ScanStone

SOIL PREPARATION SYSTEMS

Operator's Instruction Manual

STONE & CLOD SEPARATORS

EC Declaration of Conformity

in accordance with BS EN ISO/IEC 17050-1:2004

RGS Forfar Ltd.
East Mains of Burnside, Forfar, Angus, Scotland DD8 2RX

declare that:

Equipment: ..... **Stone & Clod Separator** .....

Model No. .....

Serial No. .....

in accordance with the following directive:

2006/42/EC Conforms with the essential requirements of the Machinery Directive and its amending directives

has been designed and manufactured to the following specifications:

BS EN ISO 12100-1 2003 Safety of Machinery - Basic concepts, general principles for design - Basic terminology, methodology.

BS EN ISO 12100-2 2003 Safety of Machinery - Basic concepts, general principles for design - Technical principles and specifications.

BS EN 982: 1996
Safety of machinery. Safety requirements for fluid power systems and their components - Hydraulics

BS EN ISO 4254-1: 2009
Agricultural machinery - Safety - Part 1: General requirements

BS EN ISO 13857: 2008
Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs.

Signed:-

Gordon Skea
Director
RGS Forfar Ltd.

at:- RGS Forfar Ltd. Forfar, Angus, UK
on:- 12th August 2011

CE

Foreword

Scanstone Separators have been designed specifically for soil separation and removal of clod and stones from beds formed by a deep ridger or bedmaker.
They are not intended for any other use. The manufacturer shall not be liable for damage resulting from mis-usage. The user shall bear all responsibility.
Intended use also comprises adherence to the operating, maintenance and servicing instructions outlined by the manufacturer.
The machine must only be used in perfect working condition, in accordance with the aforementioned intended use and with instructions outlined in the operator's handbook. Any functional disorders, especially those which may affect safety of personnel must be rectified without delay.
Due to the high rpm of the P.T.O. shafts, the separator is in principle a dangerous machine and should only be operated by competent experienced persons fully trained in the use of the machine and with the safety procedures associated with the machine and who are aware of potential risks involved in working with the machine.

Following the setting up and operating instructions provided should allow the operator to achieve the best performance from the machine, resulting in increased reliability and faster crop harvesting with less damage to tubers.
Owing to wide variations in operating conditions however, it is impossible for the manufacturer to make comprehensive statements in this publication regarding performance or methods of working.
The efficiency of the machine always depends on the suitability of the operating conditions. Working on Steep inclines or land that is too wet could affect the machine performance.

Operators should read carefully the Safety notes contained within the manual prior to using the machine in order to help avoid dangerous situations, expensive repairs and prolonged downtime. In addition operator's should also read all relevant legislation regarding health, safety and accident prevention applicable to the country in which the machine is to be used or resold.

ScanStone products are manufactured to the highest possible standards and specifications in the UK using carefully selected materials and components and in accordance with recognised safety standards.
The right to change specifications, equipment and maintenance instructions at any time, without notice is reserved as part of our policy of continuous development and improvement.
No liability can be accepted for any inaccuracies or omissions in this manual, although every possible care has been taken to make it as complete and accurate as possible.
Owners who encounter a problem not covered in the manual should contact their dealer or ScanStone direct at the following address:-

The Service Manager,
RGS Forfar Ltd.
East Mains of Burnside, Forfar, Angus, Scotland. DD8 2RX
tel & fax: 00 44 (0) 1307 818994
e-mail:- rgssales@btconnect.com

The serial number plate is attached to the right hand side of the front cross member. Use the space on the sample plate below to record the serial number for future reference.

ScanStone
POTATO SYSTEMS

SERIAL No.
MODEL
YEAR
UNLADEN WEIGHT (KG)
DRAWBAR WEIGHT (KG)
AXLE WEIGHT (KG)

RGS Forfar Ltd. Burnside, Forfar, Scotland CE

Warranty

ScanStone when supplying new goods guarantee subject to certain conditions that those goods are free of defects both in material and workmanship.

The following conditions apply:-

- The machine should only be used for the separation and removal of stone and clods from beds prepared by deep ridging and bed making equipment.
- That service and warranty work is carried out only by authorised ScanStone dealerships.
- That the original specification of the machine has not been altered by unauthorised modification.

Correct operation of the machine and regular maintenance will help to prevent breakdowns. If however, operating trouble is experienced during the warranty period the following actions should be adopted:-

Notify the dealer from whom the separator was purchased, quoting the model and serial number.
This should be done immediately!

Do not operate the machine. Even though the original failure may be covered by warranty - resultant damage to the machine arising from delay in reporting the fault will not be covered.

It should be noted that items consumed during normal maintenance services, by operation of the machine and by factors over which the manufacturer has no control are not automatically warrantable.
These items include - webs and their components, filters, hydraulic and lubricating oils, belts and rubber rollers and ground engaging parts.

The manufacturer cannot accept liability for damage to machines or third party through operational negligence.

Table of Contents

Part 1 Safety Precautions

For your safety, and the safety of those working with you, follow these precautions and observe all decals on the machine.

Look for this symbol in the instuction book and on the machine. It means - **Attention! Be Alert - Your safety is involved.**

General Information

Owners should ensure that operators are properly trained and are familiar with the controls and their functions as well as the safety instructions contained in the manual before starting up the machine.

This operator's handbook should be considered as part of the machine. It should be available to the operator at all times during operation of the machine.

The operator and any persons involved in the maintenance or setting up of the machine - must read this manual carefully before commencement of work.

Reading the instructions after work has begun is too late!

When hitching up the separator to the tractor - consult the tractor manufacturers instruction book for correct procedures and related safety advice.

Before starting work

- Mount the control box securely in the tractor cab in a position to suit the operator but where it cannot be operated inadvertently.
- Check the machine to ensure all services are operational and functioning correctly. Make sure all guards are in position and locked to prevent access.
- Inspect the field for hazards such as large boulders, power lines or uneven ground.
- Warn bystanders to keep clear of the machine whilst working or when hydraulic functions are operational.
- Use personal protective equipment when circumstances require or to meet legislation. e.g. ear plugs, dust masks.

During work

- Always be aware of rotating parts of the machine which cannot be completely guarded such as P.T.O. shafts, webs and cross conveyors. During operation advise personnel to maintain sufficient security distance.
- Do not run the machine with the guards removed or with guards in the raised position.
- Never stand or allow others to stand in the space between the tractor and the machine because of the danger from the P.T.O. shaft. Likewise do not allow persons to walk alongside the machine especially when the cross conveyor is working.
- Never leave the driving position of a moving or running tractor.
- Always disengage the P.T.O. drive from the tractor, and disable the tractor by stopping the engine and removing the ignition keys before reaching into, adjusting, maintaining, cleaning, repairing or clearing blockages from the machine.
  This also applies when working at the rear of the machine, inside or under the machine.
- When disabling the machine remember the separator has both mechanical and hydraulic drives. Putting the P.T.O. out of gear will not disable hydraulic functions.
- Take care when working to avoid obstacles and when working in unstable conditions.
- Avoid working across the face of slopes to minimise the risk of the machine toppling over. Side sloping inclines above 15° in angle should be avoided. On machines fitted with a loading elevator this angle could be reduced significantly. Be extra careful when turning the machine on uneven ground especially if the elevator is extended in the working position.
- When reversing the machine or emptying the stone collection hopper make sure you can see what is behind you.
- Check the machine regularly during operations for signs of wear and damage.
- Do not allow children to play anywhere near the separator or on the headlands when the machine is operational.

Part 1

After work

- Never park the machine or carry out maintenance work when underneath overhead power lines.
- Always park on even level ground using wheel chocks and the tractor handbrake to prevent rolling.

Safe servicing and maintenance

- Always secure the machine against rolling prior to starting maintenance work.
- Use only suitably qualified engineers working to the relevant electrical and hydraulic standards and codes of practice.
- Check operator's instruction book for details of service and maintenance schedules. Adhere to replacement intervals noted even if signs of wear to components (such as filters and hoses etc.) are not evident.
- Follow the procedures noted elsewhere in the safety notes for the correct shut down procedure for the machine.
  Always remember to remove the tractor ignition key!
- Do not add to or modify any part of the machine which could affect safety without the prior approval of the manufacturer. This is also applicable when welding work is to be undertaken to axle or chassis members.
- Take care when carrying out maintenance under the machine or under raised parts such as the loading elevator. Make sure adequate support devices are in position to prevent sudden lowering.
- Use stable work platforms and safety ladders when servicing overhead assemblies. The machine should not be used as a climbing aid.
- When large assemblies are to be lifted make sure lifting devices and slings etc. have the necessary capacity, are in good condition and are properly attached.

  Do not allow anyone to stand below suspended loads.
- If using high pressure water jet or steam cleaning apparatus take care to avoid contact with electrical terminals and other areas which could be susceptible to water damage.
- After cleaning the machine check all the hydraulic pipes and hoses for leaking or operational damage. Repair before putting the machine back in service.
- Check that warning and safety decals are in good condition and legible.
  Replace any missing decals or those which have become illegible.
- When servicing is complete, check all nuts and bolts loosened during repairs have been tightened satisfactorily.
  Remove all loose tools from the machine, refit and lock down all guards and safety devices.
- Dispose of hydraulic fluids, filters and contaminated materials safely according to health and safety guidelines.

Servicing the Hydraulic system.

Warning - The hydraulic system works under high pressure.

- Hydraulic oil escaping under high pressure can penetrate the skin and cause serious injury. In the case of injury, seek medical advice immediately.
- Avoid direct contact with hydraulic pipework which may have become hot through prolonged operation. Always allow sufficient time for hydraulic oil to cool.
- Check hydraulic lines regularly for any sign of leakage. Do not tighten a leaking fitting whilst the hydraulic system is pressurised. Always de-pressurise before maintenance to hydraulic components.
- Ensure hoses are properly fitted, free from twisting and clear of moving parts of machinery.
- Always replace hoses at first sign of damage.
- Avoid contamination and risk of fire by removing spilt oil immediately.

Servicing the Electrical system

- The electrical system should be inspected periodically for loose connections or scorched cables.
  If problems are discovered with an electrical component switch off the machine and rectify immediately.
- Ensure only fuses with the correct ratings are used.

Servicing Wheels and Tyres

- Check tyres periodically for signs of damage. Inflate to the pressures specified in the manual or on the decal above the wheels.
  Wheel stud torque settings should be checked daily.

Safe use of P.T.O. shaft

- Use the correct P.T.O. shafts supplied which are compatible in power capacity, safety devices and guarding.
- Consult the operator's handbook for instructions on correct P.T.O. shaft overlap, (300mm minimum). The greater the overlap the better.
- Before start up check that the P.T.O. is securely connected with guards fitted and with *anti-rotation chains in place.

**Chains must be fitted so as to allow sufficient articulation of the PTO shaft in all positions.*

- Do not run the machine with a damaged P.T.O. shaft or one which is not completely protected.
  Repair or replace immediately.

Make sure all bystanders are clear of the P.T.O. shafts before starting up. Only approach the shafts when the machine is completely stopped, with the drive disengaged, tractor engine switched off and the key removed from the ignition.

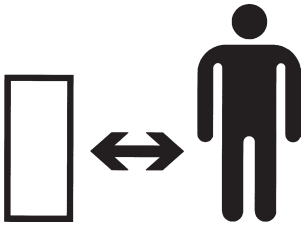
- Do not engage the P.T.O. shaft with the tractor engine switched off.

Road Transportation

- Check that the machine is free of earth, stones and clods, tools or other items of loose equipment.
- Switch the cross conveyor direction switch on the control panel to the OFF position. Use the fold up switch at the rear of the machine to retract the cross conveyor into the transport position and secure using the transport grab bar.
- Lift the share into the transport position.
- Use the steering controls to straighten the wheels for transport.
- Connect the 7 pin road light plug to the tractor and check lights and indicators are fully functional.
- Switch off and disconnect the electrical supply to the control panel.
- Disconnect the feed and return hoses and the load sensing hose and tie up round the pedestal.
- Disconnect and remove the P.T.O. connecting tractor with separator.
- Check that both tractor and separator tyre pressures are inflated to the recommended pressure for road transportation.
- Adapt road speed to take account of the conditions. Avoid sudden turns at all times especially on up and downhill slopes and across the face of slopes.
- Always remember that the steering and braking behaviour of the tractor will be influenced when towing the separator.
  Apply brakes well in advance!
- When turning or at bends - take the width and load of the separator into consideration. Dimensions and weights of separators are noted in part 2 of the manual.
- When parked - use tractor brakes or wheel chocks to prevent rolling.

Part 1

Attention, be alert, your safety is involved.

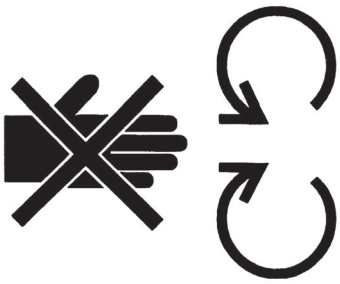


Always keep a safe distance from the machine while it is in operation.

Do not use the lock valve to depressurise the system, or at any other time unless the pressure hose is connected to the tractor hydraulic outlet.

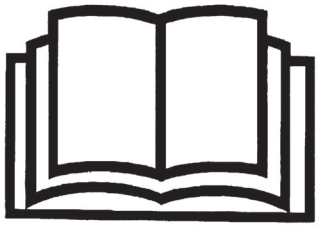
Ensure guards are locked before starting up the machine.
Do not operate the machine with guards raised or removed.

Do not stand near, or touch P.T.O. shafts whilst the machine is running.
Always switch off tractor engine and remove the ignition key before approaching the P.T.O.



Danger of entanglement!
Keep hands away from drives and other rotating parts of machinery.

Keep hands away from rotating parts of machinery.



Consult the Operator's handbook prior to putting the machine into service.
Read and understand the safety and operating instructions.

Part 2 Technical Data

Machine Specifications

O/A Length	Multiweb Basic	7.7 metres
	Multiweb c/w Hopper	8.1 metres
	Star Basic	7.4 metres
	Star c/w Hopper	7.8 metres
	Web Diablo Basic	8.3 metres
	Web Diablo c/w Hopper	8.7 metres
	Star Diablo Basic	8.0 metres
	Star Diablo c/w Hopper	8.4 metres
Transport Width	1540 wide machines	2.57 metres
	1740 wide machines	2.77 metres
Weight	4300 - 5900 Kgs	
Loading Elevator Weight	900 Kgs	
Power Requirement	75 Kw / 100 Hp	
Drive System Protection	Slip Clutches on Input and Web Drive Transmissions and on Rear Star Unit	
Tractor Hydraulic Flow Rate	30 L/minute Minumum 45 L/minute **Maximum**	
Hydraulic Protection	In-Line Filter with Blockage Warning Light	
Electrical Supply	12V DC Negative Earth	
Road Speed	30 Km/h - 19 Mph	
Bed Widths	64" - 72" - 80"	

Equipment

	Standard	Optional
Choice of Full Width or Multiblade Share	✔	
Multi Position Front Wear Plates		✔
Share Depth Control		✔
Hydraulic Drawbar		✔
Bed Shaped Intake Rotor		✔
Diablo Intake Roller	✔	
Freeflow Open Intake		✔
Canbus Control System	✔	
Hydraulic Rear Lift	✔	
Hydraulic Machine Levelling	✔	
Self Centering Steering	✔	
Adjustable Level Cross Conveyor		✔
Loading Elevator		✔
Hydraulic Scrubber Web Pressure Rollers	✔	
Driven Scrubber Web		✔
Rear Star Unit		✔
Large Stone Tines		✔
Stone Collection Hopper		✔
Central Greasing		✔
Road Lights	✔	

Web Specifications

Machine Type	Web Position	19	28	32	37	43	50
Multiweb Machine	Digger Web		✔	✔	✔	✔	✔
	2nd, 3rd & 4th Webs*		✔	✔	✔	✔	✔
	Cross Conveyor Web	✔	✔				
Star Machine	Digger Web			✔	✔		
	Rear Web		✔	✔	✔	✔	✔
	Cross Conveyor Web	✔	✔				
Optional Web Cleaners					✔	✔	

* 45mm Webs also available for some web positions.

Note: The right to change specifications at any time, without notice is reserved as part of our policy of continuous development and improvement.

Part 2

Part 3 Setting up and Adjustment

Drawbar Attachment

The separator can be raised or lowered to suit a variety of tractor drawbar heights by locating the ram pin in one of the 3 holes provided in the front lift ram bracket.

- Set the machine on firm level ground, preferably concrete or tarmac.
- Determine the required drawbar height.
- Fit the ram anchor pin in one of the holes to best suit the tractor drawbar height, (Fig 3.1.1, 3.1.2 or 3.1.3)

  i.e. hole 1 for low tractor drawbars
  - 2 for intermediate tractor drawbars
  - 3 for high tractor drawbars.

- Lift the drawbar to meet the tractor drawbar and fit the hitching pin.
- Release the locknut from the depth adjuster screw (Fig 3.1.4) and turn until the ram piston pin is centred in the slot (Fig 3.1.5).
- Tighten locknut.

Drawbar Stand

A stand is provided to support the drawbar when unhitching from the tractor.
It is not intended to bear the weight of the machine!

Note: Before using the stand make sure that hydraulic pressure is released from both front and rear lift rams and that the share is resting on the ground or on blocks.

- Remove the stand from the stowed position, fit in the upright position as shown (Fig 3.2.1) and secure in place using the pin provided.

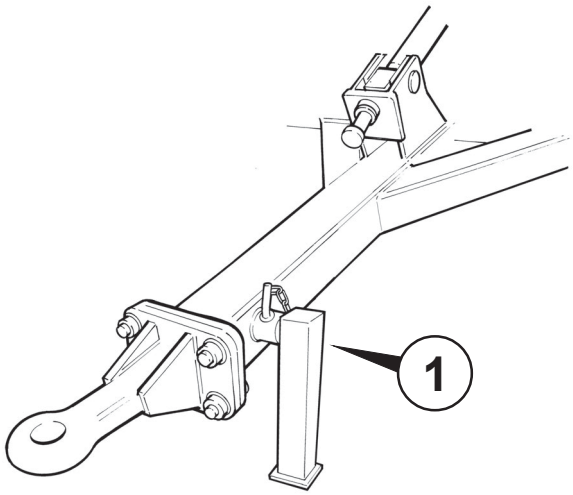


Fig 3.2

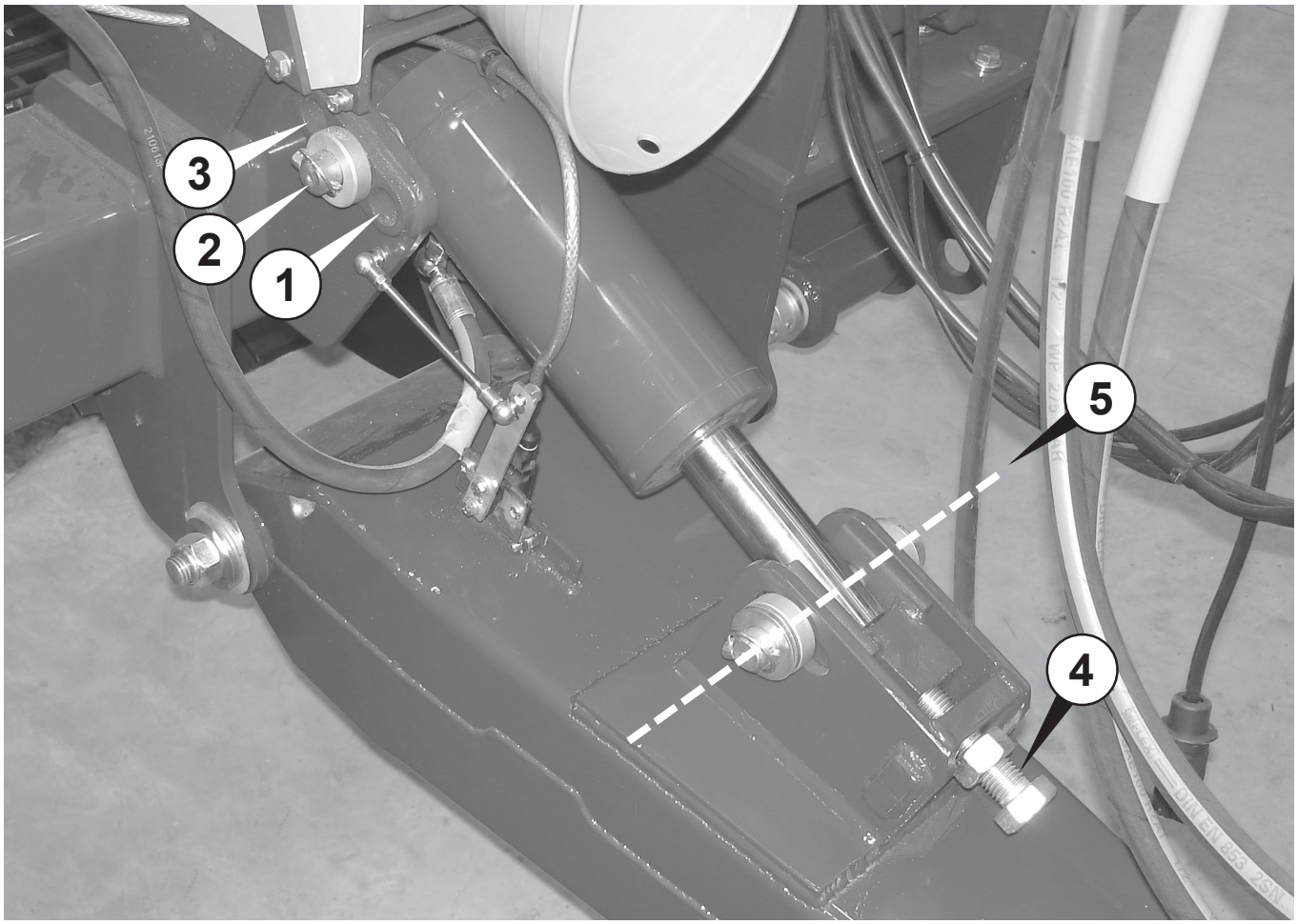


Fig 3.1

Part 3

P.T.O. Shaft

The P.T.O. shaft supplied with the machine is suitable for most tractors although a check should be made to ensure the length of the two shaft halves overlap by at least 1/3 of their length during operation, (Fig 3.3).

Use only the original P.T.O. shaft supplied, which is compatible in power capacity, safety devices and guarding.

Ensure that the P.T.O. is securely attached to the tractor and the separator before operating. The tractor symbol printed on the guard indicates the tractor end of the driveline.

Attach the safety chains allowing sufficient slack for the shaft during operation and turning. Avoid using the chains to support the P.T.O. during storage.

Check that the tractor lower links do not contact the P.T.O. during turning. If necessary adjust lower links to fully lowered position or remove completely.

Disengage the P.T.O., turn off the tractor engine and remove the ignition key before approaching the shaft or performing maintenance work.

Do not exceed the recommended operational speed - 540 r.p.m.

Disengage the P.T.O. when the angle of the joints exceeds 25°, Fig 3.4.

It is important to keep the P.T.O in first class condition. Damaged or missing parts must be replaced with correctly installed, original spare parts.
Make use of the P.T.O support hook after unhitching from the tractor. This will prevent accidental damage to the shaft end from contact with the ground, Fig 3.5

See also 'Lubrication' in Part 6 of the manual for greasing schedule.

Row Width Adjustment

Axles are fitted in factory to suit row widths of 64", 72", or 80".
To adjust - Place jacks under axle and raise until wheels are clear of the ground.
Remove bolts from ends of track rod, Fig 3.6.1.
Add / remove axle extension brackets, Fig 3.6.2 to suit new row width required.
Slide track rod ends to new position.
Replace bolts in the most suitable holes available ensuring that both wheels are adjusted equally.

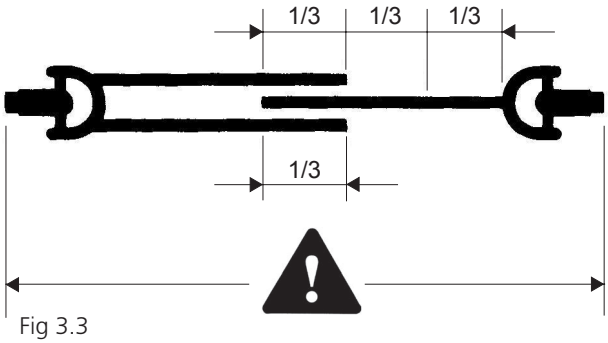


Fig 3.3

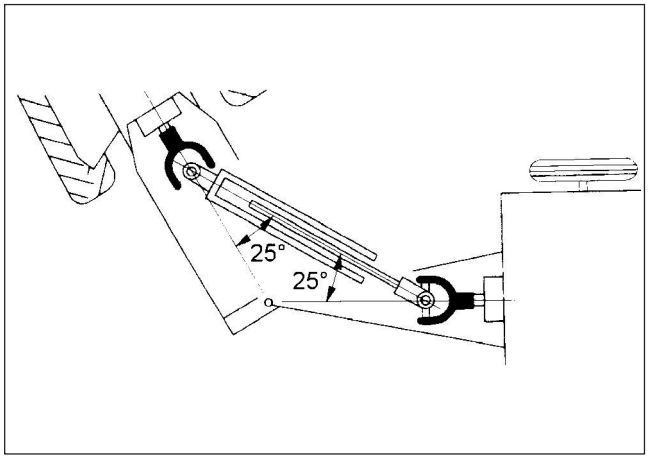


Fig 3.4

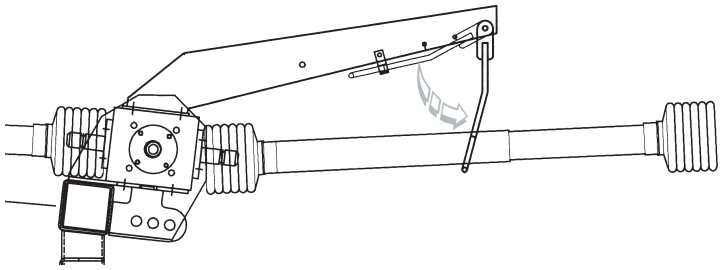


Fig 3.5

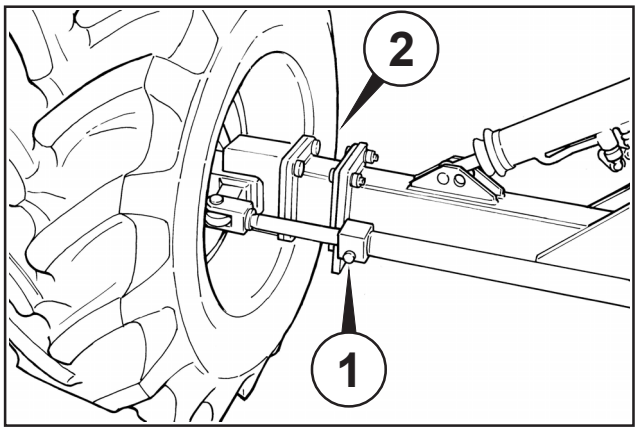


Fig 3.6

Electrical and Hydraulic Connectors

The separator requires an oil flow of 30 litres to 45 litres per minute with a pressure between 150 and 205 bar. On tractors with a high output oil flow exceeding 45 litres per minute the oil flow should be regulated to deliver between 30 to 45 litres maximum.

Oil flow above this limit will result in exceedingly high oil temperatures with the possibility of damage to the separator hydraulic system.

All hoses and connectors to be fitted to the tractor are shown in Fig. 3.7.

1. Multi-pin Control Box plug.
2. **BLUE** banded **RETURN** hose.
3. **RED** banded **PRESSURE** hose.
4. Load sensing hose.
5. Live lead to Tractor
6. Road Light plug.

Hoses and plugs should be connected to the tractor as follows:-

- **RED** banded hose to be connected to the tractor **PRESSURE** spool outlet.
- **BLUE** banded hose to be connected to the tractor **RETURN** spool inlet.

WARNING!

When connecting Pressure and Return hoses to the tractor spool valves - take care to ensure Red banded hose is fitted to the tractor Pressure outlet and Blue to the Return inlet.
Connection in any other way will result in damage to the separator hydraulic system.

- *Load Sensing hose to be connected to the tractor load sensing coupler.

  *(Read the section on 'Load Sensing System' page 3.4 for further instructions prior to starting up the machine.

- Road light plug to be connected to the tractor auxiliary socket.
- Multi-pin plug to be connected into the separator control box.
- Live lead to tractor to be connected into the tractor eurosocket or battery lead extension (supplied).

Note: A plug holder is provided at the front of the machine (Fig 3.7.6) for storing the multi-pin control box and road light plugs when not in use. Slots are also provided for storing feed and return and load sensing hose ends.

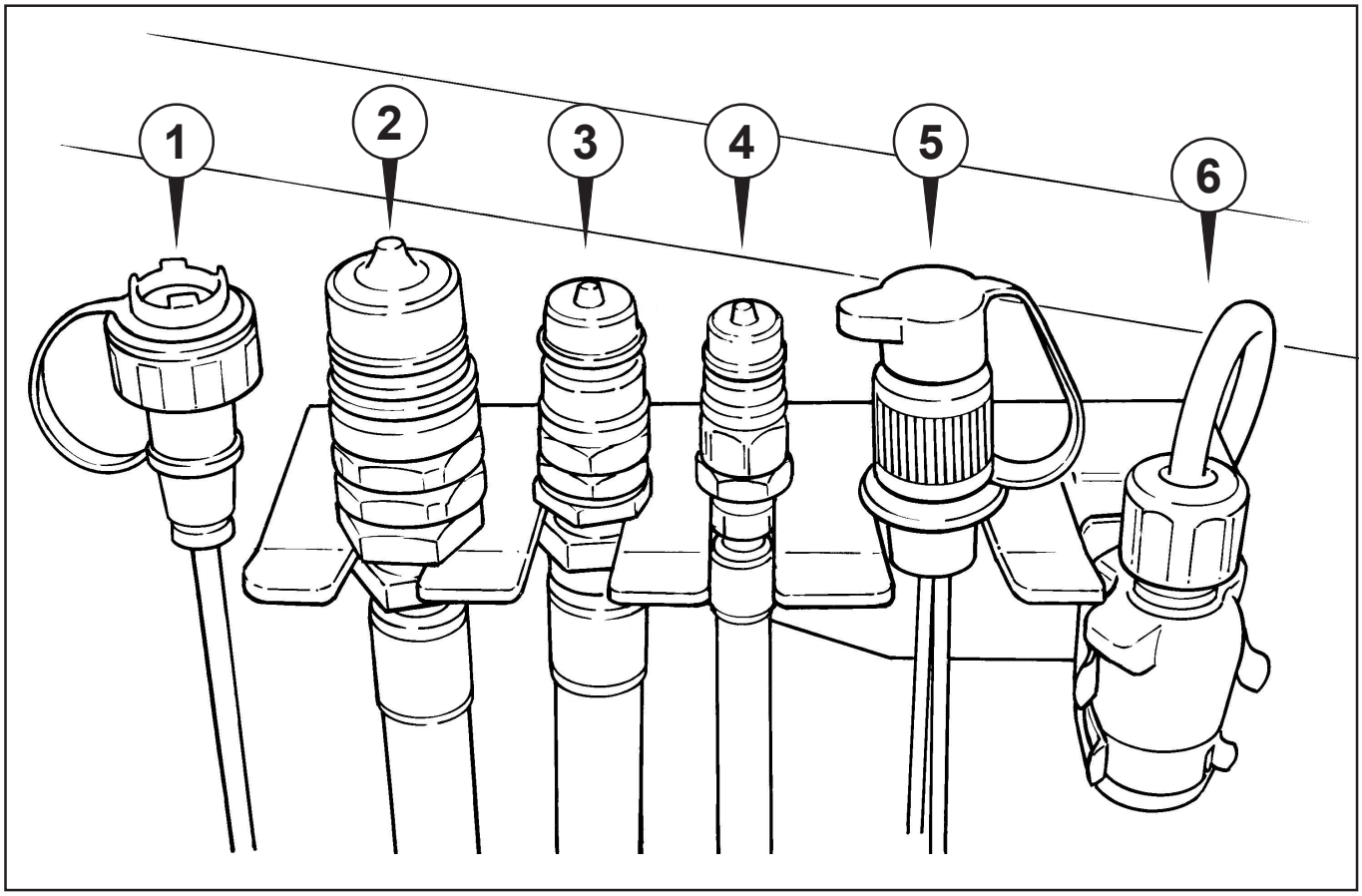


Fig 3.7

Part 3

Load Sensing

All ScanStone separators are fitted with a load sensing system which reduces hydraulic oil working temperatures thus prolonging the life of components such as pumps, valves and hoses.

Before fitting the load sensing hose (Fig 3.7.3) the tractor has to be fitted with a load sensing kit - available from tractor dealerships along with fitting instructions.

Following fitment of the load sensing kit the load sensing hose can be connected to the tractor load sensing coupling.

A simple adjustment should be made at the Separator PVG control valve - see Open and Closed Centre hydraulics page 4.3.

If in any doubt as to the type of auxiliary hydraulic system on the tractor - the operator should check the tractor manual or consult his tractor dealership for information.

WARNING
Do not attempt to connect the load sensing hose to the tractor pressure coupling as this could result in severe damage to the windrower's hydraulic system.

Share Depth Setting

Follow the instructions on page 3.1 to set drawbar height and hitch up to tractor.

Disable tractor to separator P.T.O. whilst making adjustments in this area of the machine.

- Measure the visible section of the ram piston (Fig 3.9.1) and turn adjuster screw (Fig 3.9.2) to set this dimension to 127mm.
- Connect the hydraulic Feed and Return hoses as described on page 3.3. Run the tractor engine to activate the hydraulic system.
- Follow the relevant instructions on page 4.2 - (Auto depth) to set required share depth.

A trial run should be made when the machine is in the field to assess the depth of finished seed bed behind the separator.
Further Auto depth adjustment can be made until the desired bed depth is achieved.

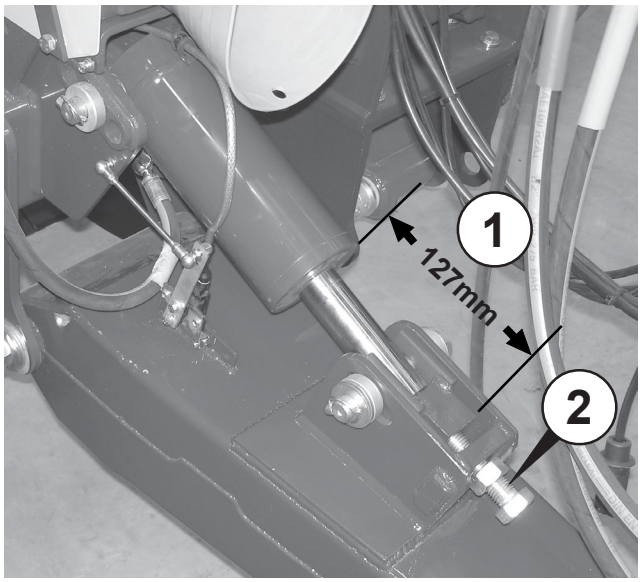


Fig 3.9

Hydraulic Drawbar

An optional hydraulic drawbar has been designed to absorb the shock to the drawbar / share should a large underground object be struck.
The internal ram and accumulator system cushion the impact and thus lessen the possibility of damage to the machine.

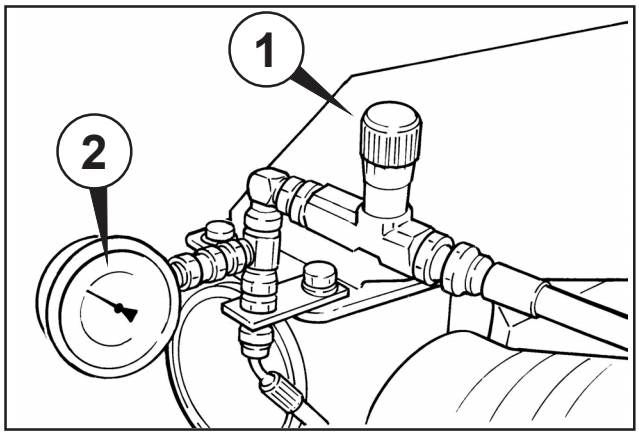


Fig 3.10

Hydraulic System Pressure

The drawbar hydraulic system should be pre-charged using the tractor hydraulics as follows:-

Follow the instructions below to pressurise the system:-

- Couple the quick release pressurising hose to the tractor auxiliary hydraulic outlet.
- Open the system lock valve by turning in an anticlockwise direction, Fig 3.10.1.
- Operate the tractor auxiliary system to obtain a pre-charge working pressure shown on the gauge, Fig 3.10.2, of 100 bar (1450 psi).
- Close the lock valve by turning in a clockwise direction.
- Disconnect the quick release pressurising hose from the tractor auxiliary outlet.
  The system is now charged and ready for use.

WARNING

Do not use the lock valve to depressurise the system, or at any other time unless the pressure hose is connected to the tractor hydraulic outlet.

Accumulator Pressure

The system accumulator is pre-charged to 117 bar (1700 psi) and requires no maintenance.
If a fault develops with the accumulator the operator should notify his ScanStone dealer.

Part 3

Diablo Machines

Diablo machines are designed to suit certain field conditions and are offered as an alternative to Rotor driven front ends.
Unlike the Rotor the Diablo is non-driven and is free to roll over the soil, providing compaction assisted by hydraulic rams. The Discs are held in position by hydraulic pressure from the accumulators mounted on the front crossmember.

Hydraulic System Pressure

The hydraulic system should be pre-charged using the tractor auxiliary hydraulic control to a pressure setting sufficient to hold the Discs in work.

Follow the instructions below to pressurise the system:-

- Couple the quick release pressurising hose leading from the lock valve to the tractor auxiliary hydraulic outlet.
- Open the system lock valve by turning in an anticlockwise direction, Fig 3.11.1.
- Operate the tractor auxiliary system to obtain a pre-charge working pressure shown on the gauge, Fig 3.11.2 , of around 38 bar (550 psi).
- Close the lock valve by turning in a clockwise direction.
- Disconnect the quick release pressurising hose from the tractor auxiliary outlet. Tie up hose end. This hose will only be required again if the pressure shown on the gauge drops (through time) below the minimum requirement.
  The system is now charged and ready for use.

WARNING

Do not use the lock valve to depressurise the system, or at any other time unless the pressure hose is first of all connected to the tractor hydraulic outlet.

Accumulator Pressure

The system twin accumulators are pre-charged to 80 bar (1160 psi) and require no maintenance.
If a fault develops with either of the accumulators the operator should notify his ScanStone dealer.

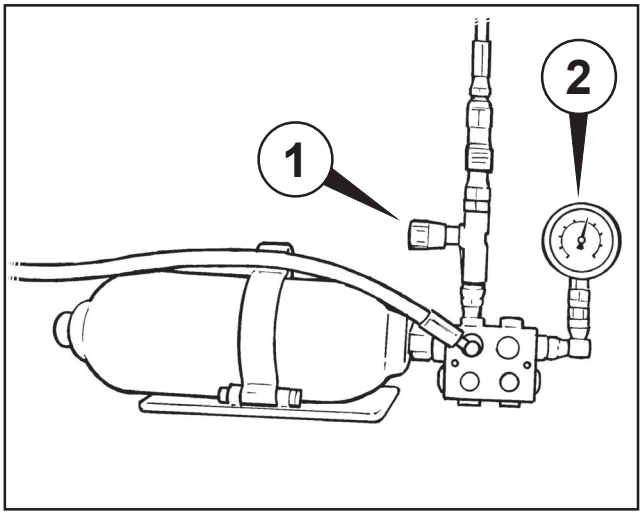


Fig 3.11

Part 4 Control Box and Operational Adjustments

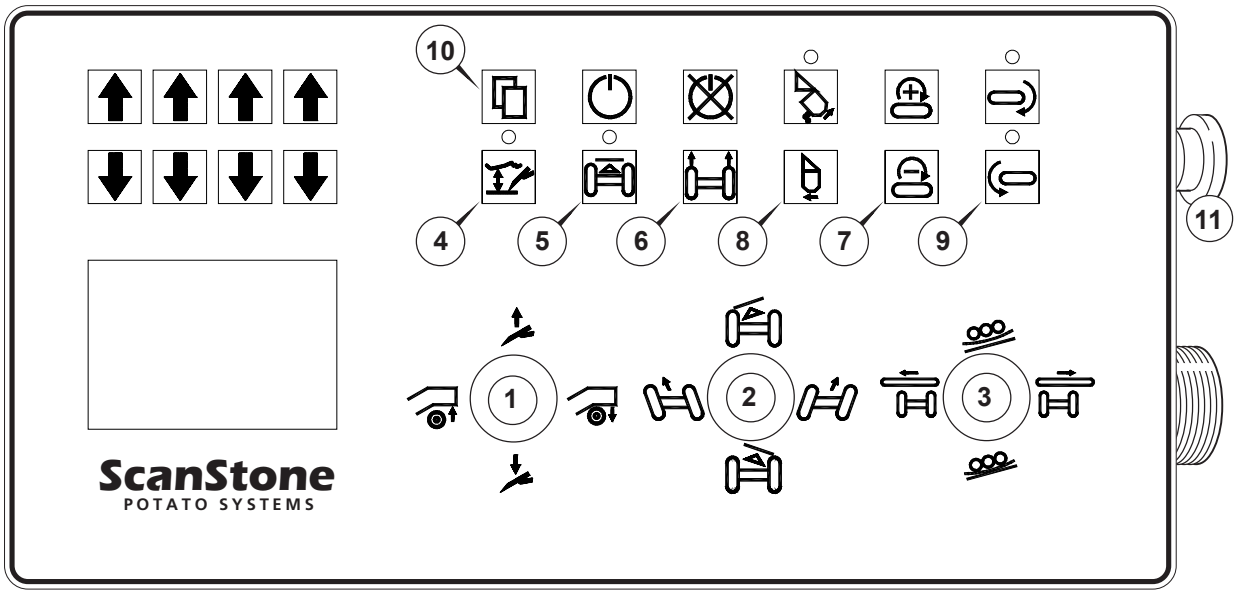


Fig 4.1

General

The Canbus control box should be mounted in the tractor cab in a position where it is accessible to the operator, but not where accidental operation could occur.
The main cable can be fed through the tractor rear window and connected to the control box by means of the multi-pin plug.

Always protect the control box from moisture and mechanical damage.

The control box is pre-programmed and tested in the factory and is ready for immediate use when it reaches the customer.

All machine functions are represented by symbols some of which will appear on the display screen when that function is activated.

These symbols are:-

Steering Indicator
Hydraulic steering is used when turning on headlands or when required to maintain machine alignment on sidling ground. The display indicator shows the extent of steering and direction - right or left.

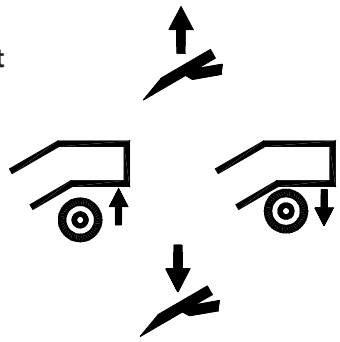
Blocked Filter Warning symbol

When the blocked filter warning symbol is displayed the filter should be replaced as soon as possible.

The joysticks and buttons on the control panel each have symbols to indicate the machine functions.

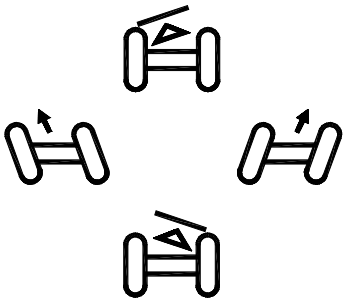
These symbols are:-

Joystick (1)
Share Depth / Rear Lift
Hold in Up position:-
to lift share
Hold in Down position:-
to lower share
Hold to Right:-
to lower lift rams
Hold to Left:-
to raise lift rams

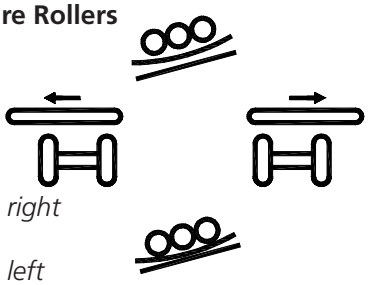


Part 4

Joystick ②
Steering and Levelling
Hold in Up position:-
to lift left hand
side of machine
Hold in Down position:-
to lift right hand
side of machine
Hold to Right:- to steer right
Hold to Left:-to steer left



Joystick ③
Conveyor Extend / Pressure Rollers
Hold in Up position:-
to lift pressure rollers
Hold in Down position:-
to lower pressure rollers
Hold to Right:-
to extend Cross conveyor to right
Hold to Left:-
to extend Cross conveyor to left



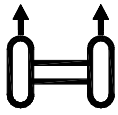
Machines fitted with Linear Sensor or fitted with Depth Wheel

④ Auto Depth
Push button to revert to share pre-set depth after turning on headland.
(red light will show)
To cancel auto depth:-
activate Joystick 1 to up or down position
(light goes off).

Press page button to show page 2 on screen.
The share symbol will appear.
Press either the up or down arrow immediately above to increase or decrease share depth.
(Numbers at bottom of screen will change accordingly).
Press page button to revert to page 1.

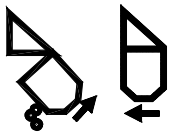
⑤ Auto Levelling
Push button to activate Auto Levelling.
(red light will show)
To cancel auto levelling:-
activate Joystick 1 to up position
(light goes off).

⑥ Self Centering Steering
Push button to activate Self Centering Steering.

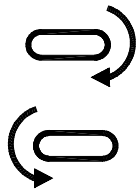


⑦ Conveyor Speed
Press the + or - button to increase or decrease speed.

⑧ Stone Collection Hopper (optional)
Press button to open.
(red light will show)
Press opposite button to close.
(light goes off).



⑨ Conveyor Web Direction
Press top button to discharge to right hand side of machine.
(red light will show).
to cancel press button again
(light goes off).
Press opposite button to discharge to left hand side of machine
(red light will show).
to cancel press button again
(light goes off).



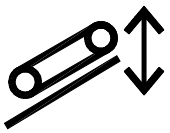
⑩ Page Button
Press button to toggle between screens 1 & 2.

⑪ On / Off
Turn** Red button **clockwise and release** to switch **Power On.
*Push in to switch **Power Off.***

Operating Front Discs
On page 1 - Left and right hand disc symbols appear in positions 1 & 2 on screen.

Press the up or down arrows immediately above the symbols to raise or lower either or both of the discs.

Driven Scrubber Web Control
On page 1 - The scrubber web symbol will appear in position 3 on screen.
Use the up and down arrows above to raise or lower the scrubber web.



⑫ Headland Management
At the start of each row press the engage button -
The share and discs will drop into pre-set positions.
At the row end press the disengage button -
The share and discs will lift clear of the soil.

Open and Closed Centre Hydraulics
The Separator can be driven by a tractor with open or closed centre hydraulics.
Switch off tractor engine before making the following simple adjustment:-

For **CLOSED CENTRE** hydraulics - insert a 6mm Allen key in aperture on bottom of valve (arrowed, Fig 4.1.1), and turn in anti-clockwise direction until resistance is felt.

For tractors with **OPEN CENTRE** hydraulics, load sensing can not be used and the allen key should be turned fully clockwise until resistance is felt.
With Open Centre operation the load sensing hose need not be coupled to the tractor.

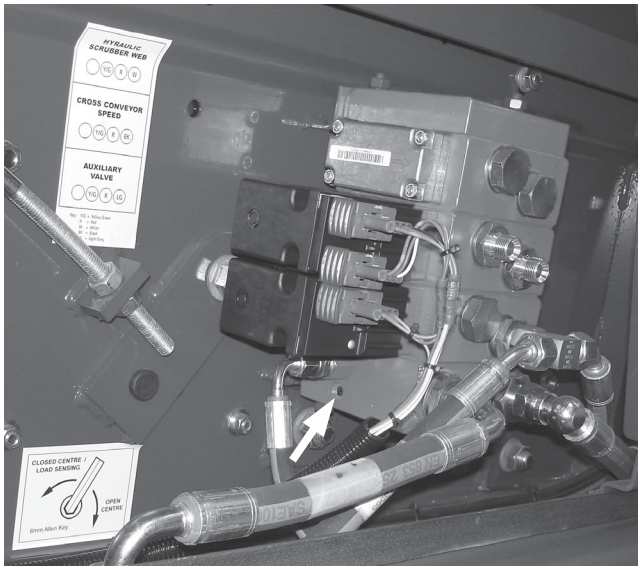


Fig 4.1.1

Screen Contrast
Screen contrast can be adjusted to suit the operator. With the hydraulic supply disabled - Press the page button and Hold. Move Joystick 2 (Levelling) either to the up or down position to increase or decrease contrast. Release the page button at any time when satisfied with the new contrast setting.

Auto Depth
(see also 'Share Depth Setting' on page 3.4 for set up instructions).
For the first 6 metres approximately of each row or until the separator wheels have reached the bottom of the furrow auto depth control should be disabled by holding the share joystick (1) in the down position.
Once the wheels are in the row bottoms, release the joystick and press the Auto Depth push button (4) to activate the auto depth control and resume working at the predetermined depth.
This also applies at the end of each row.
If during work the share has to be raised to avoid an obstacle for example, hold the joystick in the up position to disable auto depth and raise the share. Press the auto depth push button when ready to resume working at the preset depth.

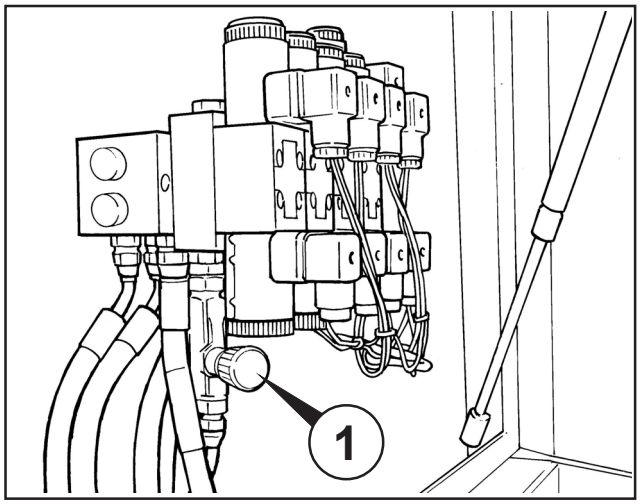


Fig 4.2

Steering Flow Control
A flow control valve is fitted to the steering hose at the rear manifold to allow the operator to increase or decrease the speed of steering movement.

Turn knob anticlockwise to open valve and increase steering speed, Fig 4.2.1
Turn knob clockwise to close valve and decrease steering speed.

Part 4

Cross Conveyor

The cross conveyor can be extended either to the right or the left hand side of the machine to suit whichever working method is to be adopted.

To unfold - Hold joystick (3) to the left to lower the conveyor from the upright transport position into the horizontal position.
Continue to hold the joystick to the left to move the conveyor into the left hand discharge position or right to move to the right hand position.
Further controls adjust the web direction and conveyor speed as described on page 4.1.

Note: The performance of some of the machine services may be affected if the conveyor is run too fast, depending on the oil flow available from the tractor.
It is always advisable to run the conveyor at a speed fast enough to avoid blockages, but slow enough to allow accurate disposal of material into the row bottoms.

When folding the conveyor for transport - the conveyor web direction switches (9) should not be lit.
Using the switch at the rear of the machine, Fig 4.4.1, activate the conveyor whilst at the same time holding down the conveyor grab arm, Fig 4.4.2.
The moving conveyor will engage the grab arm hooks and fold into the upright position.

Level Adjustment

Cross conveyors have a 2 position level adjustment to suit both ***standard rear lift*** and ***extended rear lift*** configurations.
This adjustment which is made to the machine before leaving the factory ensures that the cross conveyor remains as level as possible during operation.
Further information on cross conveyor level adjustment and settings can be found in Part 6 of the manual.

Stone Collection Hopper

A 2 piece hydraulically operated stone hopper can be fitted at the rear of the machine for the collection of large stones to be deposited on the headland rather than discharged into the furrow, Fig 4.5.

During operation of the machine check that stones are being evenly distributed across the stone hopper and not settling to one side or the other.

Always shut down the tractor engine and disable all drives if reaching in to level out the stones by hand.

Do not overfill the hopper as this may result in damage to the machine.

The stone box is emptied by activation of control box switch (8) as described on page 4.1 of this manual.
The stone box light will show when the hopper is open.

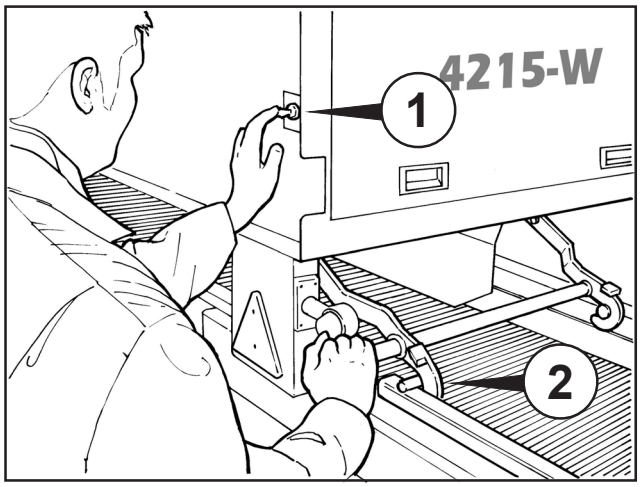


Fig 4.4

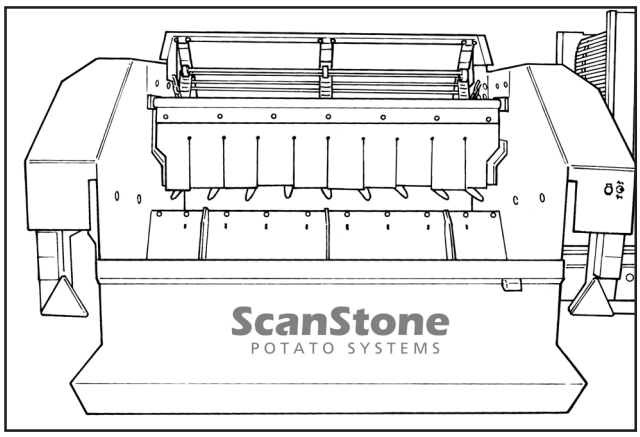


Fig 4.5

When emptying the stone collection hopper make sure you can see what is behind you!

Soil Deflectors

Soil deflectors are fitted to the roller carrier frames inside the 2nd and 3rd webs to deflect soil in the direction of the bed centre - away from the machine sides, thus preventing the wheels from running over separated soil. If working wide beds in the range 72" to 80" with a narrow separator - i.e. 4215, it may be necessary to remove these deflectors.

Web Options

Machine Type	Web Position	19	28	32	37	43	50
Multi-Web	Digger Web		✔	✔	✔	✔	✔
	2nd to 6th Webs		✔	✔	✔	✔	✔
	X - Conveyor	✔	✔				
Web & Star	Digger Web			✔	✔		
	Rear Web		✔	✔	✔	✔	✔
	X - Conveyor	✔	✔				
Web Cleaner Options					✔	✔	

Webs
Web pitches are available as listed on previous page.
Note: When separating always choose webs with a narrower pitch than those intended for harvesting!
Note: When working in light or sandy soils a build up of soil can occur under the digger web due to excessive separation which may cause the drive clutch to slip. In such conditions web covers can be fitted to every bar on the digger web (or every 2nd bar) to reduce gaps and assist soil flow onto the 2nd web.

Web Cleaners
Web cleaners, designed to suit individual web pitches can be fitted to web drive shafts to prevent soil from building up between the web bars.
They should only be fitted for wet weather conditions and removed in normal or dry conditions.

Scrubber Web
An adjustable scrubber web is fitted over the rear web of the machine to prevent stones from rolling back and also to assist with the break down of clods.
The web can be lowered for heavy clod conditions where an aggressive scrubbing action is required.
Place a steel rod through the leverage hole in the winder bar, Fig 4.6.1, and turn slightly to release the ratchet catch Fig 4.6.2. Continue to turn the bar to either raise or lower the web.
Note: In lighter stony conditions with minimum clod less scrubbing action is required and the web should be set to a higher position, making only light contact with the rear web below.
Note: If the machine is fitted with a Driven Scrubber web - refer to page 4.2 for operational instructions.

Scrubber Web Extension
A set of rubber curtains and a short web extension are mounted behind the scrubber web at the rear of the machine to aid the distribution of stones onto the cross conveyor.
The web is held in position by two chains with carbine hooks, Fig 4.7.1, which can be fitted to any rod to alter the web position or angle.

Pressure Rollers
Six pressure roller pads are fitted above the scrubber web to hold the web in work allowing clods to be crumbled down.
The rollers are raised or lowered by operation of the control panel joystick (3).

Star Unit
Following the guidance notes below will help to increase output and seed bed quality.

- Star shafts are available in 40, 45, 50 & 55mm pitches. (The distance between the centres of the star fingers). The narrower the spacing the finer the tilth of the finished work.
- Maintain a P.T.O. speed in the range 400 - 540 rpm max.
  In general, low P.T.O. speeds provide higher volume separation through the star unit but with a coarser particle size.

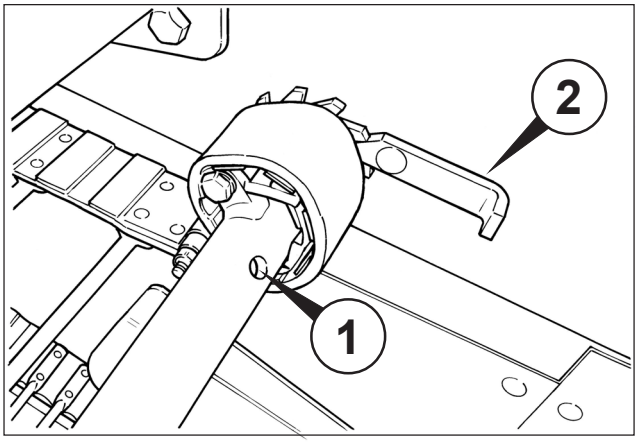


Fig 4.6

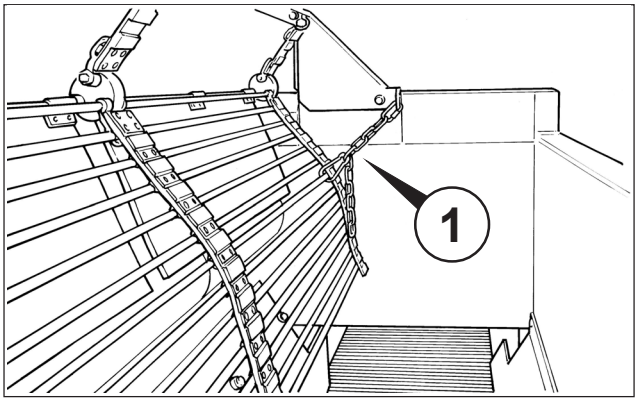


Fig 4.7

  High P.T.O. speeds carry the soil over the unit at a faster rate which results in lower volume separation but with a finer particle size.
- Always maintain sufficient forward speed to allow a steady soil flow over the stars and onto the rear web. A lack of soil on the unit will result in coarser particles falling through onto the separated bed.
- Use of the rear lift when in heavier conditions to steepen the angle of inclination can increase separation on the star unit and assist with clod breaking.
  In lighter soils however, steeper angles can result in excessive loading of the rotor and digger web increasing the power requirement without increasing output.
- Worn stars will allow larger size particles through onto the seed bed, therefore checking the condition of the stars and replacing when required will help ensure the best possible results are obtained.
- As with all land working machinery the prevailing conditions can affect the quality of work achieved.
  Examine the seed bed behind the separator after a short run to check the particles of stone and clod present.
  Note also that the size of soil particles on top of the bed is dependent on the pitches of both the rear web and cross conveyor web.

See also Part 5 Machine Maintenance - for instructions on removal and replacement of the star shafts.

Part 4

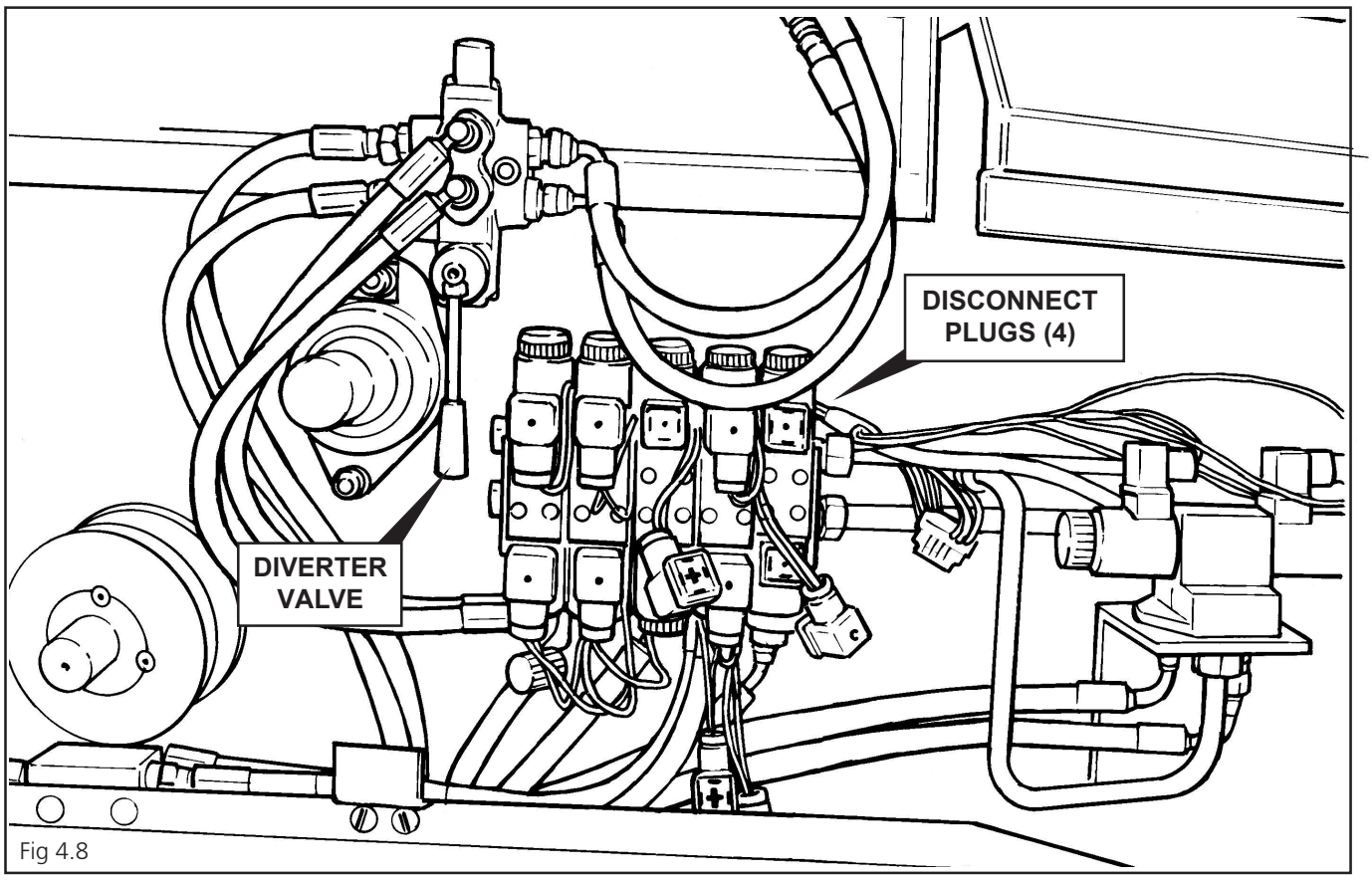


Fig 4.8

Loading Elevator

Machines ordered with Loading Elevators are fitted out in the factory but partly dismantled for ease of transport. Separate fitting instructions are provided to allow the elevator to be reassembled.

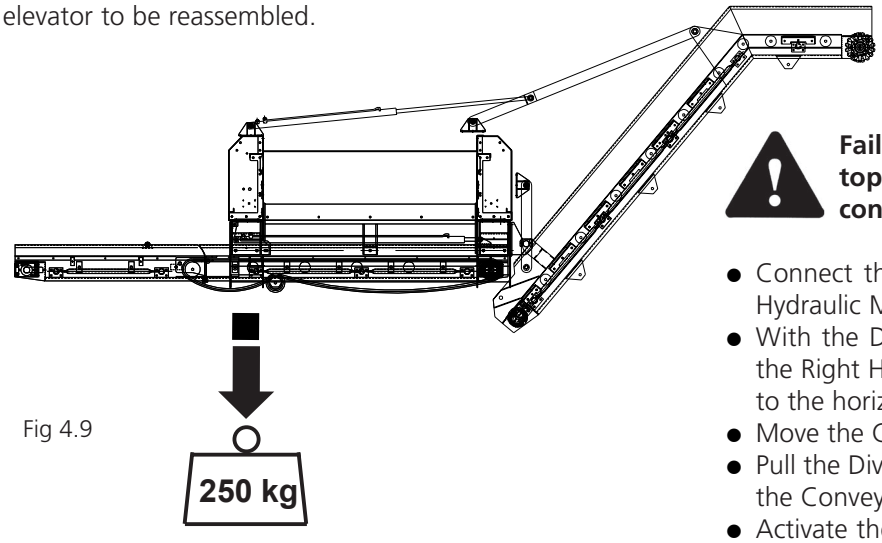


Fig 4.9

Important - The weight of the Loading Elevator must be balanced by attaching a counterweight of 250 kgs approximately, to the Left hand side of the machine.
The customer is solely responsible for providing this counterweight which is necessary to provide stability when the machine is in operation. See Fig 4.9.

- **Note:** Disconnect the solenoid plugs for Rear Lift and Levelling services (2 black plugs and 2 white plugs), see Fig 4.8). These plugs must be removed from the solenoids prior to operating the elevator in order to disable lift and levelling functions.

Failure to disconnect plugs may result in toppling over of the machine in certain conditions.

- Connect the Elevator hoses to the tractor Auxiliary Hydraulic Manifold.
- With the Diverter Valve lever in the **IN** position use the Right Hand Joystick to lower the Cross Conveyor to the horizontal position.
- Move the Conveyor to Right until fully out.
- Pull the Diverter Valve lever **OUT** to re-direct oil from the Conveyor to the Loading Elevator.
- Activate the Tractor Auxiliary Hydraulics flow control valve to lower the Loading Elevator into the working position.
  The elevator is now ready for use.

Having previously disconnected the Rear lift and Levelling solenoid plugs these functions are now inactive and inadvertant operation of the control panel joystick and pushbutton will have no effect on the operation of the machine.

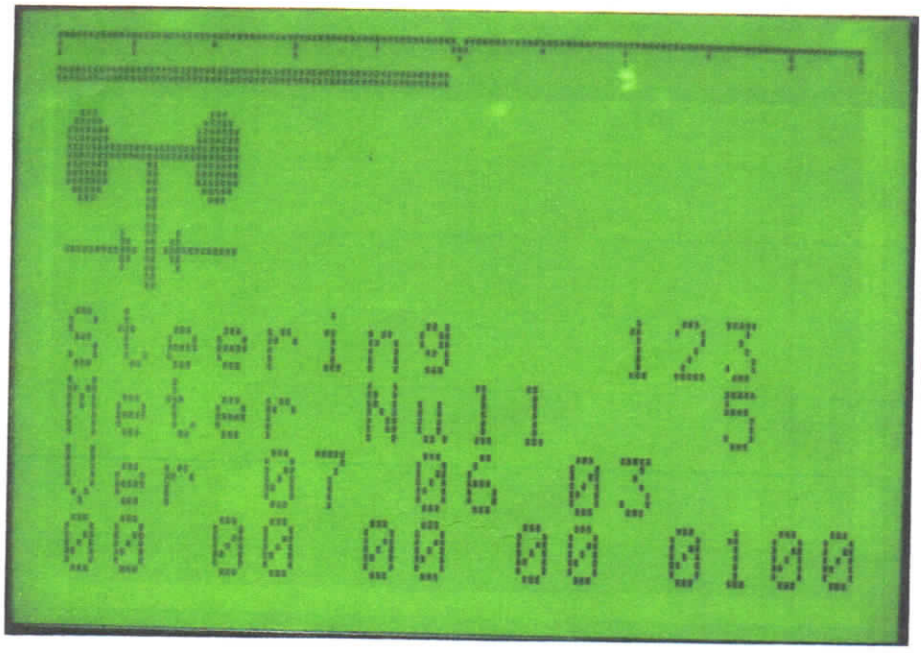
ScanStone Separators

16/11/11

Changing Settings on Canbus Control Box

To access settings:-
Hold the **page** button and then press the **Self Centre Steering** button.
After a short delay the first settings page appears.
Release the **Steering** button first.
Each press of the set button will step through the various pages.
Press the **Self Centre Steering** button once to exit setting mode.

Setting Pages



Page 1 - Steering
Align the Steering and then switch the hydraulic oil OFF before entering Settings Mode.

Steering Mid-point - Joystick 3 - right (XCONV) to save position
Steering Meter adjust - Joystick 3 - up/down (PRESSURE) to adjust meter offset

Typical Value
110-130

TO EXIT

- PRESS SELF CENTRE STEERING TO EXIT.

SAVING THE DEPTH

1) Press page button shown in figure 4.10

Figure 4.10

2) Now on the screen there should be an image of the share- if you can't see it then push the page button (fig 4.10) again as it may be on page 2. It should look like figure 4.11

Figure 4.11

3) By using the arrow buttons (figure 4.12) you can adjust the depth. The numbers at the bottom of the screen should change.

Figure 4.12

4) To save this position press the auto depth button shown below in figure 4.13.

Figure 4.13

5) The depth will have been saved.

CHANGING LEVELLING SENSITIVITY

- If levelling axle is working too much and is too sensitive, navigate to the levelling page on service pages.

- Move joystick 3 up or down to increase or decrease the deadband (increase for less sensitivity)- See below

LOAD SENSING WITH A WHITE FACED CONTROL BOX

- Press pages button and self centred steering button together
- Press pages button to navigate through pages until you reach load sensing page
- If load sensing is 0, then load sensing is on
- If load sensing is 1, then load sensing is off
- To change from off to on, press 3rd joystick to the left. Then the value should change from 0 to 1.
- To change from on to off, press 3rd joystick to the right. The value should change- if not then try to the left.
- Then press the self centred steering button to exit the settings page
- On the working page, when load sensing is off, the open oil tank icon should appear (see right).
- When load sensing is on there will be no oil tank icon.

When load sensing is on screen should look like below-

Part 5 Machine Maintenance

Re-tightening of screws

All nuts and bolts should be re-tightened after the first 20 hours of service. This also applies to machines which have undergone repair work.

Taper Lock Bushes

Check all taper lock bushes on the machine after the first 20 hours or after repair work to ensure they are secure.
Tap with a hammer and blunt punch in a circular motion around the taper lock then pinch up the socket head screws with a socket wrench, Fig 5.1.

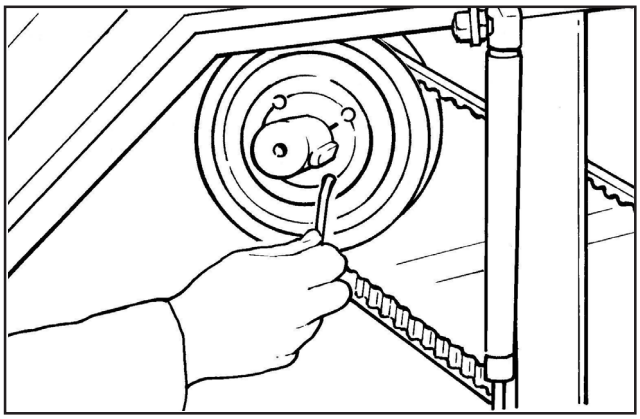
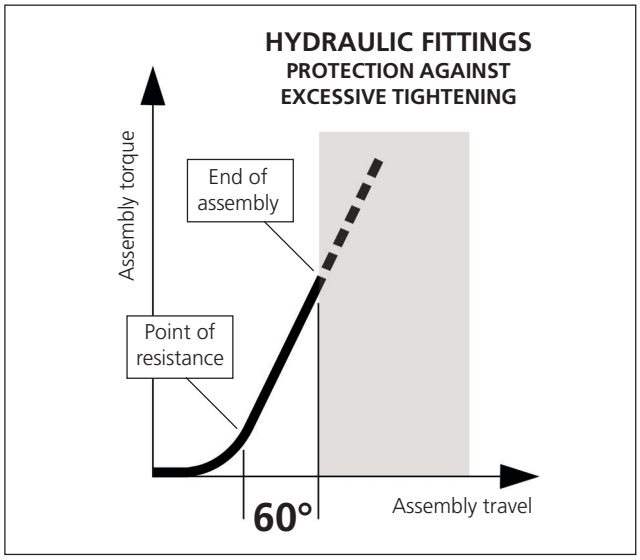


Fig 5.1

If taper lock bushes are to be replaced the following instructions should be followed:-

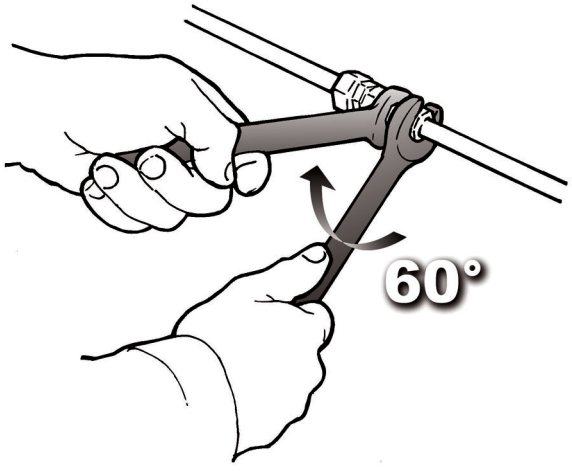
- Clean the taper lock bush to completely remove all traces of the protective film.
- Clean thoroughly the pulley and shaft end onto which the bush is to be fitted to remove oil and dirt.
- Push the bush into the pulley hub and rotate until the holes are in alignment.
- Apply loctite solution (or similar) to the threads of the screws before inserting into the assembly - Do not tighten!
- Fit the pulley / taper lock assembly onto the shaft and slide into the correct position.
  Note: It will also be necessary to loosely fit the drive belt over the pulley at this stage.
  Remember when positioning the assembly on the shaft that when the bolts are tightened the bush will nip the shaft first before drawing the pulley onto the bush.
- Tighten the screws gradually a few turns of each at a time until all bolts are locked up very tightly, Fig 5.1.
  Note: Use a piece of pipe or wrench to increase leverage.
- Tap the face of the bush using a hammer and blunt punch to ensure correct seating on the shaft and further tighten screws.
  Repeat this procedure once or twice more tapping around the face of the bush and tighten up the screws.
- Check the tightness of the screws once the drive has run under load for a short time.
- Fill empty holes in the bush with grease to exclude dirt.
  Note: Torque values are given in the table opposite.

BUSH	TORQUE (Nm)	SCREW QUANTITY	SIZE
1610	20	2	3/8" BSW
1615	20	2	3/8" BSW
2517	48	2	1/2" BSW
3020	90	2	5/8" BSW



Tightening of Hydraulic Fittings

Over tightening of hydraulic fittings can cause oil leaks. This can be avoided by correct tightening of fittings.
When assembling / re-assembling pipework on the machine always finger tighten the fitting to the point of resistance, then using a suitable spanner tighten by a further 60°.
Following these instructions will ensure correct contact with captive seal within fitting blocking any possible leakage path.



Part 5

Filter

The separator's hydraulic system is protected by a filter connected to the main feed line, Fig 5.2.1, which is used to strain impurities from the oil before it reaches the hydraulic valves.

Important: The filter must be replaced each season.

Failure to replace the filter as recommended could result in unfiltered oil entering the system and causing problems with the hydraulic services and damage to the spool valves.

The filter body has an electrical clogging sensor, Fig 5.2.2, which sends a signal to the control box in the event of a blocked filter. When the blocked filter symbol is displayed on the control panel screen the filter should be replaced as soon as possible.

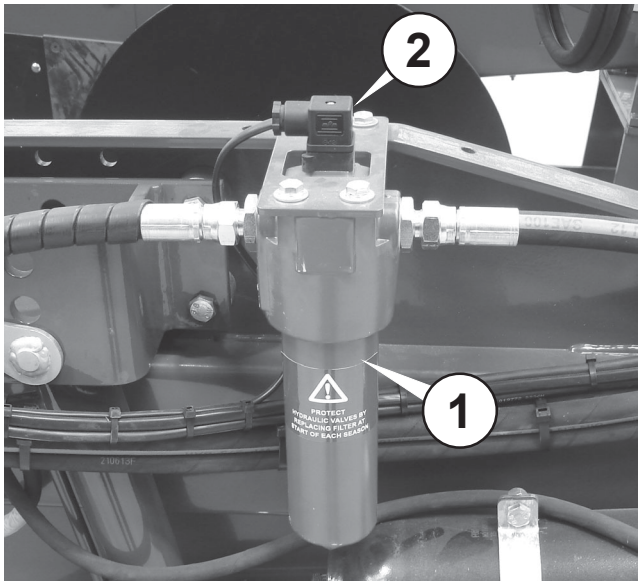


Fig 5.2

Drive Belt Tension

Drive system belt tensions are checked before the machine leaves the factory. If however a belt is removed for maintenance it should be re-installed to fit comfortably - neither too tight or too loose.

Screw type adjusters are fitted to allow belt tensions to be fine tuned and checks can be made to ensure the correct level of tension is achieved.

Attach a spring balance to the belt at mid span, Fig 5.3 (a), and check the force necessary to deflect the belt by 1/100th of its span centres (b). The force measured should equal that shown in the table opposite. If not, adjust the tensioner screws accordingly.

A tension meter can also be used to read the level of tension and frequency readings are also given opposite.

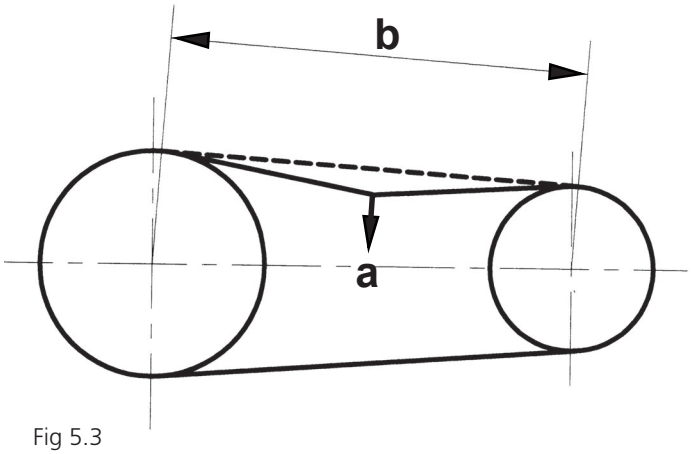


Fig 5.3

Gearbox

The Web drive gearbox is fitted with a level plug for inspection and top up, Fig 5.5.1.

Check level regularly and top up if required with EP 90 gear oil. The gearbox holds 1½ litres of oil.

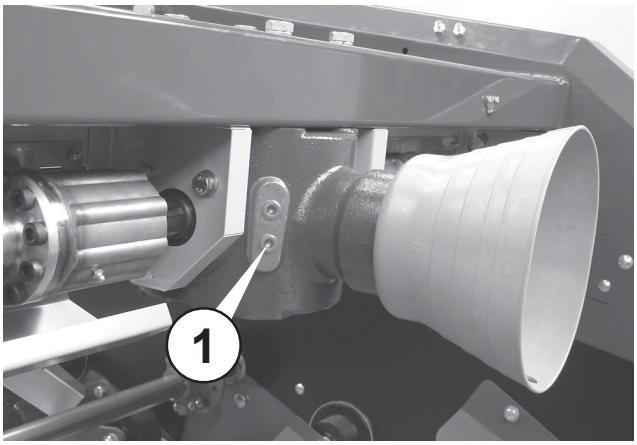


Fig 5.5

Clutches

Two 5 row clutches are fitted to the output shafts on either side of the web drive gearbox, Fig 5.8.
A further clutch is fitted to the central rear star shaft.
These clutches do not require adjustment!
If clutch slip occurs - Disable the machine by switching off the tractor engine and removing the ignition key.
Check over the machine for a blockage or for jamming of a mechanical component such as a trapped stone and clear as necessary.
If the clutch continues to slip for no apparent reason such as jamming or soil overloading - the clutch pawls and springs may be worn or damaged.

Warning - Clutch refurbishment requires special tools! Consult your ScanStone dealer.

Each clutch has a grease nipple (Fig 5.8.1 & Fig 5.9.1) - Check lubrication schedule for greasing intervals.

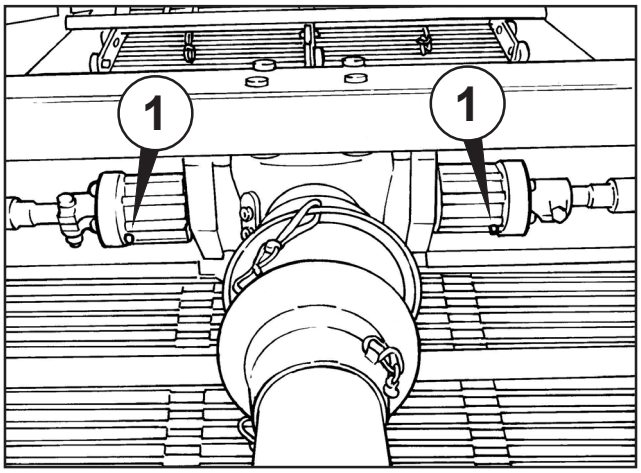


Fig 5.8

Wheels and Tyres

Check tyres periodically to ensure the correct pressure is maintained - 2.5 bar (36 p.s.i).
Keep tyres away from sharp objects and from petrol, grease, oil and solvents.
Check wheel stud torque settings at 8 hour intervals and tighten if required to 271 N/m.

Star Shaft Removal & Replacement

The high output Star unit consists of 6 rows of polyurethane stars mounted on heavy duty demountable steel shafts.
The shafts are designed with 2 piece interlocking drive flanges at each end which allow them to be detached and lowered out of the unit quickly and easily without the need to remove drive belts and pulleys.

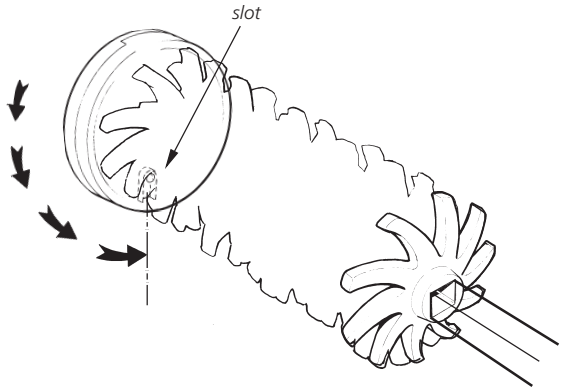
Take care when removing shafts - Heavy lifting may be involved. Use a forklift with suitable sling to attach the shaft when lowering.

Keep hands and feet clear when lowering shafts.

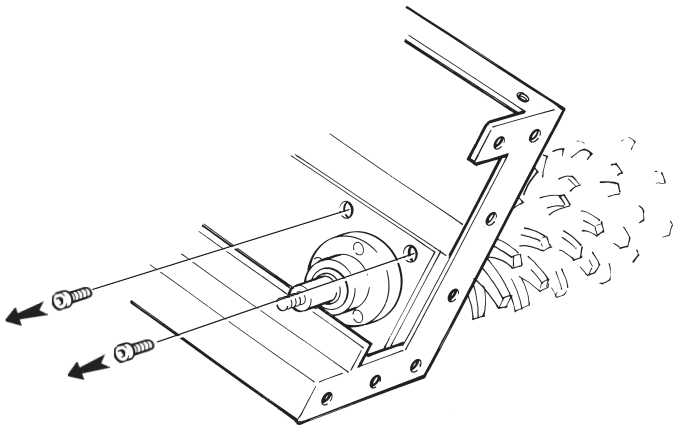
Shafts can be removed by following steps 1 to 6 on the opposite page.

Note: When re-installing a star shaft position the shaft on the ground and rotate until the small groove in the flange face is in the upward facing position.
This ensures correct seating with the locating pin in the chassis half of the flange.

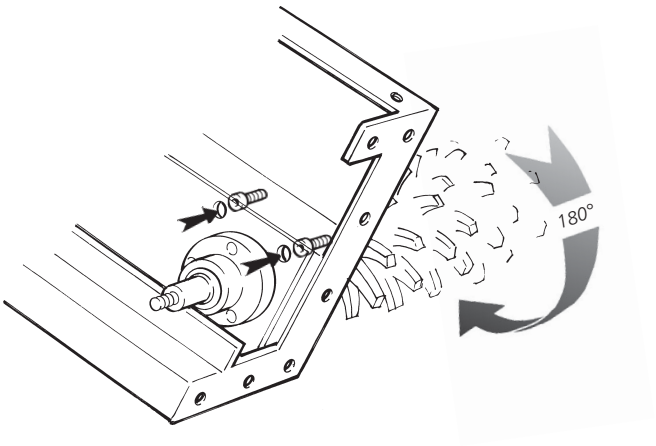
For details of alternative star pitches and shaft assembly drawings see pages 5.7 to 5.9.



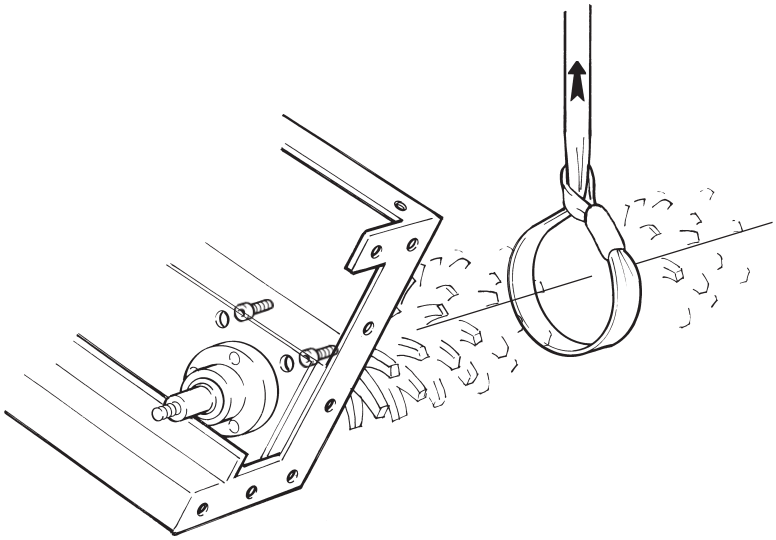
step **1** *Rotate the star shaft until the slot in the drive flanges is facing downward. (This is easily seen from the underside).*



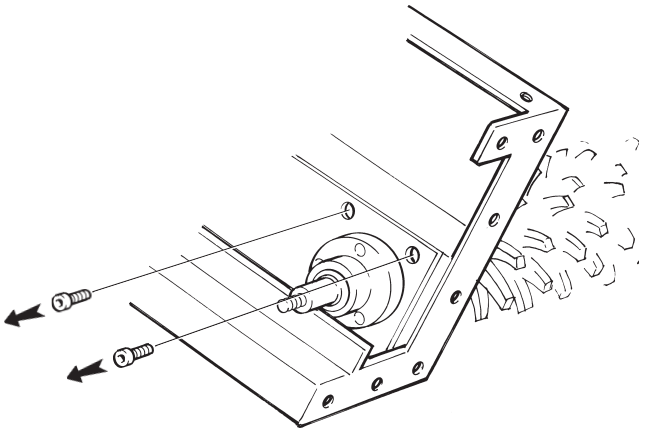
step **2** *Remove the 2 bolts which are visible through the access holes. (both sides of the machine)*



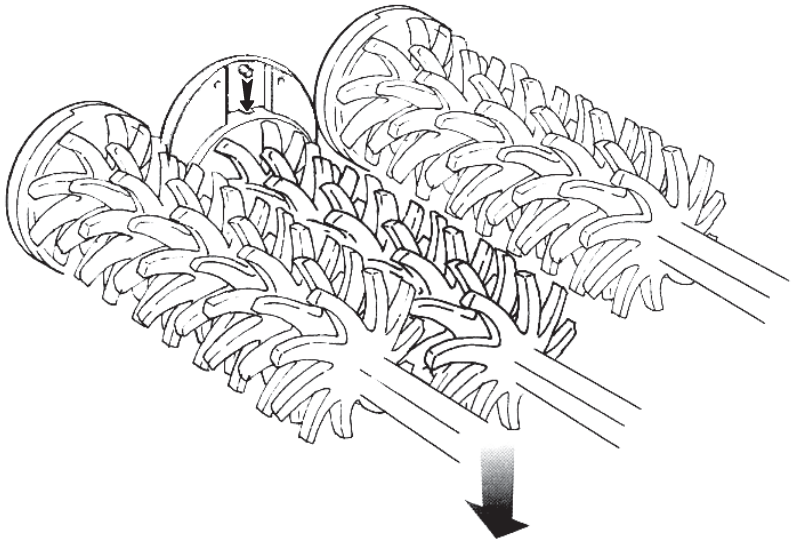
step **3** *Rotate the shaft through 180° until the 2 remaining bolts (in each end) are visible through the access holes*



step **4** *Position the forklift blade above the shaft centre and using a suitable sling or rope attached to the shaft - lift slightly to take up the slack.*



step **5** *Remove the 2 remaining bolts each side of the machine.*



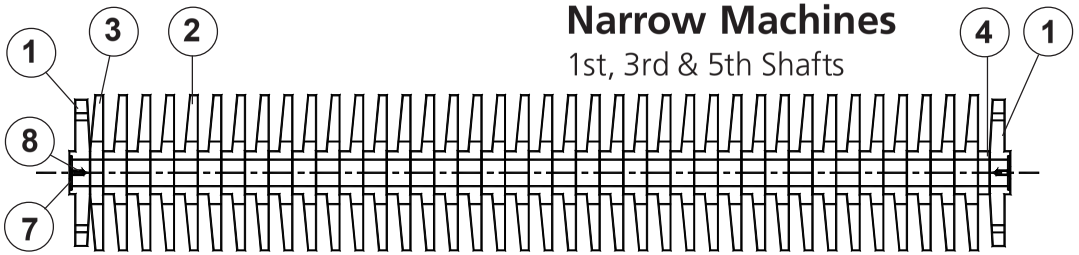
step **6** *Use the forklift to lower the shaft out of the machine.*

Note: *When lifting a star shaft back into the machine procedures 1 to 6 are reversed.*

Always use 'Loctite 243' on bolts when re-installing shafts.

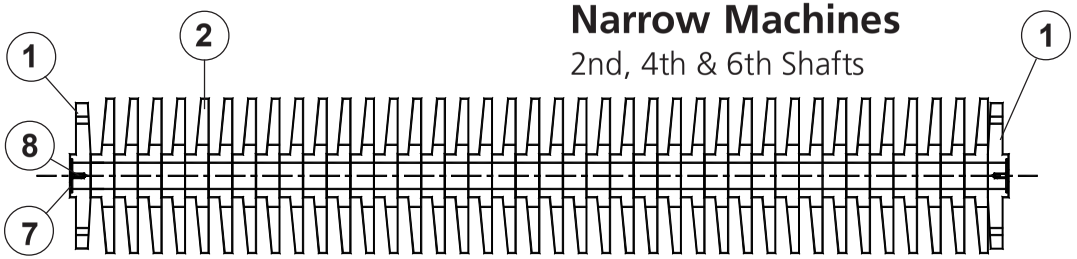
Drop Out Star Shafts (40mm Spacings)

Narrow Machines
1st, 3rd & 5th Shafts



Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12280	1
1	Welded Flange/Shaft RH	UN-12281	1
2	Full Star	UN-02995	37
3	Half Star	UN-02996	1
4	20mm Ring	UN-02997	1
5	5mm Ring	UN-02998	-
6	2.5mm Ring	UN-02999	-
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

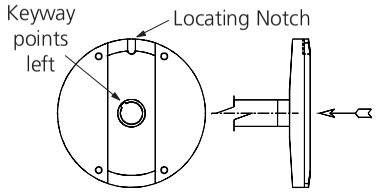
Narrow Machines
2nd, 4th & 6th Shafts



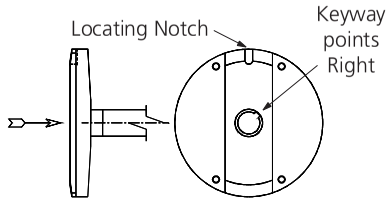
Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12280	1
1	Welded Flange/Shaft RH	UN-12281	1
2	Full Star	UN-02995	38
3	Half Star	UN-02996	-
4	20mm Ring	UN-02997	-
5	5mm Ring	UN-02998	-
6	2.5mm Ring	UN-02999	-
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

Star Shafts are fitted with a bolt on flange to one end but are welded to the flange at the opposite end of the Shaft.

Use this diagram to determine whether to order a left or right hand replacement shaft



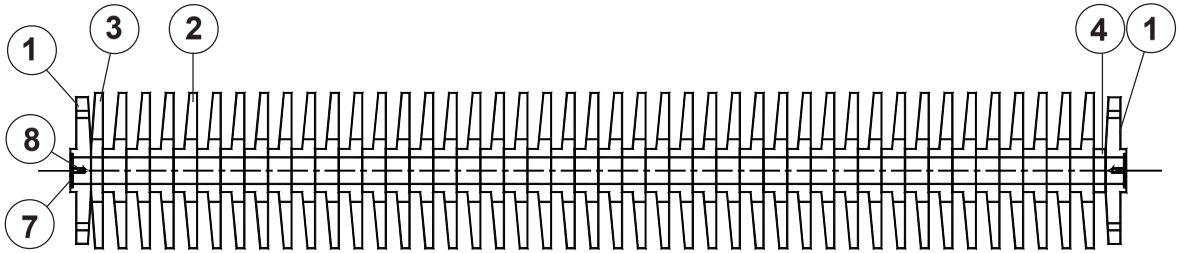
View on Welded end of shaft **(Left Hand)**



View on Welded end of shaft **(Right Hand)**

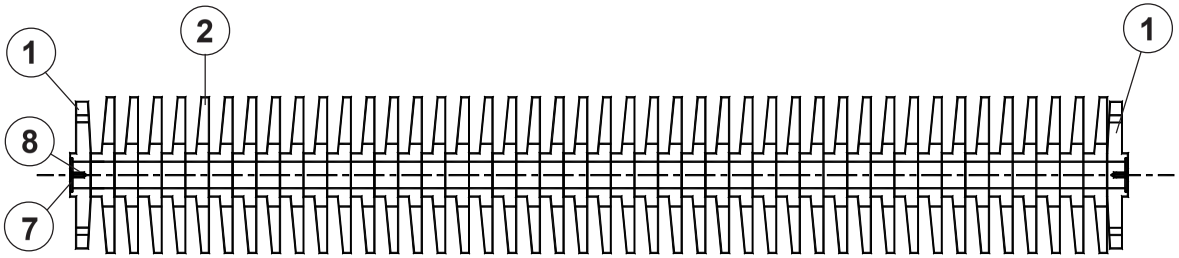
Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12282	1
1	Welded Flange/Shaft RH	UN-12283	1
2	Full Star	UN-02995	42
3	Half Star	UN-02996	1
4	20mm Ring	UN-02997	1
5	5mm Ring	UN-02998	-
6	2.5mm Ring	UN-02999	-
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

Wide Machines
1st, 3rd & 5th Shafts



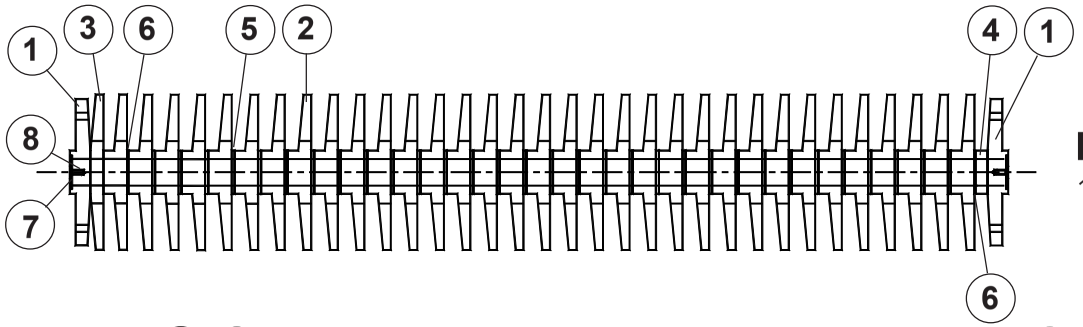
Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12282	1
1	Welded Flange/Shaft RH	UN-12283	1
2	Full Star	UN-02995	43
3	Half Star	UN-02996	-
4	20mm Ring	UN-02997	-
5	5mm Ring	UN-02998	-
6	2.5mm Ring	UN-02999	-
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

Wide Machines
2nd, 4th & 6th Shafts



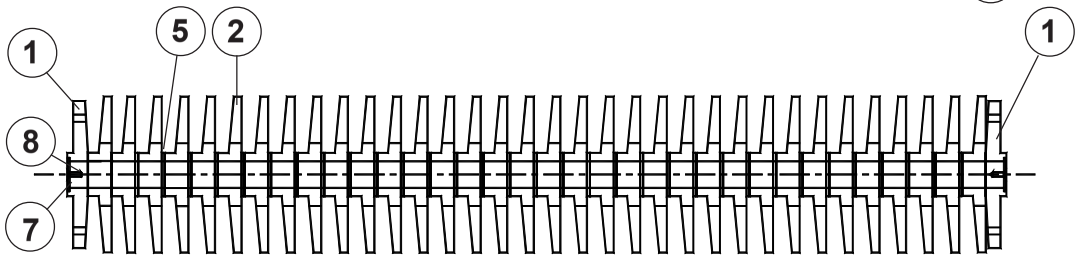
*Shafts are numbered from 1 (front) to 6 (rear)

Drop Out Star Shafts (45mm Spacings)



Narrow Machines
1st, 3rd & 5th Shafts

Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12280	1
1	Welded Flange/Shaft RH	UN-12281	1
2	Full Star	UN-02995	33
3	Half Star	UN-02996	1
4	20mm Ring	UN-02997	1
5	5mm Ring	UN-02998	31
6	2.5mm Ring	UN-02999	2
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

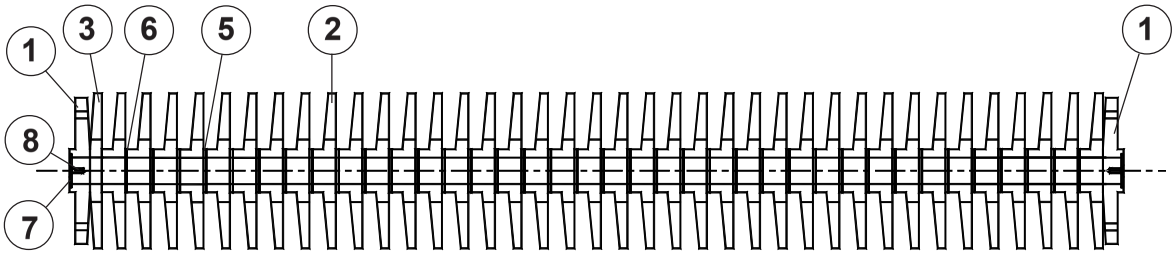


Narrow Machines
2nd, 4th & 6th Shafts

Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12280	1
1	Welded Flange/Shaft RH	UN-12281	1
2	Full Star	UN-02995	34
3	Half Star	UN-02996	-
4	20mm Ring	UN-02997	-
5	5mm Ring	UN-02998	32
6	2.5mm Ring	UN-02999	-
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

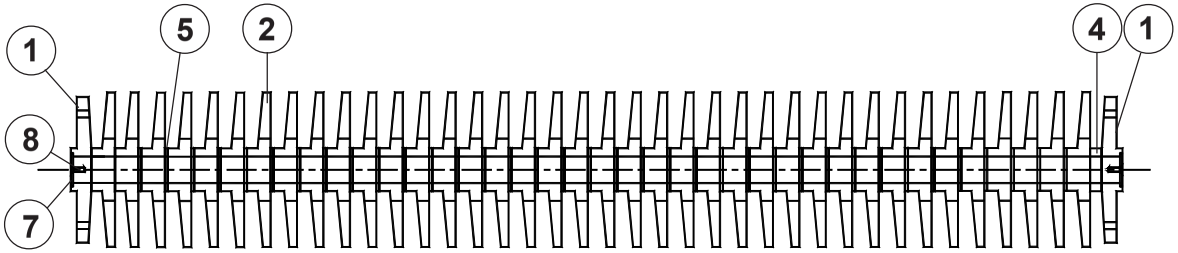
Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12282	1
1	Welded Flange/Shaft RH	UN-12283	1
2	Full Star	UN-02995	38
3	Half Star	UN-02996	1
4	20mm Ring	UN-02997	-
5	5mm Ring	UN-02998	35
6	2.5mm Ring	UN-02999	2
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

Wide Machines
1st, 3rd & 5th Shafts



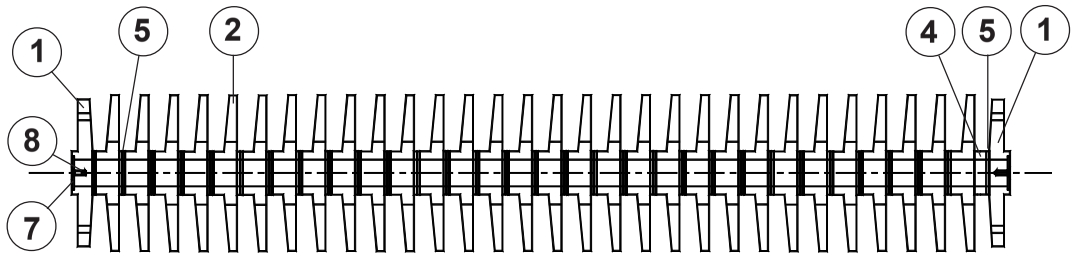
Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12282	1
1	Welded Flange/Shaft RH	UN-12283	1
2	Full Star	UN-02995	38
3	Half Star	UN-02996	-
4	20mm Ring	UN-02997	1
5	5mm Ring	UN-02998	36
6	2.5mm Ring	UN-02999	-
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

Wide Machines
2nd, 4th & 6th Shafts



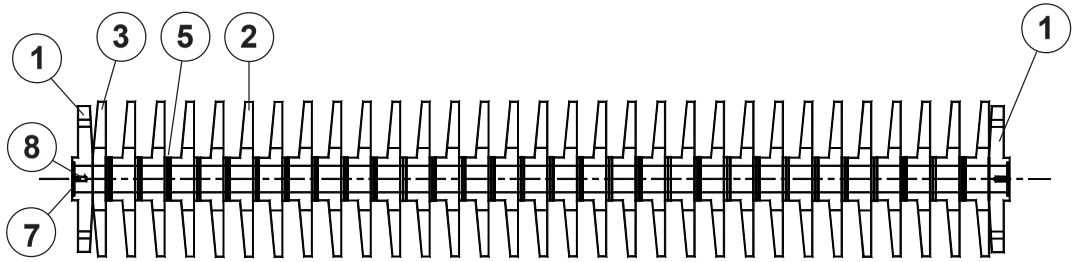
*Shafts are numbered from 1 (front) to 6 (rear)

Drop Out Star Shafts (50mm Spacings)



Narrow Machines
1st, 3rd & 5th Shafts

Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12280	1
1	Welded Flange/Shaft RH	UN-12281	1
2	Full Star	UN-02995	30
3	Half Star	UN-02996	-
4	20mm Ring	UN-02997	1
5	5mm Ring	UN-02998	60
6	2.5mm Ring	UN-02999	-
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

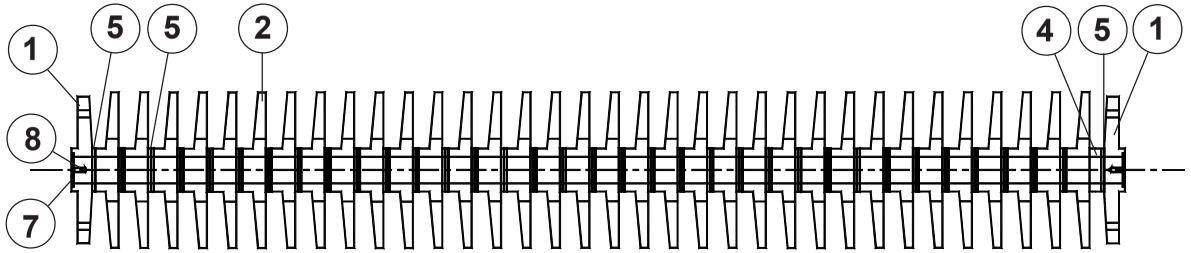


Narrow Machines
2nd, 4th & 6th Shafts

Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12280	1
1	Welded Flange/Shaft RH	UN-12281	1
2	Full Star	UN-02995	30
3	Half Star	UN-02996	1
4	20mm Ring	UN-02997	-
5	5mm Ring	UN-02998	60
6	2.5mm Ring	UN-02999	-
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

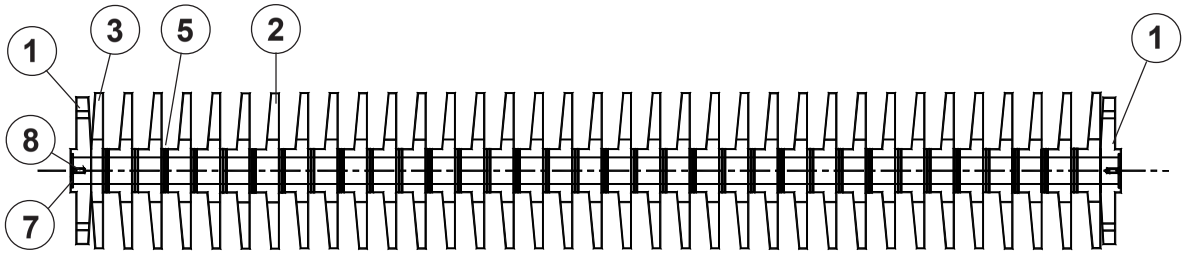
Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12282	1
1	Welded Flange/Shaft RH	UN-12283	1
2	Full Star	UN-02995	34
3	Half Star	UN-02996	-
4	20mm Ring	UN-02997	1
5	5mm Ring	UN-02998	68
6	2.5mm Ring	UN-02999	-
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

Wide Machines
1st, 3rd & 5th Shafts



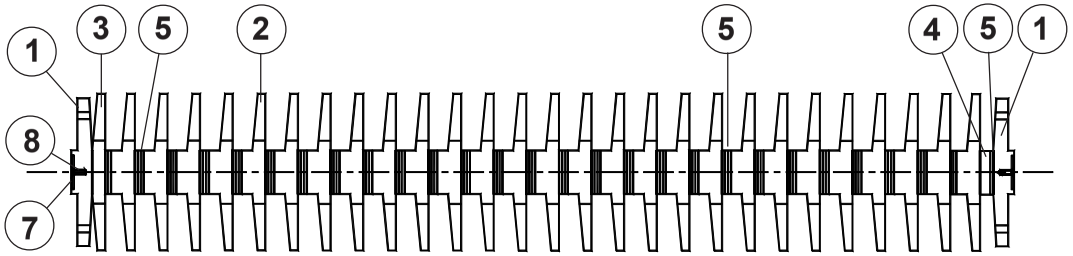
Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12282	1
1	Welded Flange/Shaft RH	UN-12283	1
2	Full Star	UN-02995	34
3	Half Star	UN-02996	1
4	20mm Ring	UN-02997	-
5	5mm Ring	UN-02998	68
6	2.5mm Ring	UN-02999	-
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

Wide Machines
2nd, 4th & 6th Shafts



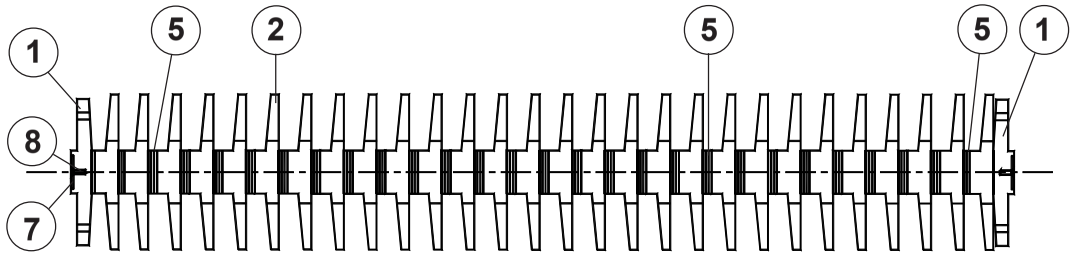
*Shafts are numbered from 1 (front) to 6 (rear)

Drop Out Star Shafts (55mm Spacings)



Narrow Machines
1st, 3rd & 5th Shafts

Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12280	1
1	Welded Flange/Shaft RH	UN-12281	1
2	Full Star	UN-02995	27
3	Half Star	UN-02996	1
4	20mm Ring	UN-02997	1
5	5mm Ring	UN-02998	80
6	2.5mm Ring	UN-02999	-
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

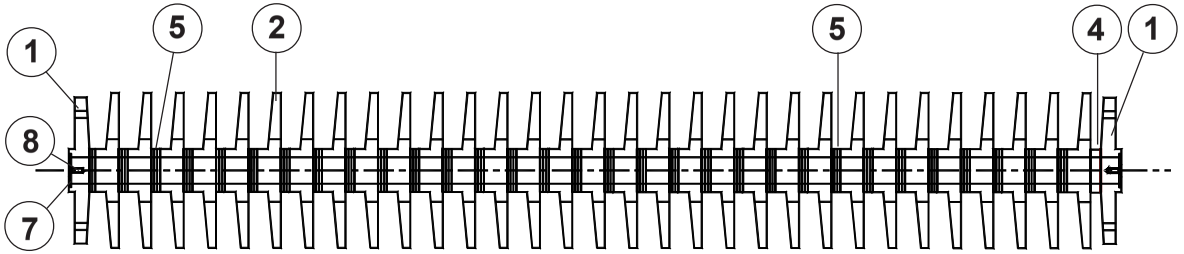


Narrow Machines
2nd, 4th & 6th Shafts

Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12280	1
1	Welded Flange/Shaft RH	UN-12281	1
2	Full Star	UN-02995	28
3	Half Star	UN-02996	-
4	20mm Ring	UN-02997	-
5	5mm Ring	UN-02998	80
6	2.5mm Ring	UN-02999	-
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

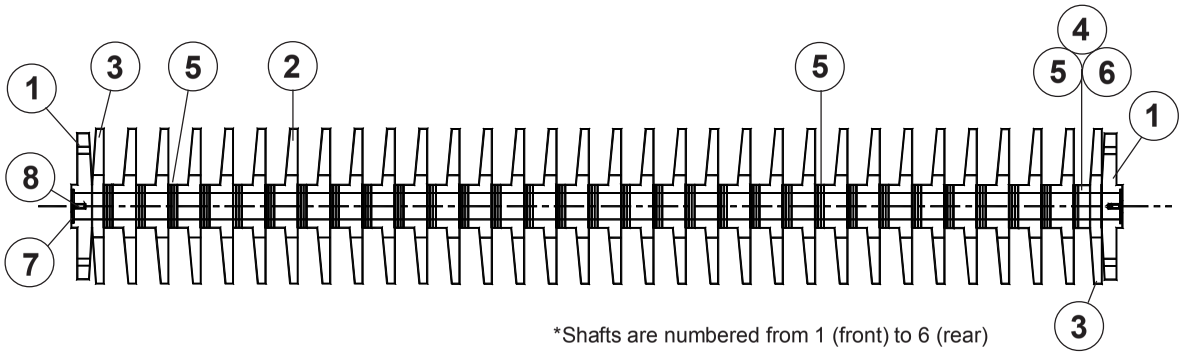
Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12282	1
1	Welded Flange/Shaft RH	UN-12283	1
2	Full Star	UN-02995	31
3	Half Star	UN-02996	-
4	20mm Ring	UN-02997	1
5	5mm Ring	UN-02998	92
6	2.5mm Ring	UN-02999	-
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

Wide Machines
1st, 3rd & 5th Shafts



Item	Description	Part No.	Qty.
1	Bolt-on Flange LH	UN-10452	1
1	Bolt-on Flange RH	UN-10599	1
1	Welded Flange/Shaft LH	UN-12282	1
1	Welded Flange/Shaft RH	UN-12283	1
2	Full Star	UN-02995	30
3	Half Star	UN-02996	2
4	20mm Ring	UN-02997	1
5	5mm Ring	UN-02998	91
6	2.5mm Ring	UN-02999	1
7	Washer	UN-10474	2
8	Screw M8x25	UN-S1M8x25	2

Wide Machines
2nd, 4th & 6th Shafts



*Shafts are numbered from 1 (front) to 6 (rear)

Rear Star Unit

The rear star unit consists of 3 driven star shafts designed to convey large stones into the stone collection hopper. Spacers positioned between each star allow small or medium sized stones to fall through onto the cross conveyor for removal into the row bottoms.
Each star shaft can be easily removed to allow worn stars or spacers to be replaced if necessary.

To replace stars / spacers:-
Detach the carbine hooks holding the scrubber web extension in position, Fig 5.10.1 and lift web clear of the shafts.
Remove deflector plates bolted either side of the machine, Fig 5.11.1 to allow access to the shaft end flanges.
Remove the 3 bolts in each end flange, Fig 5.11.2 splitting the flanges into two parts. Remove the smaller part to allow the star shaft to be lifted out of the machine.
Remove the socket head countersunk screw from the centre of the end flange to allow the stars and spacers to be removed from the shaft.
Reverse these procedures when re-fitting the shaft.

Note: Shaft bearing housings each have a grease nipple for lubrication. These require 1 pump of grease every 100 working hours.
The clutch also has a grease nipple which requires 1 pump of grease every 200 hours, - see Lubrication schedule.

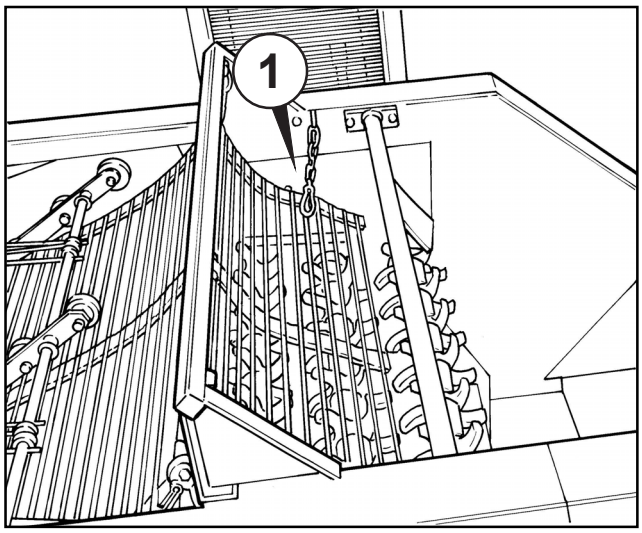


Fig 5.10

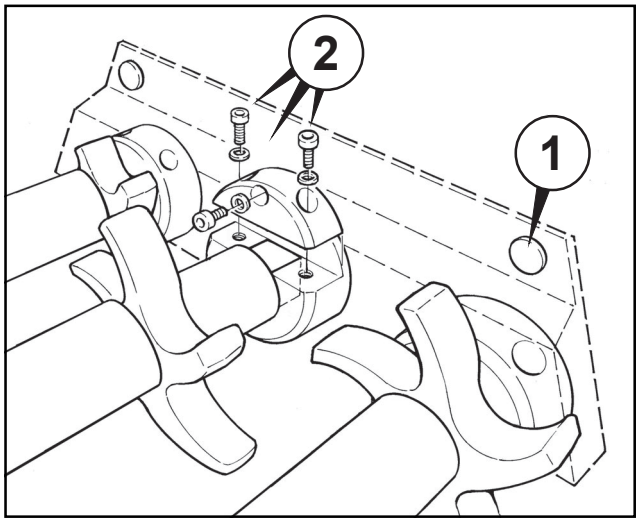


Fig 5.11

Stone Rake

The stone rake offers an alternative to rear star separation and consists of a row of tines designed to assist large stones into the stone collection hopper. Smaller stones are allowed to drop through onto the cross conveyor.

Periodic checks should be made to ensure nylon slider surfaces, Fig 5.12.1, are free from grit which could result in rapid wear.

Note: Adjustable rod ends and support arm bearings each have a grease nipple for lubrication, Fig 5.12.2. These require 1 pump of grease every 100 working hours - see Lubrication schedule.

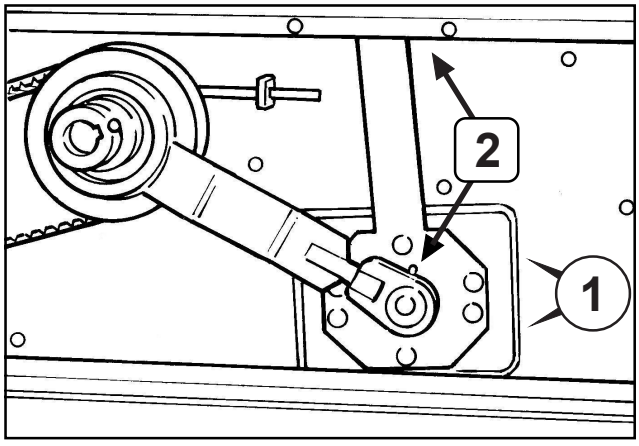


Fig 5.12

Part 5

Hydraulic System Checks

If a problem develops with one of the hydraulic services some simple remedies may correct the fault.
The hydraulic solenoids are grouped together at the front and rear of the machine, and decals indicate which valves control each function.
These are also shown opposite.
Activate the control panel switch for the service which is not functioning correctly whilst simultaneously holding a screw driver on the metal part of the relevant solenoid head, Fig 5.14.1. A slight magnetic pull should be apparent.
When the switch is released the magnetism should cease.
Repeat this procedure by moving the switch in the opposite direction and check for magnetism whilst holding the screw driver at the opposite end of the solenoid.

When checking any of the double acting services i.e. *Machine Levelling, Cross Conveyor Position, Pressure Pads* and *Steering* the dump valve should also be checked simultaneously for magnetism along with the applicable solenoid valve.

These tests should prove if the solenoid valves are working properly.

A further test can be made to establish if the electrical supply to the solenoid is sufficient:-
Disconnect the plastic plug from the face of the solenoid.
Carefully separate the two halves of the plug to reveal the wiring terminals.
Fit a voltmeter between the terminals.

Black numbered wire = positive +
Green / Yellow wire = Earth

With the service activated a reading of 12 to 13 Volts should register on the meter.
If not - this would indicate insufficient power supply from the tractor.
Check power source!
Fit the 2 core cable from the control box directly to the tractor battery and re-check the voltmeter reading.

A further check can be made by mechanically operating the solenoid valve.

Lower the Front and Rear Lift rams and switch off the tractor engine.
Failure to do so could result in injury if sudden dropping of machine occurs when the solenoid valve is operated!

Place a small screwdriver into the hole in the head of the solenoid valve, Fig 5.14.2, and push the pin a few times. This may help to free the valve if it has become stuck.
Start up the tractor engine and enable the machine hydraulics. Check by operating the relevant control panel switch that the fault has now been rectified.

If problems persist - Consult your ScanStone dealership.

Front Manifold

Pressure Pads	Driven Scrubber web	LH Disc	RH Disc	Share
Up	Up	Down	Down	Down
Down	Down	Up	Up	Up

Rear Manifold

X-Con Position	Steering	Levelling	Stone Box	Rear Lift
Right	Right	Down	Close	Down
Left	Left	Up	Open	Up

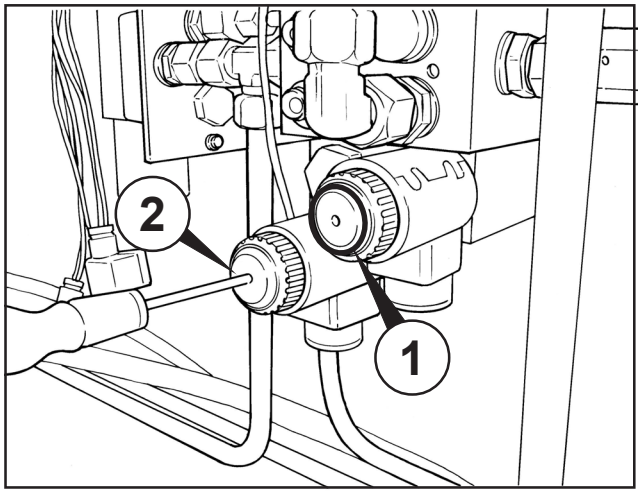


Fig 5.14

The Hydraulic Scrubber Web, Cross Conveyor Speed, Auxiliary Valve, Front and Rear Manifold Blocks are all fed from the PVG valve group.
To check that the spools are operating - a lever can be fitted to the appropriate mechanical actuator, Fig 5.15:A, and that function should be operated electrically by activation of the relevant control panel switch. The lever should move when that service is activated.
A similar check can be done mechanically:-
When the control system is powered up the spool should be held electrically in the neutral position and movement should not be possible. To check that the spools operate - disconnect the plug on the appropriate solenoid, Fig 5.15: B, and fit the lever to the same spool.
It should now be possible to operate the spool manually.

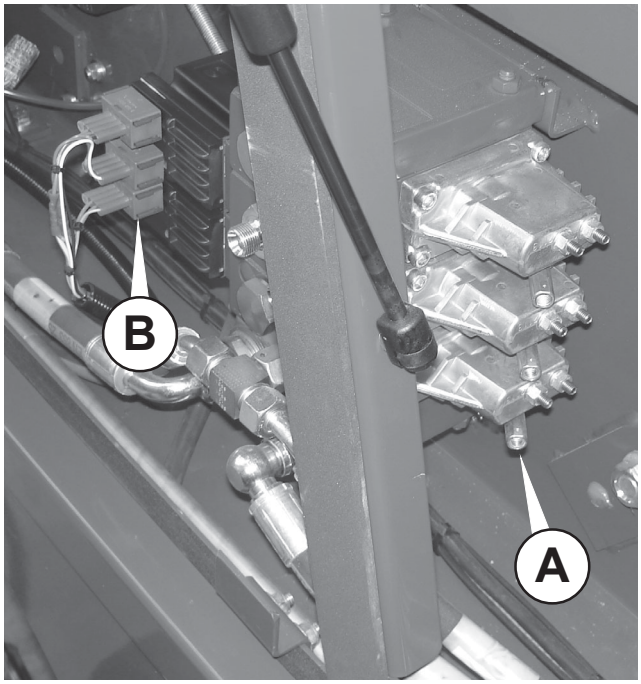
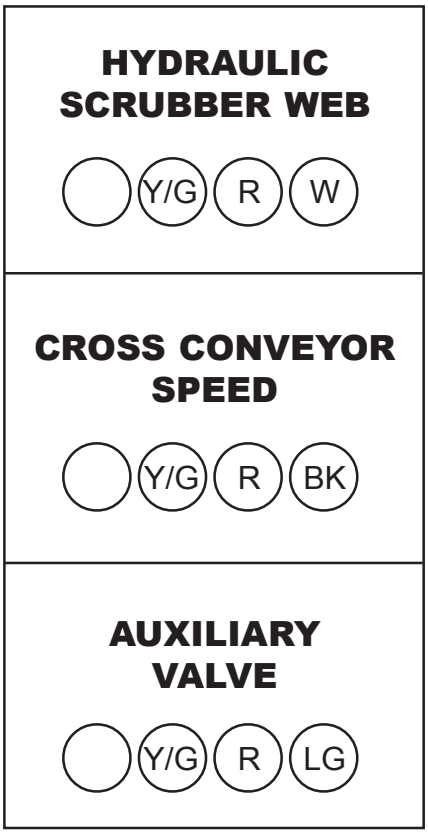


Fig 5.15



Hose Replacement Intervals - Hoses should be replaced every 5 years even if signs of wear or damage is not apparent.

When replacing hoses always use the correct specification*:-

***SAE 100 R2 AT • DIN EN 853 2SN**

SIZE	WORKING PRESSURE	MIN. BURST PRESSURE
1/4"	400 Bar (5800 psi)	1600 Bar (23200 psi)
3/8"	330 Bar (4800 psi)	1320 Bar (19150 psi)
1/2"	275 Bar (4000 psi)	1100 Bar (15950 psi)

Hydraulic Problems

Problem	Probable Causes	Suggested Remedy
● Hydraulic services operate too slowly or not at all.	● Incorrect Feed and Return hose connection to tractor.	● Check hoses are correctly fitted with as little restriction as possible.
		● Check tractor is supplying oil at a rate of 30 litres per minute (6.6 gallons) at a pressure of between 150 bar - 205 bar
	● Cross conveyor may be running too fast.	● Reduce conveyor speed
● Overheating of hydraulic oil.	● Blocked oil cooler on tractor.	● Clean oil cooler to ensure it is free of dust etc.
	● Low oil level in tractor reservoir.	● Add oil to reservoir
	● Quick release fittings on tractor and separator incompatible - resulting in restricted oil flow.	● Check fittings and replace as appropriate.
	● Closed centre / Load Sensing switch in incorrect position.	● Check type of auxiliary hydraulics on tractor and see instructions on page 3.4 of manual.
	● Tractor oil flow too high.	● Check flow rate does not exceed 45 litres / minute.
● Hydraulic leaks from pipe fittings or pipes rupturing	● Tractor oil flow too high	● Reduce tractor hydraulic flow rate to between 30 - 45 L/min Maximum.
● Malfunctioning hydraulic service	● Faulty solenoid valve or lack of electrical power from tractor.	● Follow 'Hydraulic system check' instructions on page 5.12 of manual.

Winter Storage

1. Wash the machine thoroughly, taking care to avoid electrical components.
2. Operate the machine controls to remove the load from all hydraulic rams.
3. Lubricate and grease the machine according to the schedules printed on pages 7.1, 7.2 and 7.3 of the manual and the decals on the machine.
4. Grease all components such as share blades which have been polished through contact with the ground. Grease also exposed piston rods on all hydraulic rams.
5. Check all drive belts for tautness and grease adjuster threads.
6. Tie up hydraulic hoses ensuring ends are clear of the ground.
7. Remove the control box and store in a dry environment.
8. Check tyre pressures are as recommended according to the decals or remove load from the tyres by placing the machine on blocks.
9. In the unlikely event that the machine is out of service for a period of three years or more - have the hydraulic system inspected and properly tested and if necessary overhauled prior to usage.

Part 6 Special Settings

Extended Rear Lift - Height Adjustments

Fig 6.1 shows the axle / jaw relationship as fitted on standard machines.
In conditions where operator's are working in deep beds further axle clearance can be achieved by making the adjustments shown in Fig 6.2. These adjustments consist of moving the axle jaws to the next set of holes in the axle plate and turning the steering ram bracket through 180° to accommodate the new steering ram position. These alterations give an increased axle clearance of 50mm.

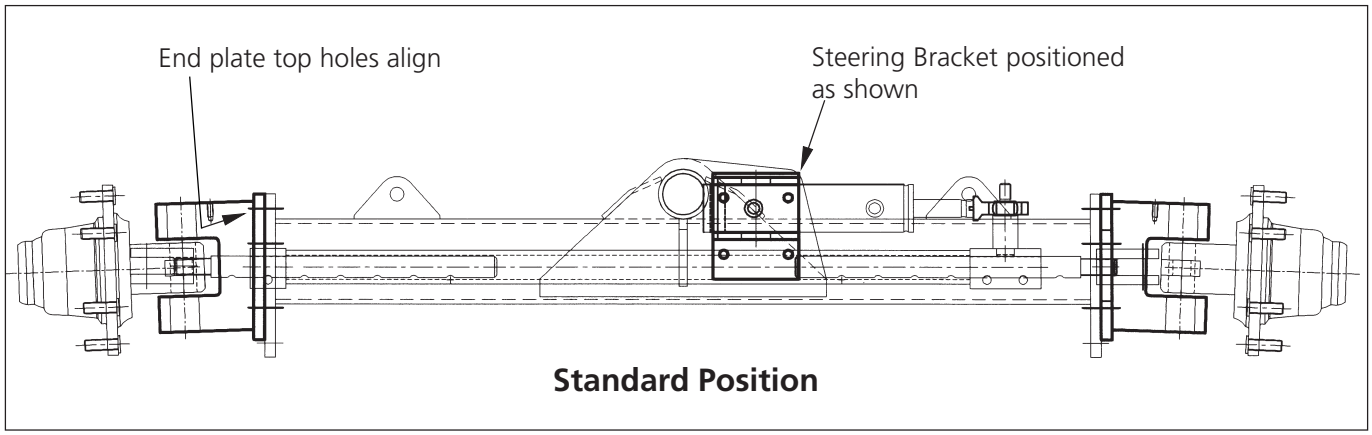


Fig 6.1

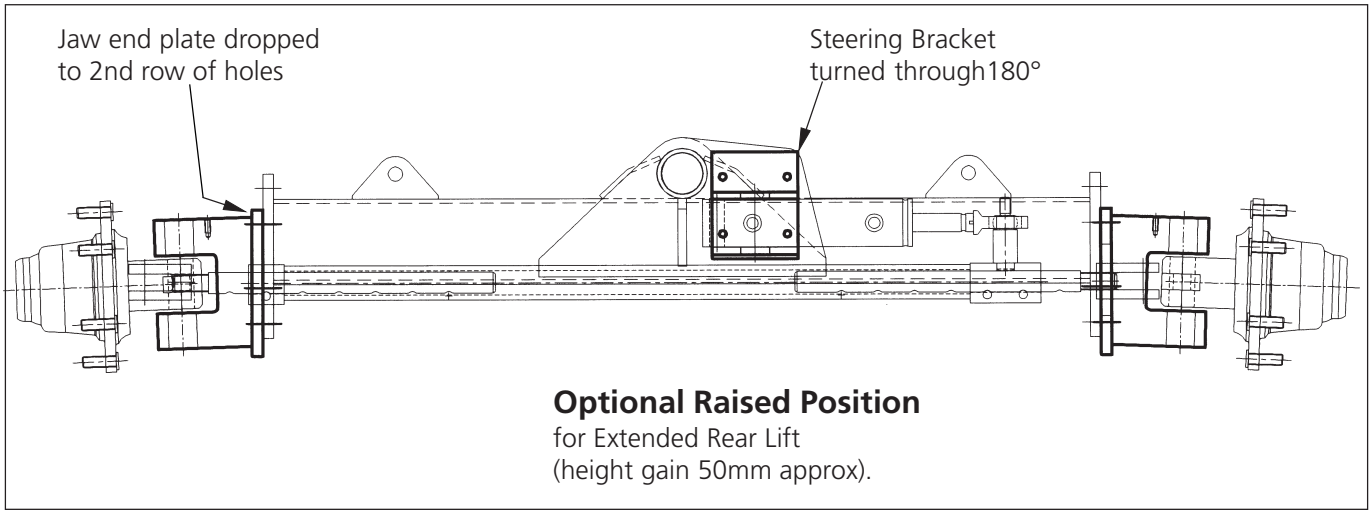


Fig 6.2

A choice of holes is provided in the axle mount assembly for the rear lift ram, Fig 6.3.
Operator's who require additional rear lift should locate the ram in the top set of holes. This will result in a height gain of 100mm.

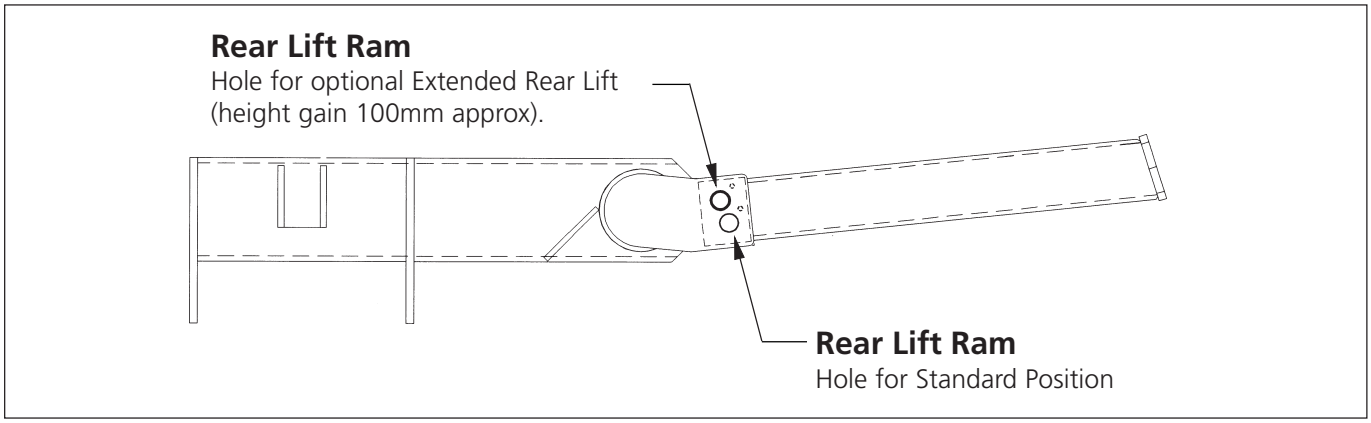
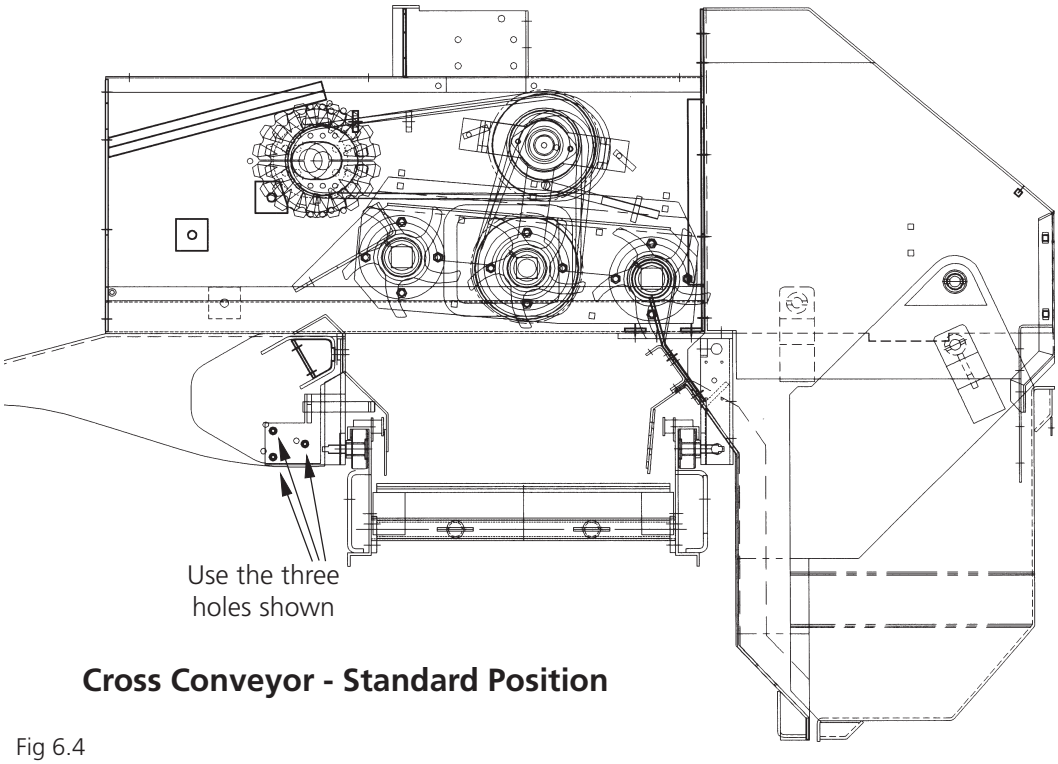


Fig 6.3

Part 6

Cross Conveyor - Level Adjustments

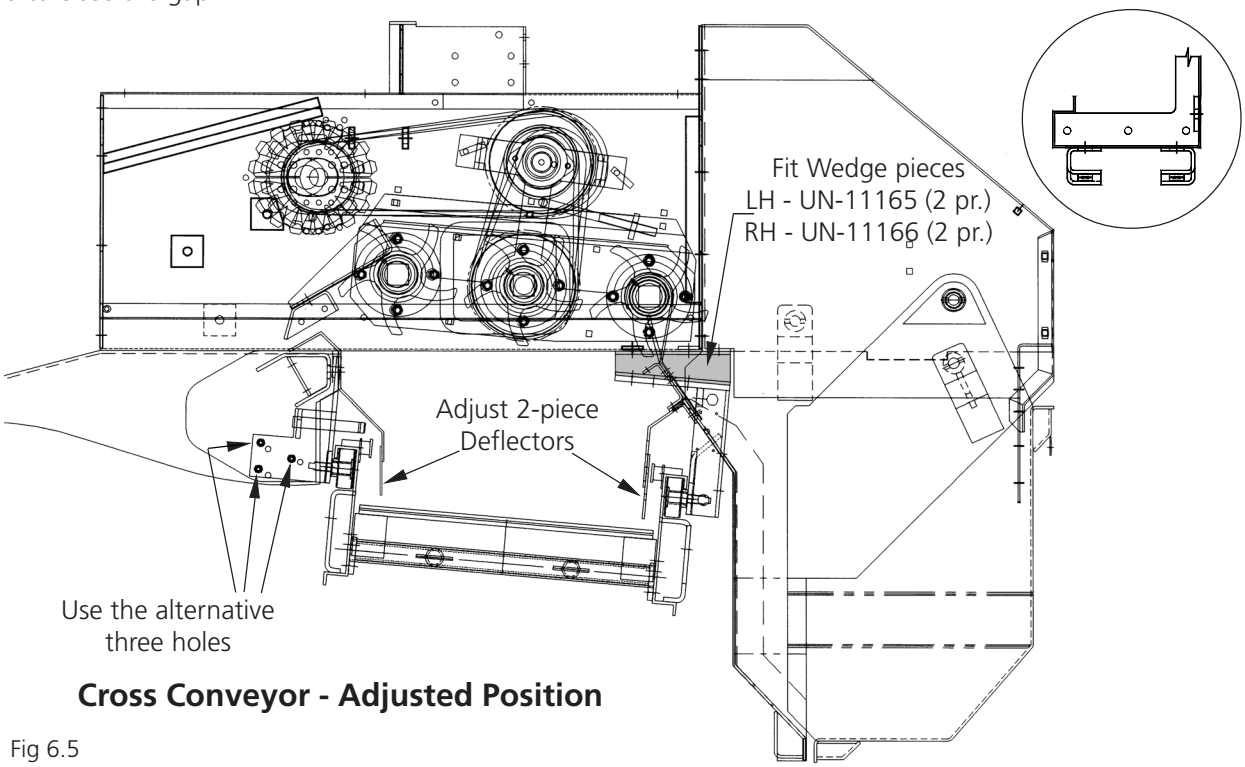
The cross conveyor has 2 level settings as shown in figures 6.4 and 6.5.
Fig 6.4 shows the conveyor set up in the standard position.
Note the 3 holes used for attachment of the roller support plates to the chassis support frame.



Cross Conveyor - Standard Position

Fig 6.4

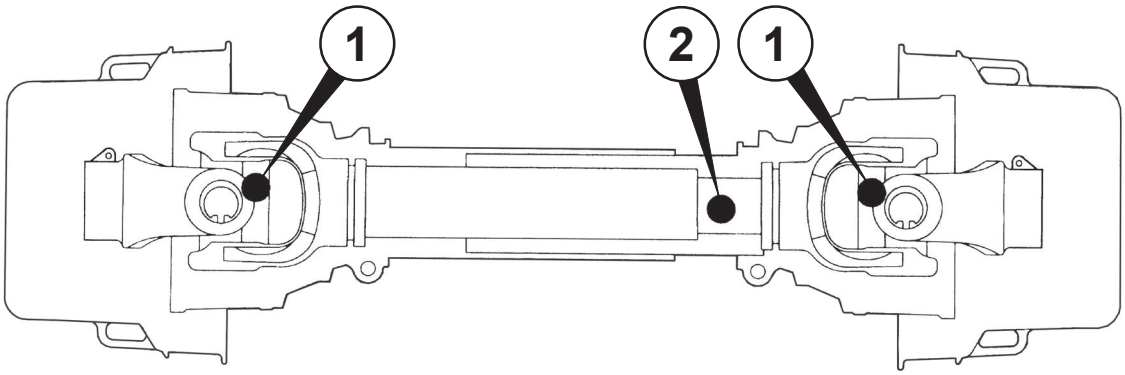
If the machine is configured for extended rear lift the cross conveyor should be set in the adjusted position to ensure that it is level during operation - Fig 6.5.
Wedge pieces are fitted between chassis and cross conveyor supports and the 3 alternative holes are used in the chassis support frame for attachment of roller support plates. Adjustment is also made to the 2 piece deflectors which are extended to close the gap.



Cross Conveyor - Adjusted Position

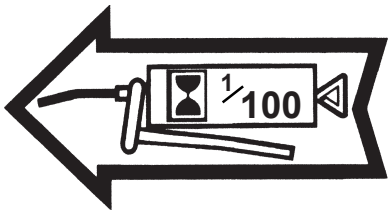
Fig 6.5

Part 7 Lubrication Schedule

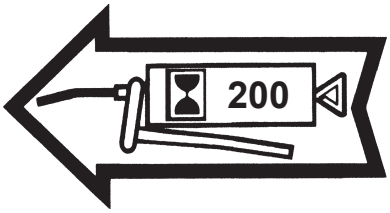


P.T.O. Shaft

1. Grease every **8** hours
2. Grease every **16** hours



- 1 pump of grease every 100 hours

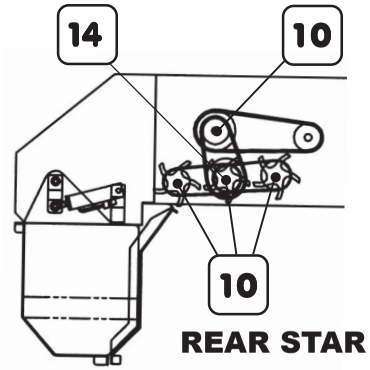


- 1 pump of grease every 200 hours

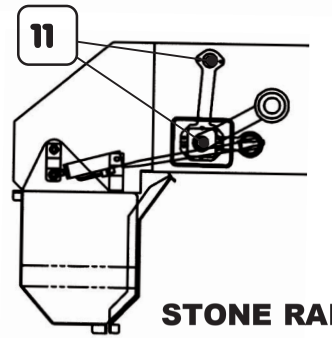
The above decals can be found at the appropriate points on the machine where grease is to be applied at specified intervals.
Use only high quality, multi purpose lithium based grease.

DO NOT overgrease bearings - always follow recommendations

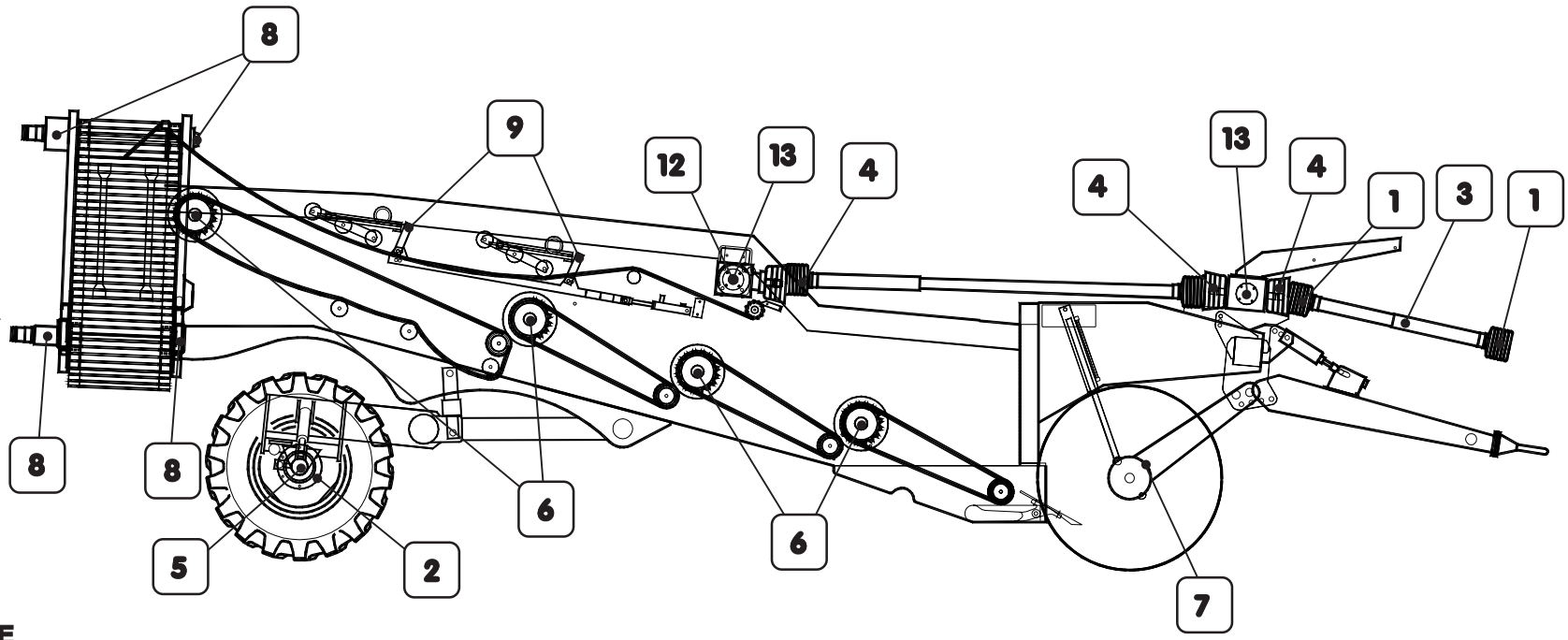
LUBRICATION - WEB MACHINE

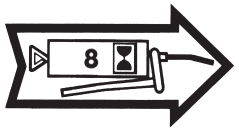


REAR STAR



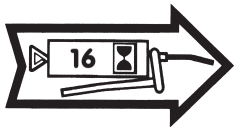
STONE RAKE



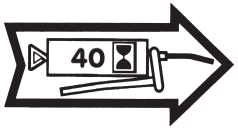


GREASE AT 8 HOUR INTERVALS
1. P.T.O. Universal Joints

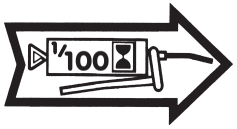
CHECK AT 8 HOUR INTERVALS
2. Wheel Stud Torque Settings (271 Nm)



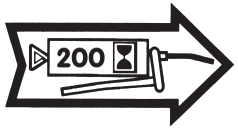
GREASE AT 16 HOUR INTERVALS
3. P.T.O. Sliding Shafts



GREASE AT 40 HOUR INTERVALS
4. P.T.O. Guard Cones



GREASE AT 100 HOUR INTERVALS
5. Wheel Hub
6. Drive Shaft Bearings
7. Disc Bearings
8. Cross Conveyor Drive Shaft Bearings
9. Scrubber Web Mount Bar Bearings
10. Rear Star Bearings (7)
11. Stone Rake Pivot & Rod Ends

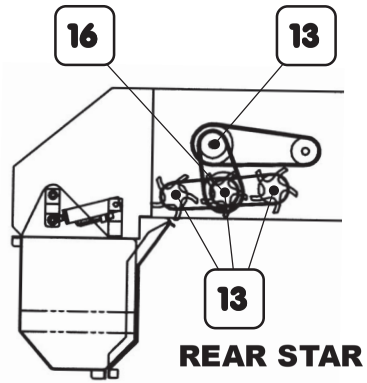


CHECK AT 100 HOUR INTERVALS
12. Oil Level - Gearbox

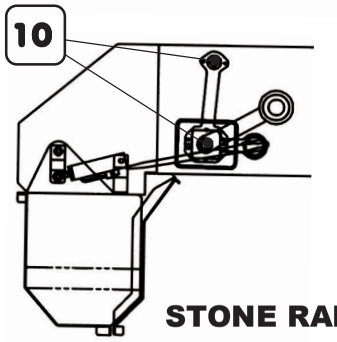
GREASE AT 200 HOUR INTERVALS
13. Input Drive Shaft Clutches
14. Rear Star Clutch

***Apply one pump of grease only at the intervals noted**

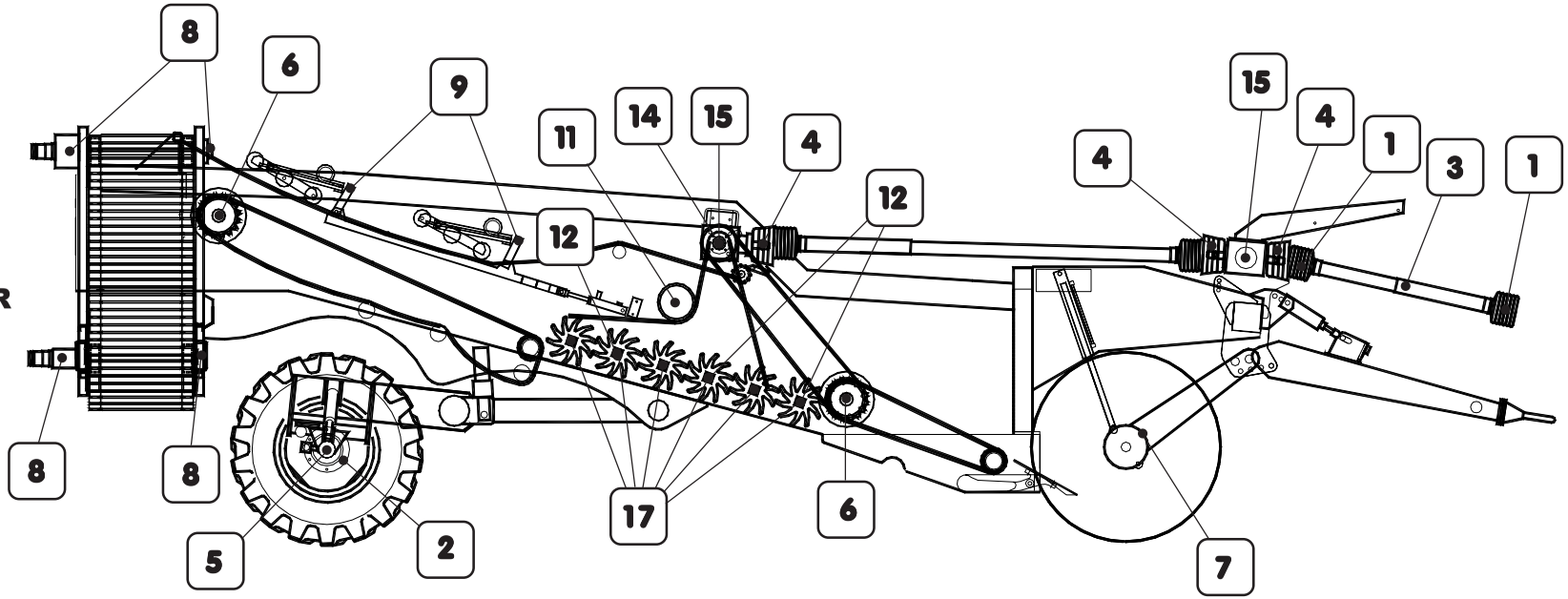
LUBRICATION - STAR MACHINE

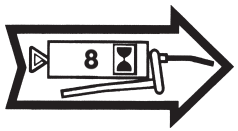


REAR STAR



STONE RAKE



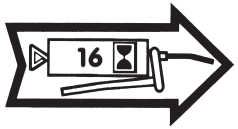


GREASE AT 8 HOUR INTERVALS

1. P.T.O. Universal Joints
17. Star Shaft Bearing Housings (12)

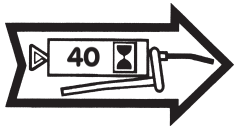
CHECK AT 8 HOUR INTERVALS

2. Wheel Stud Torque Settings (271 Nm)



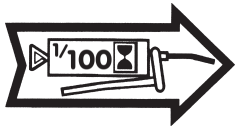
GREASE AT 16 HOUR INTERVALS

3. P.T.O. Sliding Shafts



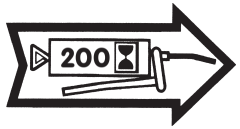
GREASE AT 40 HOUR INTERVALS

4. P.T.O. Guard Cones



GREASE AT 100 HOUR INTERVALS

5. Wheel Hub
6. Drive Shaft Bearings
7. Disc Bearings
8. Cross Conveyor Drive Shaft Bearings
9. Scrubber Web Mount Bar Bearings
10. Stone Rake Pivot & Rod Ends
11. Tensioner Pulleys
12. Idler Pulleys (6)
13. Rear Star Bearings (7)



CHECK AT 100 HOUR INTERVALS

14. Oil Level - Gearbox

GREASE AT 200 HOUR INTERVALS

15. Input Drive Shaft Clutches
16. Rear Star Clutch

***Apply one pump of grease only at the intervals noted**

Part 7

Handling Oil & Grease

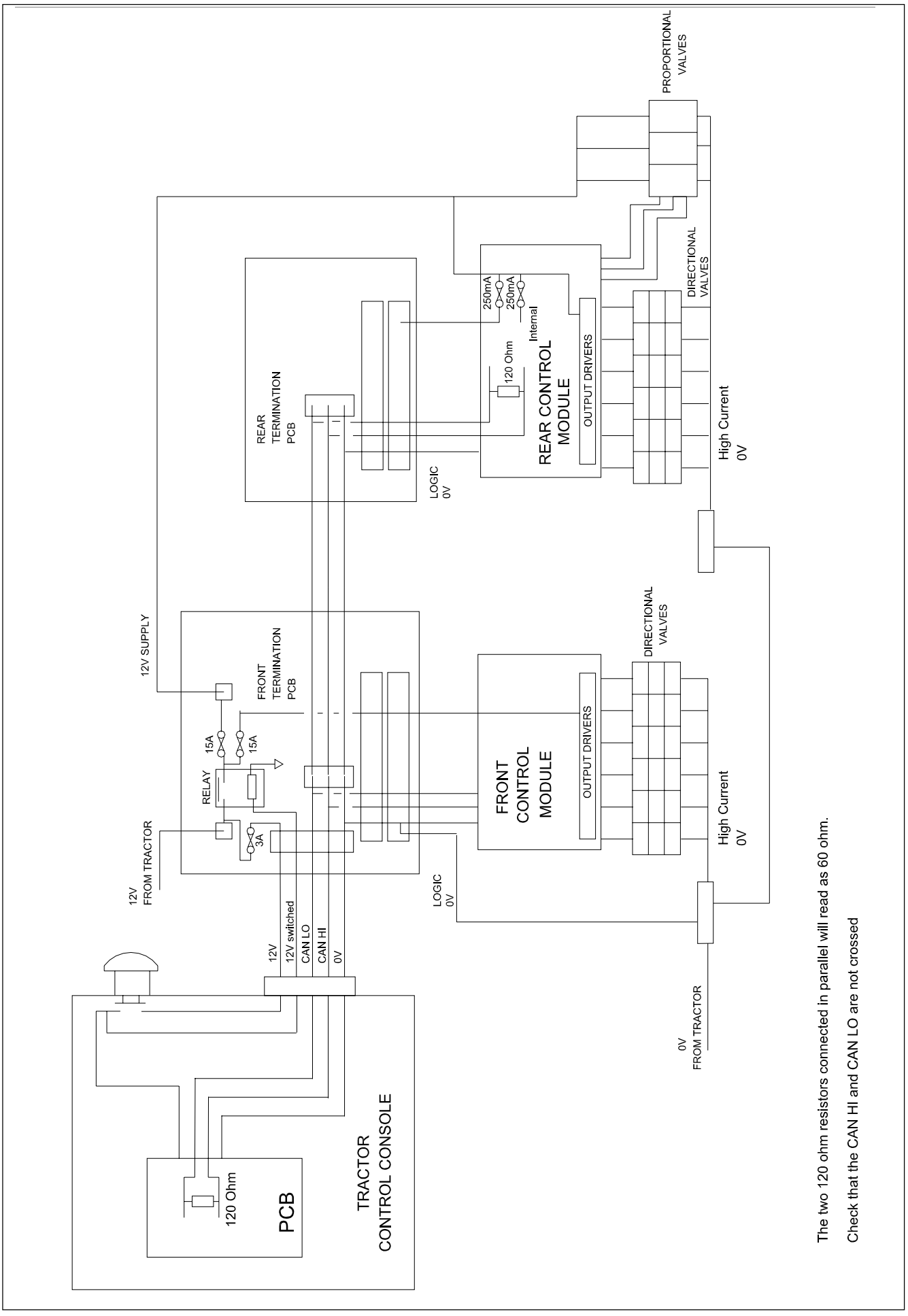
Oil and grease products used on this machine are not considered to be particularly hazardous to health unless ingested. Handle these products responsibly and in accordance with good industrial hygiene and safety practices.

Contact with skin:-
Wash skin with plenty of soap and water for several minutes.
Seek medical attention if irritation develops or persists.

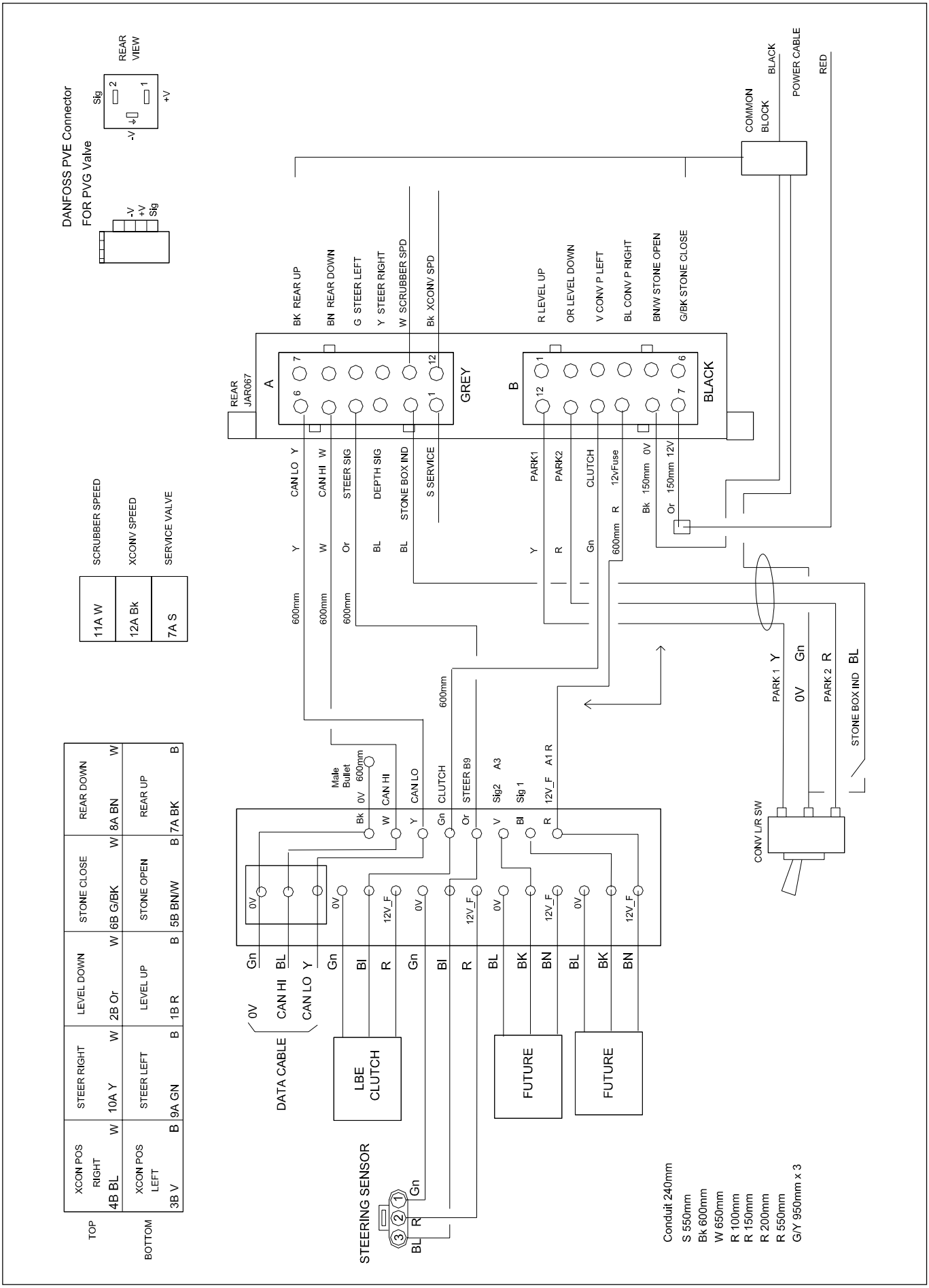
Contact with eyes:-
Flush eyes with plenty of water for several minutes.
Seek medical attention if irritation develops or persists.

***Warning:** Diesel fuel or hydraulic fluid under pressure can penetrate the skin or eyes and cause serious personal injury, blindness or death. Fluid leaks, under pressure, may not be visible. Use a piece of cardboard or wood to find leaks. DO NOT use your bare hand. Wear safety goggles for eye protection. If any fluid is injected into the skin, it MUST be surgically removed within a few hours by a doctor familiar with this type of injury.*

Part 8 Power and Canbus Circuits

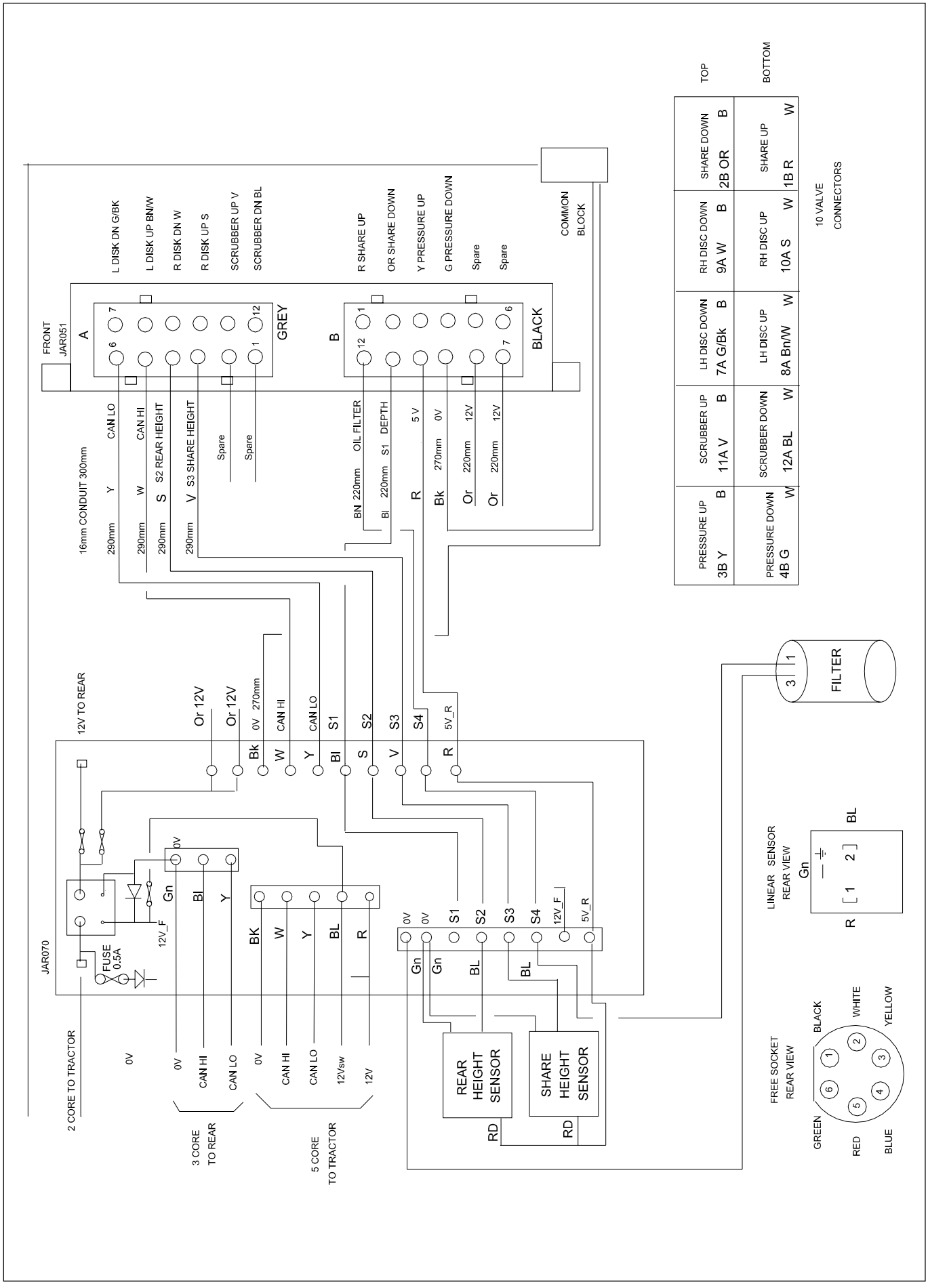


Part 8 Rear Module

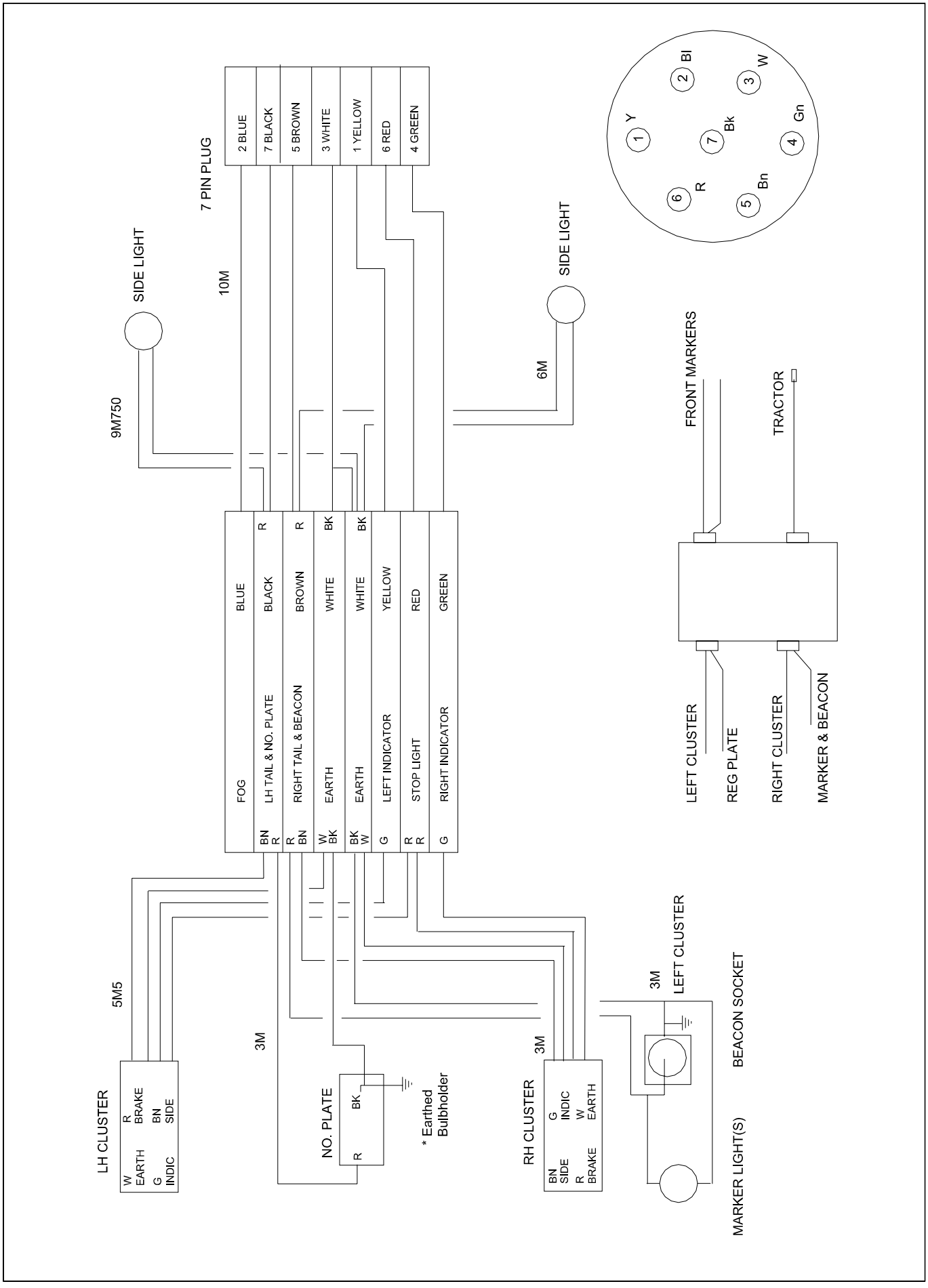


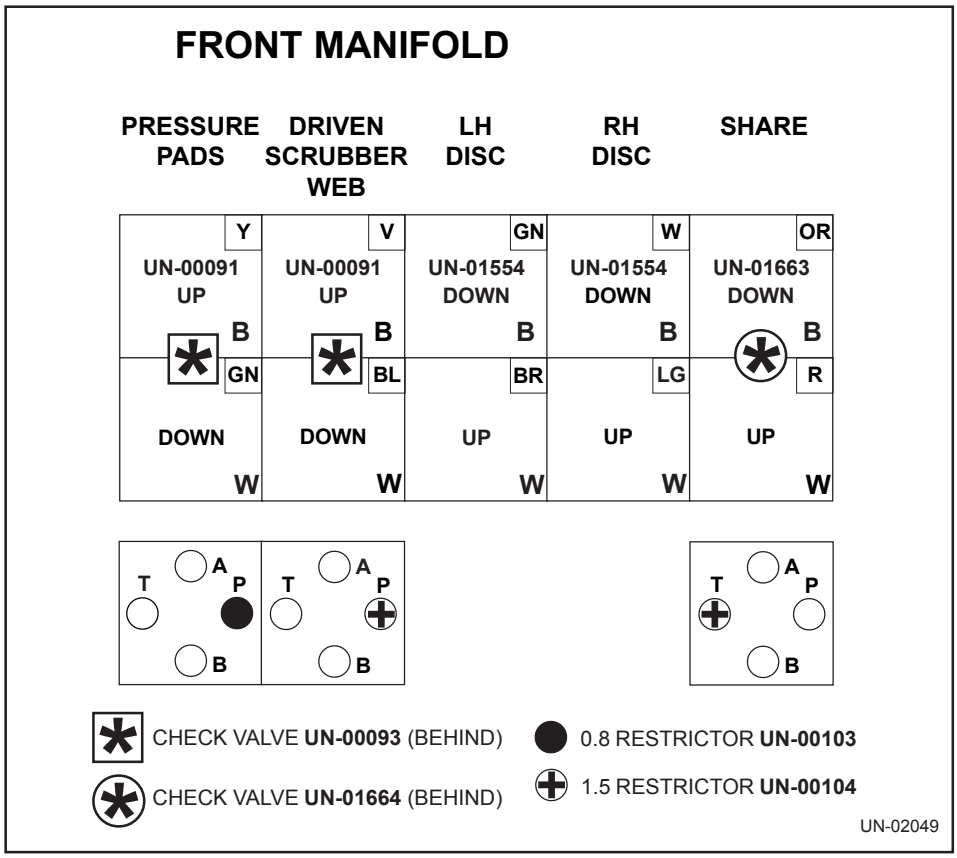
Front Module - Linear Sensors

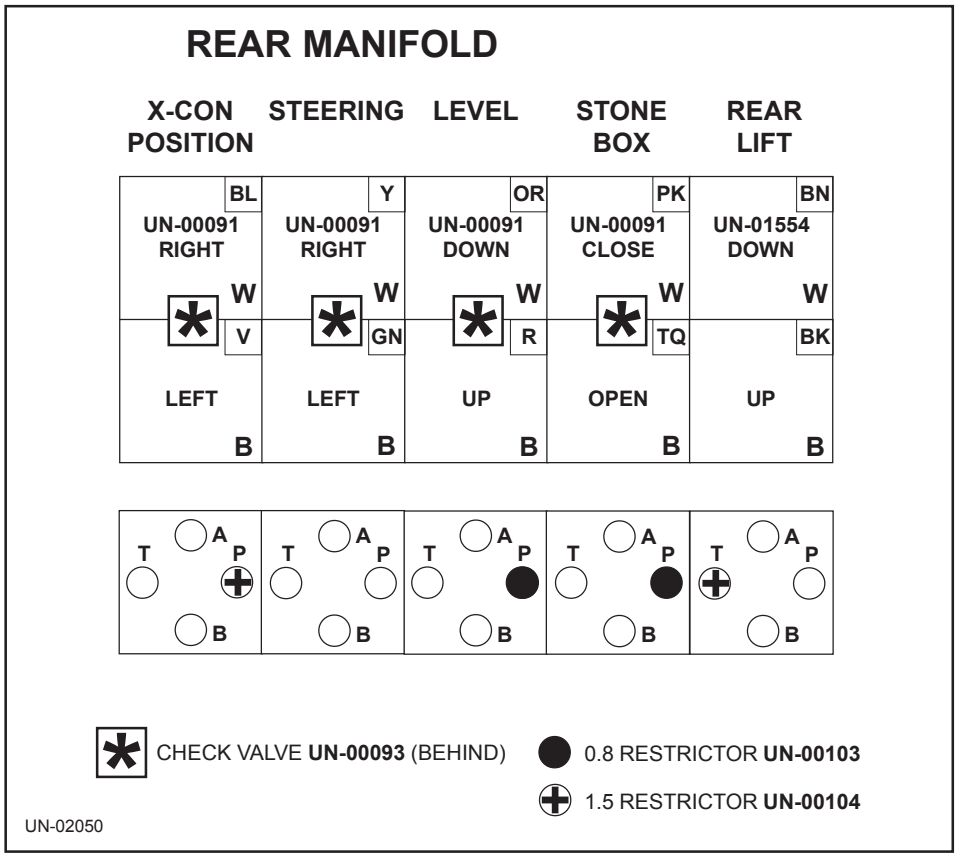
Part 8



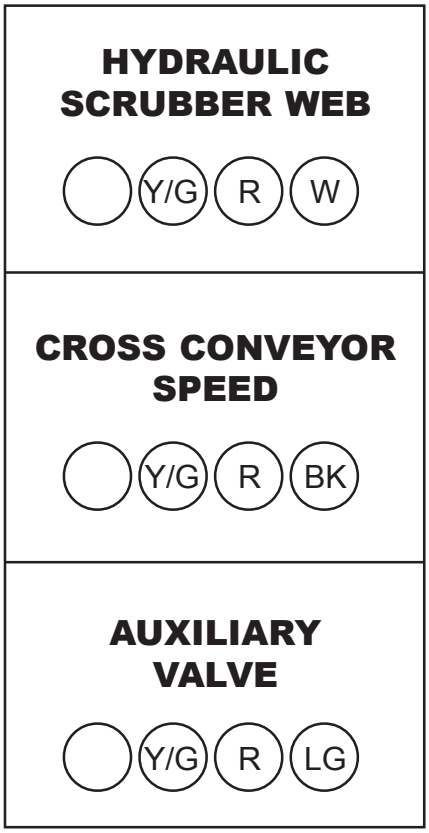
Part 8 Lighting Loom




FRONT MANIFOLD
PRESSURE PADS
DRIVEN SCRUBBER WEB
LH DISC
RH DISC
SHARE
Y
UN-00091
UP
B
GN
DOWN
W
V
UN-00091
UP
B
BL
DOWN
W
GN
UN-01554
DOWN
B
BR
UP
W
W
UN-01554
DOWN
B
LG
UP
W
OR
UN-01663
DOWN
B
R
UP
W
A
T
P
B
CHECK VALVE UN-00093 (BEHIND)
CHECK VALVE UN-01664 (BEHIND)
0.8 RESTRICTOR UN-00103
1.5 RESTRICTOR UN-00104
UN-02049


REAR MANIFOLD
X-CON POSITION
STEERING
LEVEL
STONE BOX
REAR LIFT
BL
UN-00091
RIGHT
W
V
LEFT
B
Y
UN-00091
RIGHT
W
GN
LEFT
B
OR
UN-00091
DOWN
W
R
UP
B
PK
UN-00091
CLOSE
W
TQ
OPEN
B
BN
UN-01554
DOWN
W
BK
UP
B
A
T
P
B
CHECK VALVE UN-00093 (BEHIND)
0.8 RESTRICTOR UN-00103
1.5 RESTRICTOR UN-00104
UN-02050

Part 8


HYDRAULIC SCRUBBER WEB
Y/G
R
W
CROSS CONVEYOR SPEED
Y/G
R
BK
AUXILIARY VALVE
Y/G
R
LG

Part No. ***UN-07040***

ScanStone

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