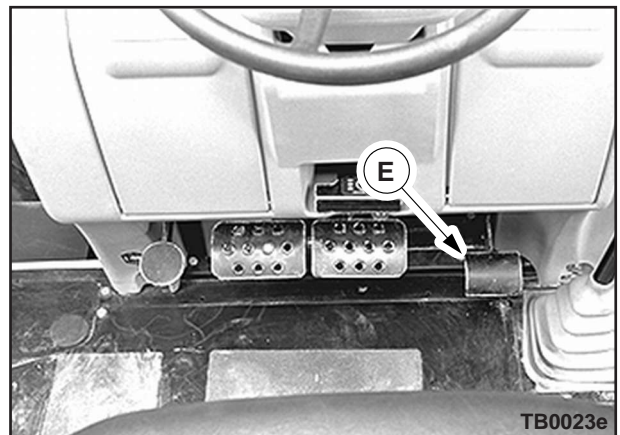
2. **Synchroshuttle only** - Place the gear change lever in 3rd gear (C), then place the direction of travel control lever in forward drive (B). The audible warning device will sound.



- Powershuttle only** - Select 3rd gear, then place the transmission control lever (D) in forward drive.



3. Using the accelerator pedal (E), increase the engine speed to about 1800 rpm. The machine must not move. If the machine moves, adjust the brake.



See "Parking Brake Adjustment" section on page 9-64.

Parking Brake Adjustment

Park the machine on flat, level ground, with the loader beams 30 cm (12 inch) above the ground. Make sure that the backhoe boom locking device is engaged.

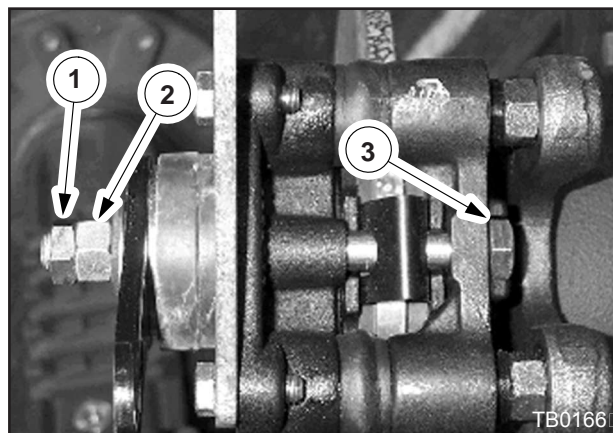
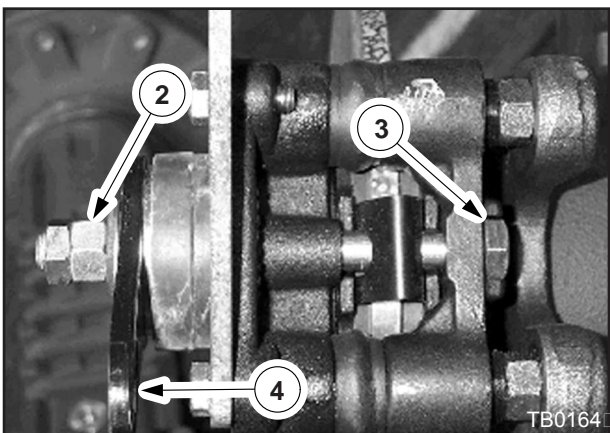
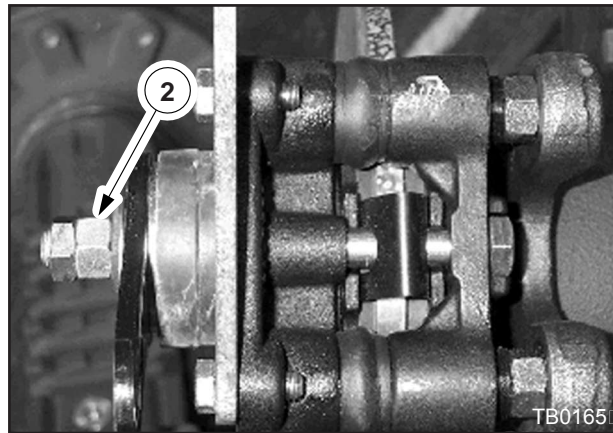
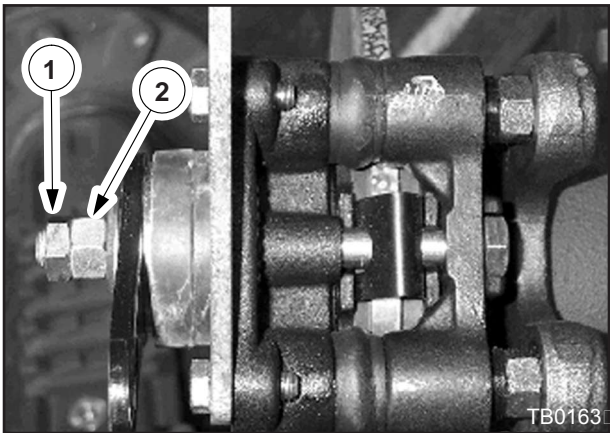
1. Use the stabilizers to raise the rear wheels.



DANGER: Make perfectly sure that the axle stands are capable of supporting the total weight of the machine.

2. Use suitable axle stands to support the rear of the machine, making sure the wheels are not touching the ground.
3. Lower the loader arms to the ground, stop the engine, remove the starter switch key and release the parking brake.
4. Loosen the locking nut (1) and adjuster nut (2).
5. Hold bolt (3) and tighten inner adjuster nut (2) until brake linings are in firm contact with brake disc. Torque to 10 Nm. Make sure operating lever (4) is in correct operating position.

6. Loosen inner adjuster nut (2) 4 to 5 flats of the nut and check that brake disc is free to rotate.
7. Tighten outer locking nut (1) to inner adjuster nut (2) and torque to 45 to 55 lbft in / 60 to 75 Nm.
NOTE: Make sure inner adjuster nut (2) does not turn relative to bolt (3).
8. Start the engine and raise the loader 30 cm above the ground. Use the stabilizers to raise the rear of the machine.
9. Remove the axle stands, lower the machine to the ground and stop the engine.



Brake System

Service specifications

Checking for leaks	Every 10 hours or every day
Bleed brakes	Every 500 hours

When the machine requires the brake bleeding procedure to be carried out, please consult your local dealer.

ROPS/FOPS Cab (or Protective Frame)

Service specifications

Inspection	Every 250 hours
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Your machine has a ROPS/FOPS cab (or frame).

- ROPS: Roll over protective structure.
- FOPS: Falling object protective structure.

An identification plate is attached to the ROPS/FOPS cab (or frame). See "Type, Serial Number and Year of Manufacture of the Machine" section on page 4-3 for:

- The manufacturer's address.
- The ROPS/FOPS serial number.
- The reference to the performance requirements meet : ISO 3471/1 1996.

Maintenance and inspection

Check the torque of the mounting bolts and, if necessary, tighten the bolts to the correct torque (395 Nm).

Check the operator's seat and the seat belt mounting hardware. Tighten the bolts to the correct torque. Replace parts showing signs of wear or damage.

Check that there are no cracks, rust or holes in the ROPS/FOPS cab (or frame) and components. Age, weather and accidents can cause damage. If you have any doubt about the state of the ROPS/FOPS cab (or frame), consult your local dealer.

Damage

If the machine has rolled over or if the ROPS/FOPS cab (or frame) has been in some other type of accident, you must replace the damaged ROPS/FOPS components in order to conserve the same degree of protection you had previously.

After an accident, check the following for damage:

- The ROPS/FOPS cab (or frame).
- The lower ROPS/FOPS cab (or frame) chassis.
- The operator's seat.
- The seat belt mounting hardware.

Before putting the machine back into service, make sure all the damaged components of the ROPS/FOPS cab (or frame) have been replaced. See the Parts Catalogue for your machine or consult your local dealer.



WARNING: Before putting the machine back into service, make sure all the damaged components of the ROPS/FOPS cab (or frame) have been replaced. See the Parts Catalogue for your machine or consult your local dealer.



WARNING: Do not try to weld or straighten the ROPS/FOPS cab (or frame).



WARNING: Do not modify the ROPS/FOPS cab (or frame) in any manner. Unauthorized modification, such as welding, drilling, cutting and adding attachments, as well as any damage resulting from collisions or the machine rolling over could weaken the structure and reduce your protection. Replace the ROPS/FOPS cab (or frame) if subjected to roll over or damage. Do not attempt to repair it.



WARNING: If you operate this machine without a ROPS/FOPS cab (or frame) and the machine rolls over, you can be seriously injured or killed. Remove the ROPS/FOPS cab only for service or replacement. Do not operate the machine with the ROPS/FOPS cab (or frame) removed.



WARNING: If you operate this machine without a ROPS/FOPS cab (or frame) and the machine rolls over, you can be seriously injured or killed. Remove the ROPS/FOPS cab only for service or replacement. Do not operate the machine with the ROPS/FOPS cab (or frame) removed.



WARNING: Do not install accessories (fixed or otherwise) which may increase the weight of the machine. This may cause serious accidents. Do not exceed the maximum weight shown on the ROPS/FOPS cab (or frame) identification plate.



WARNING: Improper ROPS/FOPS cab (or frame) inspection or maintenance can cause serious injury. Carry out the recommended ROPS/FOPS cab (or frame) inspection procedure shown in this manual. If it is necessary to replace ROPS/FOPS parts or the ROPS/FOPS cab (or frame), use only the replacement parts shown in the Parts Catalogue for your machine.

Steering and Axles

Service specifications

Check power steering system pipes, hoses and unions for damage or leakage	Every 250 hours
---	-----------------

Check all steering system fasteners and all ball joints and pivots for wear

If wear or excessive play occurs in the steering mechanism contact your local dealer.

Check power steering system pipes, hoses and unions for damage or leakage

This machine is equipped with hydrostatic power steering and it is therefore important that hoses are maintained in perfect condition and that no leaks occur anywhere in the steering system. If accessories have been added after the machine was purchased, check to ensure that they do not interfere with steering system hoses or components.

Transmission

Service specification

Check transmission mounting bolt torques	Every 250 hours (After the first 50 hours during the running-in period)
--	---

Check the tightness of the six transmission mounting bolts (three each side of machine): 70 lbft (105 Nm (M12)).

Transmission to chassis: 170 lbft (230 Nm (M16)).

Fuel Injectors

Service specification

Service the fuel injectors	Every 2000 hours
----------------------------	------------------

Fuel injection atomizers require regular servicing to maintain efficient operation. This work must be done by a CAV, Perkins Dealer or your local dealer.

Early signs of atomizer malfunction are:

- Misfiring.
- Knocking in one or more cylinders.
- Engine overheating.
- Loss of power.
- Black smoky exhaust.
- Increased fuel consumption.

Other faults can cause apparently similar symptoms and should be checked before removing injectors.

- Water in the fuel.
- Wrong fuel.
- Dirty or damaged fuel filters.

Extendable Dipper

Service specification

Replacement of the internal and external wear pads	As required
--	-------------

Top and bottom wear pads

1. Position the extendable dipper so that the inner member is extended approximately 30 cm (12 inch) and is resting on the bottom wear pad.

NOTE: The bucket must not be resting on the ground - dipper must be supported.

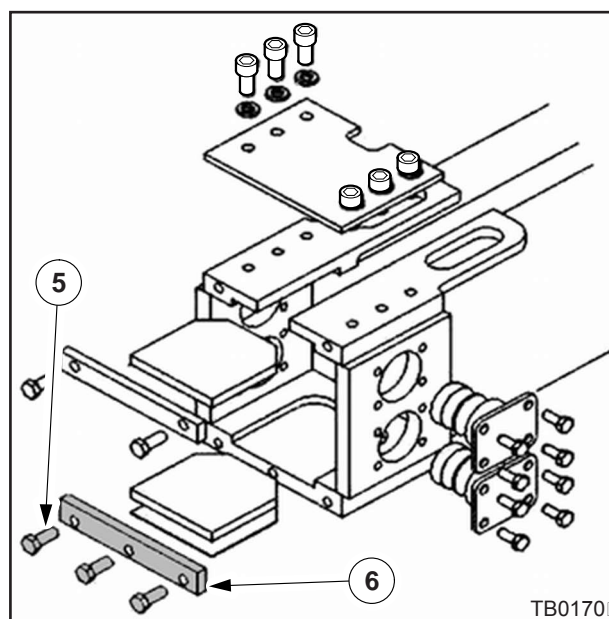
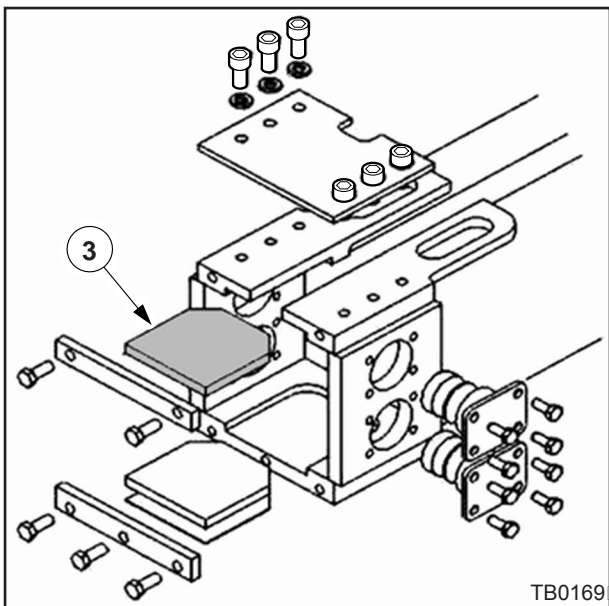
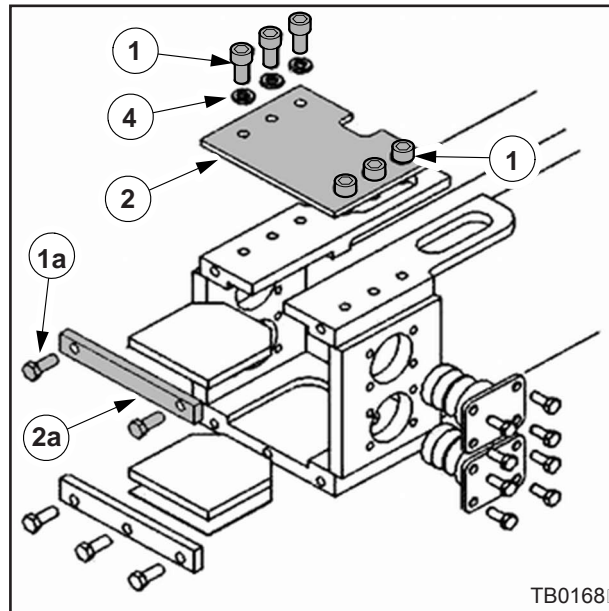
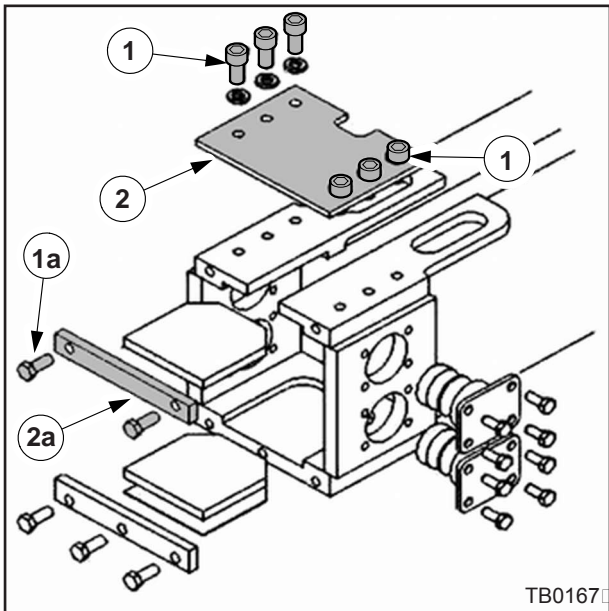
2. Remove all six bolts (1) and lift off top plate (2). Then remove both bolts (1a) and retainer plate (2a).

3. Slide out the old wear pad (3) and replace it with a new one.

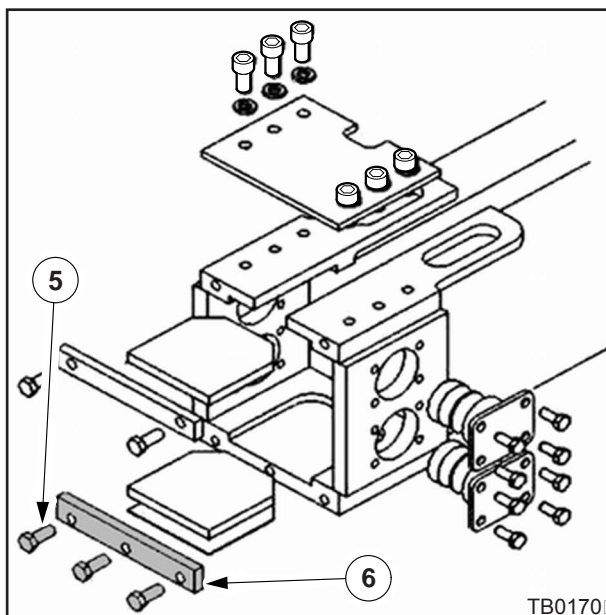
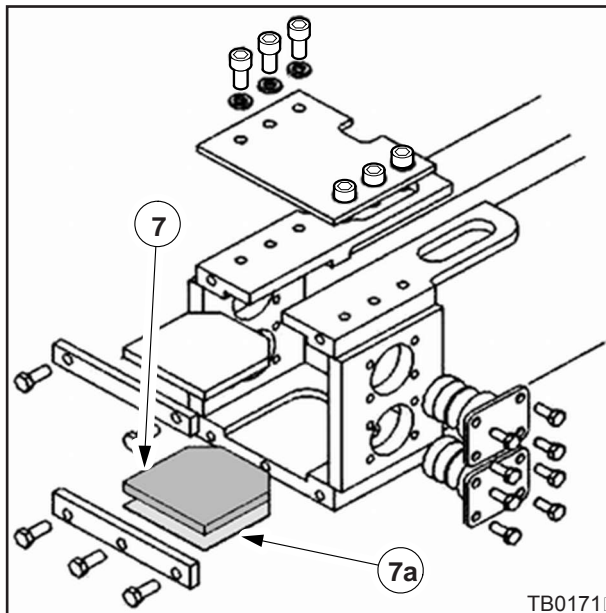
4. Refit the plate (2), washers (4) and bolts (1), which should be tightened to 140 Nm (104 lbft ft). Refit retainer plate (2a) and bolts (1a) and tighten to 140 Nm (105 lbft ft).

5. Lower the extendable dipper until the bucket contacts the ground so that the inner extendable member is pressed against the top wear pad.

6. Remove three bolts (5) and the retainer plate (6).

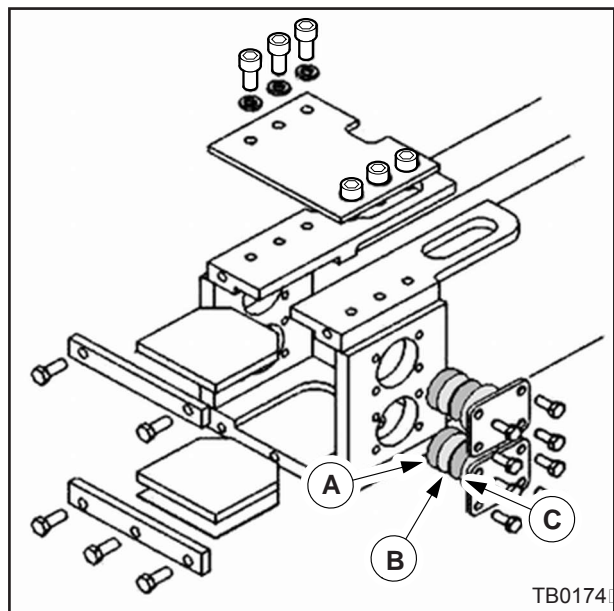
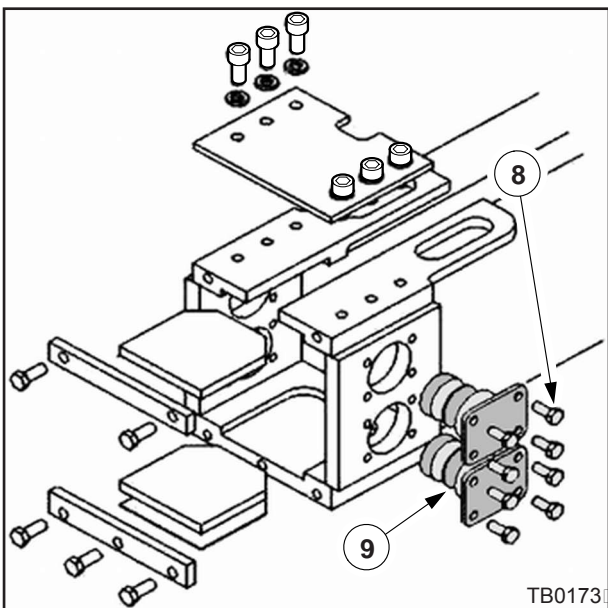


7. Remove the bottom wear pad (7) and shims (7a).
8. Fit a new wear pad and adjust the shim thickness to give a maximum gap of less than 1 mm (0.04 inch).
9. Refit the retainer plate (6) and tighten bolts (5) to 140 Nm (105 lbf ft).



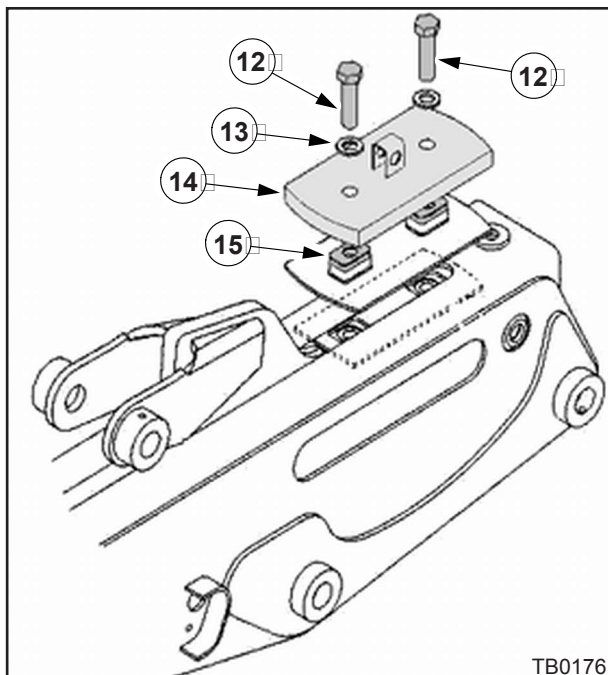
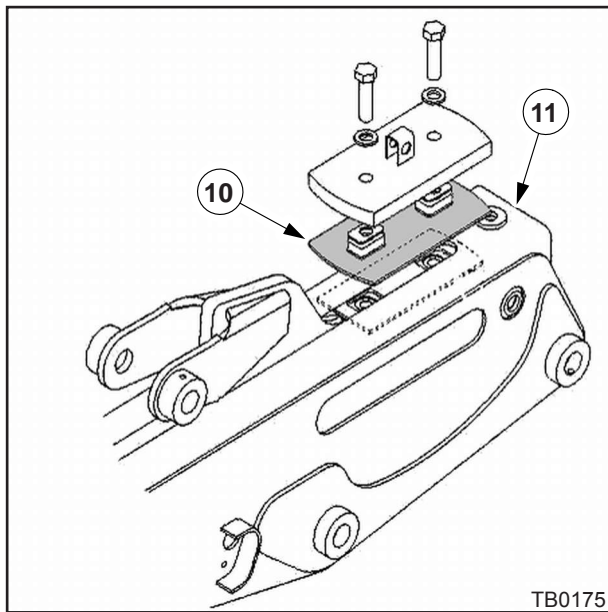
Side wear pads

1. Raise dipper, bucket must be clear of the ground (dipper must be supported).
2. Remove sixteen bolts (8) and all four housings (9), shims and wear pads.
3. Place a 1 mm (A) (0.04 inch) shim, a 2 mm (B) (0.08 inch) shim and a new wear pad (C) into two of the housings.
4. Fit both housings to one side of the extendable dipper outer member. Fit the bolts and tighten to 60 Nm (45 lbft ft).
5. Push the inner member hard against the wear pads just fitted.
6. Fit two new wear pads into the remaining housings and assemble the housings to the opposite side of the outer member. Fit and partially tighten all eight bolts.
7. Measure the clearance between the inner member and the wears pads just fitted.
8. Remove the housings fitted in step 6 and add shims behind the wear pads to achieve a total clearance between the wear pads and the inner member of less than 1 mm.
9. Fit and tighten the bolts to 60 Nm (45 lbft ft).



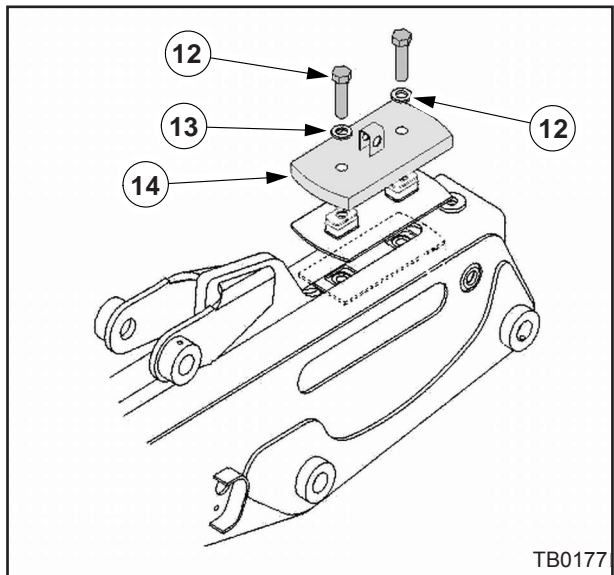
Checking and adjustment of Tail Upper wear pads

1. Position the backhoe to full reach, the dipper extended 3/4 travel and the bucket maintained 50 mm (2.0 ins) above the ground.
2. The wear clearance between the outer wear pad (10) and the dipper (11) should be maximum 1.0 mm (0.04 ins).
3. If adjustment is required, remove both bolts (12), washers (13), and retainer plate (14). Remove sufficient shims (15) equally at both locations to compensate for the measured wear clearance at step 2.
4. Refit the retainer plate (14), washers (13) and both bolts (12). Torque to 920 Nm (690 lbft ft). Re-check wear clearance refer to step 2 and make further adjustments if required.



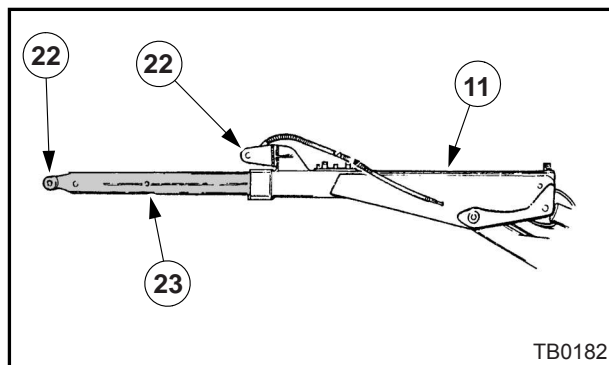
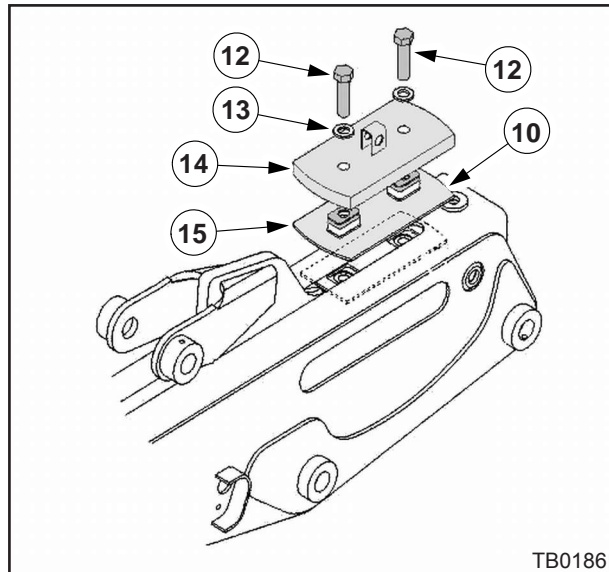
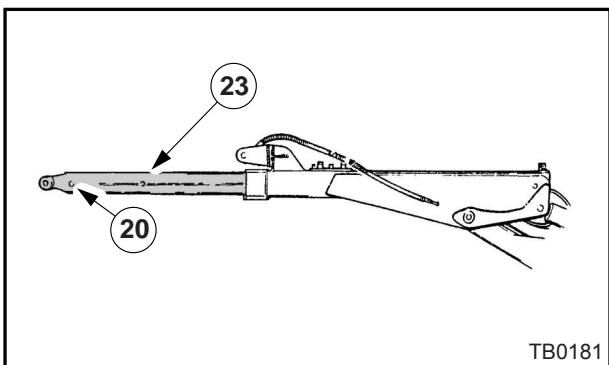
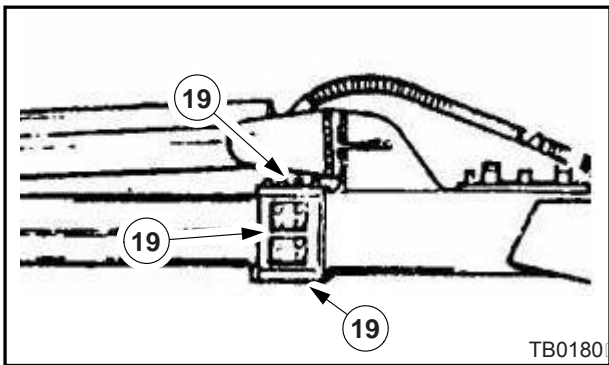
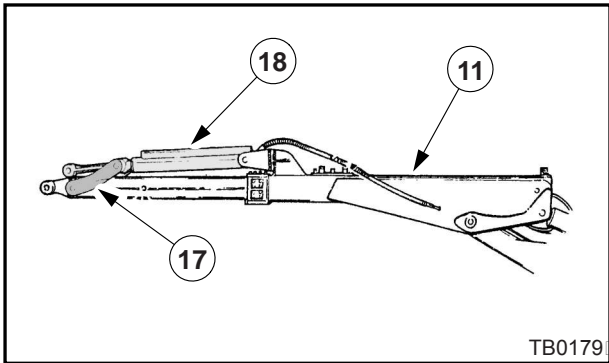
NOTICE

NOTICE: The torque on bolts (12) must be maintained to prevent damage to the backhoe boom.



Replacement of Tail Upper wear pads and Internal wear pads

1. Remove the bucket, bucket link (17) and bucket cylinder (18) from the dipper (11).
2. Remove the top, bottom and side wear pads (19) from the end of the dipper.
3. Extend inner section (23) fully, remove circlips from the extension cylinder mounting pin (20), then drive out the pin.
4. Remove both bolts (12) washers (13) and retainer plate (14). Remove shims (15) and outer top wear pad (10). Leave spacers in place.
5. Support the inner section (23) by means of a suitable chain sling and bars inserted through the bucket cylinder mounting hole (21) and bucket pivot pin hole (22). Slide the inner section (23) out of the dipper (11).



- Remove both side wear pads (24), shims (25) and top inner wear pad (26) from the inner section (23)

- Fit new wear pads (24) (**without shims**) into each side of the inner section.

Measure the total width between the outer wear pads faces, this is: **Dimension A** (mm).

Measure the internal width of dipper outer section, this is: **Dimension B** (mm).

Thickness of shims required =

Dim. B - Dim. A - 0.5 to 1.0mm

(0.02 to 0.04 inch)

Divide shims equally (up to 1.0 mm, 0.04 inch difference allowed) and install under the side wear pads.

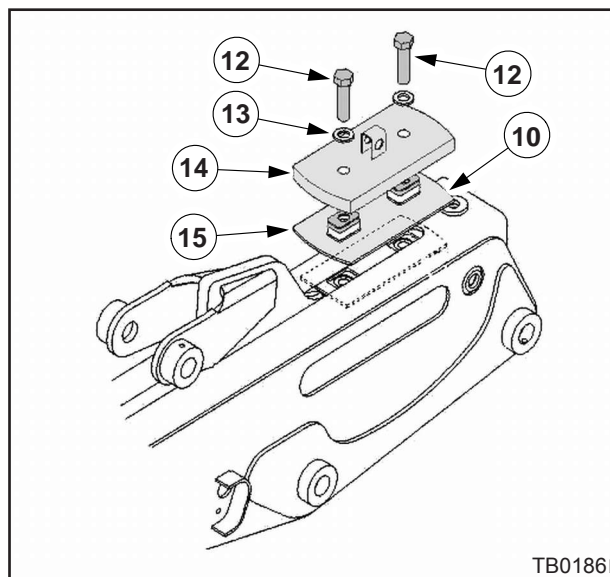
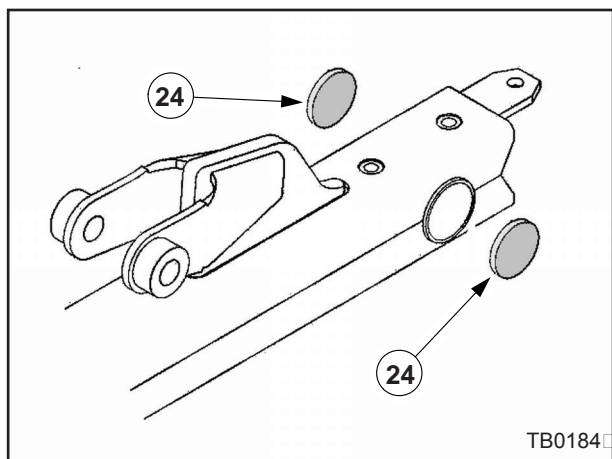
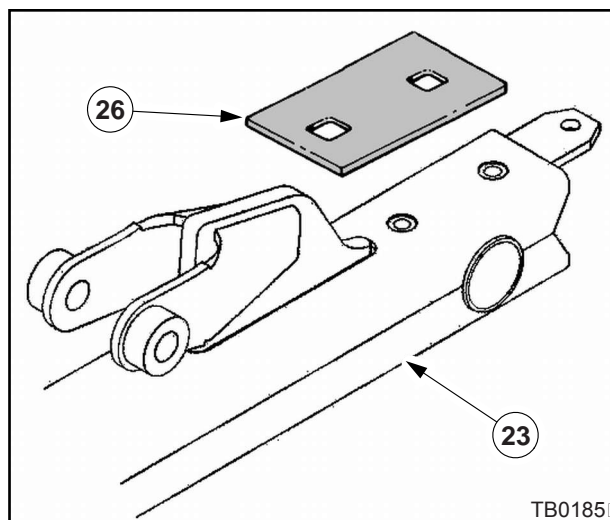
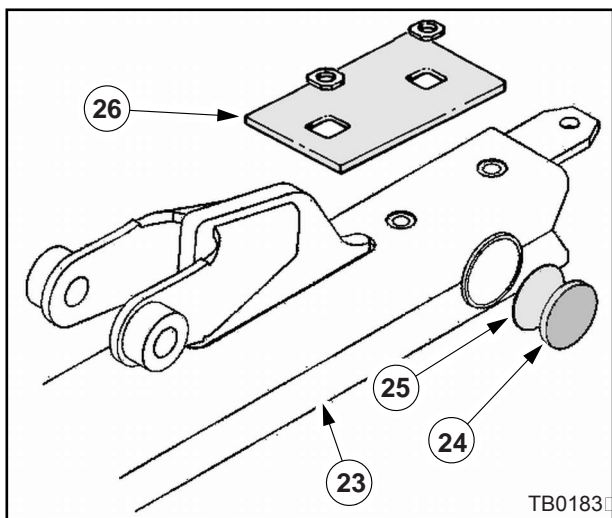
NOTE: A smear of heavy grease will help retain the shims and wear pads during assembly.

- Fit a new inner top wear pad (26) to inner section (23).

Refit inner section to dipper.

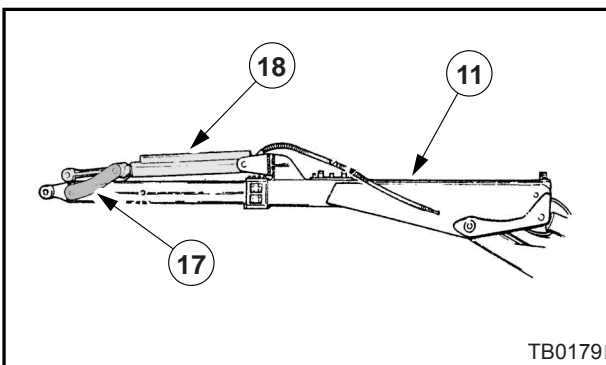
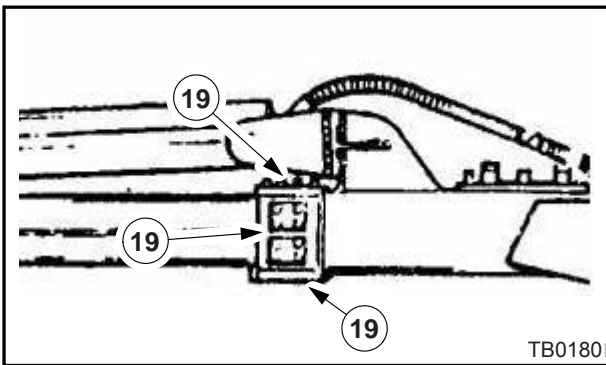
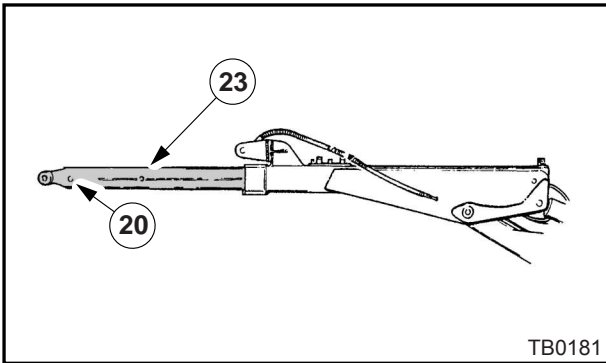
- Fit a new outer top wear pad (10), spacers, shims (15) (3mm thickness shims fitted above spacers), retainer plate (14), washers (13) and bolts (12).

NOTE: Adjustment of these wear pads must be carried out when dipper is fully assembled. Continue to next step.



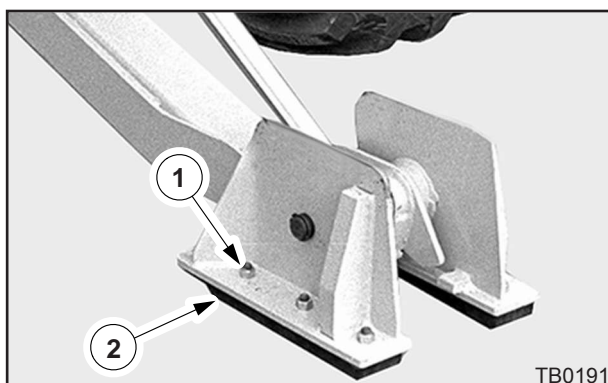
Maintenance

10. Align and fit mounting pin (20) through inner section (23) and extension cylinder then secure with circlips.
11. Refit the top, bottom and side wear pads (19) to the end of the dipper.
12. Refit the bucket, bucket link (17) and bucket cylinder (18) to the dipper (11)
Adjustment of the Tail Upper wear pads must now be checked, see "Checking and adjustment of Tail Upper wear pads", page 9-71.



Replacing a Stabilizer Pad (optional)
(Centremount (Axial) Backhoe version only)

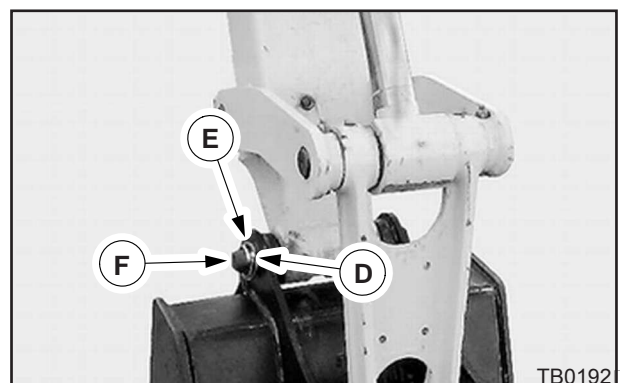
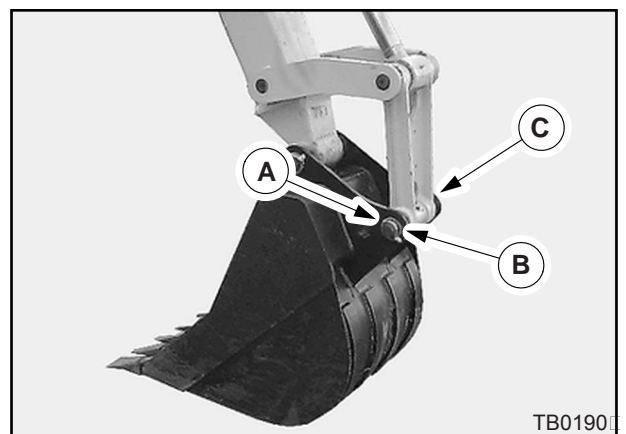
1. Park the machine on the firm, level ground, stop the engine, engage parking brake and remove the starter switch key.
2. Remove the 3 bolts (1) and the pad (2).



Replacing a Backhoe Bucket

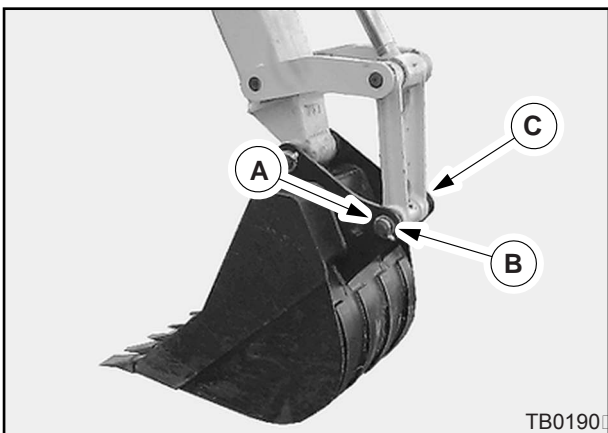
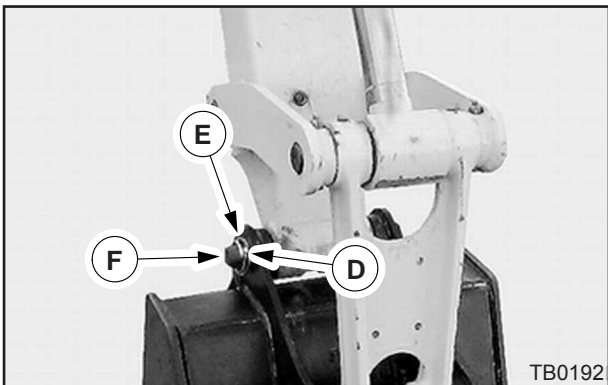
Removal

1. Park the machine on firm, level ground.
2. Lower the stabilizers until the rear wheels are just clear of the ground.
3. Place the backhoe bucket flat on the ground.
4. Stop the engine, engage the parking brake and remove the starter switch key.
5. Remove the locking pin (A), washer (B) and the connecting rod/bucket pivot pin (C).
6. Start the engine.
7. Retract the bucket cylinder rod.
8. Operate the attachment controls so that the dipper/bucket pivot pin is not under load from the dipper.
9. Stop the engine, engage parking brake and remove the starter switch key.
10. Remove the locking pin (D), washer (E) and the connecting dipper/bucket pivot pin (F).
11. Start the engine.
12. Operate the attachment controls so as to disconnect the dipper from the bucket.



Installation

1. Start the engine.
2. Extend the bucket cylinder rod to bring the connecting rod into its housing.
3. Install the connecting dipper/bucket pivot pin (F) the washer (E) and the locking pin (D)
4. Install the connecting rod/bucket pivot pin (C) the washer (B) and the locking pin (A).
5. Slightly raise the attachment and then operate the bucket and dipper control to bring the dipper lugs in line with the bucket lugs.



Replacing a Backhoe Bucket or Loader Bucket Tooth

Service specification

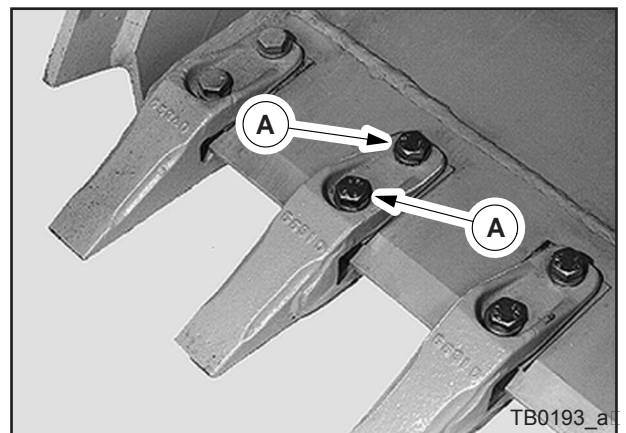
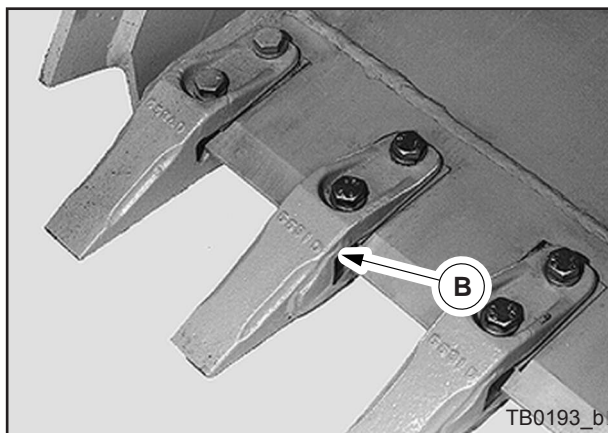
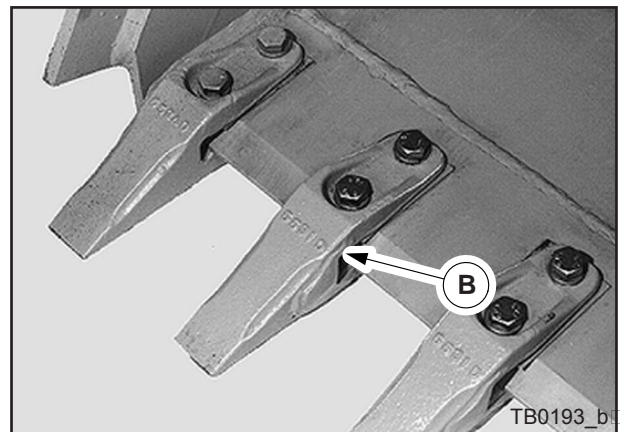
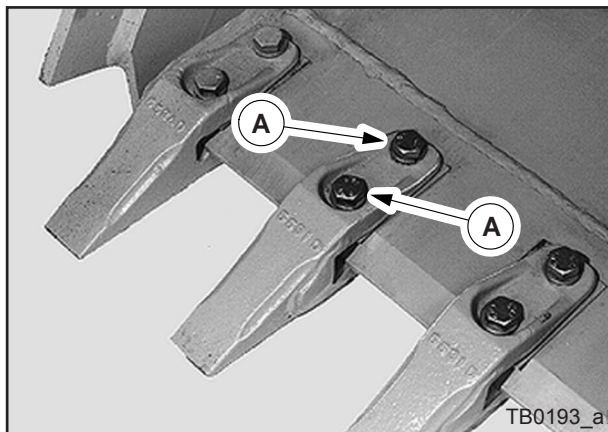
Torque tightening check	Every day for five days after replacing a bucket tooth
Fastening hardware	230 Nm (170 lbf ft)

Removal

1. Remove the fastening hardware (A).
2. Remove the tooth (B).

Installation

1. Install a new tooth and the appropriate adjustment shims (B).
2. Install the fastening hardware. Tighten to 230 Nm (A).



Maintenance

Connecting a Booster Battery



WARNING: When the electrolyte of a battery is frozen, it can explode if you attempt to charge the battery or if you try to start the engine using a booster battery. Always keep the battery charged to prevent the electrolyte freezing.



WARNING: Connecting jumper cables wrongly or short-circuiting battery terminals can cause an accident. Connect the jumper cables following the instructions in this manual.

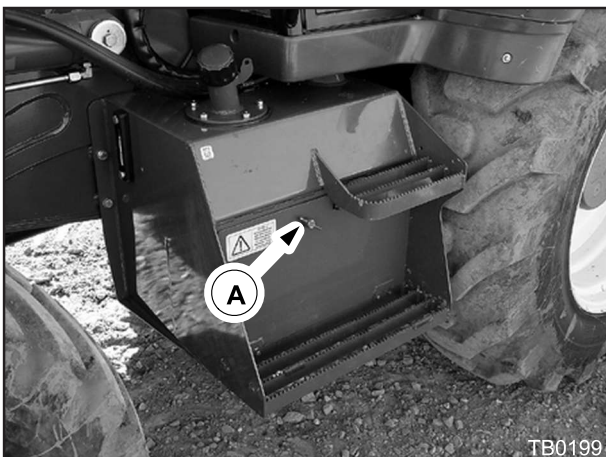
NOTICE

NOTICE: Make sure that the voltage of the booster batteries is the same as that of the machine circuit (12 volts).

Tools required

- Jumper cables

1. Open the battery cover. (A)
2. Connect the positive (+) jumper cable to the positive (+) terminal of the machine's battery.
3. Connect the negative (-) jumper cable to the negative (-) terminal of the machine's battery.
4. Start the engine.
5. First disconnect the negative (-) jumper cable, then disconnect the positive (+) jumper cable from the booster battery.
6. Close the battery cover.



Bulbs

Operator's compartment light	5 W
Instrument panel indicator lamp	1.2 W
Instrument panel gauge	1.2 W
Headlights	55/60 W
Front side lights (on headlight)	4 W
Front direction indicators	21 W

Rear direction indicators	21 W
Brake lights/Rear side lights	21/5 W
Front working lights	48 W
Rear working lights	48 W
Rotating beacons	55 W
Licence plate light (specific to certain countries)	5 W

Replacing a Bulb

NOTICE

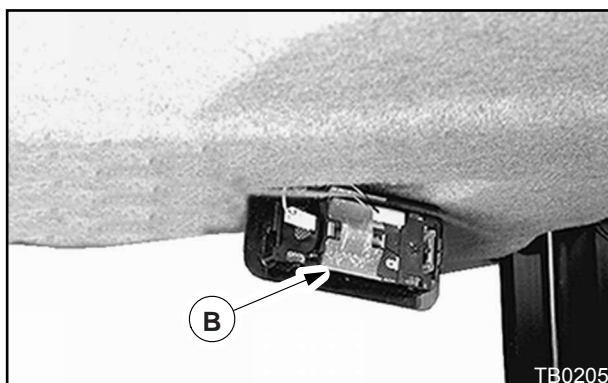
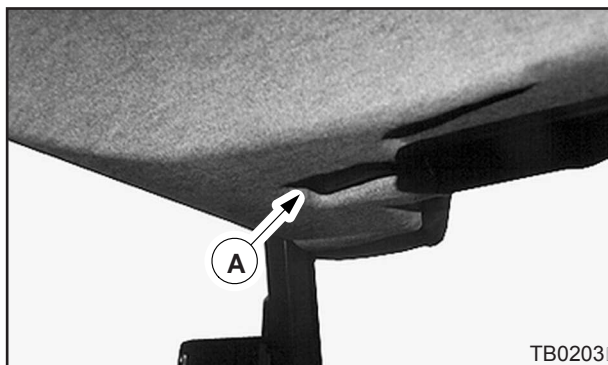
NOTICE: Never touch a tungsten iodine bulb with your fingers..

Cab interior light

Tool required

One flat-headed screwdriver

1. Remove the lens (A).
2. Remove the clip (B), the bulb and install a bulb of the same wattage (5 W).
3. Install the lens.

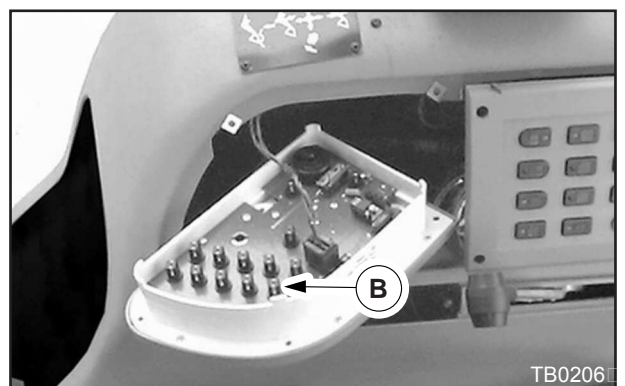
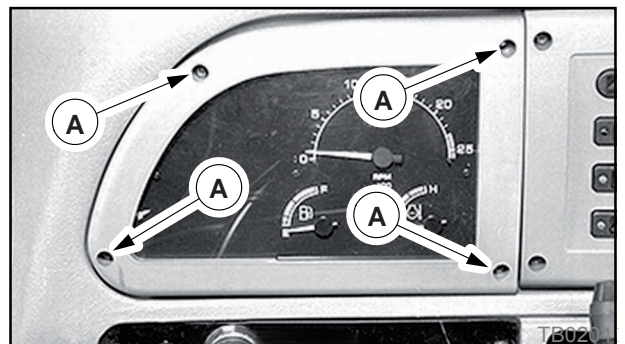


Instrument panel light

Tool required

One cross-headed screwdriver

1. Remove the four screws (A).
2. Remove the instrument panel (B) and turn it over. Turn the bulb holder to the left and remove it.
3. Install a bulb of the same wattage.
4. Install the instrument panel and the four screws.

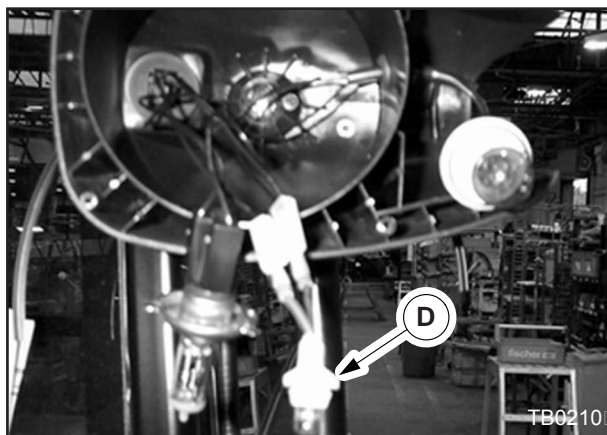
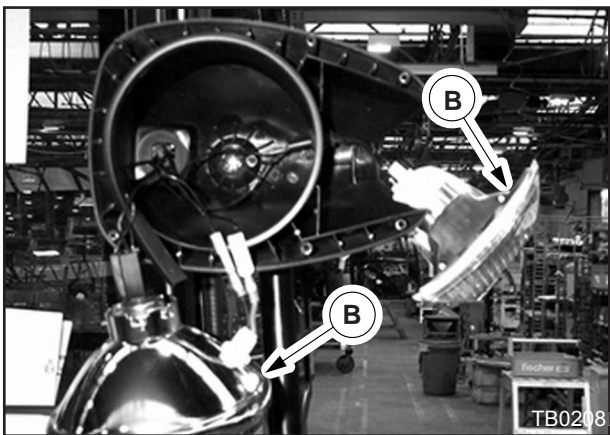
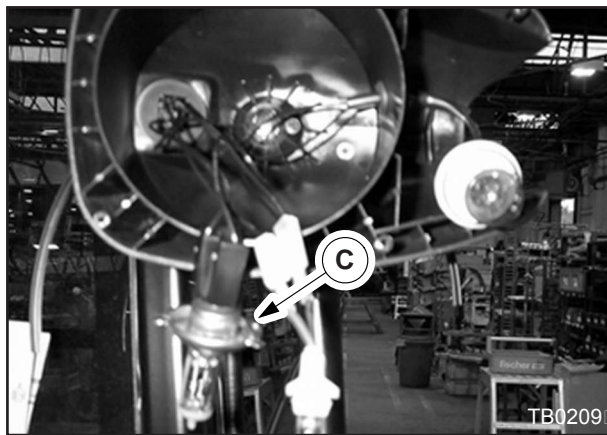


Headlights / Sidelights

Tool required

One cross-headed screwdriver

1. Remove the six retaining screws (A) then remove the light unit.
2. Remove the bulb holders (B) from the light unit.
3. **Headlights**
Remove the bulb (C) and install a bulb of the same wattage (55/60 W).
4. **Sidelights**
Remove the bulb (D) and install a bulb of the same wattage (4 W).
5. Install the bulb holder in the light unit.
6. Install the light unit and the six retaining screws.



Front direction indicator

Tool required

- One cross-headed screwdriver

1. Remove the six screws (A) then remove the light unit.
2. Remove the bulb (B) and install a bulb of the same wattage (21 W).
3. Install the light unit and the six screws.

NOTE: Some North American models only have direction indicators.

Rear lights

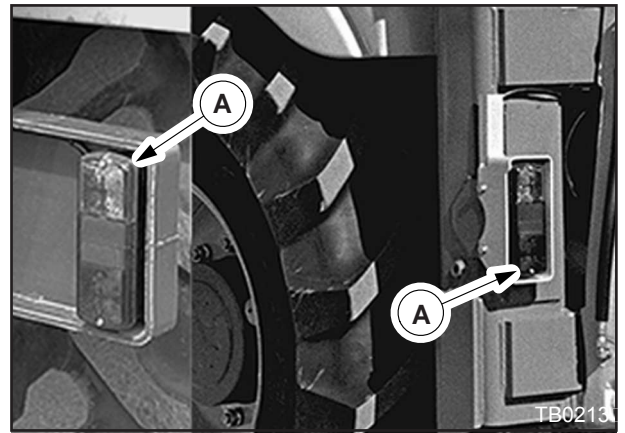
Tool required

- One cross-headed screwdriver

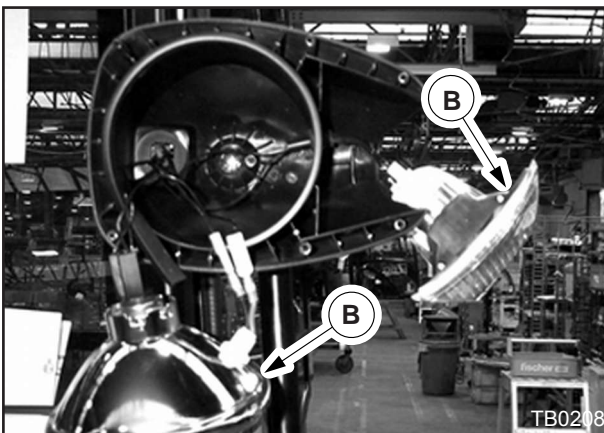
1. Remove the two screws (A) then remove the lens.
2. Remove the bulbs and install bulbs of the same wattage.
 - 1- Direction indicator (21 W).
 - 2- Brake light/Side light (21/5 W).
3. Install the lens and the two screws.



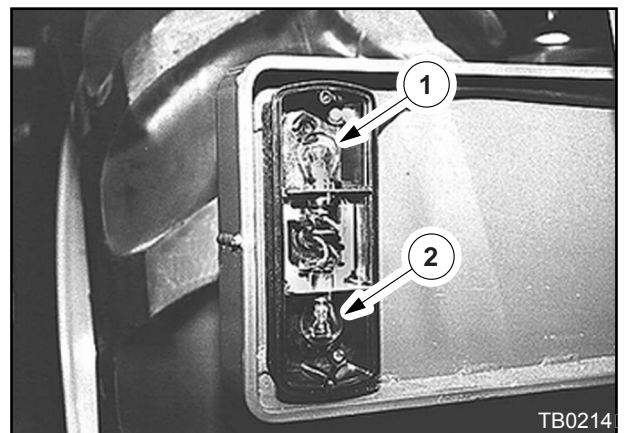
TB0207



TB0213



TB0208



TB0214

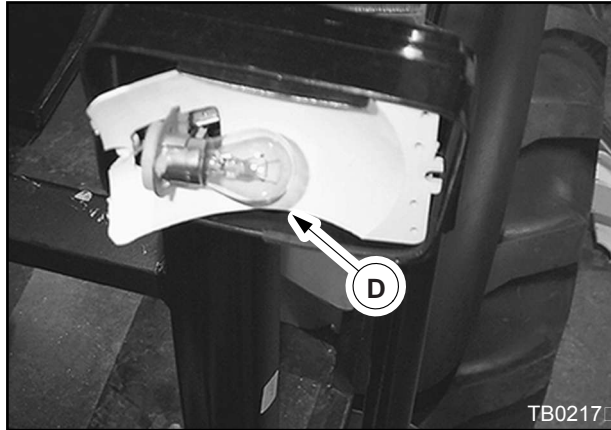
Maintenance

NOTE: Some North American models have rear lights mounted at roof level.

A. Headlight (without cab)

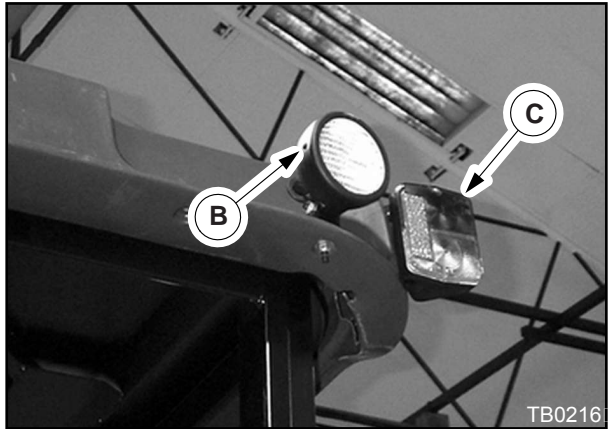


D. Headlight

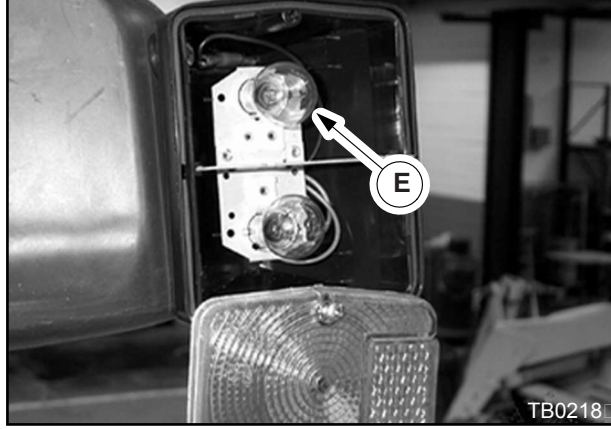


B. Rear additional spotlight

C. Rear light cluster



E. Rear light cluster

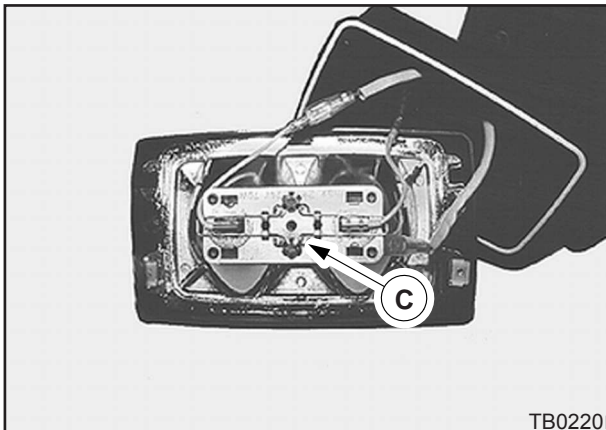
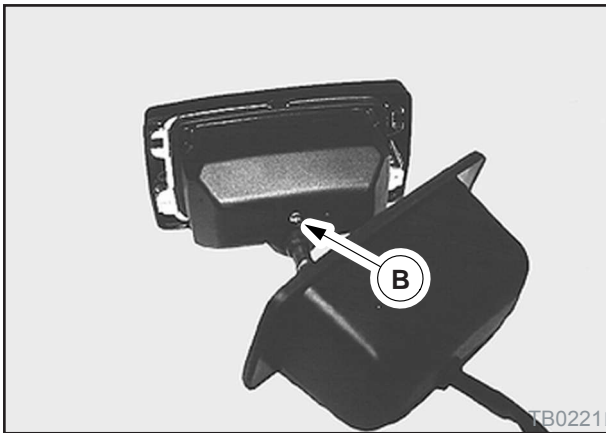
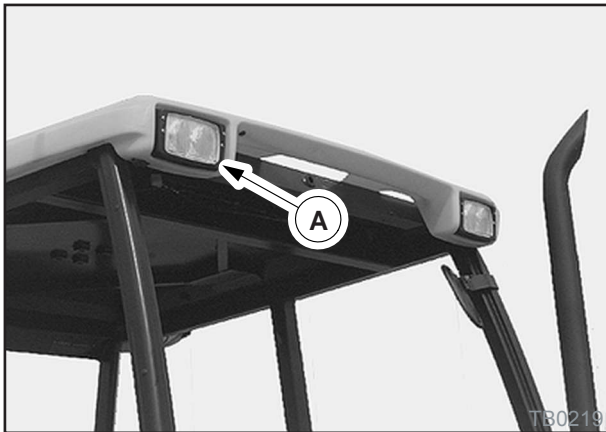


Front working lights

Tool required

One cross-headed screwdriver

1. Remove the two screws (A), remove the retaining frame and remove the light unit (B).
2. Remove the clip (C) and the bulb holder. Remove the bulb and install a bulb of the same wattage (48 W).
3. Install the bulb holder and the clip.
4. Install the light unit. Install the retaining frame and the two screws.

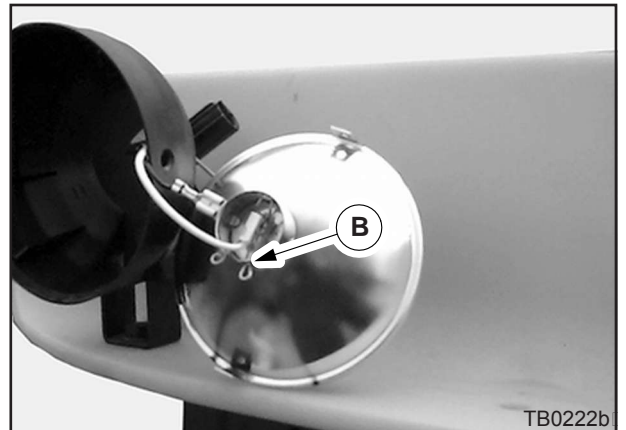
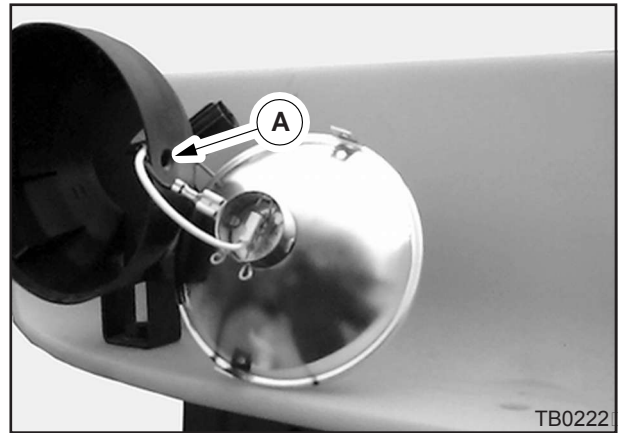


Rear working lights

Tool required

One cross-headed screwdriver

1. Remove the two screws (A) and remove the light unit.
2. Remove the clip (B) and the bulb holder. Remove the bulb and install a bulb of the same wattage (48 W).
3. Install the bulb holder and the clip.
4. Install the light unit. Install the two screws.



Maintenance

Rotating beacon

Tool required

One cross-headed screwdriver

1. Remove the three screws (A) and remove the lens (B).
2. Raise the clip and remove the bulb (C).
3. Replace the bulb by a bulb of the same wattage (55 W).

NOTICE

NOTICE: Never touch a tungsten iodide bulb with your fingers..

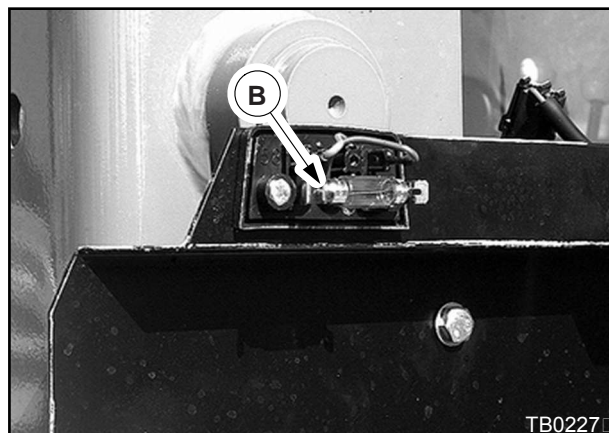
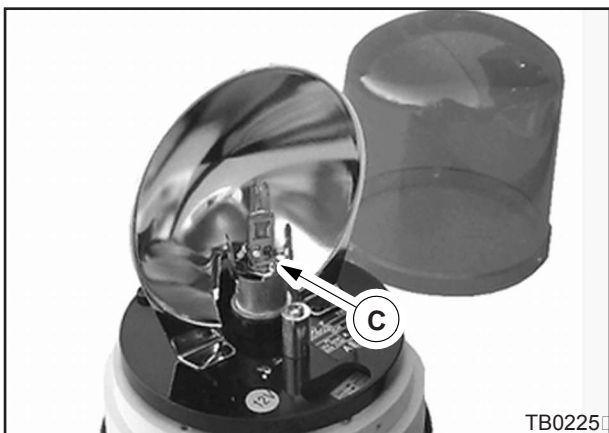
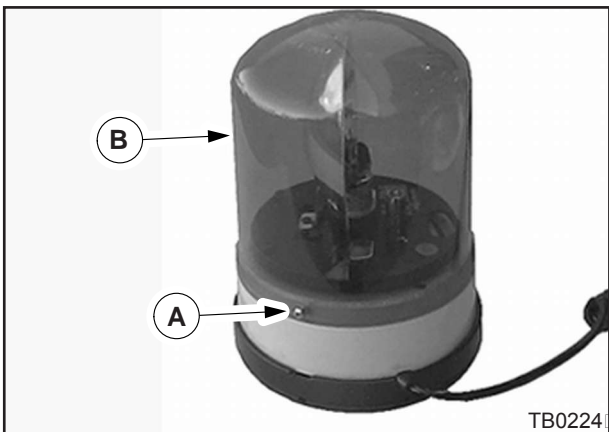
4. Install the lens and its three retaining screws.

Licence plate light (specific to certain countries)

Tool required

One cross-headed screwdriver

1. Remove the screw and the lens (A).
2. Remove the bulb (B) and replace it by a bulb of the same wattage.
3. Install the lens.



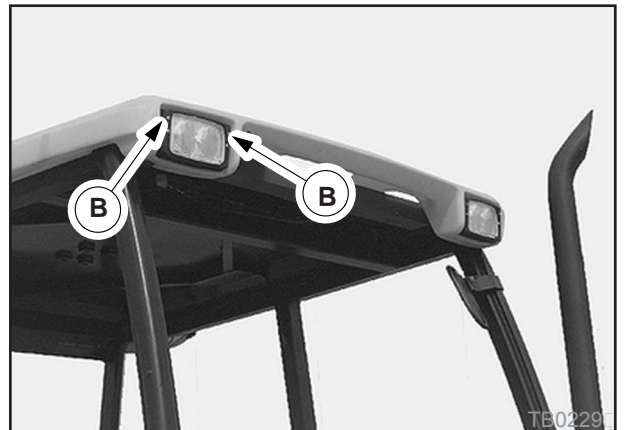
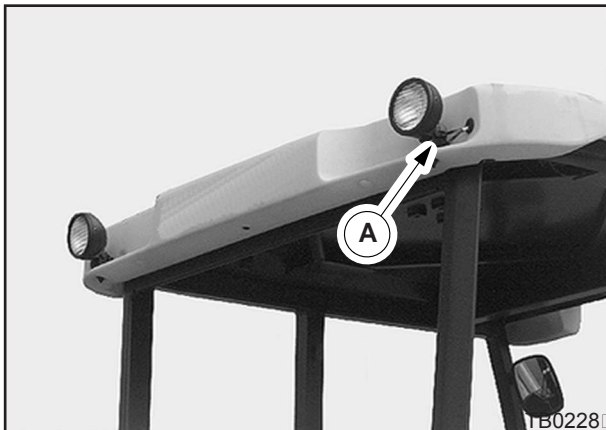
Vertical Adjustment of the Cab-Mounted Front and Rear Working Lights

Rear working lights

Vertical adjustment (A) is carried out manually.

Front working lights

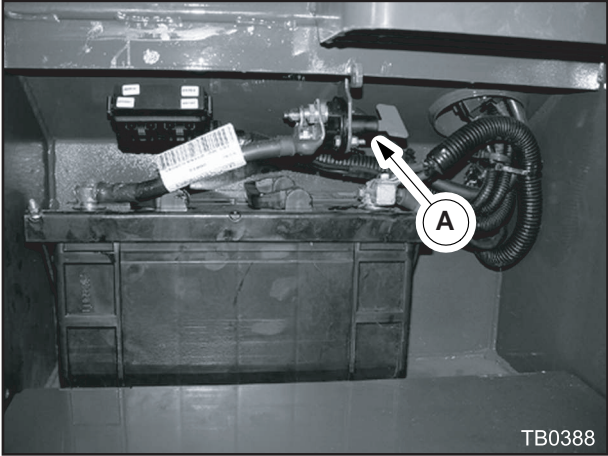
Vertical adjustment is carried out with the two screws (B).



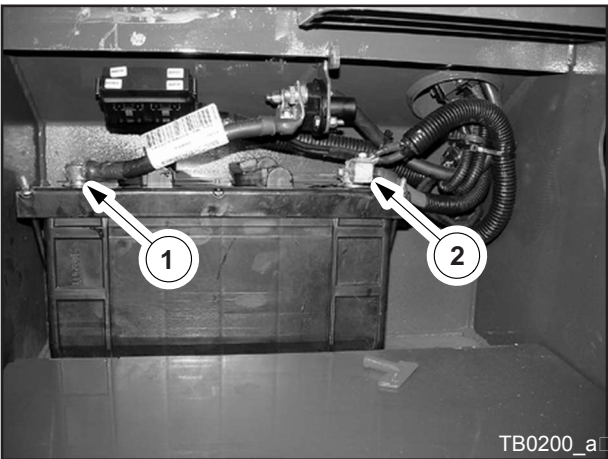
Battery

Replacing a single battery

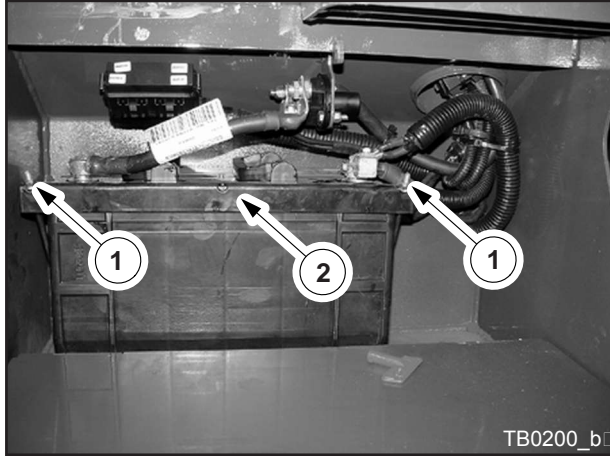
1. Remove the battery master switch key (A) (optional)



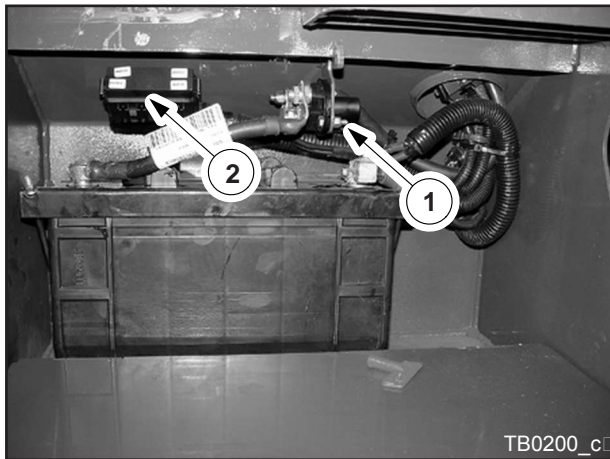
2. Disconnect the battery ground cable (1), then disconnect the battery positive cable (2).



3. Remove the retaining nuts (1) and the clamping bar (2).

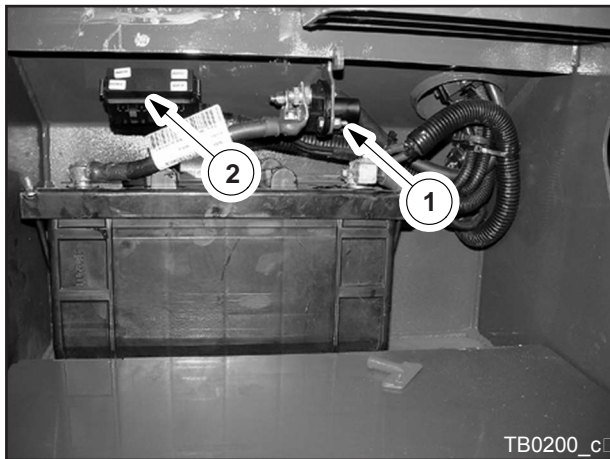


4. Detach the wiring harness (1) and position to one side. Detach the fuse box (2) and remove the battery.



5. Install the new battery.

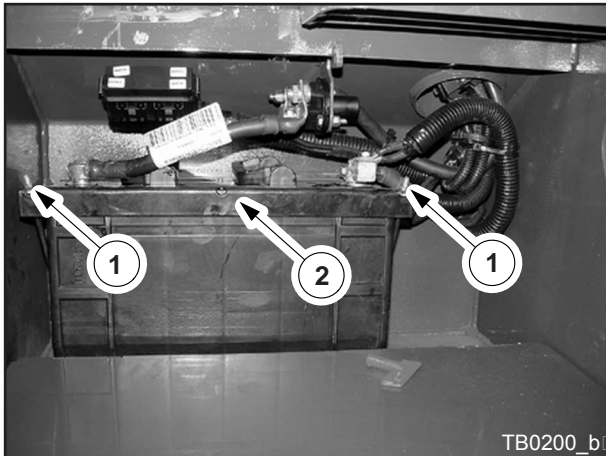
6. Install the fuse box (2). Install the wiring harness (1).



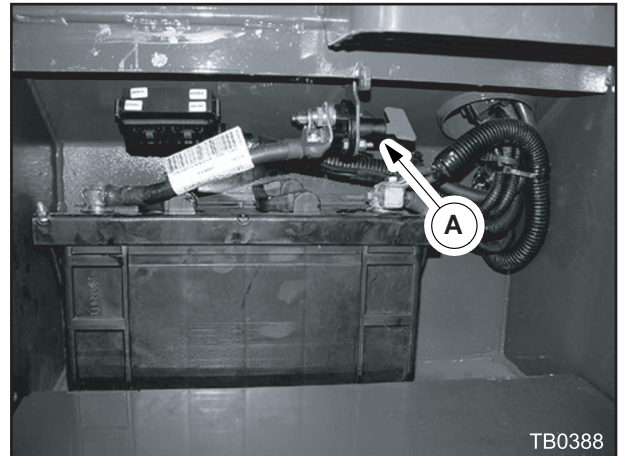
NOTICE

NOTICE: Always disconnect the battery ground cable first.

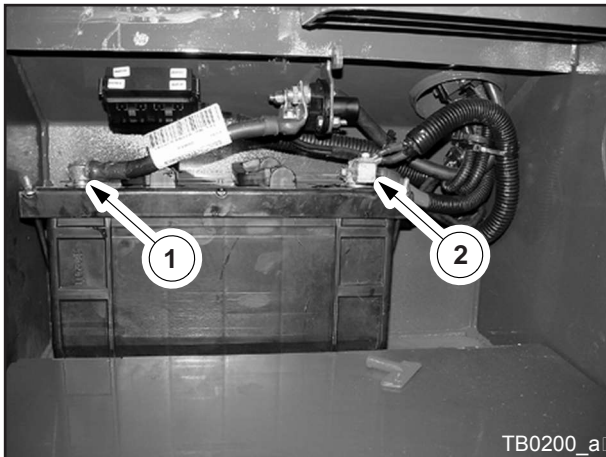
7. Install the clamping bar (2) and the retaining nuts (1).



10. Install the battery master switch key (A) (optional).



- 8. Clean the cables and the connecting terminals and coat them with grease.
- 9. Connect the battery positive cable (1), then the battery ground cable (2).



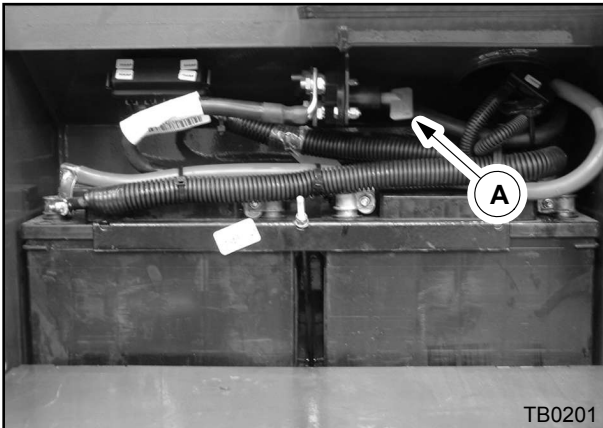
WARNING: Never reverse the battery terminals. Connect the positive cable to the positive terminal (+) and the negative cable to the negative terminal (-).

NOTICE

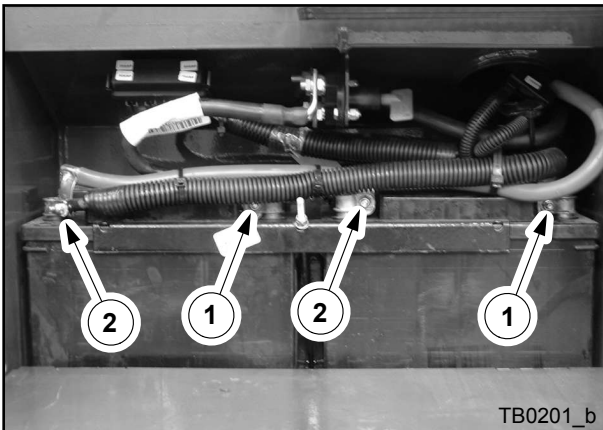
NOTICE: Always connect the battery ground cable last.

Replacing twin batteries

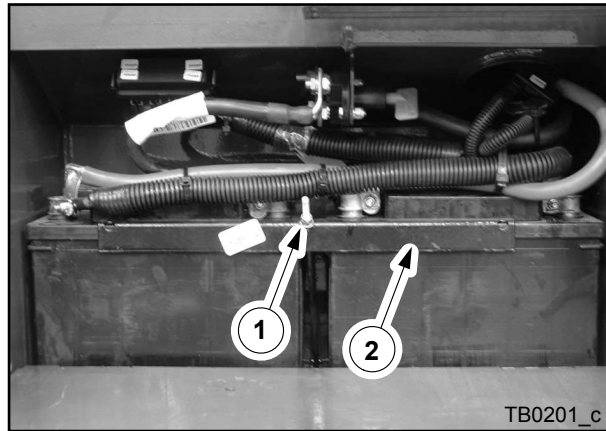
1. Remove the battery master switch key (A) (optional).



2. Disconnect the battery ground cables (1), then disconnect the battery positive cables (2).

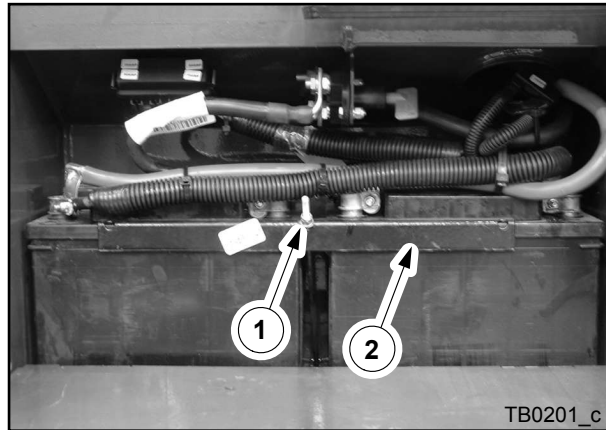


3. Remove the retaining nut (1) and the clamping bar (2). Remove the batteries.



4. Install the new batteries.

5. Install the clamping bar (1) and the retaining nut (2).



NOTICE

NOTICE: Always disconnect the battery ground cable first.

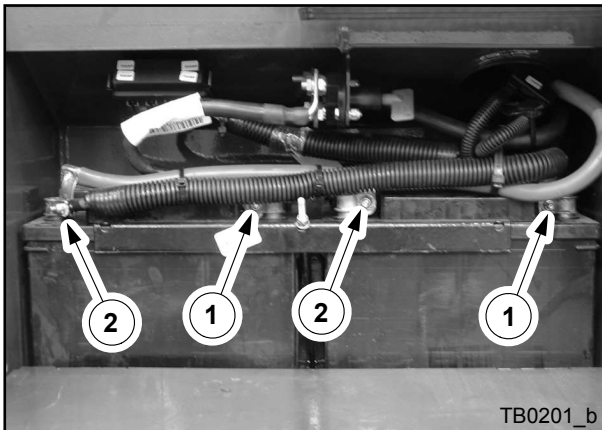


WARNING: Never reverse the battery terminals. Connect the positive cable to the positive terminal (+) and the negative cable to the negative terminal (-).

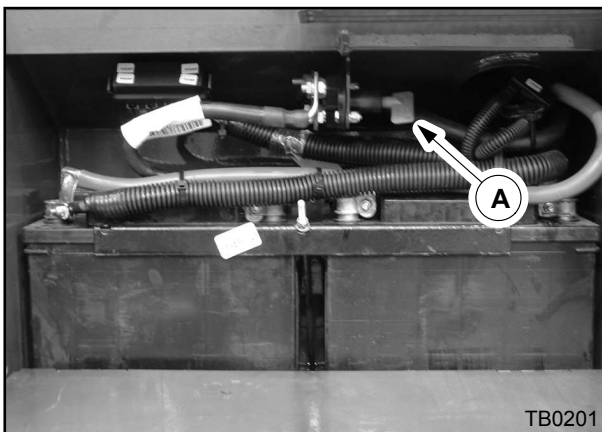
NOTICE

NOTICE: Always connect the battery ground cable last.

6. Connect the battery positive cables (2), then connect the battery ground cables (1).



7. Always connect the battery ground cable last.
8. Install the battery master switch key (A) (optional).



Maintenance

Service Schedule

PAGE	SERVICE POINTS	NO. OF POINTS	INTERVALS IN HOURS				
			CLEAN	REPLACE	CHECK	GREASE	DRAIN
9 - 8	Front axle pivots	1				10	
9 - 10	Loader attachment pivots	14				10	
9 - 11	7 in 1 loader bucket (NOTE 2)	4				10	
9 - 13	Backhoe attachment pivots (Sideshift (offset) backhoe)	23				10	
9 - 16	Backhoe attachment pivots (Centremount (axial) backhoe)	24				10	
9 - 19	Engine oil level	1			10		
9 - 19	Engine coolant level	1			10		
9 - 19	Brake fluid level	1			10		500
9 - 8	Front axle kingpins & rear on 970/980	4				50	
9 - 8	Rear cardan shaft joints	3				50	
9 - 8	Front cardan shaft joints (NOTE 1)	3				50	
9 - 19	Radiator level	1			50		
9 - 19	Hydraulic fluid level	1			50		
9 - 19	Transmission oil level (NOTE 3)	1			50		
9 - 6	Tyres pressure	4			50		
9 - 63	Parking brake	1			50		
9 - 19	Front & rear drive axle universal joints (NOTE 1)	4				250	
9 - 9	Pedal pivots	4				250	
9 - 12	Feedback linkage loader attachment	4				250	
9 - 23	Cooling system hoses and hose clamp tightness	-			250		
9 - 19	Front drive axle oil level (NOTE 1)	1			250		
9 - 19	Front reduction gear oil level (NOTE 3)	2			250		
9 - 19	Rear axle oil level	1			250		
9 - 48	Front axle breather (NOTE 2)	1			250		
9 - 50	Rear axle breather	1			250		
9 - 56	Wheel nut torque setting (NOTE 3)	-			250		
9 - 59	Engine alternator and fan belt (NOTE 3)	1			250		
9 - 61	Compressor lubrication (NOTE 2)	1			250		
9 - 61	Compressor drive belt (NOTE 2)	1			250		
9 - 65	ROPS/FOPS cab	-			250		
9 - 67	Steering system fasteners, ball joints and pivots	-			250		
9 - 67	Power steering system pipes, hose and unions	-			250		
9 - 41	Transmission mounting bolt torque (NOTE 3)	8			250		

PAGE	SERVICE POINTS	NO. OF POINTS	INTERVALS IN HOURS				
			CLEAN	REPLACE	CHECK	GREASE	DRAIN
9 - 41	Transmission oil filter (synchroshuttle and powershuttle) (NOTE 3))	1		500			
9 - 62	Air intake filter cab heater	1	500				
9 - 21	Engine oil (NOTE3) (NOTE4)	1		500			
9 - 22	Engine oil filter	1		500			
9 - 28	Fuel filter	1		500			
9 - 27	Hydraulic brake fluid	2		500			
9 - 33	Hydraulic fluid return filter (NOTE 3)	1		1000			
9 - 34	Intake strainer of hydraulic fluid (NOTE 3)	1	1000				
9 - 35	Hydraulic fluid	1					1000
9 - 37	Air filter primary element	1		1000			
9 - 45	Transmission screen filter (synchroshuttle only) (NOTE 3)	1	1000				
9 - 51	Front drive axle oil (NOTE 1) (NOTE 3)	1					1000
9 - 52	Front reduction gear oil (NOTE 3)	2					1000
9 - 53	Rear drive axle oil (NOTE 3)	1					1000
9 - 53	Rear reduction gear oil (NOTE 3)	2					1000
9 - 25	Engine coolant	1					1yr
9 - 63	Parking brake	1			2000		
9 - 60	Machine inspection and cleaning	-			(1)		
9 - 29	Bleeding the fuel system	1			(1)		
9 - 29	Bleeding the primary water separator	1					(1)
9 - 30	Fuel tank	1					1000
9 - 37	Air intake system (NOTE 3)	-			(1)		
9 - 38	Air filter primary element (NOTE 3)	1	(1)				
9 - 38	Air filter secondary element	1		(1)			
9 - 58	Radiator and oil cooler	-	(1)				
9 - 77	Bucket tooth tightening torque	-			(1)		

NOTE 1: 4 wheel drive machine.

NOTE 2: If equipped.

NOTE 3: After the first 50 hours during the running-in period.

NOTE 4: Reduce the service interval to 250 hours if the percentage of sulphur in the fuel is above 0.2%.

(1) As required

Storing the Machine

Preparation for storage

If the machine is to remain unused for a period exceeding 30 days, store it under cover or cover it with a waterproof tarpaulin.

1. Clean the machine.
2. Grease all the machine's grease fittings.
3. Raise the wheels off the ground and put suitable axle stands under the front and rear axles in order to keep the wheels clear off the ground.
4. Drain the fuel tank.
5. Pour about 8 litres of rinsing fuel in the fuel tank. Run the engine until the exhaust smoke is a bluish white colour.
6. Place a tablespoonful of Shell Oil Company VPI crystals (or equivalent) in the fuel tank.
7. Operate all the hydraulic controls to release pressure in the hydraulic circuits. See "Releasing the Pressure in the Hydraulic System" section on page 9-31.
8. Drain the engine oil and replace the oil filter. Fill the engine with the correct specification oil.
9. Drain the cooling system. Do not tighten the radiator cap. Place a "Do not start up" label on the instrument panel.
10. Clean or replace the air filter elements.
11. Coat the exposed portions of the cylinder rods and control valve spools with grease.
12. Paint all parts of the machine where the paint has been damaged.
13. Charge the battery. Remove it from the machine and place it on a wooden pallet in a cool, dry place. If possible, store it in a building where the temperature is above 0°C. Make sure the battery is clean.
NOTE: This battery does not need the addition of distilled water
14. Store the machine under a water-proof cover.

Starting up after storage



WARNING: Check the machine for leaks and for broken, defective or missing parts.



WARNING: Before starting the engine, make sure all the controls are in the neutral position. This will prevent any unexpected movement of the machine and of any electrical equipment.



WARNING: Avoid running the engine in an enclosed space. Ensure adequate ventilation at all times.

Do not start the engine before carrying out the following operations :

1. Replace the fuel filter.
2. Fill the engine cooling system with engine coolant.
3. Check the condition of the alternator belt. Replace it if necessary.
4. Check the engine oil level.
5. Check the brake fluid level.
6. Check the hydraulic fluid level.
7. Check the transmission oil level.
8. Check the oil levels in the rear axle.
9. Check the oil levels in the front drive axle and reduction gears (4 Wheel drive).
10. Grease all the machine's linkages.
11. Remove the anti-corrosion product from the hydraulic cylinder rods.
12. Install the battery.
13. Fill the fuel tank.
14. Bleed air from the fuel supply system.
15. Check the condition and pressure of the tyres.
16. Check and if necessary bleed the braking system. (consult your local dealer)
17. Start the engine.
18. Raise the machine
19. Remove the axle stands from under the axles. Lower the machine.

Scrapping the machine



At the end of its life the machine should be disassembled by a competent person using safe working practices, wearing the appropriate Personal Protective Equipment and working in accordance with local regulations.

The appropriate lifting equipment, chocks and stands must be used to maintain a stable machine as components are removed and the machine's centre of mass changes.

Care must be taken when dealing with flammable liquids and the machine parts that contained those liquids. Any process that could ignite flammable materials must not be used on components that have contained flammable liquids in them or have residual flammable liquids on them.

Fire extinguishers must be readily available if cutting/welding equipment is to be used.

Fluids must be drained off into suitable containers and if possible recycled or otherwise disposed of in an environmentally friendly way in accordance with local regulations.

Where possible recyclable materials should be separated out and processed in accordance with local regulations using an authorised agent.

10 - Specifications

820

860/880 SX & ELITE

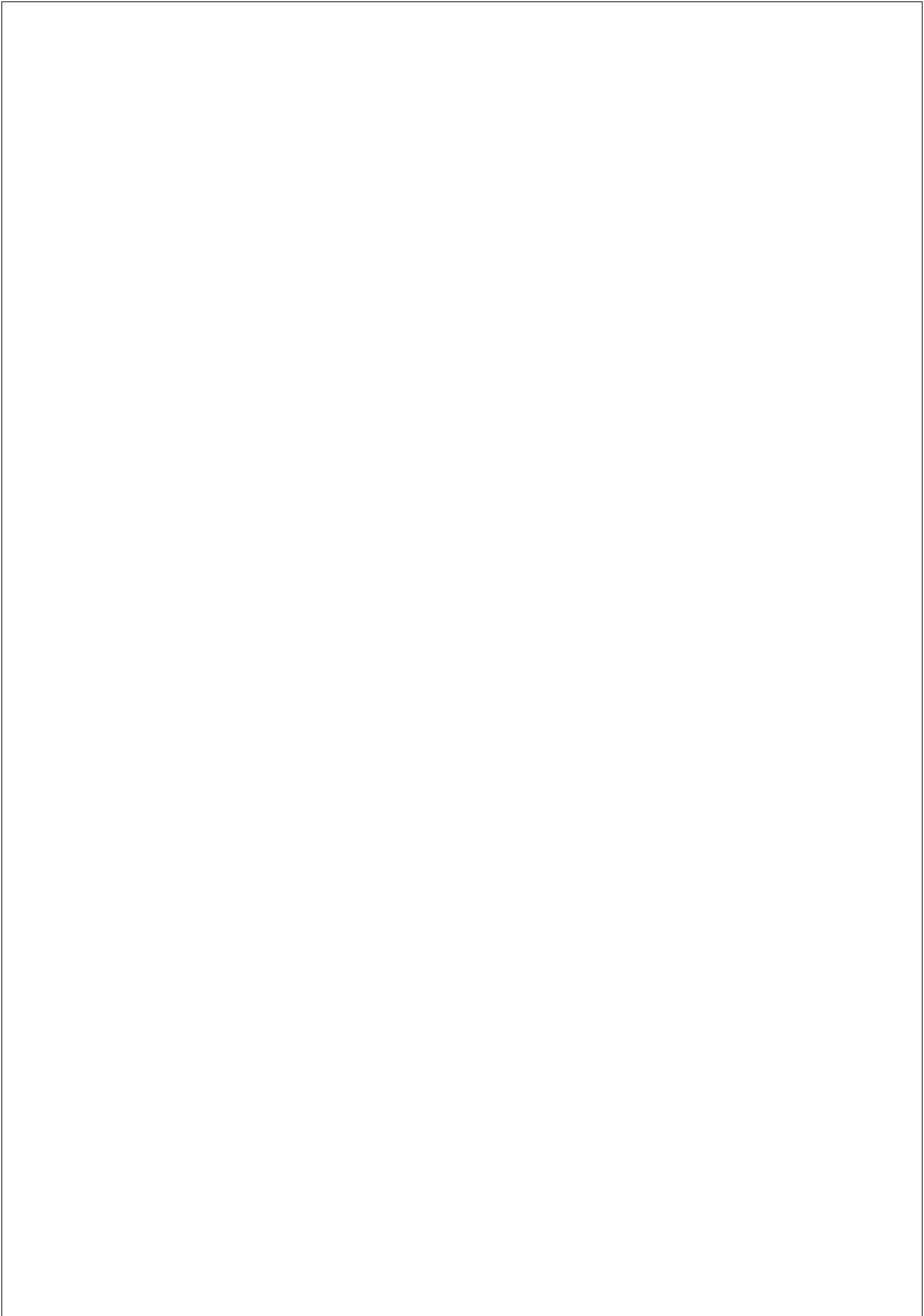
970/980 ELITE

TX760B

TX860B

TX970B

Backhoe Loader



Engine

	760 / 820	860 / 870 / 880 / 970 / 980
Make and type	PERKINS 1104D-44T	PERKINS 1104D-44T
Displacement	4.4 litres	4.4 litres
Number of cylinders	4	4
Bore and stroke	105 x 127 mm	105 x 127 mm
Aspiration	Turbo charged	Turbo charged
Injection system	Direct	Direct
Air filter	Dry type - two stage - restriction indicator	Dry type - two stage - restriction indicator
Oil filter	Screw-on cartridge, total flow type	Screw-on cartridge, total flow type
Compression ratio	18.23:1	18.23:1
ISO/TR14396 maximum horsepower (*Nominal non-certified value)	70 kW (94 hp*) @ 2200 rpm	74.5 kW (100 hp*) @ 2200 rpm
ISO/TR14396 maximum torque (*Nominal non-certified value)	392 Nm @ 1400 rpm	392 Nm @ 1400 rpm

Electrical System

System voltage	Battery (single)	Battery (double)	Alternator Standard
12 Volts (Negative ground)	12 Volts (90 amp/h)	12 Volts (70 amp/h)	100 amp

Cab

ROPS and FOPS type (with protection against rolling over and falling objects).

Tinted safety glass – wide glazed surface giving total visibility.

Operator's seat with adjustable suspension. Class III as per 1980 ISO/DIS 7096.

Fresh air heater/blower unit, full heating control including demist on front and rear windows.

Optional air conditioning.

Specifications

Transmission

Torque converter

Two phase, single-stage

Stall ratio - Synchroshuttle	3.01:1
Stall Ratio - DANA Powershift	2.60:1
Stall ratio - Carraro - Powershuttle	3.01:1

Gearbox

Synchroshuttle only

Type: Direction of travel control with 4 synchronised gears.

4 forward and 4 reverse gears (Specific to certain countries, the 4th gear is not fitted).

Electrical transmission cut-out using push button on the gear change lever or on the loader attachment control lever.

Dana Powershift only

Type: Direction of travel control with 4 powershift gears.

4 forward and 2 reverse gears (Specific to certain countries, the 4th gear forward and 3rd gear reverse are not fitted).

Semi-automatic feature on 2nd - 4th gears.

Kickdown button provides instant kick down from 2nd to 1st gear to increase tractive push.

Carraro Powershuttle only

Type: Direction of travel control with 4 powershift gears.

4 forward and 3 reverse gears (Specific to certain countries, the 4th gear is not fitted).

Semi-automatic feature on 2nd - 4th gears.

Kickdown button provides instant kick down from 2nd to 1st gear to increase tractive push.

Travel speed

	Models: 760/820/860/870/880								Models 970/980 (4WS)	
Tyre size	19.5 x 24		18.4 x 26		116.9 x 28		16.9 x 30		16.9 x 24	
Gear	kph	m.p.h.	kph	m.p.h.	Kph	m.p.h.	Kph	m.p.h.	k.p.h	m.p.h
1	5.5	3.4	5.9	3.7	5.8	3.6	6.1	3.8	5.6	3.5
2	8.8	5.5	9.5	5.9	9.4	5.8	9.9	6.1	9.0	5.6
3	19.3	12.0	20.9	13.0	20.6	12.8	21.7	13.4	19.8	12.3
4	38.5	22.7	39.6	24.6	39.1	24.3	41.0	25.6	39.5	24.5
R1	5.5	3.4	5.9	3.7	5.8	3.6	6.1	3.8	5.6	3.5
R2	8.8	5.5	9.5	5.9	9.4	5.8	9.9	6.1	9.0	5.6
R3	19.3	12.0	20.9	13.0	20.6	12.8	21.7	13.4	19.8	12.3
R4 (SS only)	38.5	22.7	39.6	24.6	39.1	24.3	41.0	25.6	-	-

Specifications

Powershift (Dana) - 4 Forward - 2 Reverse

Tyre size	Models: 860/870/880 (2WS)						Models: 970/980 (4WS)	
	16.9 x 30		19.5L x 24		18.4 x 26		16.9 x 24	
Gear	kph	m.p.h.	kph	m.p.h.	Kph	m.p.h.	Kph	m.p.h.
1	6.0	3.7	5.3	3.3	5.8	3.6	6.2	8.7
2	11.3	7	10.0	6.2	10.9	6.8	11.6	7.2
3	21.5	13.4	19.0	11.8	20.8	12.9	21.0	13.0
4	40.7	25.3	34.0	21.1	37.2	23.1	39.7	24.7
R1	-7.1	-4.4	-6.3	-3.9	-6.9	-4.3	-7.3	-4.5
R2	-14.2	-8.8	-12.7	-7.9	-13.9	8.6	-14.8	-9.2

NOTICE

NOTICE: *Specific to certain countries, the 4th gear is inoperable in forward and reverse.*

Powershift (Carraro) - 4 Forward - 3 Reverse

Tyre Size	Models: 860/870/880 (2WS)			
	16.9 x 30		18.4 x 26	
Gear	kph	m.p.h.	Kph	m.p.h.
1	6.0	3.8	5.9	3.6
2	9.9	6.2	9.7	6.0
3	21.8	13.5	21.9	13.2
4	41.2	25.6	40.0	24.9
R1	-6.0	-3.8	-5.9	-3.6
R2	-9.9	-6.2	-9.7	-6.0
R3	-21.8	-13.5	-21.9	-13.2

NOTICE

NOTICE: *Specific to certain countries, the 4th gear is inoperable in forward and reverse.*

Axles

Fixed rear axle

760/820/860/870/880 only

Includes: differential with full differential lock, planetary reduction gears and oil-immersed disc brakes.

970/980 only

Spiral bevel crown wheel and pinion driving oil immersed disc brakes through axle-end epicyclic hubs.

Oscillating front axle (4WD)

All models

Spiral bevel crown wheel and pinion driving through axle-end epicyclic hubs.

Specifications

Tyres

760/820/860/870/880 only

	Dimensions and type	Inflation pressure	
		bar	lbf/in ²
Front	Terex 12.5/80 x 18, 12P, TR-09, Ind.	3.7	54
Front	Terex 12.5/80 x 18, 10P, MPT-01, Ag.	3.7	54
Front	Firestone 12.5 x 18, 10P, R4, Ind.	3.0	44
Front	Terex 16/70 x 20, 14P, TR-09, Ind.	3.4	49
Front	Terex 405/70 x 20, 14P, MPT-01, Ag.	3.4	49
Rear	Terex 19.5L x 24, 12P, TI-05, Ind.	2.1	30
Rear	Barum 18.4 x 26, 12P, TZ-09, Ag.	1.8	26
Rear	Terex 16.9 x 28, 12P, TI-06, Ind.	2.5	36
Rear	Terex 16.9 x 30, 14P, TI-09, Ind.	2.8	41

970/980 only

Location	Dimensions and type	Inflation pressure	
		Bar	lbf/in ²
Front	Terex 16.9 x 24, 12P, TI-04, Ind	2.6	38
Rear	Terex 16.9 x 24, 12P, TI-04, Ind	2.6	38
Front	Nokian 16.9 x 24, Rad, TR1, Chev.	1.8	26
Rear	Nokian 16.9 x 24, Rad, TR1, Chev.	2.6	38
Front	Michelin 17.5 x 24, Rad, M27, Ag.	2.5	36
Rear	Michelin 17.5 x 24, Rad, M27, Ag.	2.5	36

Wheel Tightening Torque

Front wheel nuts (820/860/880 only)	300 Nm (220 lbf ft)
Front wheel nuts (970/980 only)	600 Nm (440 lbf ft)
Rear wheel nuts (all models)	600 Nm (440 lbf ft)

Brakes

Service brakes

The oil-immersed disc brakes are mounted inboard, on the rear drive shafts. Hydraulic operation by conventional brake pedal master cylinders, incorporating independent and compensating functions for site and highway use.

Parking or emergency brake

Hand-lever and cables operated through a totally separate mechanical system to directly operate a large calliper type disc brake.

Steering

Type	Hydrostatic
Pressure	175 bar (2540 lbf/in ²)

Turning circle

760/820 only (Tyres: 12.5/80x18 front, 18.4x26 rear)

	4WD Engaged		4WD Disengaged	
	RH Lock	LH Lock	RH Lock	LH Lock
Between kerbs, no brakes	9.3 m (30'5")	9.2 m (30'2")	8.2 m (26'9")	8.15 m (26'7")
Between kerbs, with brakes	8.3 m (27'2")	7.8 m (25'6")	7.1 m (23'3")	6.9 m (22'6")
Between walls, no brakes	11.95 m (39'2")	11.7 m (38'4")	10.95 m (35'9")	10.9 m (35'8")
Between walls, with brakes	10.4 m (34'1")	10.6 m (34'8")	10.3 m (33'8")	9.8 m (32'2")

860/870/880 only (Tyres: 16/70x20 front, 16.9x20 rear)

	4WD Engaged		4WD Disengaged	
	RH Lock	LH Lock	RH Lock	LH Lock
Between kerbs, no brakes	9.05 m (29'7")	9.0 m (29'5")	7.95 m (26'1")	8.0 m (26'2")
Between kerbs, with brakes	7.2 m (23'6")	7.25 m (23'8")	7.07 m (23'2")	7.07 m (23'2")
Between walls, no brakes	11.45 m (37'6")	11.42 (37'5")	10.55 m (34'6")	10.65 m (34'9")
Between walls, with brakes	9.74 m (32')	9.79 m (32'1")	9.87 m (32'4")	9.87 m (32'4")

Specifications

970/980 only (Tyres: 16.9x24 front & rear)

Two wheel steer mode

	4WD Engaged		4WD Disengaged	
	RH Lock	LH Lock	RH Lock	LH Lock
Between kerbs, no brakes	11.63 m (38'2")	12.08 m (39'6")	11.07 m (36'3")	11.44 m (37'5")
Between kerbs, with brakes	8.67 m (28'4")	8.66 m (28'4")	9.21 m (30'2")	9.31 m (30'5")
Between walls, no brakes	13.55 m (44'5")	13.96 m (45'8")	13.07 m (42'9")	13.48 m (44'2")
Between walls, with brakes	10.79 m (35'4")	10.8 m (35'4")	11.53 m (37'8")	11.55 m (37'9")

Four wheel steer mode

	4WD Engaged		4WD Disengaged	
	RH Lock	LH Lock	RH Lock	LH Lock
Between kerbs, no brakes	7.33 m (24')	7.44 m (24'4")	7.24 m (23'8")	7.48 m (24'5")
Between kerbs, with brakes	6.72 m (22')	6.69 m (21'9")	6.67 m (21'9")	6.77 m (22'2")
Between walls, no brakes	9.53 m (31'3")	9.56 m (31'4")	9.26 m (30'4")	9.48 m (31'1")
Between walls, with brakes	8.84 m (29')	8.85 m (29')	8.93 m (29'3")	9.07 m (29'8")

Hydraulic System

Pump (760/820)

Two gear pumps in tandem

Combined flow	140 L/min. (37.2 US Gal) at 2200 rpm and MRV at 225 bar
First pump	80 L/min. (21.0 US Gal) at 2200 rpm and MRV at 225 bar
Second pump	60 L/min. (16.5 US Gal) at 2200 rpm and MRV at 225 bar

Pump (860/870/880/970/980)

Two gear pumps in tandem

Combined flow	160 L/min. (42.0 US Gal) at 2200 rpm and MRV at 225 bar
First pump	80 L/min. (21.0 US Gal) at 2200 rpm and MRV at 225 bar
Second pump	80 L/min. (21.0 US Gal) at 2200 rpm and MRV at 225 bar

Loader control valve

Three spool closed centre valve, incorporating circuit relief valves for bucket and lift services. Single lever operation of bucket and lift spools, plus a third spool for attachments, such as clamshell bucket.

Maximum working pressure	225 – 0/+7 bar
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Backhoe control valve

The backhoe control valve is a closed centre seven spool sectional valve. The seven spool controlling the digging functions through two control levers. Circuit relief valves protect the boom, dipperstick, bucket, swing, extendable dipperstick and auxiliary circuits.

There are two additional levers for operating the stabiliser spools.

Solenoid valves operate the sideshift clamp, (sideshift backhoe), optional craning valve (centremount backhoe) and optional digger bucket quick attach.

A separate foot pedal is used to operate a spool for the optional extendable dipperstick or auxiliary circuit.

A solenoid operated changeover valve is used to divert hydraulic flow to either the extendable dipperstick or the auxiliary circuit.

Maximum working pressure	225 – 0/+7bar
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Servo backhoe control valve

The servo backhoe control valve is a closed centre seven spool sectional valve. Four of the seven functions: Boom, dipper, slew and bucket are controlled by two servo joysticks. Stabiliser, dipperstick and auxiliary functions are controlled by additional levers and a foot pedal, connected by mechanical linkages.

Servo pressure to the joysticks is supplied by an additional pilot generating valve. This supplies a constant low pressure supply to the joysticks.

Maximum working pressure	225 – 0/+7bar
Pilot pressure	Max 35 bar

Filtration

On return circuit, by 10 micron interchangeable cartridge-type filter.

Specifications

Noise Emissions

Model	Declared Single-Number Noise Emission Values to ISO 4871	
	A- rated sound pressure level at operator station	A - rated sound power of machine
	L_{pAd}	L_{WA_d}
860/880/970/980 with cab	78dB	103dB
760/820 with cab	78dB	102dB

Vibrations:

	Operation	Value	Uncertainty
Hand Arm Vibration as defined in EN474-1	All operations	$<2.5m/s^2$	N/A
Whole body vibration values as defined in ISO/TR 25398	Load and carry motion	0.825rms	0.412m/s ²
	V-Shaped motion	0.811rms	0.405m/s ²
	Excavating	0.249rms	N/A
	Transfer movement	0.740rms	0.370m/s ²

Note: these values are for guidance only. Actual work site, operation and operator characteristics will have a large influence on actual values for specific circumstances.

Capacities

Fuel tank	130 ltr (34.3 US Gal)
Hydraulic reservoir	85 ltr (22.4 US Gal)
Engine (with filter)	7.3 ltr (1.9 US Gal)
Front drive axle (820/860/880 only)	6.5 ltr (1.7 US Gal)
Front axle reduction gear (each) (820/860/880 only)	1.0 ltr (0.3 US Gal)
Front drive axle (970/980 only)	7.5 ltr (2.0 US Gal)
Front axle reduction gear (each) (970/980 only)	1.0 ltr (0.3 US Gal)
Rear axle (820/860/880 only)	14.5 ltr (3.8 US Gal)
Rear axle (970/980 only)	14.5 ltr (3.8 US Gal)
Rear axle reduction gear (each) (970/980 only)	1.5 ltr (0.4 US Gal)
Transmission (Synchroshuttle only)	22 ltr (5.8 US Gal)
Transmission (Dana Powershift only)	23 ltr (6.1 US Gal)
Transmission (SPS Powershuttle only)	20 ltr (5.2 US Gal)
Transmission (Carraro Powershuttle only)	20 ltr (5.2 US Gal)
Cooling system	16 ltr (4.2 US Gal)
Brake reservoir	225cc (13.7in ³)

Specifications

Buckets

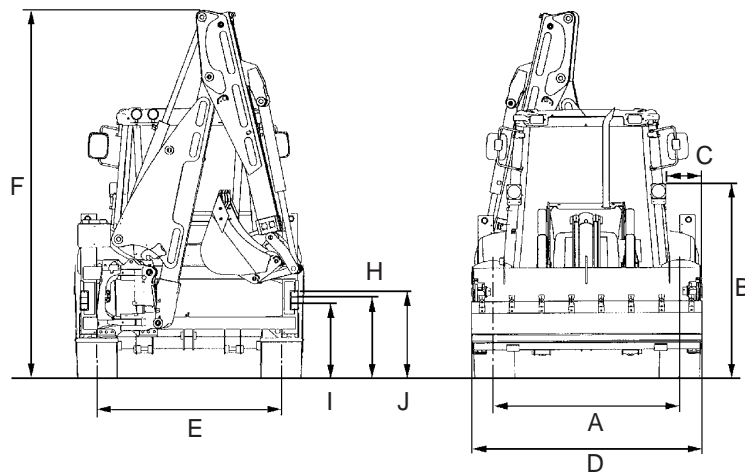
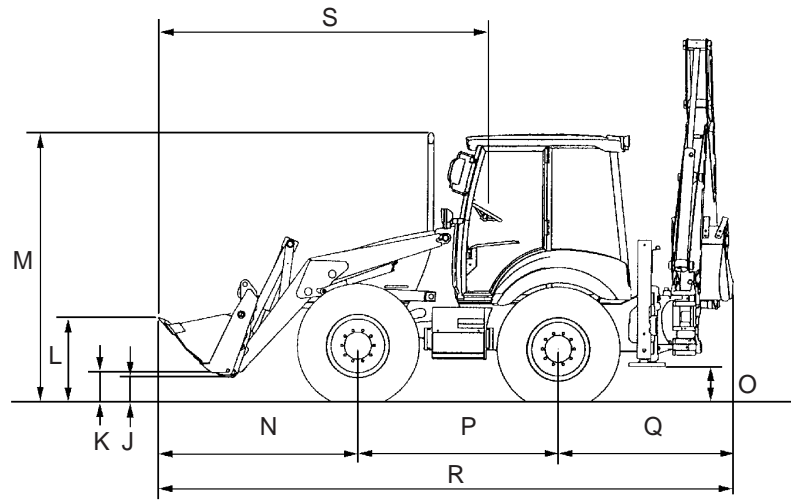
Loader

Type	Width	SAE Capacity
Standard	2386 mm (94 inch)	1.2 m ³ (1.6 yd ³)
	2310 mm (91 inch)	1.0 m ³ (1.3 yd ³)
Multi-purpose	2310 mm (91 inch)	1.0 m ³ (1.3 yd ³)
	2386 mm (94 inch)	1.2 m ³ (1.6 yd ³)

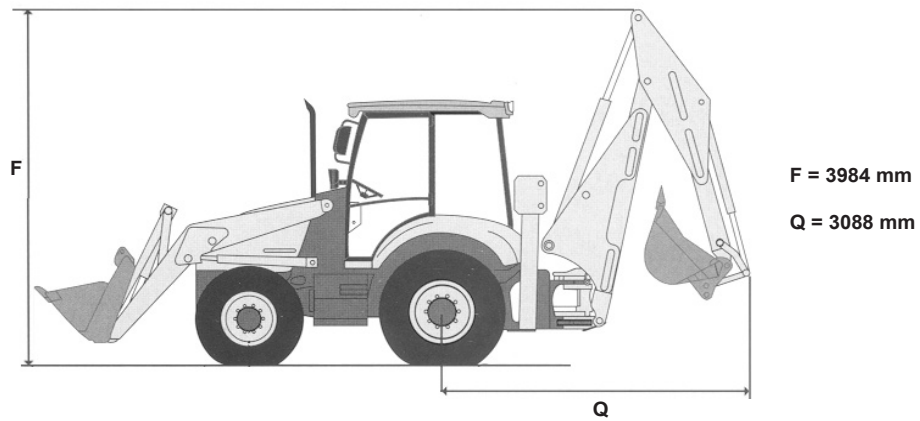
Backhoe

Type	Width	SAE Capacity
High capacity	600 mm (24 inch)	0.213 m ³ (0.233 yd ³)
Standard Capacity	305 mm (12 inch)	0.076 m ³ (0.083 yd ³)
	450 mm (18 inch)	0.113 m ³ (0.124 yd ³)
	600 mm (24 inch)	0.168 m ³ (0.184 yd ³)
	750 mm (30 inch)	0.227 m ³ (0.248 yd ³)
	900 mm (36 inch)	0.286 m ³ (0.312 yd ³)

General Dimensions and Weights



NOTE: Dimensions F and Q are different on models with Centremount backhoe



Maximum authorised weight: 8,700 Kg (19,140 lb)

Specifications

760/820/860/870/880 only

See "General Dimensions and Weights" section on page 10-13

Some dimensions will differ according to different tyre sizes, tyre pressures and loader bucket specifications

Backhoe bucket		300 mm	600 mm	900 mm
Wheel combination		18.4x26 12P 16/70x20 14p	16.9x30 14P 16/70x20 14p	16.9x30 14P 16/70x20 14p
A	(Front wheel track)	1788	1788	1788
B	(Front light vertical location)	1997	1998	1998
C	(Front light horizontal location)	372	372	372
D	(Machine max. width)	2386	2386	2386
E	(Rear wheel track)	1716	1770	1770
F	(Machine max. height)	3778	3812	3812
G	(Rear indicator vertical location)	893	928	928
H	(Rear reflector vertical location)	829	864	864
I	(Brake/rear light location)	772	807	807
J	(Lowest implement height)	250	250	250
K	(Transport position height)	300	300	300
L	(Bucket tip height (MP))	869	869	869
M	(Height to top of exhaust)	2799	2807	2807
N	(Front overhang)	2116	2116	2116
O	(Minimum machine height)	375	410	410
P	(Wheelbase)	2130	2130	2130
Q	(Rear overhang)	1751	1823	1971
R	(Overall machine length)	5957	6029	6177
S	(German bucket transport limit)	3459	3459	3459

970/980 only

(See "General Dimensions and Weights" section on page 10-13)

Some dimensions will differ according to different tyre sizes, tyre pressures and loader bucket specifications

Backhoe bucket		300 mm	600 mm	900 mm
Wheel combination		16.9x24 12P 16.9x24 12P	16.9x24 12P 16.9x24 12P	16.9x24 12P 16.9x24 12P
A	(Front wheel track)	1902	1902	1902
B	(Front light vertical location)	1997	1997	1997
C	(Front light horizontal location)	372	372	372
D	(Machine max. width)	2386	2386	2386
E	(Rear wheel track)	1902	1902	1902
F	(Machine max. height)	3778	3778	3778
G	(Rear indicator vertical location)	893	893	893
H	(Rear reflector vertical location)	829	829	829
I	(Brake/rear light location)	772	772	772
J	(Lowest implement height)	250	250	250
K	(Transport position height)	300	300	300
L	(Bucket tip height (MP))	869	869	869
M	(Height to top of exhaust)	2799	2799	2799
N	(Front overhang)	2122	2122	2122
O	(Minimum machine height)	375	375	375
P	(Wheelbase)	2090	2090	2090
Q	(Rear overhang)	1823	1751	1971
R	(Overall machine length)	6035	5963	6183
S	(German bucket transport limit)	3465	3465	3465

Specifications

Fluids and Lubricants

Fluids and lubricants must have the correct properties for each application.



WARNING - It is mandatory to observe the instructions for use of the various fluids and lubricants.

Hydraulic fluid

Hydraulic fluid is specially designed for high pressure applications and for hydraulic system. The type of fluid to be used depends upon the ambient temperature.

Temperate climates

Up to +30°C (86°F)

Fluid type: ISO VG 46

Hot climates

Up to +50°C (122°F)

Fluid type: ISO VG 68

Brake fluid - 'Safim' Brake System Only

Type of oil to be used: Mobiloil LHM (Mineral brake fluid)

Transmission component oil

Synchroshuttle

- Texamatic 7045E
- ATF Type A Suffix A
- Dextron II D
- Dextron III G
- Allison C4

Powershuttle

- Texamatic 7045E
- ATF Type A Suffix A
- Dextron II D
- Dextron III G
- Allison C4

Grease

General:

Extreme pressure grease EP NLGI grade 2.

Components

- Backhoe swing
- Prop. shafts
- Drive shafts U.J.

- Axle(s) king pins

Extreme pressure grease EP NLGI grade 2 with molybdenum disulphide.

Rear axle oil

Type of oil to be used: API GL4 grade 80W

Front axle oil (4 Wheel drive)

Type of oil to be used: API GL5 grade 80W-90

Engine oil

The engine oil to be used depends on the ambient temperature.

NOTICE

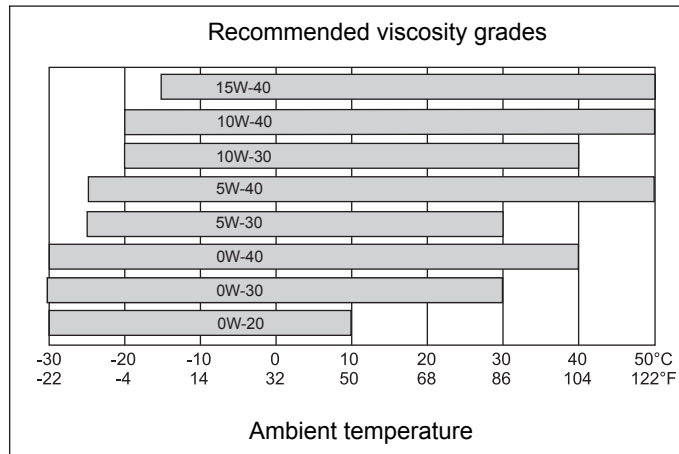
NOTICE: Do not put any performance additive or other additive in the sump. Oil change intervals shown in this manual are based on tests carried out on lubricants

Lubrication oil specification

Always make sure that the correct viscosity grade of lubricating oil is used for the ambient temperature range in which the engine will run as shown in the chart (A).

Use only a good quality lubricating oil to the minimum specification of:

- ENA DHD-1 Multigrade (preferred oil)
- API CH-4 Multigrade (preferred oil)
- ACEA E3
- API CG-4
- ACEA E5



Specifications

Coolant specification

The quality of the coolant that is used can have a great effect on the efficiency and life of the cooling system. The recommendations indicated below can help to maintain a good cooling system and to protect it against frost and/or corrosion.



CAUTION: An anti-freeze which contains the correct inhibitor must be used at all times to prevent damage to the engine by corrosion, because of the use of aluminium in the coolant circuit.

NOTICE

NOTICE: If frost protection is not necessary, it is still extremely important to use an approved anti-freeze mixture because this gives a protection against corrosion and also raises the boiling point of the coolant.

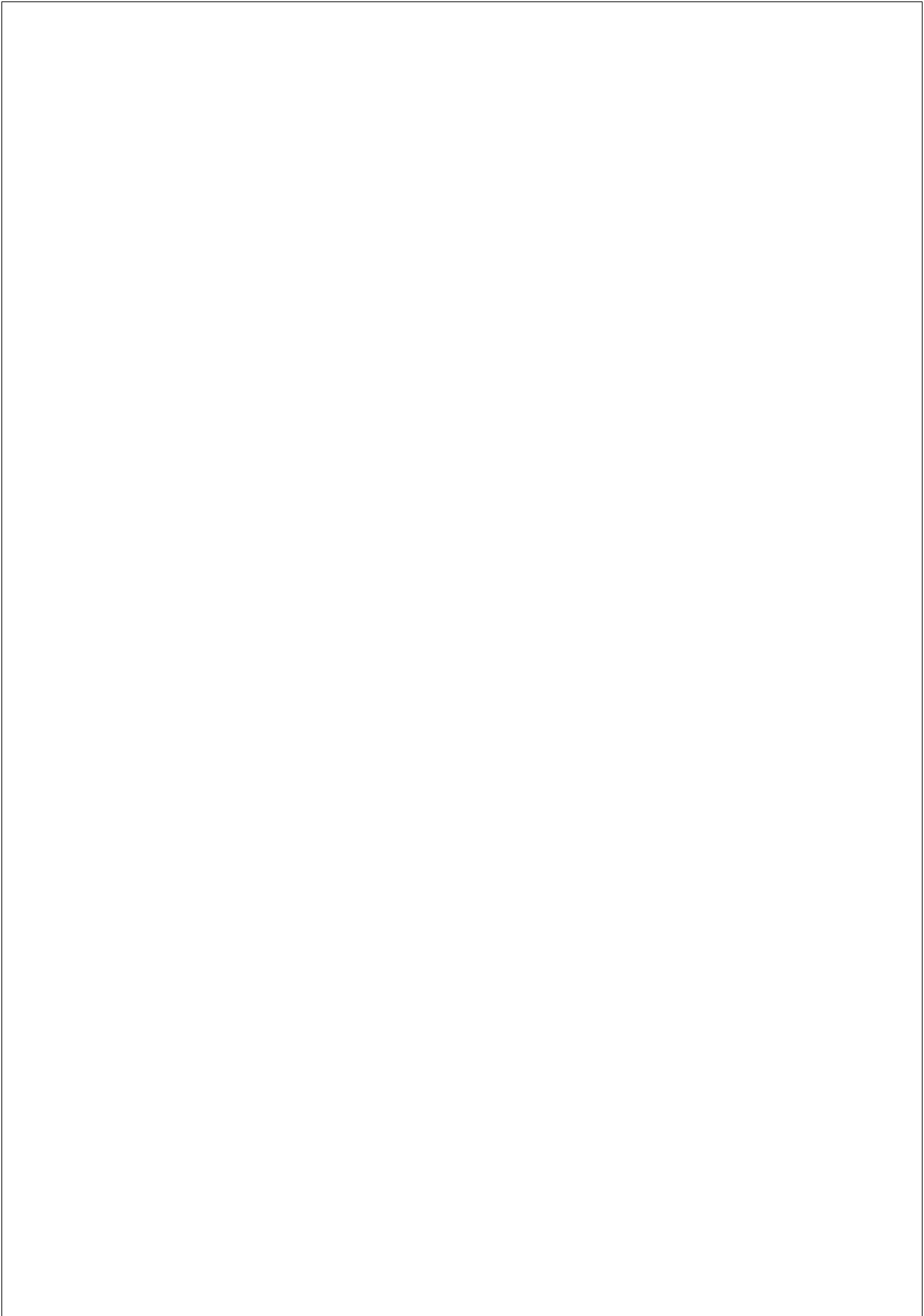
NOTICE

NOTICE: If combustion gases are released into the coolant circuit, the coolant must be renewed after repair of the fault.

If it is possible, use clean soft water in the coolant.

The quality of the anti-freeze coolant must be checked at least once a year, for example, at the beginning of the cold period. The coolant must be renewed every two years.

11 - Trouble Shooting
820
860/880 SX & ELITE
970/980 ELITE
TX760B
TX860B
TX970B
Backhoe Loader



Troubleshooting

Problem	Possible causes	
	Checks by the user	Checks by the workshop personnel
The starter motor turns the engine too slowly	1, 2, 3, 4	
The engine does not start	2, 5, 6, 8, 9, 10, 12, 13, 14, 15, 17	34, 35, 36, 37, 38, 42, 43, 63
The engine is difficult to start	5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19	34, 36, 37, 38, 40, 42, 43, 44, 63
Not enough power	8, 9, 10, 11, 12, 13, 16, 18, 19, 20, 21	34, 36, 37, 38, 39, 42, 43, 44, 62, 63, 64
Misfire	8, 9, 10, 12, 13, 15, 20, 22	34, 36, 37, 38, 39, 40, 41, 43, 63
High fuel consumption	11, 13, 15, 17, 18, 19, 22, 23	34, 36, 37, 38, 39, 40, 42, 43, 44, 62
Black exhaust smoke	11, 13, 17, 19, 21, 22	34, 36, 37, 38, 39, 40, 42, 43, 44, 62, 63
Blue or white exhaust smoke	4, 15, 21, 23	36, 37, 38, 39, 42, 44, 45, 52, 58, 61
The pressure of the lubricating oil system is too low	4, 24, 25, 26	46, 47, 48, 50, 51, 59
The engine knocks	9, 13, 15, 17, 20, 22, 23	36, 37, 40, 42, 44, 46, 52, 53, 60
The engine runs erratically	8, 9, 10, 11, 12, 13, 15, 16, 18, 20, 22, 23	34, 38, 40, 41, 44, 52, 60, 63
Vibration	13, 18, 20, 27, 28	34, 38, 39, 40, 41, 44, 52, 54, 63
The pressure of the lubricating oil system is too high	4, 25	49
The engine oil temperature is too high	11, 13, 15, 19, 27, 29, 30, 32, 64	34, 36, 37, 39, 52, 56, 57, 64
Crankcase pressure	31, 33	39, 42, 44, 45, 52
Bad compression	11, 22	37, 39, 40, 42, 43, 44, 45, 53, 60
The engine starts and stops	10, 11, 12	63

Troubleshooting

Possible Causes

1. Battery capacity low.
2. Bad electrical connections.
3. Fault in starter motor.
4. Wrong grade of lubricating oil.
5. Starter motor turns engine too slowly.
6. Fuel tank empty.
7. Fault in stop control.
8. Restriction in a fuel pipe.
9. Fault in fuel lift pump.
10. Dirty fuel filter element.
11. Restriction in air induction system.
12. Air in fuel system.
13. Fault in atomizers or atomizers of an incorrect type.
14. Cold start system used incorrectly.
15. Fault in cold start system.
16. Restriction in fuel tank vent.
17. Wrong type or grade of fuel used.
18. Restricted movement of engine speed control.
19. Restriction in exhaust pipe.
20. Engine temperature is too high.
21. Engine temperature is too low.
22. Incorrect valve tip clearances.
23. Too much oil or oil of the wrong type is used in wet type air cleaner, if one is fitted.
24. Not enough lubricating oil in sump.
25. Defective gauge.
26. Dirty lubricating oil filter element.
27. Fan damaged.
28. Fault in engine mounting or flywheel housing.
29. Too much lubricating oil in sump.
30. Restriction in air or water passages of radiator.
31. Restriction in breather pipe.
32. Insufficient coolant in system.
33. Vacuum pipe leak or fault in exhauster.
34. Fault in fuel injection pump.
35. Broken drive on fuel injection pump.
36. Timing of fuel injection pump incorrect.
37. Valve timing is incorrect.
38. Bad compression.
39. Cylinder head gasket leaks.
40. Valves are not free.
41. Wrong high-pressure pipes.
42. Worn cylinder bores.
43. Leakage between valves and seats.
44. Piston rings are not free or they are worn or broken.
45. Valve stems and/or guides are worn.
46. Crankshaft bearings are worn or damaged.
47. Lubricating oil pump is worn.
48. Relief valve does not close.
49. Relief valve does not open.
50. Relief valve spring is broken.
51. Fault in suction pipe of lubricating oil pump.
52. Piston is damaged.
53. Piston height is incorrect.
54. Flywheel housing or flywheel is not aligned correctly.
55. Fault in thermostat or thermostat is of an incorrect type.
56. Restriction in coolant passages.
57. Fault in coolant pump.
58. Valve stem seal is damaged.
59. Restriction in sump strainer.
60. Valve spring is broken.
61. Lubricating oil seal of turbocharged leaks.
62. Air leak in induction system (turbocharged engine).
63. Faulty engine management system.
64. Induction system leaks (turbocharged engines).