RICHARD WESTERN

Operation and Maintenance Manual

Suffolk Trailers

Rootcrop Trailers

Wellington Trailers

Bale & Pallet Trailers

Agricultural Dumper Trailers

Vacuum Tankers

Make a Note of the Machine serial number in this box for future reference and when ordering replacement parts.

.....

Original Instructions

It is the responsibility of the operator to read and understand the contents of this manual before operating the machine for the first time.

The Operators manual must accompany the machine at all times. If the machine is resold the Operators manual must be given with the machine to the new owners.

Index

Introduction

Pages containing information about the Manufacturer, Agent, Use of the machine and its Disposal.

Preface

Overview

Safety Decals

General Safety

Pages promoting General Hazard perception and Safety Awareness for the Operator.

Specifications

1 Transportation & Handling

2 Before Operation

2 Before Operation contd.

3 Operation

4 Maintenance & Service Schedules

5 Braking System

6 Additional Information

Introduction

INTRODUCTION

This manual provides information on the use, adjustment and servicing of the RICHARD WESTERN range of trailers.

Models covered are:-

Suffolk Trailers

Rootcrop Trailers

Wellington Trailers

Bale & Pallet Trailers

Agricultural Dumper Trailers

Vacuum Tankers

Following the advice on the correct maintenance and servicing procedures will ensure maximum performance and a long service life for your machine.

Failure to carry out maintenance work correctly, or incorrect operation will result in poor machine efficiency and loss of valuable time.

By ensuring the correct operation, and by carrying out maintenance and service work with care, you will be able to make full use of the technical knowledge and the experience with which your trailer was originally designed.

Introduction *continued*

The Richard Western range of machines covered in this manual are trailed agricultural implements designed and constructed for the sole purpose of carrying and redistributing agricultural crops and associated materials.

This is their intended use.

The machines may contain, additional equipment which may function under the direct control of the operator of a towing vehicle., or in certain circumstances automatically and autonomously.

Use of the machine in any other way is considered by the manufacturer to be contrary to the intended use. Consequently the manufacturer does not accept any liability for such use and the user therefore accepts all risks arising from such use.

Intended use also includes the observation of the service, maintenance and repair conditions and routines as prescribed by the manufacturer.

Within this manual is the information required by an operator to assemble and put the machines to work, operate and maintain them and lay them up for storage.

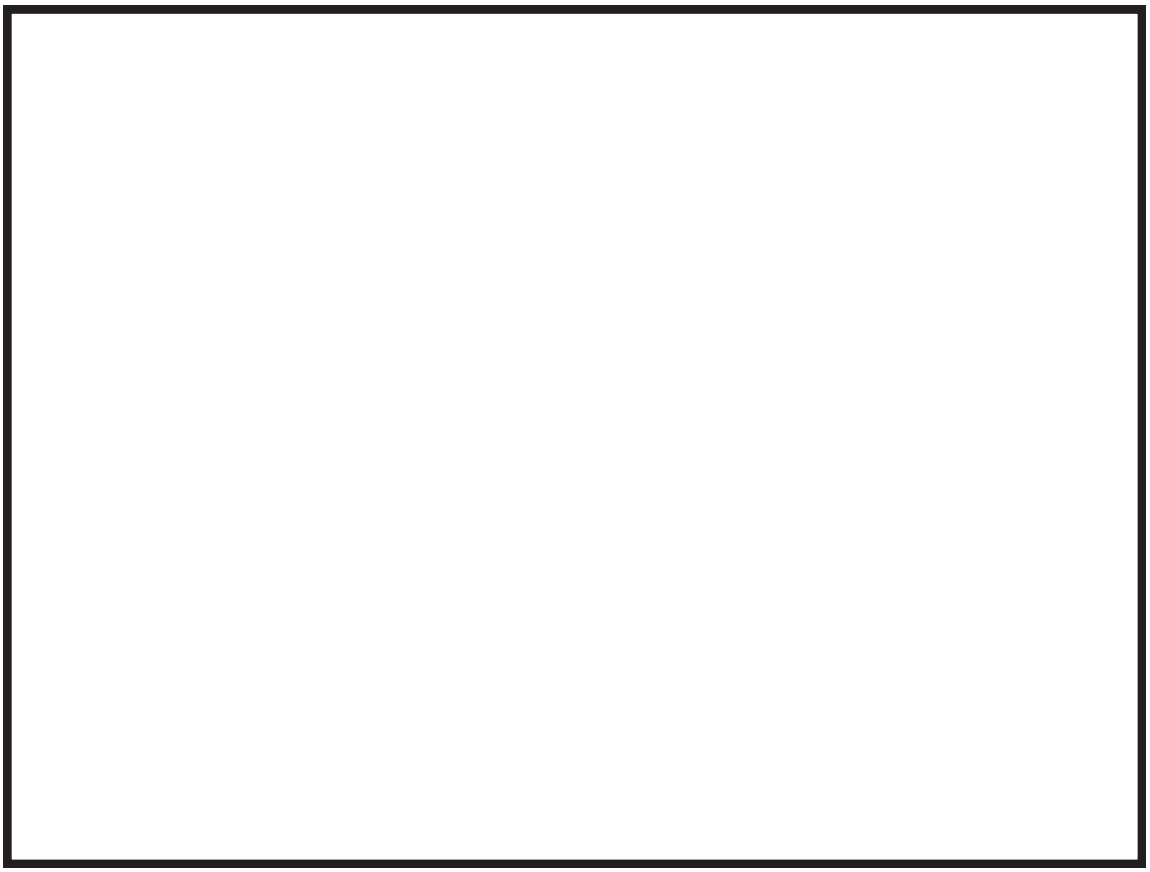
Additionally comprehensive information relating to the machines safe use and the responsibilities of the operator is also given.

The Operator and User must read this manual fully before commencing work with or transporting the machine. If the Operator or User does not understand any part of this manual further help and advice is available from the manufacturer or from the manufacturers agent shown on the following pages of this manual.

Manufacturer

Manufacturers Name :	**Richard Western Ltd**
Manufacturers Address :	**D'Urbans,** **Framlingham,** **Suffolk,** **ENGLAND** **IP13 9RP**

Agent



Agents Stamp :

Disposal

Upon completion of the useful life of the machine, all parts can be disposed of at a suitable waste disposal facility.

Care must be taken if oxy-acetylene cutting equipment is to be used.

The wheels and tyres , hydraulic & pneumatic cylinders, valves and hoses must be removed before using cutting equipment.

Oil must be drained collected and disposed of in accordance with current legislation.

Electrical components must be disposed of in accordance with the relevant legislation.

Preface

Note that the Richard Western Range of Trailers may also be referred to simply as the machine(s) in the following sections.

The instructions set forth in this manual must be read carefully and followed by all persons concerned with the operation, maintenance, repair or inspection of this machine in order to prevent accidents.

Read especially sections relating to Safety and Before Operation.

The use of spare parts, accessories and additional equipment which is not originally manufactured, checked and released by Richard Western Ltd can have a negative effect on specific design features of the machine and on its operability.
This may impair its operating safety, as well as safety at work for the operator.

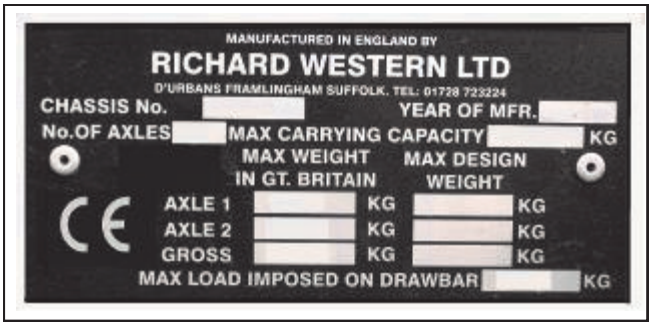
Richard Western Ltd will in no way be liable for damage or personal injury caused by the use of other than original Richard Western Ltd parts, accessories and additional equipment.

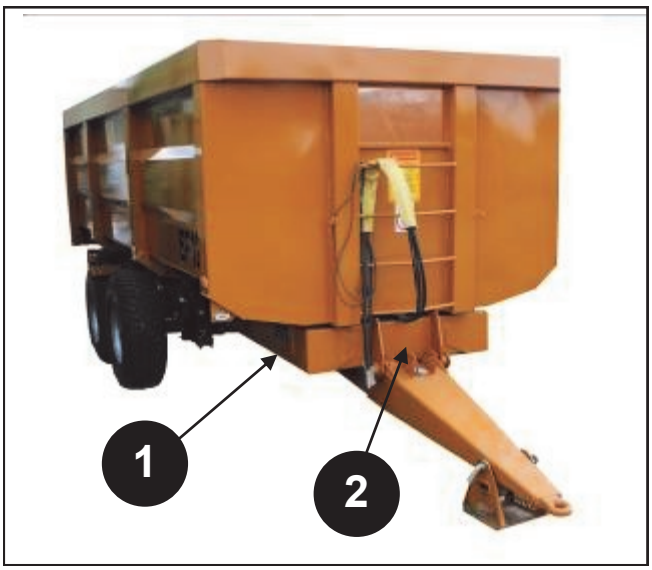
Technical specifications, dimensions and weights are given with the usual tolerances.

Front, rear, right and left refer to the direction of forward travel as viewed from the operators seat of the towing vehicle.

Fitment of Parts or accessories or modifications not approved in writing by Richard Western Ltd may compromise the effective and safe operation of the machines and could invalidate the warranty.

Richard Western Ltd operates a policy of continual improvement, as such some items in this manual may differ slightly from that of your machine.
Richard Western Ltd reserve the right to make changes to the machine or this manual without notice.
If in any doubt regarding any aspect of the design or operation of this machine contact Richard Western Ltd or your Richard Western Ltd agent for clarification.





IDENTIFICATION PLATE

The machine number (VIN)), the model are required with all orders for spare parts and technical enquiries. This is necessary in order to ensure correct delivery of spare parts.

The identification plate with the machine Number (VIN) is attached to the front right side of the machine frame (1) on all machines

Additionally an identification number is located on the forward cross brace of the main chassis (2)

ROAD TRANSPORT

Observe the applicable road regulations in your country.

Information

It is the duty of the operator to ensure that the machine is maintained and operated in accordance with all Local and National regulations.

Operating on public roads

Before operating on public roads the trailer must be correctly connected to the towing vehicle, the lights must be connected and function of the lighting equipment must be checked.
The trailers are equipped with hydraulic and/or Pneumatic braking systems. These must be correctly connected to the Towing Vehicle and checked for correct operation.

If the trailer has an air brake system the brake lines and any breakaway rope (breakaway brake) must be connected.

Number plate

To 15 m.p.h. (25 km/h) : Trailers must be fitted with a number plate issued to the vehicle owner for one of his vehicles

Over 15 m.p.h. (25 km/h) : Trailers must be fitted with a duplicate of the number plate fitted to the Towing Vehicle.

How to use this manual

The manual contains sections that cover all of the following, Safety , before and during operation, Assembly, Using the machine, Maintenance, Specifications and Technical data. Refer to the contents pages for the relevant page number.

Before use of the machine familiarise yourself with the manual and its contents.

The machine may only be operated, serviced and repaired by persons who are familiar with the machine and who have read and understood this manual, and are informed of the risks.

Observation of the relevant accident prevention regulations and other generally acknowledged regulations regarding safety, and occupational health is critical, as is conformance with local and nationally enforced standards relevant to motor vehicles and road traffic law.

Modifications to the machine without the specific approval of the manufacturer, exclude the manufacturer from any liability or damage resulting from the modifications.

Failure to follow the procedures given in this manual could invalidate the warranty given.

Safety Warnings

Identification of Warnings and Danger

All parts of the manual to do with the safety of the operator, or the safe operation of the machine, are marked with the following symbols.

Warning
This symbol identifies that hazard exists. If proper precautions are not taken, it is highly probable that the operator (or others) could be killed or seriously injured

Caution
This symbol identifies a reminder of safety practices. Failure to observe these safety practices could result in injury to the operator (or others) and possible damage to the machine.

Information
This symbol identifies instructions that make it easier to use the machine effectively and economically

Warranty

The Richard Western range of machines are supplied with a full One Year warranty.

There are some exclusions, namely :-

Wheels and Tyres

Damage caused by misuse and abuse

Damage caused by overloading

Damage to ground engaging or suspension parts

For full details refer to the manufacturers documentation.

If you have a claim under warranty contact the manufacturer or the manufacturers agent.

Electrical Equipment

Your machine may be supplied with electrical control equipment for some of its functions.

To ensure correct operation care should be taken to ensure that these controllers are correctly connected when in use.

Ensure any damage howsoever caused is repaired immediately.

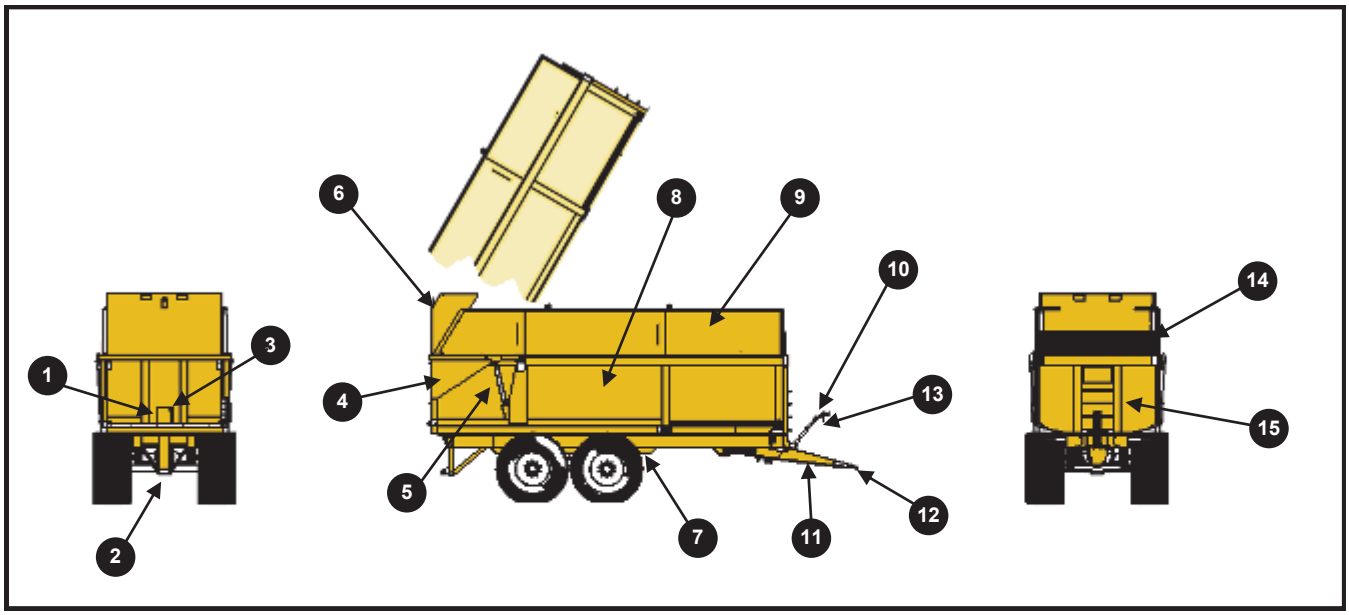
When not in use the controllers should be removed from the machine and stored in a suitable dry container on the towing vehicle or alternatively in the workshop.

If the machine is to be unused for a prolonged period of time, the open connections should covered and protected against water ingress and corrosion.

Controllers damaged by the ingress of water, water damage to electronic components or corrosion to electrical or electronic components will not be covered by the warranty agreement.

The information contained within this section identifies the major assemblies and component parts within each machine model.

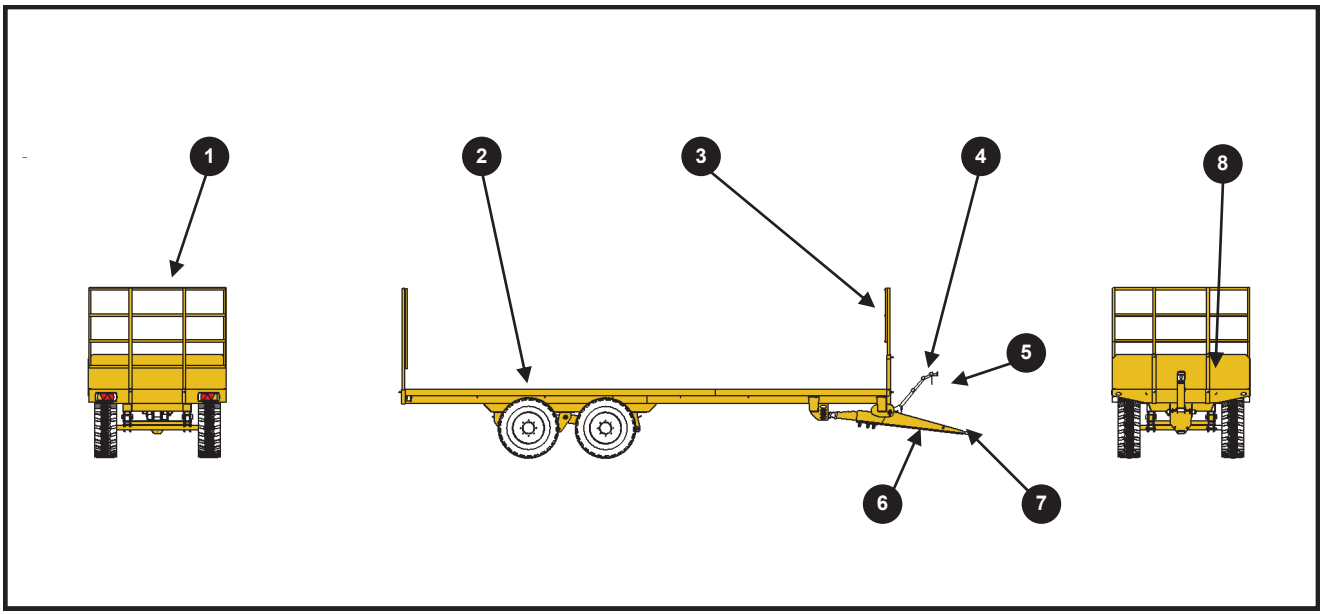
Suffolk, Rootcrop & Wellington Trailers



Key

1 Hydraulic/Air Train Couplers
2 Train Hitch
3 Grain Chute
4 Tailboard
5 Tailboard Cylinder
6 Tailboard Extension & Wings
7 Tipping Cylinders
8 Body
9 Silage Extensions
10 Hose Storage Stalk
11 Drawbar
12 Eye
13 Hydraulic & Brake Connectors
14 Front Mesh
15 Ladder

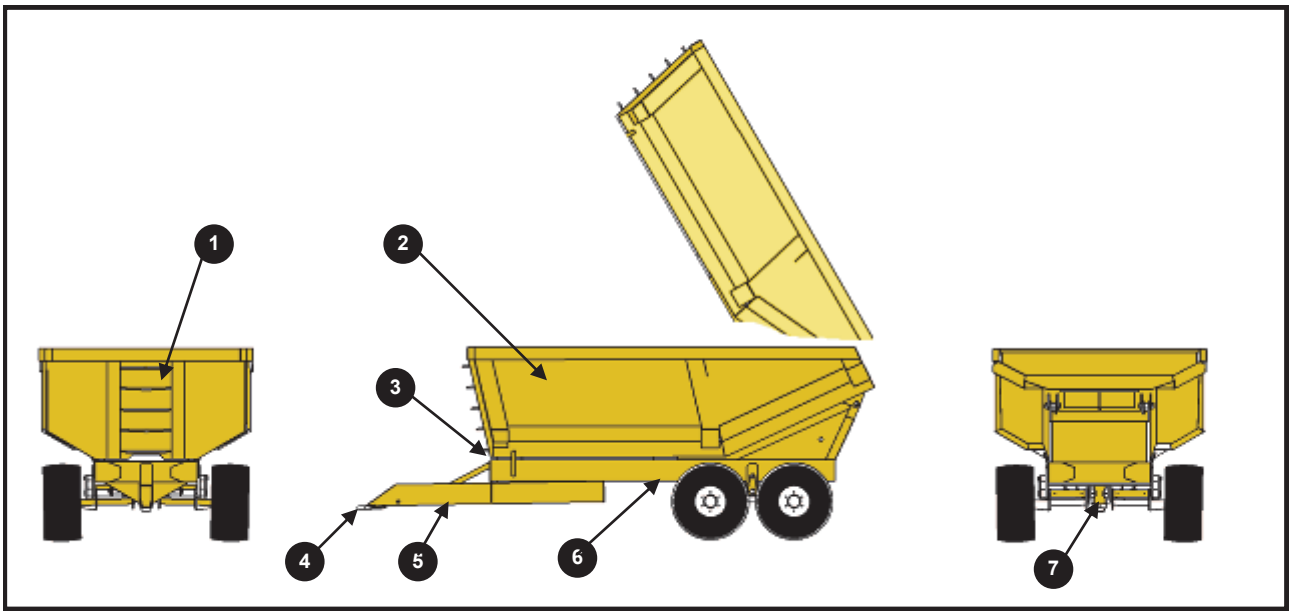
Bale & Pallet Trailers



Key

1 Rear Removable Ladder
2 Deck
3 Front Removable Ladder
4 Hose Storage
5 Hydraulic & Brake Connectors
6 Drawbar
7 Eye
8 Removable Headboard

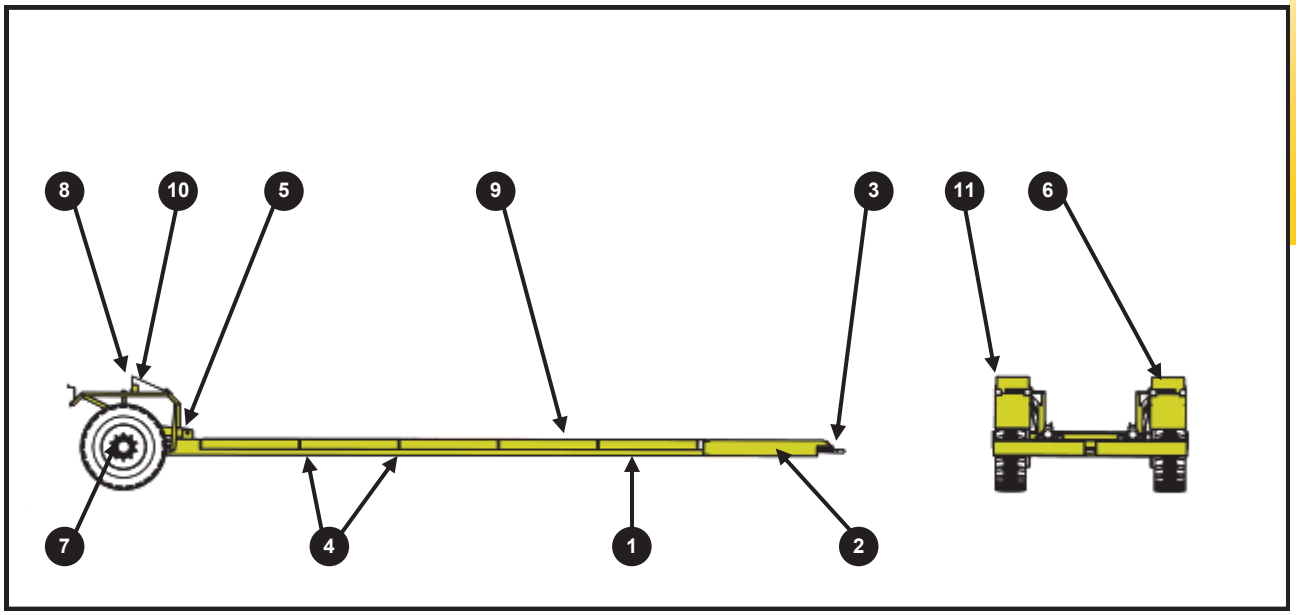
Agricultural Dumper Trailers



Key

1 Ladder
2 Body
3 Hydraulic & Brake Connections
4 Eye
5 Drawbar
6 Tipping Cylinders
7 Rocking Beam Axle

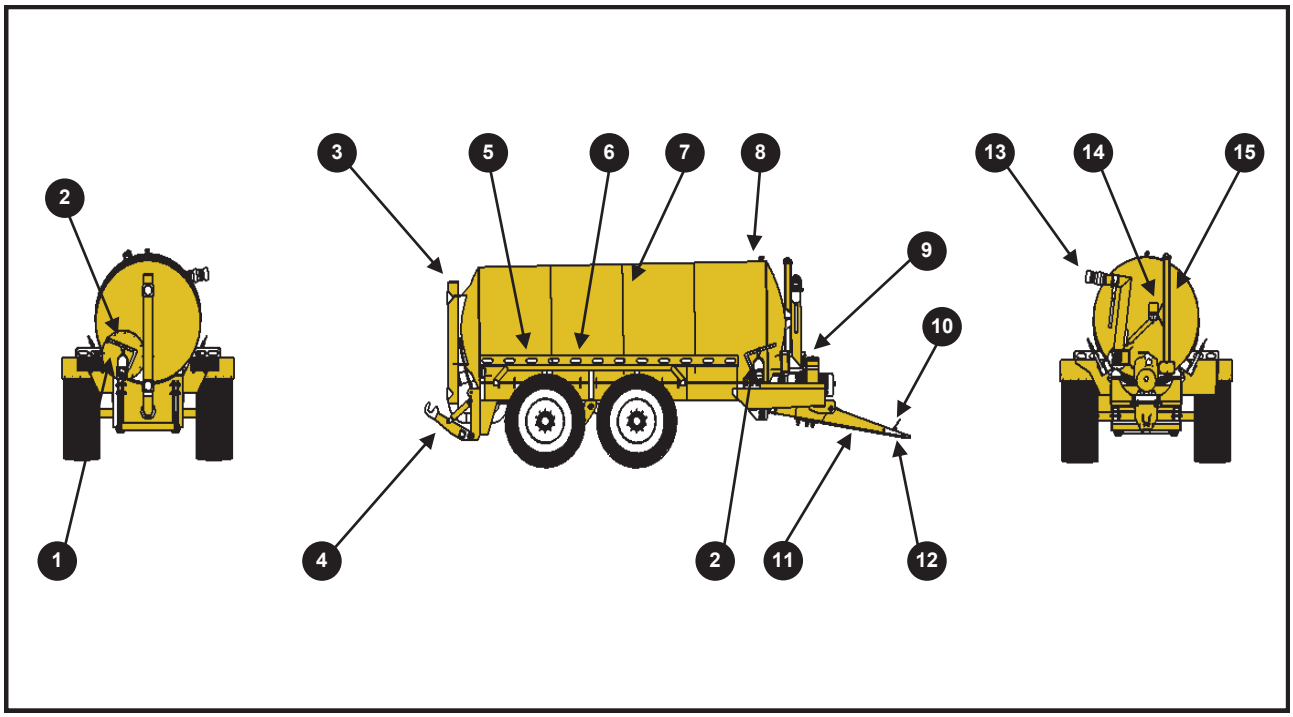
Low Loader Trailers



Key

1 Loader Frame
2 Main Drawbar
3 Drawbar Hitch
4 Tie Downs
5 Lift Cylinder
6 Mud Guards
7 Axle
8 Loading Ramp
9 Decking
10 Transport Pin
11 Lights

Vacuum Tankers



Key

1	Manhole
2	Gate Valve
3	Outlet Tube
4	Rear Linkage
5	Hose Trays
6	Hoses
7	Tank
8	Ball Trap
9	Vacuum Pump
10	PTO Shaft Rest
11	Drawbar
12	Eye
13	Loading Arm
14	Siphon Valve
15	Level Indicator

LOCATION OF SAFETY DECALS

Safety decals & warning symbols are placed in danger areas of the machine to help identify risks of injury.

The decals fixed to a machine do not make the machine safe they are there as a guide and to direct appropriate behaviour when using the machine.

The operator is ultimately responsible for his own safety and that of other persons around the machine. Never permit anyone to ride on the trailer or to approach the trailer or any of its components whilst operating.

The information in these decals show how to avoid injury and accidents by appropriate behaviour.

The location of the decals on the machine and their wording is shown on the following pages.

Over time the manufacturer may change the type and quantity of decals. A machine may therefore contain a mixture of all of the decals shown.

The numbers against the explanation correspond to those showing the location on the illustrations

Immediately replace damaged or illegible safety decals with new replacements.

When replacing parts with decals affixed to them, make sure you affix new decals again to the new parts.

Trailers

Typical

1

Overhead Power Lines

Warns the operator not to raise the body or any lifting device in the proximity of Overhead Power lines or obstructions

2

Refer to Operators Manual

Reminds the operator to refer to the operators manual for Technical information and data

3

Refer to Operators Manual

Warns the operator to disable the Towing Vehicle and Isolate the trailer from any energy sources when undertaking maintenance

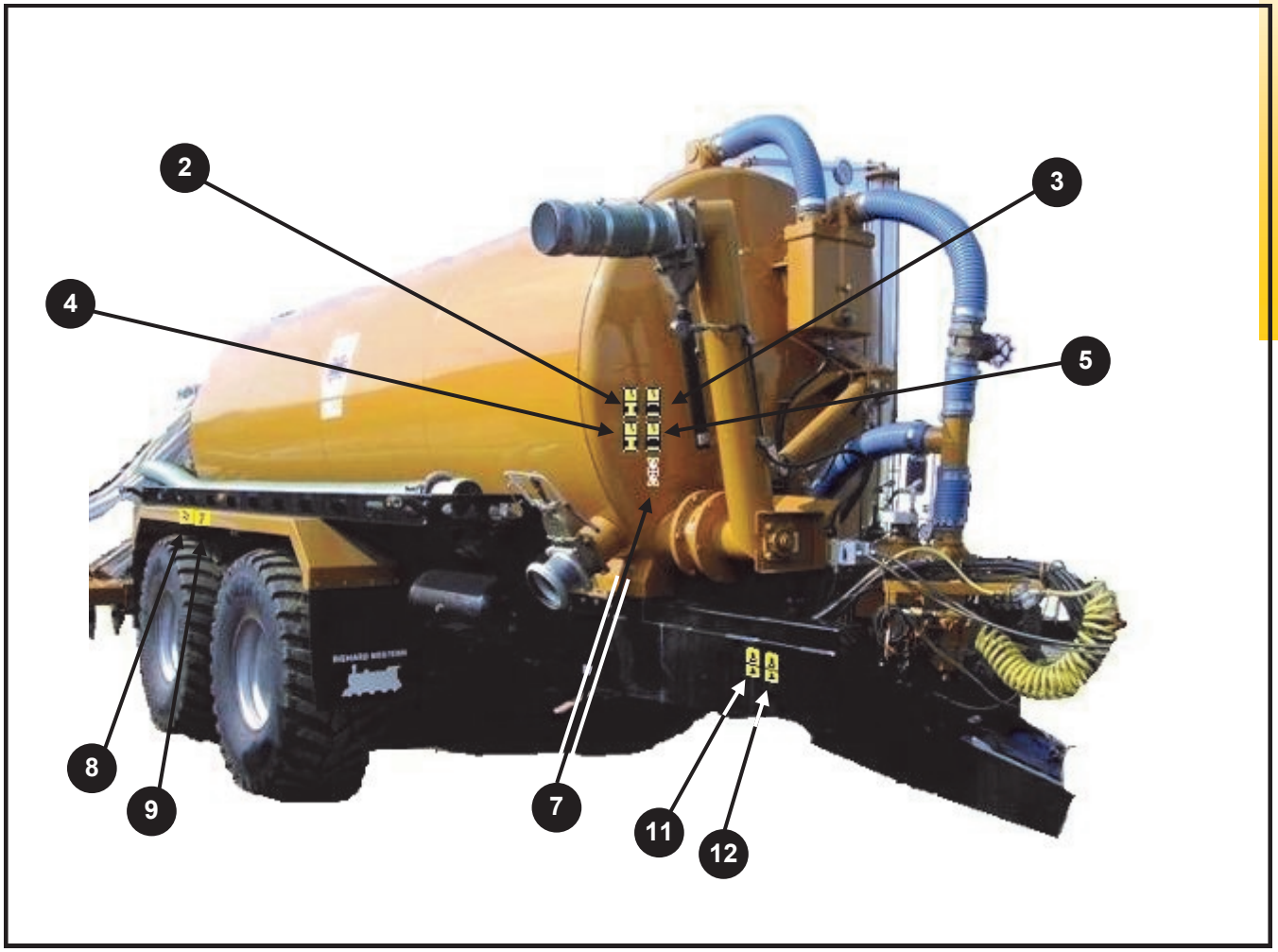
4

Hydraulic & Pneumatic Pressure

Warns the operator of the danger of trapped residual pressures when coupling and de-coupling the trailer

Tankers

Typical



5

Crush Prevention

Warns the operator of the potential for crushing injuries in the area between the Trailer and Towing vehicle

6

Crush Prevention

Warns the operator of the potential for crushing injuries in the area between the Trailer body and Chassis especially when installing the body prop

7

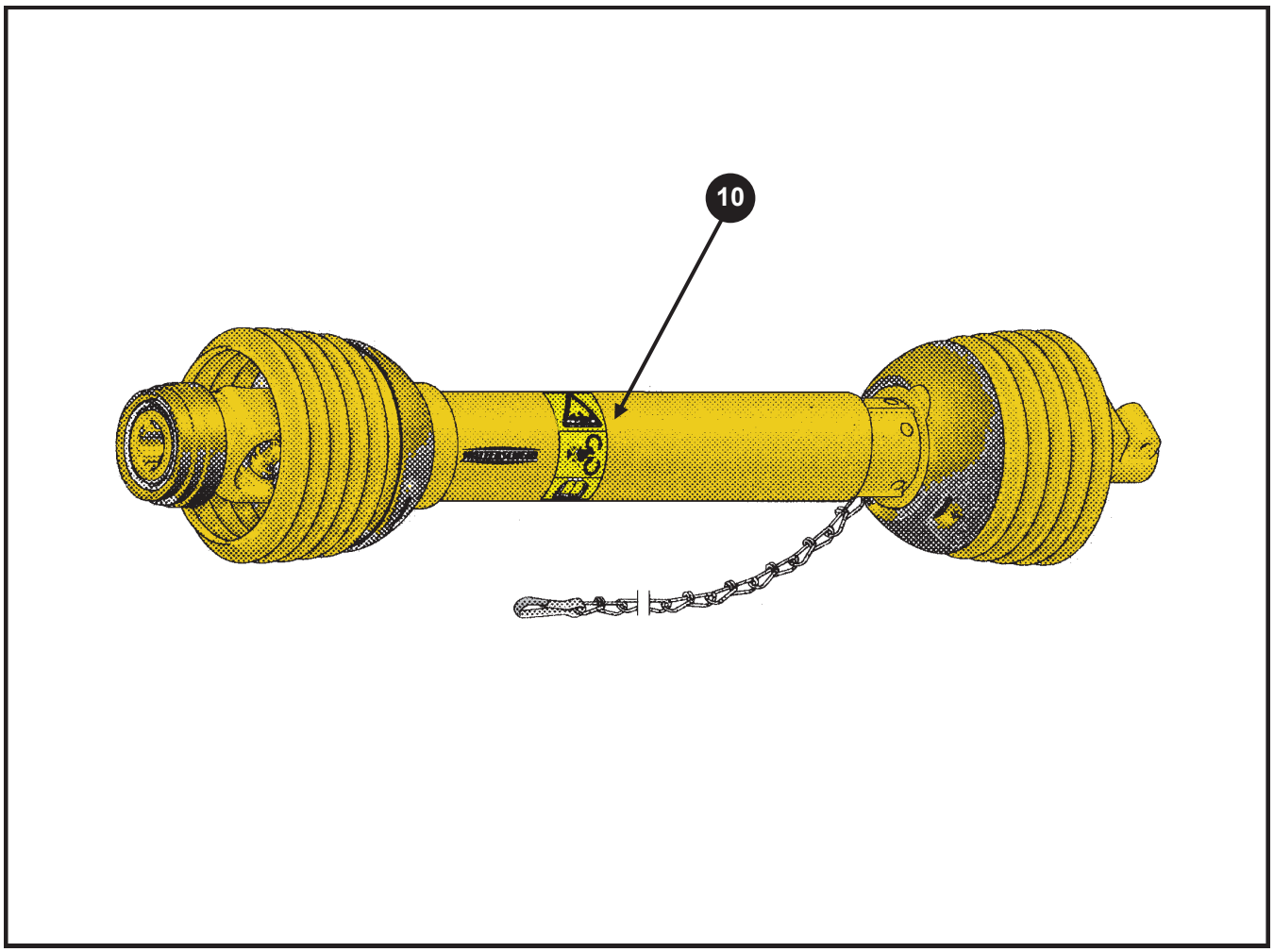
Maximum Allowable Speed

Reminds the operator of the maximum permissible towing speed

8

Service Checks

Reminds the operator to refer to the Operators Manual for information on Tyre Pressures



9

Service Checks

Reminds the operator to refer to the Operators Manual for information on Wheel Nut Torques

10

Rotating Shafts

Warns the operator to refer to the Operators Manual for information related to fitting and using the rotating driveshaft and its guards

11

Power Take Off

Reminds the operator to refer to the Operators Manual for information on Power Take Off Connection and permissible rotation Speed

12

Rotating Shafts

Warns the operator of the danger in this area due to rotating machinery

General Hazards

Introduction

Warnings or Cautions for hazards that may be present when operating the machine, or during maintenance of the machine, are shown in the following sections

Before Operation

Operation

The following Warnings and Cautions are of a General nature and are not task specific.
All personnel operating or maintaining this machine must be fully aware of these warnings.

General

WARNING

Make sure the location of high voltage power lines and buried power cables are known. Serious injury or death, by electrocution, can occur if the machine contacts these hazards.

WARNING

Do not wear loose clothing or Jewellery, which can snag on the controls or machine structure, causing personal injury.

WARNING

Make sure that all protective guards and covers are secured in place on the machine. If guards and covers are removed, a hazard to personnel will exist.

WARNING

Make sure that all foreign objects and materials, such as oil, tools, debris and other items, are kept clear from equipment, walkways and steps on the machine. Failure to do this can cause personal injury.

WARNING

Make sure that all loose items, such as tools, lunch boxes and other items, which are not part of the equipment, are secured correctly before operating the machine. Failure to do this can cause personal injury.

WARNING

Always wear the correct protective equipment, including a hard hat and protective glasses, as required.

CAUTION

Machine operators must be aware of the correct hand signals and those personnel authorised to give them.

CAUTION

Operators must accept hand signals only from a single and authorised person.

CAUTION

Make sure that all fluids used during maintenance of the machine are stored in the correct containers.

CAUTION

Never store these fluids in other types, such as glass containers.

CAUTION

Make sure that all fluids are disposed of correctly and in accordance with Local Health and Safety Regulations.

CAUTION

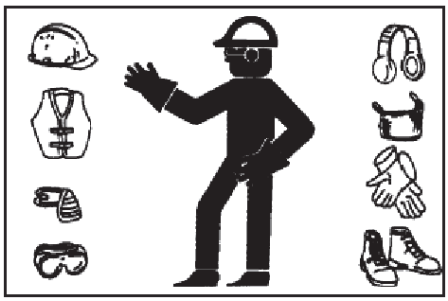
Make sure that all cleaning fluids are used with care and that any necessary repairs are reported immediately.

CAUTION

*Unauthorised personnel must **not** be permitted to operate or maintain this machine.*

CAUTION

Make sure the size of the machine, including any load, is known. This will ensure a correct and safe clearance is maintained, when operating the machine in confined spaces or near obstacles.



GENERAL HAZARDS

Pressurised air and water

WARNING

If released, air or water in pressurised machine systems can cause debris or hot water to be ejected. This can cause personal injury. Care must be taken when working on pressurised machine systems.

WARNING

Operators using pressurized air or water for cleaning purposes must wear the correct protective equipment. This includes protective clothing, shoes/ boots and goggles or face shield.

WARNING

Operators using pressurised air or water for cleaning purposes must not exceed the following maximum operating pressures:

Air - 205 kPa (30 psi)
Water - 275 kPa (40 psi).

Residual hydraulic pressure

WARNING

Refer to the Service Manual before releasing hydraulic pressure.
Non-operating hydraulic systems can retain residual hydraulic pressure. If released, this residual pressure can cause:

Sudden movement of the machine or machine attachments.

Disconnected hoses to whip.

Hydraulic fluid to be sprayed, causing a personal hazard through direct contact or ingestion.

.Fluid penetration

WARNING

Residual hydraulic pressure must be released before any hydraulic maintenance, disconnection or component removal is done. Refer to the Service Manual before releasing hydraulic pressure. Non-operating hydraulic systems can retain residual hydraulic pressure. If not released correctly, personal injury can occur.

WARNING

Leaking fluid, even from a pin hole leak, can penetrate the skin, causing serious injury or death. Always use cardboard or a board to check fluid leaks. If fluid penetration of the skin occurs, you must seek medical help immediately, preferably from experienced medical staff.

Fluid spillage

WARNING

Care must be taken to avoid fluid spillage during machine maintenance, testing, adjusting and repair. Before any possible fluid spillage can occur, a suit able container must be positioned to collect the fluid.

Disposal of waste material

WARNING

The disposal of waste materials, including potentially harmful fluids, must be in accordance with local Health and Safety Regulations.
Improper disposal procedures can be harmful to personnel and the environment.
Always use the correct and leakproof type of container for the storage of waste fluids.
Do not dispose of these fluids by pouring onto the ground, into water sources or into drains. Improper disposal procedures can be harmful to personnel and the environment.

Asbestos hazards

WARNING

Contact with asbestos must be avoided, particularly inhalation of airborne dust,which can cause serious Injury or death.
If it becomes necessary to come into contact with asbestos, you must use the guidelines that follow:
Avoid creating dust if handling debris or components that may contain asbestos, such as brake pads and bands, liner material, clutch plates and some gaskets.
Never use compressed air for cleaning purposes.
Avoid machining or brushing materials that may contain asbestos.
Before disposal, use a wet, damping down method to concentrate material dust and debris.
If possible, a vacuum cleaner fitted with a high particle air filter (HEPA), should be used to collect debris and dust.
Use exhaust ventilation on permanent machining work.
Wear an approved respirator if there is no other way to control any dust produced.
Always comply with the applicable environmental regulations for the disposal of asbestos.
Stay away from areas that may contain airborne asbestos particles.
Always comply with the applicable rules and regulations for the work place.
Use genuine Richard Western equipment, components and parts, which are supplied asbestos free.

GENERAL HAZARDS

Crushing or cutting prevention

WARNING 

Support equipment correctly before you do any work or maintenance from beneath that equipment.

WARNING 

Unless instructed otherwise, never attempt to do adjustments whilst the machine is moving or the engine or other power source is running.

WARNING 

Clearances in machine control linkages will change with control operation or machine movement. Always keep clear of controls or areas that may experience clearance changes.

WARNING 

Always keep clear of rotating or moving parts of the machine. Always re-install any guard or cover that has temporarily removed.

WARNING 

When handling cables, always wear protective gloves. Never use kinked or frayed cables.

WARNING 

Striking any object can cause debris chips to fly off, causing personal injury. Always wear protective glasses/goggles before striking an object and make sure that the area is clear of other personnel.

WARNING 

If a retaining pin is struck with force, it may be ejected and cause personal injury. Always wear protective glasses/ goggles before striking a retaining pin and make sure that the area is clear of other personnel.

Burn prevention

WARNING 

Some components will get hot during operation, causing a potential burn hazard to personnel. Before you do any maintenance on these parts, you must:

WARNING 

Always allow these parts to fully cool before you do any maintenance work.

WARNING 

Always release residual pressure in the air, hydraulic and lubrication systems and associated pipe lines/hoses, before you do any maintenance work.

WARNING 

Hot fluids and surfaces can cause personal injury. Avoid direct contact with hot fluid or surfaces.

Fire and Explosion prevention

WARNING 

If a Fire extinguisher is fitted , make sure It is available and in a fully charged and serviceable condition.

CAUTION 

Make sure you are fully aware of the operating instructions for the fire extinguisher.

Inspect and service the fire extinguisher at regular intervals or in accordance with the manufacturers instructions.

WARNING 

All fuels, most lubricants and some coolant mixtures are flammable and if leaking onto a hot surface or electrical components, can create a fire. Fire can cause severe personal injury or death.

WARNING 

Do not operate the machine close a naked flame or heat source.

WARNING 

Always clean pipes and thoroughly with a non-flammable solvent first.

WARNING 

Examine all electrical wires daily and check and tighten all electrical connections. If necessary, repair loose or frayed wires before you operate the machine.

WARNING 

Dust produced from repairs to Non-metallic components, such as hoods or fenders, can be flammable. Always repair such components in a well ventilated area, away from naked flame and heat sources.

WARNING 

Leaking pipes and hoses can cause a fire. Examine all pipes, hoses and associated supports for wear, deterioration and damage and ensure hat pipe and hose clamps are secure. Make sure pipe and hose connections are correctly torqued.

WARNING 

Remove all flammable materials such as fuel, oil and debris from the machine. Do not allow the accumulation of flammable materials on or around the machine.

WARNING 

Always store fuels and lubricants in the correct and properly marked containers and away from unauthorised personnel.

Fire and Explosion prevention (contd)

WARNING

Always store soiled oily rags and other flammable materials in protective containers.

WARNING

Do not smoke in areas that are used for the storage of flammable materials.

WARNING

Do not operate the machine close to naked flames.

WARNING

Make sure that heat shields, installed to prevent fluids or fluid spray from igniting, are fitted correctly.

WARNING

Do not weld or flame cut any pipes or tanks that contain flammable fluids or gases. Always clean such pipes and tanks thoroughly with a non-flammable solvent first.

Pipes, tubes and hoses

WARNING

Leaks from loose or damaged pipes, tubes or hoses can cause a system failure or a fire. Examine pipes, tubes and hoses regularly, particularly for signs of damage, leaks or being loose.

WARNING

Never use bare hands to check for leaks from pipes, tubes or hoses.
Always use cardboard or a board and if necessary, torque connections to the recommended value.

CAUTION

Do not bend or strike high pressure pipes or install a bent or damaged high pressure pipe.

CAUTION

You must replace any pipe, tube or hose if:
End fittings are damaged or leaking.
Outer coverings are chafed or cut.
Wires are exposed.
Outer covering is blistered or ballooning.
Flexible portion of a hose is kinked.
Outer covers have embedded armouring.
End fittings are damaged or displaced.

CAUTION

Clamps, guards and heat shields are installed to prevent vibration, contact between components and excessive heat. Make sure that all clamps, guards and heat shields are installed correctly.

Tyre hazards

WARNING

An air inflated tyre can expand and explode if excessive heat is applied through welding, heating rim compo nents, external fire or excessive use of the brakes. An exploding tyre can eject axle and wheel debris 500 m (1500 ft) or more from the vehicle, causing damage and possibly personal injury or death. All personnel must be aware of the hazards of overheating tyres.

WARNING

An over-inflated tyre can blow out or cause a rim failure. This can cause damage or personal injury. Inflation of tyres must only be done by trained personnel.

WARNING

When you inflate a tyre, you must stand behind the tyre tread and use a self-attaching inflator.

WARNING

Do not approach a warm or hot tyre. Keep the minimum distances away from the tyre and stay outside the shaded areas (refer to illustration above).

WARNING

Maintenance on tyres and rims can be hazardous. The use of incorrect procedures can result in a tyre exploding. An exploding tyre can eject axle and wheel debris 500 m (1500 ft) or more from the vehicle, causing damage and possibly personal injury or death. Maintenance on tyres and rims must be done only by trained personnel, using the correct tools and procedures. The tyre dealer or manufacturers instructions must be followed.

GENERAL HAZARDS

Mounting and dismounting

WARNING

You must never attempt to mount, dismount or jump from a machine that is moving.

WARNING

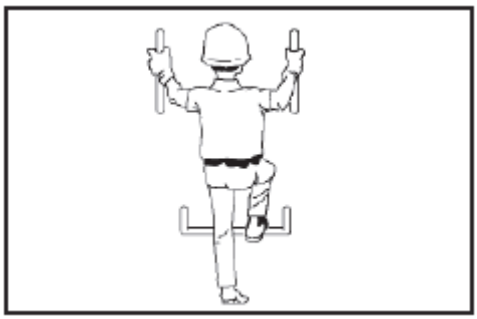
Always mount or dismount the machine at the recognised locations, which have steps and/or hand holds.
Make sure the steps and/or hand hold are clean and examined regularly.
Make any necessary repairs.

CAUTION

When you mount or dismount the machine, always keep a three -point contact with the steps and hand holds.
Three-point contact can be two feet/one hand or two hands/one foot.

CAUTION

When you mount or dismount the machine, always face the machine and never attempt to carry tools or supplies.
Tools and supplies should be raised or lowered from the machine using a hand line or other suitable method.



Before operating the machine

CAUTION

This machine must be operated only by correctly trained and authorised personnel. Certain local operating conditions may require the machine operator to obtain an operators licence or a certificate.

CAUTION

The machine operator must be fully aware of the machines capabilities and limitations. The operator must also be familiar with the local working area or site and in particular:

CAUTION

Check the area for vertical and horizontal clearances.
Check for overhead obstructions.
Check for electrical power lines and make sure the machine keeps at least 8 m (25 ft) away.

CAUTION

Check the work area or site for changes in the stability of the ground surface, back filled trenches and structural integrity of buildings, roofs etc.

CAUTION

Make sure that all protective guards and covers are correctly installed on the vehicle.

CAUTION

Make sure that if the machine is equipped with a fully working lighting system that is adequate for the working conditions, and is compliant with local or national road traffic regulations

CAUTION

Make sure that the machine reverse alarm and other warning devices are in full working order.

CAUTION

Make sure that all obstacles are cleared from the intended path or route of the machine.

CAUTION

Make sure that before the machine is moved, there are no personnel on, under or near the machine.

GENERAL HAZARDS

WARNING

Collision of high speed road traffic and slow moving machines can cause personal injury or death. When on a public road, use a flashing beacon and other lights according to local laws. Use a Slow Moving Vehicle (SMV) emblem displayed at the rear of the machine where this is a national requirement. Pull over to let faster traffic pass. Signal and slow down before turning off the road.

WARNING

Use warning devices (flags, SMV emblem, lights, etc.) which are approved for use by your local government agencies, when using equipment on public roads. Keep these devices clean and in good working order.

GENERAL SAFETY INSTRUCTIONS

Check that the machine is roadworthy and safe to operate every time it is put into operation!

1. Observe the current regulations regarding safety and accident prevention as well as the information in the operator's manual.

2. When using public roads observe all traffic regulations.

3. Make yourself familiar with all equipment and controls and their functions before starting work as it will be too late once you have set off.

4. Make sure that there is no one in close proximity to the machine before putting it into operation (Be especially aware of children!).

   Check that visibility is good, particularly when reversing (have someone direct you if necessary).

5. Clothing worn by the operator must be close-fitting. Avoid wearing loose fitting clothing when operating or maintaining the machine

6. Keep the machine clean to prevent fire.

7 If it is necessary to access the machine, the Engine of the towing vehicle must be switched off. The ignition key of the towing vehicle must be removed.

9. Any safety guards must be checked regularly for wear and replaced if necessary.

10. Any safety decals that are missing must be replaced immediately.

General

1. Use only the recommended fastenings on the machine!

2. Do not exceed the maximum load on the trailer drawbar

3. Use extreme caution when coupling and uncoupling the machine from the towing vehicle to avoid risk of injury.

4. During maintenance or after use prevent the machine from rolling away by use of the parking brake or wheel chocks.

5. A risk of injury due to crushing exists in the vicinity of the Towing vehicle 3-point linkage!

6. Couple and uncouple the machine to the towing vehicle only as specified in the instructions.

7. The performance of the towing vehicle can be influenced by the machine, ensure the towing vehicle has sufficient steering and braking capacity..

8. Make sure no one is between the machine and the towing vehicle unless both are secured and prevented from moving.

9. The travel speed must always be matched to the under wheel conditions. Avoid sudden turns and braking when driving up or down hill or across a slope.

10. Observe the maximum permissible axle loads and total weights!

11. Operate the machine only when all guards are fitted and in the correct position!

12 Ensure that the machine is stable when parked.

13. Ensure all equipment is placed in the transport position before driving on the road.

14. Always switch off the engine of the towing vehicle before carrying out troubleshooting, and for repair, maintenance and cleaning work. Remove the towing vehicle ignition key.

15. When working under raised covers ensure that they are sufficiently supported.

16. When handling sharp-edged parts, wear appropriate protection (gloves, shoes etc.).

17 . Do not stand near hinged covers.

GENERAL SAFETY INSTRUCTIONS contd

BRAKES

1. Check the brakes before every journey.

2. Check the brake system thoroughly at regular intervals.

3. If the brake system malfunctions, do not use the machine, stop the towing vehicle immediately. Repair faults immediately.

4 Any adjustments and repairs to the brake System must be carried out by your Richard Western agent or approved specialist work shop.

5 Engage a lower gear before going downhill.

6. Engage the parking brake before coupling or uncoupling the towing vehicle

7 The brakes must always be correctly adjusted. No liability can be accepted for normal wear or unauthorised modifications.

HYDRAULIC SYSTEM

1. The hydraulic system is under high pressure!

2. When connecting the hydraulic hoses to the towing vehicle hydraulics, make sure that the hydraulic systems are depressurised on the tractor side and on the machine side.

4. The female and male couplings between the tractor and the machine should be labelled to prevent incorrect connections. If connections are reversed (e.g. lifting/lowering), there is a risk of accident.

5. Keep the hydraulic plugs clean.

6. Check hydraulic lines at regular intervals, and replace them if they are damaged

7. Any replaced hydraulic lines must meet the technical requirements of the manufacturer!

10. The towing vehicle engine must be switched off and the system depressurised before starting work on the hydraulic system.

11. Repair work on the hydraulic system must be carried out by approved specialised work shops only.

WHEELS AND TYRES

1. Repair work to the tyres must be carried out by qualified technicians using suitable tools.

2. When working on the wheels make sure that the trailer is secured and that wheels are chocked to prevent it from moving.

3. Tighten the wheel nuts after the first trip with a load.

4. After replacing the wheels retighten the wheel nuts or bolts after the first 10 operating hours, then check them every 50 hours.

5. Make sure that the jack used has sufficient load capacity.

6. Avoid excessive inflation pressure.

7. The specified tyre pressure must be maintained.

8. Stand clear of the tyre when inflating.

9. Check the pressure regularly.

10. Regularly check nuts and screws for tightness and retighten them, if necessary.

11. All mounting bolts and nuts must be tightened to the torque specified by the manufacturer.

MAINTENANCE

1. Always switch off the towing vehicle engine before carrying out any troubleshooting, and before all repair, maintenance and cleaning work. Remove the ignition key!

2. Use suitable tools and wear safety gloves when replacing working parts!

3. Always disconnect the power supply before working on the electrical system!

4. Protection devices that are subjected to wear must be checked at regular intervals and replaced as necessary.

Specifications

INTRODUCTION

This section contains tables covering the general specification of the machine , dimensions , weights and capacities.

All information given is subject to alteration without notice and is subject to manufacturing tolerances.

If in doubt contact the manufacturer or the manufacturers agent for further information or advice.

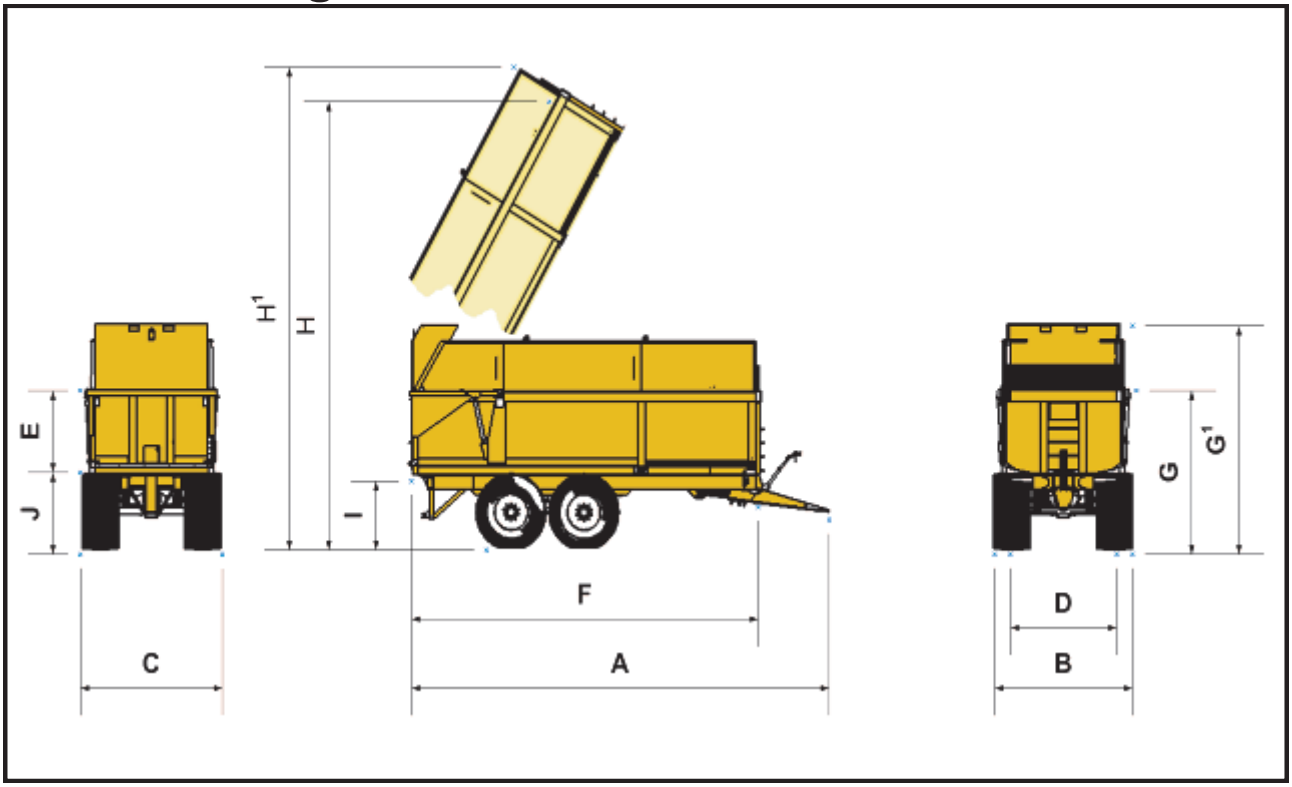
A number of factors may cause the overall dimensions to change EG Tyre pressures ,etc Always check actual dimensions before entering confined areas buildings and vehicles.

General Specification

Model			Suffolk	Rootcrop	Wellington	Bale & Pallet	Dumper	Vacuum Tanker
Electric System								
Voltage		**V**	12 V DC	12 V DC	12 V DC	12 V DC	12 V DC	12 V DC
Current (cont)		**A**	10 A	10 A	10 A	10 A	10 A	10 A
Current (max)		**A**	15 A	15 A	15 A	15 A	15 A	15 A
Braking System								
Standard			Single line hydraulic brakes					
Option	1		**Eurosafe** (TM) Hydraulic Failsafe with Load Sensing					
	2		Dual line airbrakes with Load Sensing and/or ABS					
Speed								
Standard braking system		**kmh**	32	32	32	32	32	32
Option	1	**kmh**	32	32	32	32	32	32
	2	**kmh**	Max towing vehicle speed	Max towing vehicle speed	Max towing vehicle speed	Max towing vehicle speed	Max towing vehicle speed	Max towing vehicle speed
Hydraulic System								
Supply			As towing vehicle	As towing vehicle	As towing vehicle	As towing vehicle	As towing vehicle	As towing vehicle
Hyd working pressure		**bar**	As towing vehicle	As towing vehicle	As towing vehicle	As towing vehicle	As towing vehicle	As towing vehicle
Max hydraulic pressure		**bar**	200	200	200	200	200	200
Max hydraulic flowrate		**l/min**	75	75	75	75	75	75
Noise		**dB (A)**	< 70	< 70	< 70	< 70	< 70	< 70

Data

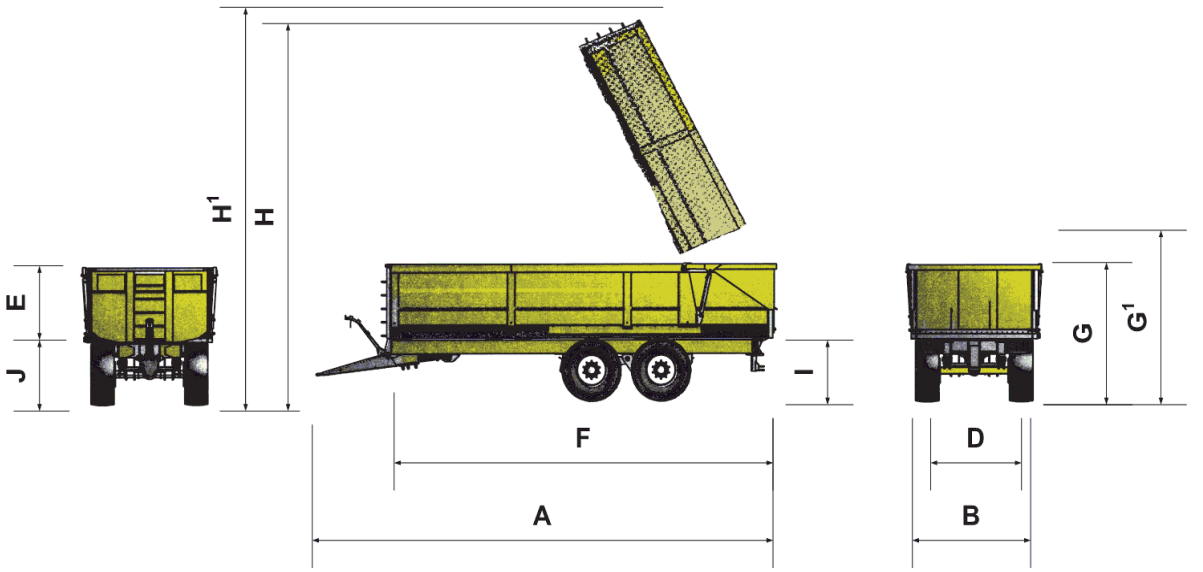
Suffolk Range



Model			SF10	SF11	SF12	SF14	SF16	SF18	SF20
Dimensions									
Length (Overall)	**A**	**m**	6.35	6.70	7.12	7.54	8.35	8.35	9.13
Width (Front)	**B**	**m**	2.13	2.13	2.13	2.13	2.13	2.13	2.13
Width (Rear)	**C**	**m**	2.29	2.29	2.29	2.29	2.29	2.29	2.29
Axle Track Width	**D**	**m**	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Body Height	**E**	**m**	1.22	1.32	1.37	1.37	1.37	1.52	1.52
Body Length	**F**	**m**	4.88	5.13	5.49	5.94	6.86	6.86	7.50
Height	**G**	**m**	2.31	2.59	2.63	2.634	2.64	2.83	2.83
Tipped Height	**H**	**m**	5.59	5.93	6.23	6.70	7.47	7.55	7.80
Height	**G[1]**	**m**	3.23	3.49	3.54	3.55	3.55	3.79	3.79
Tipped Height	**H[1]**	**m**	6.10	6.46	6.74	7.10	7.98	8.00	8.33
Tip Clearance	**I**	**m**	0.73	0.82	0.82	0.89	0.89	0.90	0.90
Platform Height	**J**	**m**	1.09	1.26	1.26	1.27	1.27	1.36	1.36
Capacities									
Grain Capacity		**m^3**	13.1	15.0	16.6	18.0	20.8	23.1	25.3
Silage Capacity		**m^3**	23.0	25.3	27.7	30.0	34.6	37.0	40.4
Cylinder Capacity		**l**	19.6	27.3	27.3	36.3	40.9	40.9	40.9
Weights									
Unladen Weight		**kg**	2790	3260	3510	4075	4850	5210	5460
Misc									
Number of Axles			2	2	2	2	2	2	3

[1] **With Silage Sides**

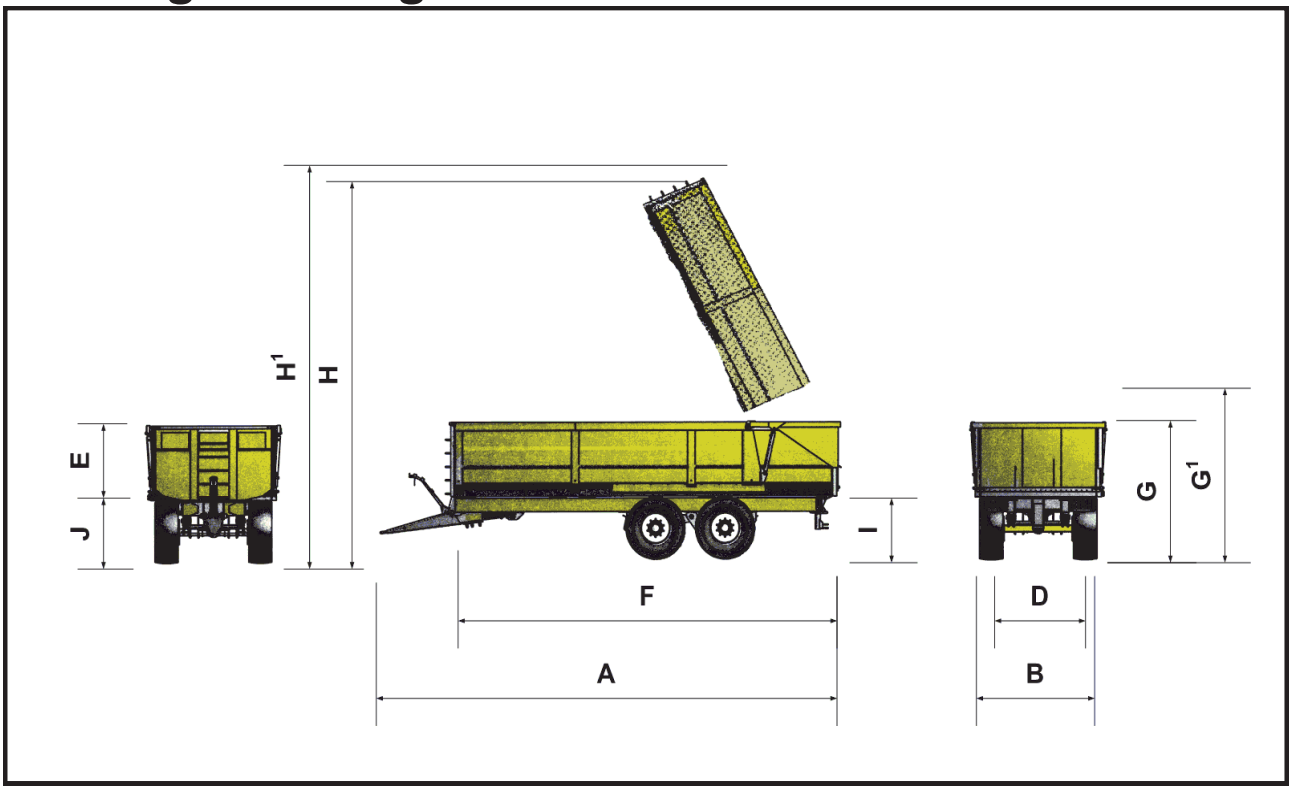
Rootcrop Range



Model			RC11	RC12	RC14	RC16
Dimensions						
Length (Overall)	**A**	**m**	7.12	7.54	8.35	9.13
Width (Front)	**B**	**m**	2.03	2.03	2.03	2.03
Width (Rear)	**C**	**m**	2.29	2.29	2.29	2.29
Axle Track Width	**D**	**m**	1.83	1.83	1.83	1.83
Body Height	**E**	**m**	1.14	1.14	1.14	1.14
Body Length	**F**	**m**	5.49	5.94	6.86	7.50
Height	**G**	**m**	2.40	2.40	2.40	2.41
Tipped Height	**H**	**m**	6.20	6.58	7.34	7.69
Height	**G[1]**	**m**	3.31	3.31	3.31	3.32
Tipped Height	**H[1]**	**m**	6.70	6.98	7.84	8.19
Tip Clearance	**I**	**m**	0.82	0.89	0.89	0.89
Platform Height	**J**	**m**	1.26	1.26	1.26	1.27
Capacities						
Grain Capacity		**m^3**	13.8	15.2	17.3	18.9
Silage Capacity		**m^3**	24.8	27.1	31.2	34.6
Cylinder Capacity		**l**	27.3	36.3	40.9	40.9
Weights						
Unladen Weight		**kg**	3910	4475	5250	5860
Misc						
Number of Axles			2	2	2	2

[1] **With Silage Sides**

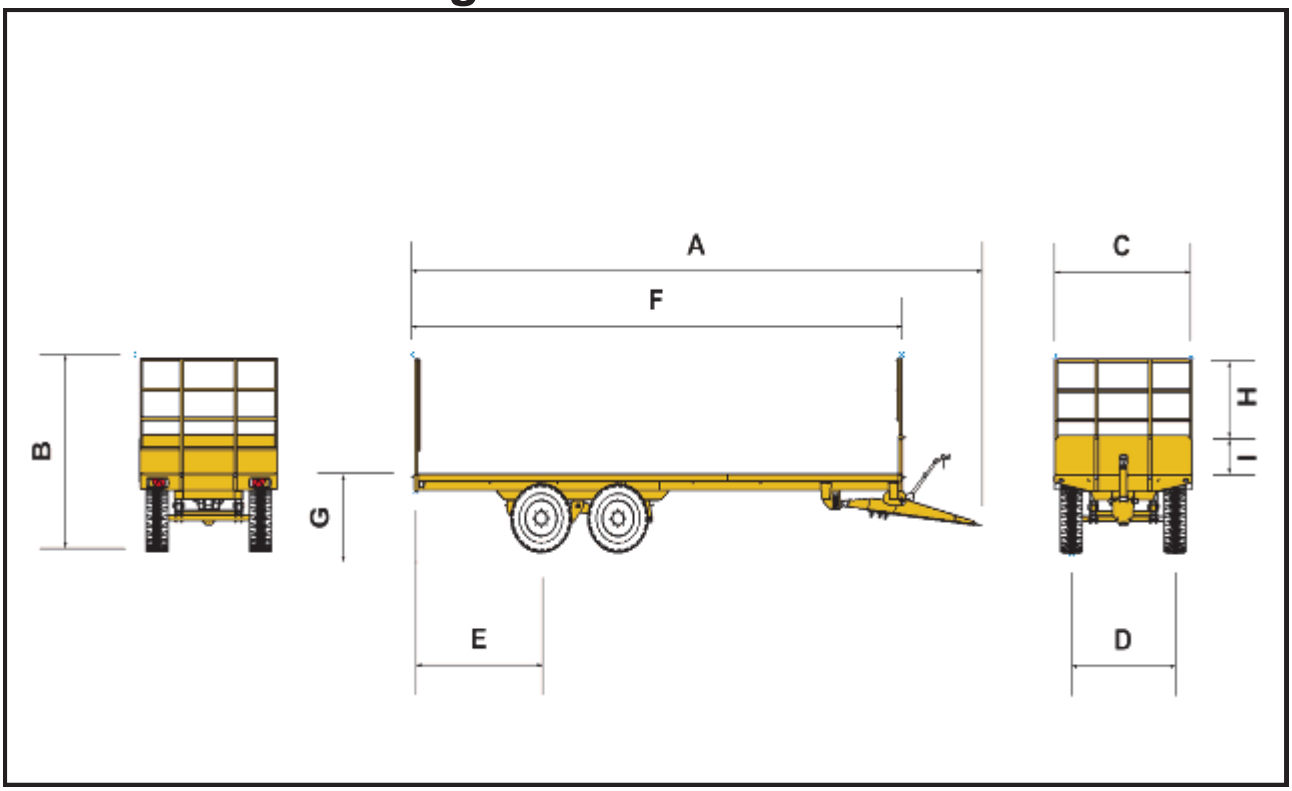
Wellington Range



Model			SWT12	SWT14	SWT16	SWT18	SWT20	SWT24
Dimensions								
Length (Overall)	A	m	7.12	7.54	8.35	8.35	9.13	9.13
Width (Front)	B	m	2.13	2.13	2.13	2.13	2.13	2.13
Width (Rear)	C	m	2.29	2.29	2.29	2.29	2.29	2.29
Axle Track Width	D	m	1.83	1.83	1.83	1.83	1.83	1.83
Body Height	E	m	1.37	1.52	1.37	1.52	1.52	1.98
Body Length	F	m	5.49	5.94	6.86	6.86	7.50	7.50
Height	G	m	2.69	2.84	2.59	2.84	2.84	3.32
Tipped Height	H	m	6.26	6.80	7.47	7.55	7.80	7.90
Height	G^1	m	3.55	3.70	3.55	3.70	3.77	3.92
Tipped Height	H^1	m	6.79	7.20	7.98	8.00	8.33	8.39
Tip Clearance	I	m	0.87	0.90	0.90	0.90	0.97	0.97
Platform Height	J	m	1.32	1.32	1.32	1.32	1.32	1.32
Capacities								
Grain Capacity		m^3	16.6	20.0	20.8	23.1	25.3	32.0
Silage Capacity		m^3	27.7	33.9	34.6	37.0	40.4	41.9
Cylinder Capacity		l	27.3	36.3	40.9	40.9	40.9	60.0
Weights								
Unladen Weight		kg	4475	4950	5350	5450	5660	5780
Misc								
Number of Axles			2	2	2	2	3	3

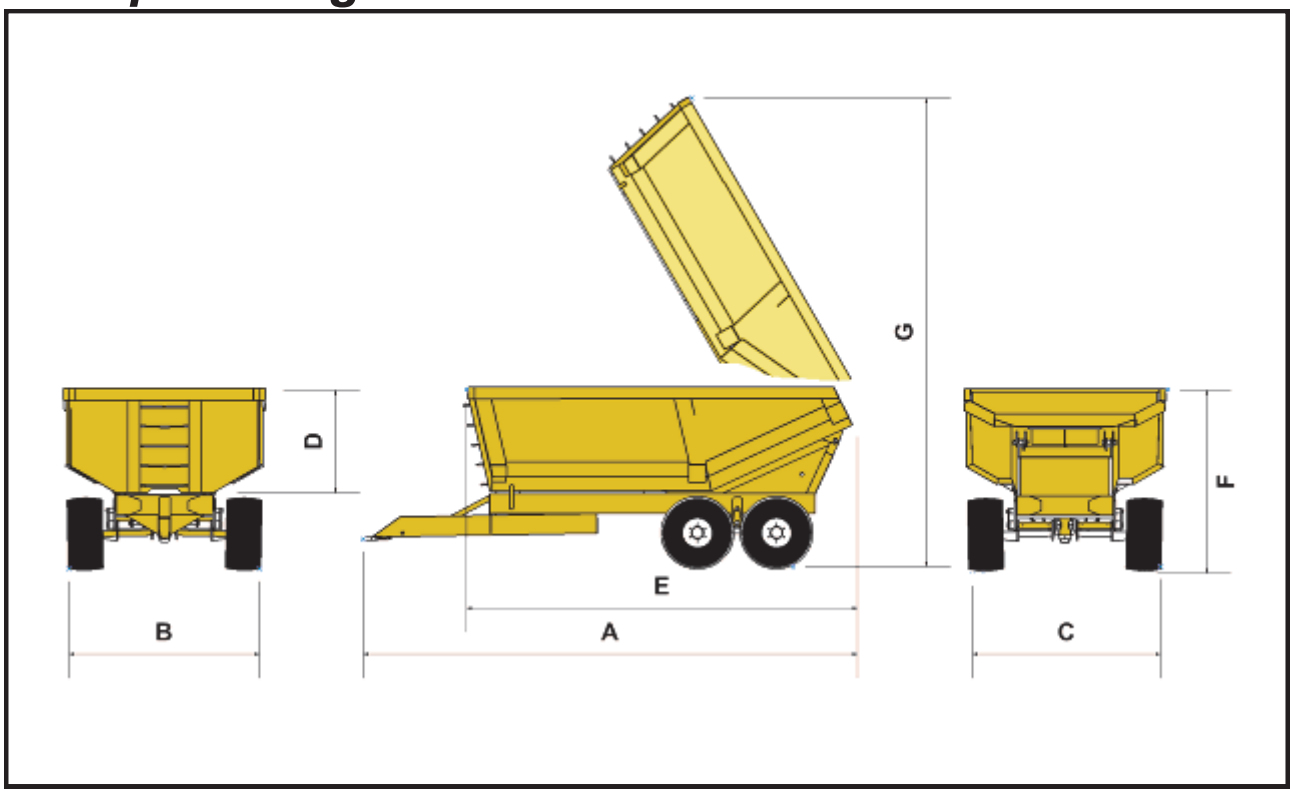
[1] **With Silage Sides**

Bale & Pallet Range



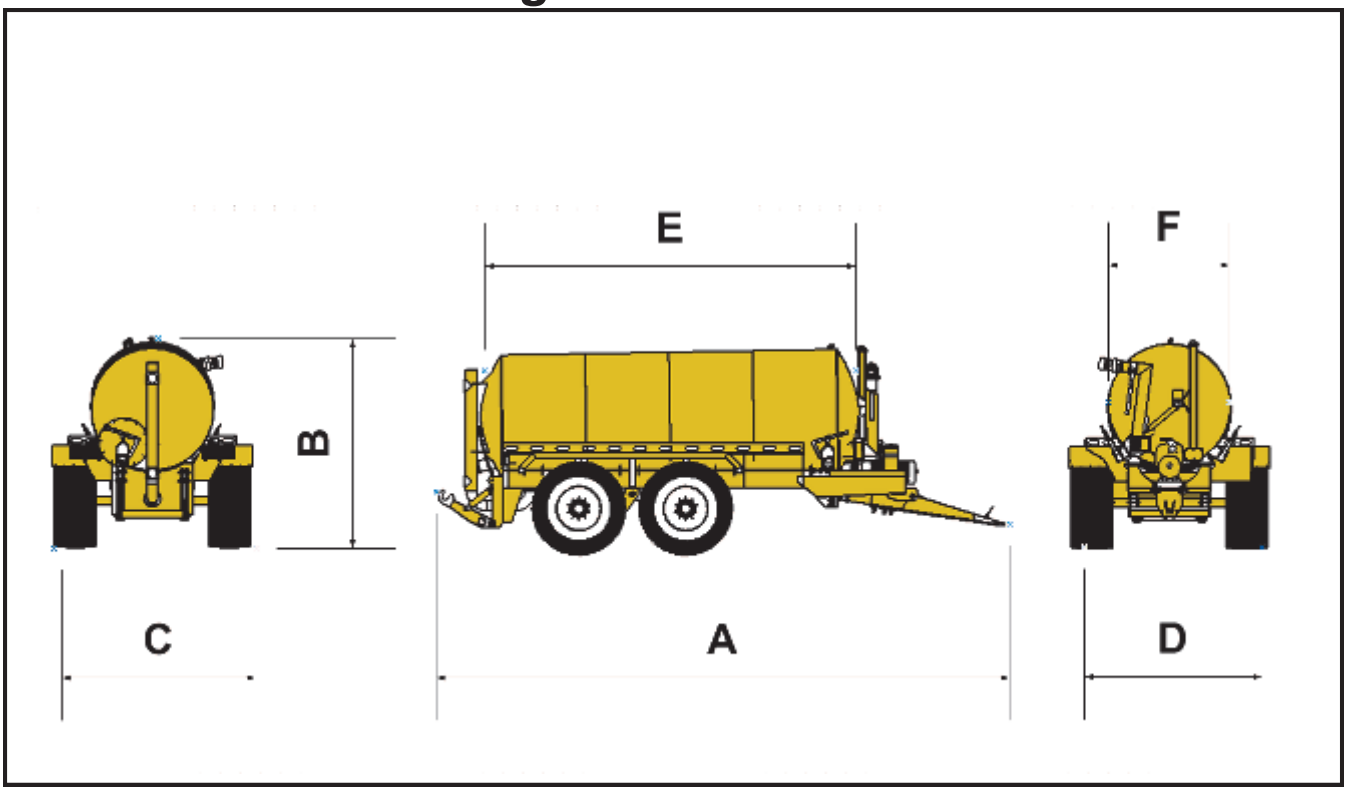
Model			BTTA10/25	BTTA12/25	BTTA12/30	BTTA14/32
Dimensions						
Length (Overall)	**A**	**m**	7.32	7.32	9.14	9.25
Height (Overall)	**B**	**m**	2.82	3.00	3.00	3.00
Width	**C**	**m**	2.46	2.45	2.45	2.45
Axle Track Width	**D**	**m**	1.70	1.83	1.83	1.83
Axle to Rear	**E**	**m**	2.44	2.44	3.00	3.25
Body Length	**F**	**m**	7.32	7.32	9.14	9.75
Platform Height	**G**	**m**	1.20	1.23	1.23	1.22
Bale Ladder Height	**H**	**m**	1.80	1.80	1.80	1.80
Headboard Height	**I**	**m**	0.60	0.60	0.60	0.60
Capacities						
Carrying Capacity		**kg**	10000	12000	12000	14000
Weights						
Unladen Weight		**kg**	1750	1850	1900	2000
Misc						
Number of Axles			2	2	2	2

Dumper Range



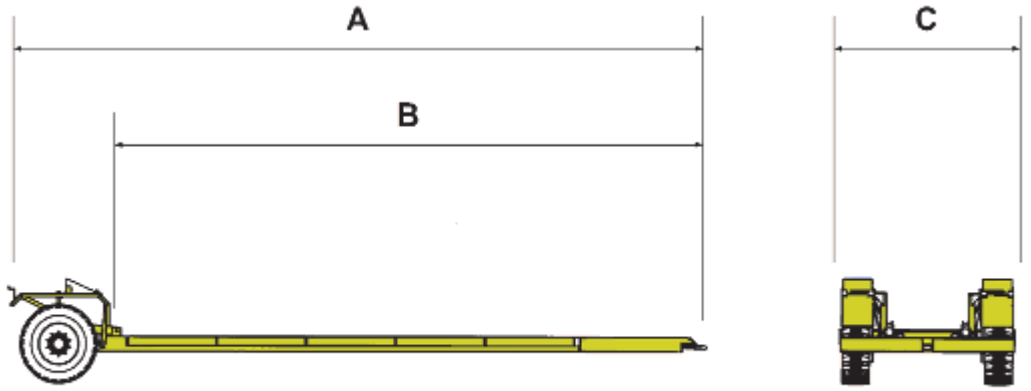
Model			DU8	DUTA8	DUTA10	DUTA12	DUTA14	DUTA16
Dimensions								
Length (Overall)	**A**	**m**	6.20	6.20	6.58	7.10	8.40	8.50
Width	**B**	**m**	2.52	2.52	2.52	2.52	2.52	2.52
Axle Track Width	**C**	**m**	2.00	2.00	2.00	2.00	2.00	2.00
Body Height	**D**	**m**	1.12	1.12	1.38	1.38	1.45	1.65
Body Length	**E**	**m**	4.52	4.52	5.10	5.52	6.24	6.24
Height	**F**	**m**	2.24	2.25	2.77	2.77	2.89	3.10
Tipped Height	**G**	**m**	6.26	6.26	6.90	7.80	8.40	8.50
Capacities								
Load Capacity		**m^3**	9.80	9.80	12.80	15.50	17.30	19.40
Cylinder Capacity		**l**	19.6	19.6	36.4	36.4	45.0	47.0
Weights								
Unladen Weight		**kg**	3000	3250	3750	4000	4500	4750
Misc								
Number of Axles			1	2	2	2	2	2

Vacuum Tanker Range



Model			ST15	ST20	ST20LP	ST25	ST25LP	ST30	ST35
Dimensions									
Length (Overall)	**A**	**m**	6.20	7.14	6.40	6.47	5.89	7.34	8.34
Height (Overall)	**B**	**m**	2.40	2.90	3.20	3.20	3.20	3.43	3.43
Width	**C**	**m**	2.20	2.29	2.85	2.29	2.81	2.29	2.58
Axle Track Width	**D**	**m**	1.83	1.83	2.80	1.83	1.83	1.83	2.20
Tank Length	**E**	**m**	3.50	5.00	3.50	4.33	3.75	5.20	6.20
Tank Diameter	**F**	**m**	1.52	1.52	1.82	1.82	1.82	1.82	1.82
Capacities									
Carrying Capacity		**L**	6810	9080	9090	11350	11350	13620	15900
Pump Capacity		**l/min**	8000	10000	10000	10000	10000	12000	12000
Weights									
Unladen Weight		**kg**	3250	4000	4000	4250	4250	5500	6000
Misc									
Number of Axles			1	2	1	2	1	2	2

Low Loader Range



Model			LL 6	LL 7.5
Dimensions				
Length (Overall)	**A**	**m**	9.69	8.77
Deck Length	**B**	**m**	6.40	7.14
Width	**C**	**m**	2.13	2.13
Capacities				
Carrying Capacity		**kg**	6000	7500
Weights				
Unladen Weight		**kg**	4.25	4.50

Axles & Tyres

Suffolk			SF10	SF11	SF12	SF14	SF16	SF18	SF20
Axles									
Axle Beam	(STD)	**mm**	70	90	90	100	127	127	100
Axle Beam	(LX)	**mm**	90	100	100	127	127	127	100
Axle Beam	(HS)	**mm**	127	127	127	127	127	127	127
Axle Studs	(STD)		6	8	8	10	10	10	10
Axle Studs	(LX)		8	10	10	10	10	10	10
Axle Studs	(HS)		10	10	10	10	10	10	10
Brakes									
Brake Drum	(STD)	**mm**	300X60	350 X 90		400X80	406 X 120	420 X 180	
Brake Drum	(LX)	**mm**	350X90	406 X 120		420 X 180			
Brake Drum	(HS)	**mm**	420 X 180						
Tyres &Rims									
Tyre Size			12.5X15	15X22.5 18PR Rem					

Rootcrop			RC11	RC12	RC14	RC16
Axles						
Axle Beam	(STD)	**mm**	90	90	100	127
Axle Beam	(LX)	**mm**	100	100	127	127
Axle Beam	(HS)	**mm**	127	127	127	127
Axle Studs	(STD)		8	8	10	10
Axle Studs	(LX)		10	10	10	10
Axle Studs	(HS)		10	10	10	10
Brakes						
Brake Drum	(STD)	**mm**	350 X 90		400X80	406 X 120
Brake Drum	(LX)	**mm**	406 X 120		420 X 180	
Brake Drum	(HS)	**mm**	420 X 180			
Tyres &Rims						
Tyre Size			15X22.5 18PR Rem			

Wellington			SWT12	SWT14	SWT16	SWT18	SWT20	SWT24
Axles								
Axle Beam		mm	127	127	127	127	127	127
Axle Studs			10	10	10	10	10	10
Brakes								
Brake Drum		mm	420 X 180					
Tyres &Rims								
Tyre Size			18 X 22.5 18PR Rem					

Bale & Pallet			BTTA10/25	BTTA12/25	BTTA 12/30	BTTA 14/32
Axles						
Axle Beam	(STD)	mm	70	90	90	127
Axle Beam	(LX)	mm	90	100	100	127
Axle Beam	(HS)	mm	127	127	127	127
Axle Studs	(STD)		6	8	8	10
Axle Studs	(LX)		8	10	10	10
Axle Studs	(HS)		10	10	10	10
Brakes						
Brake Drum	(STD)	mm	300 X 60	350 X 90		400 X 80
Brake Drum	(LX)	mm	350 x 90	406 X 120		420 X 180
Brake Drum	(HS)	mm	420 X 180			
Tyres &Rims						
Tyre Size			12.5 X 15	15 X 22.5	15 X 22.5 18PR Rem	

Axles & Tyres

Dumper			DU8	DUTA8	DUTA10	DUTA12	DUTA14	DUTA16
Axles								
Axle Beam	(STD)	**mm**	90	70	90	90	100	127
Axle Beam	(LX)	**mm**	-	-	-	-	-	-
Axle Beam	(HS)	**mm**	-	127	127	127	127	127
Axle Studs	(STD)		8	6	8	8	10	10
Axle Studs	(LX)		-	8	8	10	10	10
Axle Studs	(HS)		-	10	10	10	10	10
Brakes								
Brake Drum	(STD)	**mm**	350X90	300 X 60	350X90		400 X 80	406 X 120
Brake Drum	(LX)	**mm**	-	350 X 90		406 X 120	420 X 180	
Brake Drum	(HS)	**mm**	-	420 X 180				
Tyres &Rims								
Tyre Size			15X22.5 18PR Rem	12 X 15 14 PR	15 X 22.5 18 PR Rem		20.5 X 22.5 Kargo Rem	560/60 X 22.5 Flotation

Tanker			ST15	ST20	ST20LP	ST25	ST25LP	ST30	ST35
Axles									
Axle Beam	(STD)	**mm**	90	90	127	90	127	100	127
Axle Beam	(LX)	**mm**	-	90	127	100	127	127	127
Axle Beam	(HS)	**mm**	-	127	127	127	-	127	127
Axle Studs	(STD)		8	8	10	8	10	10	10
Axle Studs	(LX)		-	8	10	10	-	10	10
Axle Studs	(HS)		-	10	10	10	-	10	10
Brakes									
Brake Drum	(STD)	**mm**	350 X 90		420 X 180	400 X 80	420 x 180	406 x 120	420 X 180
Brake Drum	(LX)	**mm**	-	350 X 90		400 X 80	-	420 X 180	420 X 180
Brake Drum	(HS)	**mm**	-	420 X 180			-	420 X 180	420 X 180
Tyres &Rims									
Tyre Size			15X22.5 18PR Rem				28.1 X 26	15X22.5 18PR Rem	-

Low Loader			LL 6	LL 7.5
Axles				
Axle Beam	(STD)	**mm**	80	90
Brakes				
Brake Drum	(STD)	**mm**	300 X 60	350 X 90
Tyres &Rims				
Tyre Size			385/65 X 22.5	12.5 / 15 X 14 Ply

Transportation & Handling

Richard Western Trailers are generally delivered ready for use.

However in some circumstances it is necessary to remove certain components for shipment and/or storage, these will need to be fitted before use.

General instructions for the fitting of these components are given in the following pages, for further information refer to your Richard Western agent.

WARNING

Assembling the machine should only be undertaken by a competent person. If in doubt about any procedure refer to the manufacturer or the manufacturers agent for further information.

WARNING

When working on the machine always ensure that the Towing vehicle engine is turned off and the Key removed.

WARNING

Be aware of the danger areas around the machine, especially the drawbar and the rear door or tailgate. Take precautions to ensure full visibility of these areas whilst operating the machine, and prevent unauthorised access.

WARNING

When working at height use a suitable platform or similar access device.

WARNING

Make sure all personnel are outside the danger areas when testing the machine.

WARNING

When lifting components use suitable lifting equipment and sling from the marked lifting points.

CAUTION

The Silage sides are "handed", ensure Left & Right are fitted to the correct sides IE side posts on the outside.

Fitting & Removing Silage Sides

Double Acting

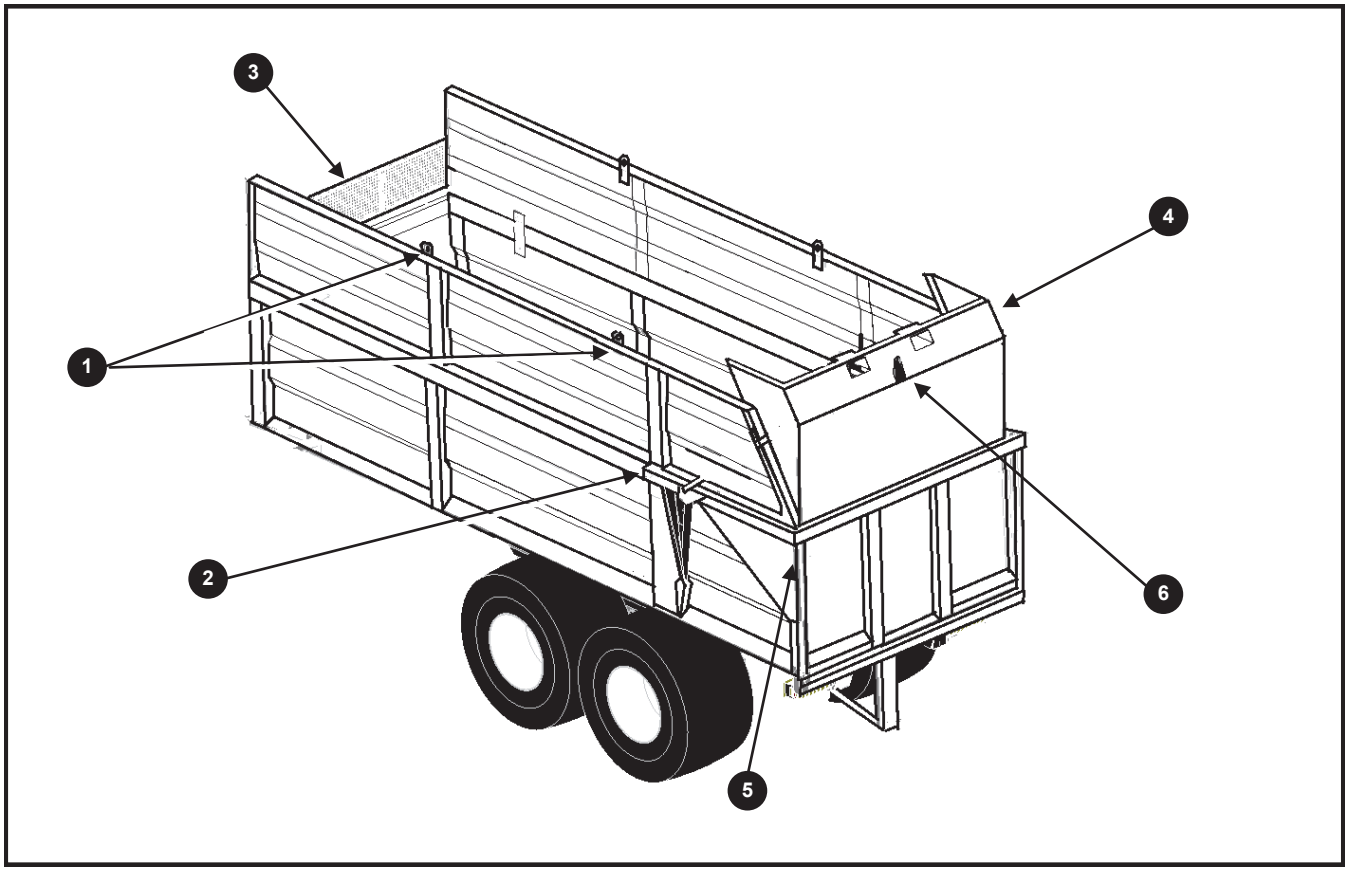
Fitting

Ensure clamp bolts in rear posts are undone fully.

Attach suitable lifting equipment to the lifting eyes **(1)** on the Left Silage side.

Carefully lift into position & guide the Silage Side post **(2)** into the rear post of the trailer body. Attach using Two M12 X 35 Bolts through side sheet.

Repeat the procedure for the Right Silage side



Attach the front mesh **(3)** using the Four M12X100 supplied, through into front post extension and tighten to 40 Nm

Tighten Clamp bolts on front face of rear posts. Lift tailboard silage extension into position using lifting point **(6)** Ensure Pinch Bolts **(5)** are fully undone before fitting.

Fit the Tailboard Silage Extension **(4)** using the Three M12 X 50 Bolts supplied and then re-tightening the pinch bolts.

Attach deflectors and Hoods to the silage sides in the desired position, do not attempt to fit or remove silage sides with the deflectors in position.

Removal is the reverse of the fitting procedure.

Auto Up & Over

Fitting

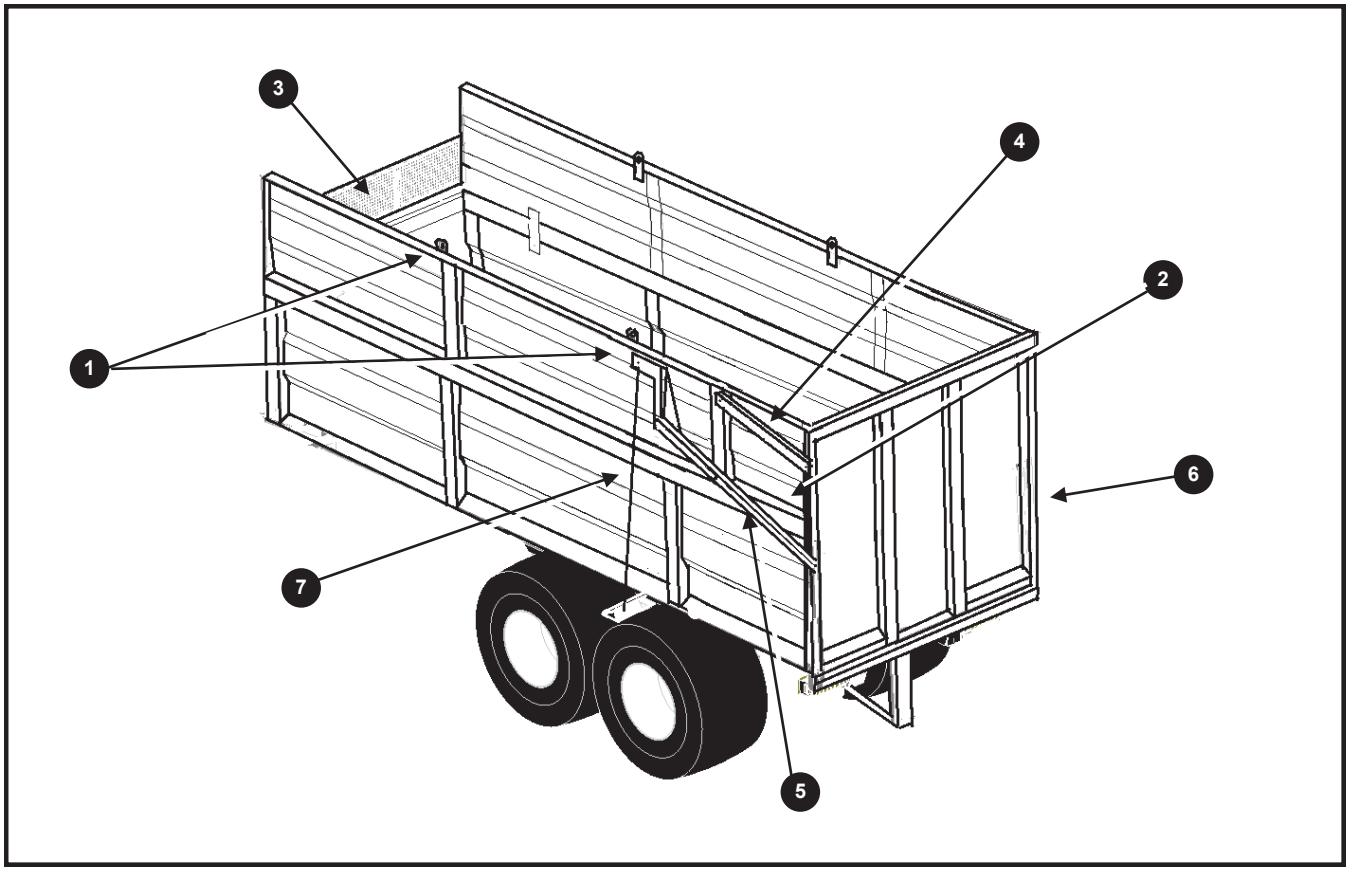
Using suitable lifting equipment attached to the lifting point provided ,remove the Standard free swinging tailgate

Attach suitable lifting equipment to the lifting eyes **(1)** on the Left Silage side.

Carefully lift into position & guide the Silage Side post **(2)** into the rear post of the trailer body. Attach using Two M12 X 35 Bolts through side sheet.

Repeat the procedure for the Right Silage side

Attach the front mesh **(3)**onto front post extension using the Four M12X100 Bolts supplied, and tighten to 40 Nm



Attach the Short Tailgate arm **(4)** and Long Tailgate arm **(5)** to the Silage sides using the Four X 25mm Pins supplied and locate with washer and split pin..

Attach the Tailgate **(6)** to the Tailgate arms using the Four Pins supplied and secure with Washers and Split Pins

Hook the wire ropes **(7)** onto the arms and secure the lower ends to the chassis outrigger brackets using the rope eyes and U Bolts supplied

.

Adjust the tension equally for both sides

Attach deflectors and Hoods to the silage sides in the desired position, do not attempt to fit or remove silage sides with the deflectors in position.

Removal is the reverse of the fitting procedure.

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK

Before Operation

WARNING

When working on the machine always ensure that the Towing vehicle engine is turned off and the Key removed.

CAUTION

Dirty Quick release couplings can cause increased wear in Hydraulic pumps and Air Compressors. Incorrectly connected couplings can cause failure within the system. Always clean the couplings before connecting them

BEFORE OPERATION CHECK THE FOLLOWING

1 The towing vehicle must be equipped for operation hydraulically with at least one feed and one free flow return.

2 Trailer Braking System

The machines can be fitted with one of the two different types of brake systems (this may differ and be dependant on locally or nationally enforced traffic regulations

– Air brake system (dual-circuit system)

– Hydraulically operated brake system.

The towing vehicle brake system must be the same as that of the machine

Machines to be towed at speeds above 32 km/h (20 mph) are to be equipped with an ABS air brake system.

3 Check the brakes before every journey.

4 Check safety equipment for function and correct position.

5 Thoroughly lubricate the machine before operation.

6 Check all Bolts and Nuts are tight.

7 Couple the towing vehicle to the trailer at idle speed only.

8 Before connecting Air and Hydraulic lines turn off the engine of the towing vehicle and ensure the connections are clean.

9 Check the wheel nuts for tightness (see Specification section)

10 Check tyres for correct inflation pressures. Correct if necessary (see Specification section)

11 If a wheel is changed check the wheel nut torques after 10 hrs of operation, and every 10 hours until the torque is maintained. (see Specification section)

12 Wheels must be changed using a jack with sufficient lifting capacity for the weight of the machine.

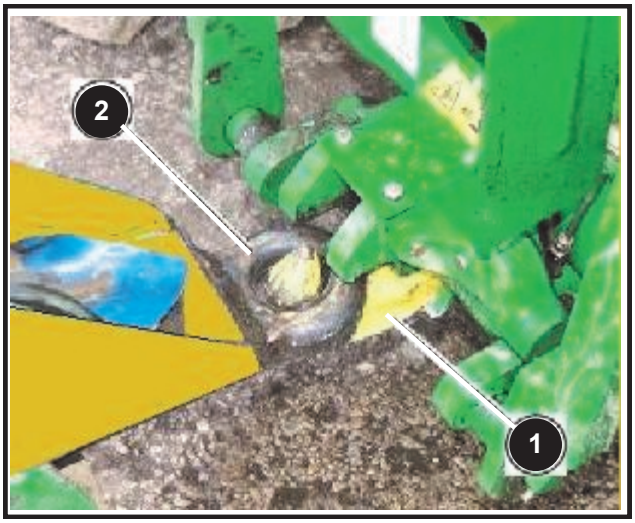
13 Never leave the trailer unattended with the trailer bed raised.

14 Make sure that there are no loose parts on the machine and the towing vehicle before moving off. Secure or cover parts which could fall off during travel.

15 Make sure no persons are in the danger areas before moving off or raising the body. If any person approaches the danger areas turn off the Towing vehicles engine immediately and make safe.

16 When connecting the Air, Electric and hydraulic lines to the Towing vehicle, ensure they are fixed in a way which allows their full articulation as the machine steers.

17 Ensure the Air, Electric and hydraulic lines cannot be trapped or chaffed by moving parts during operation.



Coupling to the Towing Vehicle - Hitch

Reverse the towing vehicle until the tow hitch **(1)** is located beneath the Eye **(2)**

Raise the tow hitch **(1)** and lock into the raised position.

Uncoupling from the Towing Vehicle - Hitch

Ensure the tipping body is lowered fully.

Ensure the drawbar is in the tow position.

Lower the trailer onto the drawbar foot or Skid

Decouple all hoses and electrical connections.

Apply the parking brake.

Unhitch the trailer.

WARNING

Ensure all personnel are outside of the danger area between the Towing Vehicle and Trailer before reversing

WARNING

Check that the trailer is properly and securely attached to the Towing Vehicle before moving off

WARNING

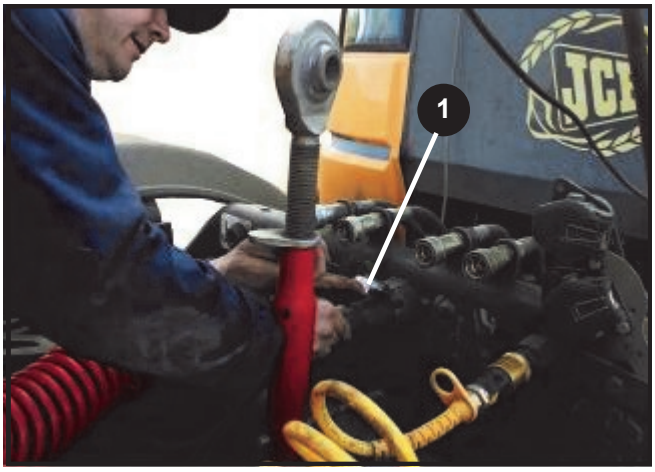
Never park the trailer with the body in the raised position

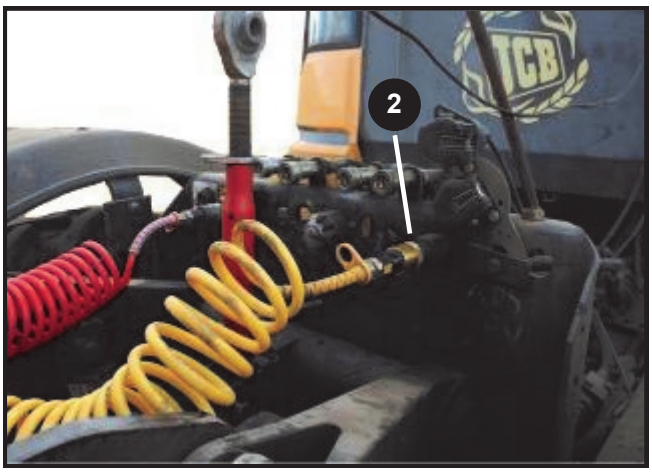
CAUTION

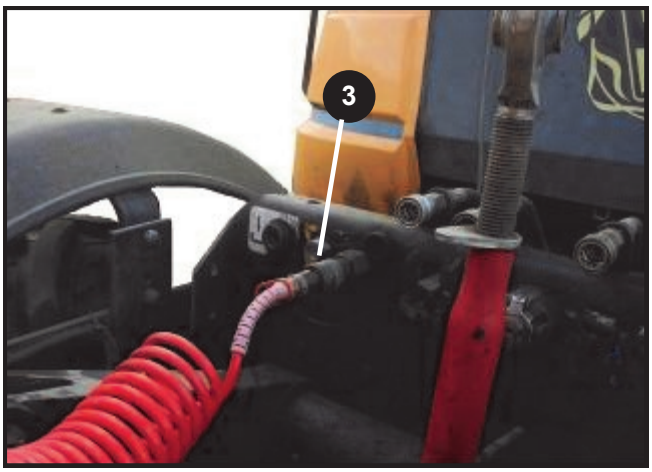
Always park the trailer on firm level ground

CAUTION

Check the Eye periodically for signs of damage or wear. Replace as required







Coupling to the Towing Vehicle
Air Braking Connections

Connect Seven Pin Trailer Electric connector **(1)** to towing vehicle trailer lighting socket.

Connect Yellow Control Line Braking Connector **(2)** to the relevant connection on the Towing Vehicle

Connect Red Air Service Line Braking Connector **(3)** to the relevant connection on the Towing Vehicle

Always connect the Yellow line first when coupling and Disconnect the Red line first when uncoupling.

Note! The trailer will also be equipped with the standard hydraulic brake connections, it is not necessary to connect these when the Air service is used.

WARNING

When working in the danger area between the trailer and the Towing Vehicle always ensure that the Towing vehicle engine is turned off and the Key removed.

WARNING

When working in the danger area between the trailer and the Towing Vehicle always ensure that the hydraulic and Pneumatic controls are in Neutral

CAUTION

Release residual Pneumatic & Hydraulic pressure before connecting or disconnecting Air & Hydraulic lines.

WARNING

Ensure all personnel are outside of the danger area between the Towing Vehicle and Trailer before reversing

WARNING

Check that the trailer is properly and securely attached to the Towing Vehicle before moving off

CAUTION

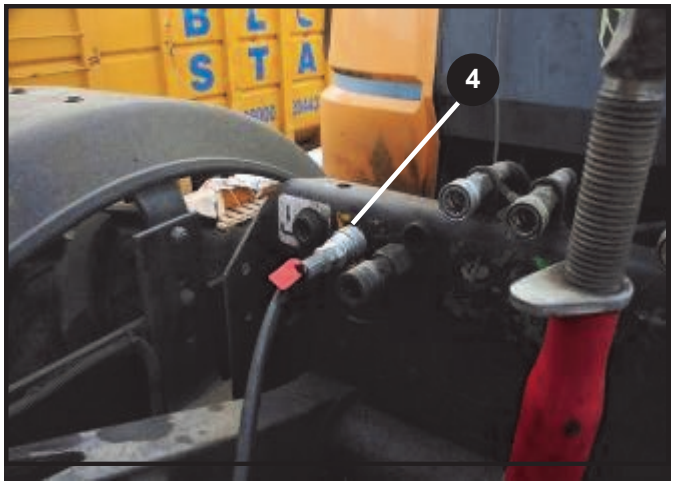
Check the Ring Hitch periodically for signs of damage or wear. Replace as required

CAUTION

Dirty Quick release couplings can cause increased wear in Hydraulic pumps and Air Compressors. Incorrectly connected couplings can cause failure within the system. Always clean the couplings before connecting them

WARNING

When coupling to a tractor connect the Yellow line first when connecting and remove the Red line first when disconnecting



Coupling to the Towing Vehicle
Hydraulic Braking Connections

For trailers that are equipped with Hydraulic Brakes connect the Hydraulic Service Line **(4)** to the correct connection on the Towing vehicle.

Note! The trailer will also be equipped with the standard hydraulic brake connections, it is not necessary to connect these when the Air service is used.

Note! The trailer will also be equipped with the Optional Air brake connections, it is not necessary to connect these when the Hydraulic service is used.

ABS Brake Connections

Some trailers are fitted with ABS braking, if applicable connect the ABS system plug to the relevant socket on the towing vehicle.

For connection information see page 5:7

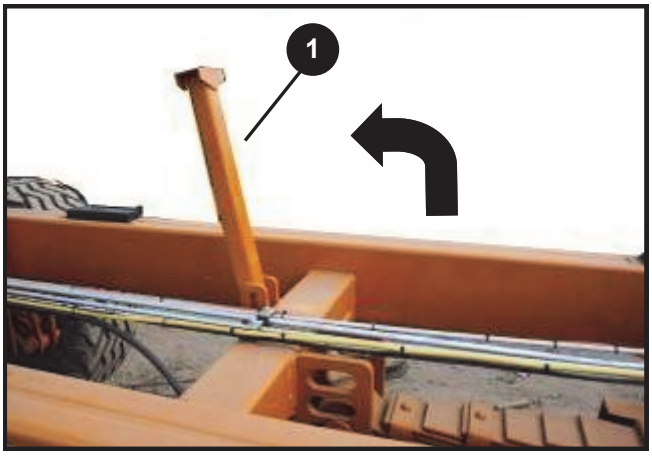
Coupling to the Towing Vehicle
Steering Axle Connections

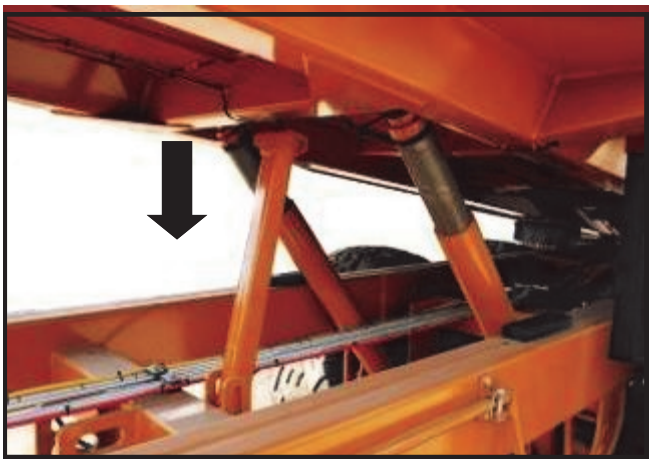
Some trailers are fitted with a self steering axle, this allows easier turning with less damage to tyres and to the road surface.

A Dual hydraulic connection from the towing vehicle is used for this.

When travelling forwards the spool valve should be moved to Retract Cylinders this allows the steering axle to follow the lead axle.

When reversing the trailer the spool position must be moved to extend the cylinders. The trailer wheels will then stay in line.





Checking Body Prop

Body Props **(1)** are carried on the machine as an integral part of the assembly and are located Between the main chassis rails beneath the body.

The prop is designed to be used to support the trailer body in the raised position should it be necessary to work beneath the raised body.

Check the operation and condition of the prop regularly

WARNING

The raised trailer could drop suddenly and cause serious injury, always use the body prop when working beneath the raised body. Ensure that whilst fitting the props nobody could operate the controls either accidentally or otherwise.

Fitting the Body Prop

Locate the prop **(1)** and raise it on its hinge until the stop position.

Lower the trailer body slowly until it rests on the prop.

Removing the Body Prop

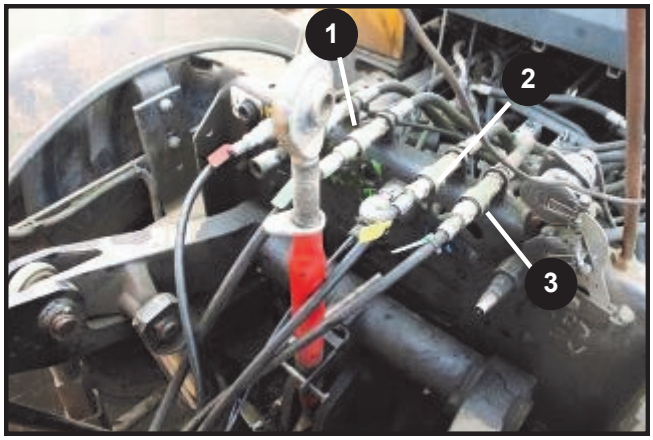
Raise the body until it is clear of the prop.
Fold the prop forwards until it secured in its stowed position

WARNING

Never raise the trailer body in the vicinity of overhead power cables or other aerial obstructions.

CAUTION

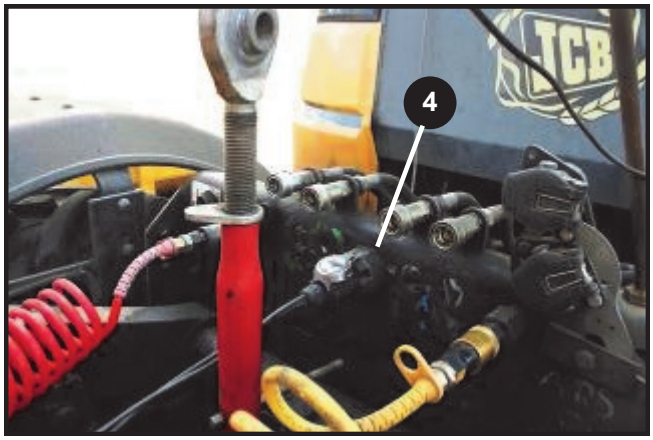
Beware of the possibility of falling objects use Personal protective equipment i.e. Hard hat as required.



Coupling to the Towing Vehicle
Hydraulic Connections

Connect the Hydraulic Raise service line **(1)** to a spool valve connection on the towing vehicle

Connect Hydraulic Tailgate service line **(2)** and the return line **(3)** to double acting spool valve connections on the towing vehicle



Coupling to the Towing Vehicle
Lighting Connections

Connect the electrical seven pin connector **(4)** to the vehicle lighting socket

WARNING

When working in the danger area between the trailer and the Towing Vehicle always ensure that the Towing vehicle engine is turned off and the Key removed.

WARNING

When working in the danger area between the trailer and the Towing Vehicle always ensure that the hydraulic and Pneumatic controls are in Neutral and that the Control Panel switch is off

CAUTION

Release residual Pneumatic & Hydraulic pressure before connecting or disconnecting Air & Hydraulic lines.

Coupling the Drive shaft to the Towing Vehicle

Ensure the Tractor and Trailer PTO shafts are clean and suitably greased.

Ensure the driveshaft is of the correct length (Refer to the driveshaft manufacturers documentation for further information)

Ensure the correct orientation of the driveshaft (IE The tractor symbol on the guard indicates the Tractor end connection).

Slide back the guard sleeve and slide the shaft onto the trailer PTO , then repeat and fit to the Towing vehicle PTO.

Fit safety chains where applicable

When not in use remove the driveshaft from the machine.

WARNING

Never enter an area where driveshaft is rotating.

WARNING

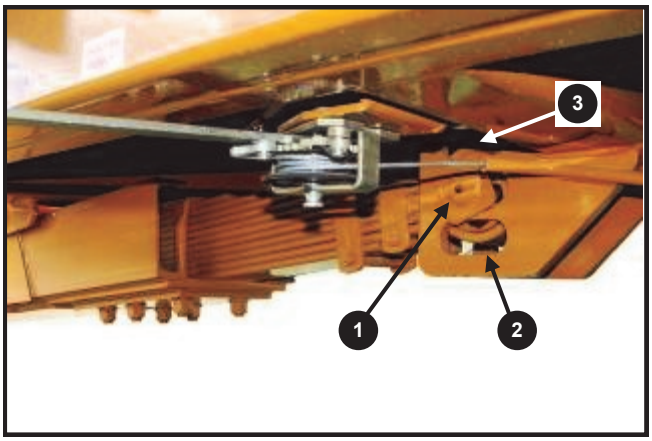
When working in the danger area between the trailer and the Towing Vehicle always ensure that the Towing vehicle engine is turned off and the Key removed.

WARNING

Never work beneath any unsupported vehicle

WARNING

Always ensure all driveshaft guards are fitted and serviceable



Adjusting Sprung Drawbar Height

The trailer chassis should run level or with the front of the trailer slightly raised when connected to the towing vehicle.

Remove any load from the trailer, lower the body apply the parking brake and disconnect from the Towing Vehicle.

Support the front of the trailer chassis on suitable supports and remove all weight from the drawbar.

Using a suitable jack under the front of the drawbar , take the load and remove the Pin **(1).**

Using the jack raise or lower the drawbar to the required height.

Insert the Pin **(1)** in the Lower hole **(2)** to increase the drawbar height , or in the Upper hole **(3)** to reduce it.

Remove jack and supports and check operation.

Adjust the drawbar and/or the hitch of the towing vehicle so that when towing the trailer body is slightly raised at the front.

Hitching the trailer so that the chassis is parallel to the road surface is acceptable, however this may cause additional wear to the trailer brakes and those of the Towing vehicle. When laden the rear axle wheels may lock when braking.

Hitching too low will cause unnecessary wear to the suspension and brake components of the front axle, and reduce the braking efficiency, and possibly locking the rear axle. It can also cause additional loading to be placed on the Towing vehicle, causing damage to rear axle and brake components.

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK

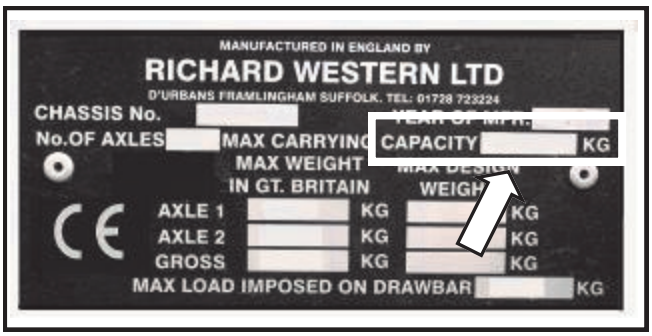
Operation

WARNING

Never exceed the trailers maximum permitted capacity as stated on the manufacturers plate

CAUTION

Dirty Quick release couplings can cause increased wear in Hydraulic pumps and Air Compressors. Incorrectly connected couplings can cause failure within the system. Always clean the couplings before connecting them



Loading the Trailer

The capacity of the trailer is shown on the Manufacturers plate on the chassis.

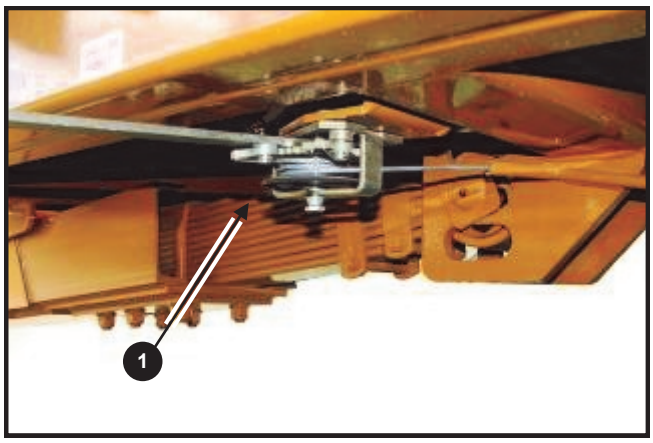
Do not overload the trailer

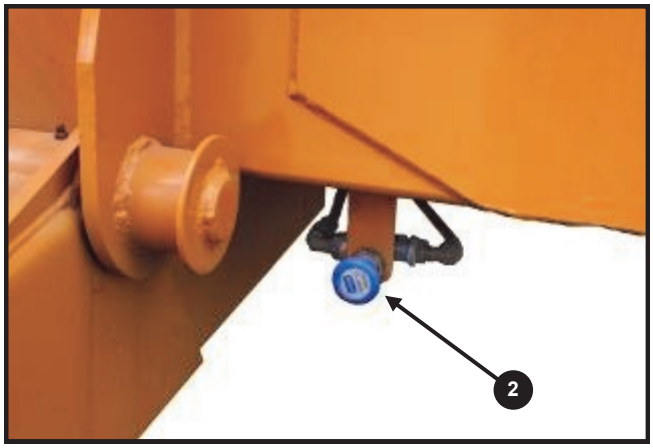
Be especially aware when loading and carrying Aggregates, Stone and other dense materials, and loads with a potential for high moisture content.

Always load by weight not volume

Use the table below as a guide

Material	Kg/M^3	Material	Kg/M^3	Material	Kg/M^3	Material	Kg/M^3
Alfalfa	256	Corn, on the cob	721	Lime, quick, lump	849	Sewage, sludge	721
Apples	641	Corn, shelled	721	Lime, quick, fine	1201	Shale, solid	2675
Ashes - wet	730- 890	Earth, loam, dry, excavated	1249	Limestone, broken	1554	Shale, broken	1586
Ashes - dry	570- 650	Earth, moist, excavated	1442	Limestone, pulverized	1394	Silage, Fresh Pasture	590
Asphalt, crushed	721	Earth, wet, excavated	1602	Linseed, whole	753	Silage, Maize	690
Bark, wood refuse	240	Earth, dense	2002	Malt	336	Slag, solid	2114
Barley	609	Earth, soft loose mud	1730	Manure	400	Slag, broken	1762
Beans, castor	577	Earth, packed	1522	Mud, packed	1906	Slag, crushed 10 mm	1185
Beans, soy	721	Earth, Fullers, raw	673	Mud, fluid	1730	Slag, furn. granulated	961
Beets	721	Fertilizer, acid phosphate	961	Oats	432	Slate, solid	2691
Bran	256	Fish, meal	593	Oats, rolled	304	Slate, broken	1290-1450
Brewers grain	432	Flaxseed, whole	721	Peat, dry	400	Slate, pulverized	1362
Brick, common red	1922	Flint - silica	1390	Peat, moist	801	Soy beans, whole	753
Brick, fire clay	2403	Flour, wheat	593	Peat, wet	1121	Stone, crushed	1602
Brick, silica	2050	Fullers Earth - raw or burnt	570- 730	Potash	1281	Stone (common, generic)	2515
Buckwheat	657	Garbage, household rubbish	481	Potatoes, white	769	Sugarbeet pulp, dry	208
Chalk, solid	2499	Glass - broken or cullet	1290-1940	Rice, hulled	753	Sugarbeet pulp, wet	561
Chalk, lumpy	1442	Granite, solid	2691	Rice, rough	577	Sugarcane	272
Chalk, fine	1121	Granite, broken	1650	Rye	705	Turf	400
Cinders, furnace	913	Grain - Maize	760	Sand, wet	1922	Wheat	769
Cinders, Coal, ash	641	Grain - Barley	600	Sand, wet, packed	2082	Wheat, cracked	673
Clay, dry excavated	1089	Grain - Millet	760- 800	Sand, dry	1602		
Clay, wet excavated	1826	Grain - Wheat	780- 800	Sand, loose	1442		
Clay, dry lump	1073	Gravel, loose, dry	1522	Sand, rammed	1682		
Clay, fire	1362	Gravel, with sand, natural	1922	Sand, water filled	1922		
Clay, wet lump	1602	Gravel, dry 10 to 50mm	1682	Sand with Gravel, dry	1650		
Clay, compacted	1746	Gravel, wet 10 to 50mm	2002	Sand with Gravel, wet	2020		
Clover seed	769	Gypsum, solid	2787	Sandstone, solid	2323		
Concrete, Asphalt	2243	Gypsum, broken	1290-1600	Sandstone, broken	1370-1450		
Concrete, Gravel	2403	Gypsum, crushed	1602	Sawdust	210		





Moving Off

Ensure all Hydraulic connections are made and that services are functioning correctly

Ensure all Air connections are made and that the brakes are functioning correctly

Ensure all electrical connections are made and that all lighting systems and the Eurosafe braking (option) are functioning correctly.

When the Air Braking system is fitted allow air pressure from the towing vehicle to build to the required level.

Release the manual Parking brake lever **(1).**

If only using the hydraulic brakes or when shunting the trailer push the Air release valve **(2)** before moving off.

Ensure the trailer is fully lowered and the tailgate is closed before releasing the brake and moving away.

CAUTION

Check all around the trailer before moving away, especially in confined areas and when reversing.

CAUTION

Be especially careful when reversing, use a banksman if visibility is limited.

Tipping the Trailer

Bring the Towing machine to a stop.

Always position the towing vehicle and trailer in a straight ahead position wherever possible.

Check for overhead obstructions especially when inside a building and near power lines.

If the Tailgate is latched manually, release the latches before tipping.

Select the Towing vehicles tipping control and raise the trailer body, control the speed to suit the type of material being carried.

If an independently operated tailgate is fitted operate this from the towing vehicle as the body is raised. Ensure the load is not able to apply undue pressure to the tailgate and therefore prevent damage

Slowly drive forward to ensure the loaded material is fully discharged.

Stop the towing vehicle and fully lower the body and close the tailgate before driving off.

Always lower the trailer body when leaving the machine.

CAUTION

Take care when tipping on gradients

CAUTION

Avoid tipping on unconsolidated ground

CAUTION

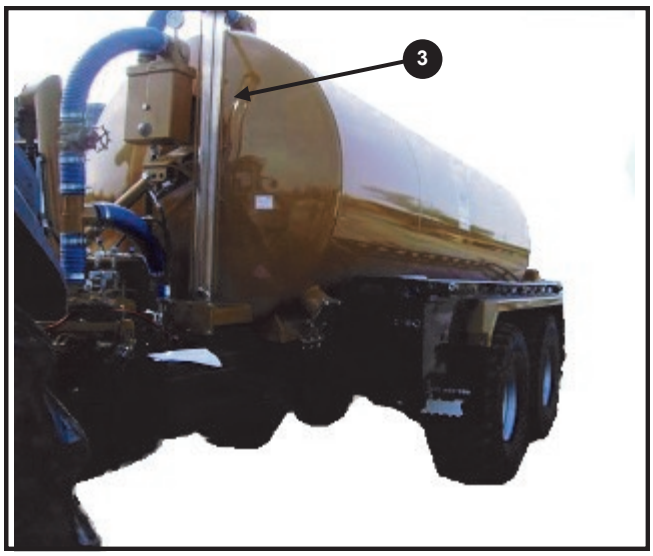
Be prepared for a change in stability as the centre of mass changes as the load is ejected from the trailer . Slow flowing or sticking loads can apply an upwards force to the drawbar.

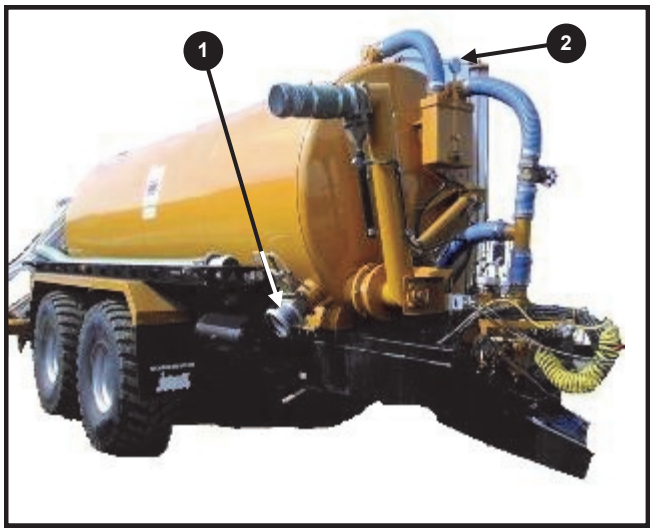
CAUTION

It is recommended to use a double acting tailgate when tipping rootcrops

CAUTION

Never leave the trailer raised when disconnected from the towing vehicle





Operating the Vacuum Tanker

Due to the bespoke nature of some tanker work, the instructions given here are generic, your dealer will be able to give full training and provide additional information as required.

Filling (Generic Operation)

Connect the PTO shaft to the pump splined shaft and the tractor unit as described in the Before operation section.

Set lever on the pump to the vacuum position,(either manually or hydraulically) make sure that the outlet valve and all others openings or hatches into the tank are closed

Connect a suitable hose to the chosen Inlet **(1)** and run the hose to the lagoon or tank being emptied. Ensure the hose is fully submerged into the liquid and remains so during the operation.

Start the Tractor and Engage PTO and run at **500-540** rpm.

Check the oil drip feed on the pump are adjusted correctly (See maintenance section)

When the vacuum gauge **(2)** reads approximately Minus 0.4 Bar open the relevant valve connected to the hose to its fullest extent.

The tank will start to fill. The operator should stay with the vehicle and prepare to close the valve and disconnect the pump to prevent overfilling.
The tanker is nearly full, when slurry is visible in the sight glass **(3)** and approx 300mm from the top of the tank.

At this point the operator should close the gate valve and stop the pump. If the tank is overfilled, it is possible that liquid can enter the pump body causing damage to the vanes and casting.

Primary and Secondary Moisture traps fitted to the top of the tank and the front wall respectively are to limit excess liquid passing through the pump.

Note! They do not give total protection. Damage caused to the pump in this way will not be covered by warranty.

When the tank is full, the gate valve closed and PTO and pump stopped, it is safe to remove the Hose from the tanker.

Due to the efficiency of present pumps it is not usually necessary to maintain a PTO speed of 540 rpm during the filling process. By reducing the PTO speed less strain is placed upon the unit and a greater tank capacity is achieved.

Operating the Vacuum Tanker

Emptying (Field Operation)

In the field emptying is usually through the rear gate valve and splash plate.

Turn the pump lever to pressure, and engage the tractor PTO.

When pressure has built to 0.5 bar commence forward movement and when in the correct position open the rear hydraulic gate valve.

The application rate can be controlled by varying the forward speed of the Tractor.

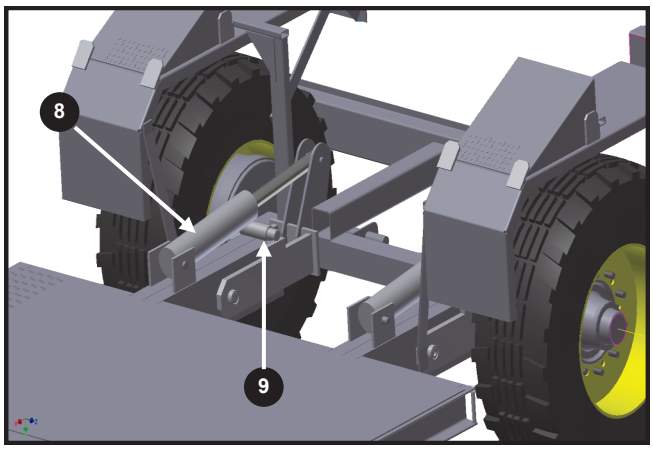
The tanker is fitted with a pressure relief valve, if the pressure in the tanker is too high this valve will open to vent excess pressure to atmosphere. When this occurs disengage the PTO and allow the pressure to fall, as this happens the spread pattern will decrease.
Re engage the PTO to raise pressure again to the normal operating figure.

Maintenance

In addition to the maintenance shown in the service schedules, the secondary moisture traps should be drained every 2-3 loads and inspected and cleaned every 2 Months of operation.

Basic Instructions for Optional Equipment

Filler Arm	Ensure good engagement with the floor funnel before commencing a filling operation.
Shut off Trolley	As above. Ensure that sufficient pressure is applied to open the gate valves fully.
By-Pass Valve	This allows air during the pressurisation cycle to bypass the system, ensuring that the pipework and the tank are not subjected to over pressure when using a large pump.
Linkage Arms	These allow for the mounting of Injectors or dribble bars at the rear of the tank.



CAUTION

Never reach beneath any unsupported part of the machine, especially when removing the locking pins. Always work from above.

CAUTION

Always lower the bed when leaving the machine.

CAUTION

Always ensure the load is properly and suitably restrained before moving off.

CAUTION

Never rely on weight, friction or a vehicles parking brake to restrain the load. Always use chains and straps.

CAUTION

To prevent slip and trip injuries keep the bed clean and free from dirt, spilled oil and debris.

Operating a low loader Trailer

When connected to the Towing Vehicle the bed of the trailer can be raised or lowered as required.

Lowering the Trailer

To lower trailer extend the cylinders **(8)** to lift trailer bed fully.

Stop the engine of the towing vehicle, walk to rear of machine and remove locking pins **(9)** and store safely.

Start the engine of the towing vehicle and place hydraulic spool lever in float position the trailer bed will lower to ground.

Lower the front end of the loader by lowering the pick up hitch of the towing vehicle using the manufacturers instructions.

Implements, tracked and skid steer vehicles can often be loaded onto the bed from the side.

Wheeled vehicles can be positioned on the bed in the following manner.

Disconnect the hydraulic and Electrical connections to the trailer.

Position loading wedges and any additional blocking either side of the trailer drawbar.

Drive the machine onto the bed straddling the drawbar.

Raising the Trailer

To raise trailer extend the cylinders **(8)** to lift trailer bed fully.

Stop the engine of the towing vehicle, walk to rear of machine and insert locking pins **(9)**

Start the engine of the towing vehicle and place hydraulic spool lever in float position the trailer bed will lower until stopped by the locking pins.

Operating a Dumper Trailer

Although the tipping control of the dumper models is similar to that of other trailers, particular care must be taken when tipping due to higher tip angle, a higher centre of mass and the potential for sticking loads.

Tipping the Dumper

Reverse to the tip site and ensure the trailer and towing vehicle are in a straight line.

Raise the dumper body using the towing vehicle spool valve and observe the load as it starts to discharge from the dumper body.

The speed of discharge can be controlled by raising and lowering the body.

CAUTION

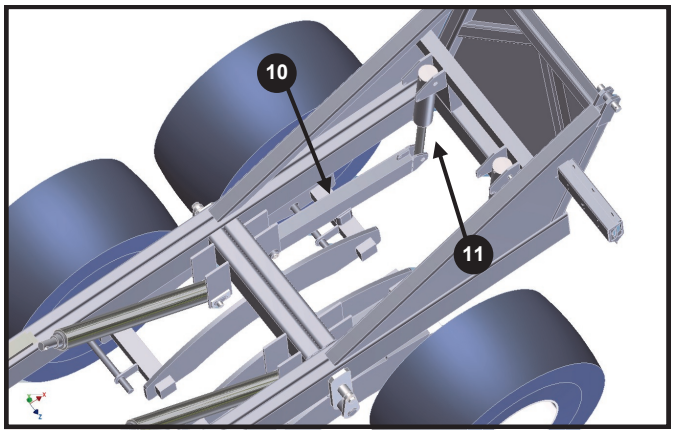
Be especially vigilant when tipping a dumper trailer, as the machine can become unstable in certain conditions.

CAUTION

Be aware of stability problems caused by unstable ground and sticking loads.

CAUTION

In the event of instability occurring lower the body and reposition trailer on firm level ground before proceeding.



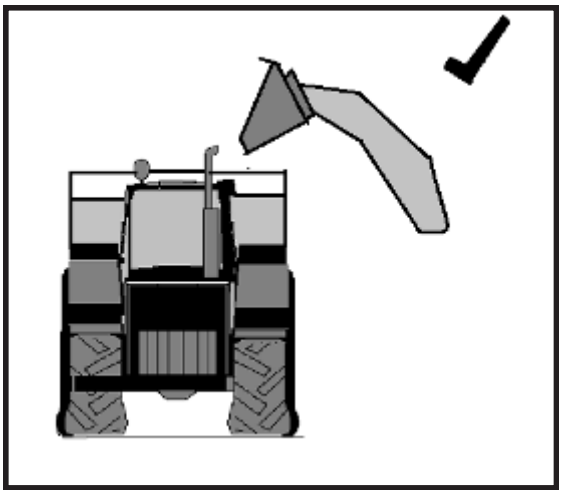
Anti Jack Option

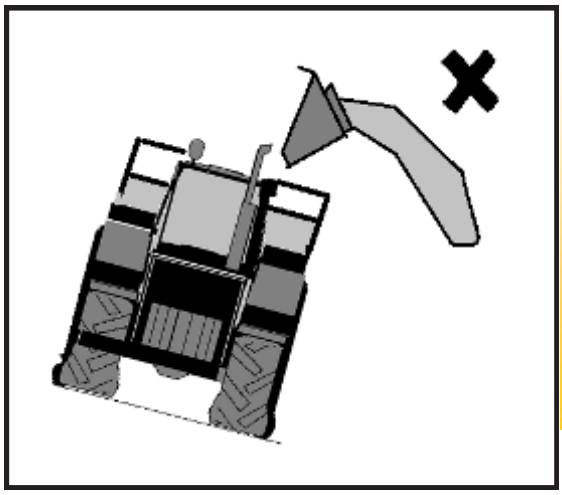
The Anti jack system is available as an option on DUTA 10 machines and as standard on DUTA 12 and 14 machines.

It consists of two beams **(10)** which push down on the rear of the rocking beam axle.

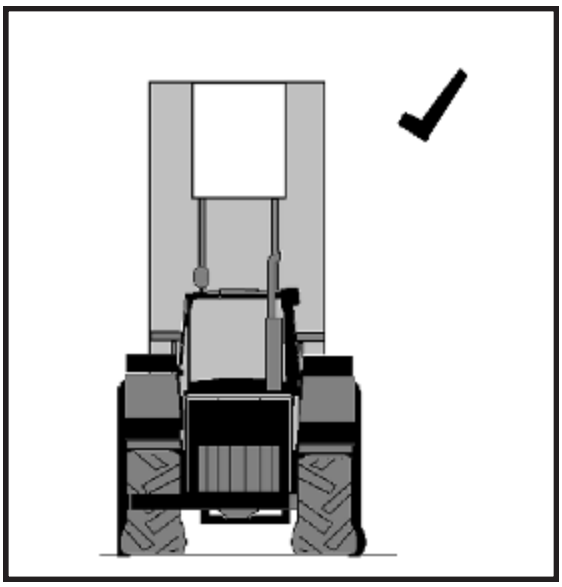
Single acting cylinders **(11)** which are operated independently of the tipping action push down two beams onto the rear of the rocking beam axle.

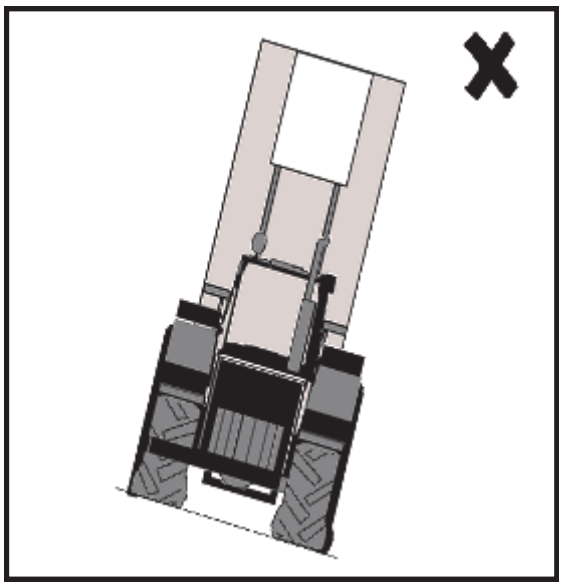
The cylinders are returned by springs when Released.
Pressure should be applied to the axles until the axle just locks on each side to provide a stable tipping base.
The cylinders should not be used to jack trailer clear of ground.



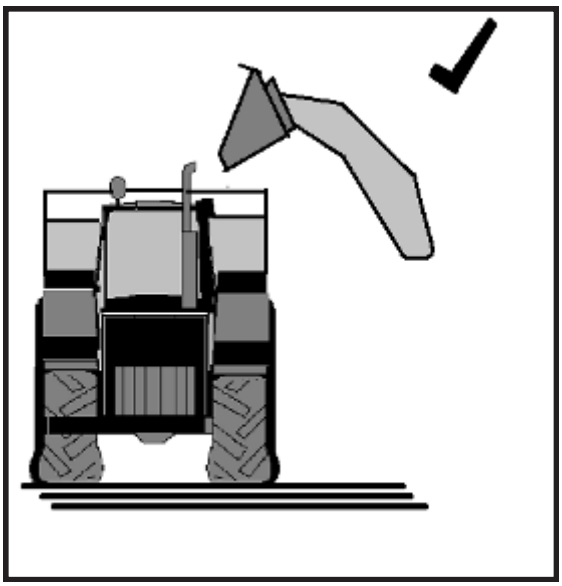


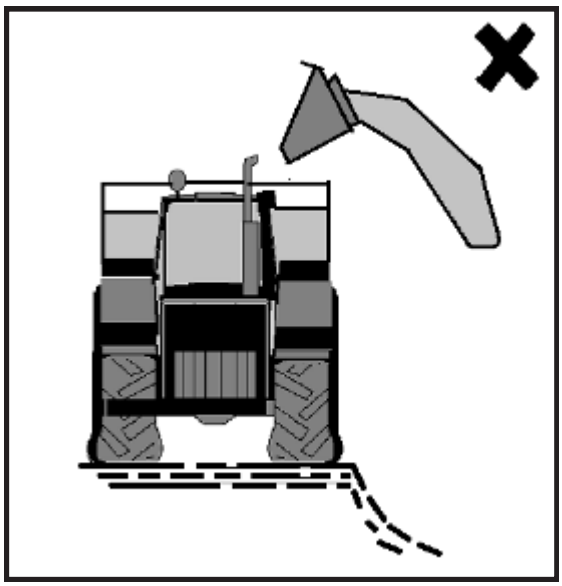
Load and travel on Level Ground as far as practical. Avoid Traversing slopes





Always tip on Level Ground





Always load on firm Ground, avoid trenches and submerged services

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK

Maintenance & Service Schedules

The service and maintenance schedule must be adhered to ensure the optimum availability and efficiency of the machine is maintained.

Failure to adhere to these schedules may cause damage to the machine and possibly endanger the operator and others.

The warranty given for the machine will become void if the maintenance schedule is not followed.

WARNING 

Ensure all personnel are outside of the danger area between the Towing Vehicle and Trailer before use.

WARNING 

When working in the danger area between the trailer and the Towing Vehicle always ensure that the Towing vehicle engine is turned off and the Key removed.

WARNING 

When working in the danger area between the trailer and the Towing Vehicle always ensure that the hydraulic and Pneumatic controls are in Neutral and that the Control Panel switch is off

WARNING 

Ensure the control panel or Joystick power is in the off position before maintaining the machine.

WARNING 

Ensure the Cylinder locks are installed before working under the raised bed.

WARNING 

Wear the correct personal protective clothing. The brake linings may contain asbestos, a respirator should be worn whilst handling brake components.

WARNING 

Ensure tyre pressures are correct. Incorrect tyre pressures can cause stability and handling problems for the trailer and Towing vehicle

CAUTION 

Release residual Pneumatic & Hydraulic pressure before connecting or disconnecting Air & Hydraulic lines.

CAUTION 

Ensure that decals are clearly visible. Replace damaged or missing decals immediately.

CAUTION 

Carry out all maintenance at the correct intervals and in accordance with the instructions in this manual.

Service Schedule

	Suffolk	Rootcrop	Wellington	Bale & Pallet	Agricultural Dumper	Vacuum Tankers
■ Perform task						
☐ Check						
Maintenance Task						
Daily						
Inspect for damage due to the load or loading machine	☐	☐	☐	☐	☐	☐
Check Brake operation	☐	☐	☐	☐	☐	☐
Check Park brake operation	☐	☐	☐	☐	☐	☐
Grease Tipping Cylinder Pivots	■	■	■		■	
Grease Body Tipping Pivots	■	■	■		■	
Grease Tailboard Cylinders	■	■	■			
Grease Tailboard Pivots	■	■	■			
Drain Water from Air reservoir (if fitted)	■	■	■	■	■	■
Check Oilers						☐
Weekly						
Check Lights	☐	☐	☐	☐	☐	☐
Check wheel nut torque	☐	☐	☐	☐	☐	☐
Check for Oil leaks	☐	☐	☐	☐	☐	☐
Grease Rocking Beam Pivots (if fitted)	■	■	■	■	■	■
Grease Sprung Drawbar (if fitted)	■	■	■	■	■	■
Check Side extension Bolt security (if fitted)	☐	☐	☐	☐	☐	☐
Check Hydraulic hose condition	☐	☐	☐	☐	☐	☐
Check air line condition	☐	☐	☐	☐	☐	☐

	Suffolk	Rootcrop	Wellington	Bale & Pallet	Agricultural Dumper	Vacuum Tankers
Weekly contd						
Grease brake linkages	■	■	■	■	■	■
Check connections to Towing Vehicle	□	□	□	□	□	□
Check Towing Eye condition	□	□	□	□	□	□
Check Tyre Pressures	□	□	□	□	□	□
Check Tyre condition	□	□	□	□	□	□
Grease all nipples on running gear	■	■	■	■	■	■
Inspect the machine for loose Nuts and Bolts	□	□	□	□	□	□
Check Tank Oil level						□
Check operation of Valves						□
Every Month						
Check operation of Overfill Valve						□
Lubricate PTO						■
Clean Valves						■
Every 3 Months						
Check Brake clearance & wear	■	■	■	■	■	■
Adjust Brakes	■	■	■	■	■	■
Grease Steering Axle Kingposts (Option)	■	■	■	■		
Change Overgear Oil						■
Check all Screws and Locknuts	■	■	■	■	■	■
Check Tie Rod for damage	□	□	□	□		

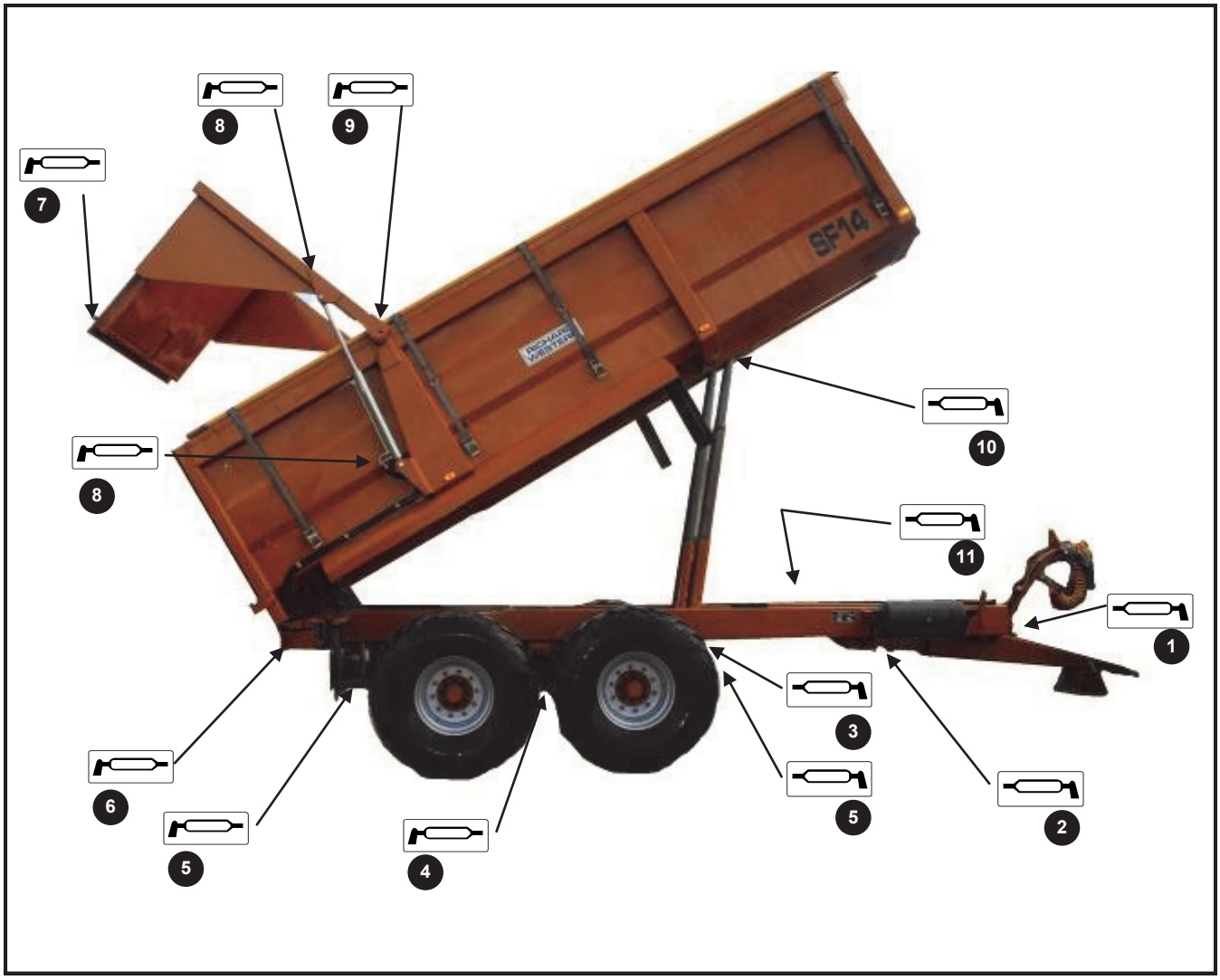
Service Schedule contd

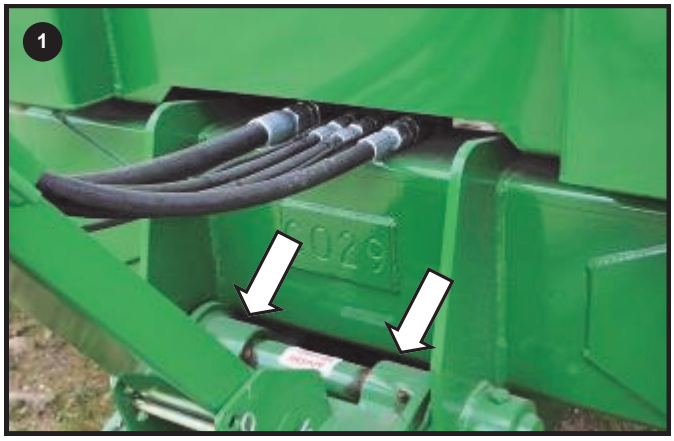
	Suffolk	Rootcrop	Wellington	Bale & Pallet	Agricultural Dumper	Vacuum Tankers
Every 6 Months						
Check the Axle Hubcaps	■	■	■	■	■	■
Check Wheel bearing wear	■	■	■	■	■	■
Tighten All Suspension U-Bolts	■	■	■	■	■	■
Tighten All Spring Drawbar U-Bolts	■	■	■	■	■	■
Check Blade wear						□
Every Year						
Clean the Oil tank						■
Clean the Lubrication pump						■
Check Suspension	■	■	■	■	■	■
Every 2 Years						
Lubricate Wheel Bearings	■	■	■	■	■	■
Laying Up Protection						
Protect all Electrical Connections	■	■	■	■	■	■
Clean down machine	■	■	■	■	■	■
Repaint any areas where paint has been removed	■	■	■	■	■	■
Replace worn or damaged parts	■	■	■	■	■	■
Replace missing or damaged decals	■	■	■	■	■	■
Grease all bright parts	■	■	■	■	■	■
Cover ends of all Quick release connectors	■	■	■	■	■	■

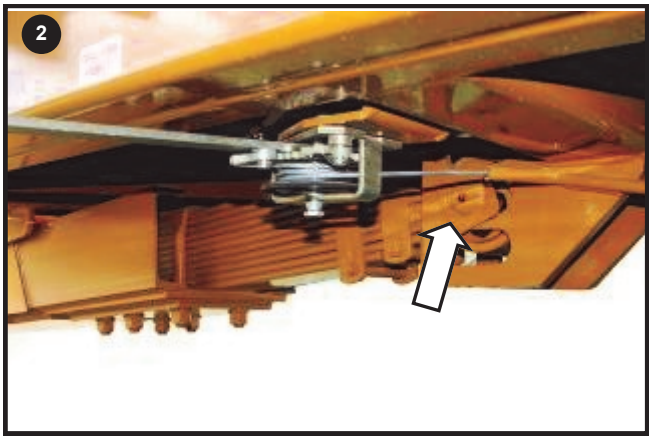
ABS Brakes *additional requirements*

	Suffolk	Rootcrop	Wellington	Bale & Pallet	Agricultural Dumper	Vacuum Tankers
Every 3 Months						
Check all system components for signs of damage	☐	☐	☐	☐	☐	☐
Test whole system for air leakage	■	■	■	■	■	■
Every Year						
Check Electrical wiring for damage	☐	☐	☐	☐	☐	☐
Check piping for damage & security)	☐	☐	☐	☐	☐	☐
Check Sensor for Wear & Readjust as required	■	■	■	■	■	■
Every 2 Years						
Replace Modulator & Solenoid	■	■	■	■	■	■
When Hubs removed						
Check and readjust Exciter & Sensor	☐	☐	☐	☐	☐	☐

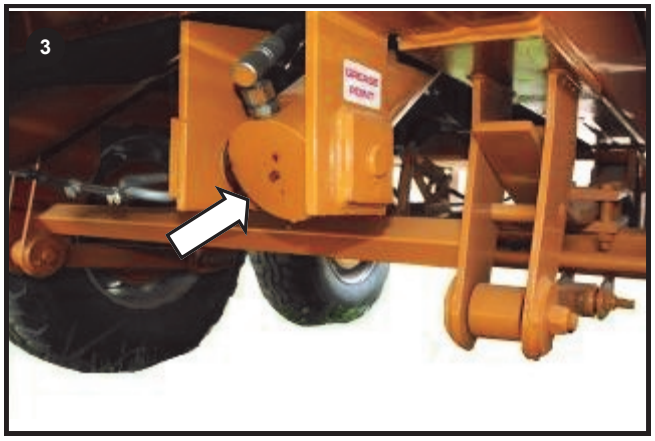
Grease Points





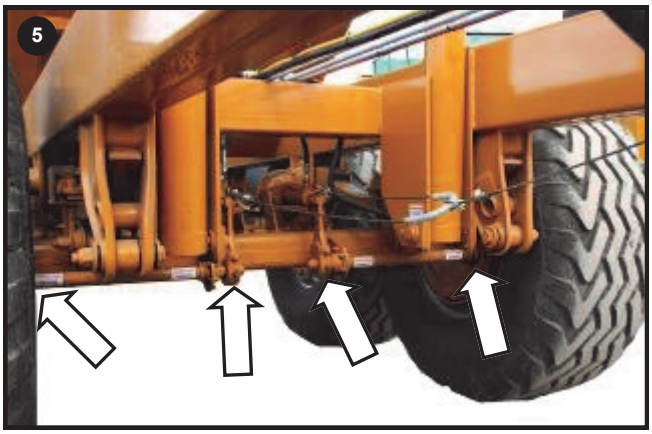


Grease Sprung Drawbar Pivots where applicable



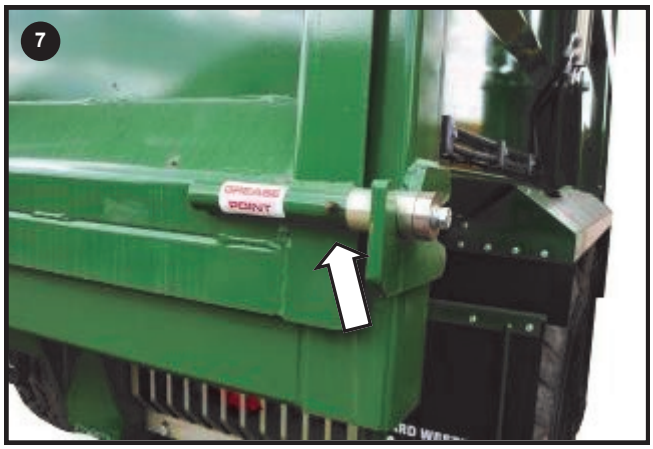
Grease Lower Tipping Cylinder Pivots (2 Positions)

Grease Suspension & Rocking Beam Pivots

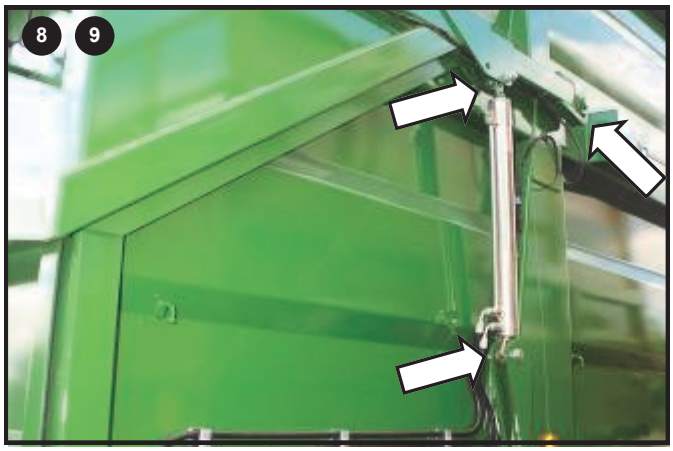


Grease Brake linkage pivots (4 Positions each Axle)

Grease Body Tipping pivots (2 Positions)

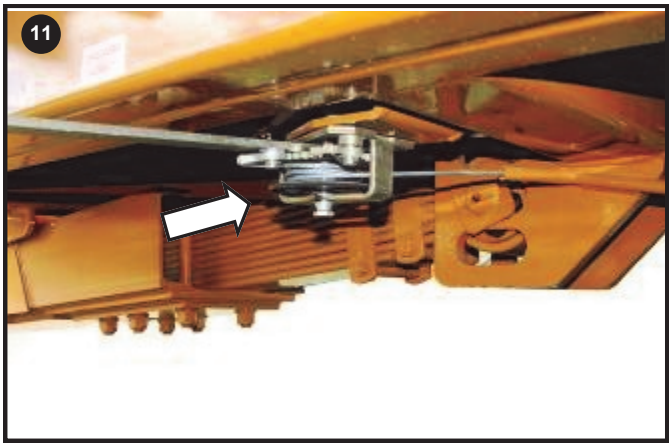


Grease Tailboard Pins (2 Positions)



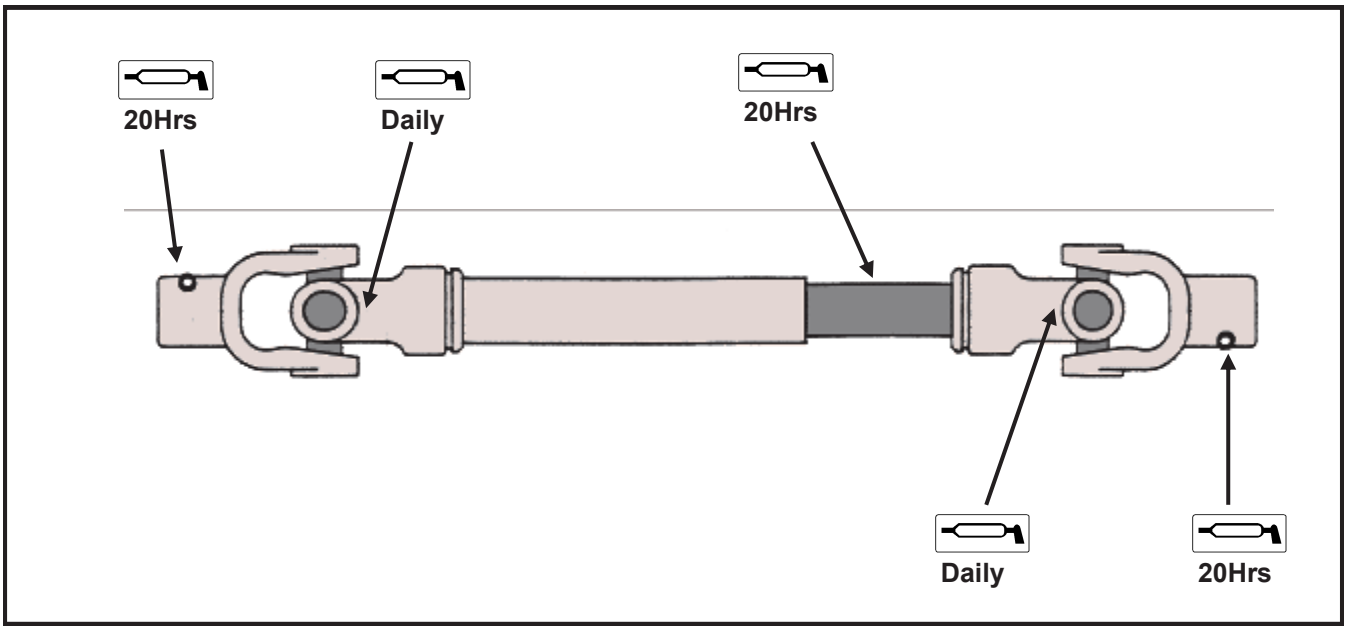
Grease Tailboard Cylinders and pivot (Both Sides)

Grease Upper Tipping Cylinder Pivots (2 Positions)

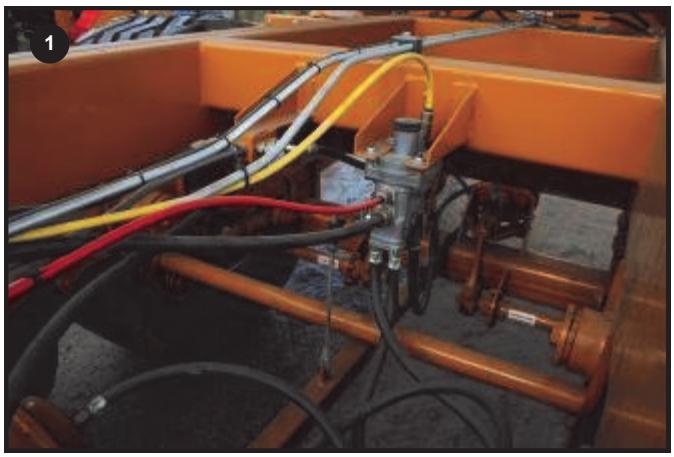


Grease Parking Brake Lever

Power Take Off

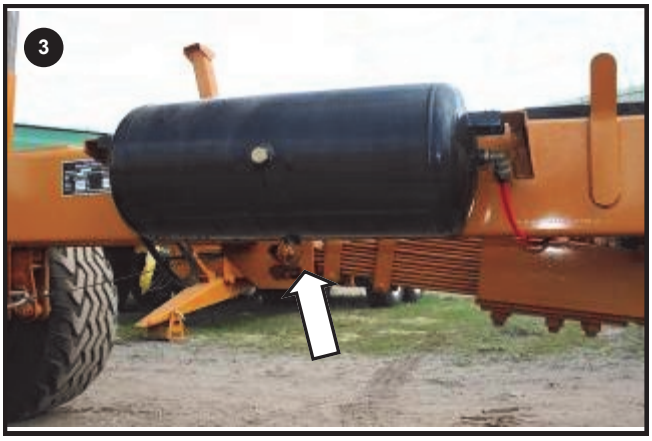


Service Checks



Check All Air and Hydraulic Lines for signs of Damage
Check Connections to Towing Vehicle

Check the condition of the Towing eye for signs of wear or damage



Drain water from Air reservoir

Check Wheel Nut Torque

Check Tyre Pressure & Tyre condition

Check Lights & Reflectors for Correct operation & Damage

Axles Brakes & Suspension

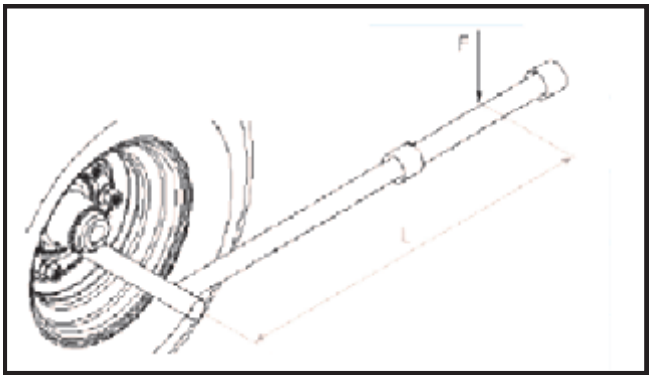
This section contains information that must be followed to ensure the correct functioning of the axles and wheel brakes.

If in doubt contact the manufacturer or the manufacturers agent for further information or advice.

CAUTION

Failure to adhere to these instructions may affect the performance of the brakes and axles and could therefore lead to injury

For additional Information refer to the manufacturers documentation



TIGHTENING WHEEL NUTS

Before Use
After Refitting
Every 6 Months

On wheels that have been replaced or refitted, the nuts can loosen after short periods of operation.

It is therefore necessary to check the tightness of the nuts after the first loaded run, after refitting and again after approx 1000 km (620 Miles)

To tighten the nuts, to use a suitable wheel brace, and tighten the progressively and diagonally. Check the torque using a Torque Wrench, or if not available use a suitable spring balance and refer to the table above.

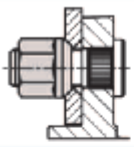
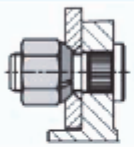
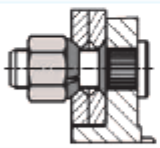
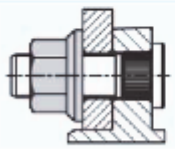
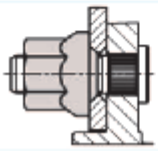
DO NOT OVERTIGHTEN

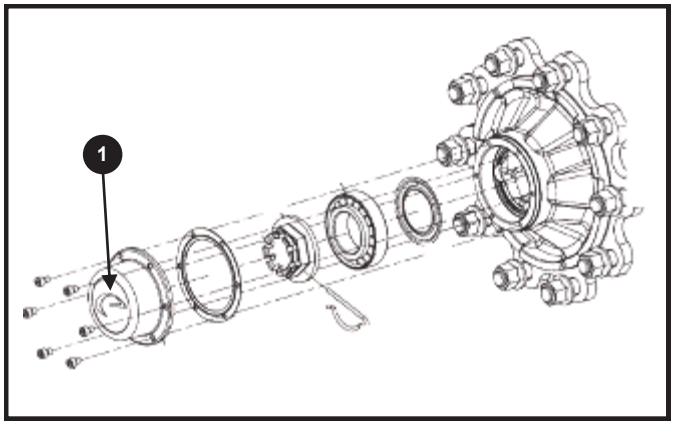
CAUTION

Do not use Impact Tools to tighten the Wheel Nuts

CAUTION

Various Wheel Nut and Stud combinations may be used. Always select the correct Nut Type from the table before checking Wheel Nut Tightness.

NUT TYPE	Spanner	Wheel stud	Tightening torque	Leverage (*L)	Force (*F)
	mm	mm	Nm	mm	Kg
DIN 	17	M12x1.5	90	300	30
	19	M14x1.5	130	300	40
	24	M18x1.5	270	450	60
Plain nut + washer 	24	M18x1.5	270	450	60
	27	M20x1.5	380	600	60
	30	M22x1.5	510	800	60
"Twin" 	24	M18x1.5	270	450	60
	27	M20x1.5	380	600	60
	30	M22x1.5	510	800	60
"M" 	-	-	-	-	-
	27	M20x1.5	450	800	55
	32	M22x1.5	650	1000	65
"Bec" 	28	M18x1.5	270	450	60
	30	M20x1.5	380	600	60
	32	M22x1.5	510	800	60



CHECKING THE HUBCAPS

Every 6 Months

Missing or damaged hubcaps must be replaced immediately to avoid dirt penetrating into the hub which might result in damage to the bearings.

Check that the hub caps **(1)** are in place and in perfect condition.

For press fit hubcaps, check visually that they are fully home.

For hubcaps attached using screws, fit a new gasket if necessary when the hubcap is removed and retighten the screws regularly

CHECKING THE WHEEL BEARING PLAY

Every 6 Months

.
Wheel bearings are subject to wear: their lifetime depends on the operating conditions, the load, the speed, the adjustment and lubrication, etc.

To check the wheel bearings:

- Use a suitable Jack and lift the wheel off the ground.
- Turn the wheel in both directions slowly to check for any rough points or friction.
- Turn the wheel at high speed to check for unusual noises, such as grating or knocking.

If the bearing is damaged or worn, the bearing and seals should all be replaced

CAUTION

It is advisable to Check Hub Caps and Wheel bearing play after the first 1000km (620 miles)

LUBRICATING THE WHEEL BEARINGS

Every 2 Years

In normal operating conditions, lubricate the bearings every 2 years or every 50,000 km and when the brake shoes are replaced.

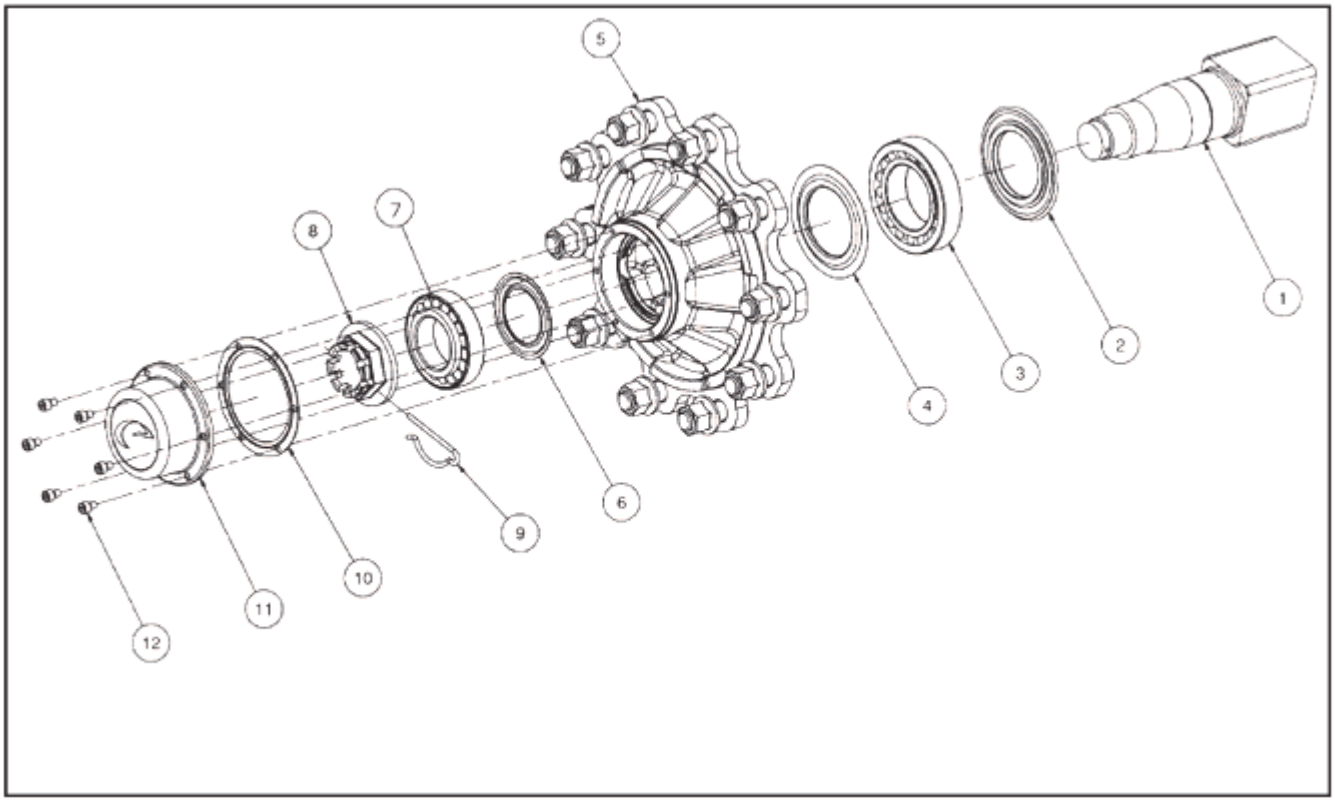
In harsh conditions the bearings should be lubricated more frequently.

Use a general purpose EP grease formulated for lubricating plain, ball and roller bearings, subject to heavy loads and impacts typical of HGV, agricultural vehicle hubs, etc.

All parts (hub, spindle, bearings, seals, castle nuts, hubcap, cotter pin) should be degreased and Perfectly clean before reassembly.

The work should be carried out in a clean environment with appropriate tools as the slightest bit of dirt can Damage the bearings or even the spindle.

When carrying out maintenance on the bearings, check the brake linings, drum and return springs, clean the brakes,clean and lubricate the brake cam shaft.



1 *Spindle*
2 *Oil seal*
3 *Inner bearing*
4 *Grease retaining plate, inner bearing*
5 *Hub*
6 *Grease retaining plate, outer bearing*
7 *Outer bearing*
8 *Castle nut*
9 *Split pin or Split cotter pin*
10 *Hubcap gasket*
11 *Hubcap*
12 *Hubcap screw*

METHOD - DISASSEMBLY

Slacken the wheel nuts**.(12)** Lift the axle until the wheel is off the ground, and remove the wheel

Ensure the trailer cannot move by chocking the remaining wheels or suitably supporting the trailer.

Release the brakes

Remove the hubcap **(11)** and Gasket **(10)**. Remove the split pin or pin **(9)** from the spindle and remove the castle nut**.(8)**

Remove the drum/hub assembly**.(5)** using a hub puller if necessary: the outer ring, the grease retaining plates inside the hub (depending on the model), the small bearing cone and cage come away with the hub.

The bearing cups and grease retaining plates can be left inside the hub for cleaning.

Remove the large bearing cage and cone **(3)** from the spindle **(1)** using a bearing puller if necessary.

Check the oil seal **(2)** between the spindle and the large bearing (or the wheel bearing seal depending on the model), and replace these parts if necessary. A puller may be required to remove the wheel bearing seal.

Note the orientation of the oil seal for reassembly.

Check the contact surfaces on the spindle for the bearing and seal and the threaded end of the spindle and remove any bumps or scratches.

Check the hub surfaces and the bearing face of the castle nut in the same way.

Clean and degrease all parts with a suitable cleaning fluid.

REASSEMBLY & LUBRICATION

Grease the spindle lightly.

Refit the oil seal or wheel bearing seal **(2)** ensure that the seal is the right way round), use a tube of the correct size to fit the wheel bearing seal to avoid damaging the seal.

Apply a generous coating of grease to the large bearing cage and rollers **(3)**, making sure that the grease penetrates all round the rollers and under the cage. Fit Bearing Cone of the large bearing onto the spindle **(1),** take care not to damage the cage of the bearing, use a tube of the correct size to tap the bearing onto the spindle.
Apply a 15 - 20 mm layer of grease all around the large and small bearing cups that are still in the hub **(5).**

If the hub does not have grease retaining plates **(2 & 6)**, put a large amount of grease in the centre of the hub to act as a reservoir.

Slide the hub/drum **(5)** assembly over the spindle and the brake shoes keeping the hub perfectly straight and aligned until it is in contact with the oil seal at the back of the spindle.

Apply a generous layer of grease to the small bearing cage and rollers **(7)** and fit the assembly to the spindle.

Tighten the castle nut **(8)** (right-hand thread) to take up the internal play (the roller bearings should then be firmly held between the hub seatings). Rotate the hub whilst tapping it gently with a mallet

Slacken the castle nut until there is no longer any friction between the castle nut and the outer bearing and the hole for the pin is aligned with a notch in the castle nut. Check that the hub rotates freely.

Lock the castle nut with a new split cotter pin as appropriate.

For hubs without grease retaining plates, fill the hubcap with grease, then refit the Hubcap **(12)** and Gasket **(11)**

BRAKE MAINTENANCE & ADJUSTMENT

Initial checks

The brakes should be tested before using for the first time and after the first laden journey:

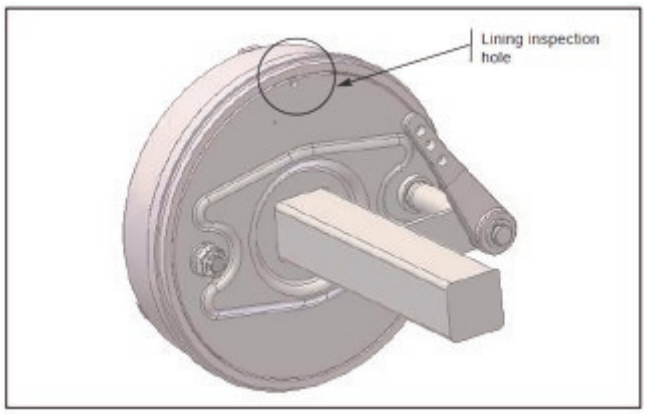
Check the actuator and return spring mountings, check the actuator stroke and return travel and check that the road and parking brakes operate and release correctly.

Tighten the screws and nuts (covers, fulcrum, etc), check the cotter pins, pins, circlips, etc.

Check for hydraulic fluid and air leaks.

Checking brake clearance and wear

Every 3 Months



as the minimum lining thickness is reached.

Check and test the brakes before intensive use and every 3 months:

Check the brake wear and the clearance between the brake linings and the drum visually.

It is probable that the linings are worn when the actuator travel has increased significantly.

Check the thickness of the brake linings
(See table opposite)

The brake shoes should be replaced as soon

Check that the brakes are clean and clean them if necessary.

MINIMUM LINING THICKNESS		
BRAKE TYPE	DIMENSIONS (Drum internal diameter and lining width)	Minimum lining THICKNESS
A25	250 x 60	2
A30	300 x 60	2
309E	300 x 90	2
310E	300 x 100	5
314E	300 x 135	5
316	300 x 160	5
A320	350 x 60	2
A410	355 x 80	2
A61	400 x 80	2
408E	400 x 80	2
314S	300 x 135	5
A910	406 x 120	5
A940	406 x 140	5
412S	406 x 120	5
414S	406 x 140	5

ADJUSTING BRAKES (WITH FIXED LEVERS)

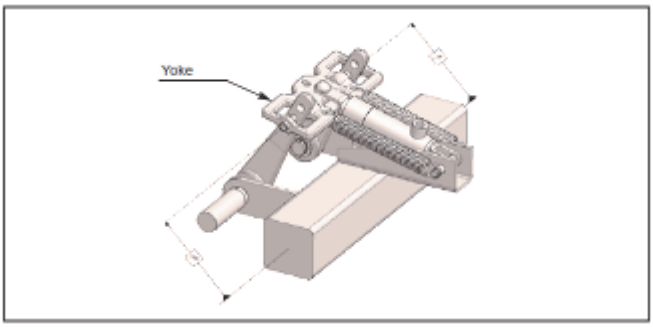
Every 3 Months

Take up the slack when the actuator stroke reaches about two thirds of the maximum travel.

To adjust, turn the lever by one or more splines, ensuring that the brakes are not touching when released (to prevent overheating the brakes).

CAUTION

Never change the linkage position for the actuator on the lever. Always use the original hole

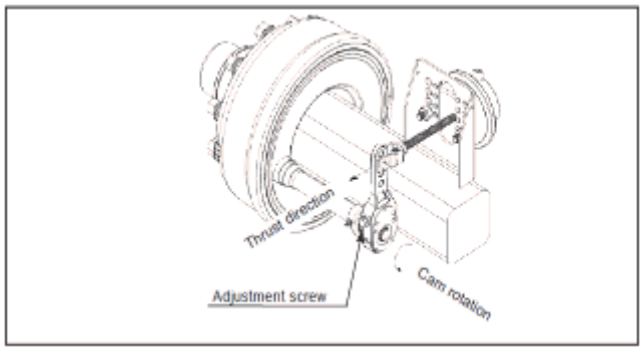


For braking systems which use a yoke, the yoke must remain parallel with the axle especially when the brakes are fully applied
This means that the stroke of the levers on the brakes at each side must be identical. Otherwise, the brake slack must be adjusted.

ADJUSTING BRAKES (WITH ADJUSTABLE LEVERS)

Every 3 Months

Take up the slack when the actuator stroke reaches about two thirds of the maximum stroke



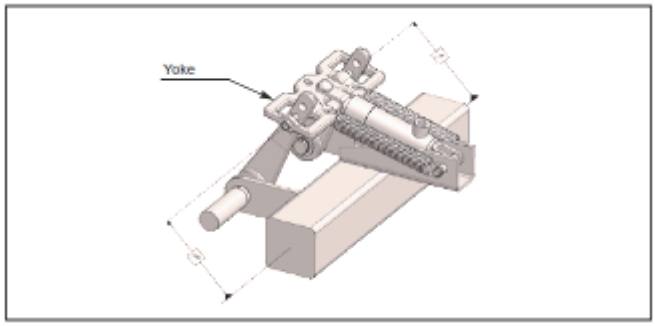
To take up the slack, turn the adjustment screw on the lever to adjust the relative position of the cam and the lever

NB. The actuator brakes by pushing the lever to turn it in a particular direction. The screw must be adjusted so that the cam moves in this direction to take up the slack. The direction in which the screw must be turned depends on the configuration of the axle.

Ensure that the brakes are not touching when released (to prevent overheating the brakes).

CAUTION

Never change the linkage position for the actuator on the lever. Always use the original hole

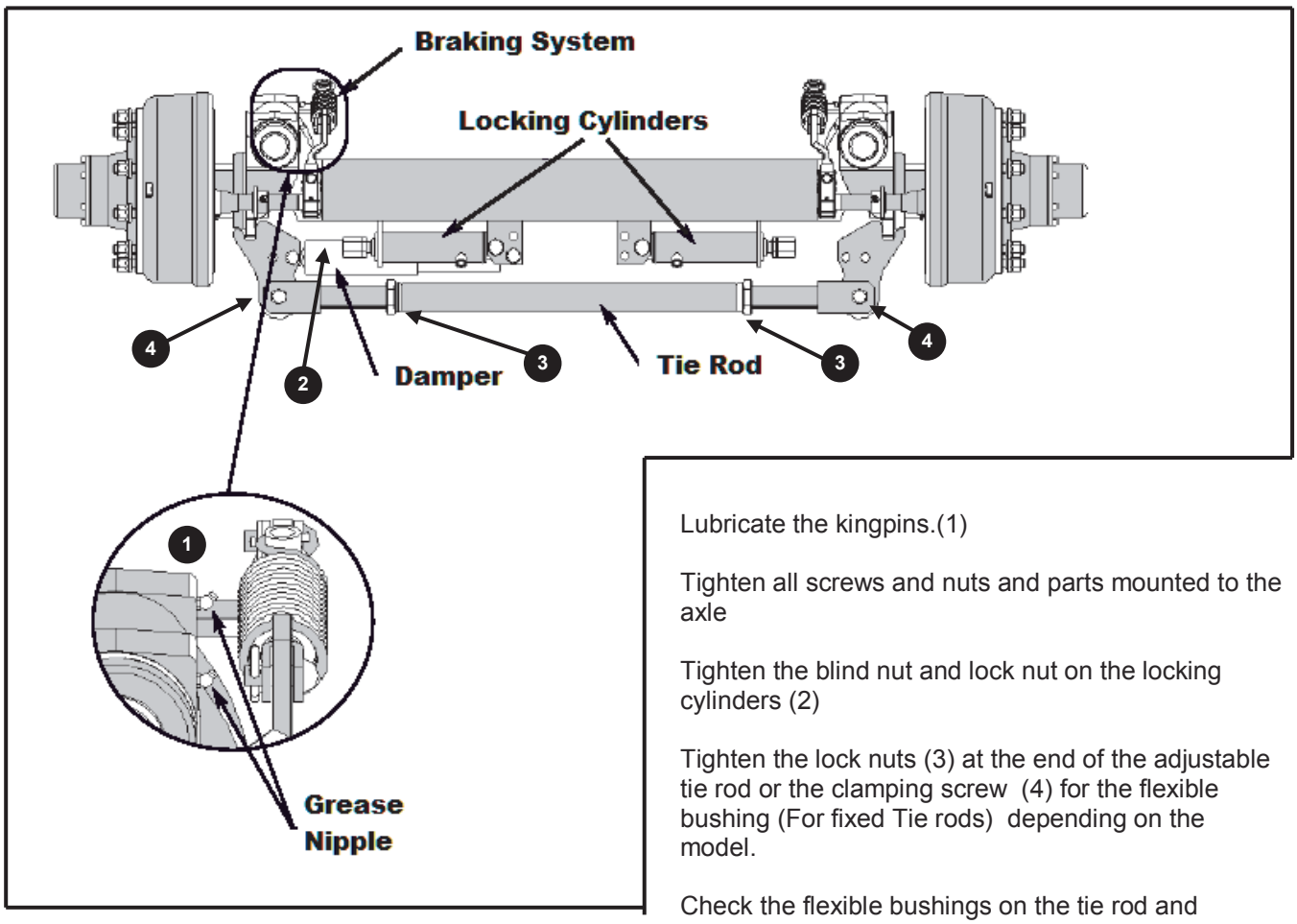


For braking systems which use a yoke, the yoke must remain parallel with the axle especially when the brakes are fully applied
This means that the stroke of the levers on the brakes at each side must be identical. Otherwise, the brake slack must be adjusted.

ADJUSTMENTS FOR STEERING AXLES

Every 3 Months

Steering axles should be maintained in the same way as standard axles. The following additional maintenance is required for steering axles



Lubricate the kingpins.(1)

Tighten all screws and nuts and parts mounted to the axle

Tighten the blind nut and lock nut on the locking cylinders (2)

Tighten the lock nuts (3) at the end of the adjustable tie rod or the clamping screw (4) for the flexible bushing (For fixed Tie rods) depending on the model.

Check the flexible bushings on the tie rod and damper and change them if necessary.

Check that the tie rod has not been accidentally bent as this adversely affects the steer axle, in particular the wheel alignment.

.

CAUTION

When maintaining hydraulic components Always release trapped hydraulic pressure

For further Information and detailed servicing instructions refer to the manufacturers documentation or to your dealer.

BASIC TANDEM SUSPENSION

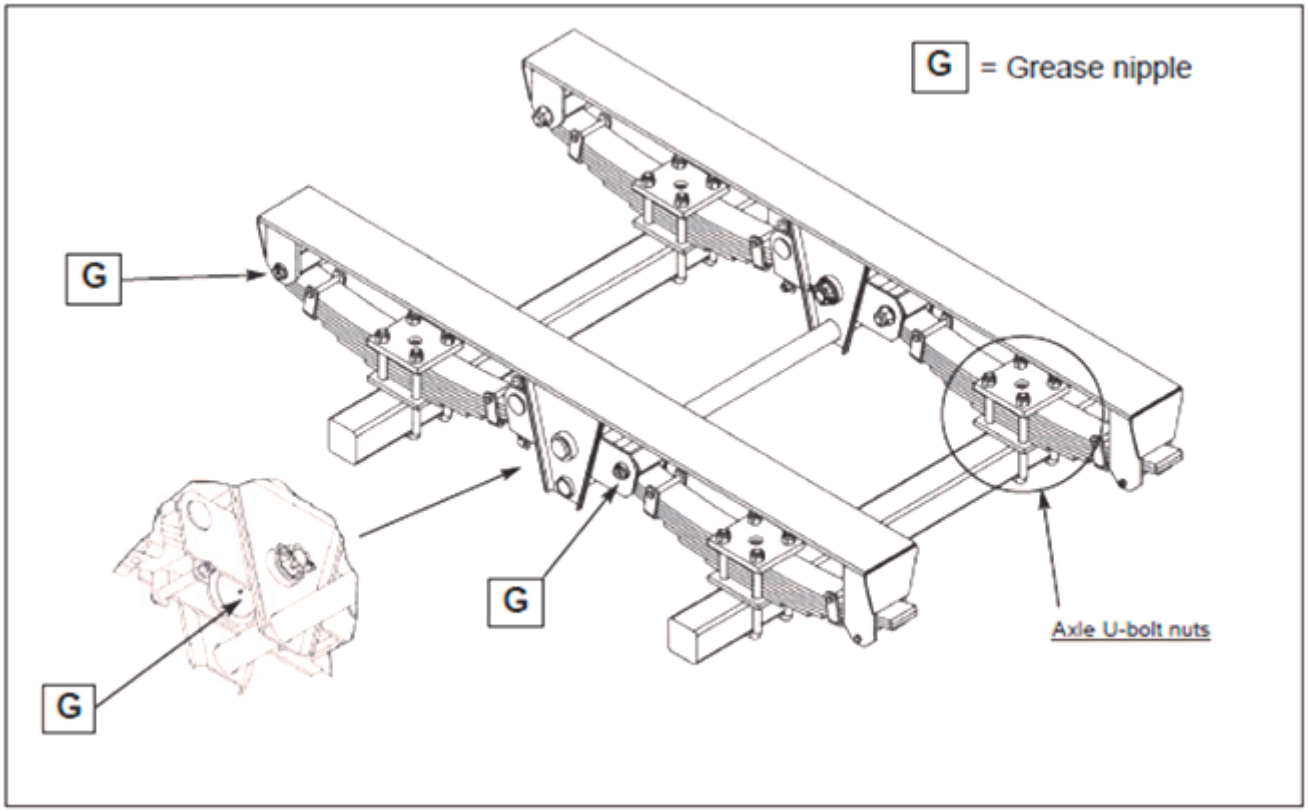
Every 6 Months

After the first laden journey, before intensive use.

Tighten all the centre clamping bolts and axle U-bolts to the recommended torque. (See Table Below)

Tighten the nuts diagonally

Retighten all the nuts and screws on the suspension (spring shackles, rocker, equaliser bearings, spring bolts, springs) Lubricate the rocker bearings and the spring bolts.



U-bolt	Torque
mm	mKg
Ø18	23
Ø22	45
Ø24	50
Ø27	60

Every year

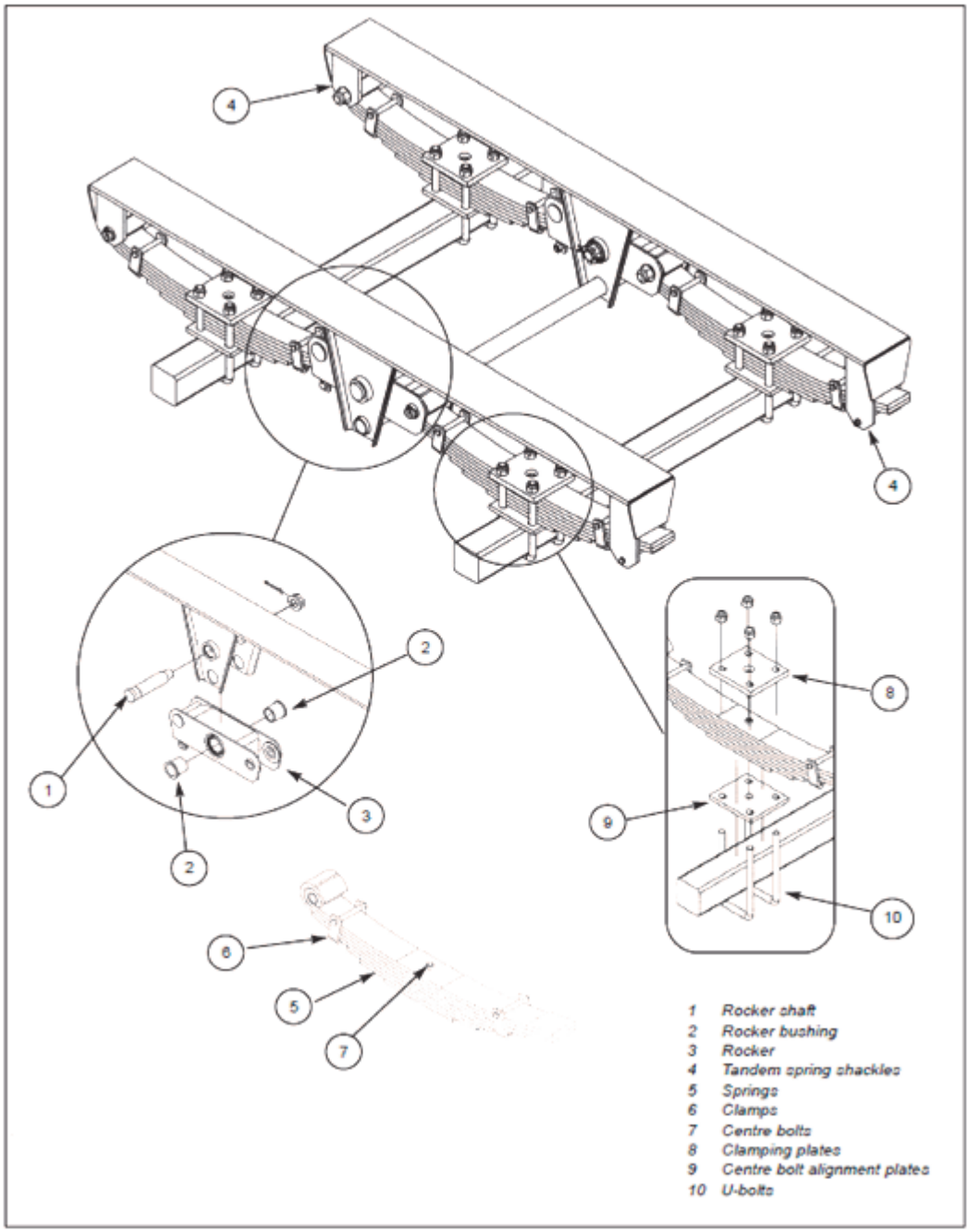
Check the play between the bushings **(2)** and the rocker shafts **(1)** and, if there is excessive play, replace the worn parts.

Check the rocker **(3)** and the spring shackles **(4)** for wear (spring bearing surface) and replace these parts if they are very worn.

Check the general condition of the springs **(5),** clean them thoroughly and brush the sides of the springs to check for cracks.

If there is any play between the springs and the axles, check the whole of the clamping system: clamping plates **(8),** spring alignment **(9),** bridges **(10)**

Maintenance of half-tandem suspensions without rocker bars is the same as for simple tandem suspensions with rocker.



SPRING DRAWBAR

Every 6 Months

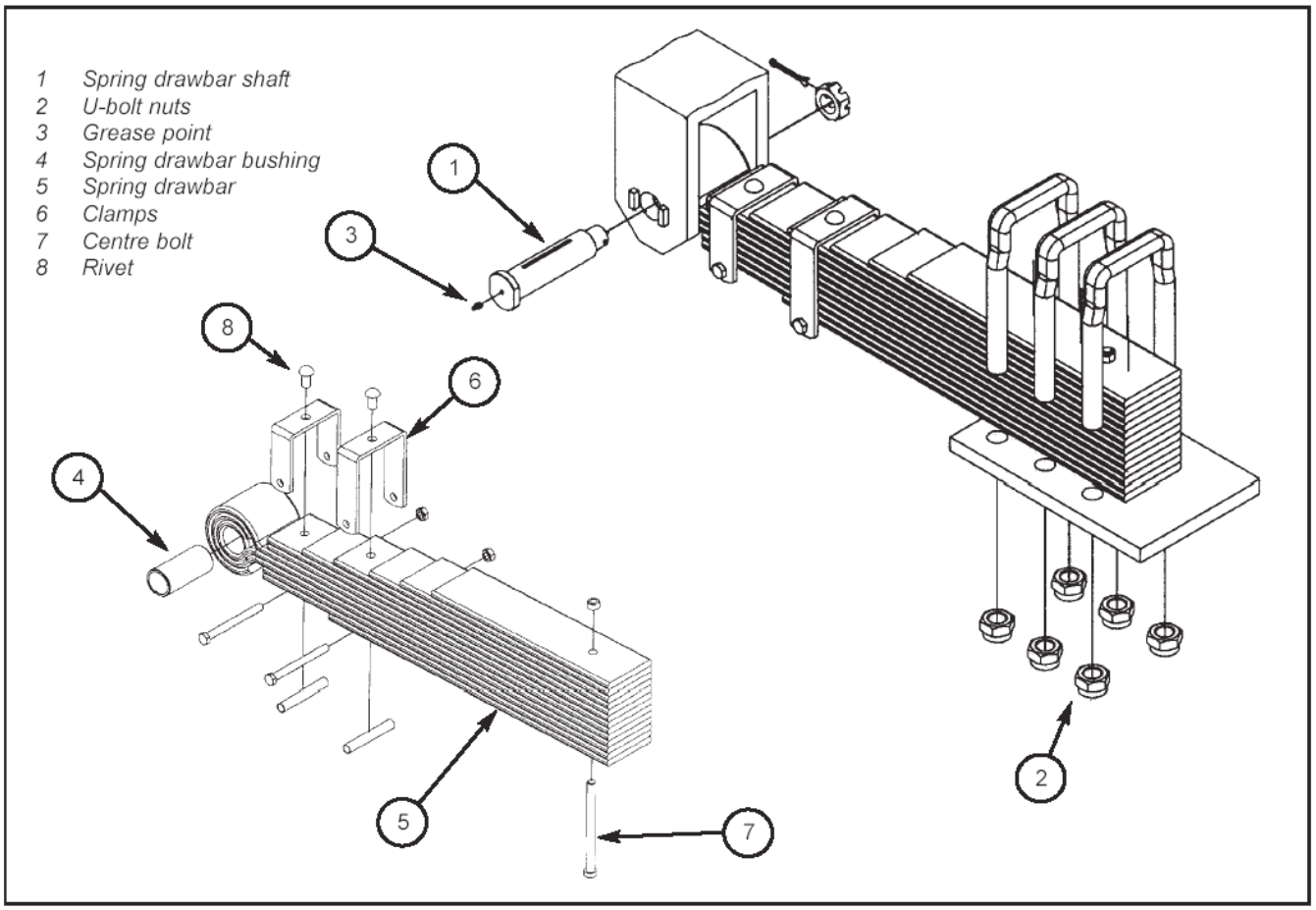
After the first laden journey, and before intensive use.

Retighten all the mounting U-bolt nuts **(2)** to the recommended torque

Lubricate the attachment shaft **(3)**

CAUTION

Under harsh or intensive operating conditions, maintenance should be carried out more frequently.



Every year

Check the play between the bushing **(4)** and the spring drawbar shaft **(1)** and, if there is excessive play, replace the worn parts.

Check the general condition of the spring **(5)** clean it thoroughly and brush the sides of the springs to check for cracks.

Check the condition of the clamps **(6).**

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK

Vacuum Pump & Equipment

This section contains information that must be followed to ensure the correct functioning of the Vacuum Tankers Pump and associated equipment

The tanker may be supplied with either a shaft driven or hydraulic driven pump.

General information only is given for both

If in doubt contact the manufacturer or the manufacturers agent for further information or advice.

Failure to adhere to these instructions may affect the performance of the brakes and axles and could therefore lead to injury

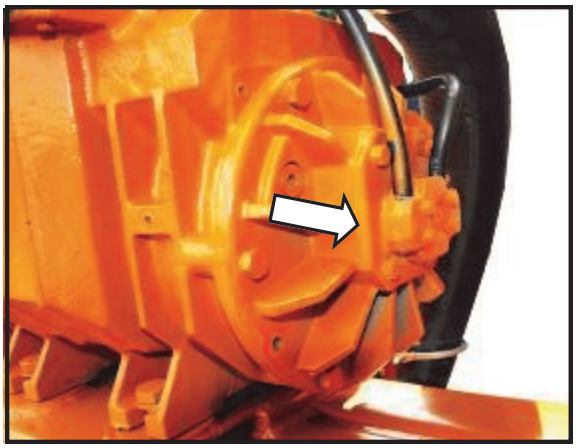
For additional Information refer to the manufacturers documentation

LUBRICATION CHECKS

Daily

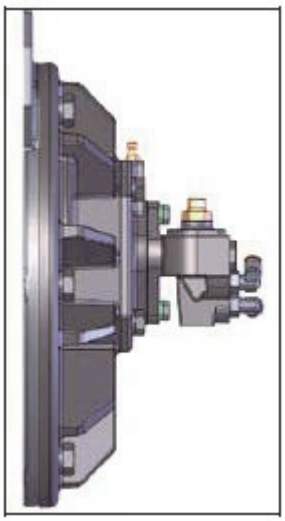
Increase frequency in periods of heavy usage

The pumps may be supplied with one of Two different lubrication systems.



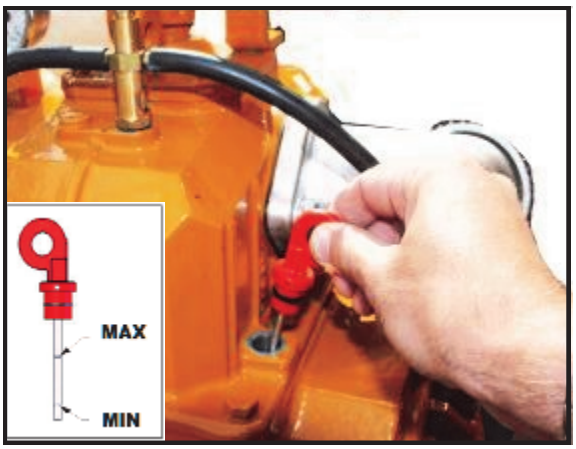
Forced Lubrication with Gears

The system is lubricated both in the aspiration and compression stages by means of a gear pump in the rear casing driven by the drive shaft.
The oil is held in a reservoir and delivered to the pump which transfers it to the manually controlled dosing oilers, Excess oil is returned to the reservoir.



Automatic Lubrication

The system is lubricated both in the aspiration and compression stages by means of an adjustable flow rate dosing pump in the rear casing driven by the internal rotor.



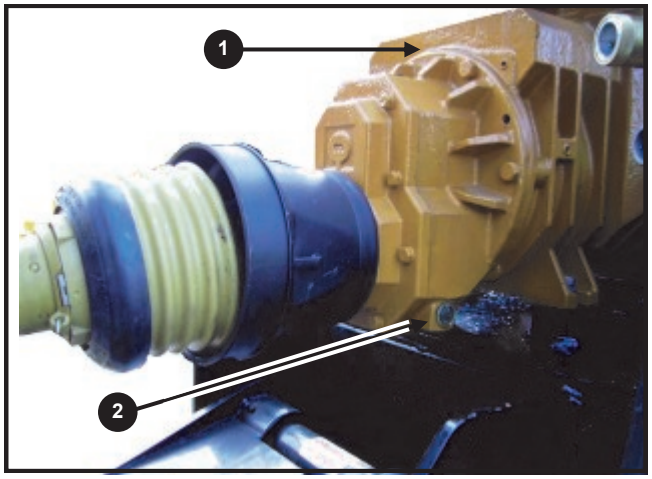
Oil Level

For Internal lubrication the oil level can be checked by using the Dipstick located on the manifold. With the tank full the MAX mark will be reached. The tank should be re-filled when the oil level is at MIN.

Oil Type

The vacuum pump is delivered without lubrication oil inside the oil tank and overgear box (if any). Pour mineral lubrication oil type ISO VG 100 in the oil tank and ISO VG 460 in the overgear box.

Weekly



Check Oil Level.

On some versions an Oil filler **(1)** is provided on the top of the overgear casing, and a level indicator / plug **(2)** on the side

Amount of Lubrication Oil

Model	Pump Type	Forced Flow Rate	Automatic Flow Rate	Oil Tank Capacity
		Drops / min	Cm^3 / Hour	Litres
Special Applications	PM 60	20 - 25	160	1.7
1500 - 2500	PM 70	25 - 30	170	2.7
3000 +	PM 80	30 - 35	180	3.7

Monthly

Increase frequency in periods of heavy usage

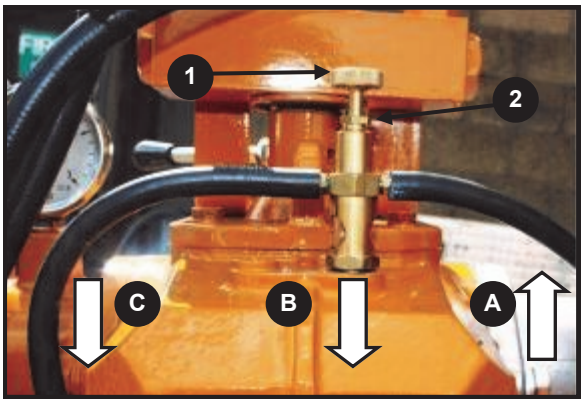
Lubricate PTO

Lubricate the input shaft drive splines and perform a visual inspection for any indications of wear or damage.

LUBRICATION CHECKS

Daily

Increase frequency in periods of heavy usage



Lubricating Oil regulation

Forced Gear Type

The regulation of the amount of oil in the vacuum pump with gear lubrication is performed as follows:

Loosen the lock ring **(2)**

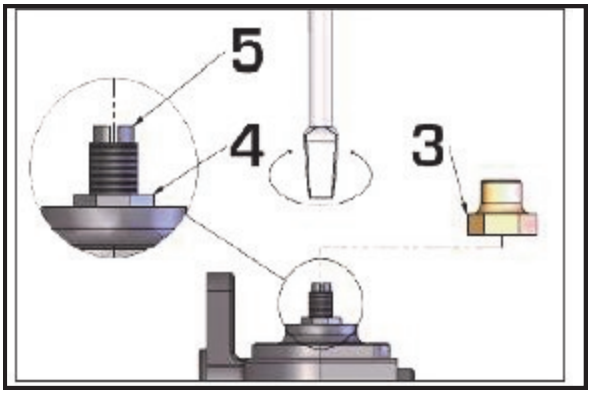
Operate the regulation ring **(1)**

Rotating clockwise a reduced oil delivery is achieved (-),

Rotating anticlockwise an increased oil delivery is achieved (+).

When regulation has been adjusted, tighten the ring **(2)**

The oil from the tank flows through tube **(A)** enters the aspirator/compressor through the passage **(B)** and excess oil returns to the tank through tube **(C)**



Automatic Type

Standard regulation of oil delivery, in automatic lubrication, is carried out at by the manufacturer.

If, for any reason, a different regulation is necessary proceed as follows:

Remove cover **(3)**

Loosen counter nut **(4)**

Operate the register pin **(5)**

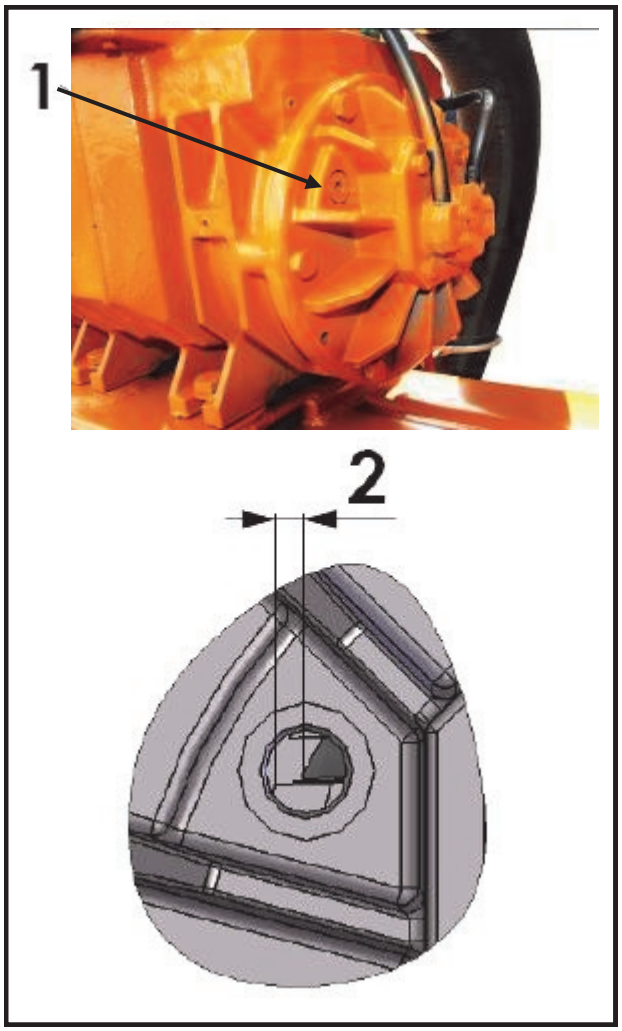
Rotating clockwise a reduced oil delivery is achieved (-);

Rotating anticlockwise an increased oil delivery is achieved (+).

When the regulation is over, tighten the counternut **(4)** and tighten the cover **(3) .**

CHECK BLADE WEAR

Every 6 Months



Inspecting the Blades

To verify the wear of the blades in the vacuum pump, proceed as follows:

Remove the threaded inspection cap **(1),** located on the rear of the vacuum pump casing

Rotate the rotor to align a blade with the inspection hole.

Measure the distance **(2)** between the external surface of the rotor and the external face of the blade.

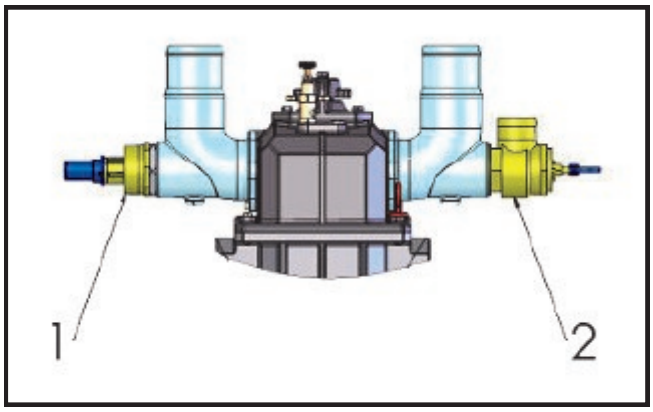
If such distance is longer than 10-15% of the original height of the blade, replace the entire series of blades.

See Blade Dimensions in table below

Model	Pump Type	No. of Blades	Dimensions
Special Apps	PM 60	20 - 25	280 X 69 X 7.5
1500 - 2500	PM 70	25 - 30	360 X 69 X 7.5
3000 +	PM 80	30 - 35	450 X 69 X 7.5

VALVE OPERATION

Weekly



OVERPRESSURE & VACUUM VALVE

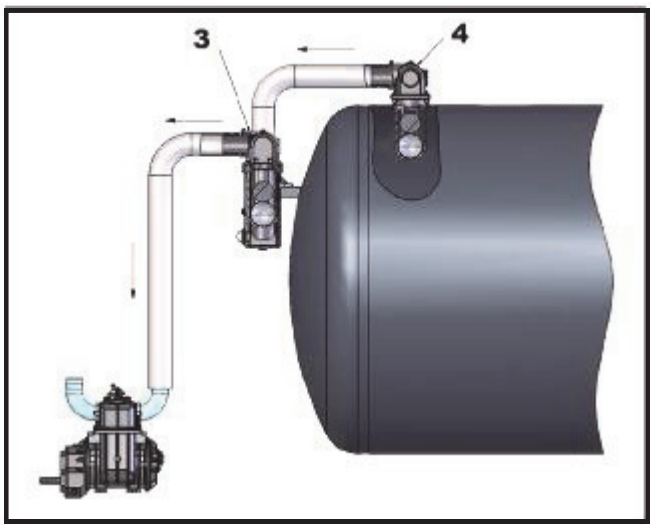
Visual Inspection

Check the Overpressure valve **(1)** and the Vacuum Valve **(2)** visually for signs of damage, leakage or contamination.

Check for correct operation.

For more detailed diagnosis and setting procedures refer to the manufacturers documentation

Monthly



OVERFILL VALVES

Visual Inspection

Check the Overfill valve **(4)** and the Safety Overfill Valve **(3)** visually for signs of damage, leakage or contamination.

Remove the valves for cleaning.

Check for correct operation.

For more detailed diagnosis and setting procedures refer to the manufacturers documentation

OIL TANK

Every Year

Cleaning

Wash the oil tank at least once a year, with suitable detergents.

CLEANING

Every Year

Each time sewage enters the system

PUMP BODY

If a little amount of sewage enters the vacuum pump, immediately clean the inside of the body, with oil, by means of the discharge tube with the pump compressing.

Carry out the same operation when the vacuum pump does not operate for a long time.

In that case, remove the aspiration and delivery tube connected to the valves located on the trailer and elbows.
This is because the gas created inside the tanker, flowing into the vacuum pump, may cause rust inside the pump body, which may cause the failure of the blades when the equipment is restarted.

To avoid corrosion do not use water.

Wash the body with detergents (e.g. thinner), then disassemble the body and clean it.

Tyre Pressures

	Pressure	
Tyre Size	Bar	PSI
15 X 22.5 18PR Rem	5.5	79.8
12.5/80 X 15 PR10	5.0	72.5
12.5/80 X 15 PR12	5.25	76.1
12.5/80 X 15 PR14	5.5	79.8
20.5 X 22.5 Rem	4.5	65.3
28.1 X 26	2.2	31.9
560/60 22.5 FP	4.0	58.0
560/45 22.5 FP	4.0	58.0
650/50 22.5 FP	4.0	58.0
710/40 22.5 FP	4.0	58.0
620/55 26.5 FP	4.0	58.0
16.9 X 34	*	*
18.4 X 34	*	*

* Check with supplier

The pressures shown are a guide only. If tyres are changed different manufacturers may require different pressures.
The application for which they are used may also cause changes. Always check with the tyre supplier before use.

Recommended Lubricants

	bp	CALTEX	Castrol	Esso	Mobil		
Grease	Energrease LS / LS2	Marfak All Purpose 2 Multifak EP2	Agricastrol Multi Use Spheerol AP2 Castrol LM	Esso MultiPurpose Beacon 2	Mobilux 2 Mobigrease MP	Farm Grease Universal Retinax A	Multifak EP2 Totalfarm Multis 2
Oil Tank (Tankers Only)	Energol CS 100 HLP-HM 100		Magna 100 Hyspin AWS 100			Tellus 100	
Overgear Box (Tankers Only)	Energear GR-XP 460		Alpha SP 460			Omala 460	

Laying up & Long Term Storage

If the trailer is to be out of service for a long period

Remove any drain bolts from the Body floor

Wash the trailer removing any dirt and any remaining load

Retouch any damaged paintwork

Replace any damaged or worn parts

Check all Nuts and Bolts for tightness

Grease all Nipples

Coat all bright parts with Grease or an anti rust additive

Store the trailer under cover away from livestock, chemicals or solvents

Brake system

This section contains information that must be followed to ensure the correct functioning of the following brake options

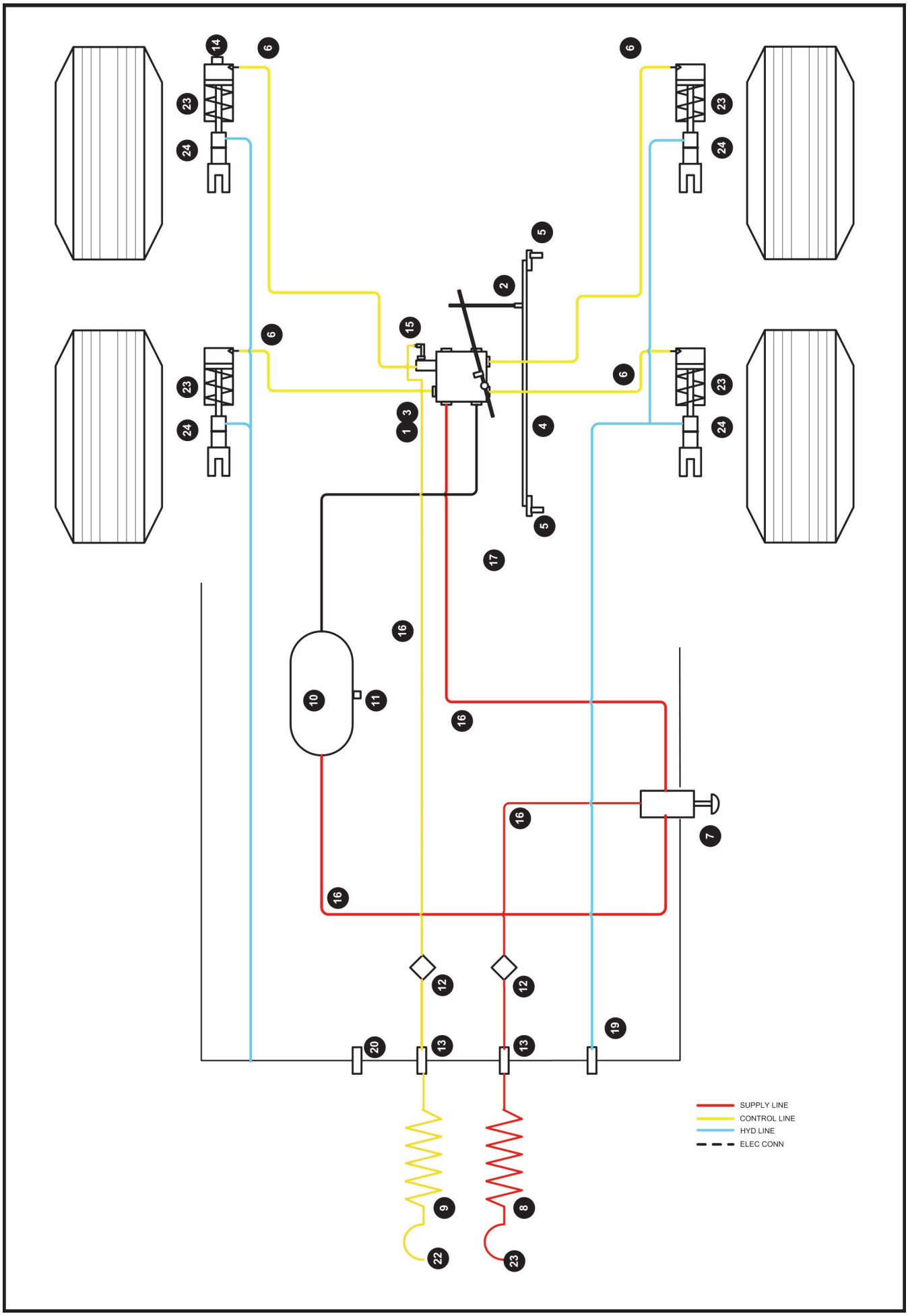
Pneumatic Brakes
Hydraulic Brakes
ABS brakes.

If in doubt contact the manufacturer or the manufacturers agent for further information or advice.

Failure to adhere to these instructions may affect the performance of the brakes and axles and could therefore lead to injury

For additional Information refer to the manufacturers documentation

All information supplied courtesy of JH Milne

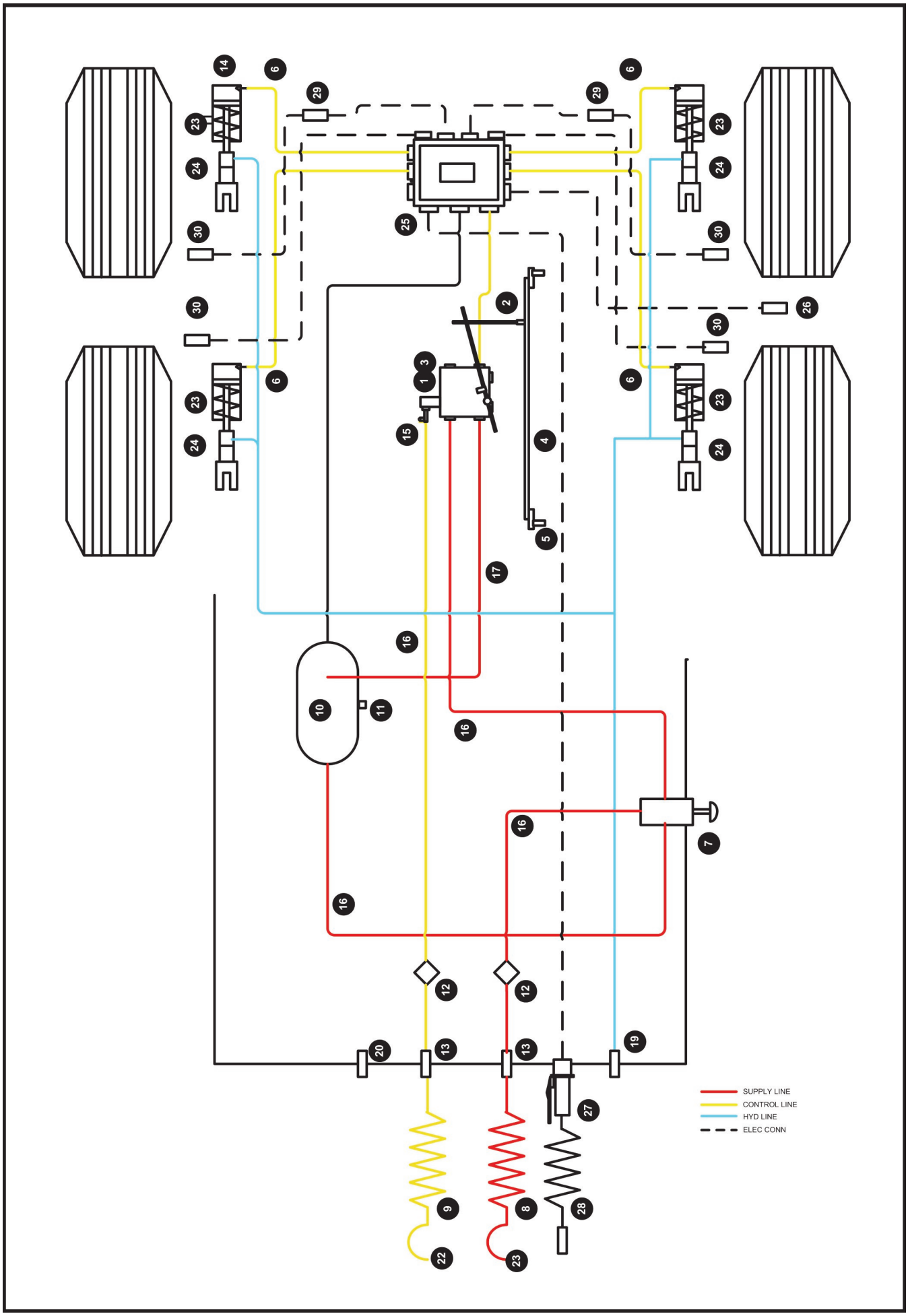

SUPPLY LINE
CONTROL LINE
HYD LINE
ELEC CONN

Brake system

Pneumatic

Two Line Air / Hydraulic with Mechanical Load Sensing Valve

	Component Description
1	Load Sensing Emergency Relay Valve (Mech Suspension) (RELSV)
2	Load Sensing Valve Linkage
3	Load Sensing Valve Fixing Bracket
4	Telescopic Rod
5	Rubber Isolation Mount
6	Hose
7	Shunt Valve
8	Red Connection Coiled Hose
9	Yellow Connection Coiled Hose
10	Reservoir
11	Drain Valve
12	Inline Filters
13	Bulkhead Connectors
14	Test Point (Brake Chamber)
15	Test Point Tee (Load Sensing Valve)
16	Tube
17	Tube
18	Connector
19	Hydraulic Trailer Brake Coupling
20	Dummy Coupling
21	Dummy Coupling
22	Coupling
23	Air Brake Actuators
24	Hydraulic Brake Actuators


SUPPLY LINE
CONTROL LINE
HYD LINE
ELEC CONN

Brake system

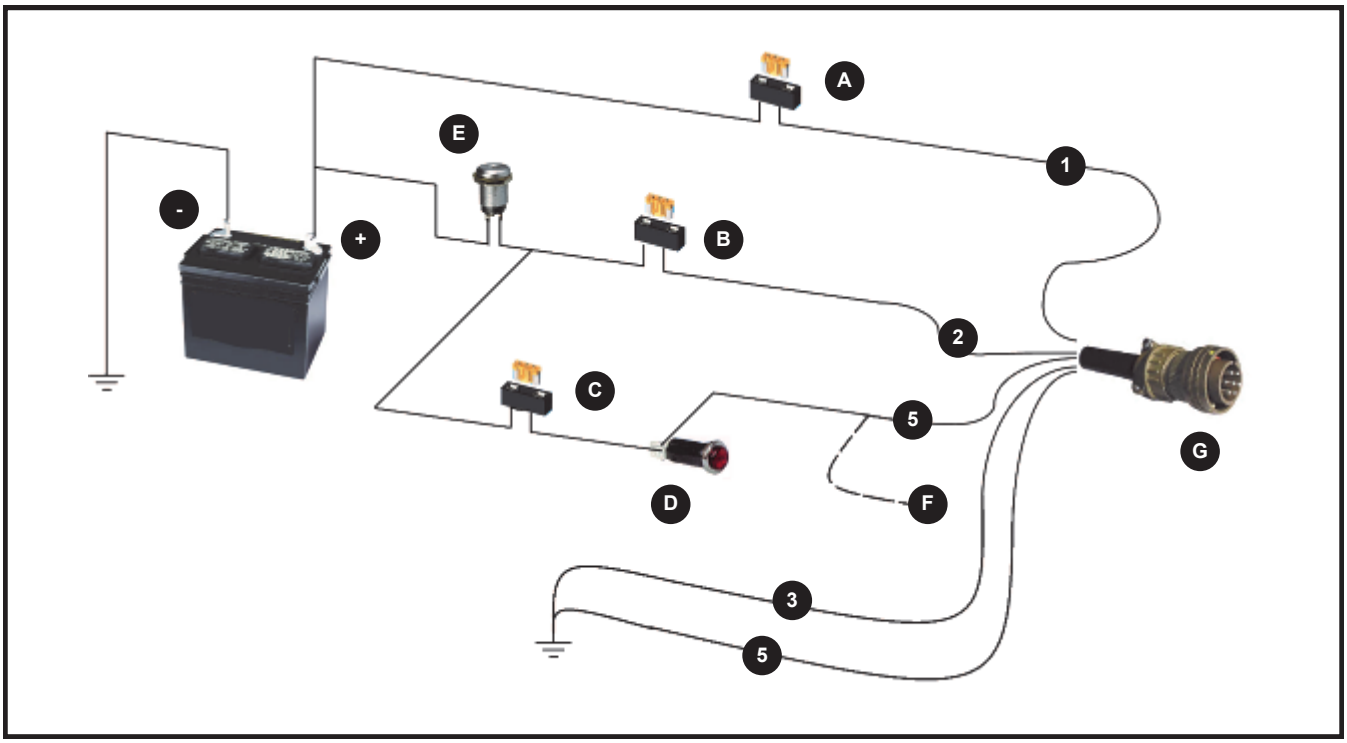
Pneumatic

Two Line Air or Air / Hydraulic with Mechanical Load Sensing Valve & ABS

	Component Description
1	Load Sensing Emergency Relay Valve (Mech Suspension) (RELSV)
2	Load Sensing Valve Linkage
3	Load Sensing Valve Fixing Bracket
4	Telescopic Rod
5	Rubber Isolation Mount
6	Hose
7	Shunt Valve
8	Red Connection Coiled Hose
9	Yellow Connection Coiled Hose
10	Reservoir
11	Drain Valve
12	Inline Filters
13	Bulkhead Connectors
14	Test Point (Brake Chamber)
15	Test Point Tee (Load Sensing Valve)
16	Tube
17	Tube
18	Connector
19	Hydraulic Trailer brake Coupling
20	Dummy Coupling
21	Dummy Coupling
22	Coupling
23	Air Brake Actuators
24	Hydraulic Brake Actuators
25	ABS Modulating Valve 12V 2 Sensor
26	Diagnostic cable & Socket
27	ABS Socket DIN 7638
28	ABS Flexible Connection
29	Sensor Cable
30	Wheel Sensor

Brake system

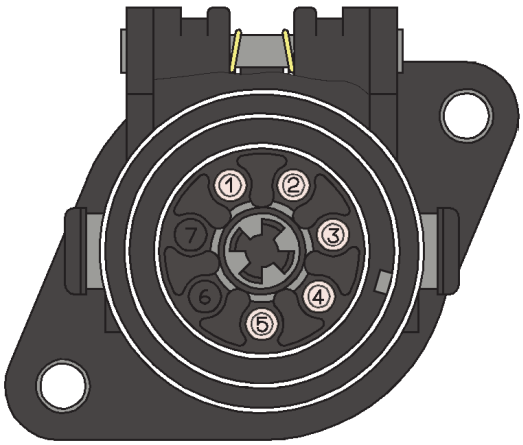
For Tractors not fitted with an ABS Connection the following diagram shows what is required.



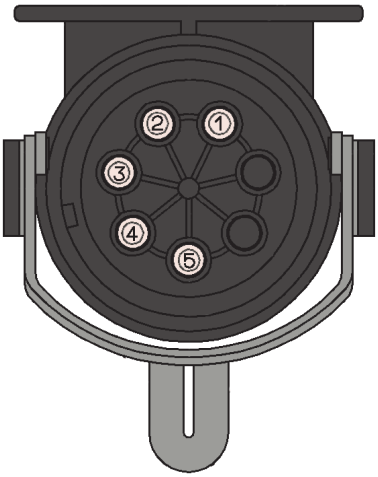
	Component Description	Notes
1	Red Cable to Battery Positive	
2	Red / White to Ignition Switch	
3	Brown / Blue return to Battery Negative (Ground)	1.5mm^2 Cable
4	Brown return to Battery Negative (Ground)	6mm^2 Cable
5	Blue / Yellow ABS Warning Lamp	
A	Fuse 25 Amp	6mm^2 Cable
B	Fuse 5 Amp	1.5mm^2 Cable
C	Fuse 5 Amp	1.5mm^2 Cable
D	Warning Lamp	2W rating
E	Ignition Switch	
F	Optional Connection to 24S Socket Pin 2	1.5mm^2 Cable
G	ISO 7638 Connector	

ISO 7638

The following Diagram shows the correct cable connections for the 12 Vdc ISO 7638 ABS Socket (28) on the tractor and the 12Vdc ABS Plug (27) of the trailer



28



27

Pin	Component Description	Notes
1	Battery Positive	
2	Switched Ignition Live	
3	Battery Negative (Ground)	1.5mm^2 Cable
4	Battery Negative (Ground)	6mm^2 Cable
5	Warning Lamp	
6	Not Used	
7	Not Used	6mm^2 Cable

Two-line trailer air braking systems

General description

The two-line trailer braking system is based on the commercial trailer braking systems which are designed to meet the criteria set by European Council Directive 71/320/EEC.

These systems use one Red air line (known as a supply or emergency line) which, when coupled to the tractor is permanently pressurised, and one Yellow line (known as the service or control line) which has a variable pressure.

This variable pressure is controlled by the driver, and is determined by the how quickly the driver wishes to slow down, or whether the tractor's parking brake is applied.

It is commonplace for this line to be fully pressurised when the tractors ignition is switched OFF.

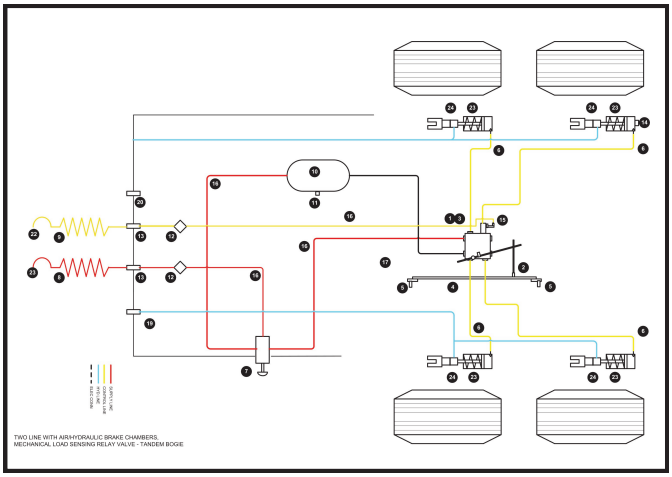
The schematic diagram on page 5:2 is a typical layout of a tandem-axle trailer, with a Relay Emergency Load Sensing Valve (RELSV) (1), whilst the circuit shown on 5:4 shows the combined RELSV (1) and Advanced Brake System (ABS) controller (25)

The RELSV (1) is mounted between the axles, and connects to either a telescopic pole or an angle iron (4) which fits between them, the angle iron system is sometimes supported by rubber isolation mounts (5).

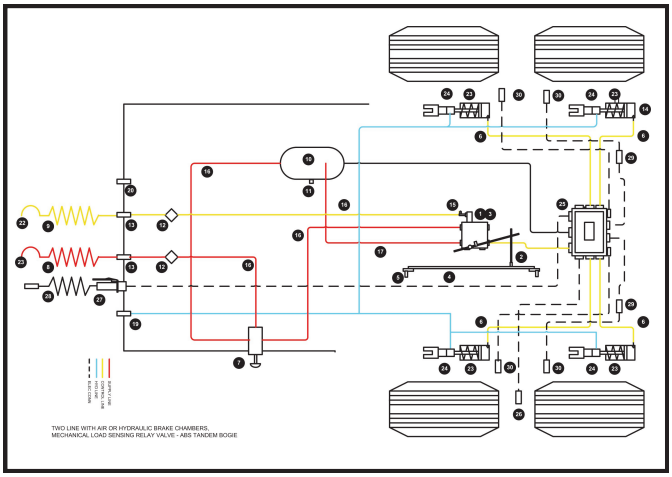
For a two sensor ABS system the front axle is ABS sensed (30), the layout also shows extra (optional) ABS sensors connected to the rear axle. These extra ABS sensors should ensure that the rear axle does not lock.

Where no ABS system is fitted, then the RELSV (1) delivers the air directly to the brake chambers (23) from each of its delivery ports.
(The brake chambers are also fitted with hydraulic cylinders (24), which are fed directly from the tractor's hydraulic brakes, when the tractor does not provide trailer air braking.)

For tri-axle trailers with ABS, then the centre axle is normally ABS sensed, when using a two ABS sensor system. With a four ABS sensor system, the extra two sensors are fitted on the front or rear axle, dependent upon trailer design and weight distribution.
With a tri-axle trailer the RELSV (1) is generally fitted above the centre axle and connected directly to it.

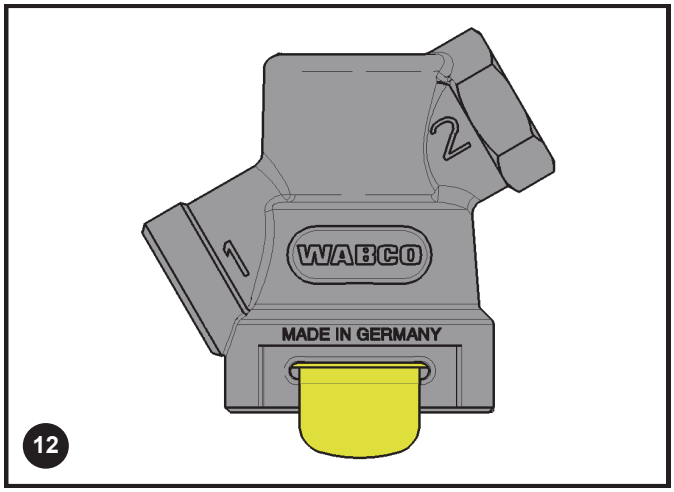


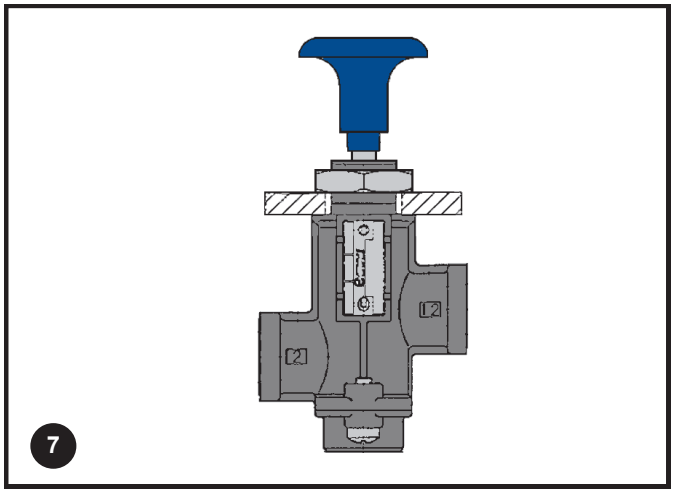
Non ABS refer to page 5:2

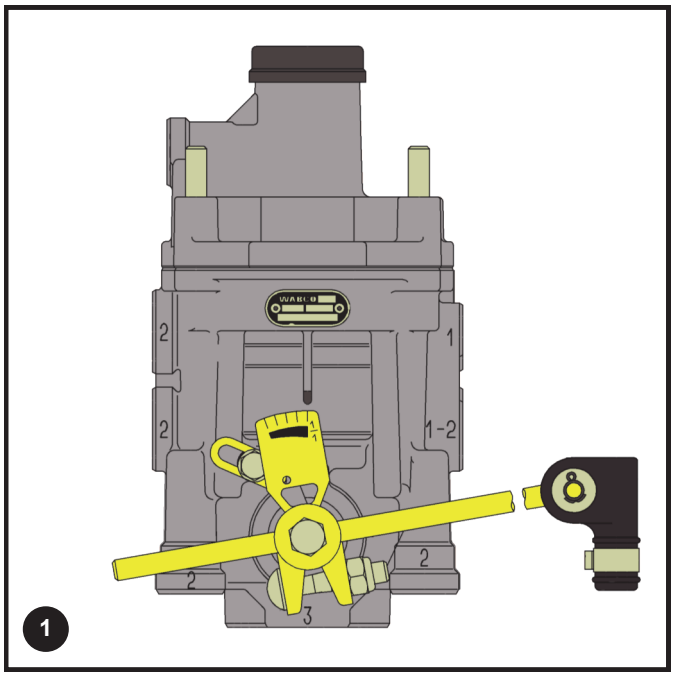


ABS refer to page 5:4

Two-line Pneumatic trailer braking systems







Operation

Refer to diagrams on 5:2 & 5:4

The air enters the trailer via the Red flexible connection line (8), and passes through a filter (12). The filter is designed to trap particles of dirt, and to stop them entering the sytem, it is not designed to stop water entering the trailers system.

Water separation is a function of the tractors pneumatic braking system as they should be fitted with an air dryer. Filters should be dismantled and cleaned from time to time to remove any debris.

The air then passes through a shunt valve (7), which is mounted on the side of the trailer, the air pressure pushes out its button. This button can be pushed in to release the trailers brakes, when a tractor with air braking is not available. The button can be pulled out again, to re-apply the brakes, or it will automatically be reset after the Red flexible connection line (8), is re-connected to a tractor with air braking.

The air travels into the combined RELSV (1) at port 1, before exiting at port 1-2 to feed the air reservoir (10).

The reservoir is linked back to the shunt valve (7), air in this line signals the RELSV (1) simulating that the Red flexible connection line (8), has been re-connected, after the shunt button is pushed in.

The reservoir (10) is then charged with air until it reaches the system pressure set by the tractor.

This is normally between 6.5 bar and 8.5 bar, and this pressure is also present at port 1 of the ABS modulator valve (25).

Note: Pipes shown as Red on pages 5:2 & 5:4 (and the Black pipe between the tank and ABS module (25) in 5:4) will be pressurised when ever the tractor is connected, and charged up.

None of these pipes should be removed, for diagnostic or repair purposes, until the tractor has been disconnected from the trailer and all of the air drained from the trailers reservoirs.

Operation contd.

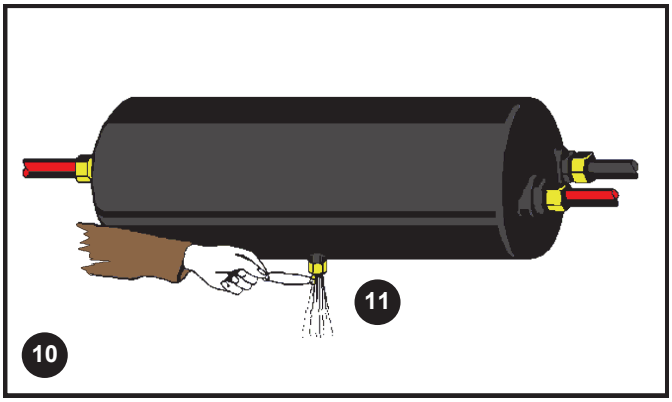
Reservoir Draining

Draining should be undertaken periodically to remove any water that has condensed in the air reservoirs.

A drain valve which is fitted at the bottom of each air reservoir.

Failure to drain the reservoirs will lead to a reduction in the available air capacity, affecting the brake performance.

This water may also freeze in the winter, causing other problems.



Brake Application

During braking, a control pressure is sent to the trailer through the Yellow flexible connection (9).

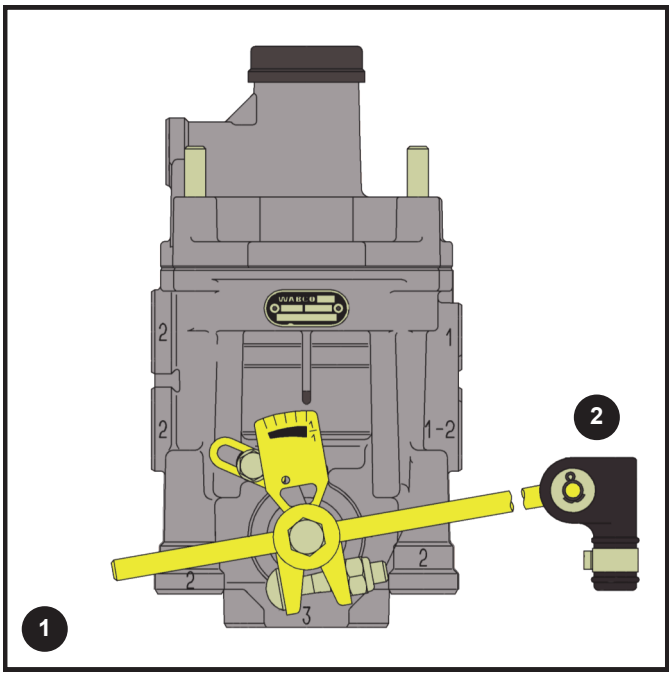
This pressure in this line is determined by how hard the driver presses the brake pedal, and the pressure may be anything up to the maximum pressure in the tractor's system.

However, under normal braking (known as check braking) this control pressure is often around 2 bar.

The control pressure enters the trailer and passes through the yellow line filter (12), before reaching the RELSV (1) at port 4.

The RELSV (1) has several functions, one of which is load sensing.

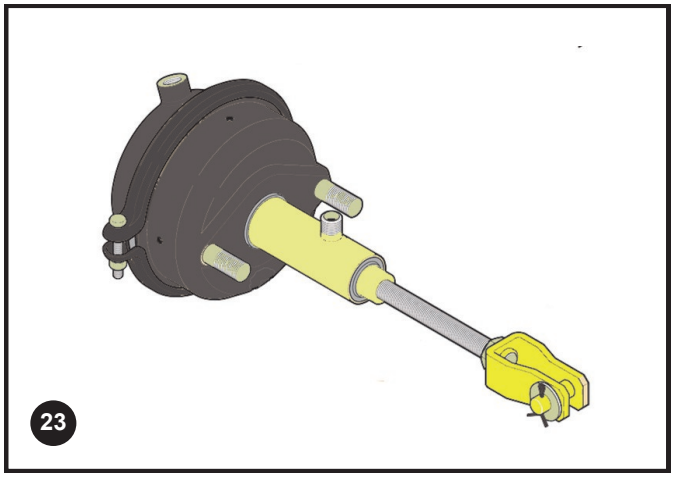
The RELSV (1) is connected to the suspension via a vertical linkage rod (2) and its operating arm.
With tandem axled trailers it is common to be connected between the two axles by either telescopic pole or an angle iron (4), in order to give the RELSV (1) an average spring deflection.

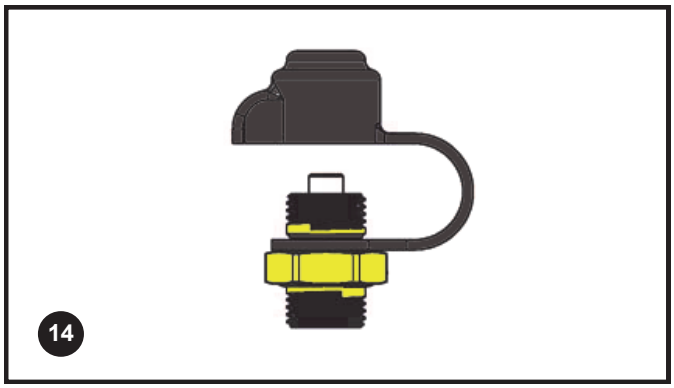


The service pressure may be modified by the RELSV (1) based upon the physical load sensed by the valve, as weight is removed from the trailer its chassis rises, causing the RELSV (1) operating arm to lower (rotate clockwise).

This has the effect of increasing the ratio between input and output pressures, thus reducing the braking pressures.
This new, modified pressure exits the RELSV (1) at port 2, and signals the ABS modulator valve (25) at port 4 (just below where the ABS sensors plug in).
The ABS modulator then delivers this same pressure to all of the brake chambers, unless "wheel locking " is detected.

Operation contd.





Air / Hydraulic Actuators

The brakes are applied in a controlled manner, as the pressure builds up behind a rubber diaphragm housed inside the brake chambers (23), and the output forces act on the slack adjusters (or levers) increasing the torque entering the foundation brakes via the camshafts.

As the driver releases the brakes, the control pressure drops. This results in the air within the brake chambers returning back up to the ABS modulator (25), where it exhausts to atmosphere.

No pressure should be evident at the brake chambers whilst the service brakes are not being applied.

This can be checked using the test points (14), one of which is fitted to a spare port in each of the brake chambers.

The RELSV (1) of a two-line air braking system also fulfils an “emergency” function, which is designed to apply full tank pressure into the brake chambers (irrespective of load condition) should the Red flexible connection be removed, or become ruptured.

A comparison of the pressure in the Red line and that in the reservoir (10) is made in the RELSV (1) Should the Red line pressure fall below 2.5 bar the remaining pressure in the reservoir is supplied directly to the Air / Hydraulic actuators (23).

This happens automatically when the trailer’s Red flexible connection is removed during uncoupling.

This emergency function is not be used as a substitute for the trailer’s mechanical parking brake, as any air leak will cause the brakes to release, and the trailer would be left without any effective parking brake.

Basic checks

Before Operation

Some basic but functional air checkscan be undertaken by the operator as and when required.

Two calibrated air pressure gauges are required, along with suitably long connecting hoses, it is useful to have long test hoses so that two gauges can be positioned close together and viewed simultaneously.

Test 1 (Charging Test)

Disconnect the Red flexible connection from the tractor, and drain all of the air from the trailers reservoirs.

Attach one gauge to a test point on one tank (fit test point if necessary – normally M22x1.5 threaded).

Fit a second gauge in the Red line, push in the shunt valve button (7) and reconnect the Red flexible connection.

The button should pop out as the Red flexible connection is connected.

Read the two gauges side-by-side and monitor each gauge as the system charges up. The reservoir pressure should rise in line with the pressure in the Red line (it may be slightly behind), until the tank is fully charged and the tractor compressor unloads

If the tank pressure is much lower than the red line pressure when the tractor unloads, then this indicates an internal problem with the RELSV (1), or the pipe work leading to port 1.

This pipe can be tested by disconnecting the Red flexible connection, and temporarily removing the pipe from port 1 of the RELSV (1), and replacing it with a new one.

This new pipe can then be connected to the tractor's red coupling, and the test repeated.

If the pressures now rises correctly, then examine any filters for blockages, and the original pipe work for kinks.
If the pressures still fail to equalize, then the RELSV has an internal fault. Repair or replace as necessary.

Test 2 (Red Line/Leak Test)

Fully charge the trailer and disconnect the Red Flexible Connection.

A "chuff" of air should be heard as the air exits the open Red line.

Observe the gauge connected to the trailer's air reservoir, the pressure should drop momentarily, then stabilize.

If the reservoir pressure continues to drop, then check the open Red line for the presence of air pressure (A new thin rubber glove is ideal for this, as it can be attached to the open Red flexible connection, and sealed with tape/cable tie and left. If it inflates quickly, this indicates a leaking RELSV).

If no air is seen leaking from the open Red flexible connection, this indicates that the leak is downstream of the RELSV, and this is best identified using a soap-water mixture.

Pay particular attention to pipe fittings, and note that these do not require to be tightened too much, as their seals will often become damaged by over-tightening.

Finally, if the tank pressures drop very slowly over an extended period, then this is acceptable as long as the leaking is not audible. This is known as "permissible leakage".

Test 3 (Smooth Operation/No Residual Pressure)

Swap the test coupling to the Yellow line, or attach the gauge and test hose to any test point in the Yellow line leading up to port 4 of the RELSV (1).

Attach the other gauge to a test point on any brake chamber.

Fully charge the trailer, and keep the Red flexible connection.
Place the two gauges close together, and monitor them both as the service brakes are slowly and repeatedly applied on and off.
Both pressures should be seen to rise and fall smoothly, with both showing zero bar when the tractor's brakes are released. (Do not worry if the pressure at the brake chamber is lower than that of the Yellow line, as the settings of the RELSV are not yet being tested.)

If the pressure in the Yellow line is unstable then the brake chamber pressure will be aswell.

This would indicate a problem with the tractor's brakes, in particular with its trailer control valve.

If the Yellow line pressure is smooth, but unstable at the brake chamber, then the problem is trailer related, and this is found by moving the gauge from the brake chamber to the output of the RELSV (port 2).

The test can be repeated, and if the pressure still is not smooth then this indicates a faulty RELSV. If it was smooth, then the problem is inside the ABS modulator (25), as it must be creating an unstable pressure, even though it is signalled with a stable one.

The same tests can be repeated for residual pressure problems, should both gauges not show zero pressure when the service brakes are released.

Test 3 (Output of the RELSV)

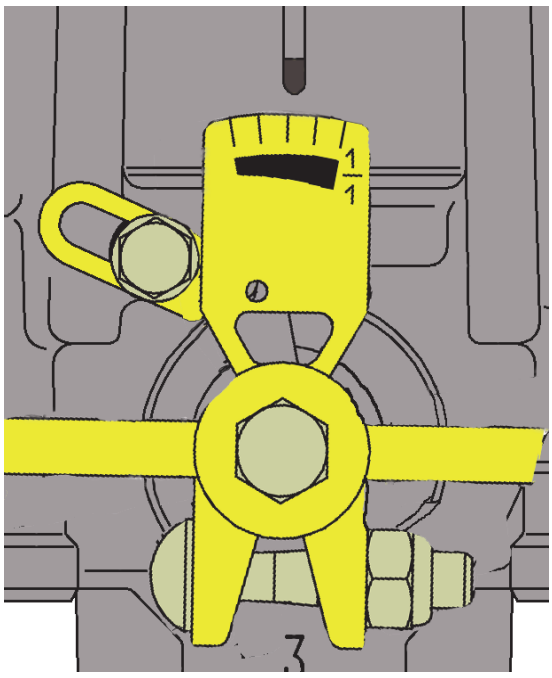
The RELSV (1) is connected between the chassis and axles, and senses the way the springs deflect, as increasing weight causes them to flatten. This movement is transferred to the RELSV operating arm via a vertical linkage (2) . This linkage, along with any other components (angle iron, flexible mounts etc) should be periodically checked for signs of damage, or becoming loose.

In order to check that the RELSV is functioning correctly, the linkage can be removed from the operating arm, and the service brakes applied.

The Red Flexible connection needs to be connected for this test. An air gauge in the brake chamber will show the output pressure, and this gauge can be observed whilst the operating arm is rotated. As the operating arm is raised the brake chamber pressure should increase until it matches the service line pressure, and decrease as the arm is lowered. This demonstrates that the load sensing function of the RELSV is working.

When the vertical linkage is reattached to the operating arm, it is important that the arm is at the correct angle to give the proper braking pressure for the weight being carried.
A decal is fitted to the arm, which rotates with the arm passing a pointer on the RELSV's casting. This decal shows the approximate setting for the RELSV, but the valve is best set when the trailer is empty, and the linkage adjusted until the correct unladen pressure is given, when a known "test pressure" is used.
A typical unladen decal position is shown to the left, but this is only shown for a guide.

The trailer builder should be able to provide this information, if it does not appear on a LSV data plate attached to the chassis.



RELSV Setting procedure

Before Operation

The RELSV is probably the most important part of the trailer's braking system, whether ABS is fitted or not.

A poorly set up RELSV can be both dangerous and expensive.

Too little output pressure leads to under braking, and this could result in a jack-knife.
Too much pressure can cause the trailer to lock, and "swing" past the tractor.

Additionally, too much pressure causes premature and expensive trailer tyre wear.

Periodically, and when connecting to a different tractor it is worthwhile checking the RELSV output pressures, and making sure they match the suspension correctly.

To do this properly you will require two gauges, a tape measure, calculator and a little patience!

1 With the trailer standing on firm level and connected to the tractor, load it to the maximum weight allowed.

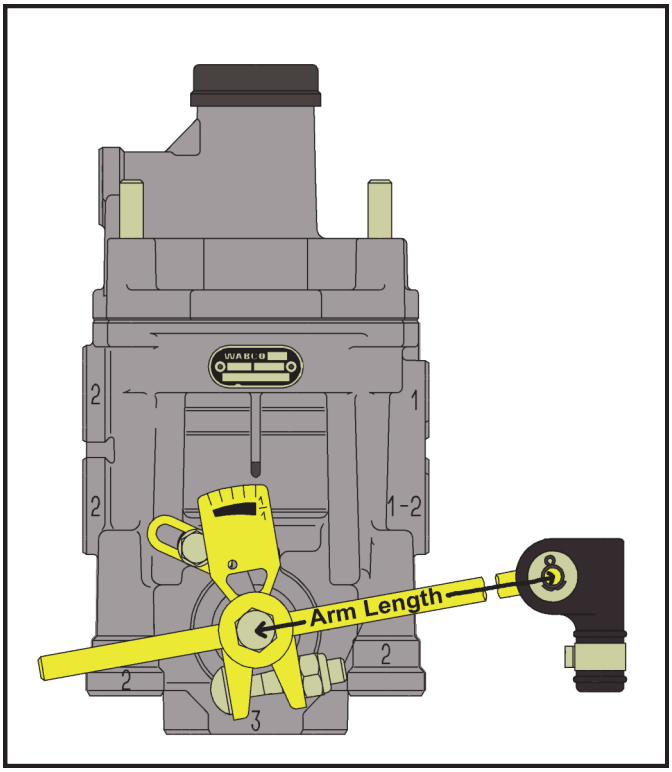
If the RELSV is connected to one axle, then measure the distance between the top of this axle and the underside of the chassis (If the trailer is fitted with a bar between the axles, then you can measure the distance above each axle and halve the total).

Record this measurement in mm

2 Remove the load and repeat the same measurements as taken above.

The difference between these two measurements is the "unladen to laden spring deflection".
For this example we shall assume it is 25mm.

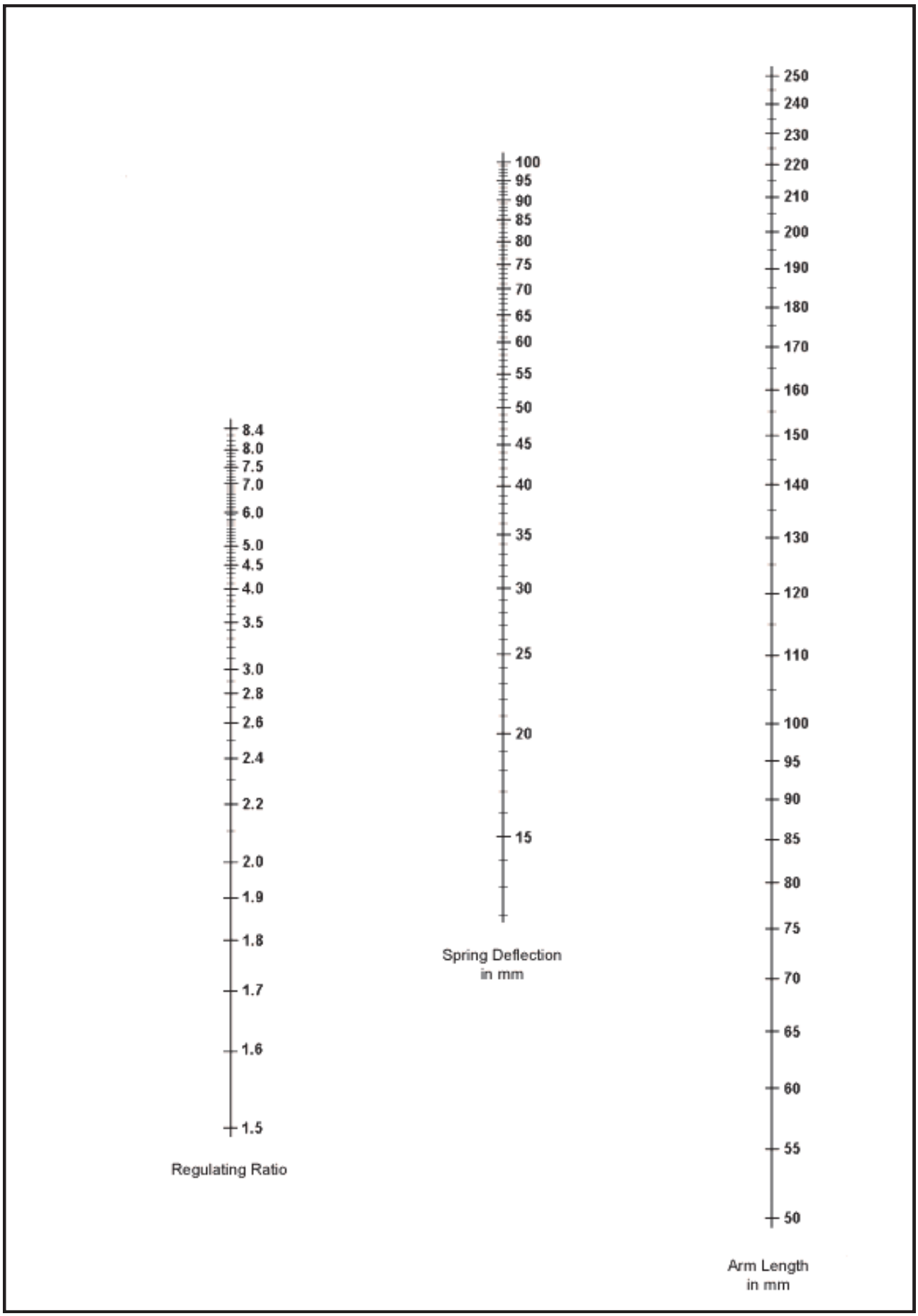
3 Find out the recommended unladen LSV setting pressure for your trailer. This may be on a data plate, or available from the trailer manufacturer.
This is not the pressure present in the trailer's brakes during normal unladen braking, but is a pressure used for setting up the RELSV!.
Along with this unladen pressure you should also get its associated "test pressure", as well as the laden brake pressure.



Typically these could be 6.0 bar (Test) 2.5 bar (Unladen) and 6.0 bar (Laden). If you cannot get access to the actual test pressures for your trailer, then the above figures may be close enough.

4 Calculate the "regulating ratio".
An acceptable way of doing this is by dividing the test pressure by the unladen pressure.
Using the example above, this would be 6.0 divided by 2.5 = 2.4

5 Look at the graph (Figure 2 below), and find the point on the left hand column which relates to the regulating------- ratio (2.4) which you have just calculated. Mark that point.
In the central column find the point which relates to your unladen to laden spring deflection, which you measured in Step 2 (25mm). Mark that point.
Draw a straight line from the point you marked in the left column, through the point in the second column, and extend this line until it crosses the right hand column.
Where it crosses this column read off the measurement, as this is the correct RELSV arm length for this trailer. This length is measured from where the arm connects to the RELSV (centre of the securing bolt head) and the point where the rubber linkage fits on the other end.
Adjust the arm length on the valve accordingly, and tighten the securing bolt.


8.4
8.0
7.5
7.0
6.0
5.0
4.5
4.0
3.5
3.0
2.8
2.6
2.4
2.2
2.0
1.9
1.8
1.7
1.6
1.5
Regulating Ratio
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
Spring Deflection
in mm
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
95
90
85
80
75
70
65
60
55
50
Arm Length
in mm

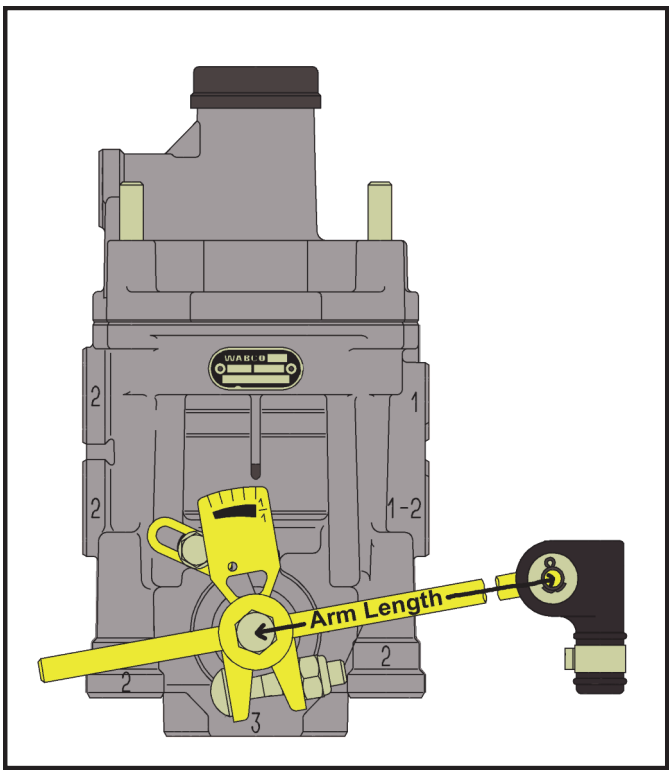
RELSV Setting procedure contd

6 Check the unladen setting by applying the test pressure to the Yellow line (6.0 bar used in this example), and measure the RELSV output pressure.
This can be measured directly at any unused port 2, or on a brake chamber.
If the pressure is correct (2.5 bar in this example), then the valve is now set up.

If the pressure is too low (2.0 bar for example), then the vertical linkage between the RELSV arm and the axle (or bar) is too short.

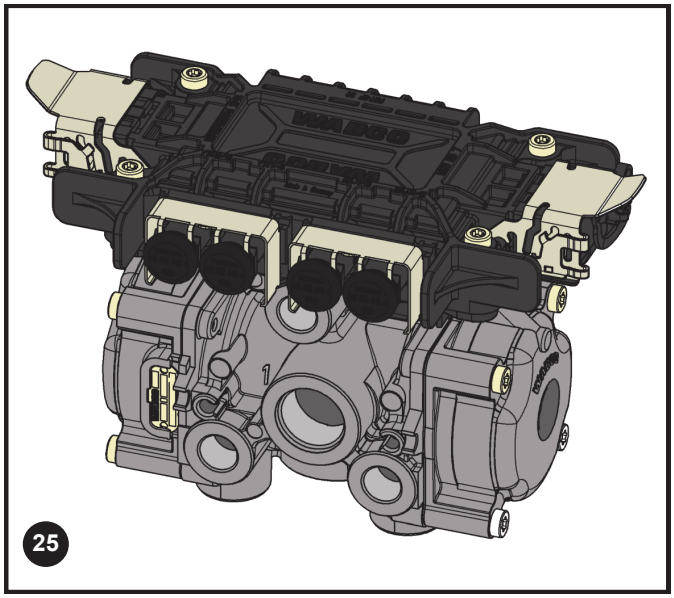
If the output pressure is too high, then the vertical linkage is too long.
Amend the length until the unladen output pressure is correct (tolerance ± 0.2 bar).

Having set the RELSV at its correct unladen setting, and adjusted the arm length to match the true unladen/laden spring deflections, the valve should now automatically adjust to the correct brake pressure settings.



Brake system

ABS



Note ! A trailer may have four wheels but just Two ABS sensors, the unsensed wheels still receive ABS modulated braking. However, unsensed wheels may still lock, as the ECU cannot detect this locking tendency, unless sensors are fitted to all wheels.

Note ! Failure of the ABS lamp to illuminate will not cause a failure of the brakes to apply. However, the ABS functions may be impaired to a greater or lesser extent, so wheel locking may be evident which could lead to a loss of stability, and an accident.

WARNING

If the ABS warning lamp illuminates whilst driving, proceed with caution until it is safe to stop. Check the sytem for faults before proceeding.

WARNING

Braking systems and brake related equipment must only be serviced by competent persons using the correct maintenance equipment

General Description

The ABS system is designed to stop the wheels from locking, when the trailer is braked and the road surface is slippery.

Under normal braking operation the ABS does not affect the braking performance, but merely monitors the changing wheel speeds. By doing this it compares the differing wheel speeds and determines if there is a tendency for one or more wheels to lock.

The ABS system consists of an Electronic Control Unit (ECU) and a modulator valve (25) which is hard wired directly onto the ECU.

The ECU and modulator are internally split into two halves, so that one half of the ECU controls one half of the modulator, which in turn controls the braking system for one side of the trailer.

The braking system for the other side of the trailer is controlled by the other half of the ECU and modulator.

Two ABS sensors (30) are mounted in the brake assemblies on at least one axle, and these are in close proximity to toothed “polewheels”, which pass by the ABS sensors, as the wheels rotate.

These ABS sensors are connected to the ECU by extension cables, and they are connected so that the nearside sensor controls the braking for the nearside wheels.

Operation

The ABS system when correctly operated is automatic and requires no inputs from the operator.

ABS systems are available in either 12 Vdc or 24Vdc variants. A 24Vdc version cannot be towed by a 12Vdc tractor and vice versa.

The main connection to the tractor is via the dedicated supply socket (ISO 7638 see page 5:7)

When connected to tractor as the tractor is started the ECU “exercises” the Modulator valve (25), this will be heard as a series of clicks, and if the service brake is applied some rapid exhaust sounds.

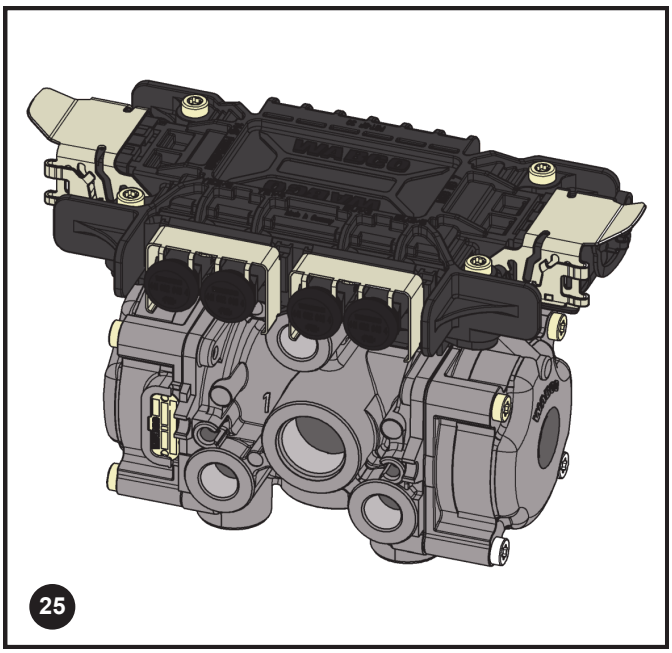
During initial power up, a cab mounted trailer ABS warning lamp should illuminate briefly, before going out. This warning lamp will indicate any ABS related failure to the driver.

Operation contd

The ABS ECU (25) monitors, processes and compares the wheel speeds detected at the wheel sensors (30) , and only acts on this information if it determines that one, or more of the sensed wheels are about to lock.

At that point the ECU transmits a signal to the half of the modulator valve which is connected to that wheel, and this closes the inlet port, stopping further pressure building up in the brake cylinders.

If the locking tendency persists, a further signal is also transmitted to the exhaust port, resulting in air being relieved from the respective brake chambers. The wheels speeds are controlled in this way until the ECU is determines that the lock-up condition has been averted, and then normal braking is resumed.



Basic Checks

The cab-mounted warning lamp should illuminate and extinguish once the tractor's ignition has been switched on. If this happens, then no checks are necessary.

Should the warning lamp stay on until the vehicle is moving, then this is also OK, and no further checks are required.

However, should the warning lamp fail to illuminate upon ignition, or fail to extinguish when pulling away, or come on again during driving, then a few basic checks may help find the cause.

General faults may be caused by poor electrical connections or damage to the cables .

These are best done with the ignition ON, following the warning lamp going out.
Trace the cable gently moving them and their connectors, check to see if the cab warning lamp illuminates, or flickers, or whether the ABS is heard to exercise again. If the ABS exercises, then you know that it switched OFF momentarily whilst the cable was moved, this could indicate a break in the power feed.
Testing the ABS sensor extension cables, where they connect to the ECU in this way, is also worthwhile, ensure any loose connections or pins are tightened and ensure correct operation.
Always make sure that they are correctly reconnected following any removal.

Power and warning lamp checks are best performed using two wires attached to a 21watt bulb, with the voltage to match the ABS system, rather than an LED tester or multimeter.

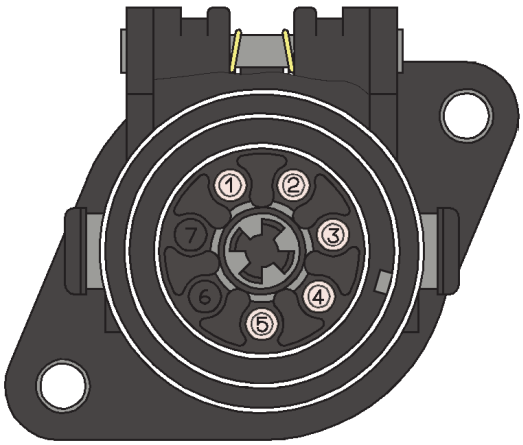
These checks can be performed in stages, initially at the tractor's ISO 7638 socket, then into an attached ABS flexible connection cable, and finally in the ISO 7638 power cable after removing it from the ABS ECU. In this way the various segments of the cabling are checked in turn, which will pinpoint any cable problems.

All of the power and ABS warning lamp tests on the following pages are conducted within the ISO 7638 power supply (28).

Brake system

ABS

Testing



28

Test 1 (Exercise check)

When the tractor ignition is switched ON, the trailer will exercise the Modulator valve (25) (This is often four sharp clicks, or click chuff click chuff, if the service brakes are applied.)

If these four noises are heard, then the ABS is being powered correctly.

If OK ignore Test 3 (ABS Power Test).

Test 2 (ABS warning lamp check)

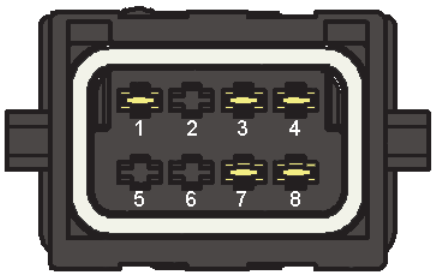
With the ABS flexible connection between the tractor and trailer disconnected (ignition ON) the ABS warning lamp should be OFF.

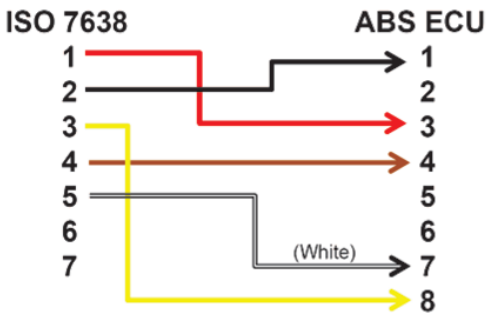
(If the ABS warning lamp is ON, the tractor has a wiring problem.)

At the tractor socket (28) using a multimeter or test lamp, connect one terminal to pin 5, and the other to pin 4 (see 5:7 for pin functions). The ABS warning lamp should illuminate, but not the test bulb (If the test bulb illuminates brightly, the tractor has a wiring fault).
If the warning lamp fails to switch ON and OFF as the test lamp is connected and disconnected, then the ABS warning lamp fault is within the tractor wiring.
If the warning lamp operates correctly, repeat the tests into the plug on the ABS flexible connection between the tractor and trailer (27), having firstly reconnected it to the tractor, and disconnected it from the trailer's ABS socket .

If the lamp is still working correctly, repeat the test into the ISO Power cable where the cable connects to the ABS ECU (25), this time using pins 4 and 7.

If the warning lamp is functioning correctly, then all of the ABS warning lamp wiring is correct.
Should the ABS warning lamp fails to illuminate after reconnecting all of the cables, and switching the ignition ON, then the fault must be inside the ABS ECU. (25)
However, if the ABS warning lamp stays on, then further tests are required.
By cycling the ignition ON (2 seconds) OFF (2 seconds) and ON again, a request is sent to the trailer's ABS ECU to give out a "blink code". If the ABS warning lamp starts flashing, this indicates that the ECU is functioning correctly, make a note of the number of flashes, as these can be used to identify the source of the problem.





ISO POWER CABLE TO ECU

Testing contd

Test 3 (ABS Power Test)

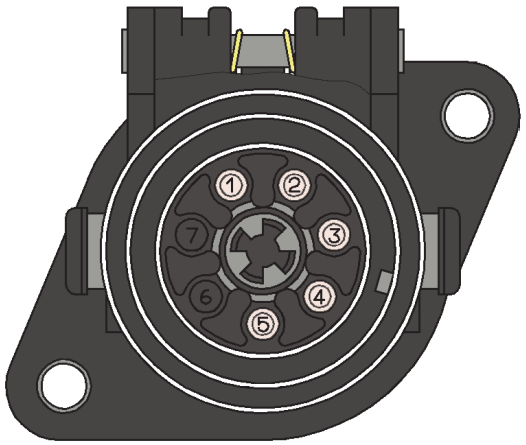
Using a multimeter or a 21 Watt test lamp, and with the ignition switched ON, check that it illuminates brightly when connected across pins 2 and 3 of the tractor's socket (28).
If it fails to illuminate then check the tractor fuse (often 5 Amp). Refer to the tractors operation & maintenance manual for details of the electrical system.

Check that that it switches ON/OFF with the ignition ON/OFF.
Repeat the test with the test lamp across pins 1 and 4.

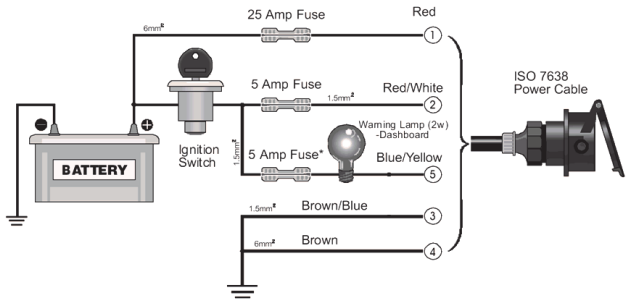
If the lamp fails to illuminate then check the fuse (often 25 Amp). With the test lamp across pins 1 and 4, the lamp may stay illuminated, even after the ignition is switched OFF, and if it does then this is OK.
Connect the test lamp across pins 4 and 5. The lamp must not illuminate, but the cab warning lamp should come on.

All of the above tests can be repeated the ABS ISO7638 flexible connection between the tractor and trailer (27) having firstly disconnected it from the trailer's socket, in order to check the connection for damage.

Finally the remainder of the ISO 7638 cable can be checked by repeating the tests at the ABS ECU (25), remembering that the pin numbers are different, so refer to ISO Power cable to ECU wiring diagram shown on the previous page.



28



TYPICAL TRACTOR ABS ELECTRICAL CIRCUIT

Brake system

ABS

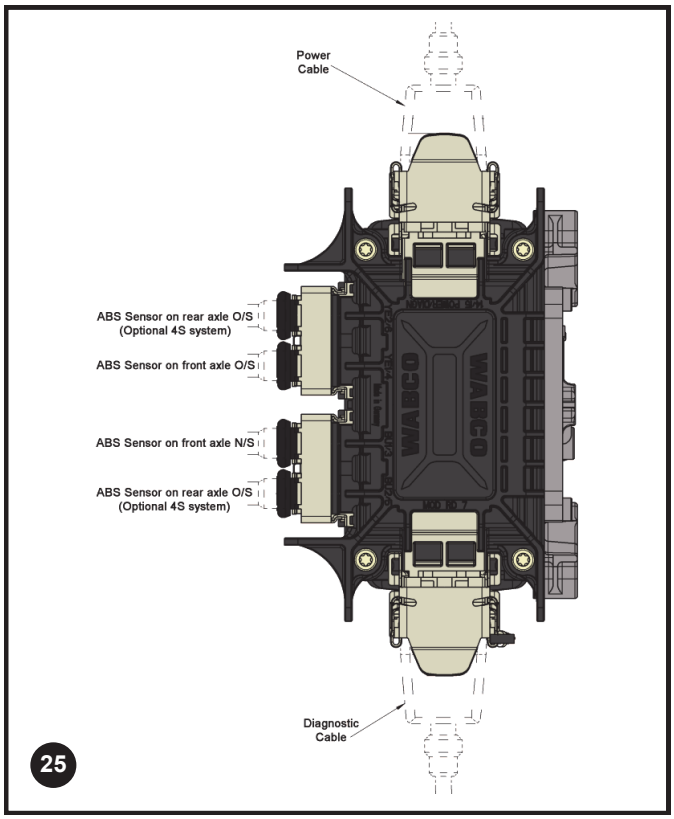
Testing contd

Basic blink code errors

By starting the blink code routine (see page 5:19), any current ABS wiring fault error codes are shown by the ABS warning lamp, located in the tractor. The error codes are repeated three times.

Fault Code	Component	Comments
3	ABS Sensor BU1 c	Broken wire – normally nearside of trailer
4	ABS Sensor YE1 d	Broken wire – normally offside of trailer
5	ABS Sensor BU2 e	Broken wire – normally nearside with 4 sensor system
6	ABS Sensor YE2 f	Broken wire – normally offside with 4 sensor system
7	Extra Modulator	Broken wire/solenoid – only on 4S/3M systems
9	Internal Modulator	Broken wire – new ABS assembly required
10	Internal Modulator	Broken wire – new ABS assembly required
11	Internal Modulator	Broken wire – new ABS assembly required
14	Power Supply	Check for over/under voltage
15	Internal ECU fault	Replace ABS assembly

Note! Fault codes 3,4,5,6,7,14 & 15, correspond to numbers cast into the ABS ECU valve body (25), allowing the faults to be traced to a specific connection.



Component Testing

The ABS system consists of three basic components (ECU (25), Cables (29) and ABS Sensors (30)) the most effective method of fault diagnosis may be by substitution.
This is ideal for checking cabling/ABS Sensor wiring problems, when no specialist diagnostic tools are available.

When removing any cable it is vital that the cable is marked, so it can be returned to its original position. It is also imperative to ensure that no unused electrical connections are left open, as water will enter the electronics and cause premature failure.

Water can also enter the electronics via “repaired cables”, where water migrates up the inside of the repaired cable, and corrodes the inside of the ECU.

The cable connections to the ECU (25) are shown opposite, only the two central ABS cables are used for a two ABS Sensor system.

If in doubt contact your dealer or a specialist ABS repairer!

Troubleshooting Guide

Problem	Cause	Solution
TRACTOR (TRAILER CIRCUIT) LOW PRESSURE WARNING BUZZER ON ALL OF THE TIME	AIR LEAK IN SYSTEM	DISCONNECT TRAILER TO ASCERTAIN WHETHER LEAK IS IN THE TRACTOR, OR TRAILER
	COMPRESSOR OR UNLOADER/AIR DRYER PROBLEM	CHECK IF COMPRESSOR IS BLOWING-OFF AT UNLOADER, OR AIR DRYER.
	LOW PRESSURE SWITCH PROBLEM	CHECK CONNECTIONS - REPAIR AS NECESSARY CHECK LP SWITCH PRESSURES AGAINST THOSE IN THE AIR TANK (TRAILER CIRCUIT)
TRAILER BRAKES DO NOT RELEASE WHEN SYSTEM FULLY CHARGED, AND THE TRACTOR'S HAND BRAKE IS RELEASED	INSUFFICIENT RED LINE "FLOW"	CHECK SELF-SEAL VALVE TO ENSURE IT IS LIFTING SUFFICIENTLY TO ALLOW A HIGH FLOW OF AIR TO THE TRAILER
	INSUFFICIENT RED LINE PRESSURE	CHECK PRESSURE AT THE TRACTOR'S RED COUPLING USING CALIBRATED AIR GAUGE. PRESSURE SHOULD BE BETWEEN 6.5 BAR AND 8.5 BAR
	PRESSURE STILL IN YELLOW LINE	CHECK TRACTOR'S IGNITION IS SWITCHED ON
		CHECK CABLE LINKAGE (IF FITTED) TO TRACTOR'S TRAILER CONTROL VALVE, AND ADJUST/REPAIR AS NECESSARY
	RELSV EXHAUST PORT BLOCKED	ENSURE RELSV EXHAUST IS OPEN
TRAILER BRAKES DO NOT APPLY DURING TRACTOR BRAKING	INSUFFICIENT YELLOW LINE "FLOW"	CHECK LIFTER VALVE PRESENT IN TRAILER'S YELLOW SUSIE
		CHECK SELF-SEAL VALVE IN TRACTOR'S YELLOW COUPLING
		CHECK TRAILER'S YELLOW AIR LINES FOR KINKS OR BLOCKAGES
	INSUFFICIENT PRESSURE IN TRAILER'S AIR RESERVOIR	CHECK THAT AIR FLOWS UNRESTRICTED FROM PORT 1-2 OF RELSV, WHEN THE RED SUSIE IS CONNECTED AND PRESSURISED
INSUFFICIENT PRESSURE IN TRAILER'S AIR RESERVOIR	POOR AIR FLOW TO TRAILER'S AIR RESERVOIR	CHECK FOR KINKED OR BLOCKED PIPES
		CHECK THAT AIR FLOWS UNRESTRICTED FROM PORT 1-2 OF RELSV, WHEN THE RED SUSIE IS CONNECTED AND PRESSURISED
TRAILER'S BRAKES "SNATCHING"	RELSV NOT WORKING SMOOTHLY - INPUT AND OUTPUT PRESSURES JERKY WHEN COMPARED USING AIR GAUGES	REPAIR/REPLACE RELSV AND ENSURE THAT ANY REPLACEMENT IS SET UP CORRECTLY
TRAILER BRAKING TOO HARD, OR TOO WEAK	INCORRECT LSV SETTING	CHECK SETTINGS AGAINST RECOMMENDATION
	INCORRECT SLACK-ADJUSTER LENGTH	CHECK LENGTH AGAINST RECOMMENDATION
	INCORRECT BRAKE CHAMBER SIZE	CHECK SIZE AGAINST RECOMMENDATION
	LSV LINKAGE DAMAGED	CHECK LINKAGE AND ANGLE IRON
TRAILER BRAKES GETTING TOO HOT	HAND BRAKE PARTIALLY APPLIED	CHECK HANDBRAKE CABLES/ ADJUSTMENT
	RESIDUAL PRESSURE IN BRAKES	ENSURE NO AIR TRAPPED IN YELLOW LINE
	HYDRAULIC LINE ALSO CONNECTED	DISCONNECT HYDRAULIC BRAKE LINE

Problem	Cause	Solution
	FAULTY ABS POWER CABLE	CHECK/REPLACE (SEE TEST INFORMATION)
TRAILER BRAKES NOT GOING INTO "EMERGENCY", AFTER RED LINE REMOVED	KINKED PIPE IN LINE TO RELSV	CHECK ALL PIPES TO PORT 1 OF RELSV
	INCORRECT RED SUSIE COUPLING	CHECK COUPLING HAS NO SELF-SEAL VALVE
	RELSV EXHAUST PORT BLOCKED	ENSURE RELSV EXHAUST IS OPEN
ABS WARNING LAMP IN TRACTOR CAB ILLUMINATED WHEN NO ABS TRAILER CONNECTED	EARTH PROBLEM WITHIN TRACTOR'S ISO 7638 WIRING	CHECK ABS SOCKET FOR TOUCHING, LOOSE WIRES
		CHECK WIRING FROM ABS SOCKET TO CAB ABS WARNING LAMP.
ABS WARNING LAMP IN TRACTOR CAB DOES NOT ILLUMINATE WHEN TRACTOR CONNECTED TO TRAILER WITH ABS FITTED	ABS WARNING LAMP BULB BLOWN	REPLACE BULB
	ABS WARNING LAMP FUSE BLOWN	REPLACE FUSE (OFTEN 5 AMP)
	NO ABS SUSIE CONNECTED	CONNECT ABS SUSIE TO TRACTOR'S SOCKET
	FAULTY ABS SOCKET	IS PIN 5 PUSHED BACK INTO ABS SOCKET?
	FAULTY ABS SUSIE	REPLACE ABS SUSIE
	FAULTY ABS POWER CABLE	CHECK/REPLACE (SEE TEST INFORMATION)
	FAULTY ABS ECU	REPLACE ABS UNIT
ABS WARNING LAMP IN TRACTOR CAB DOES NOT EXTINGUISH AFTER CIRCA 2 SECONDS, WHEN CONNECTED TO TRAILER WITH ABS FITTED	POWER FAULT	CHECK FOR 12 VOLTS ACROSS PINS 1 & 4 OF ABS SOCKET
		CHECK FOR 12 VOLTS ACROSS PINS 2 & 3 OF ABS SOCKET
		CHECK FOR 12 VOLTS ACROSS PINS 1 & 8 OF ABS POWER CABLE, AT ABS ECU END
		CHECK FOR 12 VOLTS ACROSS PINS 3 & 4 OF ABS POWER CABLE, AT ABS ECU END
	ABS SENSOR SHORT/OPEN CIRCUIT	CHECK BLINKCODE FOR SENSOR FAULT LOCATION (SEE LIST)
	ECU PROBLEM	CHECK BLINKCODE FOR 12 FLASHES - REPLACE IF NECESSARY
	ABS POWERED FOR EXTENDED TIME	TOW TRAILER AND CHECK THAT LAMP GOES OUT AFTER CIRCA 7 KM/H
ABS WARNING LAMP IN CAB GOES OUT AFTER CIRCA 2 SECONDS, BUT ILLUMINATES AGAIN WHILST DRIVING	ABS SENSOR AIR GAP	CHECK ABS SENSOR INSTALLATION, AND PUSH SENSOR UPTO ABS POLEWHEEL
	POLEWHEEL WOBBLE	CHECK ABS SENSOR AND POLEWHEEL INSTALLATION, AS WELL AS WHEEL BEARING
SYSTEM DOES NOT "EXERCISE" AFTER POWERING UP (NO CLICKING/CHUFFING AUDIBLE)	POWER FAULT	CHECK FOR 12 VOLTS ACROSS PINS 1 & 4 OF ABS SOCKET
		CHECK FOR 12 VOLTS ACROSS PINS 2 & 3 OF ABS SOCKET
		CHECK FOR 12 VOLTS ACROSS PINS 1 & 8 OF ABS POWER CABLE, AT ABS ECU END
		CHECK FOR 12 VOLTS ACROSS PINS 3 & 4 OF ABS POWER CABLE, AT ABS ECU END
	FAULTY ABS ECU	REPLACE ABS UNIT

Troubleshooting Guide

Problem	Cause	Solution
WHEELS LOCK DURING BRAKING - NO ABS WARNING LAMP ILLUMINATED	TOO MUCH BRAKE PRESSURE	CHECK RELSV SETTINGS
	NO ABS SENSORS FITTED TO LOCKING WHEELS	ADD EXTRA ABS SENSORS TO LOCKING AXLE TO CONVERT TO A 4S/2M SYSTEM
WHEELS LOCK DURING BRAKING - ABS WARNING LAMP ILLUMINATED	POWER FAULT	CHECK FOR 12 VOLTS ACROSS PINS 1 & 4 OF ABS SOCKET
		CHECK FOR 12 VOLTS ACROSS PINS 2 & 3 OF ABS SOCKET
		CHECK FOR 12 VOLTS ACROSS PINS 1 & 8 OF ABS POWER CABLE, AT ABS ECU END
		CHECK FOR 12 VOLTS ACROSS PINS 3 & 4 OF ABS POWER CABLE, AT ABS ECU END
	ABS SENSOR AIR GAP	CHECK ABS SENSOR INSTALLATION, AND PUSH SENSOR UPTO ABS POLEWHEEL
	POLEWHEEL WOBBLE	CHECK ABS SENSOR AND POLEWHEEL INSTALLATION, AS WELL AS WHEEL BEARING

Brake system

Euro-Safe (TM) Hydraulic System

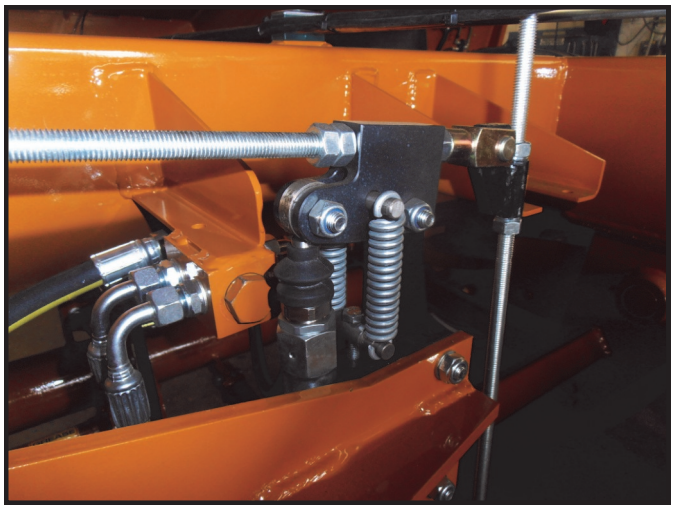
General Description

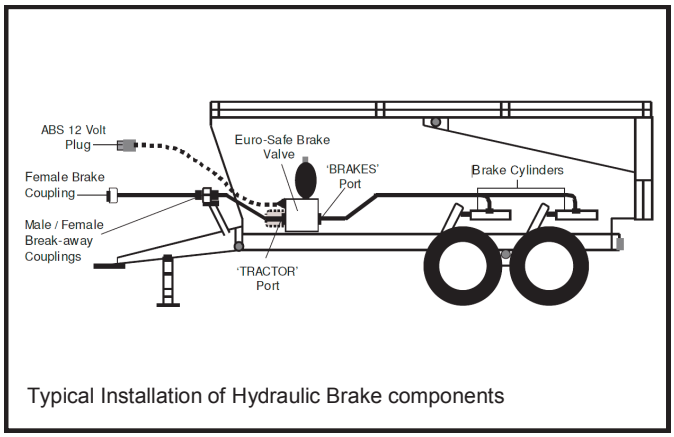
The 'Euro-Safe' Automatic Fail-Safe/Emergency braking system is a dual line system, the service line is Hydraulic and the emergency line electric.
It has been designed to fully comply with the revised EU Braking Regulations for towed trailers and implements travelling faster than 25 KPH.

The system provides automatic application of the trailer brakes in the event of the trailer becoming detached from the towing vehicle as well as a temporary parking brake.

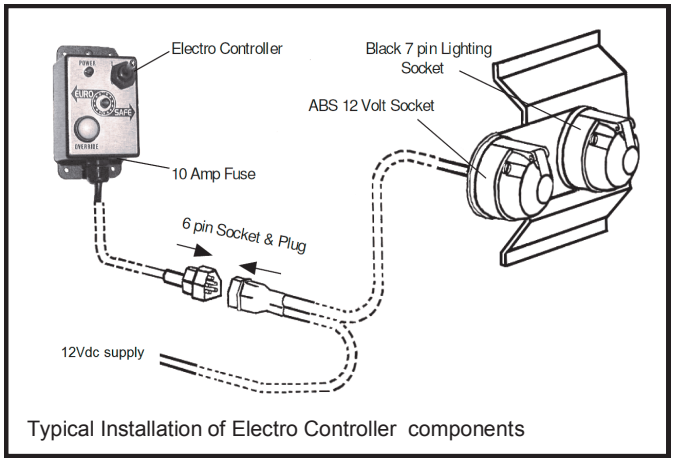
The Euro-Safe brake valve is controlled by an Electro Controller located inside the cab of the towing vehicle. The use of the Electro Controller allows the operator, to fully control the trailers brakes, applying-releasing and overriding them without leaving his seat.

When applied the Euro-Safe brake valve delivers a brake pressure of 90-100Bar, which is essential when parking heavy trailers as the tractors parking brake is only designed to hold the weight of the tractor. A built in Safety Feature ensures that the trailer brakes do not release until the system has been fully recharged. An integrated high-pressure filter ensures no debris enters the system, which may cause malfunction or brake failure.





Typical Installation of Hydraulic Brake components



Typical Installation of Electro Controller components

Initial Setup

Operating the Euro Safe valve for the First time or after a major Service

Connect the trailer to the tractor.

Connect the hydraulic brake coupling and ABS brake plug to the tractor.

Unscrew all the brake pipes from the brake cylinders.

Place containers beneath each cylinder to recover any waste oil and debris exhausted from the cylinders.

With the Electro Controller switched **'OFF'**, start up the tractor, depress the tractors brake pedal for 10 seconds, this will flush the brake lines free of any debris that has entered the system.

Retighten the connectors and then bleed each brake cylinder individually making sure the system is air free.

Check tightness of all connectorsand check for signs of any leakage.

Switch **'ON'** the Electro Controller – the Red power light will illuminate and low-pressure warning buzzer will sound.

Allow the accumulator to charge by depressing the tractors brake pedal for 25-35 seconds (depending on oil temperature), until the trailer brakes release, the low-pressure warning buzzer stops and green light illuminates.

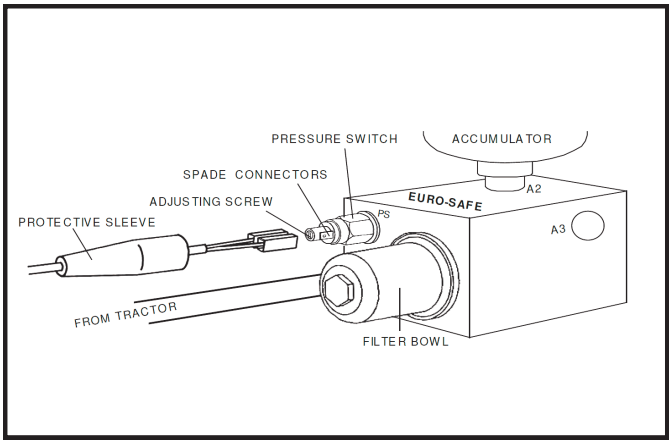
Keep brake pedal depressed for a further 10 seconds, the system is now ready for use.

Re-setting the Pressure switch

IF LOW PRESSURE WARNING BUZZER CONTINUES TO SOUND!

Check the tractors trailer-braking valve maximum pressure, if the maximum braking pressure is lower than120 Bar, the valve needs repairing or replacing.

Reset the pressure switch to suit the tractors maximum trailer braking pressure.



Note! The pressure switch is factory set and sealed. If seal is broken warranty for the unit becomes void.

Pull back the protective sleeve from the pressure switch.

Switch 'ON' the Electro Controller in the cab.

Recharge the accumulator by depressing the tractor brake pedal for 30-40 seconds depending on oil temperature.

If low-pressure buzzer continues to sound slowly turn the adjusting screw anti-clockwise, until the trailer brake's release, buzzer stops and green light illuminates.

Turn the adjusting screw a further eighth of a turn anticlockwise (45^0).

Switch 'OFF' the Electro Controller then repeat the above steps ensure the correct adjustment has been made.

Push the protective sleeve back over the pressure switch.

Test the trailer brakes: - Switch 'OFF' the Electro Controller – this applies the trailer brakes, slowly drive the towing vehicle forward, if trailer brakes are locked 'ON' – the system is working,
If not: Check that the trailer brakes are fully adjusted replace worn parts if necessary.

If in doubt contact the manufacturer or your dealer.

Brake system

Euro-Safe (TM) Hydraulic System

Operation

When operating the tractor/trailer brakes under normal driving conditions oil from the tractors trailer brake circuit passes through the EURO-SAFE brake valve, applying the trailer brakes, in the usual way.

Oil stored in the accumulator is used for temporary parking and emergency braking only.

Operating the EURO-SAFE fail-safe/emergency brake valve: -

Connect trailer, hydraulic brake coupling and electrical brake ABS plug to the tractor.

Switch 'ON' the Electro Controller the red power light will illuminate.

If low-pressure buzzer sounds, recharge the accumulator by depressing the tractor brake pedal for 20 -30 seconds, until trailer brakes release, the buzzer stops, and the Green light illuminates.

Note! Keep brake pedal depressed for a further 10 seconds after green light illuminates this ensures that the accumulators are charged to maximum tractor pressure.

THE TRAILER BRAKES WILL APPLY WHEN: -

a) The Electro Controller is switched 'OFF'
b) The ABS plug is disconnected or the electrical power is lost or interrupted.

THE ACCUMULATOR PRESSURE AND THE BRAKES CAN BE RELEASED AT ANY TIME BY: -

a) Switching the Electro Controller '**OFF**' - this will apply the trailer brakes.
b) Push and hold the override button the Electro Controller, Red power light will illuminate

Alternatively twist and hold the Manual Override button mounted on the brake valve for 10 seconds. This will discharge the accumulator and release the trailer brakes.

IMPORTANT! Whilst driving if the green light goes out and the buzzer sounds . Push and hold the red override button until you can safely stop.

If all electric supply to the tractor is lost the trailer brakes can be released by twisting the Manual Override button.

Parking the Trailer

To park trailer with brakes applied.

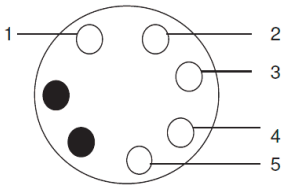
The Trailer brakes will apply when the Electro Controller is switched 'OFF' or the electrical supply is interupted or ABS plug removed.

To park trailer with brakes released

Switch the Electro Controller to 'OFF' - this will apply the trailer brakes.
Push and hold the override button the Electro Controller, the Red power light will illuminate.
Alternatively twist and hold the Manual Override button mounted on the brake valve for 10 seconds, this will discharge the accumulator and release the trailer brakes.

WARNING

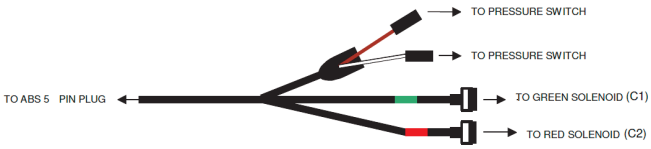
It is still legal requirement to have a mechanical parking brake fitted and working on agricultural trailers and implements, and should be used when parking the trailer up for long periods.



1 Red
2 Green
3 Brown
4 White
5 Yellow/Blue if fitted

ABS Socket Connections

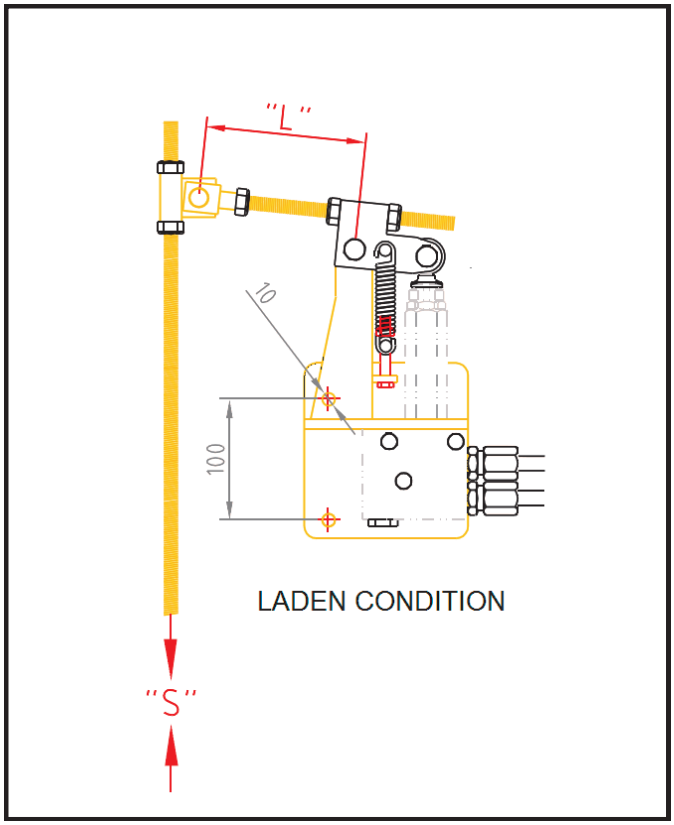
ATTENTION! it is still legal requirement to have a mechanical parking brake fitted to agricultural trailers and implements, and should be used when parking the trailer up for very long periods.
Or chock up the wheels securely, then release the mechanical parking brake or Euro-Safe brake valve. (This prevents the brake shoes sticking to the drum)
IMPORTANT! WHEN THE EURO-SAFE BRAKE VALVE IS FITTED TO A TRAILER THE BRAKES CAN ONLY BE OPERATED IF
THE TRACTOR IS FITTED WITH THE ELECTRO CONTROLLER.
It is IMPORTANT that the Male-Female breakaway couplings provided are fitted into the trailers brake line, which connects from the Euro-Safe brake valve to the Female brake coupling. (See diagram above)
This ensures that if the trailer breaks away from the tractor accidentally the couplings automatically disconnect making sure no hoses are damaged and also preventing any oil spillage on to the highway.
If trailer brakes are operated via the tractor spool valve: - Activate the spool valve until the system is fully charged,
buzzer stops, green light illuminates and trailer brakes release.
Ensure that the spool valve pressure does not exceed 150 Bar or damage may occur to the trailer brakes.

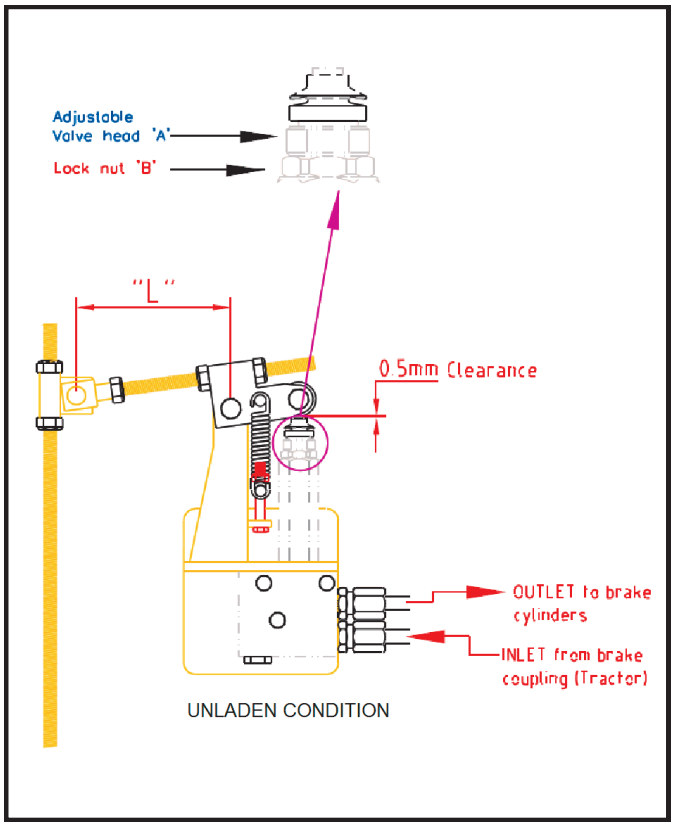


Trailer Wiring connections

Brake system

Euro-Safe (TM) Hydraulic System





Adjusting the Minimum braking pressure

Unscrew Locknut B

Turn the Valve head A clockwise to increase the brake pressure or Counter clockwise to decrease.

Check the minimum pressure setting.

If satisfactory, retighten lock nut B

The same principles apply to the hydraulic system as earlier described for the Pneumatic system..

The load sensing valve should be set with the trailer sitting level. It should be checked when the trailer is first attached and re-checked whenever the trailer is connected to a different towing vehicle.
This is because any variation of the drawbar height will change the setting of the valve.

Note! For trailers fitted with the Heavy Duty (50mm thickness) spring the Distance L should be 70mm and for those fitted with the Light Duty (40mm thickness) the distance L should be 120mm.

Troubleshooting Guide

Problem	Cause	Solution
LOW PRESSURE WARNING BUZZER ON ALL THE TIME: – TRAILER BRAKES WILL NOT RELEASE	PRESSURE SWITCH SET TOO HIGH	RESET PRESSURE SWITCH
	TRACTOR -TRAILER BRAKE VALVE NOT DELIVERING THE CORRECT PRESSURE	CHECK THE PRESSURE- IF THE MAX PRESSURE IS BELOW 120BAR REPAIR OR REPLACE TRACTOR-TRAILER BRAKE VALVE
	LOOSE CONNECTION, WIRING LOOM DAMAGED	CHECK CONNECTIONS - REPLACE WIRING LOOM
	JOHN DEERE TRACTORS TRAILER BRAKING PRESSURE TOO LOW **NEW HOLLAND, CASE , MF CLAAS TRACTORS** AIR IN THE TRACTOR BRAKE LINE CAUSING TRAILER BRAKE VALVE TO MALFUNCTION	ADJUST TRACTOR-TRAILER BRAKE VALVE PRESSURE TO 150 BAR MAX (REFER TO DEALER) BLEED THE TRACTOR BRAKES, FIRST RIGHT SIDE THEN LEFT. TEST TRAILER BRAKING PRESSURE. IF LOWER THAN 120BAR CONSULT DEALER
LOW PRESSURE WARNING BUZZER SOUNDS WHILST DRIVING. **PRESS & HOLD OVERRIDE BUTTON UNTIL YOU CAN SAFELY STOP**	PLUG & SOCKET TERMINALS CORRODED	CLEAN TERMINALS AND SPRAY WITH ANTI CORROSION COMPOUND
	PRESSURE SWITCH SET TOO HIGH	PRESS OVERRIDE BUTTON UNTIL YOU CAN SAFELY STOP THEN ADJUST PRESSURE SWITCH 1/4 TO 1/2 TURN ANTICLOCKWISE
	DEBRIS WITHIN SYSTEM CAUSING VALVES TO MALFUNCTION	REPLACE HIGH PRESSURE FILTER ELEMENT
		TAKE OUT VALVE C1 CLEAN THOROUGHLY AND FLUSH SYSTEM
TRAILER BRAKES WILL NOT RELEASE WITH SYSTEM CHARGED	RETURN FILTER BLOCKED WITHIN THE TRACTOR-TRAILER BRAKING VALVE	**JOHN DEERE TRACTORS** CLEAN OUT RETURN FILTER WITHIN TRACTOR TRAILER BRAKING VALVE
	TRAILER BRAKE COUPLINGS WORN RESTRICTING FLOW	REPLACE WITH NEW
	HIGH PRESSURE FILTER BLOCKED	REPLACE ELEMENT
	DEBRIS WITHIN SYSTEM CAUSING C2 VALVE TO JAM	REMOVE VALVE C2 CLEAN THOROUGHLY AND FLUSH SYSTEM
	TRACTOR - TRAILER WIRING LOOM OR PLUG & SOCKET DAMAGED	REPAIR OR REPLACE
NO POWER TO ELECTRO CONTROLLER	LOOSE CONNECTION OR WIRING LOOM DAMAGED	CHECK CONNECTIONS, REPAIR OR REPLACE LOOM
	BLOWN FUSE	REPLACE FUSE
ELECTRO CONTROLLER NOT FUNCTIONING CORRECTLY	WATER HAS ENTERED CONTROLLER	REPLACE CONTROLLER
TRAILER BRAKES DO NOT APPLY WHEN ELECTRO CONTROLLER IS SWITCHED OFF	PRESSURE SWITCH SET TOO LOW	RESET PRESSURE SWITCH
	TRACTOR - TRAILER VALVE NOT DELIVERING THE CORRECT PRESSURE	TEST TRAILER BRAKING PRESSURE. IF LOWER THAN 120BAR REPAIR OR REPLACE TRACTOR - TRAILER BRAKE VALVE . CONSULT DEALER
	TRAILER BRAKES NEED ADJUSTING	ADJUST,CHECK AND REPLACE WORN PARTS AS REQUIRED
	ACCUMULATOR PRE-CHARGE PRESSURE DEPLETED	REPLACE ACCUMULATOR

Problem	Cause	Solution
FEMALE BRAKE COUPLING WILL NOT CONNECT TO TRACTOR. EXCESS RESIDUAL PRESSURE IN BRAKE LINE	DISCONNECTED THE HYDRAULIC LINE BEFORE THE ELECTRICAL LINE	DISCONNECT THE ELECTRICAL LINE BEFORE THE HYDRAULIC LINE
	BACK PRESSURE IN TRAILER BRAKE LINE	RELEASE PRESSURE, DISCONNECT BREAKAWAY COUPLING AND RECONNECT.
	DEBRIS CAUSING VALVE MALFUNCTION	REMOVE VALVE C2 CLEAN THOROUGHLY AND FLUSH SYSTEM

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK

Additional Information 6

Easy Sheet (Side Wind)

Opening the Sheet

Undo the ratchet straps, and if not already attached clip the pullover rope to the D shackles,

The clips attached at either end of the shorter rope attach to the first and third webbing straps, the centre clip attaches to the second web, ensure the rope is not tangled.

The fourth webbing strap is not required for normal use and is only used during delivery this strap may be removed for on farm use.

Remove the winding pole from its storage location on chassis.

Insert the winding pole into the outer roller, this can be done from the front or the rear of the trailer depending on ease of access.

Wind sheet across to the stops on the opposite side of the trailer. The straps will be wound up inside the sheet.

If the trailer is going to moved locate the winding pole back to its storage location.

.

Throw the rope across the trailer and secure onto rope hooks as shown.

Easy Sheet (Side Wind)

Closing the Sheet

Undo the rope from rope hooks on the side of the trailer and throw rope over trailer.

Pull the sheet back over the trailer, a final quick pull will flick the ratchet straps over side of trailer ready to locate in ratchets.

Ensure all straps are over side of trailer, and locate through the ratchets on body.

The ratchets can now be tightened, do not over tighten as this will put unnecessary strain on sheet.

The rope can either be removed or tied between rope hooks to take up the slack.

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK

Published and Printed in the
United Kingdom for
Richard Western Trailers Ltd

REF RW 11/2013
Original Documents