



# OPERATION AND MAINTENANCE MANUAL

Suffolk Trailers

Rootcrop Trailers

Wellington Trailers

Bale & Pallet Trailers

Stone and Rubble Trailers

Pusher Ram Trailers



**PROVEN IN THE FIELD**

**CONTACT US**

**+44(0)1728 723224 • [sales@richardwestern.com](mailto:sales@richardwestern.com)**

**Richard Western Ltd, D'Urbans, Framlingham, Suffolk IP13 9RP**

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

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### **Original Instructions**

# **Please Read and follow all instructions before Operating the Machine**

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.

You can find digital copy of this manual on our website: **[www.richardwestern.com](http://www.richardwestern.com)** .

Also reorder this RW Trailer User Manual Version 1 by contacting **+44 (0) 1728 723 224** or **[stores@richardwestern.com](mailto:stores@richardwestern.com)** .

Edition 1

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# 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
- Stone and Rubble Trailers
- Pusher Ram Trailers

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.

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.

## WARNING



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.

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# Tilly Pass

Richard Western Ltd recommends that thorough, planned maintenance is carried out on all our machines and trailers on a frequent and regular basis as under the Health and Safety at Work Act 1974, it is the employers responsibility to manage health and safety risks in their businesses. As such employers have a duty to protect the health, safety and welfare of their employees and others who may be affected by their work activities. It is important to maintain and repair your equipment in good mechanical working order. Richard Western Ltd would recommend that you replace worn and broken parts with genuine Richard Western parts.

You should have received a Richard Western manual when you purchased your trailer or machine, but these are also available online [www.richardwestern.com](http://www.richardwestern.com).

Please note that Richard Western Ltd will not be liable for damage or personal injury caused by failure to comply with regular maintenance or the use of aftermarket parts.



# Tilly Pass Scheme

There is no Ministry of Transport test on agricultural machinery as there is no government regulation that requires agricultural trailers to be registered for road use in the UK. This may result in trailers not being maintained in accordance with the Provision and Use of Work Equipment Regulations 1998 (PUWER) ( [hse.gov.uk/work-equipment-machinery/puwer.htm](http://hse.gov.uk/work-equipment-machinery/puwer.htm) ) with the potential of a trailer being used in a dangerous, unroadworthy condition.

Richard Western Ltd encourage their UK customers to register their trailer with the Tilly Pass scheme. This is a voluntary scheme for farm trailer operators whereby authorized Tilly Pass dealers carry out an annual maintenance inspection of the trailer, repair and issues and confirm the trailer has been inspected to PUWER. A re-check is required each year and a new certificate will then be issued.



Find out more information about the Tilly Pass Scheme, including dealers that have subscribed to the scheme at [www.tilypass.co.uk](http://www.tilypass.co.uk)



**FULL DAILY & MONTHLY CHECKS MUST BE CARRIED OUT BY TRAINED OPERATORS / OWNER.**

**LOAD THE HEAD TO TOW APP AT [www.tilypass.co.uk](http://www.tilypass.co.uk) TO ACCESS TRAILER MANUFACTURERS RECOMMENDED SAFE TOWING CHECKS.**

# Manufacturer

**Manufacturers Name:**

Richard Western Ltd.

**Contact details:**

+44 (0) 1728 723224

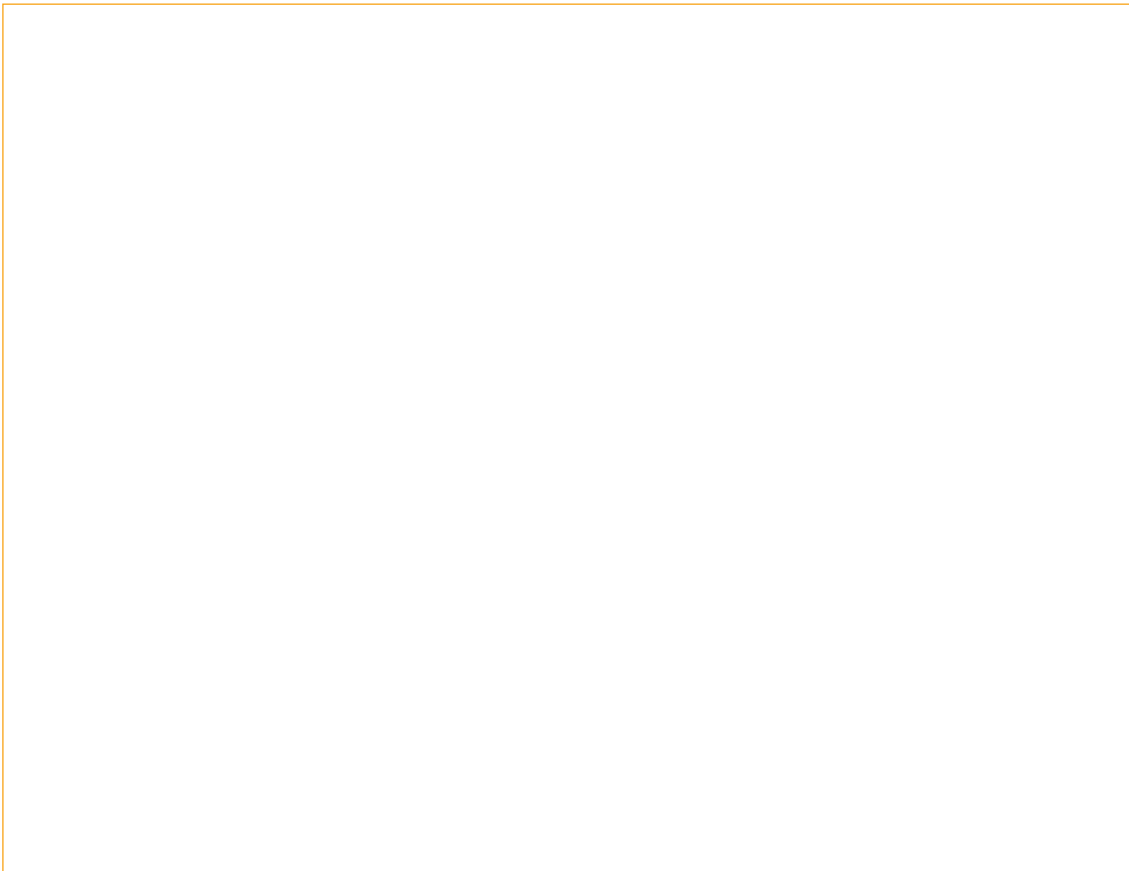
sales@richardwestern.com

**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 crossbrace of the main chassis (2)

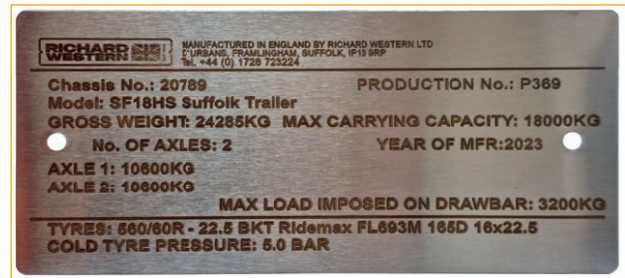
## ROAD TRANSPORT

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.



## Declaration of Conformity

Richard Western Ltd will not be held responsible for any loss or damage resulting from machine applications other than those specified above. Any other use the machine may be put to is entirely at the owners/operators risk. The Designated use of Richard Western machinery includes that the manufacturer's operating, maintenance, and repair instructions given by the manufacturer will be strictly fulfilled. Designated use means operating the trailer exclusively for persons familiar with the machine and fully aware of the associated risks involved in operating it.

Any alteration of safety equipment, the Declaration of Conformity, and the UK CA / CE / UK NI sign on the machine lose its validity.

## 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.

In accordance with The Road Vehicles (Display of Registration Marks) Regulations 2001, Regulation 8, agricultural trailers in the UK must display a registration plate. This plate can either show the mark of another agricultural vehicle owned by the same keeper, or if the trailer is used on public roads, it must display a plate matching the towing vehicle. The registration plate must be mounted in a vertical position or as close to vertical as possible, ensuring it is clearly visible from the side or rear of the vehicle.

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 **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 **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.

**IF IN DOUBT ASK US** or dealer, refer to page **8** for contact details.

## 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 be 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.

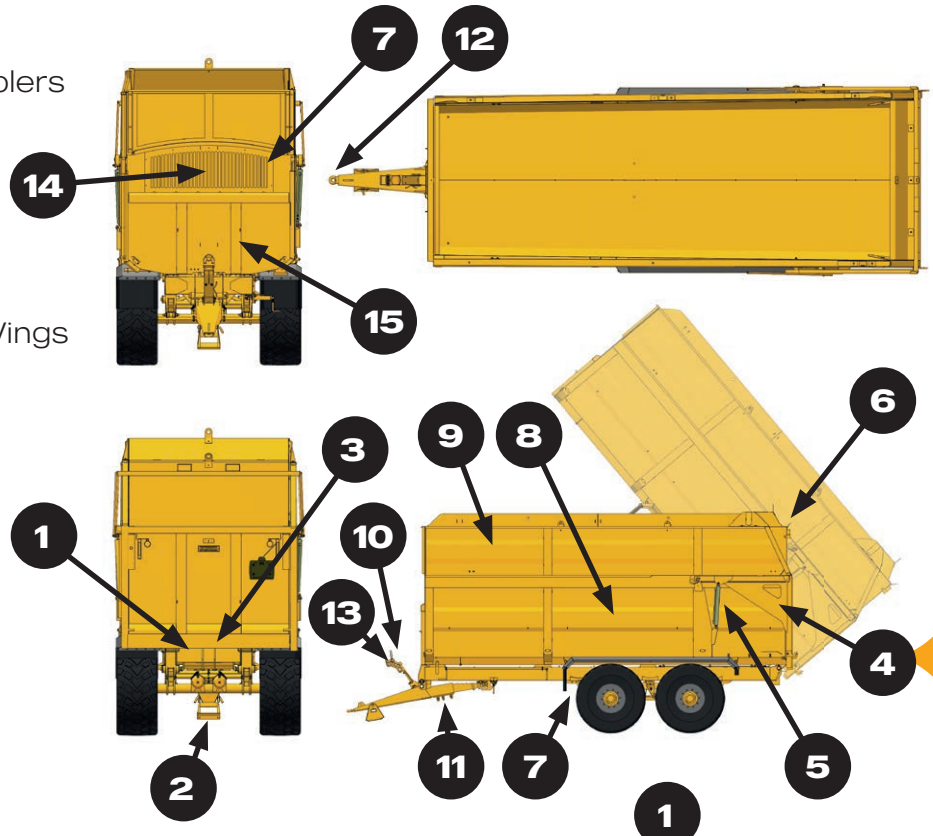
# Overview

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

## Suffolk, Rootcrop & Wellington Trailers

### Key:

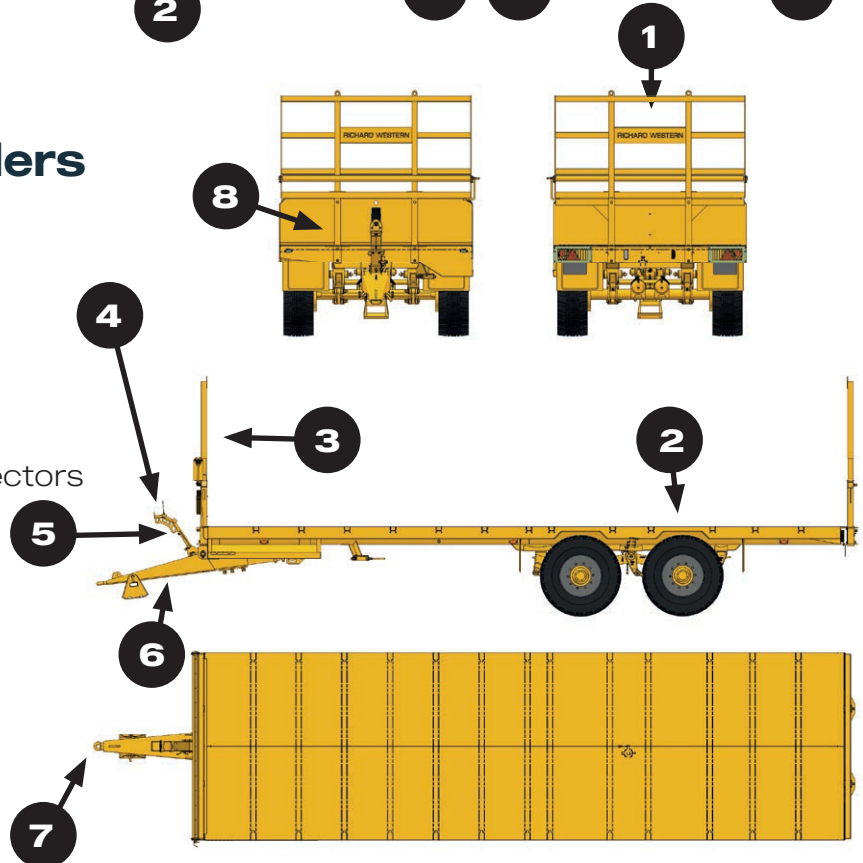
- 1 Hydraulic/Air Train Couplers
- 2 Train Hitch
- 3 Grain Chute
- 4 Tailboard
- 5 Tailboard Cylinder
- 6 Tailboard Extension & Wings
- 7 Tipping Cylinders
- 8 Body
- 9 Silage Extensions
- 10 Hose Storage Stalk
- 11 Drawbar
- 12 Eye
- 13 Hydraulic & Brake Connectors
- 14 Front Mesh
- 15 Ladder



## Bale & Pallet Trailers

### Key:

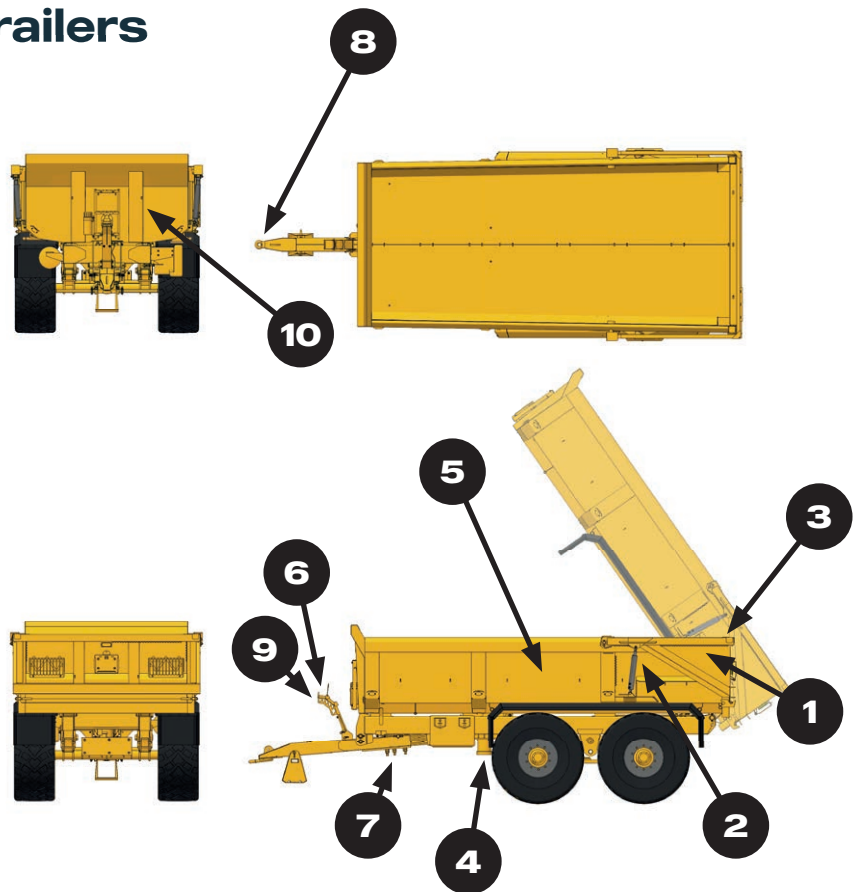
- 1 Rear Removable Ladder
- 2 Deck
- 3 Front Removable Ladder
- 4 Hose Storage
- 5 Hydraulic & Brake Connectors
- 6 Drawbar
- 7 Eye
- 8 Removable Headboard



## Stone and Rubble Trailers

### Key:

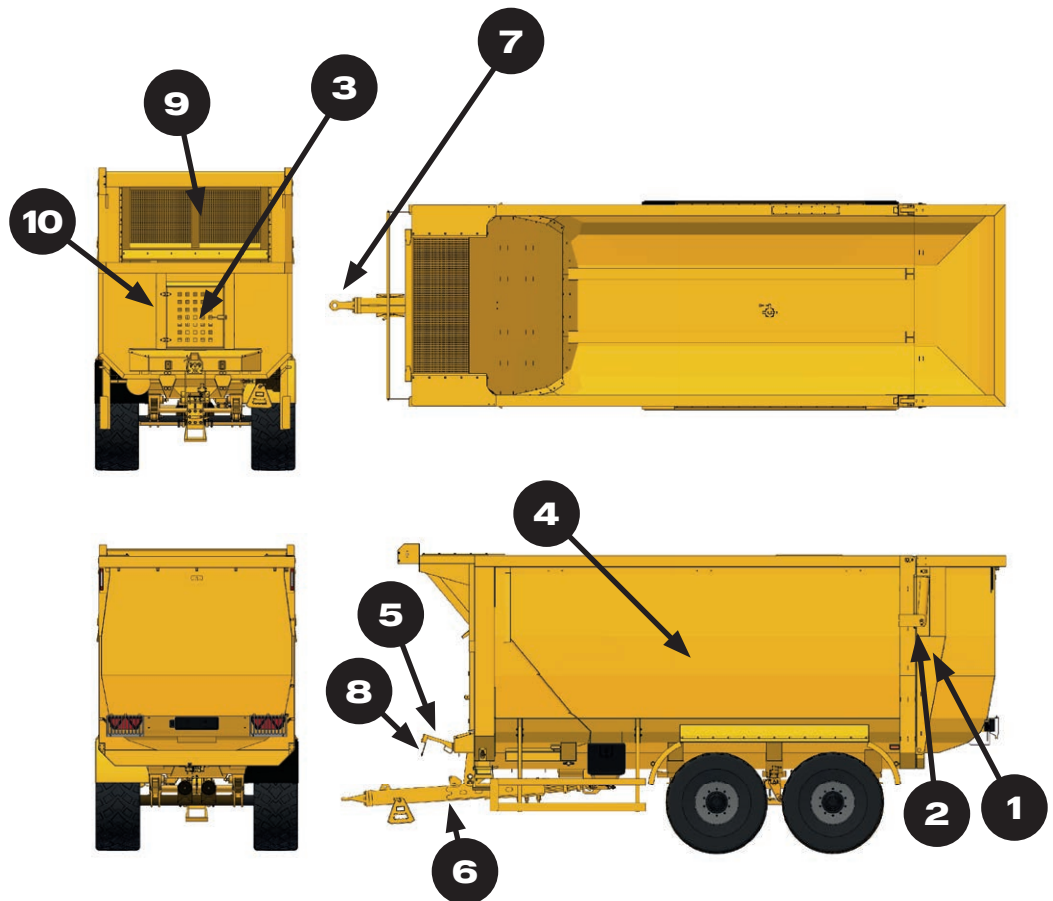
- 1 Tailboard
- 2 Tailboard Cylinder
- 3 Tailboard Extension & Wings
- 4 Tipping Cylinders
- 5 Body
- 6 Hose Storage Stalk
- 7 Drawbar
- 8 Eye
- 9 Hydraulic & Brake Connectors
- 10 Ladder



## Pusher Ram Trailers

### Key:

- 1 Tailboard
- 2 Tailboard Cylinder
- 3 Tipping Cylinders
- 4 Body
- 5 Hose Storage Stalk
- 6 Drawbar
- 7 Eye
- 8 Hydraulic & Brake Connectors
- 9 Pusher
- 10 Ladder



# Safety Decals

## 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.

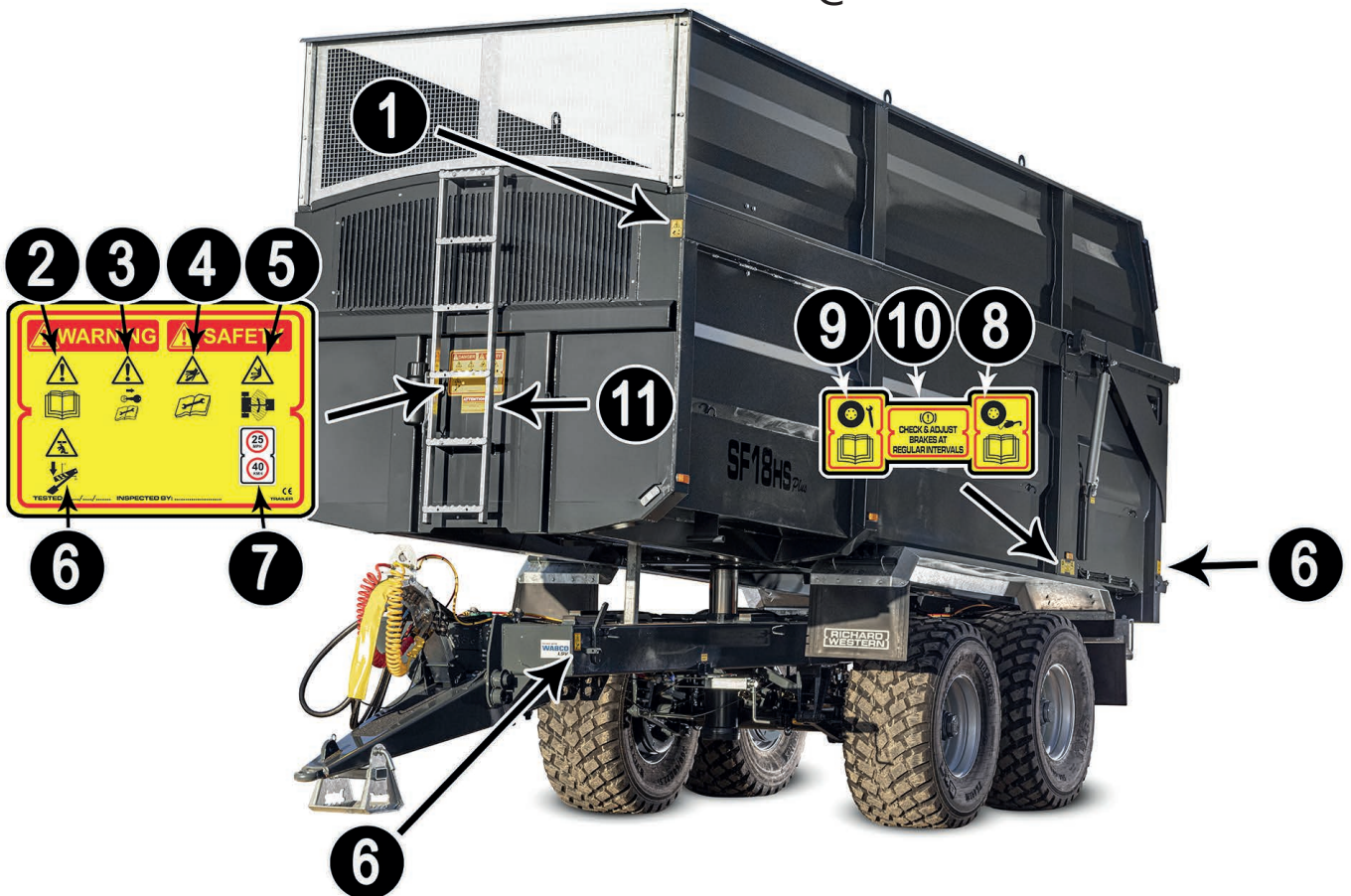
Over time the manufacturer may change the type and quantity of decals. A machine may therefore contain a mixture of all of the decals shown.

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

**CAUTION** 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.

For replacement stickers please contact our parts department on **+44 (0) 1728 723224** or **stores@richardwestern.com**



# Suffolk, Rootcrop, Wellington, Stone and Rubble, Bale Trailers & Pusher 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.





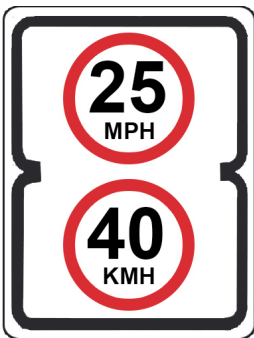
**5**  
**Crush Prevention**

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



**6**  
**Crush Prevention**

Alerts the operator to always use the body prop when running maintenance or repairs under the body. Never use the body prop if the trailer has a load.



**7**  
**Maximum Allowable Speed**

Reminds the operator of the maximum permissible towing speed.



**8**  
**Risk of Injury**

Alerts the operator to always use the body prop when running maintenance or repairs under the body. Never use the body prop if the trailer has a load.



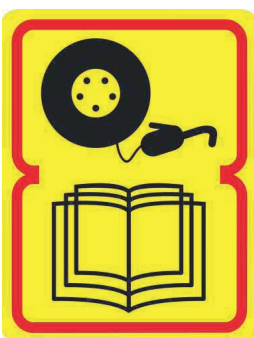
**9**  
**Risk of Injury**

Alerts the operator to make sure that before use there are no bystanders near the hydraulic tailgate and watch out for falling load from the trailer.



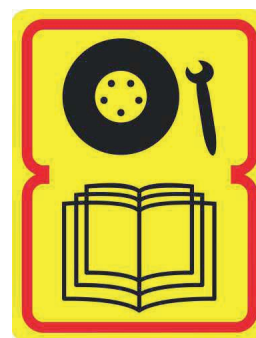
**10**  
**Risk of Injury**

Alerts operator to use tap to stop tailgate from closing down while working next to the trailer.



**11**  
**Service Checks**

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



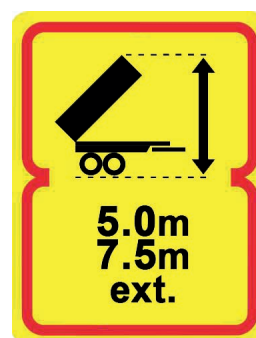
**12**  
**Service Checks**

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



**13**  
**Do Not Board**

Do not board on platform or ladder when the machine is in operation.



**14**  
**Tip Height Warning**

Reminds the operator of trailer tipped height, with and without extensions fitted.



**13**

**Service Check**

Reminds the operator to refer to the Operators Manual for information on break checks.

break -> brake



**14**

**Brake Connection Warning**

Warns the operator not to connect hydraulic and air brakes at the same time.



**15**

**Information sticker**

Lubrication points. Stick near the lubrication points that the operator would have easier to spot.



**16**

**Information sticker**

This is the location at which it is safest to raise and support the machine via a jack and axle stands.

# General Safety

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





**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.


**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 suitable 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.



## 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

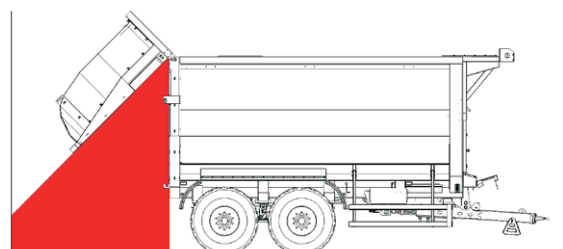
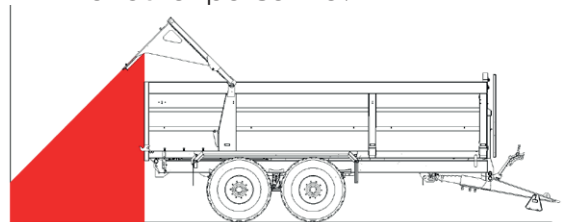


Striking any object can cause debris chips to fly off, causing personal injury. Always wear protective glasses/goggles before striking an object and make sure that the area is clear of other personnel.

### 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.





## General Hazards

### 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.

**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.

You must replace any pipe, tube or hose if:

**CAUTION**



- 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 armoring. 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 components, external fire or excessive use of the brakes. An exploding tyre can eject axle and wheel debris 500m (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**

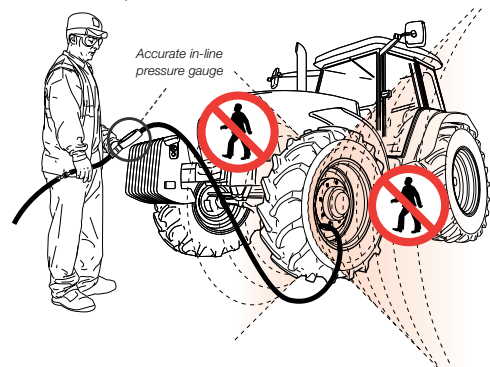


When you inflate a tyre, you must stand behind the tyre tread and use a self-attaching inflator.

**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 below).



Safety during tyre inflation in motor vehicle repair

**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 500m (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**

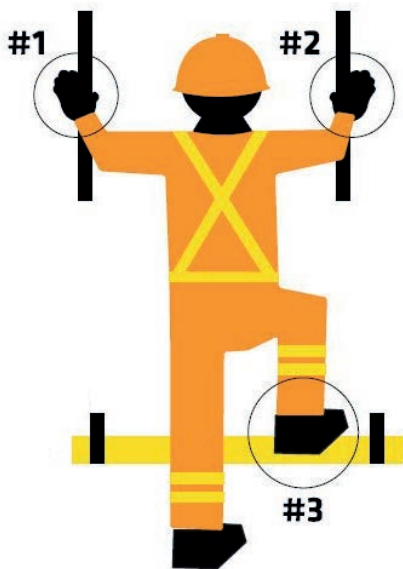


When you mount or dismount the machine, always keep a three-point contact with the steps and hand holds. Three-point contact can be two feet/one hand or two hands/one foot.

**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 8m (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.

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

## **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.

## **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 minimum jack & axle stand ratings must be equal to or greater than axle weight (e.g. for 10 tonne axle weight jack must be minimum 10 tonne). The use of a bottle jack is not recommended! See page 74 for instructions.
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 manufacturer's agent for further information or advice.

### CAUTION



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.

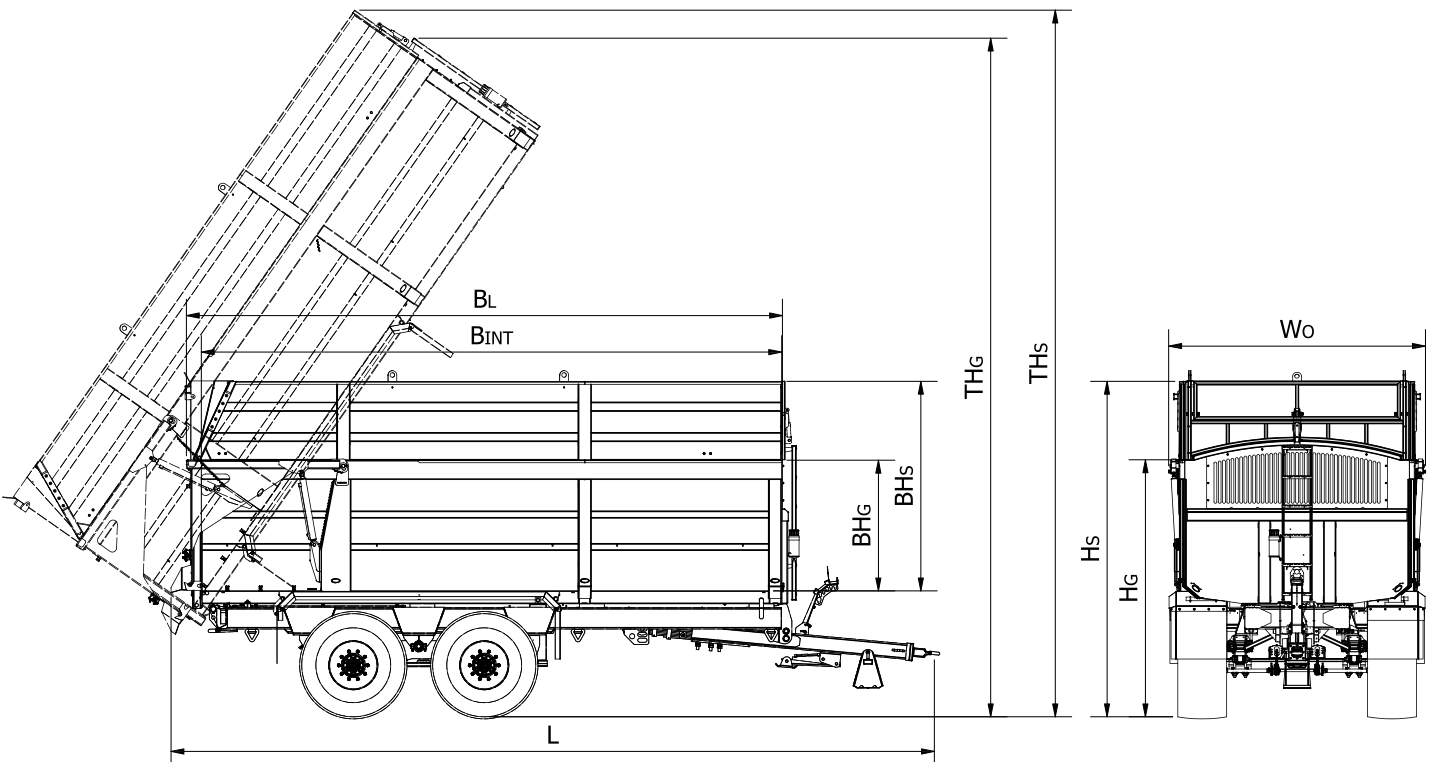
# General Specification

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

# Suffolk Trailer Specifications

Dimensions	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)
<b>L, Overall length (mm / inch)</b>	7,983	314"	8,891	350"	9,532	375"	10,530	415"
<b>HG, Overall height - Grain (mm / inch)</b>	2,789	110"	2,989	118"	3,065	121"	3,065	121"
<b>HS, Overall height - Silage (mm / inch)</b>	3,703	146"	3,906	154"	3,979	157"	3,979	157"
<b>Wo, Overall width (mm / inch)</b>	2,988	118"	2,988	118"	2,988	118"	2,988	118"
<b>BL, Body length (mm / inch)</b>	6,034	238"	6,960	274"	7,578	298"	8,578	338"
<b>BHG, Internal body height - Grain (mm / inch)</b>	1,370	54"	1,524	60"	1,524	60"	1,524	60"
<b>BHS, Internal body height - Silage (mm / inch)</b>	2,284	90"	2,438	96"	2,438	96"	2,438	96"
<b>BINT, Internal body length (mm / inch)</b>	5,940	234"	6,860	270"	7,400	291"	8,500	335"
<b>Average internal width (mm / inch)</b>	2,496	98"	2,496	98"	2,496	98"	2,496	98"
<b>THG, Tipped height - Grain (mm / inch)</b>	7,021	276"	7,900	311"	8,500	335"	8,469	333"
<b>THS, Tipped height - Silage (mm / inch)</b>	7,313	288"	8,193	323"	8,839	348"	8,825	347"
<b>Front width (mm / inch)</b>	2,422	95"	2,422	95"	2,422	95"	2,422	95"
<b>Rear width (mm / inch)</b>	2,578	101"	2,578	101"	2,578	101"	2,578	101"

\* Dimension dependent on tyre sizing (580/70R38 shown)



# SF33-SF50

Suffolk Export Trailers	SF33HS PLUS		SF40HS PLUS		SF45HS PLUS		SF50HS PLUS	
Running Gear	Tandem		Tandem		Tandem	Tri-Axle	Tandem	Tri-Axle
Axle carrying capacity (kg / US Ton)	14,000	15,440	18,000	19,850	120,000	22,050	24,000	26,460
Volume - Grain (m <sup>3</sup> / cu ft)	20	703	26	901	28	985	32	1116
Volume - Silage (m <sup>3</sup> / cu ft)	33	1176	41	1448	45	1582	51	1801
Volume - Silage heaped (m <sup>3</sup> / cu ft)	40	1411	49	1737	54	1899	61	2161
Axle beam tandem (mm)	150x150x12		150x150x12		150x150x16	N/A	150x150x16	N/A
Axle track width tandem (mm / inch)	2200 / 87"		2200 / 87"		2300 / 90.5"	N/A	2200 / 90.5"	N/A
Brake size tandem (ØxW, mm / inch)	420x180 / 16.53x7"		420x180 / 16.53x7"		420x220 / 16.53x8.7"	N/A	420x220 / 16.53x8.7"	N/A
Axle beam tri-axle (mm)	N/A		N/A		N/A	150x150x12	N/A	150x150x12
Axle track width tri-axle (mm/inch)	N/A		N/A		N/A	2200 / 87"	N/A	2200 / 87"
Brake size tri-axle (ØxW, mm/inch)	N/A		N/A		N/A	420x180 / 16.53x7"	N/A	420x180 / 16.53x7"
Rear Steering Axle	Optional		Optional		N/A	Standard	N/A	Standard
Front Steering Axle	N/A		N/A		N/A	Optional	N/A	Optional
Standard tire size	560/60R22.5		560/60R22.5		560/60R22.5	560/60R22.5	560/60R22.5	560/60R22.5
Optional tire size for tandem	650/55R26.5		650/55R26.5		650/55R26.5	N/A	650/55R26.5	N/A
Optional tire size for tri-axle	N/A		N/A		650/55R26.5 800/45R26.5	650/55R26.5 800/45R26.5	650/55R26.5 800/45R26.5	650/55R26.5 800/45R26.5
Hoist volume	26 Litres	6.9 US Gal	42 Litres	11 US Gal	56 Litres	14.8 US Gal	56 Litres	14.8 US Gal

Model shown includes optional equipment at extra cost



Suffolk Trailer Model	Grain Capacity	Silage Capacity	Body Length	Body Height	Front Width	Rear Width	Tip Height (Grain) est.	Tip Height (Silage) est.	Grain Top Rail Height (560/60R22.5 wheels)
SF11	14.68(m <sup>3</sup> )	24.90(m <sup>3</sup> )	5.02m	1.32m	2.13m	2.27m	6.02m	6.44m	2.71m
SF12	16.32(m <sup>3</sup> )	27.29(m <sup>3</sup> )	5.39m	1.37m	2.13m	2.27m	6.32m	6.74m	2.76m
SF14	17.71(m <sup>3</sup> )	29.58(m <sup>3</sup> )	5.85m	1.37m	2.13m	2.27m	6.79m	7.21m	2.76m
SF15	19.06(m <sup>3</sup> )	31.87(m <sup>3</sup> )	6.31m	1.37m	2.13m	2.27m	7.46m	7.90m	2.76m
SF16 Compact	20.47(m <sup>3</sup> )	34.29(m <sup>3</sup> )	6.78m	1.37m	2.13m	2.27m	7.56m	7.98m	2.76m
SF16	20.47(m <sup>3</sup> )	34.29(m <sup>3</sup> )	6.78m	1.37m	2.13m	2.27m	7.56m	7.98m	2.76m
SF17	21.20(m <sup>3</sup> )	34.00(m <sup>3</sup> )	6.31m	1.52m	2.13m	2.27m	7.50m	7.92m	2.91m
SF18	22.72(m <sup>3</sup> )	36.46(m <sup>3</sup> )	6.78m	1.52m	2.13m	2.27m	7.64m	8.06m	2.91m
SF20	24.87(m <sup>3</sup> )	39.91(m <sup>3</sup> )	7.40m	1.52m	2.13m	2.27m	7.89m	8.31m	2.98m
SF24	28.22(m <sup>3</sup> )	45.28(m <sup>3</sup> )	8.40m	1.52m	2.13m	2.27m	9.39m	9.81m	2.96m

# Rootcrop Trailers

Rootcrop Trailer Model	Capacity	Body Length	Body Height	Front Width	Rear Width	Top Rail Height (560/60R22.5 wheels)	Tip Height
RC14HS Plus	16.96(m <sup>3</sup> )	6.78m	1.15m	2.13m	2.27m	2.52m	7.74m
RC14HS Extra	18.19(m <sup>3</sup> )	6.78m	1.22m	2.13m	2.27m	2.59m	7.82m
RC16HS Plus	18.56(m <sup>3</sup> )	7.4m	1.15m	2.13m	2.27m	2.57m	8.35m
RC16HS Extra	19.86(m <sup>3</sup> )	7.4m	1.22m	2.13m	2.27m	2.64m	8.40m



Model shown includes optional equipment at extra cost



# Beet Wellington Trailers

Beet Wellington Trailer Model	Grain Capacity	Silage Capacity	Body Length	Body Height	Front Width	Rear Width	Grain Top Rail Height (560/60R22.5 wheels)	Tip Height (Grain) Est.	Tip Height (Silage) Est.
<b>BWT16</b>	20.18(m <sup>3</sup> )	33.58(m <sup>3</sup> )	6.78m	1.32m	2.13m	2.27m	2.78m	7.75m	8.63m
<b>BWT18</b>	22.29(m <sup>3</sup> )	36.31(m <sup>3</sup> )	6.78m	1.52m	2.13m	2.27m	2.93m	7.80m	8.68m
<b>BWT20</b>	24.40(m <sup>3</sup> )	39.74(m <sup>3</sup> )	7.40m	1.52m	2.13m	2.27m	3.00m	8.50m	9.38m



Model shown includes optional equipment at extra cost

# Bale & Pallet Trailers

	BTTA16/ 25	BTTA16/ 28	BTTA16/ 30	BTTA16/ 32	BTTA16/ 34	BTTA16/ 38
<b>Carrying capacity</b>	16 tonnes	16 tonnes	16 tonnes	16 tonnes	16 tonnes	16 tonnes
<b>Body length</b>	7.62m	8.50m	9.30m	9.91m	10.36m	11.58m
<b>Body width</b>	2.50m	2.50m	2.50m	2.50m	2.50m	2.50m
<b>Platform height: 385/65R22.5 wheels</b>	1.18m	1.18m	1.18m	1.18m	1.18m	1.18m
<b>Platform height: 445/45R19.5 wheels</b>	1.03m	1.03m	1.03m	1.03m	1.03m	1.03m
<b>Platform height: 560/45R22.5 Wheels</b>	1.18m	1.18m	1.18m	1.18m	1.18m	1.18m
<b>Platform height: 560/60R22.5 Wheels</b>	1.44m	1.44m	1.44m	1.44m	1.44m	1.44m
<b>Ladder height</b>	1.93m	1.93m	1.93m	1.93m	1.93m	1.93m
<b>Axle from rear</b>	2.56m	2.87m	3.07m	3.27m	3.38m	3.86m
<b>Axle track</b>	2.00m	2.00m	2.00m	2.00m	2.00m	2.00m
<b>Number of axles</b>	2	2	2	2	2	2



Model shown includes optional equipment at extra cost

# Stone and Rubble Trailers

Stone & Rubble Trailer Model	Volume/ Capacity	Body Length	Body Height	Front Width	Rear Width	Top Rail Height (560/60R22.5 wheels)	Tip Height
SRT20	12.44(m <sup>3</sup> )	5.02m	1.15m	2.13m	2.27m	1.88m	6.14m

Model shown includes optional equipment at extra cost



# Pusher Trailers

Pusher Trailer Model	Capacity (m <sup>3</sup> ) before compaction	Carrying Capacity (Tonnes)	Body Width External	Body Width Internal	Body Length	Overall Length	Loading Height	Open Door Height
PR3018	30(m <sup>3</sup> )	18t	2.55m	2.24m	5.61m	7.51m	3.74m	4.94m
PR3621	36(m <sup>3</sup> )	21t	2.55m	2.24m	6.63m	8.53m	3.74m	4.94m
PR4024	40(m <sup>3</sup> )	24t	2.55m	2.24m	7.31m	9.21m	3.88m	5.08m
PR5030	50(m <sup>3</sup> )	30t	2.55m	2.24m	9.00m	10.91m	3.74m	4.94m



# 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.

# 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 10hrs of operation, and every 10 hours until the torque is maintained (see Specification section).
12. Wheels must be changed using a jack greater than axle weight (e.g. for 10 tonne axle weight jack must be minimum 10 tonne). The use of a bottle jack is not recommended! See page 74 for instructions.
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.
18. Check the Eye periodically for signs of damage or wear. Replace as required. Refer to page 39 for more information.

## 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. Use chaining point (3) for secondary coupling.

## Uncoupling from the Towing Vehicle - Hitch Ensure the tipping body is lowered fully.

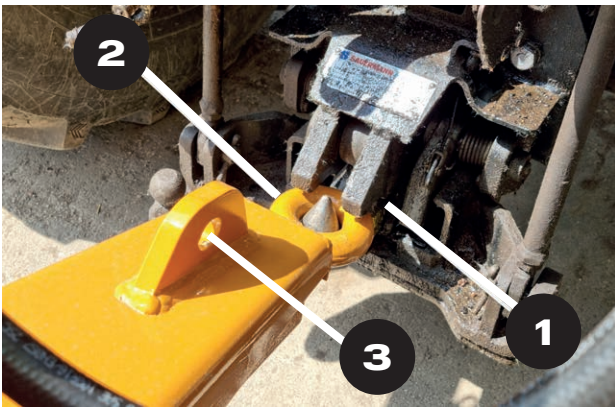
Ensure the drawbar is in the tow position.


Lower the trailer onto the drawbar foot or Skid.


Decouple all hoses and electrical connections and secondary coupling.


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.

**CAUTION**  Always park the trailer on firm level ground.

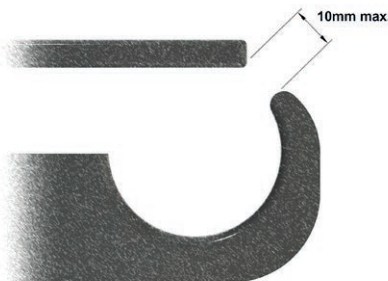
**CAUTION**  Check the Eye periodically for signs of damage or wear. Replace as required.

## Inspecting Towing Eye

When inspecting the towing eye for wear or damage, **towing eye gauges** can be used to measure wear accurately. These tools are readily available online from various suppliers and help ensure the towing eye remains safe and compliant.



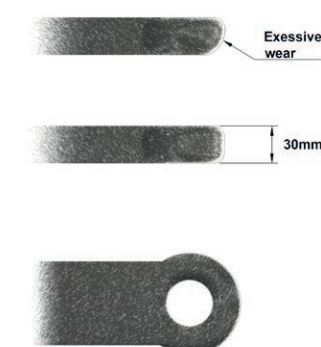
The coupling mostly used, is the pickup hitch. This is a large hook which lowers and raises by means of a mechanism on the back of the tractor and connects to trailers and equipment by means of hooking through the hitch eye.



Two things have to be regularly checked on this type of coupling:

(1) the gap, if there is one, at the top of the pickup hitch. The make and age of the vehicle, governs whether or not there is a gap in the first place, Should there be a gap, then according to British Standard Specifications and EEC Directive 89/173 as amended that gap should not exceed 10mm.

10mm max.



(2) the thickness of the metal which forms the hitch eye on the drawn vehicle or equipment. Again according to British Standard Specifications should not be less than 30mm.

## Coupling to the Towing Vehicle

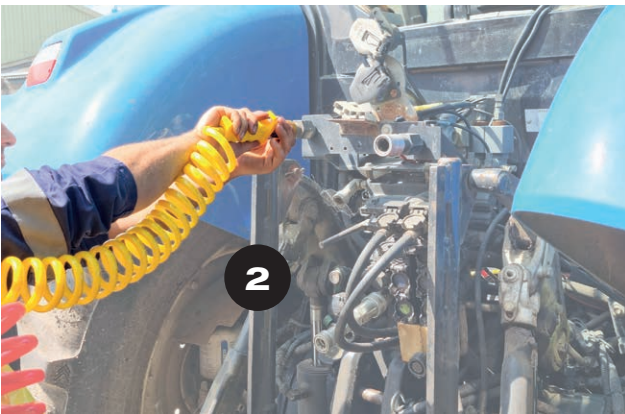
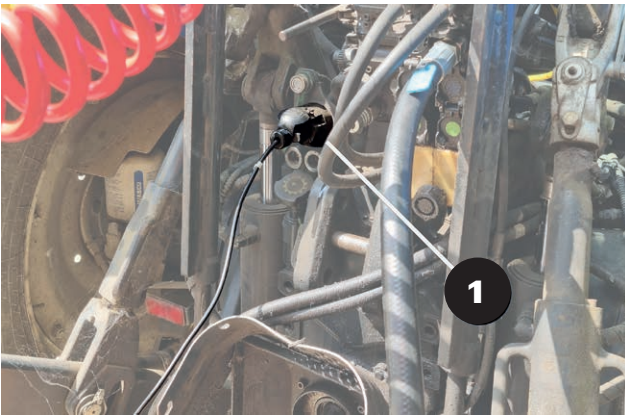
### Air Braking Connections

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 must not be connected 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



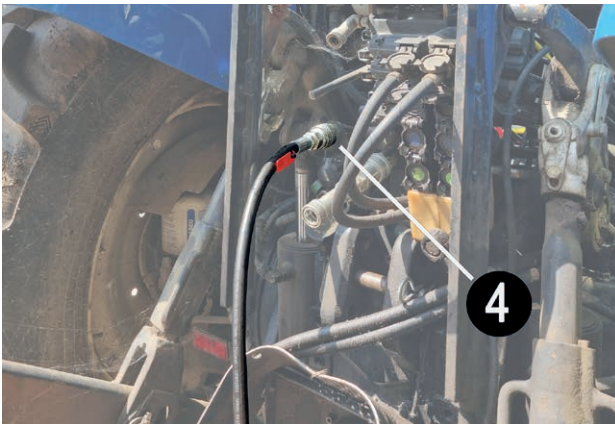
Dirty Quick release couplings can cause increased wear in Hydraulic pumps and Air Compressors. Incorrectly connected couplings can cause failure within the system. Always clean the couplings before connecting them.

#### 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 must not be connected when the Air service is used.



Note! HYDRAULIC & AIR BRAKES: must not be connected to the tractor at the same time.



### **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 from page 114.

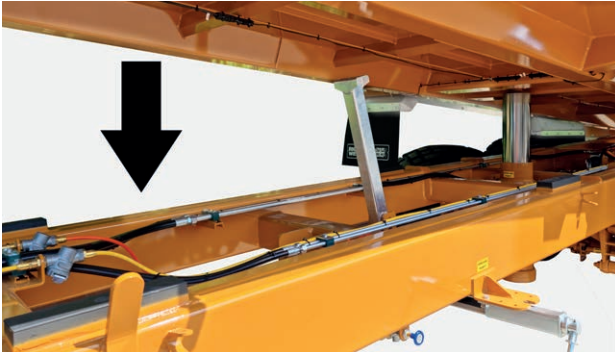
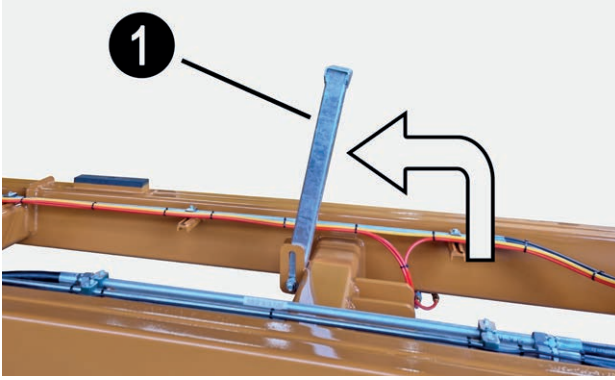
### **Coupling to the Towing Vehicle Steering Axle Connections**

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 Power Cylinders this allows the pressure in the cylinders to be released , and the steering axle will 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.

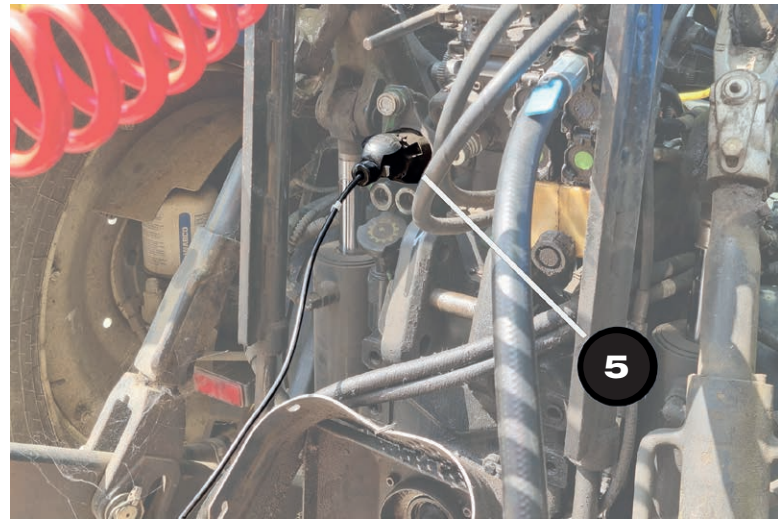
### Removing the Body Prop

Raise the body until it is clear of the prop. Fold the prop forwards until it is 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 Lighting Connections

Connect the electrical seven pin connector (5) 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).

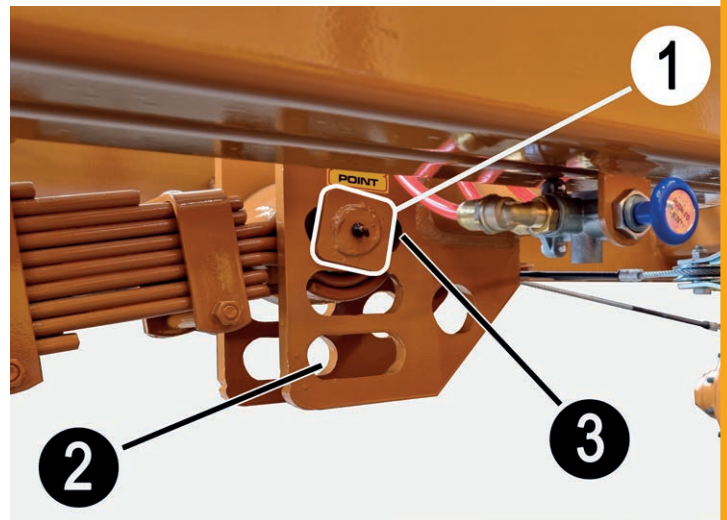
Slide back the guard sleeve and slide the shaft onto the trailer PTO , then repeat and fit to the Towing vehicle PTO.

Fit safety chains where applicable.

When not in use remove the driveshaft from the machine.

For normal operation the skid should be moved to its stowed position at the rear of the drawbar.

The correct skid must always be used when parking the machine.



### Adjusting Sprung Drawbar Height

The trailer chassis should run level 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.

**WARNING** Never work beneath any unsupported vehicle.



## Adjustments before Towing the Trailer



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.

# Operation

## WARNING

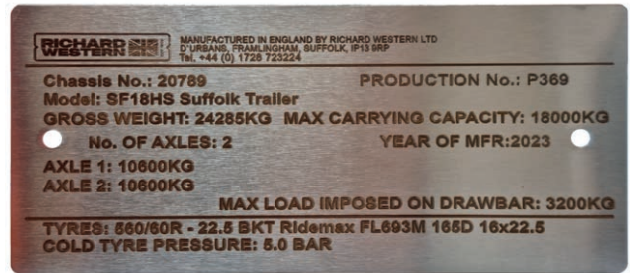


Never exceed the trailers maximum permitted capacity as stated on the manufacturers plate

## 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.

Always load by weight not volume.

See table on next page.

Material	Kg/M <sup>3</sup>	Material	Kg/M <sup>3</sup>	Material	Kg/M <sup>3</sup>	Material	Kg/M <sup>3</sup>
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.

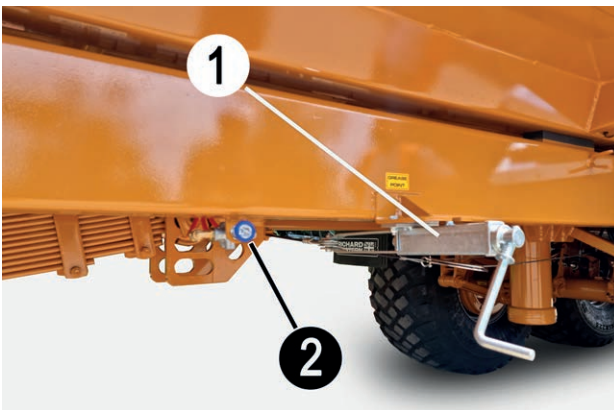
Ensure all electrical connections are made and that all lighting systems and the Eurosafe braking.

(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.



**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, fully lower the body and close the tailgate. Position the trailer tip valve in "Float" before driving off, to avoid increased stresses in the trailer structure during transport.

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.



# Pusher Trailer Control Box Instructions

Connect the trailer to tractor as usual either connect the hydraulic brakes or the air brake system not both.

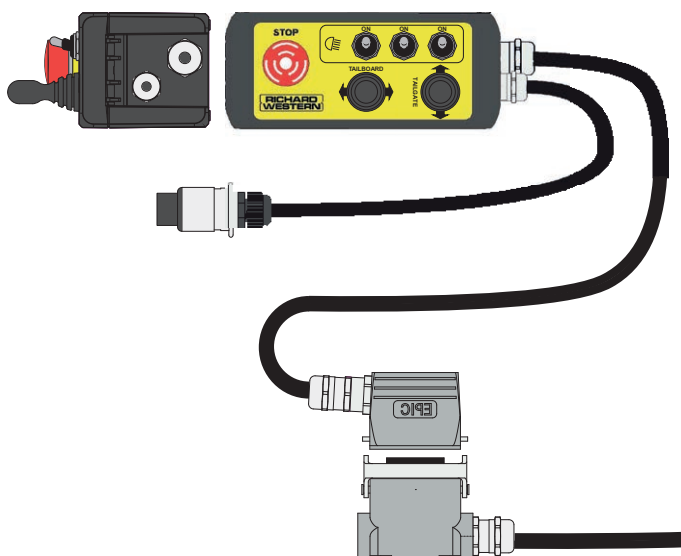
There are two hydraulic pipes which act as a pressure and return for the hydraulic valve the return line can be identified by the elongated hexagonal block just behind one of the probe ends this is to prevent back feeding of valve block, ideally this should be located to a free flow return to prevent back pressure.

The main control box should be plugged in next there is a lead and a plug socket is located under the front ram socket, ensure that the clamps are fully locked home to ensure good connection attach the box to flat window using attached suction device. The power connector may then be plugged into a reliable 12v supply.

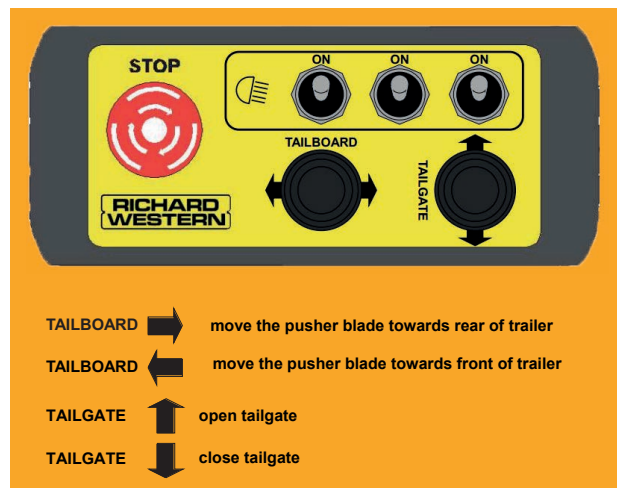
There is also provision for a weighing if required the display is plugged into the socket on the stalk of the trailer and again connect power supply.

Once all is connected release the handbrake and ensure that all functions are working correctly.

On this machine to enable compatibility with majority of users the valve block is not load sensing but requires oil to be directed from tractor spool during operation and the oil to be shut off when not in use to prevent overheating.



## PUSHER OPERATION



Always leave pusher at front of trailer to ensure that cylinder is protected from the elements.

When operations are complete stop oil flow.

Periodically clear out front area of machine if material is accidentally loaded into this area during the compression cycle, and check tailboard cylinder area for material build up periodically.



# Reversing the trailer

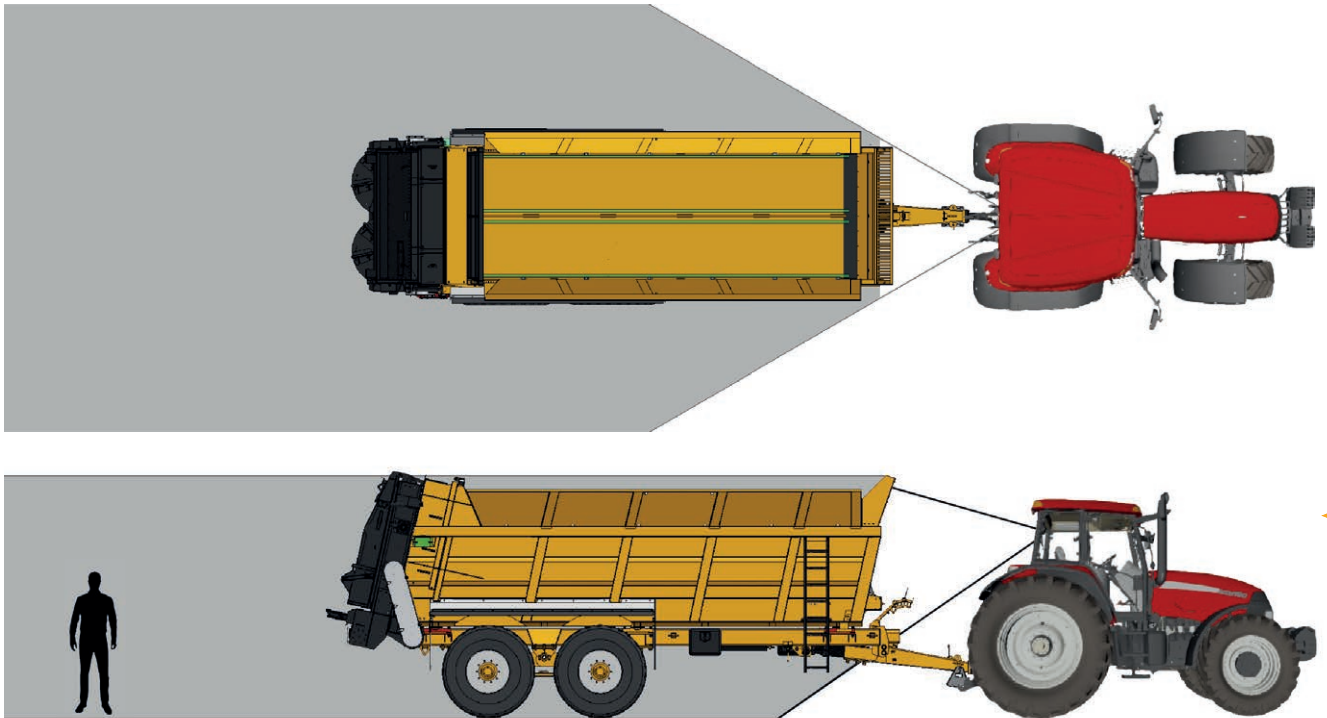
## Blind Spots

Appropriately trained and experienced personnel recognise the dangers when reversing, less experienced operators may not.

When reversing, even small trailers can have significant blind spots where visibility is reduced both behind and to the sides of them.

Failure to spot an obstruction can endanger the life of personnel or damage the trailer.

Consider the use of audible reverse warning aids and additional lighting especially in low light conditions.



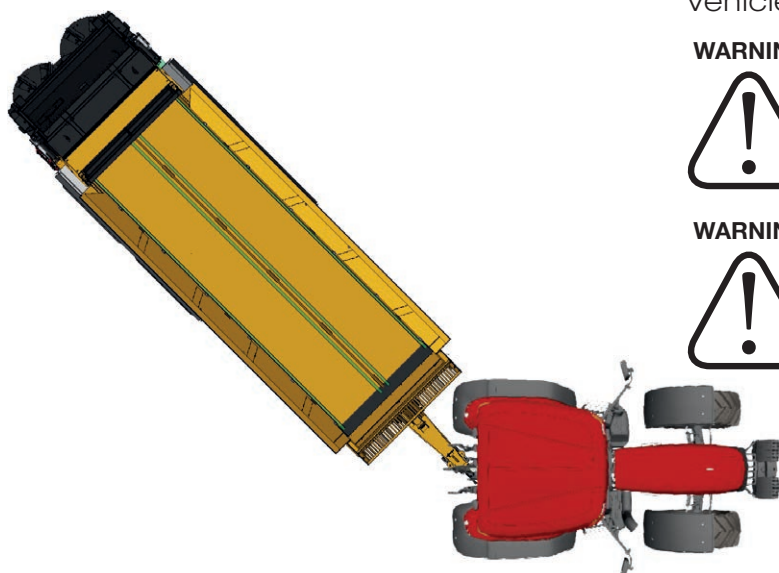
## Jack knife

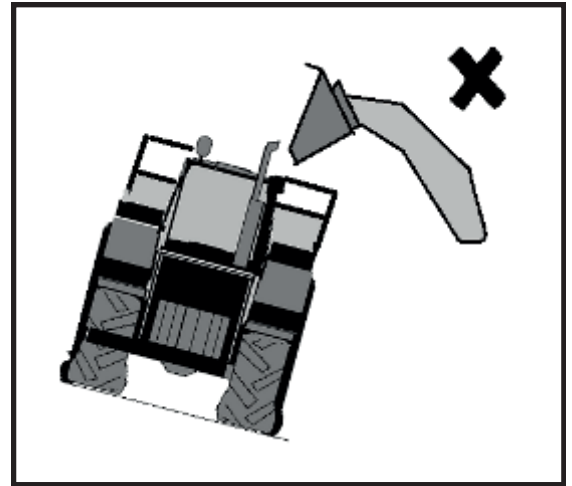
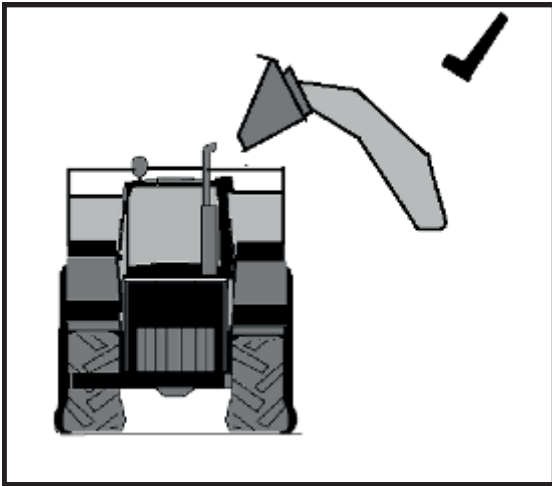
Avoid jack knives when reversing as this will inevitably lead to contact between the trailer and the towing vehicle, resulting in damage to both the towing vehicles tyres and the trailer drawbar.

**WARNING** Always check behind when reversing to ensure the area is clear of obstructions and personnel.

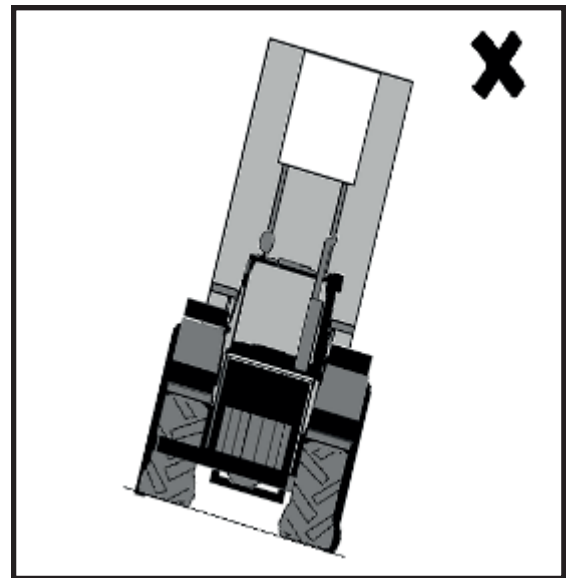
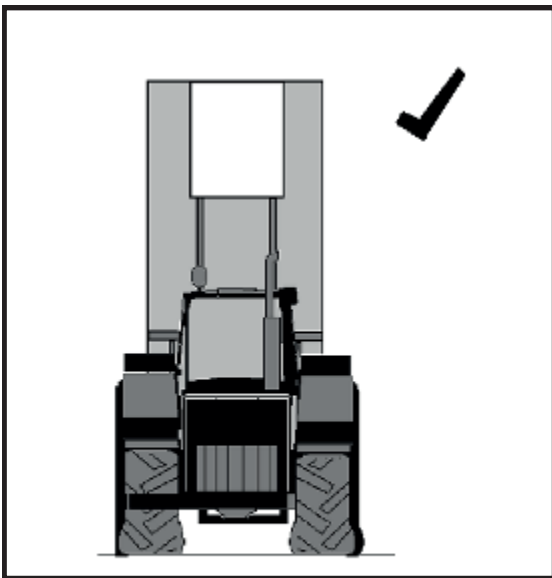


**WARNING** If in any doubt employ the services of a banksman to assist you with your manoeuvre.

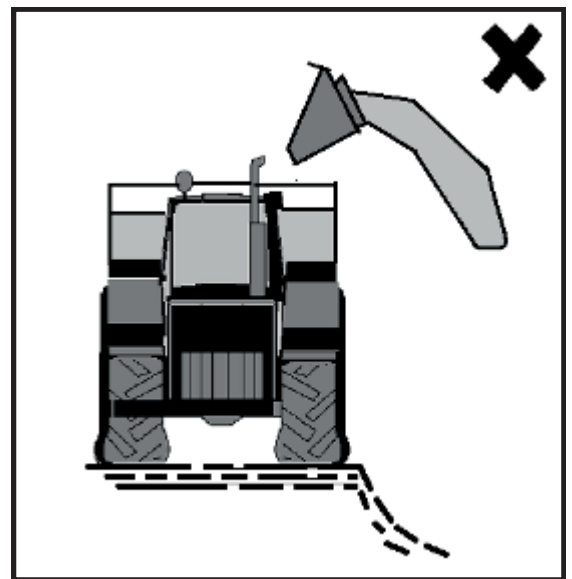
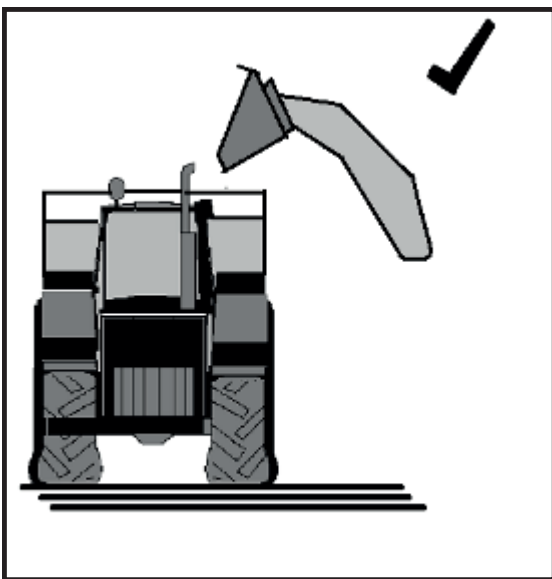




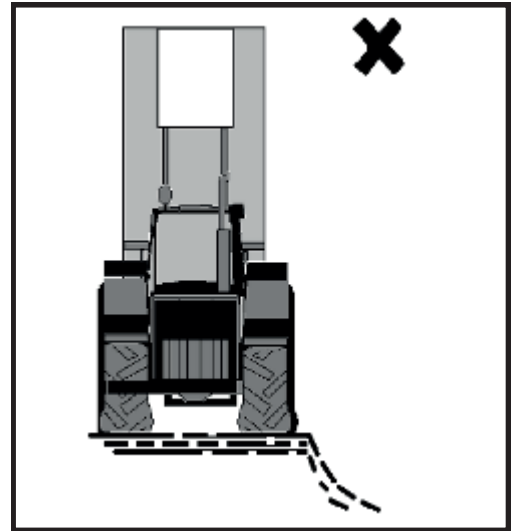
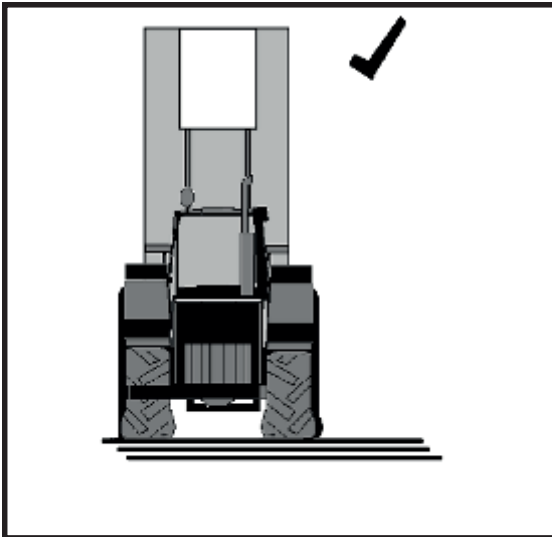
Load and travel on Level Ground as far as practical. Avoid Traversing slopes.



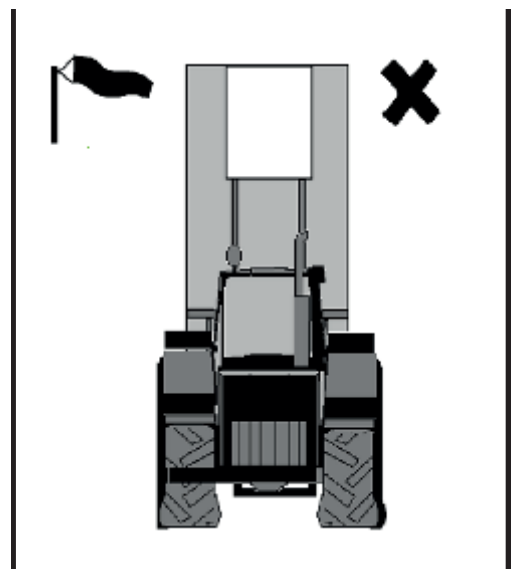
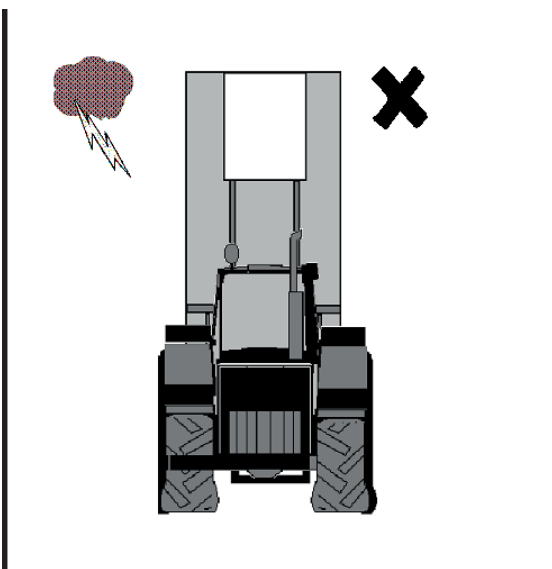
Always tip on Level Ground.



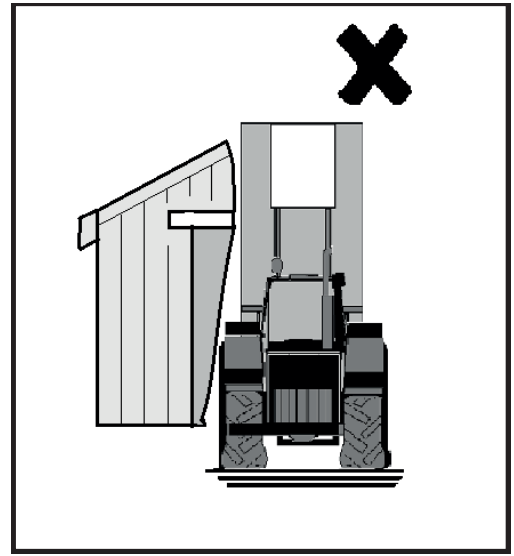
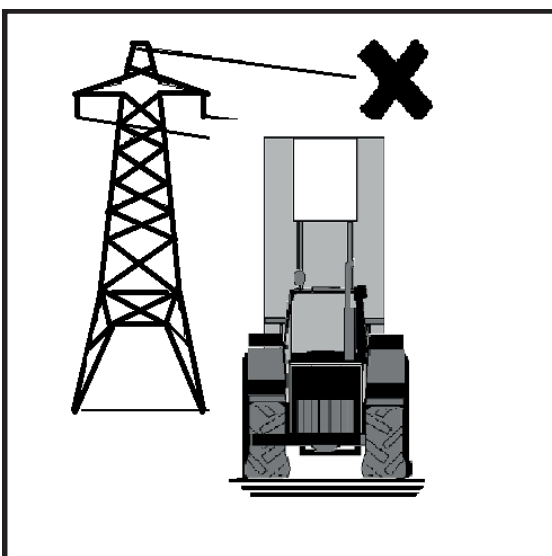
Always load on firm Ground, avoid trenches and submerged services.



Avoid Tipping on unstable ground, avoid trenches and submerged services.



Take extra care when tipping during electrical storms and high-wind conditions.



Do not tip within 10Mm of Overhead wires. Do not travel with body raised and avoid low and overhanging buildings and structures.

# 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	Stone & Rubble	Pusher
<b>Perform task</b>						
<b>Check</b>						
<b>Maintenance Task</b>						
<b>Daily</b>						
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)	■	■	■	■	■	■
<b>Weekly</b>						
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	Stone & Rubble	Pusher
<b>Weekly Cont.</b>						
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 (If fitted)						■
Check operation of Valves						■
<b>Every Month</b>						
Lubricate PTO (If fitted)	■					■
<b>Every 3 Months</b>						
Check Brake clearance & wear	■	■	■	■	■	■
Adjust Brakes	■	■	■	■	■	■
Grease Steering Axle Kingposts (Option)	■	■	■	■	■	■
Check all Screws and Locknuts	■	■	■	■	■	■
Check Tie Rod for damage	■	■	■	■	■	■

	Suffolk	Rootcrop	Wellington	Bale & Pallet	Stone & Rubble	Pusher
<b>Every 6 Months Cont.</b>						
Check the Axle Hubcaps	■	■	■	■	■	■
Check Wheel bearing wear	■	■	■	■	■	■
Tighten All Suspension U-Bolts	■	■	■	■	■	■
Tighten All Spring Drawbar U-Bolts	■	■	■	■	■	■
Check Blade wear						■
<b>Every Year</b>						
Clean the Oil tank (If fitted)	■					■
Clean the Lubrication pump						
Check Suspension	■	■	■	■	■	■
<b>Every 2 Years</b>						
Lubricate Wheel Bearings	■	■	■	■	■	■
<b>Laying Up Protection</b>						
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

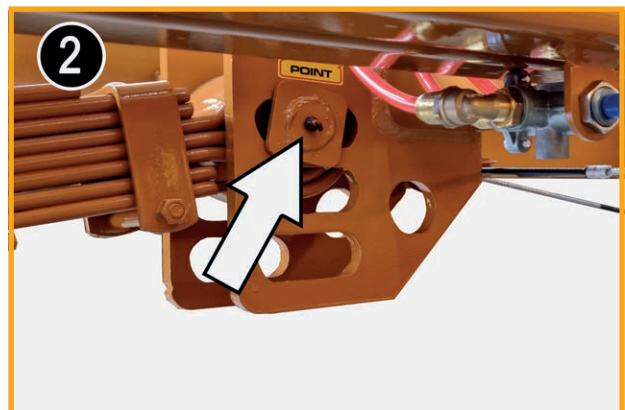
	Suffolk	Rootcrop	Wellington	Bale & Pallet	Stone & Rubble	Pusher
<b>Every 3 Months</b>						
Check all system components for signs of damage	■	■	■	■	■	■
Test whole system for air leakage	■	■	■	■	■	■
<b>Every Year</b>						
Check Electrical wiring for damage	■	■	■	■	■	■
Check piping for damage & security)	■	■	■	■	■	■
Check Sensor for Wear & Readjust as required	■	■	■	■	■	■
<b>Every 2 Years</b>						
Replace Modulator & Solenoid	■	■	■	■	■	■
<b>When Hubs removed</b>						
Check and readjust Exciter & Sensor	■	■	■	■	■	■



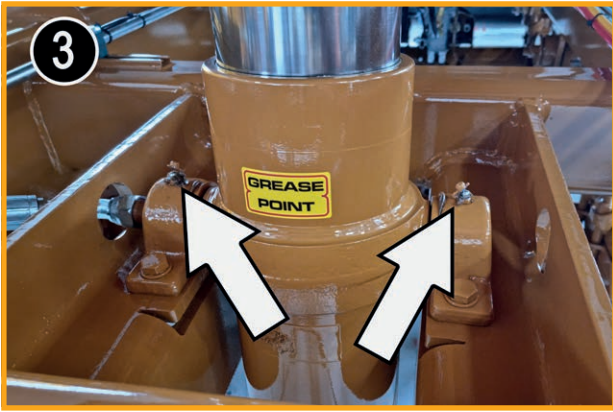
# Lubrication Points

(Suffolk Trailers, Rootcrop Trailers & Wellington Trailers)

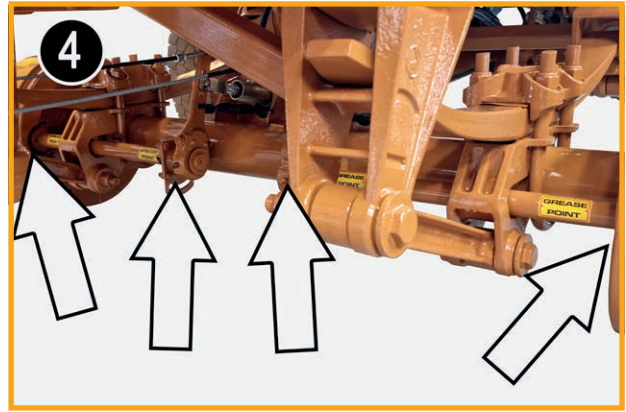
Every 8hrs or daily unless specified



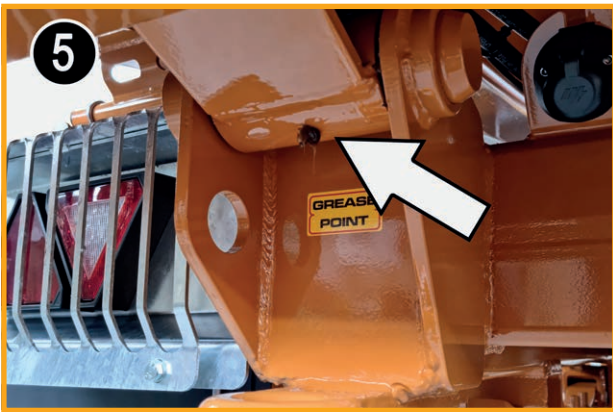
Grease Sprung Drawbar Pivots where applicable.



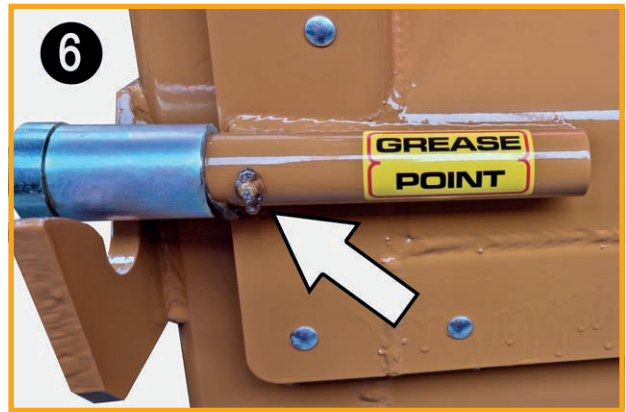
Grease Lower Tipping Cylinder Pivots.



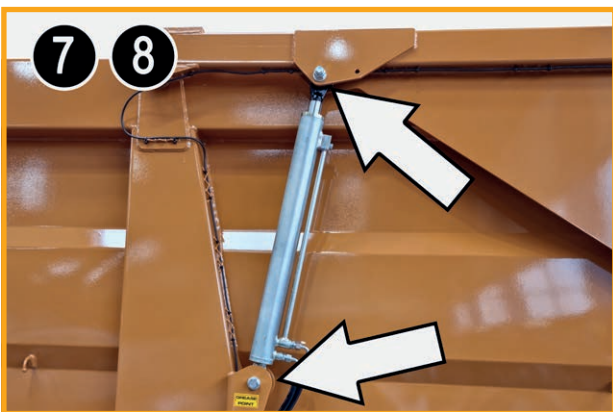
Grease Brake linkage pivots (4 Positions each Axle).



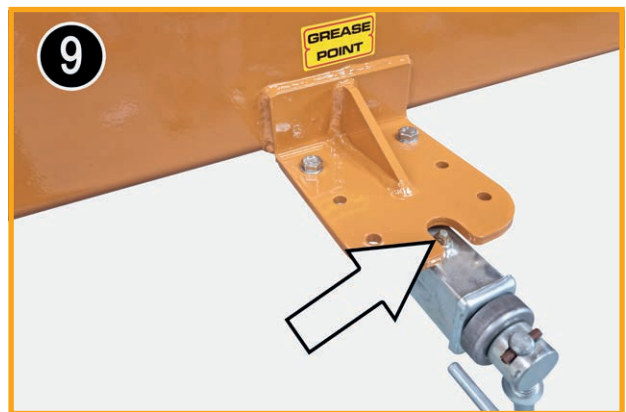
Grease Body Tipping pivots (2 Positions).



Grease Tailboard Pins (2 Positions).



Grease Tailboard Cylinders and pivot (Both Sides).



Grease Parking Brake Lever.



Grease Upper Tipping Cylinder Pivot.

# Service Checks

(Suffolk Trailers, Rootcrop Trailers & Wellington Trailers)



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

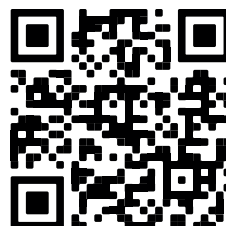


Refer to page 39 for more information.

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

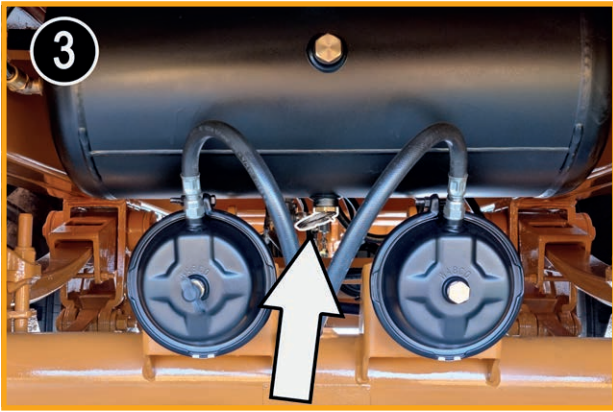


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<https://www.richardwestern.com/support/head-to-tow/>



Drain water from Air reservoir.



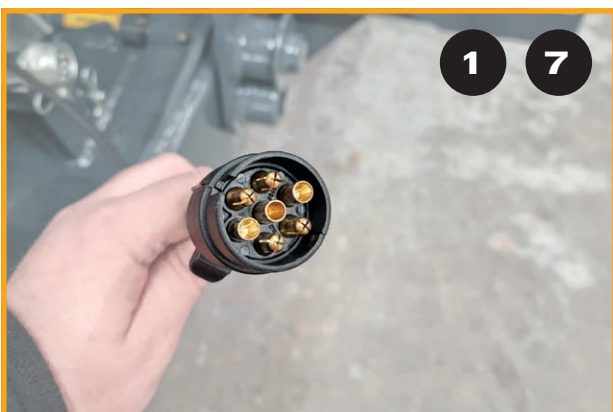
Check Wheel Nut Torque.



Check Tyre Pressure & Tyre condition.



Check Lights & Reflectors for Correct operation & Damage.

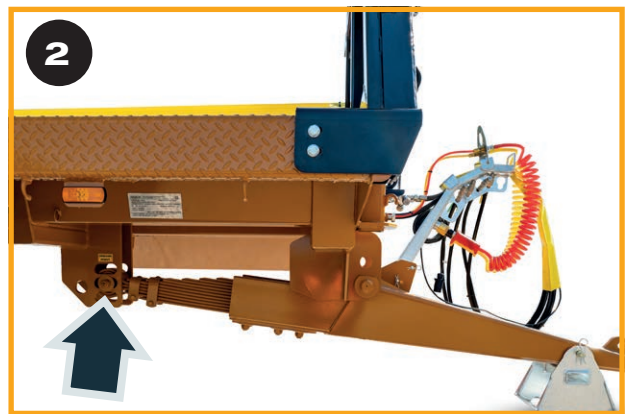
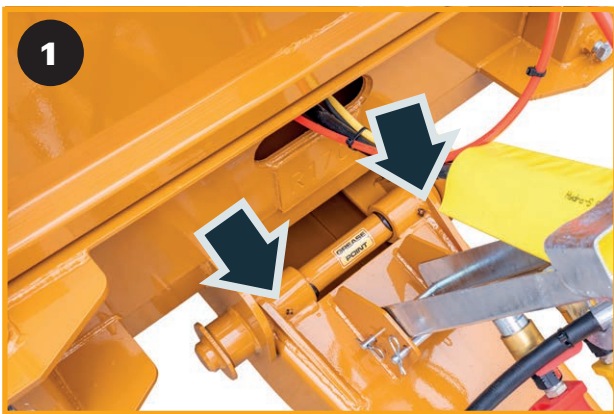
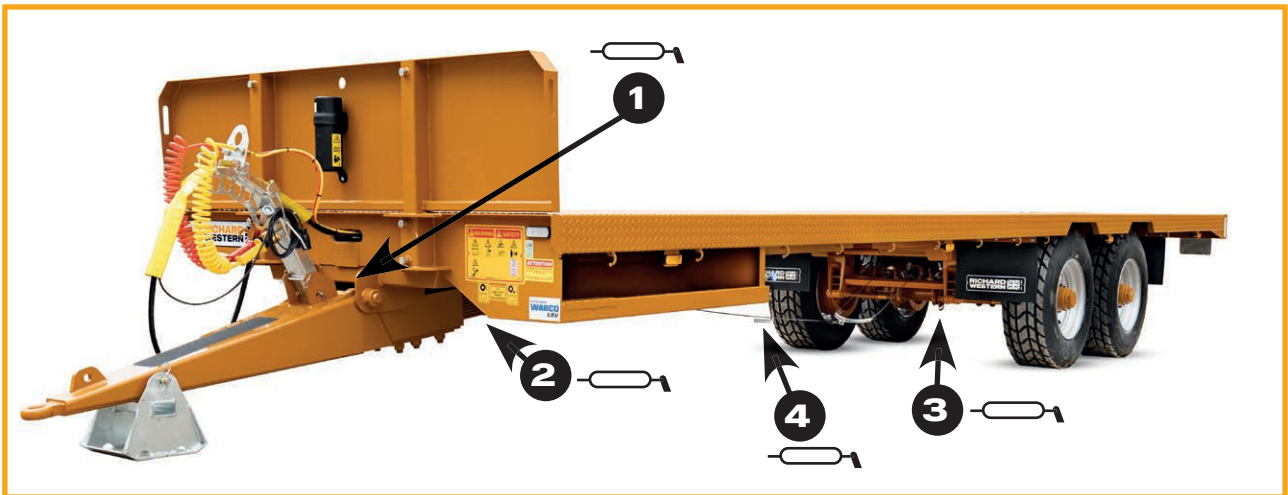


Check 7 pin plug connector.

# Lubrication Points

(Bale & Pallet Trailers)

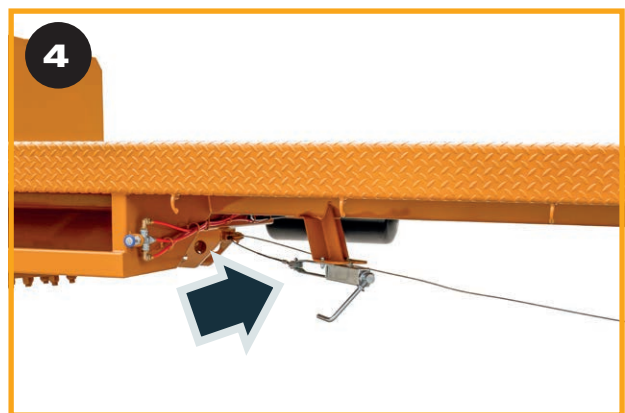
Every 8hrs or daily unless specified



Grease Sprung Drawbar Pivots where applicable.



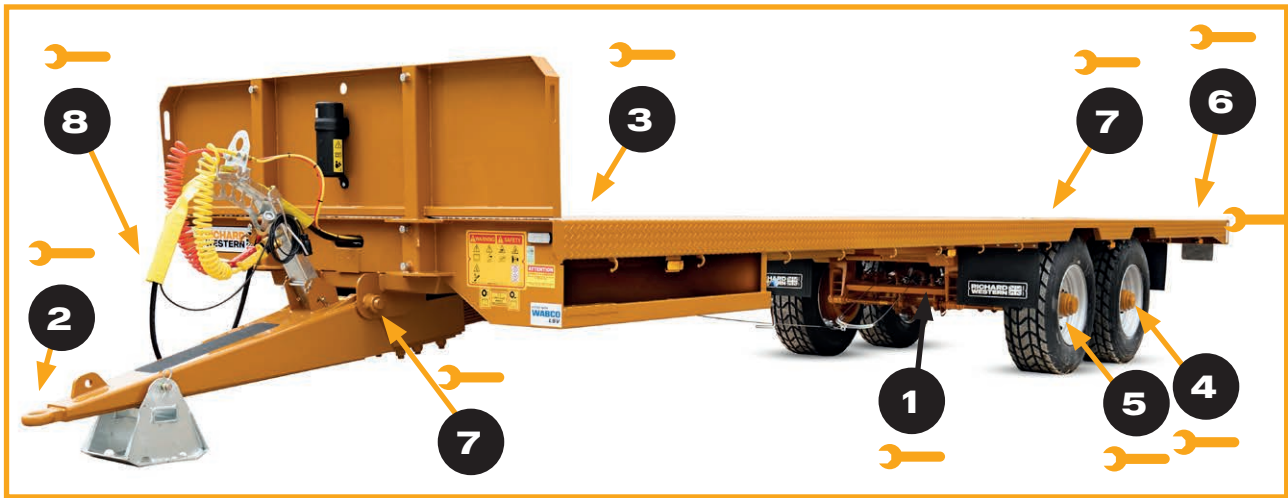
Grease Brake linkage pivots  
(4 Positions each Axle).



Grease Parking Brake Lever.

# Service Checks

(Bale & Pallet Trailers)



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

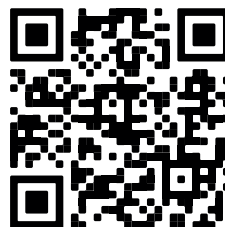


Play Daily Check List video by scanning QR Code



Refer to page 39 for more information.

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



For Daily, Weekly, and monthly check list please visit link below or scan QR Code to visit on your mobile device.

<https://www.richardwestern.com/support/head-to-tow/>



Drain water from Air reservoir.



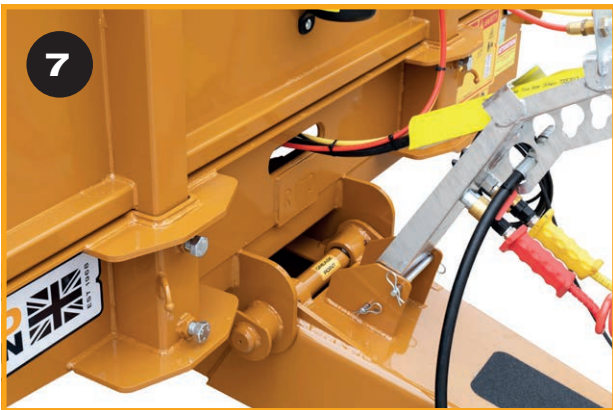
Check Wheel Nut Torque.



Check Tyre Pressure & Tyre condition.



Check Lights & Reflectors for Correct operation & Damage.



Check bolts securing head board / Ladders and other attachments for (2 positions).



Check bolts securing head board / Ladders and other attachments for (2 positions).



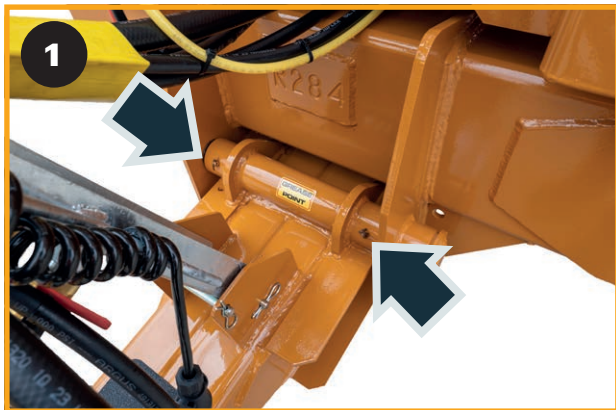
Check 7 pin plug connector.



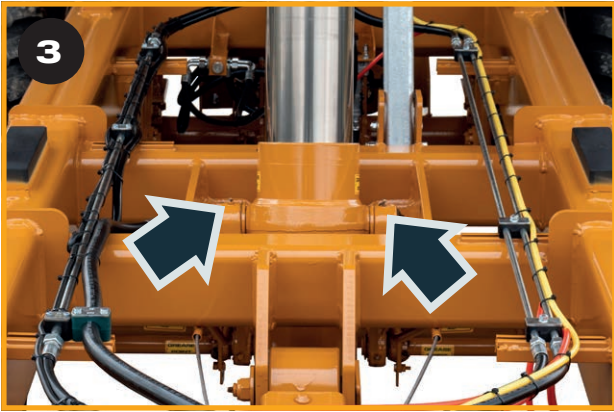
# Lubrication Points

(Stone and Rubble Trailers)

Every 8hrs or daily unless specified



Grease Sprung Drawbar Pivots where applicable.



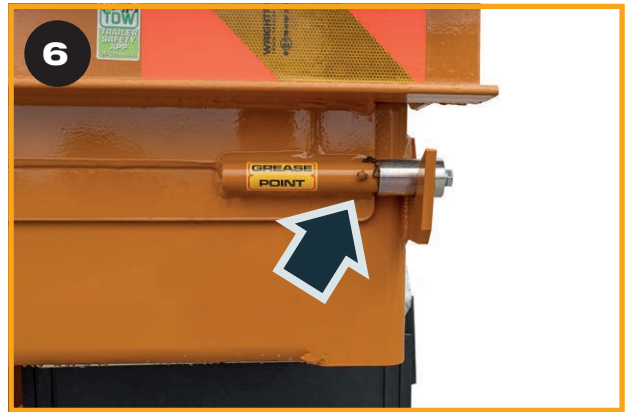
Grease Lower Tipping Cylinder Pivots (2 Positions).



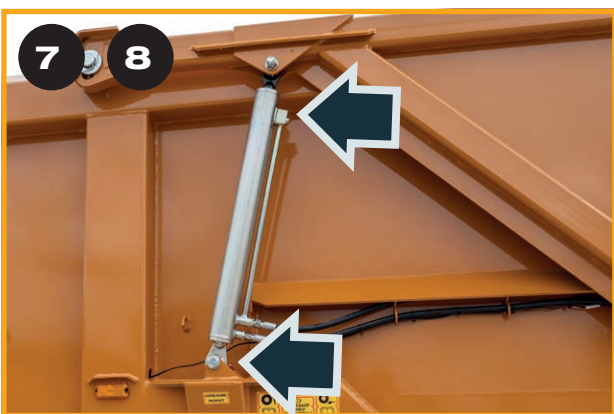
Grease Brake linkage pivots (4 Positions each Axle).



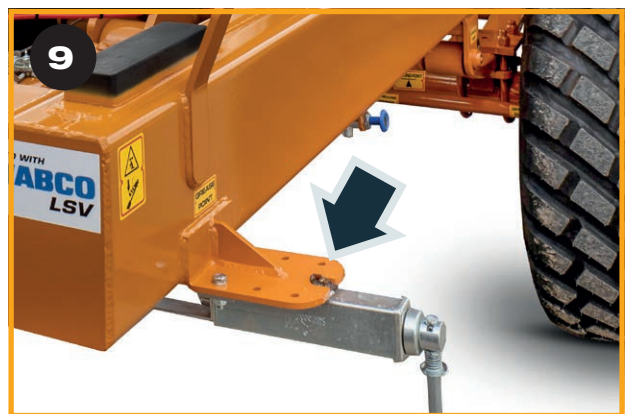
Grease Body Tipping pivots (2 Positions).



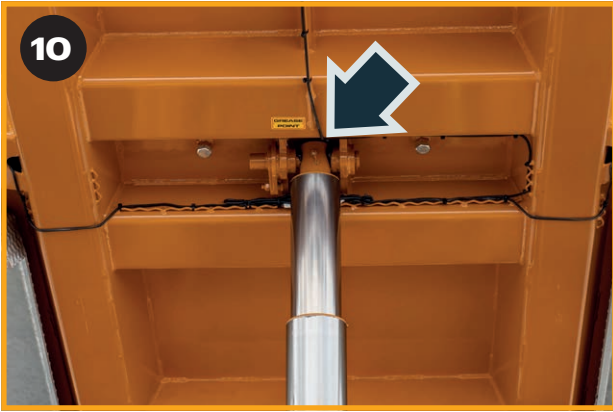
Grease Tailboard Pins (2 Positions).



Grease Tailboard Cylinders and pivot (Both Sides).



Grease Parking Brake Lever.



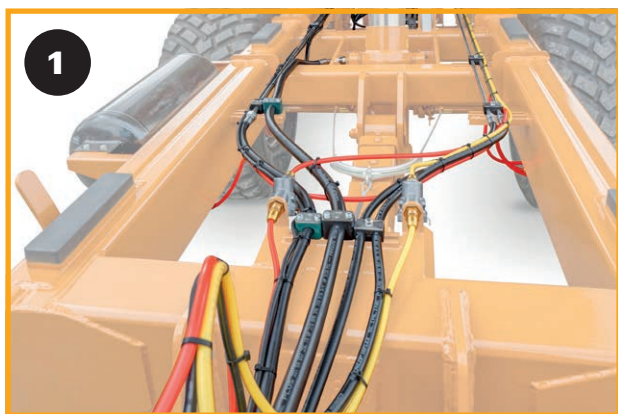
Grease Upper Tipping Cylinder.



Grease Pivots (3 Positions).

# Service Checks

(Stone and Rubble Trailers)



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

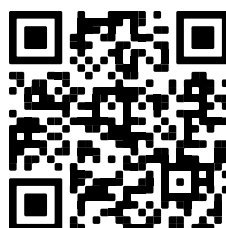


Refer to page 39 for more information.

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



Play Daily Check List video by scanning QR Code



For Daily, Weekly, and monthly check list please visit link below or scan QR Code to visit on your mobile device.

<https://www.richardwestern.com/support/head-to-tow/>



Drain water from Air reservoir.



Check Wheel Nut Torque.



Check Tyre Pressure & Tyre condition.

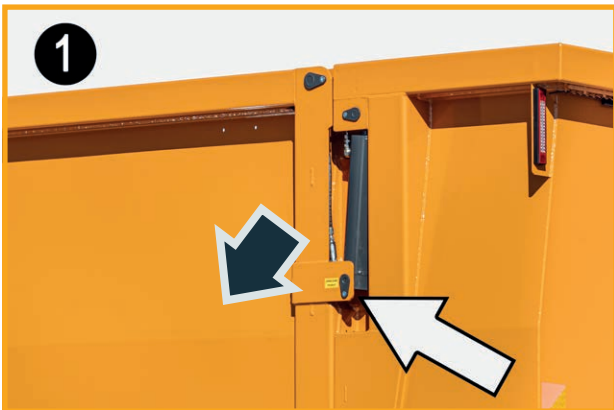


Check Lights & Reflectors for Correct operation & Damage.

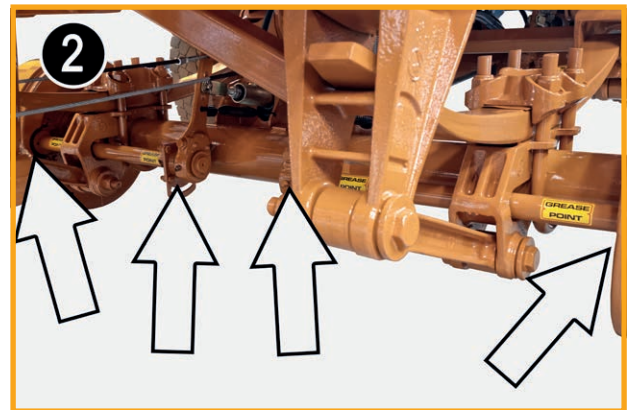
# Lubrication Points

(Pusher Ram Trailers)

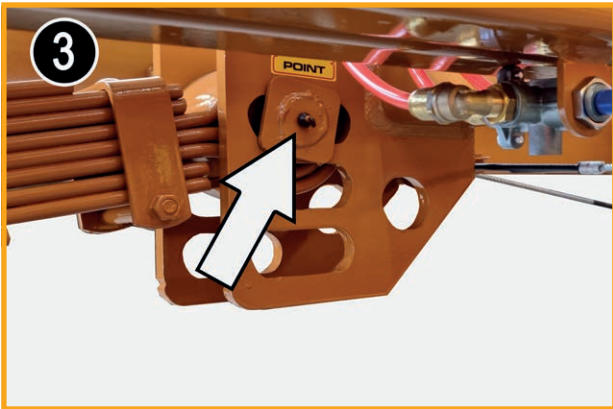
Every 8hrs or daily unless specified



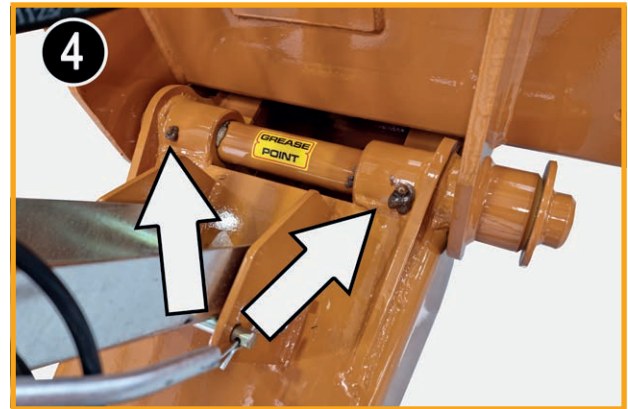
Grease Tailboard Cylinders and pivot (Both Sides).



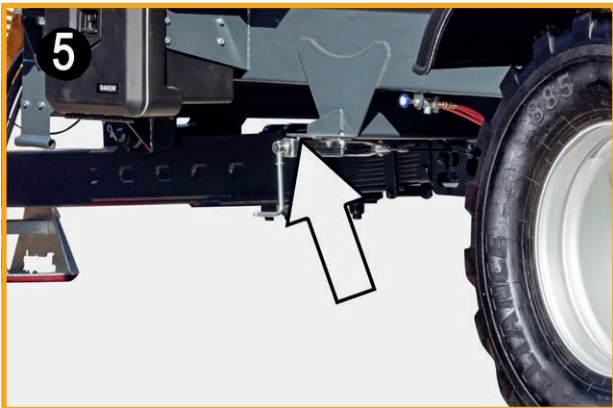
Grease Brake linkage pivots (4 Positions each Axle).



Grease Sprung Drawbar Pivots where applicable.



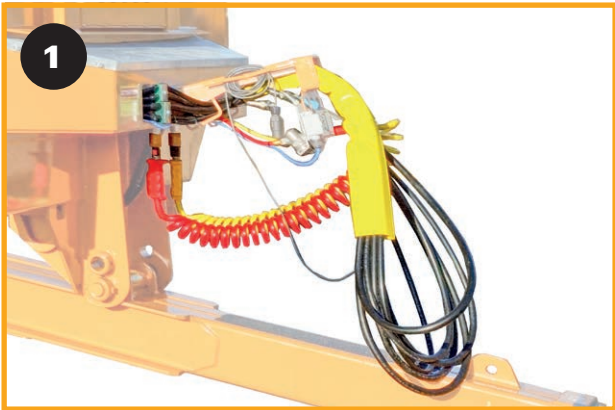
Grease Sprung Drawbar Pivots where applicable.



Grease Parking Brake Lever.

# Service Checks

(Pusher Ram Trailers)



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

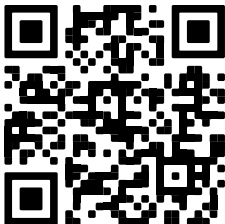


Refer to page 39 for more information.

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

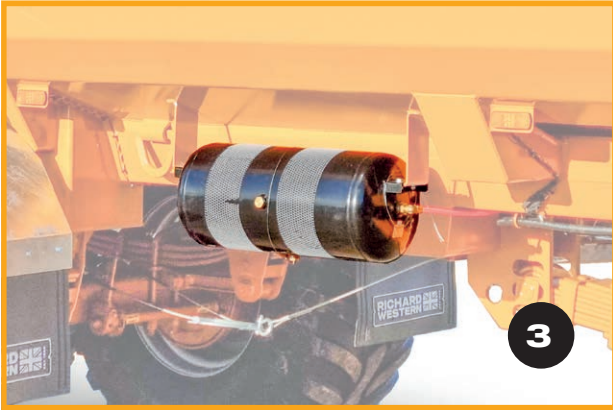


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<https://www.richardwestern.com/support/head-to-tow/>





Drain water from Air reservoir.



Check Wheel Nut Torque.



Check Tyre Pressure & Tyre condition.



Check Lights & Reflectors for Correct operation & Damage.

# Changing Wheel

## Changing Wheel on Richard Western Trailer with Tandem Axles

Due to the size and weight of trailing agricultural machines, special precautions must be adhered to when removing or replacing a tyre and wheel assembly.

### CAUTION



- Due to the risks involved, wheel removal **MUST** only be carried out by skilled trained personnel (i.e. professional tyre fitter).

### CAUTION



- NEVER work under a trailer which is unsupported.
- NEVER remove more than one wheel at a time.
- ALWAYS stand clear of the trailer with the wheel removed.
- The hydraulics of any Jack / Machinery / etc, deployed are not solely relied upon while working in the danger zone.
- As far as possible those involved in the task stay clear of the danger zone (crush area if the machine were to collapse off its temporary support);

## FAILURE TO FOLLOW THIS PROCEDURE COULD RESULT IN SERIOUS INJURY OR DEATH

1. If loaded, empty the trailer.
2. Ensure trailer is parked on firm level ground and ground conditions at the jacking point can withstand the loading.
3. Check trailer is securely hitched to the tractor, apply the tractor park brake, stop the engine and remove the key.
4. Ensure brakes are applied and wheels which are not being removed are chocked.
5. Slightly loosen the wheel nuts of the wheel to be removed.
6. Place jack below axle, as close to wheel as possible ensuring to leave room for an axle stand between the jack and the wheel.

**Minimum jack & axle stand ratings must be equal to or greater than axle weight (e.g. for 10 tonne axle weight jack must be minimum 10 tonne).**

**The use of a bottle jack is not recommended!**

7. Using the jack raise the wheel to be removed ensuring other wheels remain on the ground. Raise the trailer until high enough for a fully inflated tyre to be refitted.
8. Position axle stand below axle as close to wheel as possible.
9. Lower axle onto stand.
10. Completely remove wheel nuts.
11. Remove wheel using suitable support equipment.
12. To fit new wheel, place the wheel onto the axle hub using suitable support equipment.
13. Tighten all wheel nuts.
14. Raise machine from axle stand using the jack.
15. Remove the axle stand and lower the machine fully.
16. Tighten the wheel nuts to the prescribed tightening torque - see general tightening torque recommendations.

## Jacking Points

- Jacking points are provided at the rear of the machine as indicated by this symbol.



**Play How to Change a Wheel video by scanning QR Code**

## 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.

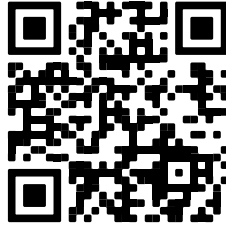


For additional Information refer to the manufacturers documentation.

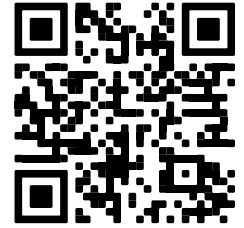
# BPW Suspension & Axle Maintenance

Scan QR codes or visit [richardwestern.com/bpw-manuals](http://richardwestern.com/bpw-manuals) for latest manuals.

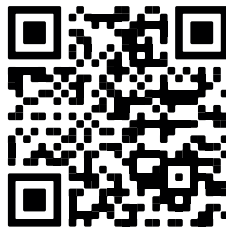
## Workshop manual for air suspensions



## Agricultural brake systems



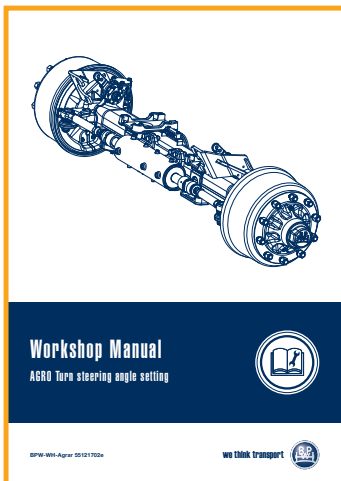
## Workshop manual for hydraulic suspensions



## Agricultural bearings



## AGRO Turn steering angle settings



## ADR Suspension & Axle Maintenance

Scan QR code or visit [richardwestern.com/adr-manual](http://richardwestern.com/adr-manual) for latest manual.

## Maintenance Manual



# Spring Drawbar

## Every 6 Months

After the first laden journey, and before intensive use.

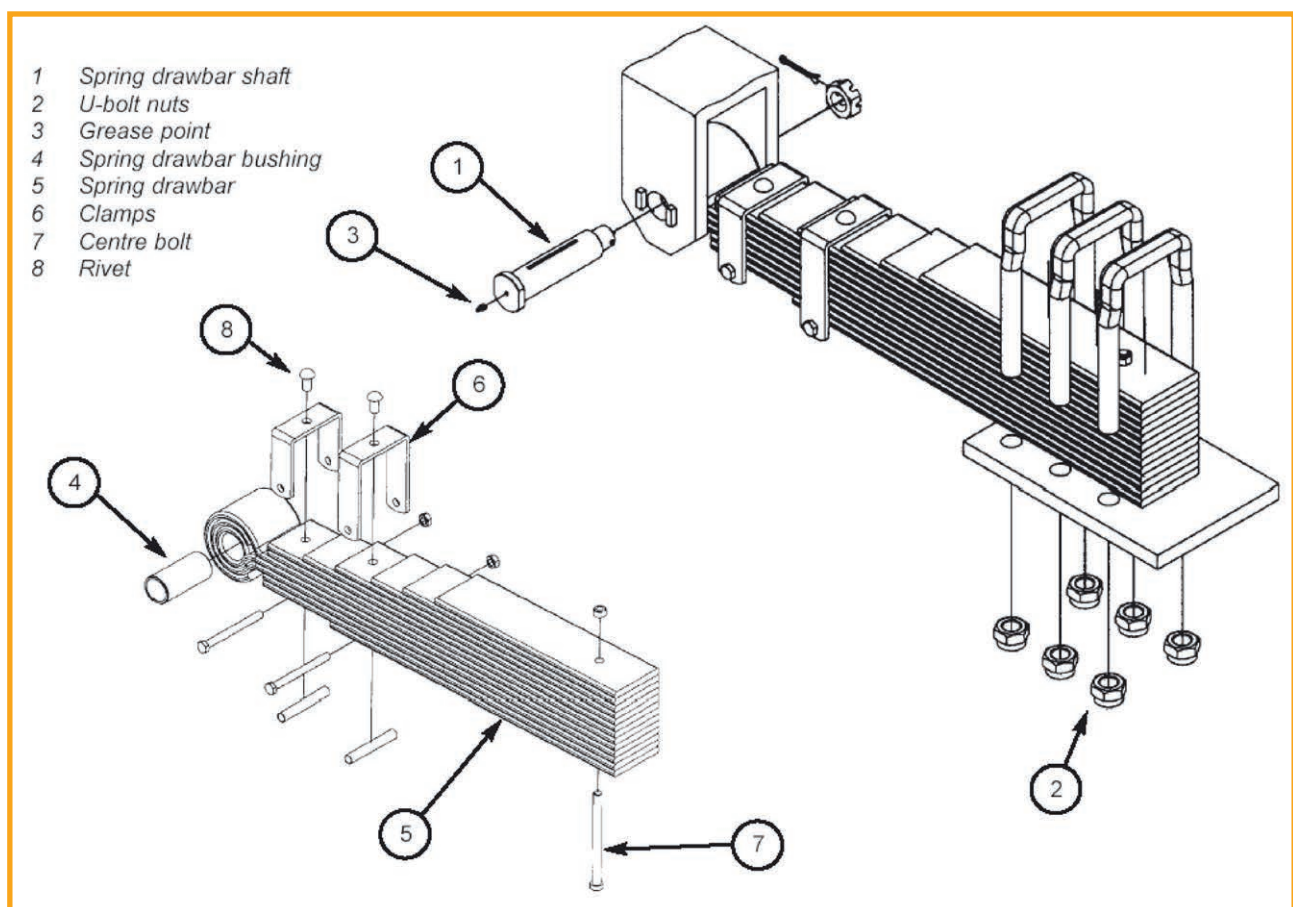
Retighten all the mounting U-bolt nuts **(2)** to the 980Nm torque.

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)**.

# Service & Maintenance Manual

## 1. Introduction:

Thank you very much for purchasing a Distag QCS axle, this manual aims to ensure the safety of operators, through the maintenance and service of the axle through its lifetime.

### Please Note:

- This manual does not replace the manual provided by the vehicle manufacturer.
- This manual describes everyday maintenance and service operations and does not cover major repairs.
- Maintenance and service should be carried out by a suitably qualified personal using the appropriate tools and equipment.
- **The authors and publisher are not liable for any physical damage or personal injury resulting from errors or omissions in this manual.**

**Carrying out repairs and maintenance work may be dangerous. This safety notice describes only some of the potential hazards and is intended to make users aware of the risks and encourage them to take care.**

### Unstable vehicles:

- Always ensure the vehicle is stable and secure by using appropriate forces to stop movement during service and maintenance.
- Never work underneath or near a vehicle that has been raised using only a jack. When working underneath a vehicle that has been jacked up, ensure that the jack is used in conjunction with stands or other effective supports and that the jack and stands used can bear the weight of the vehicle. Also ensure that the ground is firm underneath the vehicle during maintenance and service.

### Risk of Burn

- Beware of parts which may be hot after operation, such as brake drums should be left to cool before attending to service these.

### Personal Protection:

- Ensure appropriate PPE is worn and equipment is in good working condition, always work in the presence of others.

## 1.1 Warranty

### 1.1.1 Conditions of Warranty

1.1.1.1 The warranty commitment below is only available from Distag QCS, strictly subject to the following conditions:

- The warranty period will commence 4 weeks from invoice date, or
- The warranty period commences once the machine in question has been duly registered with Distag QCS, within 4 weeks of first registration or entry into service. The registration document should include the serial number of the axle being used, and this serial number should be quoted on all correspondence.

# Service & Maintenance Manual

1.1.1.2 It is advisable and highly recommended, for users to read through the “Maintenance Instruction” before using any Distag QCS Axle. Failure to carry out required routine maintenance could invalidate the warranty.

## 1.1.2 Scope of Warranty

1.1.2.1 For the duration of the warranty period, Distag QCS will cover the costs for replacement parts, as well as labour costs for disassembly and installation in line with Distag QCS standard time guideline. Such work must be agreed in advance with Distag QCS or the relevant machine manufacturer, and performed by suitably qualified person.

1.1.2.2 Defective or damaged parts, that have been disassembled, must be kept in storage, and made available for either:

- Detailed photograph's to be taken to support the claim, or
- Recall of the concerned parts to Distag QCS premises, or to the factory.

1.1.2.3 Duration of the warranty for the parts:

- Axle Beam: Subject to normal usage, and appropriate loading, the axle beam will have a 2 year warranty.
- Components: Subject to normal usage, the warranty period will be 1 year

## 1.1.3 Exclusion from Warranty

1.1.3.1 Normal wear and tear e.g. brake linings.

1.1.3.2 Damage caused by foreign objects entering the brake drum area of the axles.

1.1.3.3 Damage caused by use of the machine in abnormal conditions, or in an inappropriate application, or by operator misuse.

1.1.3.4 Failure attributed to the basic maintenance tasks as listed in this document not being followed e.g. lack of lubrication, or regular checking and re torqueing of U-Bolts.

1.1.3.5 Any failure attributed to the original machine design, or where the axles is not fitted in accordance with the correct criteria for normal use, or where the axle used has not been specified for the machine application.

1.1.3.6 Any consequential losses, beyond the replacement of the defective items, unless agreed in writing with Distag QCS.

## 1.1.4 Repairs During the Warranty Period

1.1.4.1 If repairs are carried out during the warranty period, the guarantee covering the replaced component will continue as the original component; and not start afresh.

1.1.4.2 It is essential that all maintenance work is carried out in accordance with the prescribed intervals, in order to maintain the safe operation, and roadworthiness of the machine. The relevant operation and service guidelines of the machine manufacturer must also be adhered to.

1.1.4.3 We strongly recommend that only Genuine HO'S Unite parts are used when fitting spare parts.

# Axle Service & Maintenance Manual

## 2. Axles

### 2.1 Maintenance

#### 2.1.1 Check Wheel Nuts for Tightness

The tightening torque of the wheel nuts must be checked after,

1. The first use.
  2. The first high load journey after the wheels have been fitted.
  3. The first 1000 km.
  4. Every 1 month or 10,000 Km
- Tighten wheel nuts diagonally using a torque wrench to the specified tightening torque shown in Table 1 & Table 2 below.
  - Note that wheel contact surfaces should not have additional coats of paint as this increases the risk of the wheels becoming detached.
  - The torque values shown below can be achieved using a normal wheel nut spanner and a length of tubing as shown in the image below.
  - Distag QCS recommend the use of wheel nut indicators to insure wheel security.

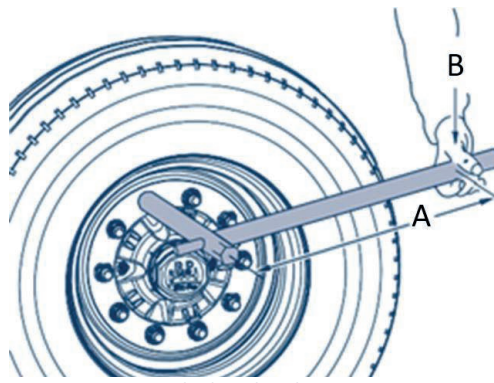
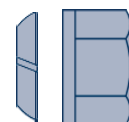


Figure 1 Calculated Tightening Torque

Table 1 Tightening Torque Value for Wheel Nut and Conical Washer

Stud Alignment	Tightening Torque	Tubing Length "A"	Physical Weight "B"
M20x1.5	380 Nm (360 - 400 Nm)	600mm	60-67Kg
M22x1.5	510 Nm (485 - 535 Nm)	800mm	60-67Kg

Wheel Nut & Conical Washer





# Axle Service & Maintenance Manual

Table 2 Tightening Torque for Wheel Nut with Collar

Spigot Alignment	Tightening Torque	Tubing Length "A"	Physical Weight "B"
M20x1.5	480 Nm (455 - 505 Nm)	800mm	57-63Kg
M22x1.5	630 Nm (600 - 660 Nm)	1000mm	60-67Kg

Wheel Nut with Collar



## 2.1.2 Checking the Manual Slack Adjuster Operation

**Please Note:** Frequent checks of the manual slack adjuster are necessary, depending upon application every 1 to 3 weeks. Follow the procedure described below to check the slack adjusters.

- Actuate slack adjusters by hand, pulling against the return spring. If there is more than 35 mm of play, the slack adjuster must be reset. This can be done by adjusting the nut on the slack adjuster as shown.
- Adjust the play, shown as "a" in the diagram below, to 10 -12% of the connected brake lever length "B", e.g. lever length 150 mm = 15 - 18 mm of play.
- Please Note: Automatic slack adjusters make this adjustment automatically whenever the camshaft is rotated by more than 17.5°.

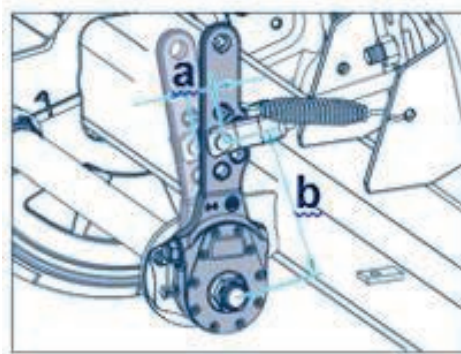


Figure 2 Manual Slack Adjuster

## 2.1.3 Checking Brake Lining Thickness

The checking of the brake lining thickness should be conducted every 3 months.

Open inspection hole by folding back the rubber flap. The brake lining should be replaced at a residual lining thickness of 5 mm (check with slide gauge) or on reaching the bottom of the indicator machined into the edge of the lining. Re-insert the rubber flap.

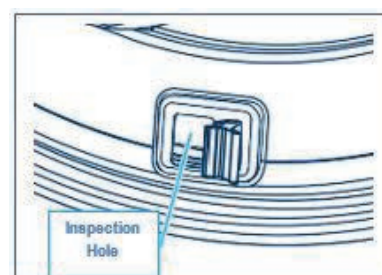


Figure 3 Inspection Hole

# Axle Service & Maintenance Manual

## 2.1.4 Check Wheel Hub Bearings

In order to check the wheel hub bearing play,

1. Lift the axle until the wheels are off the ground.
2. Release the brake.
3. Apply a lever between the tyre and the ground and check the play.

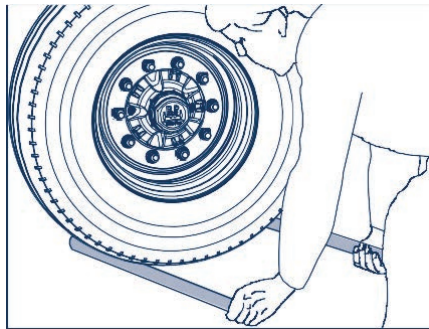


Figure 4 Checking Wheel Hub Bearings

If bearing play is detected, the bearing must be adjusted.

To adjust the wheel hub bearing:

1. Unscrew the cap.
2. Remove the split pin from the axle nut.
3. Fasten the axle nut using a torque wrench and with the continuous turning of the wheel hub. It should take several turns until the tightening torque has reached the desired value.

Tightening torques:

6 to 14 tons axle load = 150 Nm +8/-23 Nm.

-If a normal axle nut spanner is used, tighten the axle nut until the wheel bearing race drags slightly.

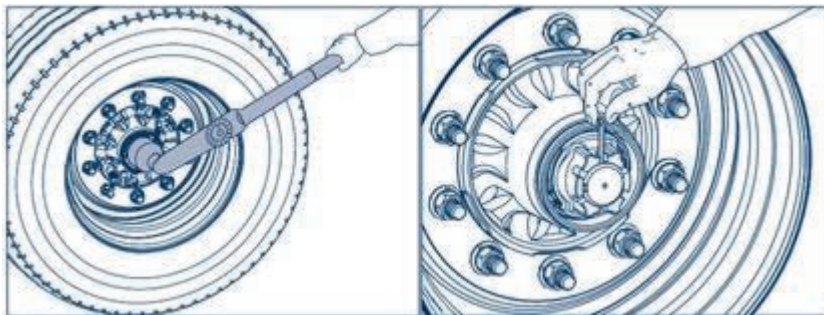


Figure 5 Tightening of the Axle Nut

Turn back the axle nut to the next available split pin hole. Should they already be in line turn back to the next hole (30° at the maximum).

Insert the split pin and bend upwards slightly.

Refill the cap as required with Ho's Unite special long-life grease.

# Axle Service & Maintenance Manual

Tighten the hub cap. Internal thread hub cap – 450Nm, External thread hub cap 400Nm

## 2.1.5 Check Hub Caps Tightness

This should be completed every 6 months

Check caps for tightness using a torque wrench or power tool.

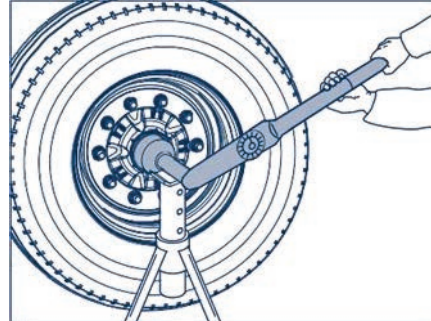


Figure 6 Checking Hub Cap Tightness

In an emergency the caps can be tightened using a normal cap spanner, by striking the latter with a hammer, or also with the aid of a piece of tubing placed over the wheel nut.

Tighten to the correct tightening torque as soon as possible.

## 2.1.6 Visual Inspection

– Every 3 months –

Check the tyre condition

– Every 6 months –

Check all components for damage and wear.

## 2.2 Lubrication

Note: After cleaning the vehicle with high-pressure cleaners, all lubrication points must be re-lubricated.

Ho's Unite Trailer axles / Ho's Unite Steering axles

Table 3 Axle Lubrication Schedule

#	Type	Every 2 Months	Every 3 Months	Every 6 Months	Every 12 Months	Every 24 Months	With each brake lining change
2.1.1	Steering Pivot (Top & Bottom)	✓					
2.1.2	Low maintenance brake camshaft bearing (Inner & Outer)		*	✓			✓
2.1.3	Slack Adjuster		✓				✓
2.1.4	Wheel Hub Bearing				*	✓	✓
*	Off-Road use						

# Axle Service & Maintenance Manual

## 2.2.1 Steering Pivot (Top & Bottom)

\* Every 2 months\*

Lift axle in order to relieve the steering pivot bearing. Grease lubrication nipple with Ho's Unite special long-life grease until fresh grease emerges from the bearing points.

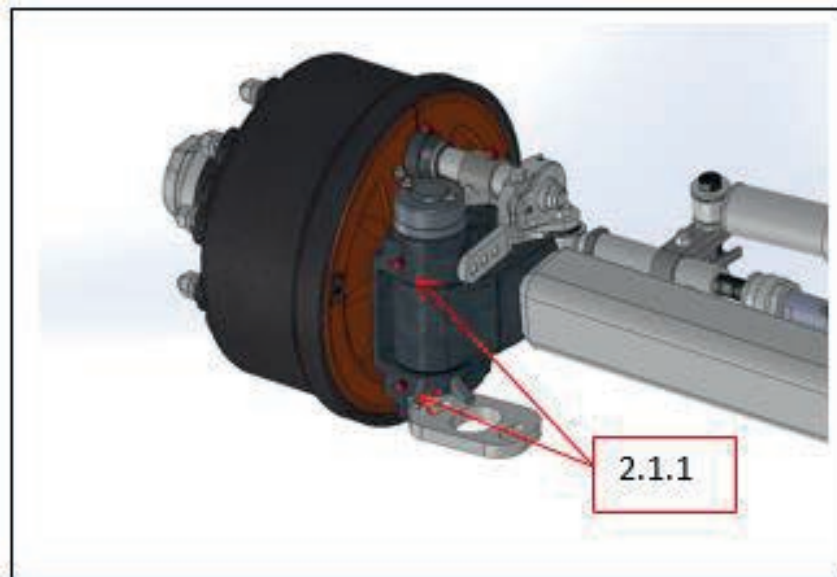


Figure 7 Showing Steering Pivot Grease Points

## 2.2.2 Brake Camshaft Bearing (Inner & Outer)

– Every 6 months – On-Road use

– Every 3 months – Off-Road use

– With each brake lining change -

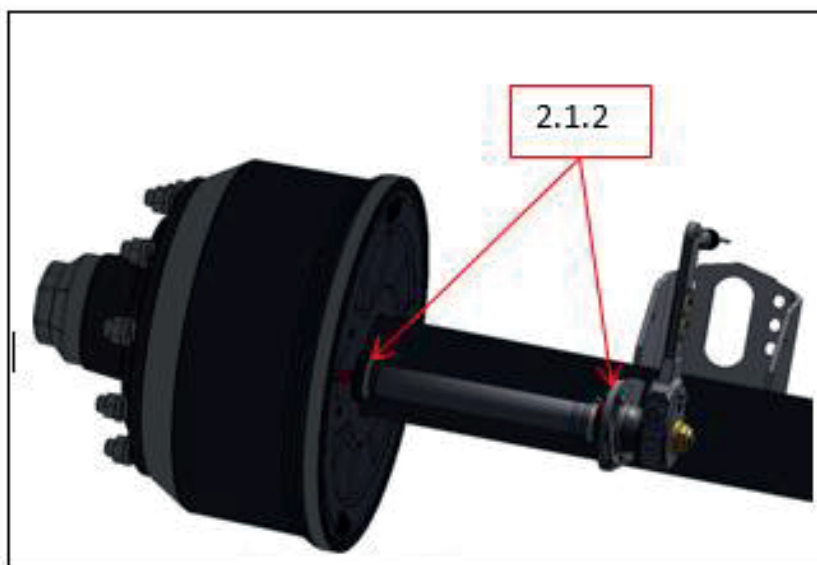


Figure 8 Showing Camshaft Grease Points

# Axle Service & Maintenance Manual

Prevent the vehicle from rolling away. Release the service brakes and the handbrake.

Lubricate the brake camshaft bearing through the grease nipple with Ho's Unite special long-life grease until fresh grease emerges from the bearing points.

## 2.2.3 Manual Slack Adjuster

\* Every 3 months \*

Grease lubrication nipple with Ho's Unite special long-life grease until fresh grease emerges.

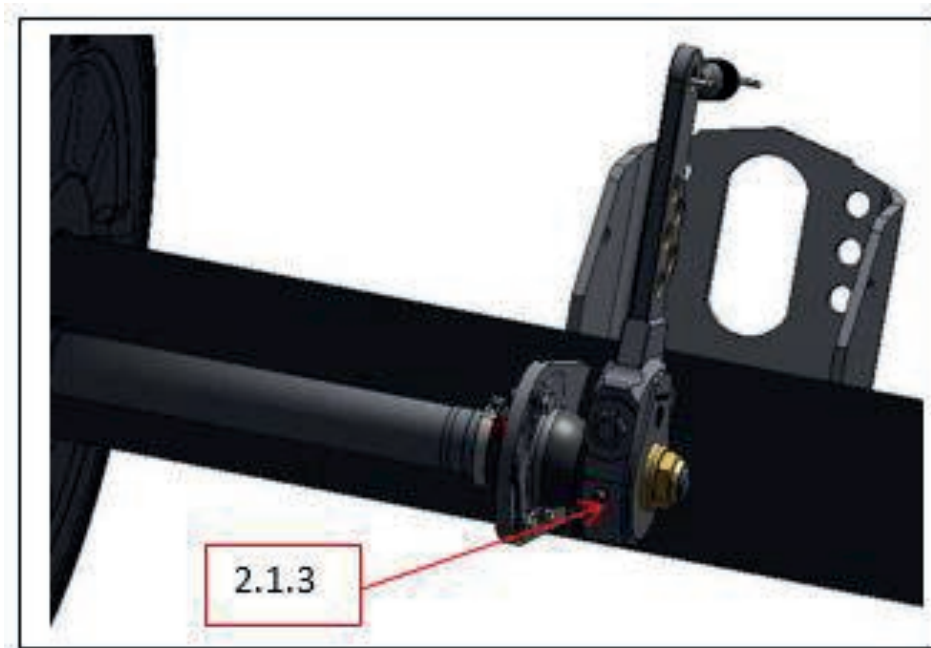


Figure 9 Showing Grease Point on Slack Adjuster

## Automatic Slack Adjuster

- Every 12 months – On-Road use
- Every 6 months – Off-Road use
- With each brake lining change –

Grease with Ho's Unite special long-life grease (approx. 80 g) until sufficient new grease emerges from the adjustment bolt.

Turn back adjustment screw (keep clutch sleeve pressed down) by approx. one turn using a ring spanner. Actuate the brake lever several times by hand. The adjustment must be carried out smoothly. If necessary, repeat several times.

Adjust the brake

## 2.2.4 Wheel Hub Bearing

- Every 24 months or up to 150,000 Km's – On-Road use
- Every 12 months or up to 75,000 Km's – Off-Road use
- With each brake lining change –

# Axle Service & Maintenance Manual

Remove the wheel hub and bearing, thoroughly clean the taper roller bearing and seals, dry and check if they can be re-used. Work Ho's Unite special long-life grease into the cavities between the taper rollers and cage in both taper bearing. (For grease quantity, see table below). Fit the wheel hub, tighten the axle nut whilst at the same time turning the wheel hub.

Table 4 Lubrication Instructions for Wheel Hubs

Lubrication Quantity Per Each Wheel Hub.			
Axle Size	Capacity	Inner Bearing	Outer Bearing
Ø310*190	11,000Kg	180g	320g
Ø406*120	11,000Kg	180g	320g
Ø420*180	12,000Kg	180g	320g
Ø420*180	14,000Kg	240g	500g
Ø420*200	16,000Kg	400g	800g
Ø420*220	16,000Kg	400g	800g

# Steering Axle Service & Maintenance Manual

## 3. Steering Axles

### 3.1 Introduction

For the general procedure on the service and maintenance of steering axles, please refer to sections 2.2 (Maintenance) and 2.3 (Lubrication) above as all the guidelines given also apply to steering axles.

Self-steering axles incorporate 1 locking cylinder and either 1 or 2 shock absorbers. The shock absorbers purpose is to stabilise the mechanism and reduce sudden movements of the wheels. The locking cylinder is used to lock the steering axle when reversing, and can also be used when driving forwards on roads at higher speeds, or on hilly terrain.

### 3.2 Maintenance

#### 3.2.1 General Maintenance for Steering Axles

- Lubricate the various components as outlined in section 2.3 above.
- Visual inspection for any leaks of oil from the hydraulic cylinder or shock absorber, also check for any signs of damage to these components.
- Inspect the tightness of all nuts and bolts associated with the steering elements of the axle, the procedure for this is shown in section 3.2.2.
- Visually inspect the connecting rod, ball joint and clevis assembly connected to the axle drum and cylinder for any damage as this will affect the steering angle.
- Check the positioning of the angle limit screws on the axles.

**It is essential before carrying out any work on hydraulic or pneumatic systems, take all necessary actions to ensure that the hydraulic fluid or air is not under pressure.**

#### 3.2.2 Tightening of Bolts and Nuts

Check the tightness of all nuts and bolts located on the steering axle every 6 months and tighten if necessary.

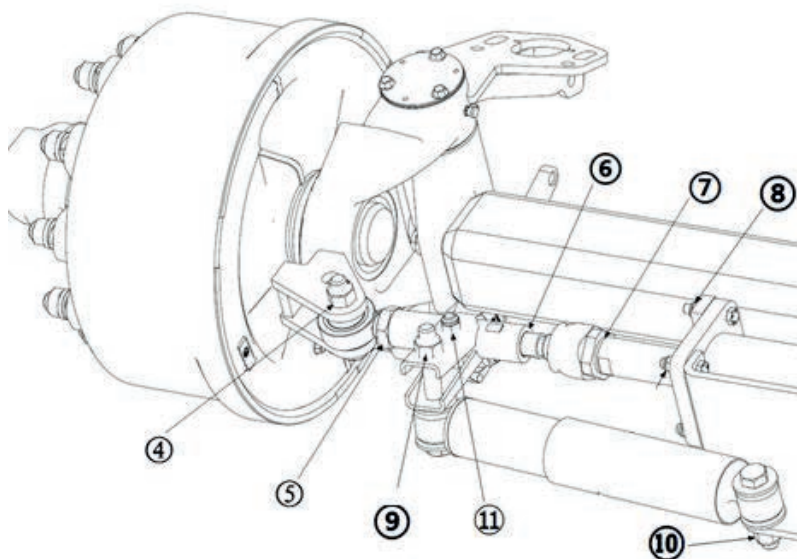


Figure 10 Showing the Tightening Points on Steering Axles

# Steering Axle Service & Maintenance Manual

- No.4 above must be tightened in order to secure the connecting rod to the axle drum.
- The tightening torque of the connection rod nut on the ball joint and clevis assembly No.5 is 750 – 850 Nm.
- The tightening torque of the ball joint and the centre piece No.6 is 650 – 700Nm.
- The tighten torque of the cylinder piston and the ball joint end No.7 is 380 – 450Nm.
- The tightening torque for the fixing of the cylinder to the axle nut No.8 is 80-100Nm.
- The tighten torque of the shock absorbers hanger and cylinder connection nut No.9 is 45-55Nm.
- Tighten the shock absorbers fixed nut No.10.
- The tightening torque for the locking nut of the clamp No.11 is 120-140Nm.

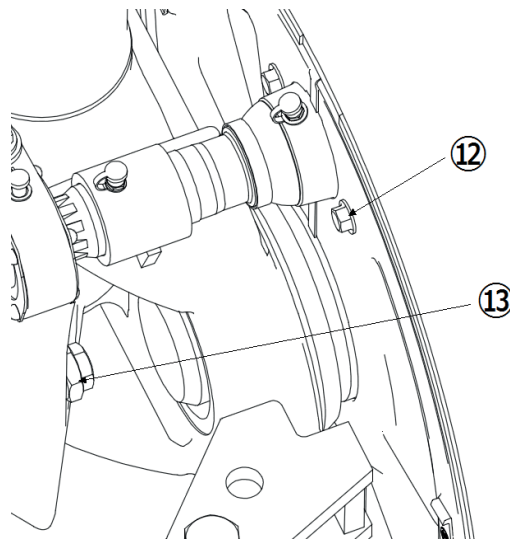


Figure 11

1. The tightening torque of the dust cover screw No. 12 is 45-55 Nm.
2. The tightening torque of the steering limit nut No.13 is 180-220 Nm.

### 3.2.3 Checking the Steering Pin

The steering pin should be checked every 6 months. The procedure for checking the steering pin is as follows,

**Step 1:** Remove bolts as shown below and remove cap.



Figure 12a



# Steering Axle Service & Maintenance Manual

**NOTE:** The orientation of the kingpin may vary, depending on the year of manufacture of the axel.

If the kingpin nut is located on the underside of the axel, the following steps (a-c) will need to be taken before proceeding on to **Step 2**.

- a. Raise axel above the ground using hydraulic jack.
- b. Remove opposite cap and rubber seal, as shown in in Figure 1b.
- c. Tap kingpin downwards using hammer to tighten taper fit of kingpin, as seen in Figure 1c.
- d. Approximate end position of Kingpin shown in Figure 1d.



Figure 1b



Figure 1c



Figure 1d

**Step 2:** Loosen lateral bolt using Allen key.



Figure 13

**Step 3:** Replace the steering pin, install the new steering pin in position ( the steering pin must fit in place, the tapered surface of the steering pin and knuckle seat must match to auto lock), if necessary replace the lubrication bearing in advance. Install

# Steering Axle Service & Maintenance Manual

the washer and seal ring in turn, and tighten the steering nut with a torque of 120-150Nm, and back loose 30°- 45°.



Figure 14a

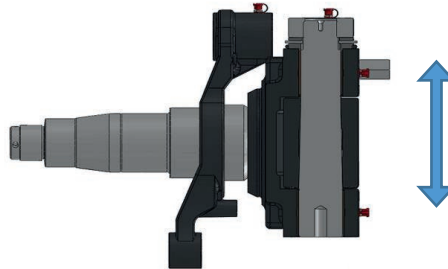


Figure 3b

**Step 4:** Apply Loctite or a different thread lock to lateral bolt and tighten with a torque of 45-55Nm.



Figure 15

1. **Step 5:** Install the knuckle end cap, and the M10 lock nut (3) with a torque of 35-40Nm as described below.

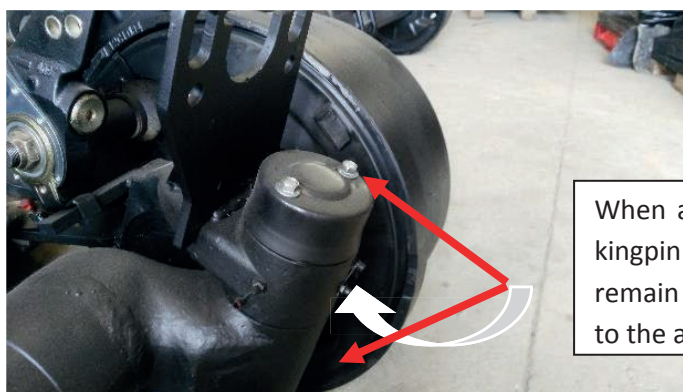


Figure 16

# Steering Axle Service & Maintenance Manual

## 3.2.4 Checking and Adjusting the Wheel Alignment

If an operator feels that the vehicle wheel alignment may be off, it is important to perform this check as early as possible in order to avoid tyre wear or component damage.

To perform a wheel alignment check,

1. Place the vehicle and the self-steering axle in line on a flat and perfectly horizontal surface.
2. This should be done with the cylinders extended, therefore the axle in the locked position.

Measure the distance between the wheel rims at the front of the self-steering axle, and then at the rear, (A and B) you should find the same measurement within tolerance of + or - 1mm.

Repeat this procedure after turning the wheels half a turn to ensure accurate measurement.

If the measurement continues to be outside of the specified tolerance follow the given procedure below in order to adjust wheel alignment.

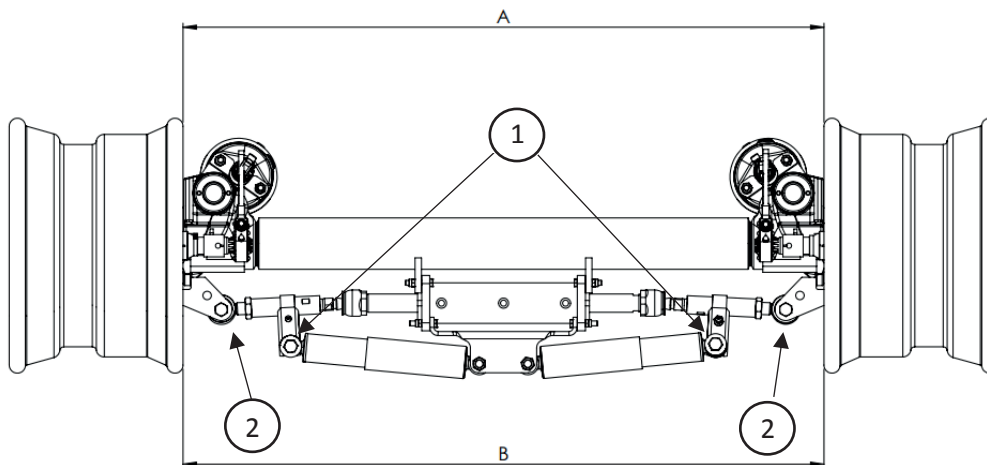


Figure 17 Distance A and B Shown for Wheel Alignment Check

### Procedure for adjusting wheel alignment:

1. Ensuring Cylinder is fully pressurised and in the locked position.
2. Remove the 2 Shock Absorber Pins shown in Figure 17 as item No. 1.
3. Remove the 2 Clevis head Pins shown as No. 2 in Figure 17.
4. Once removed, drive vehicle forwards on a straight line reference for approx. 5- 10 metres.
5. Adjust clevis head by turning until it is in position for the pin to be reinserted.
6. Re-check using procedure given above.
7. Please Note: If problems persist contact main dealer for further examination.

# Steering Axle Service & Maintenance Manual

## 3.2.5 Adjusting the Steering Angle Stopper Screws

If necessary it may be required to adjust the steering angle limit by adjusting the stopper screws, these are located as shown in Figure 18.

Check the full-lock angle regularly by turning fully to the right and to the left and checking that the tyres do not touch the trailer chassis or suspension as this might wear or damage the tyres.

If fouling occurs adjust the screws to limit the steering angle.

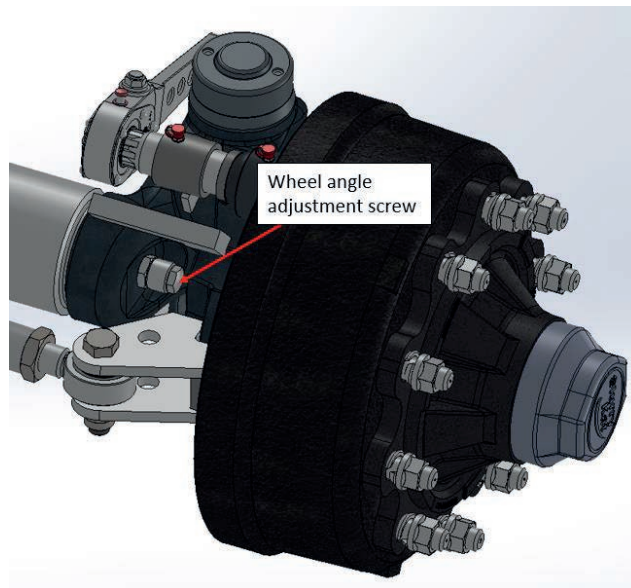


Figure 18 Showing the Location of the Wheel Adjustment Screw

# Suspension Service & Maintenance Manual

## 5.Suspension

### 5.1 Slipper & Eye Suspension

Suspension service and maintenance on the slipper & eye type suspension should be carried out,

1. After the first laden journey.
2. Every 6 months thereafter.

In order to conduct this service please follow the following procedure whilst referring to Figure 22

1. Lubrication should be applied to the 6 grease points identified in Figure 22.
2. U-Bolts should be tightened to the recommended torque as outlined in Table 5, section 4.1.
3. Ensure tightness of nuts identified as No.9, 10, 11 and 12 in Figure 23.

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

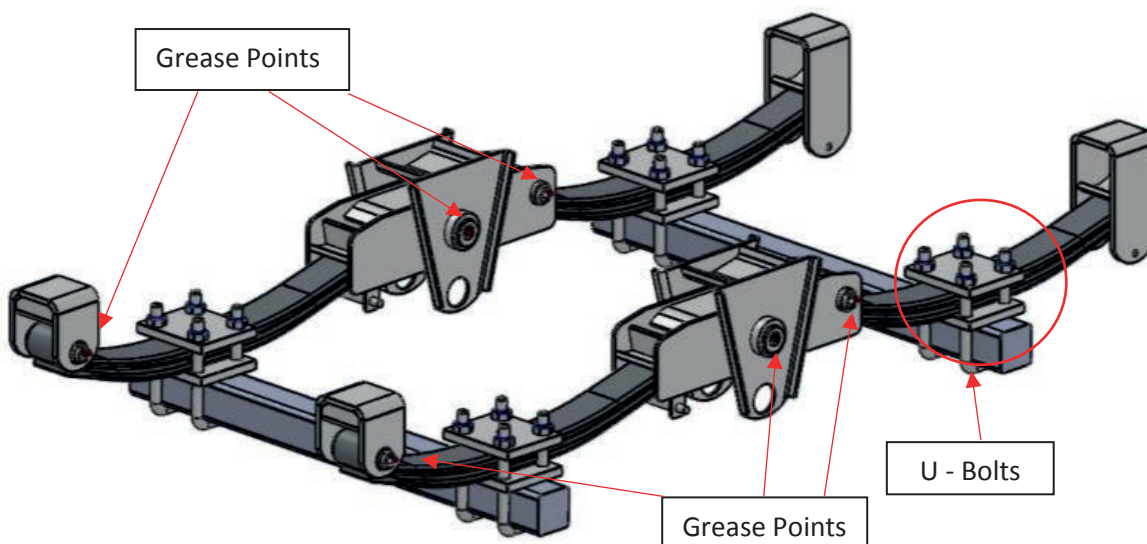


Figure 22 Showing the Service areas on Slipper and Eye Suspension

Yearly maintenance checks of the slipper and eye type suspension is also required. The following procedure should be followed to achieve this, please refer to Figure 23 in conjunction with this procedure.

- Visually inspect the condition of the springs by thoroughly cleaning them to check for any cracks or deformation.
- Check the clearance between the bushings No. 2 and the rocker shaft No. 1, if excessive clearance is seen, replace the worn parts.
- Inspect the spring shackle pin for any deformation or wear No.10 and replace if there is excessive wear or deformation.
- If clearance between the springs and the axles is visible, proceed to check the whole of the clamping system, items No.5, No.6, No.7 and No.8.

# Suspension Service & Maintenance Manual

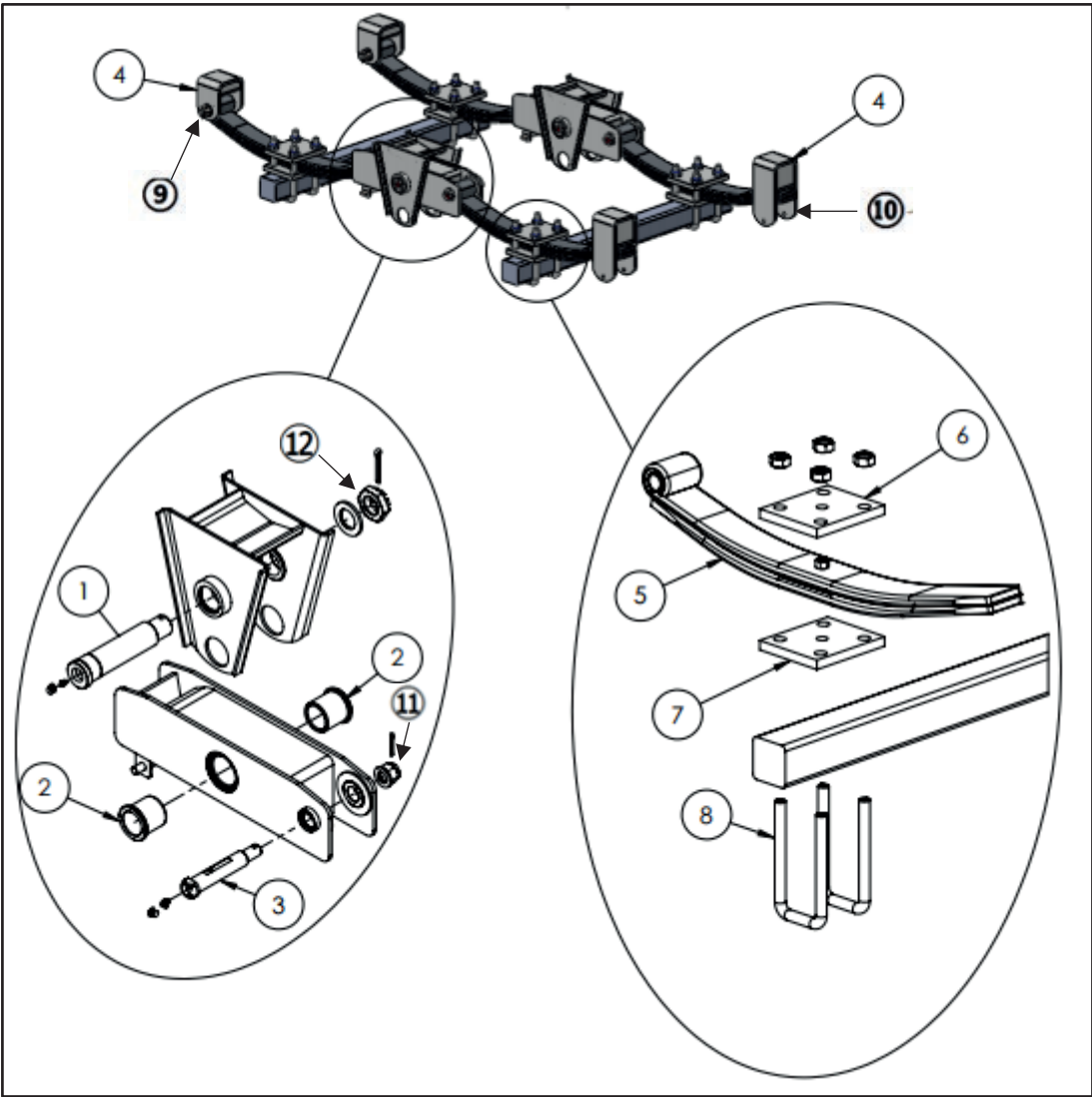


Figure 23 Exploded View of Slipper & Eye Suspension

# Suspension Service & Maintenance Manual

## 5.2 RSC & YSC Suspension

Suspension service and maintenance on the RSC & YSC suspension should be carried out,

1. After the first laden journey.
2. Every 6 months thereafter.

In order to conduct this service please follow the following procedure whilst referring to Figure 27.

1. U-Bolts should be tightened to the recommended torque as outlined in Table 5, section 4.1.
2. Ensure tightness of the nuts identified in Figure 24 on each side and Figure 25 if applicable.
3. Ensure that the clamping bracket and the suspension bracket do not touch, these can be seen in Figure 26 below. If they do, replace the conical washer which is shown as No.6 in Figure 27.

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

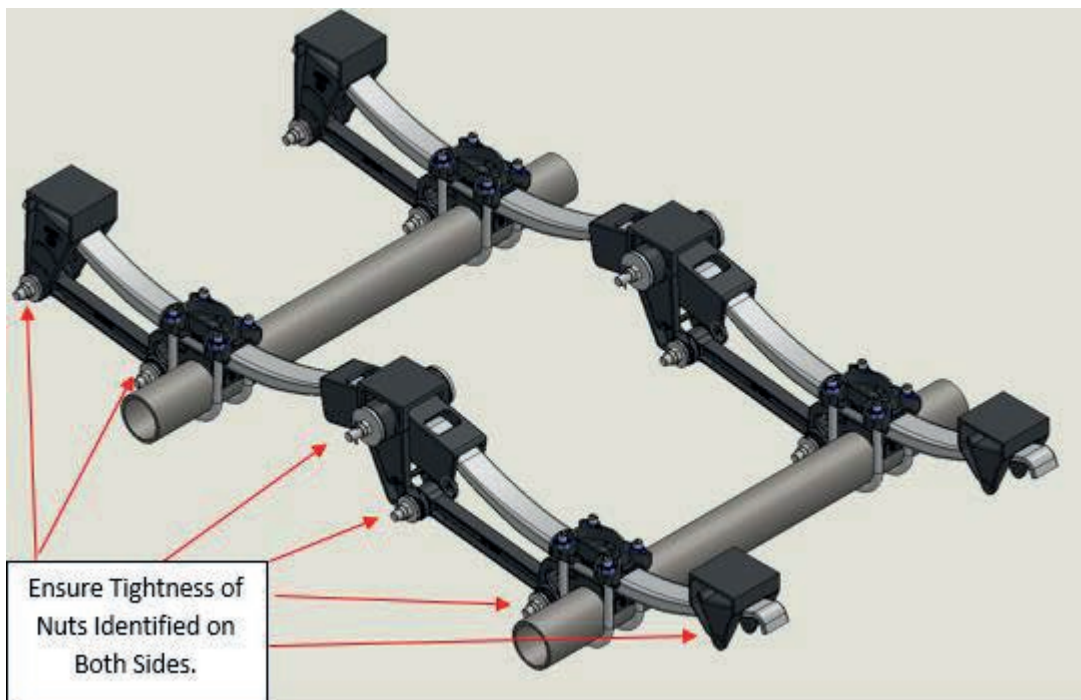


Figure 24 Showing Tightening Points for a RSC and YSC Suspension

Please Note, If a suspension incorporates an adjustable torque arm as shown in Figure 25, ensure tightness of the 4 bolts as identified also whilst servicing.



Figure 25 Adjustable Torque Arm

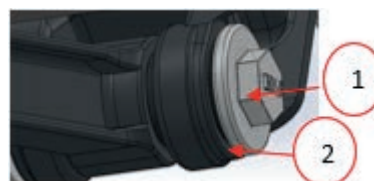


Figure 26 Space Between Washer and Bracket Edge

# Suspension Service & Maintenance Manual

Yearly maintenance checks of the RSC and YSC suspension is also required. The following procedure should be followed to achieve this, please refer to Figure 27 in conjunction with this procedure.

- Visually inspect the condition of the springs by thoroughly cleaning them to check for any cracks or deformation.
- Check the clearance between the hanger bushings No. 5 and the central equaliser pin No. 4, if excessive clearance is seen, replace the worn parts.
- If clearance between the springs and the axles is visible, proceed to check the whole of the clamping system as shown in the right section view below.

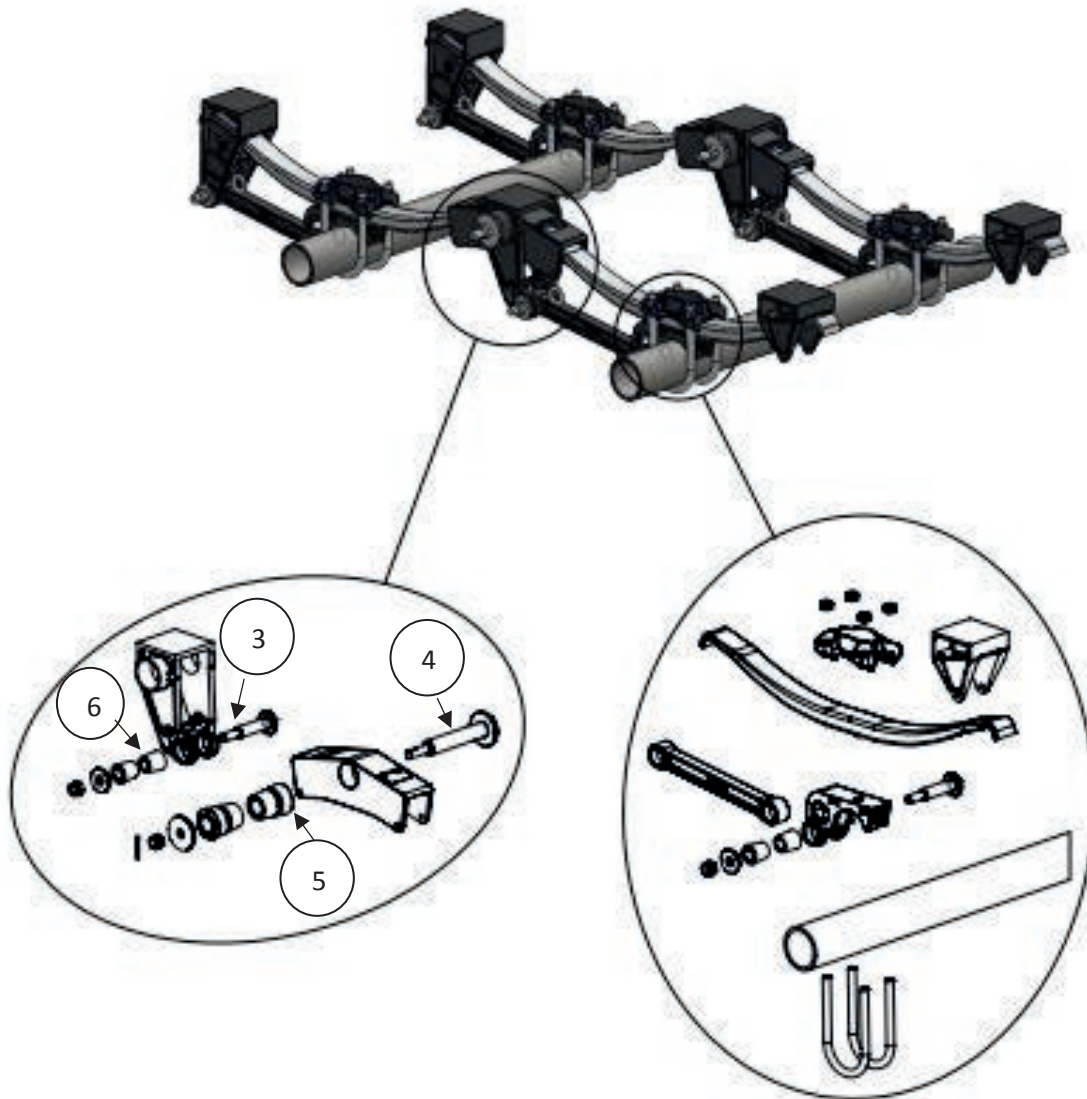


Figure 27 RSC and YSC Suspension Exploded View



# RHO (HS24XA7)

## Suspension User Manual

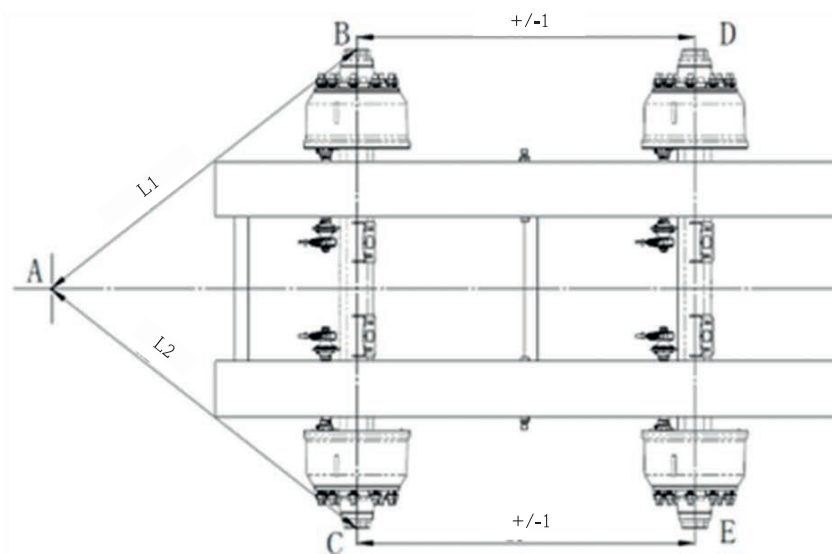
### Axle Mounting & Wheelbase Adjustment

1. Axle mounting direction:

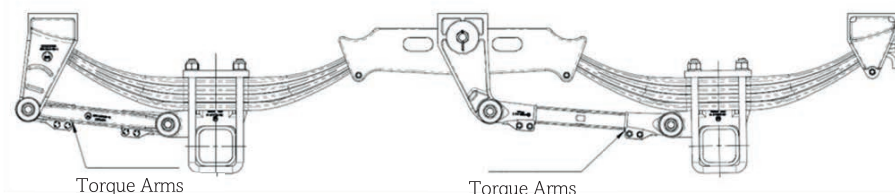
- It is recommended that the pushrod direction of the air chamber be consistent with the forward direction of the vehicle (Picture 4)

2. Wheelbase adjustment:

- Adjust the adjustable torque arm (Picture 5) so that the distance between the centre point “A” of the traction pin and the apex of the positioning pin at both ends of the middle axle is equal, i.e.  $L1 = L2$   $\pm 2$ mm (Picture 4).
- Adjust the front axle and adjust the adjustable torque arm (Picture 5) so that the distance between the two ends of the front axle B and C and the two ends of the rear axle D and E is equal, i.e.  $BD = CE \pm 1$ mm (Picture 4).
- Ensure that the axis of each axle to the frame longitudinal centre plane, vertical tolerance in the horizontal direction is no more than 2mm. After the adjustment, lock the connecting rod joint bolts and tighten all bolts to the specified tightening torque.



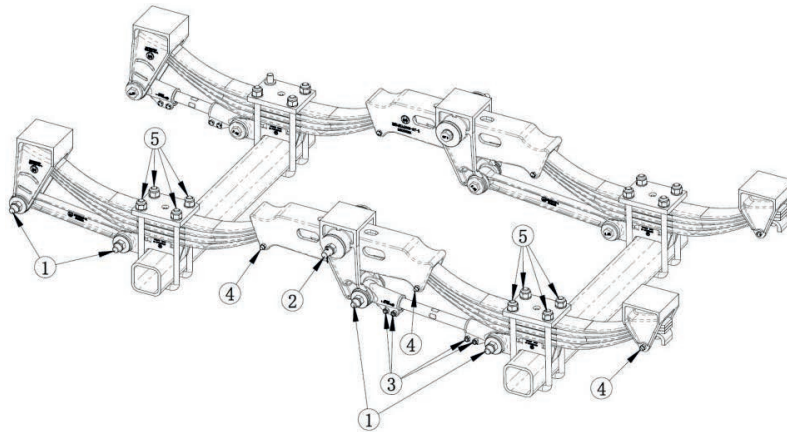
Picture 4



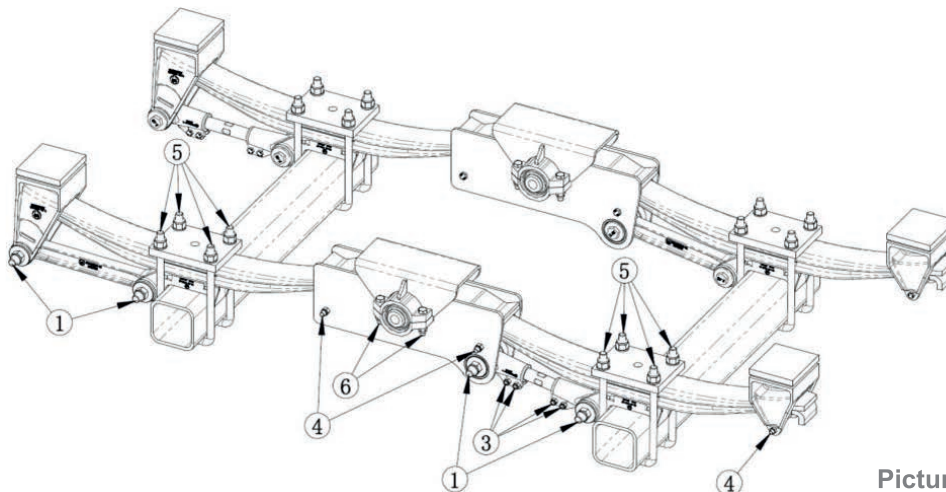
Picture 5

## Bolt Torque Settings

#	Description	Size	Recommended Torque	Acceptable Range
1	Torque Arm Bolt	M24	165 Nm	150~180 Nm
2	Centre Bolt	M24	300 Nm	280~320 Nm
3	Torque Arm Locking Bolt	M12	95 Nm	85~105 Nm
4	Spring Retaining Bolt	M12	95 Nm	85~105 Nm
5	U-Bolt	M22*1.5	550 Nm	510~605 Nm
		M24*2	700 Nm	650~750 Nm
		M30*2	1100 Nm	980~1200 Nm
6	Central Bush Locking Bolt	M16	210 Nm	190~230 Nm



Picture 6



Picture 7

# Bush Installation and Maintenance

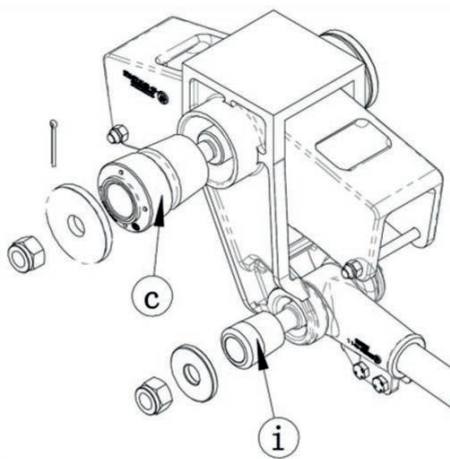
## 1. Taper Style Central Bush:

- After the first laden journey, and thereafter every 3 months or every 25,000 km (whichever comes first), visually inspect the central rubber bush “c” for signs of excess wear or damage (Picture 9a,), and use the torque wrench to tighten as per recommended bolt torque settings.
- One the central rubber bush is tightening to the recommended torque, the distance between the bolt end face or washer end face and the centre hanger face must not be less than 3.5mm (see Picture 9b), if the distance is below 3.5mm it is recommended to replace the rubber bush immediately!

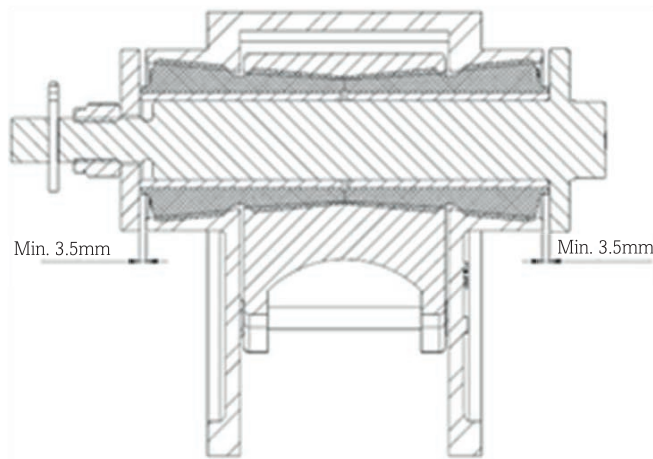
Note: When replacing the rubber bush, please apply soapy water or silicone oil on the surface of the rubber bush before pressing!

## 2. Torque Arm Bush:

- After the first laden journey, and thereafter every 3 months or every 25,000 km (whichever comes first), visually inspect the torque arm bush “i” for signs of excess wear or damage (Picture 9a,), and use the torque wrench to tighten as per recommended bolt torque settings.
- One the torque bush is tightening to the recommended torque, the bolt end face or washer end face and the hanger face must not make contact, if contact is made it is recommended to replace the torque arm bush immediately!



Picture 9a

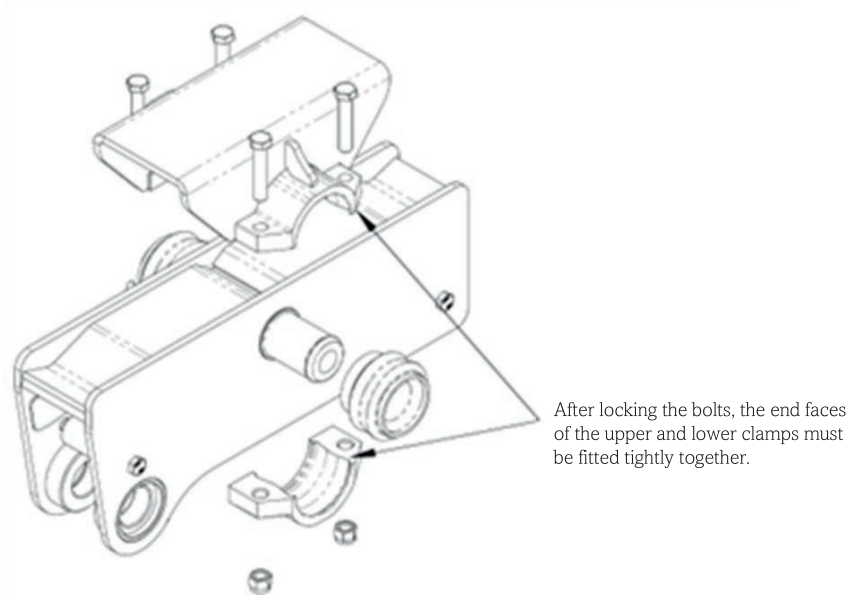


Picture 9b

### 3. Outrigger Style Central Bush:

- After the first laden journey, and thereafter every 3 months or every 25,000 km (whichever comes first), visually inspect the central rubber bush for signs of excess wear or damage (Picture 10,) and use the torque wrench to tighten as per recommended bolt torque settings.
- Once the central rubber bush is tightening to the recommended torque, the upper and lower support seats must be inspected for visible compression on the rubber bush. If visible compression of the rubber bush is not seen it is recommended to replace the torque arm bush immediately!

Note: When replacing the rubber bush, please pre-soak the rubber bush in hot water at about 80° for half an hour and apply soapy water or silicone oil on the surface of the rubber bush before pressing. When assembling, use the specified torque to lock and ensure that the end faces of the upper and lower support seats are tight (Picture 10).



After locking the bolts, the end faces of the upper and lower clamps must be fitted tightly together.

Picture 10

# Tyre Information - BKT FL693M Ridemax

Tyre Size	Ply/ Load Index	Model	Rim		Sect Width mm	Overall Diam. mm	Loaded Static Radius mm	Rolling Circum. mm	Sta tic	Recommend Load, Kg					Inflation Pressure (bar)	
			Rec.	Alt.						Speed, km/h (mph)						
										10	25	40	50	65		70
500/45R22.5	146D	FL693M	AG16.00		503	1022	455	3114		5400	4740	4080	3630	3000	2725	4.0/58
500/60R22.5	155D	FL693M	AG16.00		503	1172	531	3577		6975	6125	5270	4690	3875	3550	4.0/58
560/45R22.5	152D	FL693M	AG16.00		543	1076	484	3270		6390	5610	4830	4300	3550	3250	4.0/58
560/55R22.5	158D	FL693M	AG16.00		543	1180	533	3614		7650	6715	5780	5145	4250	3875	4.0/58
560/60R22.5	165D	FL693M	AG16.00		543	1244	549	3767		9270	8140	7005	6235	5150	4750	5.0/73
580/65R22.5	166D	FL693M	AG18.00	AG16.00	577	1326	572	4031		9540	8000	7210	6410	5670	5300	4.0/58
600/50R22.5	159D	FL693M	AG20.00		611	1172	516	3546		7875	6915	5950	5295	4375	4000	4.0/58
650/50R22.5	163D	FL693M	AG20.00		645	1222	535	3715		8775	7705	6630	5900	4875	4500	4.0/58
650/55R26.5	169D	FL693M	AG20.00		645	1389	608	4216		10440	9165	7890	7020	5800	5300	4.0/58
710/50R26.5	170D	FL693M	AG20.00		727	1383	606	4174		10800	9480	8160	7260	6000	5450	4.0/58
710/50R30.5	173D	FL693M	AG20.00		727	1485	656	4510		11700	10270	8840	7865	6500	6000	4.0/58
750/60R30.5	181D	FL693M	AG24.00		754	1675	728	5092		14850	13035	11220	9985	8250	7510	4.0/58
850/50R30.5	182D	FL693M	AG28.00		862	1625	719	4925		15300	13430	11560	10285	8500	7735	4.0/58

## New & Remoulds - Radial Trailer Tyres, Wheel & Fitments

Tyre Size	Ply/Load	Make	Pattern	Width mm	Dia. Mm	Load kg	Wheel	No. Studs/	Offset
385/55R19.5 (355/50R22.5)	156J(159A8)	Double Coin	RR905	382	925	4000kg@100km/h (4600kg@40km)	11.75 x 19.5	6/205	0
		Longmarch	LM168					8/275	0
								10/335	120
445/45R19.5	160J	Double Coin	RR905	446	898	4500kg@100km/h (5175kg@40km/h)	14.00 x 19.5	6/205	0
		Sailun	S696					8/275	0
		Longmarch	LM358					10/335	0
385/55R22.5	160J(165A8)	Double Coin	RR905	380	996	4500kg@100km/h (5175kg@40km/h)	11.75 x 22.5	6/205	0
		Sailun	S696					8/275	0
		Longmarch	LM168					8/275	-50
		Agri Remould	VP27					10/335	0
								10/335	-70
385/65R22.5	160J (164D)	Double Coin	RR905	380	1070	4500kg@100km/h (5000kg@65km/h)	11.75 x 22.5	6/205	0
		Sailun	S696					8/275	0
		Longmarch	LM128					8/275	0
		Alliance	882					8/275	-50
		Agri Remould	TTA/VP27/ VY1/404					10/335	0
425/65R22.5	165K (168D)	Double Coin	RLB900+(M&S)	415	1132	5150kg@110km/h (5600kg@65km/h)	14.00 x 22.5	8/275	0
		Sailun	S825					10/335	0
		Longmarch	LM526						
		Agri Remould	VY1						
445/65R22.5	168J (170D)	Double Coin	RLB900+(M&S)	445	1150	5600kg @ 100km/h (6076kg @ 65km/h)	14.00 x 22.5	8/275	0
		Sailun	S696					10/335	0
		Remould	EXS						
		Remould	VY1						
455/40R22.5	160F	Remould	VZL	445	935	4500kg @ 80k/h	14.00 x 22.5	8/275	0
								10/335	0
445/75R22.5	170G	Remould	EXS	444	1239	6000kg @ 90km/h	14.00 x 22.5	8/275	0
		Agri Remould						10/335	0

# Tyre Information

## Alliance A882 Steel Belted

Tyre Size	Ply/ Load Index Speed Symbol	Model	Rim	Sect Width mm	Overall Diam. mm	Loaded Static Radius mm	Rolling Circum. mm	Sta tic	Recommend Load, Kg								Inflation Pressure (Bar/ PSI)
									Speed, km/h (mph)								
									Mixed Application								
									10 6	25 16	30 19	40 25	50 31	60 37	65 40	70 43	
385/65R22.5	164D	A882	AG 11.75	389	1075	493	3205	11500	9000	7900	7550	6800	6050	5350	5000		9.0 / 131
500/60R22.5	155D	A882	AG 16.00	510	1180	529	3616	8910	6980	6120	5850	5270	4690	4150	3875		4.0 / 58
560/45R22.5	152D	A882	AG 16.00	543	1076	485	3310	8170	6390	5610	5360	4830	4300	3800	3550		4.0 / 58
560/60R22.5	165D	A882	AG 16.00	565	1244	555	3650	11850	9270	8140	7780	7000	6230	5510	5150		5.0 / 72
580/65R22.5	166D	A882	AG 16.00	575	1362	588	4030	12190	9540	8370	8000	7210	6410	5670	5300		4.0 / 58
600/50R22.5	159E	A882	AG 20.00	611	1172	527.5	3473	10060	8590	7540	7200	6490	5770	5100	4770	4375	4.0 / 58
600/55R26.5	165D	A882	AG 20.00	611	1333	604	4043	11850	9270	8140	7780	7000	6230	5510	5150		4.0 / 58
650/55R26.5	170D	A882	AG 20.00	645	1389	621	4227	13800	10800	9480	9060	8160	7260	6420	6000		4.0 / 58
710/50R26.5	172D	A882	AG 24.00	727	1383	623	4219	14490	11340	9950	9510	8570	7620	6740	6300		4.0 / 58
750/60R30.5	181D	A882	AG 24.00	754	1675	748	5121	18980	14850	13040	12460	11220	9980	8830	8250		4.0 / 58

## Alliance A885 Steel Belted

Tyre Size	Ply/ Load Index Speed Symbol	Model	Rim	Sect Width mm	Overall Diam. mm	Loaded Static Radius mm	Rolling Circum. mm	Sta tic	Recommend Load, Kg					Inflation Pressure (Bar/ PSI)
									Speed, km/h (mph)					
									Mixed Application					
									10 6	30 19	40 25	50 31	65 40	
560/45R22.5	152D	A885	AG16.00	543	1060	478	3260	8170	6390	5360	4830	4300	3550	4.0 / 58
560/60R22.5	164D	A885	AG16.00	555	1230	553	3620	11500	9000	7550	6800	6050	5000	4.0 / 58
580/65R22.5	166D	A885	AG16.00	574	1315	580	4040	12190	9540	8000	7210	6415	5300	4.0 / 58
600/50R22.5	159D	A885	AG20.00	606	1172	532	3470	10060	7875	6605	5950	5295	4375	4.0 / 58
650/50R22.5	163D	A885	AG20.00	650	1235	554	3630	11210	8780	7360	6630	5900	4875	4.0 / 58
710/45R22.5	165D	A885	AG24.00	725	1210	535	3675	11850	9270	7780	7000	6230	5150	4.0 / 58
600/55R26.5	165D	A885	AG20.00	625	1345	610	3980	11850	9270	7780	7000	6230	5150	4.0 / 58
650/55R26.5	170D	A885	AG20.00	648	1380	630	4080	13800	10800	9060	8160	7260	6000	4.0 / 58
650/65R26.5	174D	A885	AG20.00	645	1519	670	4580	15410	12060	10120	9110	8110	6700	4.0 / 58
710/50R26.5	170D	A885	AG24.00	732	1400	629	4290	13800	10800	9060	8160	7260	6000	4.0 / 58
750/45R26.5	170D	A885	AG24.00	740	1360	618	4138	13800	10800	9060	8160	7260	6000	4.0 / 58
750/60R30.5	181D	A885	AG24.00	767	1680	754	5113	18980	14850	12460	11200	9980	8250	4.0 / 58

# Cleaning and Maintenance of Paint

## Cleaning and Maintenance of SELEMIX® Paint films in the industrial market

### Background

**For Industrial coatings, the durability and resistance to aggressive climate conditions are key requirements.**

SELEMIX® provides high performance Industrial paint systems that are able to cope with the toughest of environmental conditions. Even so, as for any coating system, the owner will need to take appropriate care in maintaining the condition of the paint film to maintain a high quality appearance and image over the life of the unit.

Part of this requirement is the need to clean the paintwork regularly.

This document has been created with this in mind, and provides guidance and recommendations for the use of commercially available cleaners with SELEMIX® paint systems.

### Description

When a unit is painted in a SELEMIX® paint system, you can be sure that the quality of the paint film is excellent and will remain so for the life of the unit if maintained properly. The SELEMIX® brand delivers the most efficient process at the highest level of quality for the Industrial market.

Note: Commercial washes, high pressure washes, and use of strong detergents, should not be used during the first 30 days after application of the paint film. The use of aqueous detergents for cleaning is possible. Any deposits of road tar should be removed with a soap solution.

Automatic cleaning machines can be used, but attention must be paid to the dosing parameters of cleaning machines. The maximum concentration should not be higher than 500:1 (water:detergent).

The pH value of these solutions should be between 7 and 8, and clean water must be used for a very thorough final rinse.

**IMPORTANT: Cleaners containing the following aggressive chemicals are strictly not recommended:**

Description	CAS Number	CAUTION
Caustic soda	1310-73-2	NOT recommended
Butyldiglycol	111-76-2	NOT recommended

High pressure cleaning can be carried out as long as the temperature is maintained below 50°C. The lance must be used at a minimum of 60 cm from the paint surface (180 bars maximum).

Always carry out cleaning processes in a shaded area, never in direct sunlight.

To prevent corrosion problems, any stone chips / damage must be rapidly repaired with the correct SELEMIX® paint system.



## Detergents and their modes of use

Type	Description	Function
<b>Detergent</b>	Great variety available: the simplest versions are soap based.	Easily wet on the surface of paint films and emulsify organic deposits.
<b>Phosphate</b>	Generally Sodium Phosphate.	Removes the Calcium / Magnesium salts in Hard water.
<b>Organic Solvent</b>	In general Alcohols and Ketones.	Helps to soften and remove grease deposits.
<b>Free Alkali agents</b>	Sodium Hydroxide (Caustic Soda) NaOH.	Dissolves oils and waxes. Can attack paint resins and pigments. Cleaners containing the following aggressive chemicals are strictly not recommended.

### Soaps and detergents

The molecules of soap possess a hydrophilic nature (soluble in water) and also a hydrophobic nature (soluble in greases).

They are capable of mixing with some greases which are not soluble in water and dispersing these greases in an emulsion solution.

Also they reduce the surface tension of insoluble particles allowing them to be removed more easily from a paint surface.

### Acids, alkalis and the PH scale

The pH scale is a numeric graduation going from 0 to 14.

The neutral aqueous solutions have a pH of 7, Acids have a pH < 7, and Alkalis have a pH > 7.

The graduation is logarithmic, and one unit of pH has a factor equivalent to 10 in the concentration of acids or alkalis.

## The pH Scale

Acidity increasing

Alkalinity increasing

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>
<b>Acid Strong</b>		<b>Acid Weak</b>		<b>Neutral</b>			<b>Alkaline Weak</b>		<b>Alkaline Strong</b>					

For the dilution of Alkalis by a factor of 10, the pH is reduced by one unit. For the dilution of Acids by a factor of 10 the pH is raised by one unit.

Factor of dilution	Change of pH
<b>x 10</b>	1 Unit
<b>x 100</b>	2 Unit
<b>x 1000</b>	3 Unit

## Cleaning of paintwork

The table below lists the different types of dirt and the recommended methods of removal.

Read carefully the recommendations supplied with the different cleaning agents and ensure that they are used correctly. Do not use any abrasive products. Rinse carefully with clean water, before use of any detergents and always thoroughly rinse after using detergent cleaners.

Contamination	Causes	Method of Cleaning
<b>Pollution coming from the road or from the road or</b>	Sand, oil, carbon, exhaust gases, road tar, dust, resin from trees, bird lime, acid rain, etc.	Clean with a suitable aqueous detergent, rinse thoroughly and dry.
<b>General dirt</b>	Mud, earth, etc.	General cleaning with a pressure washer.
<b>Pollution coming from substances coming into contact in used</b>	Cement, Lime, Ashes	Clean using dedicated solution
	Oils and Greases	Steam clean or use a cleaner with an alkaline base (ensure correct dilution and strictly avoid Caustic Soda)
	Flour	Clean using dedicated solution in a pressure washer.
	Other substances	Specific agents depending upon the contamination.

## Methods and Tools used for cleaning paintwork

Rinse the vehicle thoroughly using clean water, before using a solution containing a cleaner. After cleaning, rinse thoroughly again using clean water.

Type	Recommendation
<b>Detergent Products</b>	Great variety available: the simplest versions are soap based. Alkaline - Dilution as per cleaner TDS pH 7-8 (maximum)
<b>Brushes</b>	With long, soft bristles, and must be properly maintained and replaced regularly.
<b>Sponges</b>	Clean and soft
<b>Buckets</b>	Washed and cleaned regularly. Replace with fresh clean water and detergent after each use.
<b>Pressure Washing</b>	The lance must be kept at a minimum distance of 60 cm from the paint film, with a maximum pressure of 180 bars. Always use the correct dilution.
<b>Temperature of Water</b>	Maximum 50°C for cleaning. Ambient temperature for rinsing.
<b>Rinsing</b>	A large volume of cold clear water should be used, so that no detergent/ Cleaner is left on the surface of the paint film.

## Problems caused by ineffective cleaning

Problem	Cause
<b>Unit remains dirty after the cleaning</b>	Greasy film has not been removed, bad choice of detergent. Temperature too low. Inadequate rinsing.
<b>Solid residues on the paint surface when the vehicle is dried</b>	Inadequate rinsing allowing the cleaning solution to dry on the paint surface.
<b>Matt Appearance when dry, gloss can only be returned by polishing</b>	Caustic attack from the cleaner. Usually due to incorrect dilution of the cleaner or inadequate rinsing.
<b>Residues of Cement / Lime not removed</b>	Incorrect type of cleaner.
<b>Change of colour, reduction of gloss, marbled appearance.</b>	Pigments attacked by very strong acids or alkalis.
<b>Matt patchy appearance</b>	The effect of strong sunlight (UV) on poorly rinsed areas can result in an accelerated and irregular matting of the paint.

# Storage

At the end of a season the trailer body and chassis should be thoroughly cleaned, removing all materials, muck, grease and dust.








## **To clean the inside of the body;**

- Tip the trailer slightly so the tailboard safety valve would allow oil to pass through to operate the tailgate.
- Open the tailgate.
- Using taps on the side of the trailer near tailboard cylinders to lock oil flow.
- Enter the body.
- Remove material from the inside of the body, floor and sides and brush them out or the rear, ensuring to dispose of them correctly.
- Exit the body.
- Open the taps and close the tailgate.
- Tip the body, and lower it on the safety body prop.
- Clean the underside of the body and the trailer chassis.
- Remove two bolts on each underside of the front of the body to allow water to drain.
- Lower body.

## **Before Storage**

- Visually inspect the full trailer and replace any parts that are worn, broken or missing.
- Replace any warning decals and respray areas of worn paint.
- Coat areas on exposed metal with a light coating of oil to prevent rust and seizing of moving parts.

# Recommended Lubricants

	<b>Grease</b>	<b>Oil Floor Drive Gearbox</b>	<b>Oil Rotor Drive Gearbox</b>
	Energrease LS/LS2	Energear Hypoid 80w-90	Energear Hypoid 80w-90
	Marfak All Purpose 2 Multifak EP2		
	Agricastrol Multi Use Spheerol AP2 Castrol LM	EPX 80w - 90	EPX 80w - 90
	Esso Multi- Purpose Beacon 2		
	Mobilux 2 Mobigrease MP	Mobilube 1 SHC 75W-90	Mobilube 1 SHC 75W-90
	Farm Grease Universal Retinax A	Spirax A 80w-90	Spirax A 80w-90
	Multifak EP2 Totalfarm Multis 2	Geartex EP-C 80w-90	Geartex EP-C 80w-90

# OPERATING INSTRUCTIONS & TEST PROCEDURES

**For Two-Line Air Systems Including ABS**

## IMPORTANT!

**Before working on braking systems and components always observe the following precautions: -**

- a) Stop the engine before working under a vehicle.
- b) Always chock the trailer wheels, because depleting the system pressure may cause the vehicle to roll.
- c) Keep hands away from actuators and brake levers as they may move as the system pressure changes.
- d) Never connect or disconnect an air line containing pressure, it may whip as the air is released.
- e) Never remove a component or plug unless you are certain all system pressure has been released.
- f) Never exceed maximum working pressures.
- g) Never attempt to dismantle a component until you have fully read and understood the recommended procedures.
- h) Use only the correct tools and observe all safety precautions pertaining to use of these tools.

IF ALL INSTRUCTIONS ARE FOLLOWED CORRECTLY THE TWO-LINE AIR BRAKING SYSTEM WILL PROVIDE YEARS OF TROUBLE FREE SERVICE

## WARNING!

**Thoroughly read and understand this manual before attempting any remedial work, or adjustments to this braking system.**

## DOCUMENT CONTENTS

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<b>Page 115</b>	Two-line trailer air braking system – Operation
<b>Page 116</b>	Two-line trailer air braking system – Operation (Continued)
<b>Page 117</b>	Basic pneumatic checks
<b>Page 118</b>	Basic pneumatic checks (Continued)
<b>Page 119</b>	Setting Instructions for RELSV
<b>Page 120</b>	Setting instructions for RELSV (Continued) Safe coupling and uncoupling of trailers with two-line air braking system
<b>Page 121</b>	ABS System – Description and operation
<b>Page 122</b>	Basic ABS checks
<b>Page 123</b>	Basic ABS checks (Continued)
<b>Page 124</b>	Basic ABS checks (Continued)
<b>Page 125</b>	Troubleshooting – Pneumatics
<b>Page 126</b>	Troubleshooting – ABS

### Introduction:

Since 1986 trailers used for the sole purpose of Agriculture, Horticulture or Forestry, and travelling below 20mph have been allowed to have a braking performance of just 25%. This means that a tandem axled agricultural trailer with 16 tonnes of weight imposed on the road, by its tyres, would need to generate a minimum braking force of 1000 kg per wheel.

However, the same trailer travelling above 20mph, or not being used for Agriculture, Horticulture or Forestry would be required to have twice the braking capacity, and generate a minimum of 2000 kg braking per wheel.



Trailers travelling at above 20mph are required to have a two-line air braking system, and meet the prevailing standards for HGV trailers. The tractors will also need to meet the higher braking performances, and other design criteria.

### **Two-line system – Maintenance:**

Generally speaking, the trailer two-line air braking system requires little specific maintenance. However, the whole system should be drained regularly to remove any water from the tanks.

Regular inspections should be undertaken, where all of the pipes are visually inspected to ensure that none have become kinked or worn, and all mechanical linkages should be checked, and lubricated as necessary.

The air filters can be checked for contaminants (after disconnecting both of the air susies), and these can be cleaned/replaced as necessary.

The ABS system, if fitted, is designed to monitor itself for faults.

As long as the ABS warning lamp functions correctly and the wheels do not lock, then most of the ABS system is virtually maintenance free.

However, after removing the drums/hubs care should be taken to ensure that the ABS sensors are in their correct positions, and that the teeth on the pole-wheels are free from damage and ferrous contamination. The ABS sensors should be greased using high melting point grease, so that they do not seize in their mounting bushes, and they should be pushed in by hand until they are in contact with the pole-wheels.

In order to maintain a safe level of braking, the foundation brakes need to be serviced to the same levels as HGV trailers. Any reduction in the performance of the trailer's foundation brakes can adversely affect the life of the tractor's brakes, and possibly invalidate any warranty claims.

Two troubleshooting pages are included at the end of this document, as well as extra technical detail concerning the RELSV and ABS.

Specialist diagnostic services are available to cover any aspect of the air/ABS system, and help should be sought if any doubt exists about safety critical items.

# OPERATING INSTRUCTIONS & TEST PROCEDURES

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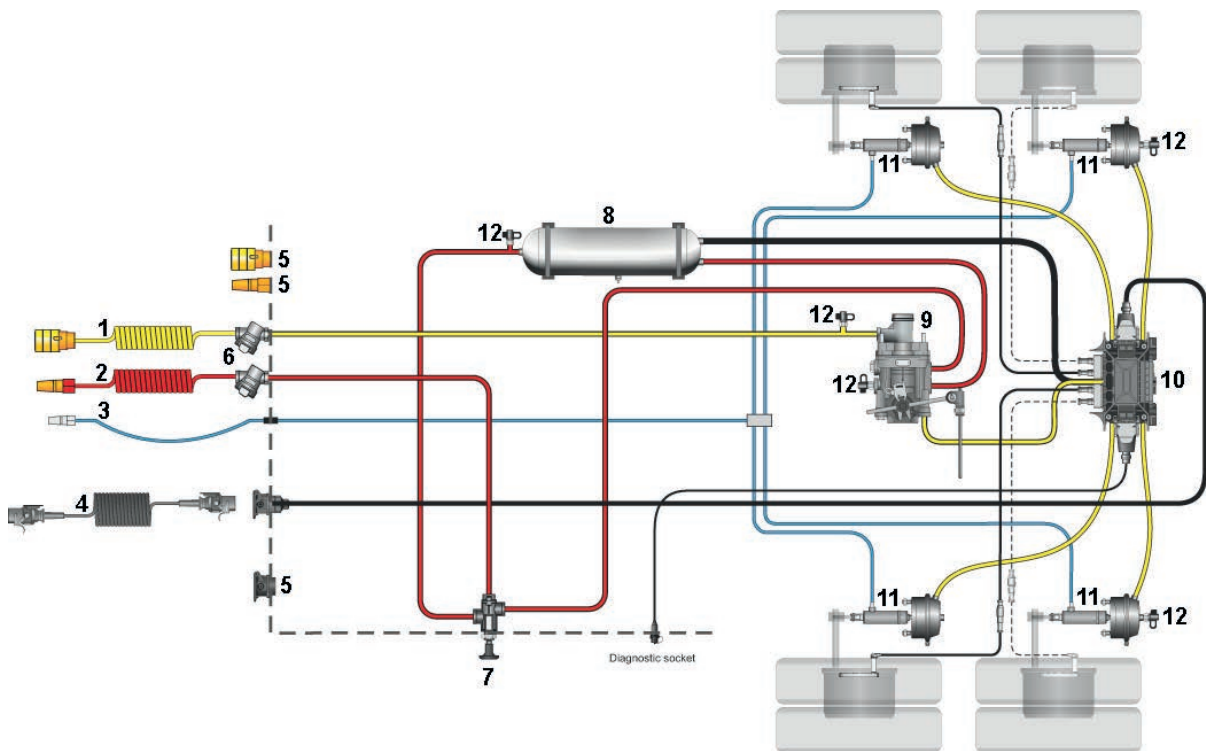
For

## Two-Line Air Systems Including ABS

### IMPORTANT!

Before working on braking systems and components always observe the following precautions: -

- a) Stop the engine before working under a vehicle.
- b) Always chock the trailer wheels, because depleting the system pressure may cause the vehicle to roll.
- c) Keep hands away from actuators and brake levers as they may move as the system pressure changes.
- d) Never connect or disconnect an air line containing pressure, it may whip as the air is released.
- e) Never remove a component or plug unless you are certain all system pressure has been released.
- f) Never exceed maximum working pressures.
- g) Never attempt to dismantle a component until you have fully read and understood the recommended procedures.
- h) Use only the correct tools and observe all safety precautions pertaining to use of these tools.



Position Number	Description	Position Number	Description
1	Yellow line Susie	7	Shunt Valve
2	Red line Susie	8	Air Tank
3	Hydraulic brake hose	9	RELSV
4	ABS Power Susie (5 core)	10	ABS Modulator Valve + Cables
5	Dummy Couplings	11	Air + Hydraulic Brake Chambers
6	Filters	12	Pneumatic Test Points

## Two-line system – Operation:

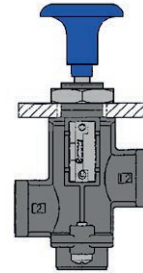
The air enters the trailer via the red susie (2), and passes through a filter (6). The filter is designed to trap particles of dirt, to stop them entering other valves further down the line. It is not designed to stop water entering the trailer's system, as this function is part of the tractor's braking system when fitted with an air dryer. From time to time it is worthwhile dismantling each filter, and cleaning out any debris that has been caught.

### Filter (6):

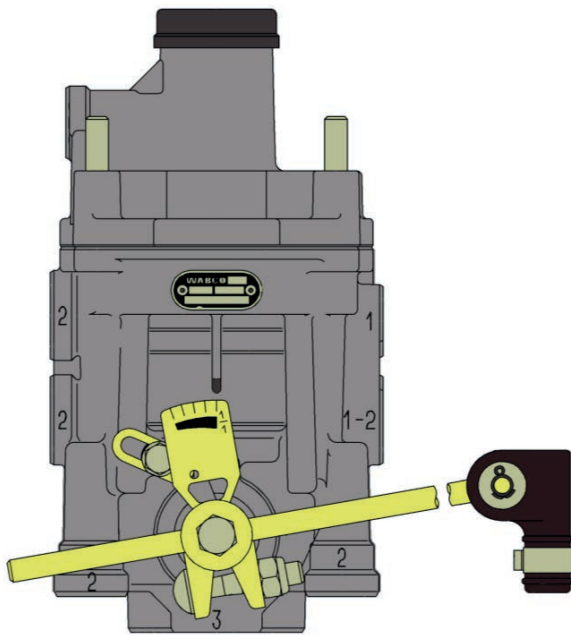


The air then passes through a shunt valve (7), which is mounted on the side of the trailer, and the air pressure pushes out its button. This button can be pushed in to release the trailer's brakes, when a tractor with air braking is not available. The button can be pulled out again, to re-apply the brakes,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

### Shunt Valve (7):



### RELSV (9):

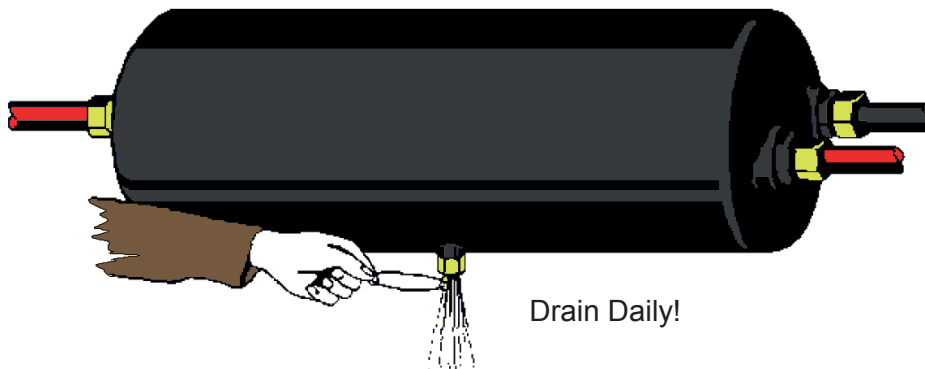


The air travels into the combined RELSV (9) at port 1, before exiting at port 1-2 to feed the air tank (8). The tank is linked back to the shunt valve, and this link is used to "fool" the RELSV into thinking the red susie has been re-connected, after the shunt button is pushed in. The tank then charges up 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 (10).

Note: Any pipe shown as red in Figure 1 (and the black pipe between the tank and ABS) will be pressurized all of the time 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 trailer's air tanks.

Draining is achieved using a drain valve which is found at the bottom of each air tank. Draining should be done periodically to remove any water that has condensed in the air tanks. Failure to drain the tanks will lead to a reduction in the available air capacity of the tanks, affecting the brake performance, and this water may also freeze in the winter, causing other problems.

### Air Tank (8):



## Two-line system – Operation (Continued):

During service braking, a control pressure is sent to the trailer down the yellow susie (1). This pressure 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, before reaching the RELSV at port 4.

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

The service pressure may be modified by the RELSV based upon the weight sensed by the valve, as the RELSV is connected to the suspension via a vertical linkage (rod) and its operating arm.

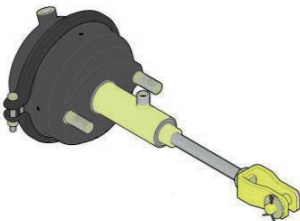
With tandem axled trailers it is common to be connected between the two axles by either telescopic pole or an angle iron, in order to give the RELSV an average spring deflection. The angle iron is usually mounted using rubber bobbings which absorb the movement between the axles.

(With tri-axled trailers there is no need for an angle iron, as the RELSV is generally connected directly to the centre axle.)

As weight is removed from the trailer its chassis raises, causing the RELSV's 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 at port 2, and signals the ABS modulator valve at its 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 a "wheel locking tendency" is detected. (A full description of ABS function is given later).

### Air + Hydraulic Brake Chamber (11):

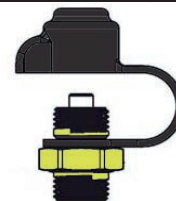


The brakes are applied in a controlled manner, as the pressure builds up behind a rubber diaphragm housed inside the brake chambers (11), and the output forces act on the slack adjusters (or levers) increasing the torque entering the foundation brakes via the camshafts.

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, where it exhausts to atmosphere. Therefore 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 (12), one of which should be found in one of the spare ports in the brake chambers. (A test procedure is given later).

Test points can be added to any spare ports, and they come in two standard port sizes being M16x1.5 and M22x1.5. They can also be used to drain the air tanks, should no drain valve be fitted.

### Test Point (12):



The two-line air braking system contains an "emergency" function, which is designed to apply full tank pressure into the brake chambers (irrespective of load condition) should the red susie be removed, or become ruptured.

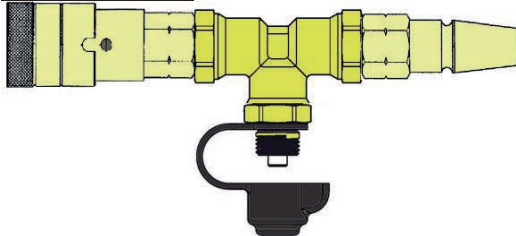
This function is part of the RELSV, where the pressure in the red line and tank are "compared", and tank pressure is delivered into the brake chambers, via the ABS modulator, should the red line pressure fall below 2.5 bar. This happens automatically when the trailer's red susie is removed during uncoupling.

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

## Basic pneumatic checks:

In order to perform some basic air checks, at least two good quality, calibrated air gauges are required, along with their connecting hoses, and often a few extra assorted test points. The trailer should have test points positioned around the system, so that tests can easily be carried out. All test points have the same size connecting thread (M16x1.5) where the test hoses attach, and it is useful to have long test hoses so that two gauges can be positioned close together and viewed simultaneously.

### Test Coupling:



If there are no test points in the yellow line leading up to port 4 of the RELSV (port in the top section), then a good alternative is to make up a test coupling c/w a test point to fit between the tractor and trailer's susie. These can have a male C-Coupling at one end, and a female at the other, or suitable Palm Couplings if these are fitted.

These test couplings are useful to test the pressures coming from the tractor, whilst still connected to the trailer.

### Test 1 (Charging Test):

Disconnect the red susie from the tractor, and drain all of the air from the trailer's air tank(s), and attach one gauge to a test point on one tank (fit test point if necessary – normally M22x1.5 threaded).

Fit a second air gauge in the red line (using male/female test coupling as described above), push in the shunt valve button and reconnect the red susie. The button should pop out as the red susie is connected.

Have the two gauges side-by-side and monitor each gauge as the system charges up. You want to see the tank pressure rise in line with the red line (it may be slightly behind), until the tank is fully charged and the tractor unloads (blows off).

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, or the pipe work leading to port 1 of it.

This pipe can be tested by disconnecting the red susie, and temporarily removing the pipe from port 1 of the RELSV, 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 rise 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 susie. A "chuff" of air should be heard as the air exits the open red line. Observe the air gauge connected to the trailer's air tank, and the pressure should drop momentarily, then stabilize.

If the tank 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 susie, 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 susie, 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".

## **Basic pneumatic checks (Continued):**

### **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.

Attach the other gauge to a test point on any brake chamber. If none are available, then an M16x1.5 threaded one can be added to a brake chamber, as most brake chambers have an extra port which has been blanked.

Fully charge the trailer, and keep the red susie connected.

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 we are not yet testing the settings of the RELSV.) If the pressure in the yellow line is "jerky", then so will be the pressure in the brake chamber. 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 jerky 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, as it must be giving out a jerky pressure, even though it is signalled with a smooth one.

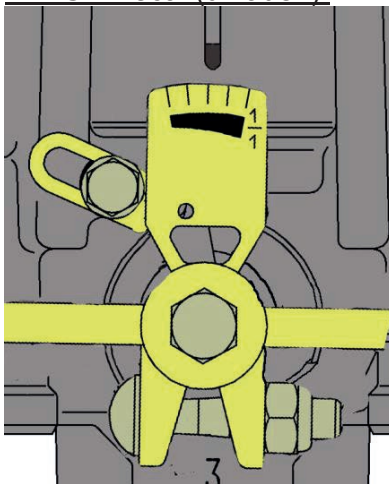
The same tests can be repeated for looking for residual pressure problems, should both gauges not show zero pressure when the service brakes are released.

### **Test 3 (Output of the RELSV):**

The RELSV 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. This linkage, along with any other components (angle iron, cotton reels 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 susie 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.

### **RELSV Decal (unladen):**



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.

Full RELSV setting instructions are given on the next two pages.

## RELSV Setting Instructions:

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" passed the tractor. Also, too much pressure causes premature and expensive trailer tyre wear.

Periodically 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!

### Step 1:

Have the trailer completely laden (the maximum weight allowed) and stand it on level ground whilst still connected to the tractor. 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).

### Step 2:

Remove the load completely 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 was **25mm**.

### Step 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, or J H Milnes.

**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.

### Step 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**

### Step 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.

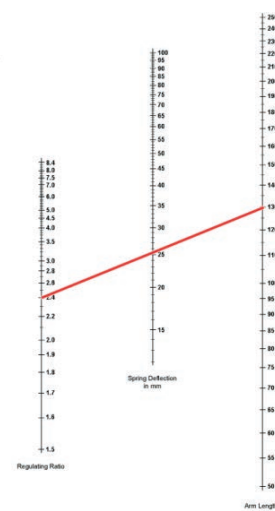
In the central column find the point which relates to your unladen to laden spring deflection, which you measured in Step 2 (25mm). Mark that point.

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.

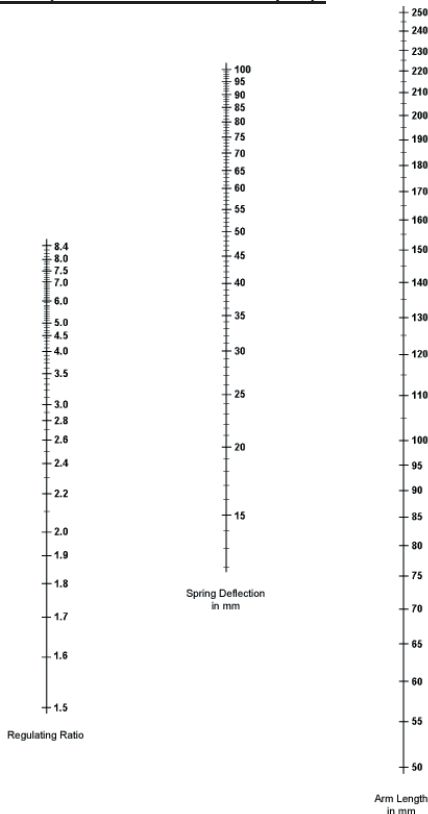
Adjust the arm length on the valve accordingly, and tighten the securing bolt.

Figure 2 Example:

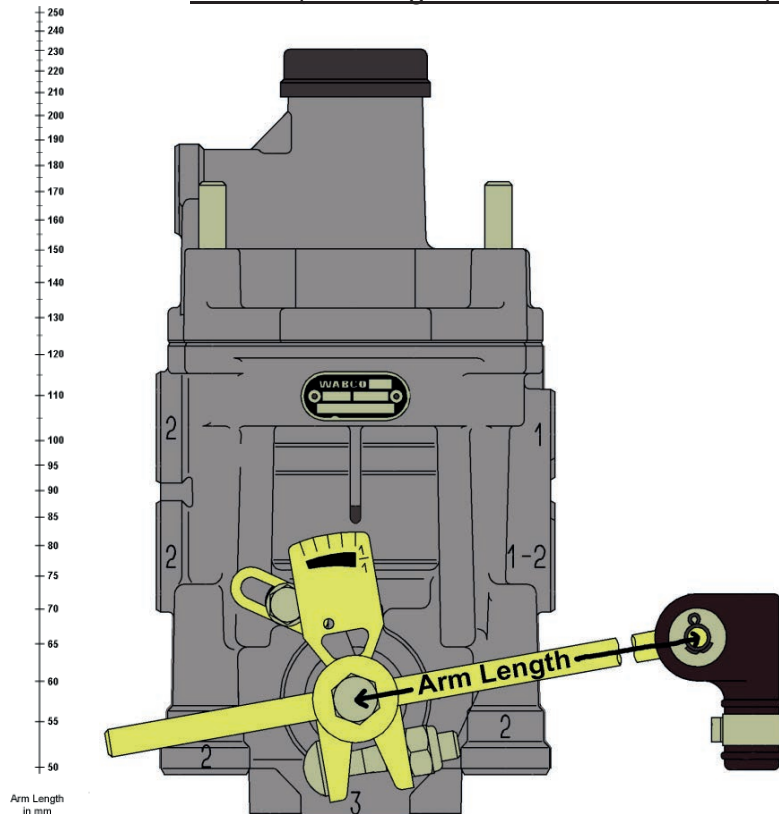


## RELSV Setting Instructions (Continued):

Figure 2 (RELSV Arm Graph):



RELSV (Arm length and laden decal shown):



### Step 6:

Check the unladen setting by applying the test pressure down 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.

Conversely, 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  $\pm 0.2$  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.

## Safe coupling and uncoupling of tractor/trailers with two-line air braking:

The safe operation of the two-line air system relies on the driver correctly connecting the two air lines between the tractor and trailer, as well as any ABS power cable.

When coupling an air braked trailer to a tractor never have just the red line connected. (That is to say, connect the yellow line first when coupling, and remove the red line first when uncoupling.)

Follow all other Health & Safety rules and remember it is always good practice to not walk/climb between the tractor and trailer during coupling and uncoupling.

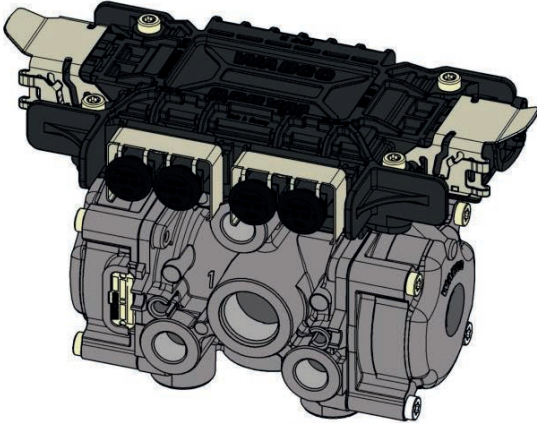


## ABS Description and operation:

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 looking for a “locking tendency”.

The ABS system consists of an electronic control unit (ECU) and a modulator valve which is hard wired directly onto the ECU.

### ABS ECU and Modulator Valve:



Both 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 going to one side of the trailer. The braking going to the other side of the trailer is controlled by the other half of the ECU and modulator.

Two ABS sensors are mounted in the brake assemblies on 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.

Even though a trailer may have four wheels and 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. Because of this, ABS systems are available with two or four ABS sensors.

Trailer ABS systems comes in either 12 volt or 24 volt variants, which cannot be towed by a vehicle with the other voltage. Although they look very similar, the main dedicated power supply socket (known as ISO7638) is different. Once correctly powered, the ECU “exercises” the ABS modulator valve, and this can be heard as a series of clicks, including some quick exhausting, if the service brakes are applied.

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, and if it comes on during driving, the driver should proceed with great caution, and get the system checked out as soon as possible by a trained person, with the correct diagnostic equipment. A simple rule of thumb is that the lamp must come on and go out, and stay out whilst driving. If it stays on until the vehicle is driven, then this is OK as well.

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

The ABS ECU monitors, processes and compares the wheel speeds detected at the wheel sensors, and only acts on this information if it believes there is a chance that one, or more of the sensed wheels are about to lock. At that point the ECU sends 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 sent to the exhaust port, resulting in air being dumped from the respective brake chambers. The wheels speeds are controlled in this way until the ECU is satisfied that the lock-up has been averted, and then normal braking is resumed.

## Basic ABS Checks:

As mentioned earlier, 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.

"Wiggle tests" can be done at any time to see if cables have intermittent breaks.

These are best done with the ignition ON, following the warning lamp going out.

By wiggling any cable, 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 during the wiggle test, indicating a break in the power feed.

Wiggle testing the ABS sensor extension cables, where they connect to the ECU, is also very worthwhile, and these cables can be "tightened" using a small flat screwdriver to slightly distort the two small female pins found inside the ABS extension cables, having firstly disconnected them from the ECU.

Always make sure that they are correctly reconnected following any removal.

Power and warning lamp checks are best performed using two bare 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 susie, 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 shown below take place within the ISO 7638 power supply.

### Test 1 (Exercise check):

When the ignition is switched ON, can the trailer be heard to exercise? (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 susie disconnected from the tractor (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, connect one wire from the test lamp to pin 5, and the other to pin 4 (see Figure 3 for pin positions). The ABS warning lamp should illuminate, but not the test bulb (If the test bulb illuminates brightly, the tractor has a wiring fault).

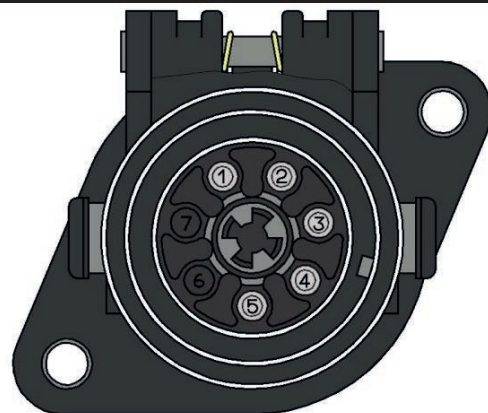
If the warning lamp fails to switch ON and OFF as the test lamp is connected and disconnected, then the ABS warning lamp fault is within the tractor wiring.

If the warning lamp operates correctly, repeat the tests into the plug on the ABS susie (Figure 4), 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.

Note: The pin numbers have changed to pins 4 and 7 (see Figures 5 & 6).

Figure 3 (12v ABS Socket on tractor):



## Basic ABS Checks (Continued):

Figure 4 12v ABS Plug:

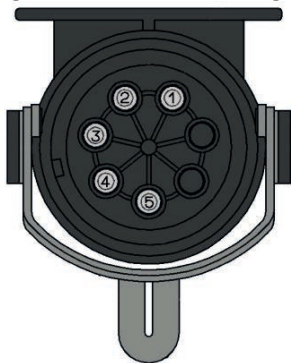


Figure 5 ABS Wiring:

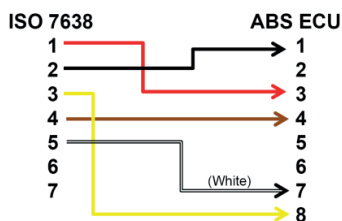
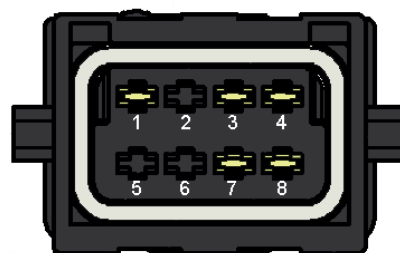


Figure 6 ISO Power cable:



If the warning lamp is functioning correctly, then we now know that all of the ABS warning lamp wiring is correct.

Should the ABS warning lamp fails to illuminate now, after reconnecting all of the cables, and switching the ignition ON, then the fault must be inside the ABS ECU.

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, we now know that the ECU is functioning correctly, so make a note of the number of flashes, as these can be used to identify the source of the problem.

### Test 3 (ABS Power Test):

Using the 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.

If it fails to illuminate then check the fuse (often 5 Amp). Also check that that it switches ON/OFF with the ignition ON/OFF.

Repeat the test with the test lamp across pins 1 and 4.

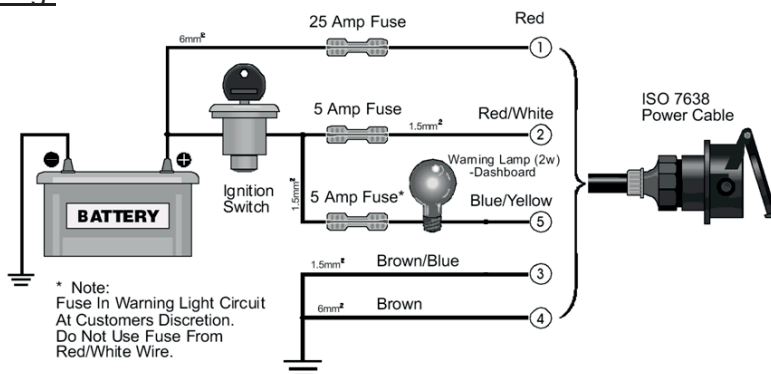
If the lamp fails to illuminate then check the fuse (often 25 Amp). With the test lamp across pins 1 and 4, the lamp **may** stay illuminated, even after the ignition is switched OFF, and if it does then this is OK as well.

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 into the ABS 7638 susie, having firstly disconnected it from the trailer's socket, in order to check the susie for damage.

Finally the rest of the ISO 7638 cable can be checked by repeating the tests at the ABS ECU end, remembering that the pin numbers are different, so refer to wiring diagram shown in Figure 5.

### Tractor's ABS Wiring:



## Basic ABS Checks (Continued):

### Basic blink code errors:

By starting the blink code, any current ABS wiring fault error codes are blinked out by the trailer's ABS warning lamp, which is in the tractor. The error codes are repeated three times.

A table of the error codes is shown below.

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

With fault codes 3 4 5 6 7 14 and 15, these same numbers appear as casting numbers on the ABS ECU, allowing the faults to be traced to a specific connection.

### Component Checking:

As the ABS system consists mainly of three basic components (ECU, Cables and ABS Sensors) the best way to diagnose many faults is by way of substitution. This is ideal for checking cabling/ABS Sensor wiring problems, when no specialist diagnostic tools are available.

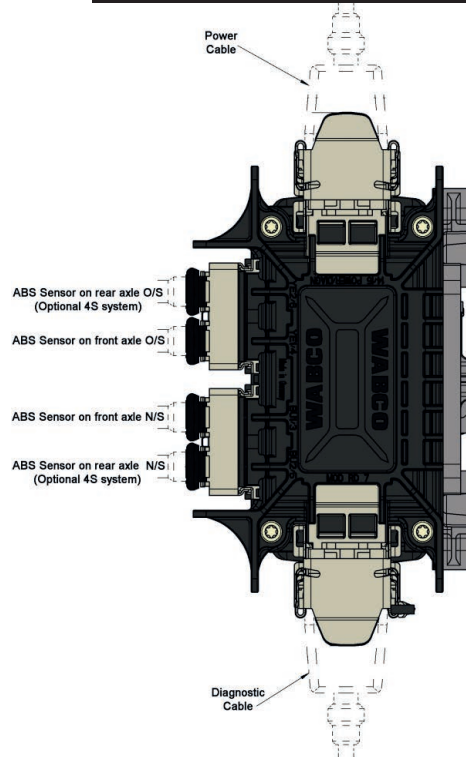
When removing any cable it is vital that the cable is marked, so it can be returned to its original position. It is also imperative to ensure that no unused electrical connections are left open, as water will enter the electronics and cause premature failure.

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 are shown opposite, and only the two central ABS cables are used for a two ABS Sensor system.

If in doubt contact a specialist ABS repairer!

### ABS Cable Connections (typical):



## TROUBLE SHOOTING - PNEUMATICS

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
	INSUFFICIENT PRESSURE IN TRAILER'S AIR TANK	CHECK TRAILER'S YELLOW AIR LINES FOR KINKS OR BLOCKAGES
INSUFFICIENT PRESSURE IN TRAILER'S AIR TANK	POOR AIR FLOW TO TRAILER'S AIR TANK	CHECK THAT AIR FLOWS UNRESTRICTED FROM PORT 1-2 OF RELSV, WHEN THE RED SUSIE IS CONNECTED AND PRESSURIZED
		CHECK FOR KINKED OR BLOCKED PIPES
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 (SEE INSTRUCTIONS ON PAGE X)
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
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

## TROUBLE SHOOTING - ABS

PROBLEM	CAUSE	SOLUTION
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
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	SEE POWER FAULTS ABOVE
	ABS SENSOR AIR GAP	CHECK ABS INSTALLATION
	POLEWHEEL WOBBLE	CHECK POLEWHEEL INSTALLATION

## MENU Screen



- A** Alarm graphic - shows both alarms
- B** Alarm set key
- C** Print key - prints net, gross, time & date in weighing screens
- D** Menu key - scrolls thru' NET, GROSS & MENU screens
- E** Service reminder, flashes when weigher service is due
- F** OK key - enters data
- G** Down arrow key - scrolls down menu
- H** Up arrow key - scrolls up menu
- I** Back Up key - goes back a step

<b>Display</b>	Changes OLED contrast to high, medium or low. Also shows info: version & serial no.
<b>Diagnostics</b>	Engineers screen. Shows two channel weights and input milli-volt signals
<b>Alarms</b>	Two alarm setpoints - PIN code required To mute alarm - press any key
<b>Options</b>	Modes: Switches GROSS on & off Load: On or off RS232: Printer or scoreboard mode Count by: 1, 10, 20, 50, 100, & 200 kgs Z/func: Allow/inhibit keyboard zero
<b>Configuration</b>	To select 1 or 2 channels, air, oil or fifth wheel. Split: For split axle systems. Option for total Ch1 + Ch2 or separate Ch1 & Ch2 calibrations
<b>Calibration</b>	Weighing system calibration settings
<b>System</b>	Accesses password set and resets. Note. for PUK (PIN unlock code) contact service who will take you through your PIN retrieval. Edit time and date in system.

<b>Display</b>	Changes OLED contrast to high, medium or low. Also shows info: version & serial no.
<b>Diagnostics</b>	Engineers screen. Shows two channel weights and input milli-volt signals
<b>Alarms</b>	Two alarm setpoints - PIN code required To mute alarm - press any key
<b>Options</b>	Modes: Switches GROSS on & off Load: On or off RS232: Printer or scoreboard mode Count by: 1, 10, 20, 50, 100, & 200 kgs Z/func: Allow/inhibit keyboard zero
<b>Configuration</b>	To select 1 or 2 channels, air, oil or fifth wheel. Split: For split axle systems. Option for total Ch1 + Ch2 or separate Ch1 & Ch2 calibrations
<b>Calibration</b>	Weighing system calibration settings
<b>System</b>	Accesses password set and resets. Note. for PUK (PIN unlock code) contact service who will take you through your PIN retrieval. Edit time and date in system.

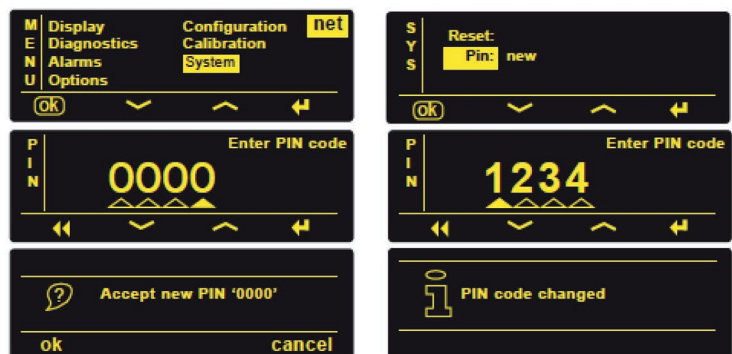
## CALIBRATION AND SET UP - follow these five steps

### STEP 1 ENTERING PIN CODE

1. In MENU screen select SYSTEM press **ok**
2. Press **↓** key to select PIN:
3. Press **ok** to display PIN input screen
4. Press **↓** & Keys to number. Press **←** to move cursor left
5. When PIN is entered press **→** to enter code
6. Press **ok** to accept PIN
7. Press **←** to back up to MENU
8. To set PIN, select PIN **ok** repeat 2 - 6

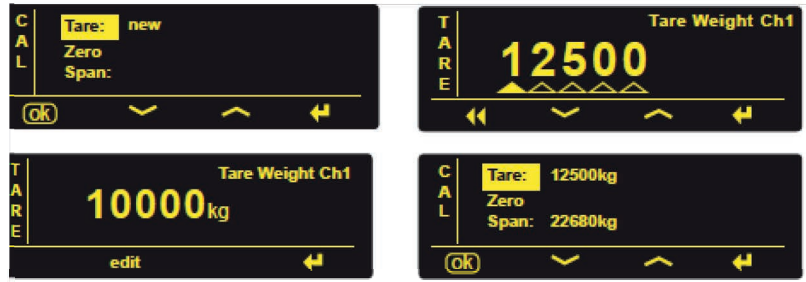
Note. PIN is needed for every calibration change

PIN can be reset to a new code of your choice. If PIN is lost call Service.



## STEP 2 SET THE VEHICLE TARE WEIGHT

1. Ensure vehicle is empty, weigh & record TARE (kerb empty) weight
2. In MENU screen select CALIBRATION press **ok**
3. Select TARE press **ok** defaults to 10000
4. Press **edit**
5. Enter the vehicle TARE (empty weight) as in stage 1
6. When done press **↩**
7. Press **↩** to return to MENU screen



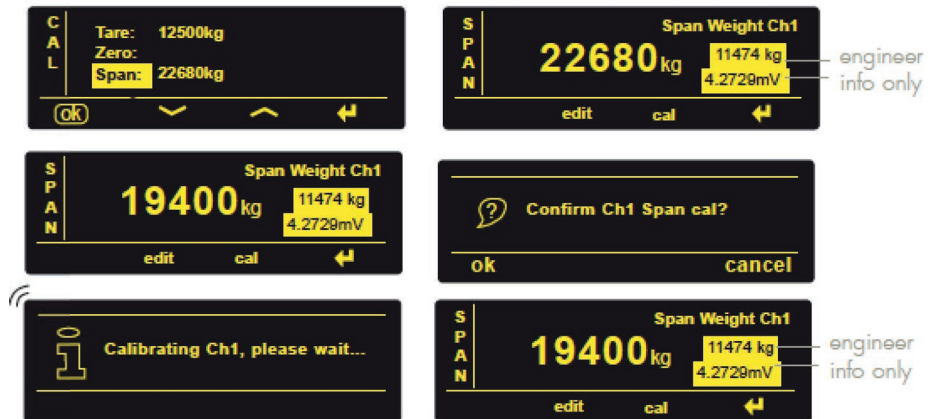
## STEP 3 SET THE ZERO (EMPTY) CALIBRATION

1. If the vehicle is a tipper, raise the body clear of the chassis
2. In CAL menu Press **▼** to select Zero
3. Press **ok**
4. Press **cal** key
5. Press **ok** to confirm channel 1 Zero CAL
6. Press **↩** to return to CAL menu



## STEP 4 FULL SPAN (NET LOAD) CALIBRATION

1. Load vehicle to its legal maximum, weigh & record GROSS:
2. Subtract the TARE (or KERB) weight from the GROSS weight to give the SPAN (NET) weight. E.g. 31900kg  
GROSS - 12500kg, TARE = 19400kg SPAN (NET)  
PAYLOAD
3. If the vehicle is a tipper, raise the body clear of the chassis
4. In CAL menu press **▼** to select Span
5. Press **ok** defaults to 22680kg
6. Press **edit**
7. Edit the SPAN (NET) PAYLOAD weight, as in STEPS 1 & 2 above, press **↩** when done
8. Press **cal** to enter CAL. Press **ok** to confirm
9. Press **↩** twice to return to MENU screen

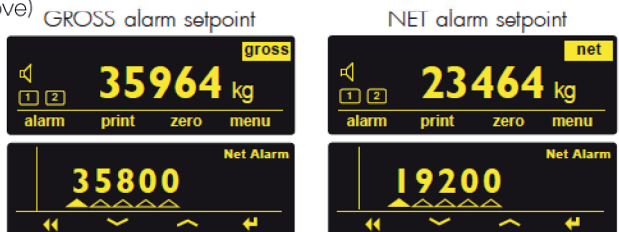


### Reverse ZERO/SPAN

The reverse zero/span is used to do a simultaneous zero and span calibration. Allows span calibration when the truck is full before zero calibration. You must be in single channel mode, ch1 only. See technical bulletin: M3505 - Version 01-11 Update - M3505 v01-11

## STEP 5 ALARM SETPOINTS (pin code required, see step on above)

1. In MENU, select ALARMS. Two setpoints appear, select 'Alarm 1'
2. Press 'OK' to toggle between 'ON' or 'OFF', select 'ON'
3. Select 'Output' Invert or Normal (see note)
4. Select 'Gross-Sounder', 'Net-Sounder', 'Gross-PPCO' or 'Net-PPCO'
5. Select 'Alm', alarm will activate at this weight. Press 'Edit' and enter target weight setpoint using techniques in previous steps.
6. 'Hys' Hysterisis (see note) edit in kg
7. 'Trigger' select- OFF, 2 seconds, 5 seconds or 10 seconds (see note)
8. When all settings are correct press **↩** to input settings
9. For alarm 2, select 'Alarm 2' and repeat STEP 5



### Note.

Output: Normal = +12 vdc to power an alarm, output invert = -12 vdc to deactivate (a packer)

PPCO: Packer-Plate cut-off, refuse trucks only

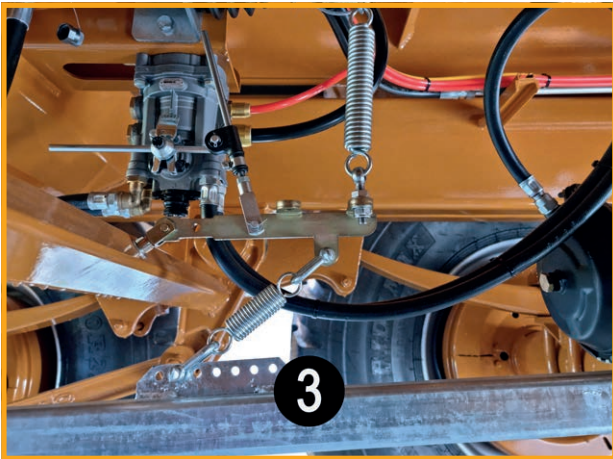
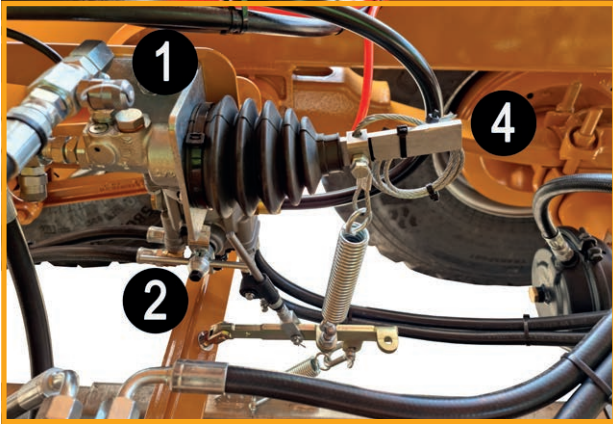
HYS: Is hysteresis and gives the option to activate the alarm in a window range above and below the alarm setpoint (an alarm reset tolerance)

Trigger: This is a selectable delay prior to alarm activation



# Brake system

## Hydraulic System Load sensing valve General Description



The Hydraulic Load Sensing valve [1] is mounted to the trailer chassis above the axle, and is connected to the Trailers hydraulic brake line.

A cable and spring linkage [2] connects the valve operating lever [4] to a balance beam [3] between the axles. If the trailer is a Tri axle vehicle the centre axle is used.

As the trailer is loaded and the Body position changes relative to the axle, the movement of the lever [4] changes the output of the valve.

When the lever is fully spring returned (Upwards) the valve allows a maximum pressure of 150 Bar (2175psi)

When the lever is fully open (Downwards) the valve is set to allow a maximum pressure of 25 Bar (362psi)

The position of the lever and of the cable etc are factory set.

Note! Any significant change to the unladen weight of the trailer will mean that the system must be recalibrated. Similarly if any components are removed or replaced the system must be reconfigured.

Contact your dealer or Richard Western Ltd for details

# Troubleshooting Guide

Problem	Cause	Solution
<b>LOW PRESSURE WARNING BUZZER ON ALL THE TIME: - TRAILER BRAKES WILL NOT RELEASE</b>	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
	<b>JOHN DEERE TRACTORS</b> TRAILER BRAKING PRESSURE TOO LOW  <b>NEW HOLLAND, CASE , MF CLAAS TRACTORS</b> 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
<b>LOW PRESSURE WARNING BUZZER SOUNDS WHILST DRIVING.</b>  <b>PRESS &amp; HOLD OVERRIDE BUTTON UNTIL YOU CAN SAFELY STOP</b>	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
<b>TRAILER BRAKES WILL NOT RELEASE WITH SYSTEM CHARGED</b>	RETURN FILTER BLOCKED WITHIN THE TRACTOR-TRAILER BRAKING VALVE	<b>JOHN DEERE TRACTORS</b> 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
<b>NO POWER TO ELECTRO CONTROLLER</b>	LOOSE CONNECTION OR WIRING LOOM DAMAGED	CHECK CONNECTIONS, REPAIR OR REPLACE LOOM
	BLOWN FUSE	REPLACE FUSE
<b>ELECTRO CONTROLLER NOT FUNCTIONING CORRECTLY</b>	WATER HAS ENTERED CONTROLLER	REPLACE CONTROLLER
<b>TRAILER BRAKES DO NOT APPLY WHEN ELECTRO CONTROLLER IS SWITCHED OFF</b>	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
<b>FEMALE BRAKE COUPLING WILL NOT CONNECT TO TRACTOR. EXCESS RESIDUAL PRESSURE IN BRAKE LINE</b>	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

# Trailer Weighing

## LOADWEIGH - M350S user & quick setup guide - Firmware version 4D.01.16

Power-up the display by either switching on the ignition (ignition live wiring) or press the power button behind the logo (where fitted) if the indicator is permanently wired to the vehicle supply.



to switch ON turn ignition and/or press logo



**Welcome screen**  
appears for 10 seconds



**Service and calibration due screen**  
appears for 5 seconds

Press menu key to scroll up and down menu screens

M E N U

Display  
Diagnostics  
Alarms  
Options

Configuration  
Calibration  
System

**MENU**

selectable options

---

1 2

15950 kg

print zero menu

**NET**

total load in body note, zero will appear +/- 500 kg to mute alarm press any key

---

1 2

31950 kg

print tare menu

**GROSS**

total truck weight note, zero will appear +/- 500 kg

---

On site

140 kg

zero menu

**MENU with options activated**

**LOAD**

When LOAD is activated, amount collected in one container from one site

---

print zero menu

540 kg

**TOTAL**

When LOAD is activated, total collected from different containers from one site

---

Channel 1 Channel 2

4770 kg 7450 kg

menu

**SPLIT SCREEN**

Shows channel 1 (e.g. front) and channel 2 (e.g. rear or separate hopper)

---

net 15950 kg

inc

○○○○○○○ | ●○○○○○○○

menu

**INCLINOMETER**

When activated and calibrated: Circles fill for each degree of body list left or right.

- Note
- GROSS or GWV (gross vehicle weight) is the total truck weight (NET + TARE)
  - NET 'net load' means the payload weight in the truck body
  - LOAD means part load collected or delivered, press PRINT to print and zero the load, weight collected is stored as an accumulation to NET
  - SPAN where used, means the NET weight used to calibrate the weigher
  - TARE weight means the weight of the empty vehicle
  - ALARM where fitted, an alarm sounder flashing beacon will activate when alarm setpoint is reached
  - ON SITE when 'load' is turned on in options, on site allows logging onto site and off site for weighing loads collected from a site with multiple bins (waste only)

# Additional Information

## Opening The Sheet



Undo the ratchet straps, and if not already attached clip the pullover rope to the D shackle and throw a rope over the trailer.



Unhook the strap top from the D ring, this can be stored on the hook below, if the trailer is going to move please secured it with a ratchet mechanism.



Remove the winding pole from its storage location on the chassis.



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

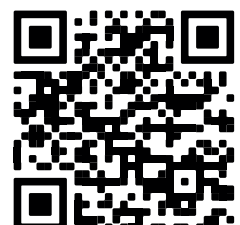


Wind sheet across to the stops on the side of the trailer. The pullover rope will follow inside the sheet.

If the trailer is going to be moved locate the winding pole back to its storage location. Throw the pullover rope to the opposite side of the trailer.



Secure the pullover rope on the rope hooks or straps as shown.



Opening the Sheet  
video by scanning  
QR Code

# Additional Information

## Closing The Sheet



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



Pull the sheet back over the trailer.



Unhook the strap from the hook underneath and hook on the D ring that's attached to a pole.

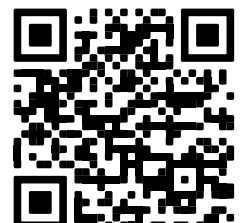


Ensure all straps are attached to the D rings and located through the ratchets on the body. The ratchets can now be tightened, do not over-tighten as this will put unnecessary strain on the sheet.



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

Opening the Sheet  
video by scanning  
QR Code



# Additional Information

## Fitting The Sheet



Offer front cowl up to trailer but do not bolt in place.



Offer the rear cowl up to the trailer at the tailgate end but do not bolt it in place.



Fix the door extension to the top of the door using 3 bolts washers and nyloc nuts. The rear cowl is to be moved to align raised lip under the centre of the double bend.



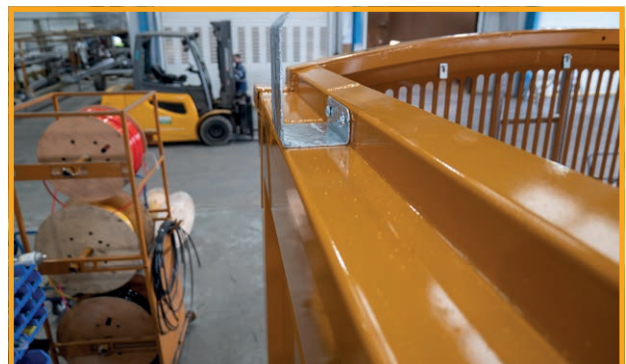
The rails can now be offered up to the trailer the cutouts should be positioned above the pivot points the rails and ends are joined by angled plates in each corner.



With the whole assembly now in place raise and lower the rear door to ensure adequate clearance.

Drill cowl fixings through the side of the trailer and bolt in place.

For the large cowl as fitted to the trailers with flat front rail, additional fixing is made to the front sheet.



It is normal for the stops to be located to the left of the trailer looking from the rear and the square tube will be on the same side. Stops might be fitted on the right side for potato operation to prevent damage from elevators. (Note the trailer is tapered wider at the rear and side poles would be drilled out and swapped to the other side with straps to change the winding direction).



Bolt centre rail to side rails with two bolts and nyloc nuts at each side this helps prevent sheet sagging in the centre.



If needed, please bend the side rails downwards where they meet the centre arch to remove height points that could damage the sheet.



Lift rolled rollover sheet and locate it in the centre of the cowl, the stop on the centre pole should be at the front of the trailer.



Unwind each side to the sides of the trailer.



Hook straps to the D Rings on the round pole.



Along the fixed side (square tube) locate the ratchet mechanism at a desired height and drill through the sides of the trailer. Repeat the process on the other side.



The bolt mechanism and feed straps through the mechanism do not tighten.

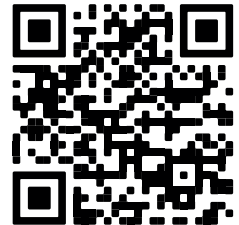


The sheet can now be rolled. Undo ratchet straps alongside the trailer and free the straps from the mechanism. Insert the winding handle into the front or rear end of the circular pole and wind the handle to the roll sheet. The sheet will roll up and come to rest against stops. To cover the trailer, pull on rope and sheet will be pulled across the trailer and dropped downside ready to reattach to the ratchet mechanism.



The winding pole can be attached to the chassis on the near side using the weld-on brackets provided.

Opening the Sheet video by scanning QR Code





# Fitting & Removing Silage Sides

## Fitting

Ensure clamp bolts in rear posts are undone fully **(2)**.

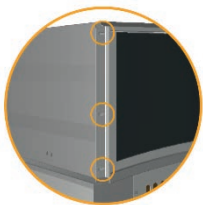
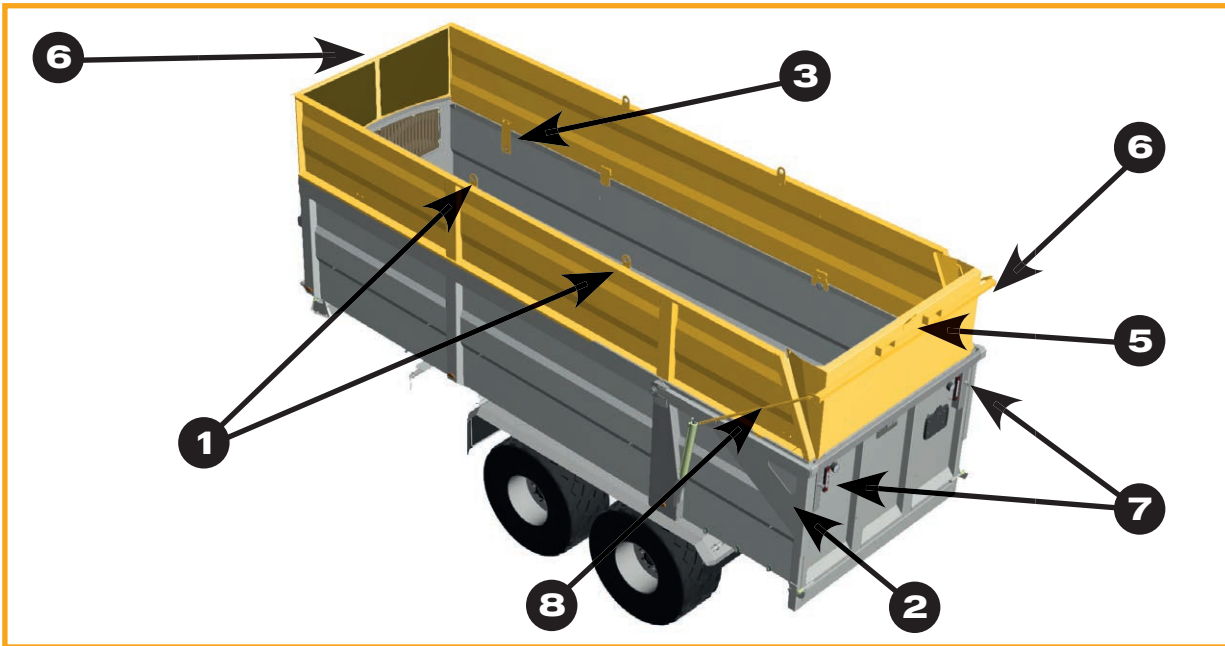
Attach suitable lifting equipment to the lifting eyes **(1)** on Silage Side.

Carefully lift into position & guide the Silage Side post into the rear post of the trailer body.



Attach using one M12 x 30 Bolt through side sheet **(3)**.

Repeat the procedure for the other Silage side.



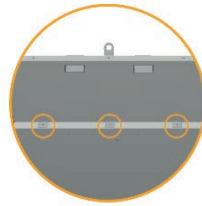
Attach the front mesh **(4)** using six M12 x 40 (for arched front sheet) and four M12 x 75 (for flat front sheet) supplied, through into front post extension and tighten to 40Nm.



Fit the Tailboard Silage Extension **(6)** using the three M12 x 40 Bolts supplied.



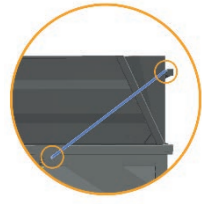
Tighten Clamp bolts on front face of rear post **(2)**.



Then re-tightening the pinch bolts **(7)**.



Ensure Pinch Bolts **(7)** are fully undone before fitting tailboard silage extension.



Attach a support bar on each side with two M12 x 55 bolts **(8)**.



Lift tailboard silage extension into position using lifting point **(5)**.

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.

# Notes

# Notes



## STONE AND RUBBLE TRAILERS



**CALL US**  
**+44(0)1728 723224**  
[www.richardwestern.com](http://www.richardwestern.com)