

PS3000

SITE DUMPERS



WORKS FOR YOU.

INSTRUCTION

2000 - 9000

Mechanical Drive Only

4.W.D Dumper Straight & Swing Skip Publication No. B9507E-4 July 2001

CALIFORNIA

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

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General Safety Notes and Seat Belt Maintenance Guidelines

\land WARNING \land

Observe the Following Points for Your Safety and Protection

Operators and maintenance personnel must always comply with the following safety precautions. These precautions are given here for your safety. Review them carefully before operating the machine and before performing general maintenance or repairs. Supervising personnel should develop additional precautions relating to the specific work area and local safety regulations.

- Before operating the machine ensure you have had proper training and are fully conversant with the machine and its operation If in Doubt ASK!
- Read this instruction manual carefully before operating the machine. Ensure this instruction manual is kept with the machine at all times and is in good condition replace the manual immediately if it becomes dirty, damaged or lost.
- Decals are fitted to the machine for safety purposes and MUST be replaced immediately if they are unreadable or lost. If the machine is repaired and parts have been replaced on which decals were fixed ensure new decals are fitted before the machine is put into service.
- Always make sure there is adequate ventilation around the machine. Never run the engine in an enclosed area without good ventilation or next to combustible materials.
- Stop the engine before refuelling, if there is a spillage mop it up and do not start the engine until it is safe again.
- The exhaust gets extremely hot. Do not place anything on top of it and keep all combustible materials clear. Do not attempt any maintenance on a hot engine.
- Be familiar with all prohibited work areas such as excessive slopes and dangerous terrain conditions.
- Check your local laws, the engine may require a spark arrester etc.
- Do not inspect or clean the machine with the engine running.
- Before carrying out maintenance on the hydraulic system ensure the hydraulic fluid is cool and there is no residual pressure in the hydraulic circuit hydraulic fluid leaking under pressure can penetrate the skin.
- Make sure you, and anyone else who uses the machine, have been shown how to operate it safely.
- A hard hat, safety boots, safety glasses and reflective clothing must be worn at all times.
- Establish a training programme for all operators to ensure safe operation.
- Do not operate the machine unless thoroughly trained.
- Do not operate the machine if it is damaged, improperly adjusted or not completely and correctly assembled.
- Before performing any maintenance on the machine, place a warning tag on the machine to prevent accidental start-up. Put the locking bar into position to prevent the front and rear chassis moving and creating a crushing zone.
- The air taken in by the oil cooler fan, if fitted, must be free of dust and debris.
- Ensure the ROPS/FOPS is not damaged.
- When loading a dumper skip, no person should be on the machine.
- Do not carry passengers.
- Keep footplates and steps free from dirt and oil etc.
- Check seat belts daily.
- Do not remove the radiator cap when the engine is hot. Do not add coolant to a hot engine.
- Always park the machine safely on firm, level ground where it will not cause an obstruction or danger chock the wheels if necessary. **DONOT LEAVE THE ENGINE RUNNING** or the start key in the start switch.
- Before taking the machine on public roads ensure the machine complies with all road traffic regulations and obey all driving laws.
- Repairs to **Punctured Tyres** and **Tyre Changes** MUST only be carried out by fully trained Operatives using the correct equipment. The manufacturer of this machine recommends a competent firm is employed to carry out these tasks.
- If the machine should roll over, the Operator must grip the steering wheel firmly allowing the seat belt to retain them in the seat until the machine comes to rest

\land WARNING \Lambda

Observe the Following Points to Prevent Damage to the Machine

- Always replace hoses, couplers and other parts with parts supplied or recommended by Benford NEVER USE SPARE PARTS OF INFERIOR SPECIFICATION.
- Never allow unqualified people to perform repairs on the machine.
- Never overfill the engine oil or fuel tank.
- If a hose bursts, stop the engine immediately ALWAYS replace with a hose of the correct specification.
- Do not start the engine if you cannot see the hydraulic oil level in the sight gauge.
- Follow the engine starting instructions in this manual and on the machine.
- If you see oil leaking report it and get it fixed immediately.
- Make sure the correct fuel, oils and grease is used.
- Do not operate the machine unless it is safe to do so. Remember to check for overhead obstructions while driving.
- Never use the machine for purposes other than those it was manufactured for.
- Always ensure workmates are aware of your work plan.
- If fitted, ensure all tyres are serviceable before using the machine.
- Never cross inclines.
- Never drive the machine on to unstable ground or close to trenches, holes etc.
- Do not operate the machine if it is damaged, improperly adjusted or not completely and correctly assembled.
- Establish a training programme for all operators to ensure safe operation.

SAFETY SYMBOLS

Safety symbols are used in these instructions to bring attention to actions that may cause personal injury or damage to the equipment. Always observe these symbols, they are included for your safety and for the protection of the power unit.



This symbol is used to identify an action that requires particular attention and/or care.

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Additional Safety and Warning Notes are Included in the Following Manual Pages

Warning Transfers Used on the Dumper



For safe use of machines on gradients, see instruction manual for skip uses Refer to Manual Sections: Gradients



Always Use Seat Belt when Operating the Machine Refer to Manual Sections: Seat Operating Instructions



Stay a safe distance away from the machine Refer to Manual Sections: General Safety



Before operating the machine, Read and Understand the Instruction Manual supplied with the machine Refer to Manual Sections: Driving Controls, Operating Instructions



Stay a safe distance from crushing zones Refer to Manual Sections: General Safety

Warning Transfers - continued



Do not ride on machine except in supplied seat and never expose body to high pressure fluid leaks Refer to Manual Section: Working on the Hydraulic System, Maintenance



Read the Instruction Manual before operating the machine and ALWAYS remove the start key before performing ANY maintenance Refer to Manual Sections: Delivery Checks, Maintenance



Engage the articulation lock before lifting machine Refer to Manual Sections: Transportation - Crane



Secure lifting cylinder with the locking device before performing maintenance in the skip area Refer to Manual Section: Skip Prop Instructions, Maintenance



Swing Skip control valve Refer to Manual Sections: Operating Instructions, Swing Skip Elevation and Slewing



Straight Skip control valve Refer to Manual Sections: Operating Instructions, Straight Skip Elevation

Warning Transfers - continued



Tyre Pressures Refer to Manual Section: Technical Specification, Tyre Specification/Capacity/Pressures/Wheel Torques



Engine noise level Refer to Manual Section: Technical Specification, Noise Levels

Roll Over Protective Structures - ROPS

Fatigue and finite life problems associated with welded products such as ROLL OVER PROTECTIVE STRUCTURES (ROPS).

Operational experience of ROPS indicates that equipment of this type may become structurally inadequate and has even failed during normal operations because users have not inspected and maintained this equipment. 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 lifesaving 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 can cause an unsafe condition to exist as well as exposing all concerned parties to liability damages. 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 should be avoided as recertification is required.

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.
- Loose, missing or damaged mounting hardware (bolts, nuts, washers, etc.). Bolts should be checked for proper torque.
- 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.
- Seat Belt. The presence and operability of a seat belt should be noted. The belt should be clean,free of dirt and grease and the latch should function smoothly.
- Other inspection. The structure should be inspected following a rollover, collision or fire.

Repair

- Replace missing or damaged hardware with the manufactures specified hardware. Re-torque all loose threaded fasteners to the manufacturers specifications.
- Replace worn or damaged resilient mounts to prevent further damage to the mounting surfaces and to prevent more severe vibration problems.
- Determine the repairability 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 rules which may be helpful are:
- Enclosure sheet metal cracks are repairable.
- Small cracks may be repairable. Consult manufacturer.
- If damaged by rollover, collision or fire consult manufacturer.
- In all cases, when doubt exists; consult manufacturer.

Seat Belt Maintenance Guidelines

WARNING

- Failure to properly inspect and maintain a seat belt can cause serious injury or loss of life in the event of an accident.
- It is critical that any time the machine is involved in an accident, the entire seat belt system must be replaced.
- The seat belt should be considered to have a finite life and must be replaced as needed throughout the life of the machine. The belt must be inspected for needed maintenance at least once a year or more often if exposed to severe environmental or vocational conditions.
- 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 side.

IMPORTANT

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



Maintenance Guidelines

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.
- 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.

Important Facts about Seat Belts

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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.

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2 and 3 Tonne Dumpers - Straight Skip





2, 3, 4, 5 and 6 Tonne Dumpers - Swing Skip











2 to 9 Tonne Dumper Instruction Manual

1-4

Introduction

The range of 2 to 9 tonne payload site dumpers have been designed to provide the greatest degree of component standardisation possible, thus providing the user with simplified servicing requirements. It is for this reason that this handbook covers the entire range of dumpers, and users of one, or all of the models will benefit from having a single source of information for all the models in their fleet.

It must be noted, that the 4000 model included in this manual is NOT the Hydrostatic Drive but the mechanical drive model

General Description

Skips - Standard and Swing

All models in the range are 4 wheel drive dumpers having a load carrying skip located over the front axle, and ahead of the driver. The 2, 3, 4 and 6 tonne models are available with a turntable skip which rotates through 180° . The skip is mounted on a ball bearing slew ring and is rotated by double hydraulic rams.

Engines

Engines on all machines are multi-cylinder diesel which transmit power to the wheels by means of mechanical gearboxes and axles.

All machines are fitted with electric starting of the engine. A separate key operated start switch is provided and is located adjacent to the steering wheel. A battery isolator switch is provided in the engine compartment.

Chassis

The chassis of the dumpers is of the two part articulating type having a centre pivot joint which articulates in both vertical, and horizontal planes.

Steering

Steering of the dumper is by an 'Orbitrol' hydrostatic steering unit, powering a single ram connecting the front and rear chassis units.

Transmission

The transmission of the dumpers comprise of heavy duty constant mesh gearboxes with three forward and one reverse gear on all models up to 3 tonne capacity. The 4, 5, 6, 7 and 9 tonne models have torque converter four speed shuttle gearboxes.

Braking

The vehicle braking is provided by means of totally enclosed oil immersed brakes located within the drive axles. These brakes are self adjusting sintered multi-plate discs which are hydraulically operated by means of single or tandem master cylinders depending upon whether the dumper has 1 or 2 axle braking.

In the case of two axle braking the tandem master cylinder provides the feature of totally independent front and rear systems. In the event of failure of one system, braking will still be available on the alternative axle.

Electric System

All models are available with full lighting to comply with British road traffic regulations. All models use a belt driven alternator to charge the battery.

General Safety

Safety

These machines are designed to carry out the function of transporting various free flowing materials. If used correctly they will provide an effective and safe means of transportation and meet the appropriate performance standards.

It is essential the machine Operator is an able bodied adult, adequately trained in its safe operation. The Operator must also be authorised to operate the machine and have sufficient working knowledge of the machine to ensure it is in a full and safe working condition before it is put to use

Operational Safety Points

When using this machine the following list of basic Do's and Don't's should be applied. This list is not necessarily a complete list, but applying these rules will greatly reduce the possibility of an accident occurring.

Always

- ☑ Carry out a daily pre-start check of the machine.
- Ensure this Instruction Manual is placed in the special holder behind the seat.
- ☑ Look around the machine before starting the engine children could be out of sight.
- ☑ Before starting the engine, ensure the transmission control lever and/or gearlever is in the NEUTRAL position.
- Examine working area looking for possible dangers e.g. trenches, confined areas, people working.
- Park the machine on safe, firm, level ground and remove the start switch key.
- ☑ Clear away obvious hazards and always operate with caution.
- ☑ Ensure you have a clear view when driving.
- Exercise great care when working on gradients especially when crossing.
- ☑ When refuelling make sure the engine is cold and the machine is in a well ventilated area, with the engine stopped. Use clean fuel and container. Beware of naked flames, grinding sparks etc.
- Winch or lift the machine from any situation where it cannot extricate itself.
- ☑ Wear appropriate protective clothing :
 - □ Hard Hat at all times
 - □ Safety Boots at all times
 - □ Safety Glasses at all times
 - □ Reflective Clothing at all times

- Gloves as conditions dictate
- Ear Protectors as conditions dictate
- □ Respirator in dusty conditions
- ☑ Wash and Clean machine at end of working day Keep water away from electrical components.
- ☑ Ensure drivers seat is correctly adjusted as described in the *Seat Operating* section of this manual.
- \square Use footsteps and grabrails provided when getting on and off the machine.
- ☑ Keep floorplate and steps free of mud, oil, debris etc.
- ☑ Use seatbelt when ROPS or FOPS is fitted.
- \square Reduce the payload if the materials are of a sticky non-flowing nature.
- Ensure materials being tipped are of a free-flowing nature -Swing skips only.
- \square Get off the machine whenever the skip is being loaded.

Never

- Attempt to 'jump' obstacles such as kerbs and manholes.
- Drive at speed over rough ground drive slowly.
- Leave the machine unattended with the engine running, this practice is not only dangerous but can cause premature engine wear.
- Carry out maintenance unless engine is stopped and the start key has been removed.
- E Carry out maintenance unless the wheels are chocked and the skip is propped.
- I Tamper with any of the safety devices on the machine.
- I Tighten or disconnect any hose whilst the engine is running.
- Attempt to start the engine from OFF the machine.
- Stand in the CRUSH area between front and rear frames when the engine is running.
- E Carry passengers.
- ☑ Use the machine as a towing vehicle.
- Allow the dumper to be loaded such that vision and safe driving is impaired.
- Overload the dumper beyond its rated payload.
- E Carry loads which extend over side of dumper they create instability and danger to pedestrians.
- ☑ Tip materials into a trench unless a banksman is employed with a stop bar or baulk of timber, to prevent the dumper getting too close to the edge and either falling in or causing the trench sides to collapse.
- Drive the dumper with the skip elevated.
- Allow personnel to work under a raised skip if the skip props are not in position.

Safe Operation Decals

The machine has a number of special decals fitted which draw the users attention to various points of operation or safety.

Before Using the Machine

Read all the decals attached to the machine and fully understand their meaning. If you don't understand their meaning contact your supervisor for clarification.

Condition of Decals

Ensure the decals are always clean and readable, replace when necessary.

Spare decals are obtainable from the Manufacturers Spares Department.

See SAFETY SECTION for Transfer Descriptions

Delivery Checks / Transportation

Delivery Checks

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

 Read this handbook completely -- it could save a great deal of unnecessary expense. Put this Instruction Manual in its holder on the engine canopy.



Read the engine handbook supplied with the dumper

- Check the general condition of the machine, -- has it been damaged during delivery?
- Check the following, where appropriate:
 - Oil levels in engine, gearbox, transfer box, both axles and torque converter.
 - □ Hydraulic oil and fuel levels using tank top level gauges.
 - Brake fluid level in the reservoir located under the floor plate or seat support on 5, 6, 7 and 9 tonne dumpers.
 - □ Tyre pressures and the battery electrolyte level.
 - □ Coolant level in radiator if fitted.

Recommended lubricants are detailed both on a prominent transfer on the machine and also in the *Maintenance* section of this manual.



Loading

When loading the dumper onto a trailer or lorry, strong loading ramps, a crane or similar lifting device should be used. See *Technical Data* section for machine weights.

Ramps

- Ensure the trailer or lorry will not move during loading by applying their brakes and also chocking their wheels if necessary.
- The angle of the ramps must not exceed the gradeability of the machine and in wet or muddy conditions may need to be less.

Gradeability Will Be Reduced In Wet, Muddy, Oily Conditions

 It is recommended a winch is used whenever machine is loaded using ramps. Use a two legged chain attached to lashing points to secure the winch hook to machine.

Crane - except 9 Tonne

• A single lifting point is provided for lifting the complete machine. The position of this point will ensure a safe stable lift of the machine in working condition using standard lifting gear.

Other Methods of Lifting Are Not Recommended





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2 to 9 Tonne Dumper Instruction Manual

Towing

 If using a crane or lifting device the rope, chain, strap etc. should be of sufficient strength to support the machine safely and be free from damage. See *Technical Data* section for machine weights.



 Before lifting the dumper ensure the vehicle is positioned in the straight ahead position, i.e. front and rear chassis are in line.

To prevent both chassis halves swinging relative to each other the articulation lock must be used.

To fit the lock remove grip clip and pin from front storage position. Pivot the locking bar around until the holes in the bar are in line with the holes in rear chassis locking bracket. Fit the pin through the holes and secure with the grip clip.



 Secure the dumper to the lorry chassis using chains, straps or ropes of sufficient strength attached to the machines front lashing points and the rear towing hitch.

Using Dumper as a Towing Vehicle

The dumper is not purpose designed as a towing vehicle, but if so used always make sure the weight of any trailer and its load does not exceed half the rated payload of the dumper. It is important that if used as a towing medium skip should be loaded with half the rated payload to provide adhesion when braking. Never tow down gradients as 'jack knifing' may occur and always tow in first gear on level ground.



Manufacturer Cannot be Held Responsible for Any Accident Resulting from the Use of this Dumper as a Towing Vehicle

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Towing - Torque Converters Models

If towed, disconnect the top drive propshaft to prevent gearbox oil starvation. Failure to observe this instruction may cause extensive gearbox damage





Driving Controls

Driving Controls

The range of dumpers have a common driving position and controls for all models up to 3 tonne capacity. The 4, 5, 6, 7 and 9 tonne capacity models have a shuttle torque converter transmission whereby an electric switch on the gearlever is used in place of a clutch pedal to enable gear changes to be made, and an electric forward/reverse selector is provided to give the machine a common range of speeds in forward and reverse.

The driver is centrally positioned with the gear lever immediately in front. The handbrake is located to drivers right, on seat support.

Clutch, footbrake and accelerator pedals are located in standard automotive format.

The tipping of the skip is controlled from the driving position by a lever operating the hydraulic control valve; which is located adjacent to the drivers right hand.



Driving Controls

Steering Column Control Variations



ircuit Breaker Gircuit Breaker Horn Charge Light Oil Pressure Light

No Lights

2 Tonne	Lister/Petter TS2
2 Tonne Swing	Lister/Petter TS2
3 Tonne	Lister/Petter TS3
3 Tonne Swing	Lister/Petter TS3





Items marked with ** are not fitted to machines with no lights





2000-3000 Dumpers Only

Start Inhibitor - see Start Inhibitors - 2 and 3 Tonne Machines

2/3000 machines have the addition of a symbol, on the dashboard decal, indicating the Operator must depress and hold the clutch pedal to deactivate the start inhibitor whilst starting the machine.



Circuit Breakers

In the event of a fault occurring, the circuit breaker will trip out, this being indicated by the button protruding out beyond its normal position. Should this occur, the reason for the overload must be found and the components at fault replaced or repaired. When the repair has been completed the circuit breaker should be reset by pressing the button until it locks in position thus restoring the electrical supply.

On machines with full lighting, there is an extra 30A circuit breaker.

Audible Warnings

On machines fitted with belt driven alternators, a continuous tone audible warning will sound when start switch is in the **RUN** position, but the engine is not running. This is fitted to warn the operator that they have left the start switch in the **RUN** position which will result in battery drain.

To avoid the 5 and 6 tonne dumper being driven with the handbrake still applied, a switch is built into the system which gives both audible warble sound and illuminated warning under these conditions.

Engines cooled by a 'V' belt driven blower, have a switch built into the system which senses a 'V' belt breakage and operates a warbler audible alarm.



On hearing audible warning, take immediate action to safely park the vehicle and stop engine until a replacement 'V' belt is fitted. Running the engine without a 'V' belt will DESTROY IT

Seat Operating Instructions

Angle Adjustment

The seat backrest is adjustable for angle, this is achieved by lifting the lever (1) at the front of the seat cushion and sliding the seat cushion forwards/backwards.

Release the lever and ensure the seat runners engage in one of the preset locking positions.

4, 5, 6, 7 and 9 Tonne Machines Will Not START Unless Operator is Sitting on the Seat



Seat Movement

On all machines the operator is able to adjust the seat in the foreaft direction by lifting knob (2) and sliding seat to desired position, then releasing the knob to lock the seat into position.



Do Not Adjust Seat While the Machine Is Moving

Weight Adjustment

The seat may be adjusted for drivers weight by sliding lever (3) downwards to the relevant weight position, as indicated by the scale on the side of the seat.

To return lever to top of scale push the lever fully downwards to the bottom of the scale and then lift lever to the top.





The seat MUST always be adjusted to suit weight of EACH Operator. Incorrect weight adjustment may inhibit operation of the seat switch fitted on 4, 5, 6, 7 and 9 tonne dumpers

Start Inhibitors - 2 and 3 Tonne Machines

The operator must be correctly positioned on the drivers seat and the clutch pedal must be fully depressed to operate the start inhibitor switch, before the engine can be started.

Start Inhibitors - 4, 5, 6, 7 and 9 Tonne Machines

- To help prevent accidents a safety system is controlled by a switch operated by the weight of the Operator on seat.
- The engine cannot be started unless the Operator is sitting on the seat and the forward/reverse lever is in neutral.

Incorrect weight adjustment may inhibit starting of the engine due to the operation of the seat switch







Starting the Engine

Do Not Use Starting Sprays to Assist Engine Starting

Before attempting to start the engine ensure :-

- There are no obvious faults with the machine.
- The Operator is Sitting on the Operators Seat.
- The gear lever or Forward/Reverse switch is in neutral.
- The Engine Stop knob is pushed fully in Deutz 5 and 6 tonne and Lister 2 and 3 tonne engines only.
- Turn the start key switch fully clockwise to the start position, release immediately the engine starts and allow the key to return to the **RUN** position. Early 2000 and 3000 machines, fitted with Lister or Hatz engines, have the start key switch positioned on the front of the dash. All later 2000 to 9000 machines have the start key switch positioned on the right hand side of the dashboard.

Never Engage the Starter Motor Whilst the Engine is Running

On machines fitted with Perkins engines -

To start the engine turn the key switch clockwise to the HEAT position and hold for up to 10 seconds.

Turn key switch to the START position ensuring the key is released as soon as the engine is running.

Do Not Crank Engines for More than 10 Seconds

Stopping the Engine

- Before stopping the engine the machine must be on firm stable ground, the handbrake must be applied and the transmission should be in neutral.
- The engine is stopped in normal use by the Operator pulling the Engine Stop knob out and turning the start switch anticlockwise to the off position when the engine has stopped.



• To stop the engine on machines fitted with Perkins and Deutz engines simply turn the start switch to the OFF position.

Do Not Allow Engine to Idle for Long Periods

Using Clutch and Gearbox

Constant Mesh Gearbox 2 and 3 Tonne Models Only

Moving Off

- Press down clutch pedal and move gear lever into first gear.
- Press down accelerator pedal slightly to increase engine speed.
- Release pressure on clutch pedal by slowly lifting foot off pedal, at the same time release handbrake, and also gradually increase the downward pressure on the accelerator pedal.

Double De-Clutching

The dumper will now be moving forward slowly and movement of the gearlever into the 2nd and 3rd gears should be made by double declutching, a procedure which is described below.

Changing Up

- Accelerate so the engine runs slightly faster than idling speed.
- Press clutch pedal down with left foot and at same time take the right foot off accelerator pedal.
- Move gear lever into neutral and release clutch pedal and pause for about one second.
- Press clutch pedal down and move gear lever into the next gear position.
- Release clutch pedal and at same time press accelerator pedal gently to increase engine speed.



Changing Down

- Press clutch pedal down with left foot and at the same time take the right foot off the accelerator. Move gear lever into neutral.
- Lift foot off the clutch pedal and at the same time press down the accelerator pedal to build up and maintain increased engine speed.
- Whilst removing the foot from the accelerator, press down the clutch pedal and engage a lower gear as quickly as possible.
- Release the clutch pedal slowly and press down the accelerator pedal. Increase the speed as required.

Use the same procedures for changing up or down into any successive higher or lower gears

Reversing 2 and 3 Tonne Machines Only

The dumper must be stationary before selecting reverse gear.

Press the clutch pedal down, and if changing from a forward gear pause in neutral before selecting reverse. Increase engine speed slightly whilst releasing the clutch and handbrake.

ALWAYS REVERSE SLOWLY AND LOOK BEHIND

Torque Converter & Shuttle Gearbox

4, 5, 6, 7 and 9 Tonne Models Only

These models are fitted with a Spicer Compact powershift reversing shuttle with an integral 4 speed synchronised transmission and a Borg Warner Torque Converter.

The procedure for driving the vehicle is as follows:-

- Select forward/reverse using the Direction Switch.
- Depress the electric control button on the gearlever and hold whilst moving into first gear.
- Release the button and gearlever.
- Release the handbrake.
- Press down the accelerator pedal slowly and drive will be progressively taken up through the torque converter and the dumper will move off.

Changing gear, up or down the range, is effected by depressing the electric control button on the gearlever and moving gearlever into a higher or lower gear position.

Due to the 'SOFT' shift incorporated on the transmission it is possible to switch between forward and reverse motion without braking, but care should be taken to ensure this operation can be conducted with safety







Steering

The dumpers have a chassis which incorporates a design known as centre pivot articulated steering. The chassis is in two parts, a front and a rear section which are joined together in the middle by a vertical pivot pin and a link which between them provides movement in the horizontal and lateral planes.

This combined movement allows the front frame to be moved relative to the rear frame, by means of a single double acting ram to provide steering.

The link in the system enables the front and rear frames to articulate relative to each other and thus provide the ability to maintain maximum adhesion with the ground at all times. The steering referred to above (i.e. a hydraulic ram connecting the frames) is controlled through the steering wheel acting on an 'Orbitrol' hydrostatic steering unit.

Hydraulic power is supplied via an engine driven pump to the steering unit, which on turning the steering wheel meters oil to the steering ram and thus provides movement in either direction of the vehicle.

In the event of a hydraulic failure the vehicle can still be steered . Under these circumstances steering loads are high and the dumper should only be driven at slow speeds.



The articulating frames can create a trap when steered into a full lock position, transfers are located in this area to warn of the danger

Stopping the Dumper

Parking Brake

Manual Gearbox

- Remove foot from the accelerator pedal.
- Depress the clutch pedal and apply the footbrake.
- When the dumper has stopped apply the handbrake and move the gearlever into the neutral position.
- Release the clutch pedal.

Torque Converter Transmission

- Remove the foot from the accelerator pedal.
- Apply the footbrake.
- When the vehicle has stopped apply the handbrake.
- Move the gear lever into the neutral position.

Models 2 to 3 Tonne

These dumpers have a parking brake system which is integral with the front axle and is operated by an over centre handbrake, located to the right of the drivers seat.



Models 4, 5, 6, 7 and 9 Tonne

These dumpers have a separate parking brake system comprising a transmission disc brake interposed between the gearbox and transfer box, which is operated by a ratchet handbrake, located to the right of the drivers seat.



Skip Uses

Never Elevate Dumper Skips Unless Dumper Is On Level Ground

The dumper vehicle is basically a load carrier and can be used for a multitude of building/contracting site functions, but essentially it is used for carrying materials from excavations or demolitions and commonly carrying materials to general building activities. The carrying of soil, sand, gravel, debris, bricks etc. requires that the materials can be placed accurately at the place point and in some cases without damage to the materials themselves.

It is for this reason that the load carrying skip is power lifted and lowered by means of double acting hydraulic cylinder(s) mounted between the front chassis and the underside of the skip which is (are) controlled from the drivers seat by a double acting hydraulic control valve.

The power for the system is provided by an engine driven hydraulic pump and the circuit is described in detail in the *Hydraulic System* section.

The skip in the lowered or loading position is located such that the driver has a good view ahead, therefore when loading the skip get off the machine and do not allow the load to be heaped in such a fashion as to impair the drivers view.

Do Not Use the Raised Skip as a Bulldozer Blade

Swing Only

This special purpose skip enables the load to be discharged through a range of 180° about the fore and aft axis of the dumper. This feature is particularly useful for side tipping into trenches, but because of this feature it is important that only free flowing materials are used.

Only Use Swing Skip For Free Flowing Materials



Do Not Drive on Land Which May Cause the Dumper to Exceed the Safe Limits Shown Above





Skip Control Valve Lever

Swing Skip Elevation and Slewing

- Elevation of the skip is by means of a single double acting ram.
- The slewing action is controlled by a dual axis control valve - move the lever forwards and backwards to lower or raise the skip, and sideways to slew skip left or right.

Anti Slew Skip Lock

- A locking device is used to locate the skip in the straight ahead position when the skip is fully lowered. Before slewing to the left or right, raise the skip slightly to clear the catch.
- To lock the skip in the straight ahead position, elevate the skip until the skip slew lock clears the catch then rotate the skip until the slew lock is directly above the catch and lower the skip.

Straight Skip Elevation

The control lever will return to the neutral position automatically if released.

- To tip skip, move control valve lever forwards.
- To lower the skip, move control valve lever backwards.

Hydraulic System

How the Hydraulics Function

The hydraulic system provides power to operate the vehicle steering and to power the skip elevation.

All dumpers other than the turntable models have a similar hydraulic circuit layout (see circuit diagrams) and all the components other than the skip ram, steering ram and the hydraulic pump are common.

In the case of the turntable dumpers, additional rams are required to slew the skip to the left or right positions.

The system comprises an engine driven hydraulic pump drawing oil from a tank located inside the chassis. The tank is fitted with a suction strainer, an oil level gauge, and a filler/breather cap. The pump generates a maximum pressure of 150 bar (2200psi) on the standard skip dumpers and 170 bar (2500psi) on the turntable skip dumpers. The system is protected by a relief valve in the control valve which is set at the same pressure. A return line filter is fitted to the circuit and is either of the replaceable cartridge type (Steel Tanks) or the replaceable element type (Plastic Tanks)

Steering of the dumper is by means of a single hydraulic ram connecting the front and rear frames, the oil supply to the ram is controlled by an Orbitrol hydrostatic steering unit. The unit receives oil via a carry over port in the 3 way control valve and meters oil to the steering ram as the steering wheel is turned, at all times.

Straight Skips



2 to 4 Tonne Hydraulic Circuit

Hydraulic System



5, 6, 7 and 9 Tonne Straight Hydraulic Circuit

Swing Skips

The control valve, operated by a lever adjacent to the drivers seat, controls the lifting, lowering and slewing of the dumper skip. The skip can be elevated at varying speeds dependent on engine speed, and it can be stopped at any intermediate point for discharging of partial loads.





ROPS - Rectangular Section 9000 Only

The ROP's on the 9000 dumper is pivoted at seat level to allow the ROP's to be lowered to reduce the transportation height - **not the working height.**

A gas strut is fitted to the ROP's to assist the Operator when lifting the ROP's into its working position or lowering it into its travelling position.

Machine fitted with with a FOP's have TWO gas struts fitted, one either side.



Only Lower the ROP's / FOP's when Transporting Dumper on a Lorry / Trailer

Work Position

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- Remove the four 'R' clips from the locking pins, two either side, and remove the pins.
- Lift the ROP's into the vertical, working position and secure by fitting the four pins as shown.
- Secure the pins in position using the 'R' clips.

Travelling Position

- Remove the four 'R' clips from the locking pins, two either side, and remove the pins.
- Lower the ROP's into the travelling position and secure by fitting the four pins as shown.
- Secure the pins in position using the 'R' clips.

Maintenance

- Check the securing pins are free from damage and are serviceable.
- Regularly grease the four mating, pivoting surfaces of the ROP's using the four grease nipples provided in the upper frames pivot plates.

See Safety Section at the Front of this Manual





2000 to 7000 ROP's and FOP's

ROPS - Round Section 2000 to 9000

The ROP's on the 9000 dumper is pivoted at seat level to allow the ROP's to be lowered to reduce the transportation height - **not the working height.** This is also an option on the 2000 to 7000 dumpers.

On the 9000 model, a gas strut is fitted to the ROP's to assist the Operator when lifting the ROP's into its working position or lowering it into its travelling position.

9000 machines fitted with with a FOP's have TWO gas struts, one either side.



Only Lower ROP's when Transporting Dumper on a Lorry/Trailer

Work Position

- Remove the two 'R' clips from the locking pins, one either side, and remove the pins.
- Lift the ROP's into the vertical, working position and secure by fitting the pins as shown.
- Secure the pins in position using the 'R' clips.

Travelling Position

- Remove the two 'R' clips from the locking pins, one either side, and remove the pins.
- Lower the ROP's into the travelling position and secure by fitting the pins as shown.
- Secure the pins in position using the 'R' clips.

Maintenance

- Check the securing pins are free from damage and are serviceable.
- Regularly grease the pins to ensure ease of fitting and removal.

See Safety Section at the Front of this Manual





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2000 to 9000

Four Wheel Drive Dumpers

Mechanical Drive Only

Including

2000, 3000, 4000,

5000 and 6000 Swing

Maintenance Section

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Machine Documents



IMPORTANT

This Instruction Manual and machine documents MUST be kept in the manual holder provided to allow the Operators to have immediate access to the information contained in the manual.





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Under NO circumstances allow conventional BRAKE FLUID to be added to the system and also NEVER purge the system and refill with brake fluid, otherwise damage will occur to all the rubber sealing components in the brake system



When Checking Liquid Levels, Machine MUST be Positioned on a Firm, Well Ventilated Level Surface Away from Naked Flames, Grinding Sparks etc. and any possible contamination

ALL Covers and Panels etc. MUST in Position Before the Machine May be Used

Machine Data

For Your Safety

If the Machine Develops a Fault

- Park the machine in a safe area, if possible
- Remove the Start Switch Key
- Attach a warning tag to the machine
- Contact a qualified person to rectify the fault
- Do not place hands, arm etc. in any area where there is a hydraulic leak while the hydraulic system is pressurised

The Repair Area

- The repair area should be level, clean, dry and have adequate light and ventilation
- Keep the floor clean, wipe up spilt oil and grease
- Always use the correct tool for the job and ensure tools are kept in good condition
- Jacks, hoists, lifting chains and ropes should be checked before using. Do they have sufficient lifting capacity?
- Do not attempt to lift heavy objects on your own

When Repairing

- Prop an elevated skip
- Always wear eye protection
- Always wear ear protectors when grinding or working in a noisy environment
- Always wear goggles or a face mask when grinding or drilling
- Always wear the correct goggles or protector when welding or burning
- Release any pressure in the hydraulic circuit before carrying out hydraulic system repairs etc.
- Always block the wheels before carrying out any repairs
- If the machine is suspended or lifted always support the machine on adequate blocks
- Always remove the start switch key to stop accidental starting
- Never work with the engine running unless absolutely necessary
- Never start the engine unless the area is well ventilated
- Always exercise extreme caution when welding, grinding or burning, against fire risk. Ensure adequate fire extinguishers are available
- Never smoke or leave the engine running when refuelling
- Always use Genuine Benford Spare Parts
- Always test the machine thoroughly before putting it back to work

Observing these points will not make the repair of the machine safe but combined with the skill and knowledge of a trained fitter they will certainly help





Skip Prop Instructions

Swing Skip

- Elevate the skip fully and lift the skip prop into its upright position
- Lower the skip until the skip prop supports the skip

2, 3 and 4 Tonne Straight Skip

- Elevate the skip fully and remove the grip clip from the pin securing the prop in its storage position
- Remove the pin and lower the prop until the hole in the prop and chassis are aligned
- Push the pin through the holes and secure with the grip pin
- Lower the skip until the skip prop supports the skip
- When replacing the prop in its storage position ensure the pin is fitted from the outside to prevent it fouling on the front chassis



5, 6, 7 and 9 Tonne Straight Skip

• Elevate skip fully and remove the linch pins securing the props in their storage position

- Lower both props gently onto the extended rams
- Lower skip until skip props support the skip

Lubrication Notes



Beware of Scalding from Hot Oil Check Oil Temperature BEFORE Draining

Never Attempt to Tighten or Loosen Hydraulic Fittings when Engine is Running. Hydraulic Oil Leaking under High Pressure Can Easily Penetrate the Skin

- Clean machine before starting maintenance.
- Ensure machine is on solid, level ground before starting maintenance.
- Perform lubrication tasks in a clean area e.g. away from dust and grinding sparks etc.
- Remove start key before draining oils to prevent accidental starting.
- During maintenance ensure strict cleanliness is observed at all times.
- To avoid the risk of accidents use the correct tool for the job and keep tools clean.
- The draining of engine or hydraulic oil is best carried out when the oil is warm NOT hot.
- Any spilt oil must be cleaned up immediately.
- Use only CLEAN containers for oil and only CLEAN, FRESH oils and grease of the correct grade.
 - Contaminated Water / Fluids / Oils / Filters Must Be Disposed of Environmentally Safely

Cleaning

- Clean the dumper thoroughly, this will make it easier to find oil leaks and loose fittings etc.
- When cleaning the dumper down it is preferable to use a biodegradable cleaner. Do not use solvents or like products which can damage rubber and plastics.
- Take care to clean the oil and fuel tank filler necks.
- The area around drain plugs should also be cleaned.

Never Direct a Pressurised Water Jet on Electrical Equipment

Working on the Hydraulic System

Never Attempt to Tighten or Loosen Hydraulic Fittings when Engine is Running. Hydraulic Oil Leaks at High Pressure Can Easily Penetrate the Skin - If the Skin is Penetrated with Hydraulic Oil Seek Expert Medical Attention Immediately





If the Skin is Penetrated with Hydraulic Oil -Seek Expert Medical Attention Immediately





Battery

Before Attempting Any Major Maintenance Disconnect Battery

Battery Isolator

Battery Isolator must always be used when carrying out service/ maintenance work which would be dangerous if the engine was to be started or the machine electric system were to be activated.

When major maintenance work is being carried out, battery must be disconnected.

The battery isolator lever is removable when in the OFF position and may be used as an anti-vandal device when the machine is left for periods of time.

Use Isolator for Emergency Battery Isolation

Battery Maintenance

Disconnect Negative Battery Lead Connection First

- Always wear safety glasses when working on the battery.
- Always disconnect Negative (-) battery lead before disconnecting the Positive (+) battery lead.
- Always connect the Positive (+) battery lead first when reconnecting battery and ensure battery vent pipe is correctly fitted.
- Never allow metal objects to touch both battery terminals at same time or allow metal objects to touch Positive (+) terminal and frame.
- When charging the battery hydrogen gas is produced. Ensure the area is well ventilated to prevent the risk of explosion from a build up of hydrogen.
- Do not smoke, weld, cut, grind etc. in vicinity of a battery being charged.
- If the skin is exposed to battery electrolyte, the affected skin must be washed immediately with running water.
- If eyes are exposed to battery electrolyte wash eyes with running water and obtain immediate professional medical attention.



Gel Batteries - 9000 Dumper Only



The Special Battery Supplied with a 9000 Dumper Must NEVER be Replaced with a Conventional Lead / Acid Battery for Safety Reasons

Battery Maintenance

The machine is fitted with a special battery which should never be replaced with a conventional lead / acid battery.

Maintenance Free

- The battery is a completely sealed system which does not contain any free electrolyte.
- The battery electrolyte is all contained in thin microporous glass separators between the lead plates.
- The hydrogen and oxygen which form within the battery are automatically turned into water.
- You never need to top up the cells with water.
- Corrosion does not need to be cleaned off, because none forms on the terminals.

Safety

The design of the battery, with its electrolyte absorbed in microporous glass, makes it an extremely safe battery. It can be placed at all sorts of odd angles, even upside down, without any risk of leakage.

The risk of overcharging it is small, because the battery tolerates a wide variation in charge voltage and current. If, in spite of everything, it should happen to be incorrectly charged, its self-sealing safety valves would come into play and prevent an explosion.

The tough and robust design can withstand some very rough treatment. Even if the battery is damaged no electrolyte will leak out.

Care and Maintenance

Before carrying out any service or maintenance work ensure that all safety precautions have been taken, for example:

The Engine

See manufacturers handbook supplied with this vehicle.

Always follow instructions given in engine manufacturers handbook for servicing, and particularly when starting or stopping the engine.

Engine Air Cleaner Servicing

Daily

• Squeeze the dust ejector vent nozzle to remove dust build up in the air cleaner case.

Servicing

- To service air cleaner first clean its surrounding area and then loosen clamp holding the sediment cup to air cleaner.
- Remove the cup and clean it out. Remove the wing nut holding the filter element and extract the filter.
- Renew, or clean the element by carefully using compressed air to blow dust out of the filter. Reassemble by reversing the above procedures.



Cleaning Air Filter

On the underside of the air cleaner casing is the dust ejector vent nozzle. Squeeze thi rubber valve to remove dust build up in the air cleaner case. Failure to do this will mean the air filter element will clog very quickly.

The air cleaner elements should be cleaned by blowing gently with an airline from the inside, or tapping gently against a firm object.





Maximum engine protection against dust is possible only if the air cleaner is serviced at regular intervals. No hard and fast rules

apply to the regularity of servicing because operating conditions vary so much. The only way to determine if an air cleaner requires cleaning or replacing is to physically check it



Site Conditions Will Dictate Frequency of Element Replacement

Air Filter Location Depending on Engine Option



Checking Coolant Level - Perkins Only

Cleaning



• When the engine is cold open the radiator filler cap cover and undo the radiator cap.

• If the coolant level is more than 20 to 25mm from the bottom of the filler neck add coolant.

Draining Cooling System

- Ensure the engine is cold and undo the radiator cap cover.
- Undo the hose clip on the bottom radiator hose and pull the hose off the radiator.
- Remove the radiator cap and allow the coolant to drain into a suitable container.
- Refit the bottom hose and tighten the clip.

Refilling Cooling System

- Ensure the engine is cold.
- Add coolant to the radiator until the coolant level is just below the filler neck, allow time for the coolant to settle adding coolant as required.
- Start the engine and allow it to reach its operating temperature. When the water is hot in the radiator header tank and all trapped air has been expelled, stop the engine, allow to cool, and top up the coolant level.
- Replace radiator cap and lock radiator cap cover in position.
- Start the engine and allow it to run for 5 to 10 minutes.
- Allow the engine to cool down and recheck coolant level. Top up coolant as required.
- The coolant level should be 20 to 25mm below the bottom of the radiator filler neck.

See Technical Specification Section for Anti-Freeze Details

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Avoid Spraying Electrical Equipment with Pressure Washers

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



Contaminated Water / Fluids / Oils Must Be Disposed of Safely

Draining and Refilling Engine Oil



Ensure Engine Oil is Warm but NOT HOT!

- Ensure engine oil is warm but not hot. This will allow the old oil to drain quicker and more thoroughly.
- Place a suitable receptacle under the engine drain plug. See diagrams for drain plug location. The 5000, 6000, 7000 and 9000 Perkins engine models have a remote drain plug.

The Dumper MUST be On Firm Level Ground When Checking or Changing the Oil

- Unscrew the drain plug and allow the old engine oil to drain completely.
- Thoroughly wash the drain plug and renew the washer if fitted. Refit the drain plug.
- The engine oil filter **MUST** be changed when the engine oil is renewed. See *Engine Manufacturers* handbook.
- Add the correct grade and quantity of engine oil to the engine. See *Engine Manufacturers* handbook.

DO NOT OVERFILL

Start the engine and check for leaks.

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• Stop engine, leave for a few minutes and recheck engine oil level. Top up as required. **DO NOT OVERFILL.**



Contaminated Water / Fluids / Oils Must Be Disposed of Safely







Hydraulics

During **ANY** hydraulic maintenance extreme care should be taken to ensure the cleanliness of the hydraulic circuit. By observing strict hydraulic cleanliness the machine will benefit from fewer hydraulic failures through contamination. For example :

Always

- Thoroughly clean the machine before any maintenance.
- Use fresh, clean hydraulic oil from a sealed container.
- Ensure old gasket particles and excess sealing compound etc. do not enter the system. If they do clean them out.
- Ensure new parts and fittings are kept in sealed bags etc. and they are stored away from any contamination.
- Remove flaking paint from around the area being maintained.
- Use paper roll, not rag, to wipe parts.
- Inspect the inside of new tanks for welding debris, rust etc.

Never

- Fit new hoses if both ends have not been fitted with plastic caps.
- Fit new valves, pumps, motors, filters etc. if all the ports have not been plugged.
- Use dirty containers for oil storage.
- Use dirty containers or funnels for filling the hydraulic system.
- Store hydraulic components on the floor, in areas where welding or grinding is done, in a dirty environment etc.

Filters

A description of the hydraulics, and circuit diagrams are contained in this manual under the section headed *Hydraulic System*. The system components are maintenance free other than the suction strainer and return line filter. If the transmission has a transmission pump filter, it should be renewed at the intervals specified in the *Service Schedule* section.

When renewing these filters the area around the filter should be cleaned before removing the old filters to prevent the ingress of dirt into the hydraulic system

Whilst removing these parts it is recommended the system is drained and refilled with clean new hydraulic oil as specified on the lubrication chart in the *Lubrication* section. To drain hydraulic tank, see the following section.

Dispose of Waste Oil in an Environmentally Safe Way

Hydraulic System Maintenance - Metal Tanks

Return Line Filter Servicing

- Drain the hydraulic system
- Unscrew the filter bowl from the filter body
- Clean the contact face of the filter body
- Smear rubber sealing ring on new filter with clean oil or grease and screw the new filter to the filter body.
- Refill the hydraulic tank with the correct oil, see *Lubrication* section.
- Start the engine and check for leaks around the filter

Use Hand Pressure to Tighten Filter - Do Not Use ANY Mechanical Pressure filter adaptor plate

Suction Strainer Servicing

- Drain the hydraulic system, remove the hose and the four fixing bolts from the filter adaptor plate
- Extract the adaptor plate and suction filter from the hydraulic tank Replace or clean the suction strainer
- Clean gasket from mating faces of the adaptor plate and hydraulic tank. Do not allow the old gasket to enter the tank.
- Refit the adaptor plate to the tank using a new gasket and reconnect the hose.
- Refill the hydraulic tank with the correct oil, see *Maintenance* section
- Start the engine and check for leaks

Draining and Refilling Hydraulic Tank

- The return line filter must be changed when performing this operation. See *Return Line Filter Servicing*.
- Ensure the hydraulic oil is warm NOT HOT!
- Place a suitable receptacle under the drain plug.
- Remove the drain plug and allow the oil to drain into the receptacle. Thoroughly wash off all particles from the magnet on the drain plug.
- When the oil has finished draining, replace and tighten the plug.
- Refill the tank with clean, fresh oil.

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Hydraulic System Maintenance - Plastic Tanks



Always Position Machine On Firm, Level Ground When Checking Fluid Levels

Checking Hydraulic Oil Level

- To check the hydraulic oil level, stop the engine and unscrew the dipstick / breather and remove from the tank.
- Wipe all traces of oil from the dipstick with clean paper and replace. Remove the dipstick again and check the position of the oil level.
- There are two marks on the dipstick, never allow the oil level to go below the Minimum mark or above the Maximum mark.

Adding Hydraulic Oil

- When adding oil, ensure a clean container and fresh, new oil is used.
- See *Lubrication* section in this manual for correct grade of hydraulic oil.
- Unscrew the return filter cap, be careful not to lose the spring from under the cap. Pour the new oil through the return filter body. Use the dipstick to check the level frequently, until the oil level is at the upper mark.

Replacing Hydraulic Oil

Position machine on firm level ground.

- Before draining the hydraulic oil ensure it is warm but not hot.
- Loosen the hydraulic tank drain plug.
- Place a suitable receptacle of sufficient capacity under the hydraulic oil tank drain plug to catch the oil, and remove the drain plug.
- When oil has finished draining replace and tighten drain plug.
- Refill the hydraulic tank with the correct grade and quantity of hydraulic oil. See *Lubrication* section.

Return Filter

When changing this filter it is recommended the tank is drained and refilled with clean oil.

- Unscrew the cap from top of return filter, be careful not to lose the spring.
- Pull the return filter out from the filter body.
- Clean the inside of the filter body and insert a new filter.
- Renew the rubber sealing ring and lubricate with a little hydraulic oil.
- Position cap and spring in filter housing and fully tighten cap.

Suction Strainer

When changing this filter it is recommended the tank is removed and cleaned.

- Thoroughly clean the tank and surrounding area.
- Drain the hydraulic oil. Undo the hose clip on the suction strainer hose and pull the hose from the suction strainer.
- Unscrew the suction strainer from the tank.



Dispose of Waste Oil and Strainer in an Environmentally Safe Way

- Clean the suction filter tank mounting face.
- Screw in a new suction strainer using a new sealing washer, fully tighten.

Hydraulic Tank Removal

- Remove the engine centre cover and engine access doors.
- Thoroughly clean the tank and surrounding area.
- Drain the hydraulic oil.
- Remove the suction strainer hose and oil return hoses.
- Undo the four fixing nuts and bolts. Take care not to lose the spacers.
- Lift the tank out of the frame.
- Thoroughly clean the tank and surrounding area before refitting the tank.
- Refitting is the reversal of the above procedure.



Ensure Spacers are in Position BEFORE Tightening Bolts

• Refill the tank. Check for oil leaks.





Diesel System Maintenance - Plastic Tanks

Diesel Fuel Level

When Refuelling Stop the Engine and Beware of Naked Flames, Grinding Sparks etc.

• Check the diesel fuel level reaches the indicated maximum level on the tank top mounted level gauge. The gauge markings indicate when the tank is (E)mpty, half full or (F)ull.



- To refill, remove the large filler cap, and pour the recommended grade of fuel through the fuel strainer inside the filler neck. **NEVER overfill the fuel tank**.
- When refuelling never leave the engine running
- Ensure the engine is cool, the machine is in a well ventilated area and always use clean fuel from a clean container.

Fuel Filter

Servicing is limited to changing the filter.

- Read the engine manufacturers manual for detailed filter replacement instructions.
- Dispose of the filter canister in an environmentally safe way.

Removing Diesel Fuel Tank and Cleaning



Work in a Well Ventilated Area Away From Naked Flames, Sparks etc.

- Remove the engine centre cover and engine access doors.
- Clean the area around the tank thoroughly. Place a suitable container under the fuel tank and remove the drain plug. Allow the fuel to drain into the container. Replace and tighten the drain plug.
- Disconnect the spill pipe from the front of the tank and the feed pipe from the bottom of the tank.
- Unscrew the four bolts fixing the tank to the chassis and lift the tank out through the top of the frame. Take care not to lose the spacers.

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- Before refitting the tank, thoroughly clean the inside and outside of the tank and its mounting area.
- To refit the tank reverse the above procedure, ensure the spacers are in position before tightening the fixing nuts and bolts. Refill the tank with clean fuel and thoroughly check for fuel leaks.
- The fuel system will need 'bleeding' to remove all the air from the fuel system. See engine manufacturers handbook for detailed instructions on this task.

Cleaning Tank

- To clean the tank it should be thoroughly washed out with clean diesel fuel and dried.
- It is advisable to change the fuel filter when cleaning the inside of the diesel tank.

Ensure Spacers are in Position BEFORE Tightening Bolts



Brakes

Arrangements

Models 2 - 4 tonne have NEWAGE axles with oil immersed totally enclosed multi-plate brakes (4 plate front and 2 plate rear). Some models have braking on front axle only, see *Technical Data* section, others have brakes on both front and rear axles operating on independent hydraulic circuits giving dual circuit safety. 5, 6 and 7 tonne models have Newage axles and dual brake circuits with 2 plates front and rear. The 9 tonne model uses the PD70 ITL axles with dual brake circuits and 3 plates.

The brake system is charged with mineral oil, **NOT BRAKE FLUID**, via a fluid reservoir which is integral with the brake master cylinder. In the case of a single braked axle the master cylinder is of the single type whereas on the 2 braked axle system a tandem master cylinder is used to provide 2 completely independent circuits.

Normally adjustment of the brakes is unnecessary due to the automatic compensation which is built into the brake design, but bleeding of the system may be necessary on occasions if pipework is damaged causing system leakage.



Under NO circumstances allow conventional BRAKE FLUID to be added to the system and NEVER purge the system and refill with brake fluid, otherwise damage will occur to all the rubber sealing components in the brake system

The brakes on the range of machines provide means of effective braking with minimum maintenance, but it is vital during maintenance on the machine that the general condition of the system. i.e. pipework, pedal operation, fluid level and general oil tightness is checked and deficiencies corrected immediately





Brake Bleeding

Ensure only mineral hydraulic oil is used to bleed braking system

Procedure

- Remove master cylinder floor plate cover, 2 to 4 tonne, and the reservoir cap. The reservoir is located under the seat support on the 5, 6, 7 and 9 tonne. Ensure the reservoir is full.
- Remove dust cap from bleeder plug of the slave cylinders.
- Attach a length of 8mm (5/16") internal diameter, clear P.V.C. tubing to bleed valve. Place the other end of the tube into a jar containing hydraulic oil ensuring that the end of the tube is below the level of the oil.
- In the case of tandem master cylinders, always bleed the rear axle brakes first.
- Slacken off bleed valve on the axle then proceed to pressurise the system by pressing down the brake pedal repeatedly as far as it will go until all air is expelled from the system.

Top Up the Fluid Reservoir as Bleeding Proceeds

- With brake pedal pressed down, tighten bleed valve, then release the pedal. Remove tubing. Do not forget to replace dust cap.
- If the other axle has been serviced, repeat above sequence.
- Test system by applying maximum load to brake pedal for two or three minutes to ensure that there are no leaks in the system.
- Check fluid level in reservoir.
- Road test the dumper. Re-check brake system for leaks or damage.



Parking Brake - 2 and 3 Tonne (Including Swing Models)

The parking brake facility is incorporated into the brakes of the front axle and is self compensating.

The parking brake lever fitted, is of the over centre type, and if incorrectly adjusted can place excessive load on brake cable

Adjustment

- If the cable requires adjustment remove the plastic hand grip and slacken the locking grub screw.
- Turn the hand lever nut in a clockwise direction until the correct adjustment is achieved. Retighten the grub screw and replace the plastic grip.
- If further handbrake cable adjustment is required use adjuster nuts on the front axle

From March 2001

The handbrake linkage on the axle should be set up as shown in the diagram. When fitting the locknuts to the cable, approximately 5mm of thread should protrude through the locknuts.

When this linkage has been set up, the adjustment should be carried out from the handbrake lever as described above.





Transmission Parking Brake - Upto March 2001

4, 5, 6, 7 and 9 Tonne

The parking brake is mounted on the transmission between the gearbox and the transfer box, and can be accessed from the underside of the dumper. Wear can occur either by stretching of the handbrake cable, or wear on the disc pads themselves, causing a reduction in efficiency.

Adjustment

- Slacken locking bolt and screw in brake module until linings contact disc.
- Back off module until flat lines up with locking bolt. Tighten locking bolt.
- Remove retaining nut from piston and position operating lever as shown.
- Refit nut and tighten securely.
- Reconnect brake cable.

Transmission Parking Brake - From March 2001

5 to 9 Tonne

The parking brake is mounted on the transmission between the gearbox and the transfer box, and can be accessed from the underside of the dumper. Wear can occur either by stretching of the handbrake cable, or wear on the disc pads themselves, causing a reduction in efficiency.

Adjustment

- Slacken the locknuts on the handbrake cable.
- Tighten the lower nut until the linings contact the brake disc and prevent the disc from turning easily.
- Slacken the nut off until the brake disc turns freely without any friction on the brake disc.
- Tighten the locknuts and check the brake disc still turns freely.
- Any further adjustment should be done using the handbrake lever, as described previously.





Front and Rear Axles

Totally enclosed sealed multi-plate brake axles are fitted, which have automatic compensation for wear of the friction discs. Normal servicing is limited to lubrication as detailed in the schedule in the *Maintenance* section, details of procedures for major repairs may be obtained from the manufacturer.

Over a period of time wear may necessitate replacement of the friction discs and/or the slave cylinder seals. These parts should be replaced as required and the system bled in accordance with the brake bleeding instructions in the *Brakes* section.



Checking Axle Oil Level

- Position the machine on level ground.
- Clean dirt from around oil level / filler plug.
- Remove the oil level / filler plug.
- The oil level should be level with the bottom of the oil level / filler plug hole.
- Add the specified oil, as required, until the oil begins to run out of oil level / filler plug hole. See *Lubrication Points and Lubricants* section for correct oil.
- Refit the filler plug.



Changing Axle Oil

- Ensure axle oil is warm *Not Hot*, to facilitate draining. Position the machine on level ground.
- Clean dirt from around drain plug and oil level / filler plug.
- Place a suitable container of adequate size under the drain plug.
- Remove the oil level / filler plug and remove the drain plug. Allow the oil to drain.
- Refit the drain plug.
- Refill the axle through the filler hole until the oil in axle is level with the bottom of the filler plug hole. See *Lubrication Points and Lubricants* section for correct oil.
- Refit the filler plug.



Contaminated Water / Fluids / Oils Must Be Disposed of Safely

Front Axle

Removal

- Ensure the machine is positioned on firm, level ground and the handbrake is ON and the rear wheels are chocked.
- Elevate the skip and **PROP**. Clean the area around the front axle and front frame.
- Loosen the front wheel nuts.
- Lift and support the front of the dumper so front wheels are just clear of the floor. Leave a 'trolley' jack positioned unde the centre of the axle this will be used to lower and pull the axle from under the dumper.
- Remove the front propshaft from the axle drive flange and lower the front of the propshaft on to the ground.
- Clamp the front flexible brake pipe at the centre pivot.
- Disconnect the brake pipe from the front axle and cap the open ends.



- Remove the handbrake cable from the axle.
- Loosen the eight nuts and bolts fixing the axle to the front frame and remove the two front wheels.
- Undo the eight nuts and bolts fixing the axle to the front frame and lower the axle on the trolley jack.
- Pull the axle from under the dumper.



Under NO circumstances allow conventional BRAKE FLUID to be added to the system and NEVER purge the system and refill with brake fluid, otherwise damage will occur to all the rubber sealing components in the brake system

Refitting

- Ensure the axle and axle mounting faces are clean.
- Push the axle into position under the front of the dumper using a 'trolley' jack.
- Lift the axle into position. Place new bolts through the frame mounting pads ensuring they fit into their respective grooves in the axle casing or holes in the mounting pads.

Pre March/April 2001

Place the bottom mounting plates into position on the bolts, fit new nuts and washers and tighten the nuts evenly until the axle is in its correct position, tight against the front frame.

- Refit the wheels tighten the wheels nuts until wheels are firmly held. When the machine is lowered to the ground the wheel nuts must be torqued to the recommended torque see *Torque Figures* section.
- Torque the axle mounting nuts to the correct torque 216 Nm.
- Remove the plugs and refit the brake pipe, release the clamp on the flexible brake at the centre pivot.
- Refit the handbrake cable and adjust see the *Brakes* section.
- Refit the propshaft.
- Lift the front of the dumper off the supports, remove the supports and lower the machine to the ground.
- Bleed the brakes see the Brakes section.
- Torque the wheels nuts. See the *Torque Figures* section for the wheel nut torques.
- Lower the skip and check the machine is in working condition.







Rear Axle

Wheels and Tyres

Removal

- Ensure the machine is positioned on firm, level ground and the handbrake is ON and the front wheels are chocked.
- Clean the area around the rear axle and frame. Loosen the rear wheel nuts.
- Lift and support the rear of the dumper so rear wheels are just clear of the floor. Leave a 'trolley' jack positioned unde the centre of the axle this will be used to lower and pull the axle from under the dumper.
- Remove the rear propshaft from the axle drive flange and lower the rear of the propshaft on to the ground.
- Disconnect the brake pipe from the rear axle and cap the open ends.
- Loosen the eight nuts and bolts fixing the axle to the front frame and remove the two rear wheels.
- Undo the eight nuts and bolts fixing the axle to the rear frame and lower the axle on the trolley jack. Pull the axle from under the dumper.



Under NO circumstances allow conventional BRAKE FLUID to be added to the system and NEVER purge the system and refill with brake fluid, otherwise damage will occur to all the rubber sealing components in the brake system

Refitting

- Ensure the axle and axle mounting faces are clean. Push the axle into position under the rear of the dumper using a 'trolley' jack.
- Lift the axle into position. Place new bolts through the frame mounting pads. Fit new bolts, nuts and washers and tighten the nuts evenly until the axle is in its correct position, tight against the rear frame.
- Refit the wheels tighten the wheels nuts until wheels are firmly held. When the machine is lowered to the ground the wheel nuts must be torqued to the recommended torque.
- Torque the axle mounting nuts to the correct torque 216 Nm
- Remove the plugs and refit the brake pipe, release the clamp on the flexible brake at the centre pivot.
- Refit the propshaft.

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- Lift the rear of the dumper off the supports, remove the supports and lower the machine to the ground.
- Bleed the brakes see the *Brakes* section.
- See the *Wheel Torque* table in the *Technical Data* section for the wheel nut torques and torque the wheels nuts.
- Check the machine is in working condition.

Check the tyres regularly for damage by cuts and embedded particles, i.e. nails, steel, glass etc. and check / adjust the pressures weekly. See *Technical Data* section for tyre pressures.





Lowering tyre pressures below the stated level can improve traction in difficult ground conditions, but the loads carried must be reduced pro-rata to avoid tyre wall damage

Gearbox

Due to the complexity of the Shuttle Gearbox only routine servicing tasks are described for this gearbox in this manual.

Removing Gearbox

Models 2 and 3 Tonne Straight and Swing Skips

Before removing the gearbox the machine must be cleaned and positioned on firm level ground. The wheels must also be chocked to prevent the machine moving.

CAUTION - Engine / Gearbox Assembly Uses a 3 Point Mounting Arrangement

- Remove the complete floor plate.
- Remove the battery.
- Place a wooden wedge or similar between the engine bed plate and the front of the engine to support the engine when the gearbox is being removed.
- Remove the split and clevis pin from the clutch operating rod on the gearbox end.

- Undo and remove the two nuts and bolts, joining the two gearbox side brackets, located on the top of the gearbox.
- Undo the nuts fixing the gearbox side brackets to the gearbox.
- Remove the return line filter, complete with bracket, and allow it to hang safely out of the way. Remove the left hand gearbox bracket.
- Undo the four nuts and bolts fixing the anti-vibration mount crossmember to the rear frame and lift the crossmember, complete with the right hand gearbox side bracket, out of the frame.
- Remove propshaft nuts and bolts, from the gearbox end, and allow propshaft to hang from the transfer box.
- Place a suitable sling under the gearbox and attach to a lifting device. Take the weight of the gearbox / engine assembly on the lifting device.
- Remove the eight setscrews, fixing the gearbox to the engine, from around the bell housing. Leave one of the two top setscrews until the gearbox is ready to be lifted out.
- Remove the last bell housing setscrew and pull the gearbox away from the engine.
- When gearbox is free from the engine lift out of the frame, turn the gearbox through 90° when lifting to facilitate removal.



Refitting Gearbox

Before Refitting Gearbox Ensure ALL Worn and Damaged Components Have Been Replaced

- Clean inside bell housing and check for gearbox oil leaks. Also check the spigot bearing in the end of the crankshaft is free from damage and wear, replace as necessary.
- Lower the gearbox into the frame and enter the first motion shaft into the crankshaft spigot bearing.
- Ensure the gearbox is in gear and the gearbox is in line vertically and horizontally with the engine. When the splines of the first motion shaft are against the splines in the clutch plate turn the gearbox output flange to align the splines. When the splines are aligned push the gearbox fully into position.
- Turn the gearbox to align the bell housing and engine fixing holes, refit the eight setscrews around the bell housing and tighten. Refit the propshaft.

- Loosely refit the anti-vibration crossmember complete with the right hand gearbox bracket. Fit the left hand gearbox mount and return line filter bracket. refit the two nuts and bolts holding the gearbox side brackets together at the top of the gearbox.
- Take the weight of the gearbox / engine assembly and remove the piece of wood supporting the front of the engine.
- When all the fixings are in place, fully tighten the side bracket nuts, the two top nuts and bolts and the four nuts and bolts holding the anti-vibration crossmember.
- Remove the lifting sling.
- Replace the clutch operating rod. Adjust as necessary.
- Replace the battery and reconnect.
- Replace the floorplate.
- Road test the machine and rectify any problems.

Make Sure the Clutch Pedal Start Inhibitor is Working Correctly



Gearbox and Transfer Box

Three types of gearbox are used on the range of machines plus a transfer box which has 2 varying ratios. The appropriate combination for each is as below. **NO** adjustments are necessary to any of these units, all that is required is adherence to the lubrication schedule in the *Maintenance* section.

Check All Oil Levels with Machine on Flat Ground

Newage Gearbox

- Ensure axle oil is warm *Not Hot!*, to facilitate draining. Position the machine on level ground.
- Clean dirt from around drain plug and the filler/dipstick.
- Place a suitable container of adequate size under drain plug.
- Remove filler/dipstick and remove drain plug. Allow the oil to drain.
- Refit the drain plug.
- Refill the gearbox through the filler hole, with the correct grade of oil, until the oil level reaches the full mark on the dipstick.



Newage Transfer Boxes

- Ensure transfer box oil is warm *Not Hot!*, to facilitate draining. Position the machine on level ground.
- Clean dirt from around drain and filler plugs.
- Place a suitable container of adequate size under drain plug.
- Remove filler and drain plug. Allow the oil to drain.
- Refit the drain plug and tighten.
- Refill the transfer box through the filler hole, with the correct grade of oil, until the oil begins to flow from the levelfiller hole.
- Replace the plug and tighten.











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Turner Shuttle Gearbox - 4, 5, 6, 7 and 9 Tonne Only



If Towed, Disconnect Top Drive Propshaft to Prevent Gearbox Oil Starvation Failure to Observe this Instruction May Cause Extensive Gearbox Damage

The only routine maintenance required is weekly checking of gearbox oil level using the screw in dipstick accessed through the removable cover plate to left of gearlever, and changing oil at the specified intervals, as detailed in the *Maintenance* section. Ensure oil cooler is full by running engine for a few seconds prior to checking oil level.



Check Oil Level with the Engine Running at IDLE Speed and the Transmission in Neutral

When draining gearbox oil the oil should be warm but *not hot!*. Ensure container used to drain the oil into is of sufficient capacity to hold the oil.

The oil should initially be changed between the first 25 and 100 hours running time, also the filter should be changed and the suction strainer cleaned. Thereafter, regular oil and filter changes are recommended at 750 hour intervals.

Renewing Gearbox Oil Filter

- Thoroughly clean the area around the filter. Unscrew the filter bowl from the filter body and clean the contact face of the filter body
- Smear rubber sealing ring on new filter with clean oil or grease and screw the new filter to the filter body. After refilling the gearbox, drive the dumper and check for oil leaks.

Use Hand Pressure to Tighten Filter

- Do Not Use ANY Mechanical Pressure

Suction Strainer

- Remove the two fixing bolts and withdraw the strainer.
- Wash the strainer, dry thoroughly.
- Refit to the gearbox using new seals.

Turner Shuttle Gearbox Lubrication

To ensure proper lubrication and operating temperatures it is most important that appropriate lubricants are used and that the correct oil level is maintained.

Oil Level Checking

The oil level should be checked daily and corrected if necessary.

The oil level must be checked with the engine idling and with the transmission oil cold. In this condition the oil level should fall between the Max and Min marks on the dipstick.

At normal operating temperature, (80°C.) the oil level will rise to 20 - 30 mm above the Max. mark on the dipstick.

Do not overfill the transmission as this may result in oil breakdown due to excessive heat and aeration from the churning action of the gears.

Early breakdown of the oil will result in heavy sludge deposits that block oil ports and build up on splines and bearings. Over filling may also cause oil leaks.

Oil Changes

An initial oil change and flush is recommended after the transmission is placed in actual service. This change should be made at any time following 50 hours in service, but should not exceed 100 hours. An oil change and flush should be scheduled for every subsequent 750 hours of operation. When changing the oil it is essential to renew the oil filter and clean out the suction strainer. The object in draining the oil is to eliminate possible bearing surface abrasion and attendant wear. Minute particles of metal, the result of normal wear in service are deposited in and circulated with the oil. Oil changes are best carried out when the transmission is thoroughly warm - NOT HOT!

Caution : Towing

To prevent oil starvation and possible seizure of the transmission whilst towing vehicle, it is imperative that the propeller shafts are disconnected. Failure to observe this precaution may result in extensive damage to transmission

The Clutch

Models 2 and 3 Tonne Straight and Swing Skips

Clutch Type

230mm (9in) Spring Centre type

Spring Centre Clutch

The clutch is set up correctly on its initial build, but bedding in of the friction surfaces may necessitate adjustment to remove excessive free pedal travel after a few hours use. Subsequent adjustments will be at lengthy intervals if the machine is used correctly and the clutch is not abused by slipping.

Routine Adjustment

Adjustment stops 1 and 2 are preset and normally require no adjustment.

When correctly adjusted, the clutch pedal should have 20-25mm of free pedal movement before resistance is felt.

In order to obtain the correct 20-25mm free pedal travel :-

- Slacken both locknuts on the clutch operating rod.
- Turn the operating rod in the correct direction to reduce or increase the effective length of the operating rod until pedal travel is correct. Retighten the locknut.
- If greater clutch adjustment is required remove pinch bolt and clutch arm from the serrated clutch withdrawal shaft which passes through the bell housing.
 - Reposition the lever arm on shaft after moving it clockwise one serration. Refit pinch bolt and tighten. Repeat the instructions for adjustment as above.





Take great care when repositioning clutch arm as only a small movement of this lever can seriously affect clutch performance

Clutch Replacment - Models 2 and 3 Tonne Straight and Swing Skips

Before carrying out the following procedure it is advisable to thoroughly clean the machine.

- Remove the gearbox, see Gearbox Section.
- Slacken the six setscrews around the clutch cover. Once the setscrews have been loosened undo them in a diagonally opposite sequence, two turns at a time until the clutch cover is loose.
- Remove all the setscrews, the clutch cover and the clutch plate.
- Check for oil leaks from the rear of the engine and from inside the clutch bell housing. If there are leaks they must be rectified before fitting a new clutch assembly.

ALL Worn Components MUST be Replaced

- It is advisable to renew the Clutch Plate, Cover and Release Bearing when servicing clutch.
- Clean and check the engine flywheel fitted to the engine crankshaft, and check the primary shaft spigot bearing for wear - replace as necessary.

When replacing the spigot bearing, care must be taken to use the correct size drift or damage to the bearing may occur preventing the aligning tool from entering the bearing. The outside bearing face must be level with the face of the mating flywheel.

If problems, other than wear, have been experienced with the clutch the engine flywheel should be checked for run out using a dial gauge. The crankshaft endfloat should also be checked using a dial gauge. These procedures are beyond the scope of this manual and reference should be made to the engine manufacturers workshop manual.

- Place a clutch alignment tool through the new clutch plate, ensuring the plate is the correct way round - *Flywheel Side* is stamped on the metal just below the clutch lining, and fit the alignment tool into the spigot bearing.
- Clean the contact face of the new clutch cover with petrol to remove all traces of grease.
- Place the clutch cover over the alignment tool and position on the two dowels.
- Hold in position using six new setscrews and washers. Screw in until resistance is felt.
- Tighten the setscrews in a diagonally opposite sequence, two turns at a time until the setscrews are tight.
- Use a torque wrench to finally tighten the setscrews to 23.5 Nm. (17 lbs/ft.)
- Renew the release bearing, if necessary. Ensure the locking spring is located correctly in the indent on the operating fork.
- Refit the gearbox, see *Gearbox Section*.







Chassis

The two part chassis is of the centre pivot articulating type and is of a design which enables both front and rear axles to be attached directly to the chassis members.

The front and rear frames are connected in the middle by a vertical pivot in spherical bearings and a horizontal link, which connects between the spherical bearing of the vertical pivot and an additional spherical bearing located in the rear frame.

This arrangement is illustrated in the diagram below and shows full movement of the chassis in both horizontal and vertical planes, thus ensuring maximum wheel adhesion at all times.



Centre Pivot

Lubrication of the three bearings in the assembly is important and should be carried out weekly in accordance with the schedule in the *Maintenance* section. Protective caps are fitted over the pivot bearing housing's and these should be replaced in the event of damage to avoid ingress of dirt and moisture to the bearings.





Overhauling Centre Pivot

Before commencing work it is advisable to clean/wash down the dumper especially where parts are to be removed and reused.

Only Work with the Dumper on Solid, Level Ground

Removing Skip

Chock the Rear Wheels to Prevent Dumper Rolling

- Use dumper hydraulics to lift skip to its full dump position. Stop engine.
- Using suitable lifting gear, support weight of the skip a lifting hole is provided at the back of the skip for this purpose.
- Drain hydraulic tank into a suitable container. Refit drain plug after draining.
- Remove the skip pivot pins and ram pivot pin on skip.
 Support skip ram and knock out its pivot pin.
 Remove remaining two skip pivot pins. Lift skip away.



DANGER - The Skip May Swing on the Lifting Gear as the Last Pin is Removed

- Disconnect battery earth lead.
- Disconnect front drive shaft from drop box flange. Let drive shaft rest on the ground.
- Disconnect steering ram at the front chassis by removing the 36mm A/F hexagon head pin and 30mm A/F self locking nut.
- Clamp the flexible brake hose to prevent loss of oil. Disconnect front metal brake pipe - see diagram.
- Disconnect handbrake cable from front axle and pull cable clear of the front chassis.

Supporting Rear and Front Chassis

- Fit supports to each corner of rear chassis to prevent chassis tipping when the front chassis is removed.
- Attach suitable lifting gear to front chassis as shown, use centre pivot tube for rear attachment point.

If the Front Axle is Left Attached to the Chassis Extreme Care Must be Taken to Prevent the Rear of the Front Chassis Turning About the Axle Pay particular attention to the hydraulic and brake line connections which should be thoroughly cleaned to stop dirt from entering the systems. Any open hydraulic / brake connections on the machine should be plugged / capped when the disconnection is made.









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Dismantling Centre Pivot

- Remove the two plastic dust caps from top and bottom of the centre pivot pin.
- Remove the 1.7/8" A/F nut from top of the centre pivot.

Note : This nut has been torqued to 1,090 Nm.

- Slacken the two clamping screws in the side of front chassis centre pivot tube to release centre pivot pin. Tap chassis pivot pin downwards through chassis.
- Remove the clamping washer, two gaiters and two thrust washers from each side of the centre pivot tube.
- Move front chassis away from axle and rear chassis.
- Clean centre pivot and renew all worn and damaged parts.

Re-Assembling Centre Pivot

- Align front chassis centre pivot with rear chassis and fit centre pivot thrust washers and gaiters to top and bottom of the pivot tube / bearings.
- With all pivots and top link aligned insert the centre pivot pin from the bottom up.
- Align the flats machined on pin with clamping screws in front chassis pivot tube. Tighten clamp screws sufficiently to prevent pin rotating.
- Refit flat washer and self locking nut to top of centre pivot pin. Fully tighten centre pivot pin nut and torque to 1,085 Nm.on the 2 to 4 tonne dumpers and 1,620 Nm on the 5 to 9 tonne dumpers. Fully tighten centre pivot pin clamp screws.
- Refit plastic dust caps to top and bottom centre pivot pin nuts.
- Reconnect steering ram to front chassis with original pin and nut. Torque nut to 283 Nm.
- Reconnect front drive shaft to transfer box flange. Use four new 7/16"UNF x 1.3/16" bolts and nyloc nuts, tighten to 81 Nm.
- Refit front axle if it has been removed. Tighten front axle to chassis bolts to 216 Nm. Refit handbrake cable.
- Reconnect front brake hydraulic piping. Remove clamp from flexible brake pipe. Bleed air from braking system, see *Brake* section for correct procedure.



Only use Mineral Oil (Hydraulic Oil) for Topping Up Brake System

 Reconnect all hydraulic pipes and refill hydraulic tank with clean, fresh oil - see *Lubrication* section for correct grade and quantity.

Refitting Skip

- With suitable lifting gear position skip on dumper and fit new pivot pins. Centralise skip so skip ram lies centrally between stiffening ribs on the bottom of the skip. With the skip in this position determine the number of large washers required to pack out the clearances on the skip pivot pins see diagram below.
- Remove skip pivot pins, one at a time, and fit the large washers in their correct positions. Refit new pivot pin and retain with washer and split pin supplied. Align the hole in the head of the pin with the tapped hole in skip. Fit M8x25 setscrew and spring washer to prevent the pin from rotating.
- Position skip ram at its skip location and fit new pivot pin. Align pin so its cross drilled hole mates with the cross drilled hole in skip pivot boss. Retain pin with an 8mm x 75mm split pin.





Finally

- Grease all pivot pins, bearings and grease points. Remove any blocks and jacks from around dumper.
- Re-connect battery.
- Start engine and run at idle, check for any hydraulic leaks.



The skip may act unpredictably while air exists in the hydraulic circuit Before operating skip ensure area around skip is clear of obstructions and people

- To remove air from the hydraulic circuit operate skip ram to its extremes of movement until the operation is smooth.
- If operation of control valve lever does not match direction of movement of the skip; stop engine, operate the control valve lever to remove trapped air and pressure in hydraulic circuit, swap over hose connections.
- Restart engine and check operation of skip again, check for and correct any hydraulic leaks.

Straight Skip Adjustment

The skip has 2 adjustment stops located on the front frame outrigger supports. These stops require adjustment to ensure the skip is supported by the chassis and does not rest on the hydraulic ram The clearance between the chassis and skip at the closest point should be a minimum of 10 mm (0.39"). Adjust the height by shimming as shown below.



Preservation and Storage

If machine is to be stored for a long period of time the following procedures should be applied :

- Thoroughly wash down the exterior of the machine and remove any build up of material
- Grease all greasing points
- Start the engine and warm it up. Drain engine oil and refill with clean fresh oil to the correct specification. See engine manufacturers handbook for further information on prolonged engine storage with regards to anti-corrosion oils and fluids.
- Check the hydraulic oil level and top up as required
- Store the machine on solid level ground which is not liable to flooding, standing water or airborne contamination.
- Smear any exposed metal parts with grease
- Leave the parking brake in the off position



Chock the Wheels Securely to Prevent the Dumper Moving

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Finally



Make Sure this Instruction Manual is Placed in its Container on Engine Canopy




Maintenance

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2000 to 9000

Four Wheel Drive Dumpers

Mechanical Drive Only

Including

2000, 3000, 4000, 5000 and 6000 Swing Lubrication Section

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Machine Documents



IMPORTANT

This Instruction Manual and machine documents MUST be kept in the manual holder provided to allow the Operators to have immediate access to the information contained in the manual



Brake Fluid



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Under NO circumstances allow conventional BRAKE FLUID to be added to the system and also NEVER purge the system and refill with brake fluid, otherwise damage will occur to all the rubber sealing components in the brake system



When Checking Liquid Levels, Machine MUST be Positioned on a Firm, Well Ventilated Level Surface Away from Naked Flames, Grinding Sparks etc. and any possible contamination

ALL Covers and Panels etc. MUST in Position Before the Machine May be Used

For Your Safety

If the Machine Develops a Fault

- Park the machine in a safe area, if possible
- Remove the Start Switch Key
- Attach a warning tag to the machine
- Contact a qualified person to rectify the fault
- Do not place hands, arm etc. in any area where there is a hydraulic leak while the hydraulic system is pressurised

The Repair Area

- The repair area should be level, clean, dry and have adequate light and ventilation
- Keep the floor clean, wipe up spilt oil and grease
- Always use the correct tool for the job and ensure tools are kept in good condition
- Jacks, hoists, lifting chains and ropes should be checked before using. Do they have sufficient lifting capacity?
- Do not attempt to lift heavy objects on your own

When Repairing

- Prop an elevated skip
- Always wear eye protection
- Always wear ear protectors when grinding or working in a noisy environment
- Always wear goggles or a face mask when grinding or drilling
- Always wear the correct goggles or protector when welding or burning
- Release any pressure in the hydraulic circuit before carrying out hydraulic system repairs etc.
- Always block the wheels before carrying out any repairs
- If the machine is suspended or lifted always support the machine on adequate blocks
- Always remove the start switch key to stop accidental starting
- Never work with the engine running unless absolutely necessary
- Never start the engine unless the area is well ventilated
- Always exercise extreme caution when welding, grinding or burning, against fire risk. Ensure adequate fire extinguishers are available
- Never smoke or leave the engine running when refuelling
- Always use Genuine Benford Spare Parts
- Always test the machine thoroughly before putting it back to work

Observing these points will not make the repair of the machine safe but combined with the skill and knowledge of a trained fitter they will certainly help

Skip Prop Instructions



Swing Skip

• Elevate the skip fully and lift the skip prop into its upright position. Lower skip until the skip prop supports the skip.



Early 5, 6, 7 and 9 Tonne Straight Skip

• Elevate skip fully, remove linch pins securing props in their storage position. Lower both props gently onto the extended rams. Lower skip until skip props support the skip.

2, 3, and 4 Tonne Straight Skip Including 9 Tonne from August 2002





- Once the skip has been fully elevated, remove the upper grip clips from both skip props in turn.
- Remove the pins and allow the props to enter the lock positions on the front chassis.
- Position the pins through the holes in the front chassis and through the corresponding holes in the props. When pushed fully through, push the grip clips securely through the locking pins.



Lubrication

Lubrication Notes



Beware of Scalding from Hot Oil Check Oil Temperature BEFORE Draining

Never Attempt to Tighten or Loosen Hydraulic Fittings when Engine is Running. Hydraulic Oil Leaking under High Pressure Can Easily Penetrate the Skin

- Clean machine before starting maintenance.
- Ensure machine is on solid, level ground before starting maintenance.
- Perform lubrication tasks in a clean area e.g. away from dust and grinding sparks etc.
- Remove start key before draining oils to prevent accidental starting.
- During maintenance ensure strict cleanliness is observed at all times.
- To avoid the risk of accidents use the correct tool for the job and keep tools clean.
- The draining of engine or hydraulic oil is best carried out when the oil is warm NOT hot.
- Any spilt oil must be cleaned up immediately.
- Use only CLEAN containers for oil and only CLEAN, FRESH oils and grease of the correct grade.

Contaminated Water / Fluids / Oils / Filters Must Be Disposed of Environmentally Safely

Cleaning

- Clean the dumper thoroughly, this will make it easier to find oil leaks and loose fittings etc.
- When cleaning the dumper down it is preferable to use a biodegradable cleaner. Do not use solvents or like products which can damage rubber and plastics.
- Take care to clean the oil and fuel tank filler necks.
- The area around drain plugs should also be cleaned.

Never Direct a Pressurised Water Jet on Electrical Equipment

Working on the Hydraulic System

Never Attempt to Tighten or Loosen Hydraulic Fittings when Engine is Running. Hydraulic Oil Leaks at High Pressure Can Easily Penetrate the Skin - If the Skin is Penetrated with Hydraulic Oil Seek Expert Medical Attention Immediately





If the Skin is Penetrated with Hydraulic Oil - Seek Expert Medical Attention Immediately

Lubrication

Service Schedule

The following service schedules are for guidance only. Under extreme operating conditions the service schedules should be adjusted accordingly to allow for the local working environment. Before carrying out any service or maintenance work ensure ALL safety precautions have been taken. Always follow the instructions given in the engine manufacturers handbook when servicing, adjusting and especially when starting and stopping the engine.

ALL Faults MUST be Reported Immediately and Corrected BEFORE the Machine is Used

10 Hours	Check tyre condition and pressures. Check ROPS for damage etc. Report ALL faults immediately. Check seat belt. Squeeze the air cleaner dust ejector. Remove filter and clean in dusty environments. Check fuel tank - NEVER allow the fuel tank to empty. Fill at the end of each shift. Check engine oil and top up as necessary. Check hydraulic oil. Check all warning lights and gauges are working correctly. Check alternator belt - if fitted. Check engine coolant level - if applicable. Check brake fluid reservoir level. Check start inhibitors are functioning correctly. Check skip prop is working satisfactorily. Visually check machine for fluid leaks, damage, missing parts, unreadable safety transfers etc.
50 Hours	Drain fuel filter sediment bowl. Lubricate the centre pivot - If fitted. Use Texaco Multifac EP2 Grease. Lubricate all other grease nipples - see lubrication chart. Check gearbox and transfer box oil levels. Oil all control pivots, e.g. throttle, tipping, ram links. Check handbrake adjustment. Check wheel nut torque. Check, clean and grease battery connections. Check for air leaks on the air inlet/filter system. Repair as necessary.
250 Hours	Drain engine and refill with fresh, clean oil. Replace engine oil filter. Check front and rear axle oil levels - top up as necessary. Check tightness of centre pivot lock screws - if fitted. Check hose lines for chaffing, adjust as necessary. Check steering lock bar is fitted and works - if applicable.
500 Hours	Replace fuel filter element. Drain gearbox oil and refill with clean, fresh oil. Clean gearbox suction strainer if fitted. Replace gearbox filter element - if fitted. Drain transfer box and refill with clean, fresh oil. Change hydraulic filter(s). Drain and clean fuel tank. Drain hydraulic tank and clean hydraulic suction strainer. Renew return line and transmission filters - hydrostatic machines only. Refill hydraulic system with clean, fresh oil. Drain front and rear axles and refill with clean, fresh oil. Check battery electrolyte levels. Check engine coolant antifreeze / water ratio - especially in sub zero conditions.
1000 Hours	Drain and replace engine coolant. Check axle location bolts. Check centre pivot pin nut torque setting.



Lubrication Points and Lubricants 2, 3 and 4 Tonne Straight



Lubrication

Lubrication Points and Lubricants 2, 3, 4, 5 and 6 Tonne Swing



...... SAE 15W/40 - 4, 5 & 6 Tonne & 2/3 Tonne Deutz



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2000 to 9000

Four Wheel Drive Dumpers

Mechanical Drive Only

Including

2000, 3000, 4000, 5000 and 6000 Swing Technical Specification

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July 2001 - 9507E/4

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Vibration Declaration

Whole Body Vibration Level a_w(m/s²) : - 0.7 - 0.8 Typical *

* Note :- The absence of a harmonised test code together with the variable conditions under which this equipment may be used allows only representative figures to be quoted.

Hand/Arm vibration level $a_{ha}(m/s^2)$: - Less than 2.5

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Dimensions and Weights - 2 to 9 Tonne Straight Skip Dumpers



B = Overall Width

G = Overall Height with ROP's

Dimensions = mm	А	в	с	D	E	F	G	Weight (wet) kg
2000	3,485	1,860	1,895	1,830	1,270	275	2,625	1,770
3000	3,755	1,950	1,925	1,950	1,400	290	2,660	2,125
4000	3,880	2,170	2,020	2,100	1,460	330	2,795	3,200
5000	4,270	2,250	2,050	2,450	1,500	308	2,835	3,560
6000	4,320	2,350	2,100	2,450	1,600	358	2,910	3,980
7000	4,320	2,500	2,100	2,450	1,600	358	2,910	4,210
9000	4,330	2,500	2,532	2,450	1,722	338	3,282	4,860





Dimensions = mm	А	В	с	D	Е	F	G	Discharge Height	Weight (wet) kg
2000 Swing	3,485	1,860	1,770	1,830	1,270	275	2,625	1,000	2,080
3000 Swing	3,755	1,950	1,800	1,970	1,400	290	2,660	1,100	2,380
4000 Swing	3,880	1,980	2,020	2,100	1,550	330	2,795	1,030	3,200
5000 Swing	4,550	2,075	2,050	2,450	1,720	308	2,835	1,060	4,065
6000 Swing	4,590	2,170	2,100	2,450	1,755	358	2,910	1,100	4,295

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Engine Rating

	Engine	k.W.	h.p.	@ R.P.M.
2000	Lister/Petter TS2 Deutz F2L1011 Hatz 2L31S	17.40 19.50 18.30	23.40 26.20 24.60	2,500
2000 Swing	Lister/Petter TS2 Deutz F2L1011 Hatz 2L31S	17.40 19.50 18.30	23.40 26.20 24.60	2,500
3000	Lister/Petter TS3 Deutz F3L1011 Hatz 2L40S	26.10 29.00 22.15	35.00 39.00 29.70	2,500
3000 Swing	Lister/Petter TS3 Deutz F3L1011 Hatz 2L40S	26.10 29.00 22.15	35.00 39.00 29.70	2,500
4000 & Swing	Perkins D3-1524	38.80	52.00	2,500
5000 & Swing	Perkins 1004-4 / 1004-42 Deutz F4L913	57.70 / 60.00 56.00	77.00 / 80.00 75.00	2,200 2,300
6000 & Swing	Perkins 1004-4 / 1004-42 Deutz F4L913	57.70 / 60.00 56.00	77.00 / 80.00 75.00	2,200 2,300
7000	Perkins 1004-4 / 1004-42 Perkins 1004-4T / 1004-40T	57.70 / 60.00 79.00	77.00 / 80.00 106.00 / 102.00	2,200
9000	Perkins 1004-4T / 1004-40T	79.00 / 74.50	106.00 / 99.00	2,200

Skip Capacities - 1 litre = 0.001 Cubic Metre

	Pay Kg	load Ibs	Water Level litres	Struck Level litres	Heaped litres
2000	2,000	4,400	910	1,080	1,550
2000 Swing	2,000	4,400	840	991	1,400
3000	3,000	6,600	1,250	1,500	1,950
3000 Swing	3,000	6,600	960	1,150	1,850
4000	4,000	8,800	1,416	1,840	2,463
4000 Swing	4,000	8,800	1,350	1,660	2,500
5000	5,000	11,000	1,700	2,264	2,973
5000 Swing	5,000	11,000	1,523	2,150	2,900
6000	6,000	13,200	1,980	2,575	3,282
6000 Swing	6,000	13,200	1,640	2,460	3,500
7000	7,000	15,400	2,077	2,934	3,724
9000	9,000	19,800	2,438	3,821	4,560

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Dumper Speeds

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	Fusing	Speed in Gears KPH					
	Engine		2	3	4	Reverse	
2000	Lister/Petter TS2 Deutz F2L1011 Hatz 2L31S	4.3	10.1	18.7	-	4.8	
2000 Swing	Lister/Petter TS2 Deutz F2L1011 Hatz 2L31S	4.3	10.1	18.7	-	4.8	
3000	Lister/Petter TS3 Deutz F3L1011 Hatz 2L40S	4.0	9.6	17.7	-	4.5	
3000 Swing	Lister/Petter TS3 Deutz F3L1011 Hatz 2L40S	4.0	9.6	17.7	-	4.5	
4000	1000 Perkins D3-1524		5.89	11.44	18.02	As Forward	
4000 Swing	Perkins D3-1524	3.11	5.89	11.44	18.02	As Forward	
5000	Perkins 1004-4 / 1004-42 Deutz F4L913	4.7	8.9	17.4	30.0	As Forward	
6000	Perkins 1004-4 / 1004-42 Deutz F4L913	5.6	10.6	20.0	32.0	As Forward	
7000	Perkins 1004-4 / 1004-42 Perkins 1004-4T / 1004-40T	5.6	10.6	20.0	32.0	As Forward	
9000	Perkins 1004-4T / 1004-40T	4.3	8.2	15.9	28.0	As Forward	

Noise Levels

	Engine	LPA Operators Ear (dBA)	LWA Sound Power Level			
2000 Straight & Swing	Lister Petter TS2, Deutz F2L1011	86.00	105.00 101.00 *			
3000 Straight & Swing	Lister Petter TS3 Deutz F3L1011	84.70 84.80	106.00 102.00 *			
4000 Straight & Swing	Perkins	85.00	107.00			
5/6000 Straight & Swing	Deutz	84.00	116.50			
5/6000 Straight & Swing	Perkins	81.50	104.00 *			
7000 Perkins	Perkins	81.50	104.00 *			
9000 Perkins	Perkins	81.50	105.00 *			
* Sound Power Levels Measured in Accordance to Directive 2000/14/EC						

Brake Arrangements

	2000 & Swing	3000 & Swing	4000 & Swing	5000 & Swing	6000 & Swing	7000 & 9000
Front Brakes	Standard	Standard	Standard	Standard	Standard	Standard
Rear Brakes	None	Standard	Standard	Standard	Standard	Standard

Gear and Transfer Boxes

	Gears	Gearbox	Transfer Box
2000 & 2000 Swing	3F 1R	40M2 Constant Mesh	G2000
3000 & 3000 Swing	3F 1R	85M2 Constant Mesh	G2000
4000 & Swing	4F 4R	Turner Compact plusT/C Shuttle	G2000
5/6000 Straight & Swing	4F 4R	Turner Compact plusT/C Shuttle	D3000
7000 & 9000	4F 4R	Turner Compact plusT/C Shuttle	D3000

Tyre Specification / Capacity / Pressures / Wheel Torques

	Specification - Capacity	Pressu Front	re (bar) Rear	Wheel Nut Torque
2000 & Swing	10.0/75 x 15.3 x 8ply - 1260 kg	2.75	2.07	163 Nm
3000	11.5/80 x 15.3 x 8ply - 1675 kg	2.75	1.50	298 Nm
3000 Swing	11.5/80 x 15.3 x 8ply - 1675 kg	2.75	2.07	298 Nm
4000 & Swing	12.00 x 18 x 12ply - 2910 kg	2.50	1.50	298 Nm
5000 & Swing	12.00 x 18 x 12ply - 2910 kg	3.75	2.07	400 Nm 8-Stud
6000 & Swing	16.00 x 20 x 12ply - 3650 kg	2.70	1.70	400 Nm 8-Stud
7000	16.00 x 20 x 12ply - 3650 kg	3.00	1.80	400 Nm 8-Stud
9000	500/60 x 22.5 x16ply - 4,628 kg	4.40	2.20	400 Nm 8-Stud 680 Nm 5-Stud

Anti-Freeze Concentrations

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	Ratio	⁰C	⁰F	16ºC (60ºF)	27ºC (81ºF)	38ºC (100ºF)
20%	1:4	-9	15.8	S.G. 1.032	S.G. 1.030	S.G. 1.028
25%	1:3	-12	10.4	S.G. 1.041	S.G. 1.037	S.G. 1.033
33.3%	1:2	-19	-2.2	S.G. 1.054	S.G. 1.049	S.G. 1.044
50%	1:1	-37	-34.6	S.G. 1.080	S.G. 1.074	S.G. 1.068
Use Good Quality Ethylene Glycol - Check Concentration Regularly						L

Lubricant Capacities - (Litres)

	2000	2000 Swing	3000	3000 Swing	4000 & Swing	5/6000 & Swing	7000	9000
Front Axle	3.50	3.50	6.00	6.00	6.00	8-Stud 7.00	7.00	15.0 - 8 Stud 23.0 - 5 Stud
Rear Axle	2.50	2.50	3.50	3.50	6.00	8-Stud 7.00	7.00	15.0 - 8 Stud 23.0 - 5 Stud
Gearbox	1.70	2.50	2.00	2.80	13.00*	13.00 *	13.00 *	13.00 *
Transfer Box	1.00	1.00	1.00	1.00	1.00	0.86	0.86	0.86
Hydraulic Tank	33.00	33.00	33.00	33.00	33.00	50.0	50.0	50.0
Grease Points	As Reqd	As Reqd	As Reqd	As Reqd	As Reqd	. As Reqd	As Reqd	As Reqd
Brake Fluid	0.25	0.25	0.2	0.2	0.2	0.2	0.2	1.2
Centre Pivot	As Reqd	As Reqd	As Reqd	As Reqd	As Reqd	As Reqd	As Reqd	As Reqd

* Total oil capacity of the Gearbox, Torque Converter and Oil Cooler

Replacement of oils is best carried out when the engine and transmission is warm allowing the oil to flow freely, carrying away any contamination at the same time

Engine Fuel, Lubrication and Coolant

Fluids = litres	Maximum Payload	Engine Model	Engine Sump	Fi Pl	iel St	Coolant
2000	2,000 kg	Lister/Petter TS2 Deutz F2L1011 Hatz 2L31S	5.3 * 6.0 ** 5.5 *	37	34	
2000 Swing	2,000 kg	Lister/Petter TS2 Deutz F2L1011 Hatz 2L31S	5.3 * 6.0 ** 5.5 *	37	34	-
3000	3,000 kg	Lister/Petter TS3 Deutz F3L1011 Hatz 2L40S	7.2 * 5.5 ** 5.5 *	37	34	-
3000 Swing	3,000 kg	Lister/Petter TS3 Deutz F3L1011 Hatz 2L40S	7.2 * 5.5 ** 5.5 *	37	34	-
4000 & Swing	4,000 kg	Perkins D3-1524	7.2 *	37	34	9.9
5000 & Swing	5,000 kg	Perkins 1004-4 / 1004-42 Deutz F4L913	10.0 **	67	50	18 -
6000 & Swing	6,000 kg	Perkins 1004-4 / 1004-42 Deutz F4L913	10.0 **	67	50	18 -
7000	7,000 kg	Perkins 1004-4 / 1004-42	10.0 **	67	50	18
9000	9,000 kg	Perkins 1004-4T / 1004-40T	10.0 **	67	50	18

* - SAE 10W/30 Engine Oil

** - SAE 15W/40 Engine Oil

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Alternators and Batteries

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	Engine	Alternator	Output - Amps	Battery Cold Start Amps
2000	Lister TS2 Deutz F2L1011 Hatz 2L31S	Beltdriven	45 60 50	Type 072 DIN 340A - IEC 420A Type 072 DIN 340A - IEC 420A Type 665 DIN 460A - IEC 570A
2000 Swing	Lister TS2 Deutz F2L1011 Hatz 2L31S	Beltdriven	45 60 50	Type 072 DIN 340A - IEC 420A Type 072 DIN 340A - IEC 420A Type 665 DIN 460A - IEC 570A
3000	Lister TS3 Deutz F3L1011 Hatz 2L40S	Beltdriven	45 60 50	Type 072 DIN 340A - IEC 420A Type 072 DIN 340A - IEC 420A Type 665 DIN 460A - IEC 570A
3000 Swing	Lister TS3 Deutz F3L1011 Hatz 2L40S	Beltdriven	45 60 50	Type 072 DIN 340A - IEC 420A Type 072 DIN 340A - IEC 420A Type 665 DIN 460A - IEC 570A
4000 & Swing	Perkins D3-1524	Belt Driven	35 amps	Type 072 DIN 340A - IEC 420A
	Perkins 1004-4 / 1004-42	Belt Driven	55 amps	Type 665 DIN 460A - IEC 570A
5000 & Swing	Deutz F4L913	Belt Driven	33 amps	Type 665 DIN 460A - IEC 570A
	Perkins 1004-4 / 1004-42	Belt Driven	55 amps	Type 665 DIN 460A - IEC 570A
6000 & Swing	Deutz F4L913	Belt Driven	33 amps	Type 665 DIN 460A - IEC 570A
7000 9000	Perkins 1004-4 / 1004-42 Perkins 1004-4T / 1004-40T	Belt Driven	55 amps	Type 665 DIN 460A - IEC 570A

Electric Circuit - 2 and 3 Tonne Hatz

- 1 Hour Meter
- 2 Blocked Air Filter Switch
- 3 Oil Pressure Switch
- 4 Alternator
- 5 Fuel Valve
- 6 Starter
- 7 Battery 12v
- 8 Start Key Switch
- 9 Circuit Breaker 10A
- 10 Charge Light
- 11 Oil Light
- 12 Blocked Filter Light
- 13 Clutch Pedal Switch

Cable Colour Codes		
В	Black	
G	Green	
К	Pink	
LG	Light Green	
Ν	Brown	
0	Orange	
Р	Purple	
R	Red	
S	Slate	
U	Blue	
т	Turquoise	
W	White	
Y	Yellow	

Electric Circuit - 2 and 3 Tonne Hatz



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Electric Circuit - 2 and 3 Tonne Lister No Lights

Electrical Circuit - 2 and 3 Tonne Lister No Lights

- 1 Battery 12v
- 2 Starter
- 3 Starter Solenoid
- 4 Ignition Switch
- 5 Key Position
- 6 Terminal Number
- 7 Relay Connections
- 8 Ignition Switch
- 9 Ignition Audible Warning
- 10 Hour Meter
- 11 Circuit Breaker
- 12 Clutch Pedal Start Inhibitor Switch
- 13 Alternator
- 14 Horn

Cable Colour Codes		
в	Black	
G	Green	
к	Pink	
LG	Light Green	
Ν	Brown	
0	Orange	
Р	Purple	
R	Red	
S	Slate	
U	Blue	
т	Turquoise	
w	White	
Y	Yellow	

Electric Circuit - 2 and 3 Tonne Lister No Lights

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Electric Circuit - 2 and 3 Tonne Lister With Lights

Electrical Circuit - 2 and 3 Tonne Lister With Lights

- 1 Battery 12v
- 2 Battery Isolator
- 3 Starter
- 4 Alternator
- 5 Hour Meter
- 6 Flashing Beacon / Auxillary Socket
- 7 Horn Button
- 8 Horn
- 9 Clutch Switch
- 10 Engine Temperature Warning Light if fitted
- 11 Charge Warning Light
- 12 Oil Pressure Warning Light if fitted
- 13 Engine Start Key Switch
- 14 Circuit Breakers

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В	Black
G	Green
к	Pink
LG	Light Green
N	Brown
0	Orange
Р	Purple
R	Red
s	Slate
U	Blue
т	Turquoise
w	White
Y	Yellow

Cable Colour Codes



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2 to 9 Tonne Dumper Instruction Manual

Electric Circuit - 2 and 3 Tonne Lister With Lights

 Marker Light Front Right Marker Light Rear Left Marker Light Rear Right 	
 Marker Light Rear Left Marker Light Rear Right 	
- Marker Light Rear Right	
- Number Plate Lights	
- Brake Lights	
- Front Head Lights	
- Front Indicator Lights	
- Rear Indicator Lights	
- Hazard Light Switch	
- Indicator Switch	
- Flasher Can	
- Brake Pressure Switch	
- Side Lights	
- Head Lights	
- Light Switch	
- Left	
- Right	

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R

Cable Colour Codes		
в	Black	
G	Green	
К	Pink	
LG	Light Green	
Ν	Brown	
0	Orange	
Р	Purple	
R	Red	
S	Slate	
U	Blue	
т	Turquoise	
w	White	
Y	Yellow	
5 A.M.A.		

2 to 9 Tonne Dumper Instruction Manual

Electric Circuit - 2 and 3 Tonne Lister With Lights

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2 to 9 Tonne Dumper Instruction Manual

Electric Circuit - 4, 5, 6, 7, & 9 Tonne Perkins

Electrical Circuit - 4, 5, 6, 7 & 9 Tonne Perkins

- 1 Battery 12v
- 2 Battery Isolator
- 3 Starter
- 4 Alternator
- 5 Engine Oil Pressure Switch
- 6 Engine Fuel Solenoid
- 7 Hourmeter
- 8 Engine Start Heater
- 9 Water Temperature Switch
- 10 Hand Brake Switch
- 11 Indicator Warning Light
- 12 1 amp 400v Diodes
- 13 Audible Warning
- 14 3 amp 600v Diode
- 15 Water Temperature Light
- 16 Charge Warning Light
- 17 Oil Pressure Warning Light
- 18 Auxillary Power Supply Beacon
- **19 Engine Start Key Switch**
- 20 Circuit Breakers

Cable (Cable Colour Codes		
В	Black		
G	Green		
к	Pink		
LG	Light Green		
N	Brown		
0	Orange		
Р	Purple		
R	Red		
s	Slate		
U	Blue		
Т	Turquoise		
w	White		
Y	Yellow		



2 to 9 Tonne Dumper Instruction Manual

Electrical Circuit - 4, 5, 6, 7 & 9 Tonne Perkins

- 1 Forward Drive Solenoid
- 2 Reverse Drive Solenoid
- 3 Reverse Bleeper
- 4 Horn Button
- 5 Horn
- 6 Gear Stick Button
- 7 Seat Switch
- 8 Forward
- 9 Neutral
- 10 Reverse
- 11 Direction Switch

Cable Colour Codes		
В	Black	
G	Green	
к	Pink	
LG	Light Green	
N	Brown	
ο	Orange	
Р	Purple	
R	Red	
S	Slate	
U	Blue	
т	Turquoise	
w	White	
Y	Yellow	



Electrical Circuit - 4, 5, 6, 7 & 9 Tonne Perkins

1	-	Marker Light Front Left
2	-	Marker Light Front Right
3	-	Marker Light Rear Left
4	-	Marker Light Rear Right
5	-	Number Plate Lights
6	-	Brake Lights
7	-	Front Head Lights
8	-	Front Indicator Lights
9	-	Rear Indicator Lights
10	-	Indicator Switch
11	-	Hazard Lights Switch
12	-	Flasher Can
13	-	Brake Pressure Switch
14	-	Side
15	-	Headlights
16	-	Light Switch
L	-	Left
R	-	Right
0	-	Off

Cable Colour Codes			
в	Black		
G	Green		
к	Pink		
LG	Light Green		
N	Brown		
0	Orange		
Р	Purple		
R	Red		
s	Slate		
U	Blue		
т	Turquoise		
w	White		
Y	Yellow		

Electrical Circuit - 4, 5, 6, 7 & 9 Tonne Perkins



2 to 9 Tonne Dumper Instruction Manual
1 -	Battery	12v
-----	----------------	-----

- 2 Battery Isolator
- 3 Starter
- 4 Alternator
- 5 Engine Oil Pressure Switch
- 6 Audible Warning Start Key Left ON
- 7 Hourmeter
- 8 Switch Cooling Fan Belt Broken
- 9 Hand Brake Switch
- 10 Warning Light Engine Overheating
- 11 1 Amp 400v Diodes
- 12 Audible Warning
- 13 3 amp 600v Diode
- 14 Charge Warning Light
- 15 Oil Pressure Warning Light
- 16 Circuit Breakers
- 17 Engine Start Key Switch

Cable Colour Codes		
В	Black	
G	Green	
к	Pink	
LG	Light Green	
N	Brown	
0	Orange	
Р	Purple	
R	Red	
S	Slate	
U	Blue	
Т	Turquoise	
. w	White	
Y	Yellow	



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2 to 9 Tonne Dumper Instruction Manual

- 1 Forward Drive Solenoid
- 2 Reverse Drive Solenoid
- 3 Reverse Bleeper
- 5 Horn Button
- 6 Flashing Beacon / Auxillary Socket
- 7 Horn
- 8 Gear Stick Button
- 9 Seat Switch
- 10 Forward
- 11 Neutral
- 12 Reverse
- 13 Direction Switch

Cable Colour Codes		
В	Black	
G	Green	
К	Pink	
LG	Light Green	
N	Brown	
0	Orange	
Р	Purple	
R	Red	
S	Slate	
U	Blue	
т	Turquoise	
W	White	
Y	Yellow	



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1	-	Marker Light Front Left
2	-	Marker Light Front Right
3	-	Marker Light Rear Left
4	-	Marker Light Rear Right
5	-	Number Plate Lights
6	-	Brake Lights
7	-	Front Head Lights
8	-	Front Indicator Lights
9	-	Rear Indicator Lights
10	-	Indicator Switch
11	-	Hazard Lights Switch
12	-	Flasher Can
13	-	Brake Pressure Switch
14	-	Side
15	-	Headlights
16	-	Light Switch
L	-	Left
R	-	Right
0	-	Off

Cable Colour Codes		
в	B Black	
G	Green	
к	Pink	
LG	LG Light Green	
N	N Brown	
0	Orange	
Р	Purple	
R	Red	
S	Slate	
U	Blue	
т	Turquoise	
w	White	
Y	Yellow	



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Torque Figures

Standard Unplated Nut and Bolt Torque Figures - Nm			
	Material Grade ISO		
Dia. (mm) / Pitch	8.8	10.9	12.9
8 / 1.25	23.5	33	39.65
10 / 1.50	46.8	65.8	79
12 / 1.75	87.7	132.2	147.8
14 / 2.0	131.5	185	222
16 / 2.0	206.3	290	348.3
18 / 2.5	253	355	426.5
20 / 2.5	402	566	678

Correction Factors for Plate Finishes			
	Finish		
	Self Colour	Zinc	Cadmium
Self Colour	1.0	1.0	0.8
Zinc	1.15	1.2	1.35
Cadmium	0.85	0.9	1.2

Durlock Unit Torque Figures - Nm		
	Material Grade ISO	
Dia. (mm) / Pitch	12.9	
8 / 1.25	39	
10 / 1.25	79	
12 / 1.75	147.8	
14 / 2.0	222	
16 / 2.0	348	
20 / 2.5	678	

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Torque Figures

Conversion Factor Example

The tightening torques given on the previous pages are for unplated nuts and bolts. As finish and lubrication materially affect tightening torque by increasing or reducing friction, it is necessary to apply correction factors to achieve the required bolt loading when one or both of the components is plated.

Example of Correction

Nut Finish - 8mm Self Colour

Bolt Finish - 8mm 8.8 Grade Cadmium

Correct Tightening Torque = 23.5 x 0.8 = 18.8 Nm

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