GOLDACRES

Smart Farmers Choose Goldacres

Special EF 3000 I 4000 I 5000

OPERATOR'S MANUAL

CONTENTS

Optional Equipment Supplements

CHAPTER 1

INTRODUCTION

Part number	
Revision number	
Date Produced:	

Chapter	Current Revision	Revision Date
1- Introduction	2.0	
2 - Warranty & Registration	2.0	
3 - Safety	2.0	
4 - General info & specfiications	2.0	
5 - Pre-operation	2.0	
6 - Operation	2.0	
7 - Delta boom	2.0	
8 - Calibration	2.0	
9 - Lubrication & maintenance	2.0	
10 - Troubleshooting	2.0	
12- Chem induction hopper	2.0	
13 - Vortex induction hopper	2.0	
14 - Chemical probe	2.0	
15 - Exacta foam marker	2.0	
16 - Transcal	2.0	

INTRODUCTION

Congratulations on your purchase of a new Goldacres sprayer. I am proud of the reputation that Goldacres has established for providing technologically advanced equipment to a wide variety of industries.

This operators manual has been designed to ensure that you will get the optimum performance from your equipment. Please take the time to read and understand this manual prior to using your equipment.

For further information on the Goldacres product range please visit our website: www.goldacres.com.au.

Roger Richards
Engineering Manager

CONTACT DETAILS

3 Morang Crescent
MITCHELL PARK VICTORIA 3355
PH: 03 5342 6399
FAX: 03 5342 6308
www.goldacres.com.au

1-3 North Western Road
ST ARNAUD VICTORIA 3478
PH: 03 5477 3999
FAX: 03 5477 3908

PLEASE NOTE:
All information in this operator's manual is based on the latest product information available at the time of printing. The policy of Goldacres is one of continuous improvement and as such Goldacres reserve the right to alter any specifications and designs without notice and without incurring any obligation regarding such changes.

CHAPTER 2

SAFETY

GENERAL

The following pages outline important safety information. At Goldacres safety is a high priority. These safety and warning instructions MUST be followed to ensure the safe operation of your Goldacres equipment.

Each signal word tells you: what the hazard is, what can happen, and what you can do to reduce chance of injury.

Explanation of key terms used in this operator's manual:

DANGER	You will be killed or seriously hurt if you don't follow instructions
WARNING	You can be killed or seriously hurt if you don't follow instructions
CAUTION	You can be hurt if you don't follow instructions
NOTE	Is used to notify people of installation, operation or maintenance information that is important but not hazard related.

THE OPERATOR

All operator's of this equipment must be adequately trained in the safe operation of this equipment. It is important that all operator's have read and fully understand the operator's manual prior to using this equipment.

All new operator's should be trained in an area without bystanders or obstructions and become familar with the sprayer controls prior to operation.

SAFETY PRECAUTIONS

WARNINGS

- Any unauthorised modifications to this equipment may affect its function and create a serious safety risk.
- Keep clear of overhead obstructions – especially powerlines as contact can be fatal.
- Never attempt to clean parts, or nozzles, by blowing with mouth.
- Never attempt to siphon chemicals, or substances, by sucking.
- It is imperative that the vehicle manufacturer's specifications be checked and all instructions for use when transporting, or towing, be adhered to at all times.
- Care should be taken when transferring liquid into the tank to ensure that the gross weight of the equipment does not exceed the carrying, braking and/or towing capacity of the vehicle to which the equipment is attached as specified by the vehicle manufacturer.

  NOTE: 1 LITRE WATER = 1 KG.
- Water weighs 1kg per litre, however conversion factors must be used when spraying liquids that are heavier or lighter than water. Example: liquid nitrogen has a density of 1.28 kg/L and will therefore be significantly heavier than water if the tank is filled completely.
- Suitable care should be taken when driving with the equipment attached to the vehicle. Consideration should be given to both the carrying capacity of the vehicle and the gradient of the terrain when determining the speed at which the vehicle can be driven safely.
- Ensure that the maximum speed of the vehicle, when loaded, is within the vehicle manufacturer's limitations.
- Ensure equipment is securely fastened, or attached, to vehicle at all times.
- Where equipment is fitted to a tractor, ensure tractor linkage arms are secure and do not sway.
- Never stand within the radius of boom wings.
- Never work under any hydraulically raised boom.
- Do not use access steps or ladders on this equipment unless it is safely supported on solid blocks or by vehicle attachment. If unsupported, the equipment can become unstable and may become likely to tip.

ENTANGLEMENT IN ROTATING DRIVE LINES

Rotating drives can cause serious injury or even death when entanglement occurs. Keep hands, feet, hair an clothing away from all moving parts to prevent injury. Never operate this machine with covers, shrouds, or guards removed.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Always wear close fitting clothing and safety equipment designed for the job.

Exposure to loud noise over an extended period can cause impairment or loss of hearing. Be active in the conservation of your hearing and wear appropriate hearing protection at all times.

Chemicals can be harmful to humans, appropriate PPE should be used when handling chemicals. Always refer to the chemical manufacturers label for guidelines on the appropriate PPE to use with the chemical/s you are using.

Goldacres also suggest that you read and understand the following Australian standards:

- Australian Standard for Chemical protective clothing AS3765
- Australian Standard for Respiratory protection devices AS1715

AIR BORNE PARTICLES

Always stand well clear of equipment during operation. Any spray drift is dangerous and may be hazardous to humans.

WARNINGS (Continued)

When heating and welding components, ensure that all paint and other such materials are removed. Often hazardous air borne particles and fumes are generated from welding and heating.

When sanding the machine, work in a well ventilated area and wear an approved respirator. If a solvent is used to remove paint and other substances, wash the area with soap and water to neutralize the work area.

DO NOT HEAT PRESSURIZED FLUID LINES

When conducting any process on the machine that involves heat; be aware of pressurized fluid lines in the vicinity of your work area.

Pressurized lines can be easily cut when the heat over shoots the target object.

DO NOT CARRY PASSENGERS

Do not stand or carry passengers on the steps or platform when the equipment is in motion or when the booms are being folded or unfolded.

FLUIDS UNDER PRESSURE

Fluids escaping from high pressure lines can cause serious injury to skin. Hydraulic oil can easily penetrate human skin.
This hazard can be avoided by relieving the pressure in the system.

Do not disconnect any hoses, nozzles or filters while equipment is operating. Disconnecting these components while under pressure may result in uncontrolled fluid discharge which may be hazardous.

When the repair is complete ensure that all fittings and lines are secured before re-applying pressure.

CAUTIONS

- A supply of fresh water should be with the equipment at all times.
- Tanks are not designed for use with diesel fuel or any flammable liquid.
- Do not use this machine in ambient temperatures exceeding 40 degrees Celsius.
- Each individual boom section has a maximum delivery of 35 litres per minute with clean filters fitted.
- The maximum combined flow of all boom sections is limited to 140 litres per minute, or 50% of the pump flow whichever is the lesser amount, with clean filters.
- Do not exceed the maximum spraying pressure of 8 Bar.
- Ensure that all bolts are tightened and secured before operation.
- Where fitted, care should be taken to never overfill the diaphragm pump with oil or operate at speeds exceeding 540 rpm.
- Always ensure that the boom is securely supported when travelling.

NOTES

- Always read, and understand, the operator's manual prior to operation of this equipment.
- It is the responsibility of the operator to ensure that there are no decals missing from the equipment and that any damaged, or missing, decals are replaced prior to operation.
- Goldacres equipment ordered, or operated, outside the guideline limitations may not be warranted by Goldacres for successful performance. Operators working outside these limitations do so at their own risk, unless specific advice has been sought from, and provided by, Goldacres, in writing.
- Always read and follow the chemical manufacturer's guidelines for safe application as per the chemical label. Particular attention should be given to the recommended target application rate of the chemical being applied as per the chemical label.
- Inspect the equipment thoroughly for damage and wear before operation.
- Lubricate the equipment as per recommended requirements before operating.
- Flush chemicals from equipment immediately after use.
- Certain chemicals may be unsuitable for use with Goldacres standard plumbing designs. Consult your Goldacres dealer if in doubt.
- Do not operate the equipment while under the influence of any drugs, alcohol or if excessively tired.
- Make sure that the equipment complies with all relevant road regulations when transporting.
- Goldacres equipment uses several materials that may be harmful to the environment. Potentially harmful waste used with Goldacres equipment includes such items as oil, fuel, coolant, brake fluid and batteries. If these items are disposed of incorrectly the waste can threaten the surrounding environment and ecology. The waste products can leech into surrounding water sources and contaminate the area.
- When draining fluids from the equipment use appropriate, leak proof containers. Do not use food or beverage containers because someone may consume the contents by mistake.

SAFE USE OF CHEMICALS

The safe use of chemicals with this equipment is the responsibility of the owner/operators. All operators should be trained in the safe use of chemicals.

Goldacres suggest that you always follow the chemical label and that a relevant ChemCert course is completed by owners/ operators prior to operation of this equipment.

ChemCert course overview:
The ChemCert course is aimed at providing the level of training needed by producers to make sure that they understand the requirements to use agricultural and veterinary chemicals safely and effectively. The course also encourages people to think about using alternatives to chemicals in their production systems by taking a risk management approach.

The ChemCert course has become the industry standard for chemical training. Satisfactory completion of the ChemCert AgVet Chemical Users Course results in ChemCert registration and the award by the training provider of a Statement of Attainment for two nationally recognised competency standards:

RTC 3704A
Prepare and apply chemicals

RTC 3705A
Transport, handle and store chemicals

The ChemCert course is generally delivered by trainers over two days, plus additional assessment activities.

Further information on ChemCert courses can be supplied by the ChemCert organisation in your state:

Victoria:
www.chemcertvic.org.au
Ph: 03 5622 2055

South Australia:
www.chemcertsa.com.au
Ph: 08 8842 4048

Queensland:
www.chemcertqld.org.au
Ph: 07 5466 5850

Western Australia:
www.chemcertwa.com.au
Ph: (08) 9341 5325

New South Wales:
www.chemcert.com.au
Ph: 02 9387 4714

CHAPTER 3

GENERAL INFORMATION & SPECIFICATIONS

GENERAL

Chassis:

The chassis is an all steel construction, that is fully welded for superior strength. The chassis is shot blasted, primed and then protected by the Goldacres paint process for excellent chemical resistance and durability.

Paint Colours:

Wheels: N23 Neutral Grey
Steel work: G13 Dark Green

Tank:

All tanks are constructed from UV resistant polyethylene. Polyethylene tanks have a very high chemical resistance. Due to the rotomoulding process, there can be a variance in the overall dimensions of the tank which in turn results in variations to the tank capacity. For this reason, calibration markings should be used as a guide only.

Agitation:

The Supermix agitator is located at the back of the tank and is used to generate increased agitation within the tank. The pressure line to the Supermix agitator from the control manifold passes through a nozzle and then through the barrel into the tank. This causes extra agitation as flow around the agitator is sucked into the barrel and is then passed back into the tank. To increase this venturi effect, the bypass flow from the electric control valve also passes through the barrel, multiplying the agitation effect. The supermix agitator has an approximate capacity of 300 - 1300 l/min depending of the pump size and pressure operating pressure. For further information refer to the "maintenance" chapter.

Boom Valves:

Motorised boom valves, for control of boom section on/off, are fitted as standard. Typically these are mounted on the boom centre section at the rear of the sprayer. The number fitted is dependent on on the number of boom sections and number of boom lines.

Controller:

Raven automatic rate controllers are fitted as standard. Automatic rate controllers will maintain a user defined application rate automatically as the towing vehicle speed changes. In order to function, the automatic rate controller relies on a compatible (and functional) flow meter, speed sensor and control valve. For specific information on Raven controllers please refer to Raven operator's manual supplied and "calibration" section of this manual.

Filtration:

Filtration is a critical part of the sprayer's performance.

Goldacres sprayers are typically fitted with:

1 x Suction filters (30 mesh)

2 x Pressure filters (1 x 80 & 1 x 100 mesh)

Nozzle strainers.

Pump:

Udor, positive displacement, oil backed diaphragm pumps are fitted as standard on Goldacres equipment. The normal operating range is from 1 - 8 bar which is sufficient for efficient nozzle performance. A PTO drive is standard and a hydraulic drive is optional.

Chemical Induction:

The method of chemical induction into your sprayer is dependent on the optional chemical induction equipment fitted to your sprayer.

Goldacres chemical induction equipment available includes:

- Chemical probe
- Chemical induction hopper
- Transcal volumetric measuring device
- Direct Chemical Injection modules

Booms:

Goldacres booms are available in a variety of sizes up to 36 metres in width. Delta booms up to 24 metres can be fitted to the Special EF these booms feature hydraulic lift and fold, with control from the cabin of your tractor. Individual wing tilt is available as an option.

All booms feature: pitch, roll and yaw suspension in order to provide a superior boom ride and assist in the efficient application of chemical to your target.

Nozzles:

As information regarding nozzles is specific to those being used in your application, no specific reference is made to nozzle application rates or nozzle types in this operator's manual. Goldacres suggest the use of a current TeeJet nozzle selection catalogue for reference to nozzle sizes, outputs, spray patterns and general spraying information. For more technical information on the function of spray nozzles and factors affecting their performance you can also use the TeeJet "User's guide to spray nozzles".

The TeeJet nozzle selection catalogue and Users guide to spray nozzles are available from Goldacres dealers, or as a free download from the TeeJet website:

www.teejet.com

Machine Limitations:

All Goldacres equipment is subject to operating limitations, it is the operator's responsibility to ensure that this equipment is being operated within these limitations and appropriately to the operating conditions at hand.

Goldacres do not endorse use of this machine for spraying at speeds greater than 20 km/hr and should not be used in ambient temperatures exceeding 40 degrees celsius.

Each indivual boom section has a maximum delivery of 35 litres per minute with clean filters fitted. With clean filters fitted, the maximum combined flow of all boom sections is limited to 140 litres per minute, or 50% of the pump flow, whichever is the lesser amount.

Custom built equipment:

Where the owner of this sprayer has requested that custom built equipment or options be fitted to this sprayer it is necessary to understand that custom fabrication and engineering is subject to many variables. Goldacres cannot fully field test all custom built options prior to despatch, and owners of new sprayers fitted with custom built equipment or options need to understand that the functionality of these items may require refining in order to operate as desired.

Wheels & Tyres:

All tyres used on Goldacres sprayers have been designed to carry the maximum loaded weight of the sprayer when travelling at 20 km/h. The load capacity of the tyres decreases as travelling speed increases so it is important to heed this travelling speed limit.

The tyre pressure also needs to be checked regularly (check every 8 to 12 hours of operation) and maintained at the required tyre pressure.

There are many factors concerning the appropriate tyre pressure for a particular tyre and load. For example, the tyre size, rim type, tyre status (driven or free rolling), load, speed, haul length and ply rating all need to be considered when determining the tyre pressure.

To determine the correct tyre pressure:

1. Determine the maximum weight of the sprayer when loaded (do not forget to add the weight of the rinse water tank and the foam marker tank when filled).
2. Allow for each tyre to carry half the maximum loaded weight of the sprayer (this does not allow for any load on the tractor pull or cyclical loading, which provides for a safety margin).
3. Determine what tyre size and ply is on the sprayer.
4. Determine what appropriate tyre pressure will provide the load capacity required by the respective tyre as indicated in the following table.

For further information on wheels & tyres please refer to the "maintenance" chapter.

GOLDACRES TYRE CHART

Tyre Size	Ply	Rated Pressure (KPa)	Rated Capacity (Kg)	Cyclic Loading Pressure (KPa)	10km/hr	20km/hr	30km/hr	40km/hr
14.9x24	8	180	1600	234	2992	2080	1840	1728
16.9x34	10	200	2360	260	4413	3068	2714	2549
18.4x38	14	250	3450	325	6451	4485	3967	3726
18.4x38	16	240	4400	322	8228	5720	5060	4752

Axles:

The Special EF sprayers are fitted with rigid axles as standard.

Special EF sprayers can be optionally fitted, with air bag suspension.

The air bag suspension consists of a 12 volt air compressor, a ride height valve, 2 air bags, shock absorbers, axle (used as air reservoir) and hosing.

The 12 volt compressor is powered up when the ignition is switched on (Advance only). A 20amp fuse is fitted to the ignition relay box to protect the compressor circuit.

The compressor, located in the right hand pod, has a pressure cut out switch fitted to it which cuts the power to the compressor when the reservoir recommended pressure is achieved. When the pressure in the reservoir drops below 70psi, the compressor will start again.

The pressure cut out switch can be adjusted by turning the nut at the end of the spring to apply more or less pressure to the contact spring. The recommended maximum pressure to run in the air bag system is 90 psi. If the compressor runs continually there may be an air leak present. All hoses and fittings must be checked and repaired if necessary.

The compressor draws its air through a paper element filter mounted on the right hand side boom rest. This filter element must be cleaned daily. In dusty conditions this filter must be cleaned on a more regular basis. For machines that work in very dusty conditions the filter should be mounted as high up the boom rest frame as possible so it will be drawing clean air.

Ground conditions, ground speeds and wind conditions can all be factors in determining what measures are necessary to supply clean air to the compressor.

Further information on air bag suspension and axles can be found in the maintenance and troubleshooting chapters.

Hydraulics:

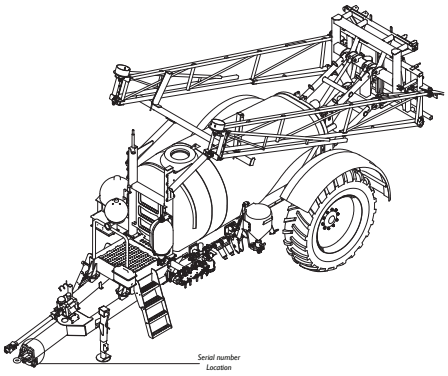
Special EF sprayers can be set up for use on closed centre and open centre hydraulic systems. It is important that you are familar with the operating system of your tractor prior to connecting your sprayer.

Optional Equipment:

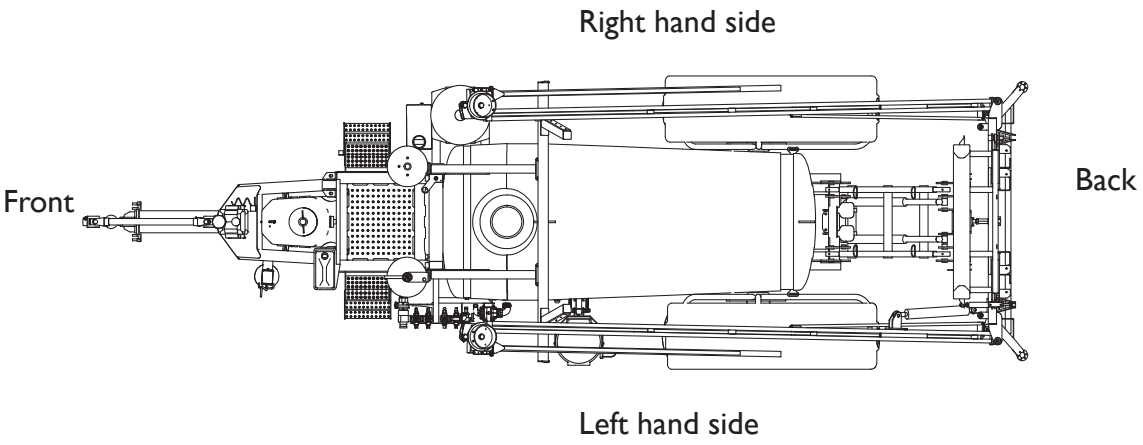
An extensive range of optional equipment is available for fitting to Goldacres sprayers. Specific information regarding optional equipment fitted to your machine can be found in the rear of this manual.

IDENTIFICATION

When ordering parts or requesting service information for your sprayer it is important to quote the serial number of your machine, and the purchase date, in order to receive accurate information. The location of the serial number plate on your machine is shown in the picture.



ORIENTATION



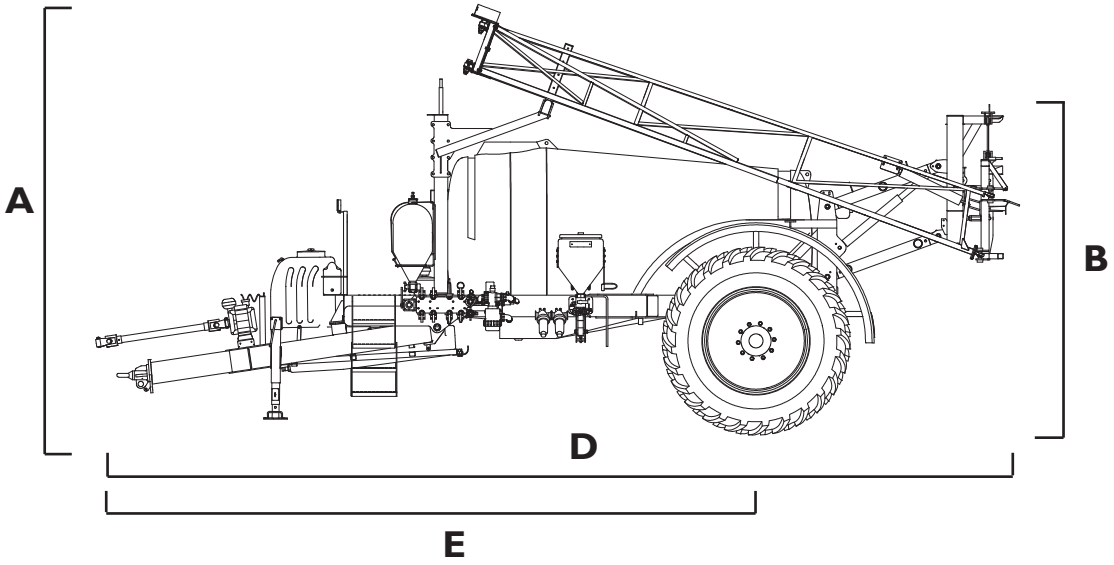
DIMENSIONS

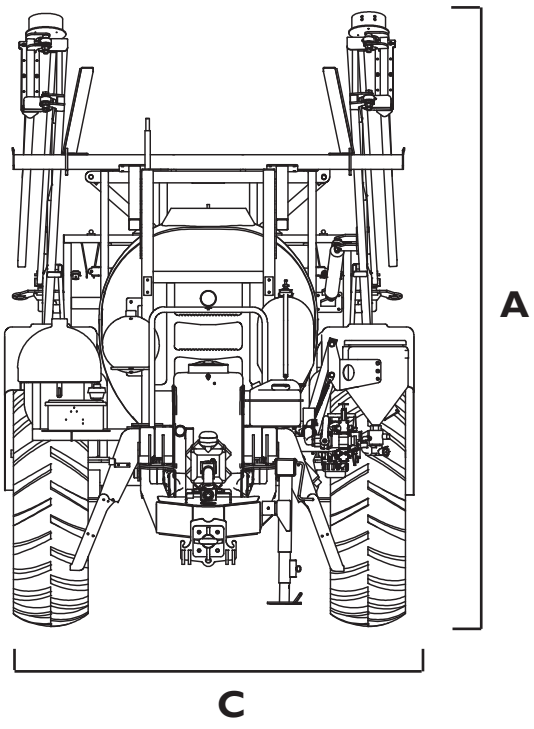
Boom size (M)	A Front Height	B Rear Height	C Width	D Total Length	E Wheelbase
4000lt					
18	3800	3150	2550	8350	5950
20	3800	3150	2550	8350	5950
21	3800	3150	2550	8350	5950
24	3800	3150	2550	8350	5950

DIMENSIONS

The following information is provided as a guide only (table over page).

Variations in weights and dimensions may occur without notification. To ensure that the weights and dimensions are accurate for your sprayer it is recommended that you measure and weigh your sprayer individually.





PARTS ORDERING

When ordering parts from your Goldacres dealer, please quote:

- Serial No.
- Part No. required
- Part Description
- Quantity Required

The parts manual supplied with this machine includes all the relevant information that you need when ordering parts from your dealer or Goldacres. When returning parts to Goldacres, or to a Goldacres dealer, for service or repair all parts MUST be cleaned thoroughly before sending them. Goldacres cannot expose technicians to the many potentially hazardous pesticides and substances that are in use.

NOTE: Please ensure that all parts are clearly labelled with the owner's details, and a brief description of the fault. Goldacres are not liable for the return of any goods to Goldacres or a Goldacres Dealer. The goods must be returned to the point of sale. The customer will be responsible for any cost incurred by a Goldacres appointed person travelling to any site outside the point of sale.

Genuine Goldacres parts only should be used on Goldacres equipment.

DECALS

Machine decals are fitted to advise of safety hazards and assist in machine identification. Specific information regarding the decals fitted to your machine are included in the supplied parts manual.

Each decal has a part number printed onto the decal which also assists with ordering replacement decals.

Understanding safety decals and their purpose assists in the safe operation of your sprayer. Safety decals are their for your protection and it is the responsibility of the operator to replace damaged and/or missing safety decals. Operators should regularly review decals.

Replacement decals can be ordered through your Goldacres dealer.

CHAPTER 4

PRE-OPERATION

CONNECTING TO THE TRACTOR

Prior to connecting your tractor to the sprayer, it is important that the operator has read and fully understands this operator's manual.

Step 1: Ensure that the tractor is suitably rated to safely tow the sprayer and that the drawbar pin size matches the hitch on the sprayer. A replaceable insert (Part number GA4582455) can be purchased to reduce the slack if required.

Step 2: With the sprayer parked on a level surface, use the sprayer jack to raise the sprayer hitch in line with the tractor hitch.

Step 3: Reverse the tractor into sprayer hitch until aligned, and insert drawbar pin (not supplied). Then connect safety chains.

Step 4: With the sprayer securely attached to the tractor, raise the jack until weight is transferrred to the tractor. Then raise the jack and store in transport position (as pictured).

Step 5: Fit the PTO shaft (if applicable).
- Grease the PTO shaft as per the lubricrtion schedule
- Fit the sprayer ensuring that the locking pin is correctly engaged
- Ensure that all safety guards and chains are in place

It is important that the instructions "fitting the PTO shaft" are followed for first time PTO shaft setup.

For hydraulic drive pumps - connect hydraulic hoses to tractor remote outlets. (Refer to "general info & specs" chapter for important hydraulic information.)

Step 6: Fit the spray controller and any other switch boxes supplied in tractor cabin. Make sure that all controllers and switch boxes are securely mounted.

Step 7: Connect any power leads from controller or switch boxes directly to battery.

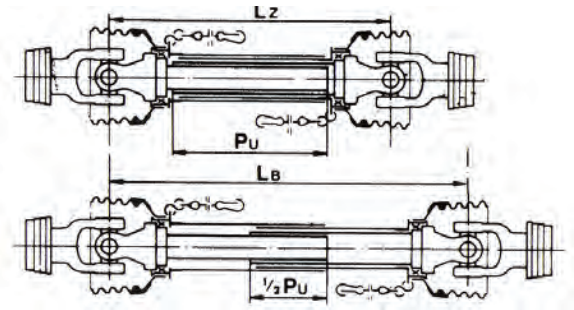
Step 8: Connect drawbar connections (hydraulic hoses, wiring loom, speed sensor cable, tail light plug and any other connections) between the tractor and the sprayer.

Disconnection of the sprayer from the tractor is the reverse of the above instructions.

FITTING THE PTO SHAFT

Wide angle PTO shafts are fitted as standard to Prairie & Prairie Advance sprayers. When using/hitching a sprayer (especially for the first time) the following critical points concerning the PTO shaft must be considered:

Maximum PTO operating length
Try to obtain the greatest possible overlap. In its working position, the PTO shaft must not be extended by more than half the profile overlap (Pu) available when fully compressed (Lz). The maximum PTO operating length is shown on the diagram below as Lb)

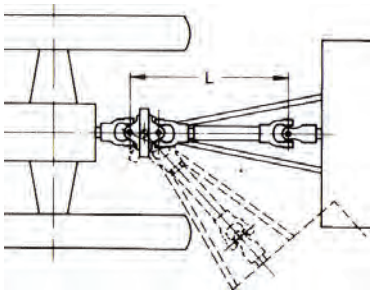


PTO shaft length adjustment
To adjust the length:
1. Hold the shafts next to each other in the shortest working position and mark them.
2. Shorten the inner and outer guard tubes equally.
3. Shorten inner and outer sliding profiles by the same length as the guard tubes.
4. Round off all sharp edges and remove burrs.
5. Grease sliding profiles before reassembling.

NOTE: It is preferrable to have the hitching point halfway between the universal joints on the PTO shaft. This will equalise the joint angles when turning.

Maximum PTO joint operation
Ensure equal joint angles. For wide angle PTO shafts the following are guidelines for operation:

Continuous operation = 25 degrees
Short duration = 80 degrees
Stationary = 80 degrees



Coupling the PTO shaft
Press in the locking pin and simultaneously push PTO shaft onto pump or tractor PTO shaft until pin engages. Pull PTO shaft back to make sure pin has engaged and the shaft cannot come off.

Chains
Chains must be fitted so as to allow sufficient articulation of the shaft in all working positions. Note: The PTO shaft must not be suspended from the chain.

HYDRAULIC DRIVE PUMPS

Diaphragm pumps can also be driven by a hydraulic motor which is bolted directly to the front of the pump.

The oil line to the hydraulic pump is fitted with a needle valve that regulates oil flow to the pump. Many tractors feature hydraulic oil flow regulation in the cabin, however this needle valve can be used to control the flow on tractors that are not fitted with hydraulic oil flow regulation.

Where the tractor has the capability to regulate flow from the cabin, it is recommended to close the needle valve and adjust the hydraulic oil flow from the tractor to set the pump running at 400 - 540 rpm.

To set the pump speed:

1. Depress the [speed] button on the console for five seconds to display speed.

Hydraulic drive pump

Hydraulic drive pump - needle valve

DRAWBAR CONNECTIONS

The standard drawbar connections are as shown in the pictures below:

Raven SCS440/450 male & female connectors

Raven male and female speed sensor connections

Tail light connection

Hydraulic hose connections

Safety chains

MOUNTING THE CONSOLE/S

The mounting of the consoles within the cabin of your tractor is a critical part of the set up process. It is important that the consoles are mounted in the cabin in such a way that it cannot cause harm to the operator under any circumstance while also being mounted in a user friendly way.

When the sprayer is removed from the tractor, and the consoles are to remain fitted, please ensure that all console's remain firmly mounted and cannot become a projectile.

For specific information on mounting the consoles, please refer to the Raven installation and service manual supplied.

Example of consoles securely mounted in cabin (SCS4400 console and additional consoles shown as example only)

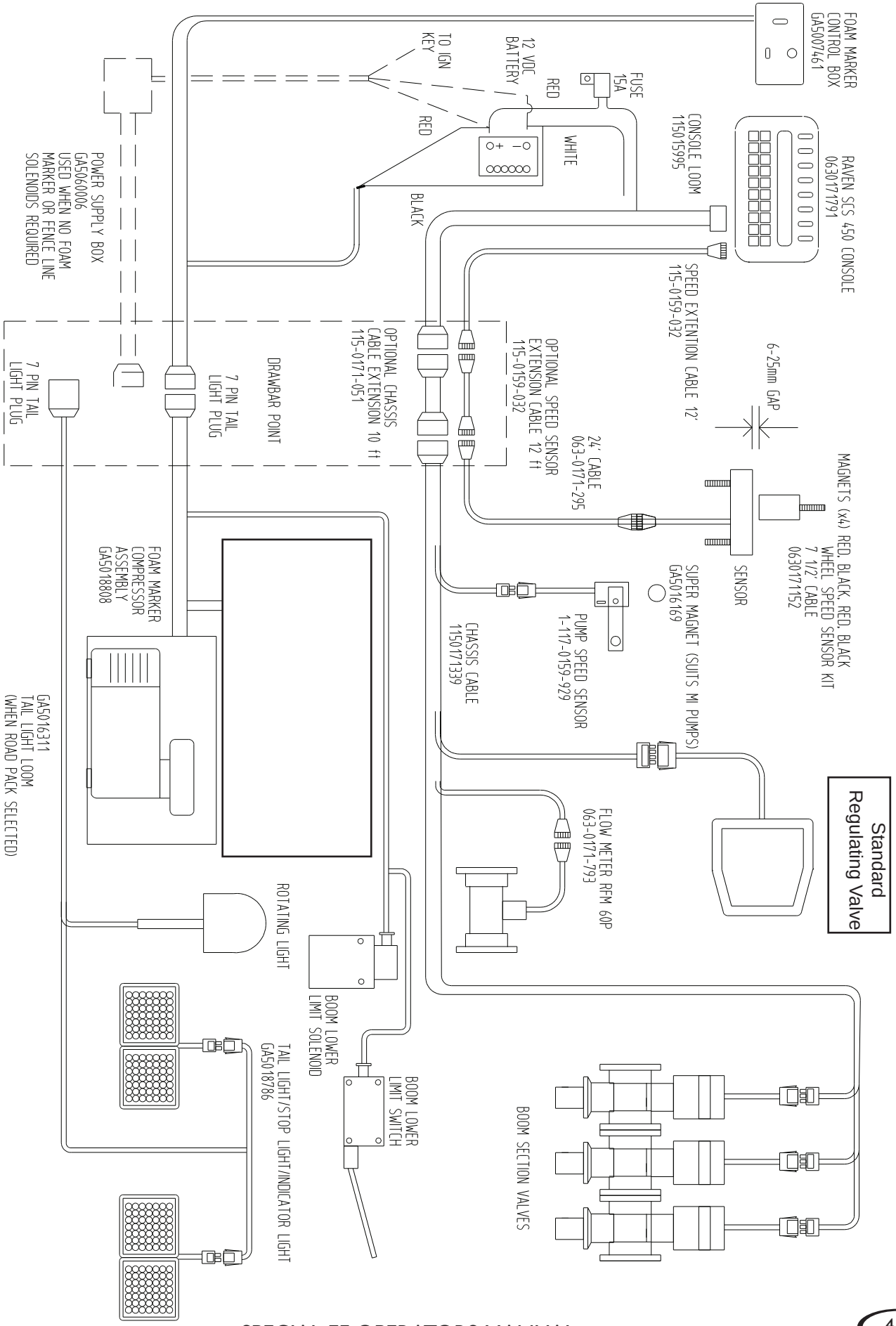
CONNECTING THE CONSOLES

The consoles should be connected as per the electrical schematics following. These schematics provide you with a layout of all connections to ensure that the system is properly connected prior to operation.

To connect to the battery:
With the consoles mounted in the cabin, turn the power switch to OFF and route the red and white battery wires to a 12v battery. Attach the white battery wire to a negative terminal and the red battery wire to a positive terminal.

Attach the negative wires last.

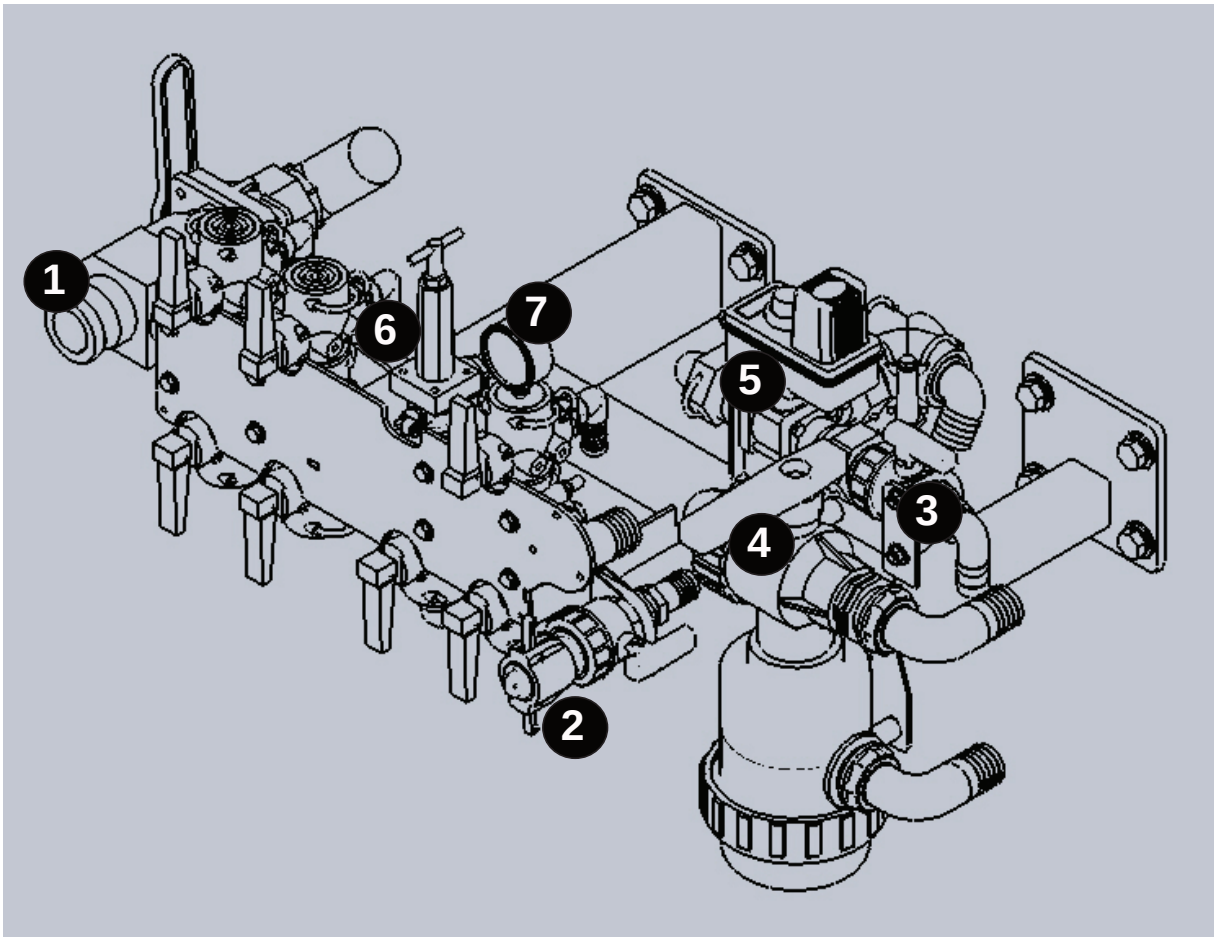
Wiring Layout - Raven SCS 440/450 console



CHAPTER 5

OPERATION

EZ CONTROL


1
6
7
5
3
4
2

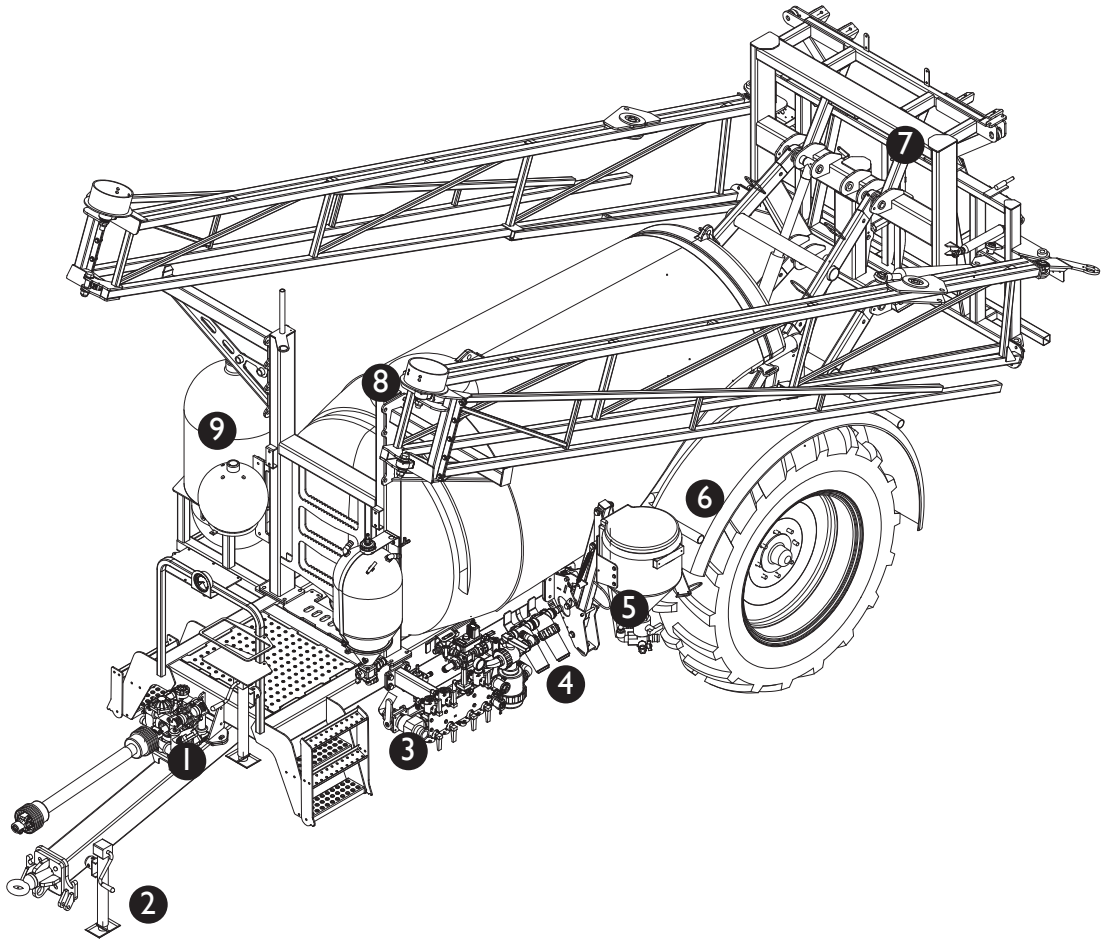

MAIN TANK RINSE NOZZLES
TRANSCAL RINSE
PRESSURE RELIEF
AGITATOR
FILL MANIFOLD
PRESSURE MANIFOLD
FRESH WATER FILL
FOAM MARKER FILL
HOPPER
VENTURI
EZ control

EZ CONTROL

Fill Manifold *These functions are only available when external water is being pumped into the system.*	**Use**
Main tank rinse nozzles	Turning on this function allows the use of the tank rinse nozzles with larger quantities of fresh water making it useful for a more thorough flushing/ decontamination.
Fresh water fill	Used to fill the rinse water tank.
Foam marker fill	Used to fill the foam marker tank.
Transcal rinse	Allows external fresh water to be used in rinsing the transcal ciruit.

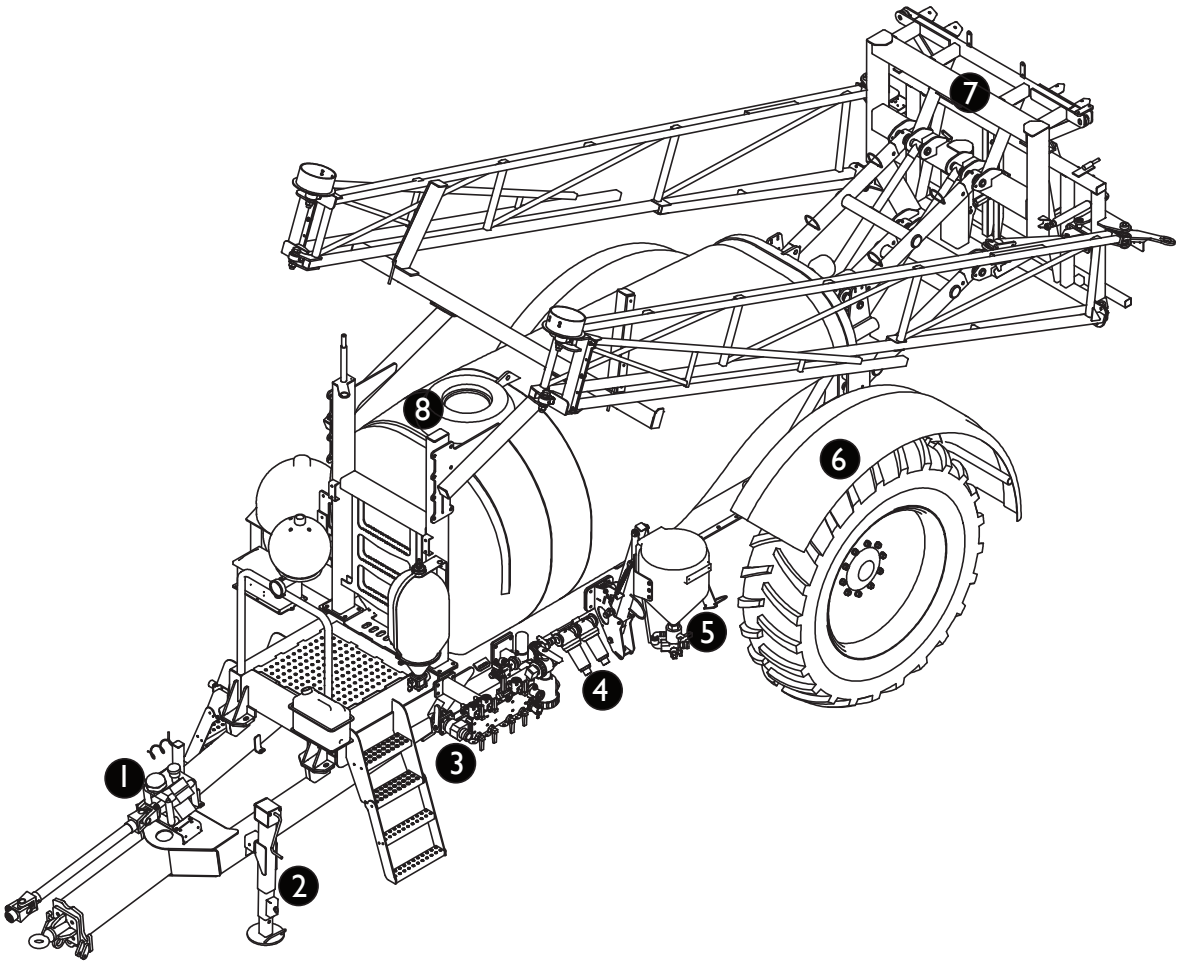
Pressure Manifold *These functions only available when the main spray pump is operating - pressurising the system.*	
Hopper	Turn ON to use induction hopper
Venturi	Turn ON to use transcal or chemical probe
Agitator	Turn ON to activate agitator
Bypass	Turn ON bypass when in spray mode
Pressure relief	Used to adjust manifold pressure
Other	
1: Main tank fill	Used to direct external water delivery to main tank. When the main tank fill ball valve is on, the other functions of the fill manifold can be used, however they will not be under pressure as only a small amount of flow will be directed to the fill manifold.
2: Chem probe coupling	Connect the chem probe to suck chemical directly from the drum.
3: Bypass	Turn ON bypass when in spray mode
4: Suction selection valve	Turn ball valve to suck from either main tank or fresh water tank
5: Control valve	The control valve regulates the flow being directed to the booms.
6. Pressure relief valve	Used to set maximum system pressure
7. Manifold pressure gauge	Used to set manifold pressure with relief valve

MACHINE KEY FEATURES (3000Lt)



Number	Feature
1.	Diaphragm pump
2.	Jack
3.	EZ controll fill & pressure manifold
4.	Pressure filters
5.	Chemical induction hopper (option)
6.	Mudguards (option)
7.	Boom paralift
8.	Main tank lid
9.	Flush water tank

MACHINE KEY FEATURES (4000/5000Lt)



Number	Feature
1.	Diaphragm pump
2.	Jack
3.	EZ controll fill & pressure manifold
4.	Pressure filters
5.	Chemical induction hopper (option)
6.	Mudguards (option)
7.	Boom paralift
8.	Main tank lid

FILLING

When filling the machine it is necessary to connect to an external water source.

The main tank should always be filled through the quick fill. This line fills through the top of the tank and then through a hose inside the tank so that the water is deposited in the centre of the tank. Water can then be pumped into the system from an external pump.

The following steps should be used as a guide to filling the machine:

Main tank fill:

1. Connect the fill hose (not supplied) to quick fill cam lock coupling.

2. Make sure that the "main tank fill" handle on the EZ control is in the OFF position (so that there can be no flow coming out of the tank if it is not already empty).

3. Turn the fresh water pumping system on (make sure the pressure does not exceed 100psi)

4. Turn "main tank fill" handle on EZ control to ON. The main tank should now be filling.

5. When the required amount of water has been transferred into the main tank, stop the flow by turning the "main tank fill" to OFF.

EZ Control
External water delivery station:
The external water delivery station allows several filling functions of the sprayer to be performed simultaneously.

1. With fresh water coming into the system as per "Main tank fill" instructions, ensure that all flip valves, including the "main tank fill" ball valve, on the external water delivery station are turned to OFF.

2. Turn the desired function ON by selecting the appropriate flip valve as labelled.

3. When filling the foam marker tank, ensure that the foam marker tank is vented.

4. When the required amount of water has been transferred, turn the appropriate flip valve to OFF.

5. When all functions have been performed, turn the external water delivery system OFF.

Adding chemical to the main tank:
Where chemical induction equipment (chemical probe, induction hopper, transcal or DCI) has been fitted, please refer to the instructions on operating this equipment at the rear of this manual.

SPRAY APPLICATION

After completing the filling process, you are now ready to start spraying. While travelling from the fill station to the field, the pump should be operating at 450 - 540 rpm with the agitator operating to ensure that the chemical mix is adequately agitated prior to spraying.

NOTE: The following information is provided as a guide only. It is the responsibility of the operator to assess the conditions in the field where the spray application is taking place

1. Enter the field, unfold boom and set the boom to desired height above the target and have pump running.

2. Switch on the console and set to run in self test mode (while stationary). Information on running in self test mode can be found in the Raven operators manual supplied.

3. Turn on all boom sections

4. Remain stationary until all boom lines have been completely purged with product from the main tank.

5. Switch off all boom sections.

6. Commence travel on primary swath and engage boom master switch and all boom sections. Auto rate controller will now control application based on the calibration information entered by the operator.

7. To avoid overlap it is recommended that individual boom section switches are used to turn on/off sections as needed.

8. When you have completed the task at hand, please follow the flushing instructions to ensure that all plumbing is flushed.

AGITATION

To acheive satisfactory agitation,
The following guidelines are recommended.

1. Add 20 percent of the tanks volume of fresh water to the main tank.
2. Add all chemicals.
3. Add the remaining quanity of water required.
4. Turn the agitator on with the pump at operating speed.

NOTE: Check to ensure that the supermix agitator is working (there should be a visible circulation of water near the back of the tank near the agitator).

5. If the tank has been filled and the spray mixture has been allowed to settle, agitate for as long as it takes the pump to pump the quantity of water in the tank. For example: with 4000 litres in the tank with a 160l/min pump agitate for 4000/250 = 25 minutes.

To agitate while spraying:
Have the bypass ball valve and agitator ball valves OPEN.

FLUSHING

The following information is provided as a general guide for flushing your sprayer following a spray application.

For more specific information regarding flushing, and decontamination, specific to the products that you are applying, it is recommended that you consult the chemical label or your chemical supplier.

To use the flush water tank to flush pump & boom only:

1. Turn pump off
2. Turn 3 way suction selection valve to draw from flush water tank rather than main product tank.
3. Set Raven console into manual mode.
4. Switch all boom sections to ON
5. Turn off bypass tap, then hold increase button for 15-20 secs. This will ensure that standard valve is fully open to direct all flow to booms (This will eliminate bypass from the booms to main tank).
6. Turn pump ON. The pump will now draw water from the flush water tank and direct all flow to the booms.
7. Keep boom switches on until the contents of the flush water tank has been run through the booms.

To flush entire system (pump, boom & tank)

1. Drain the main tank.
2. Connect to external water source (to provide fresh water supply).
3. Turn main tank fill tap OFF to direct external water supply to the fill manifold under pressure.
4. Engage tank rinse nozzles with the flip valve on EZ control (if fitted) and allow rinsate to drain out through the main tank drain.
5. Close main tank drain.
6. Add a quantity of fresh water (a minimum of approximately twice the pumps capacity) to the main tank (as per instructions under filling).
7. Turn on pump with agitator and bypass open to allow fresh water to circulate.
8. Turn off all taps to allow the pressure relief valve to blow off and purge the "relief to tank" line.
9. Operate induction equipment (if fitted), with a quantity of fresh water in order to flush venturi system.
10. Once complete drain chemical induction hopper (where fitted) delivery hose externally.
11. Now follow the instructions for boom flushing as above - keep ball valve drawing from main tank.

DECONTAMINATION

Decontamination of your spraying equipment is important when changing chemicals or application methods.

Information specific to your circumstances, the spraying equipment being used and the chemicals being applied should be provided by your agronomist of chemical supplier. Follow the flushing instructions above, while using the appropriate decontaminating agent.

END OF DAY

At the end of the spraying day: Follow the flushing and decontamination procedure as per previous instructions.

1. Unfold the boom in an area convenient to dispose of residual chemical (an area where chemical can not run-off into above ground or sub surface water courses).
2. Clean all filters.
3. Clean all nozzles.
4. Wash down unit
5. Drain main tank

CAUTION If the sprayer is left attached to the tractor when parking the sprayer, make sure the tractor park brake is applied, the engine turned off and the sprayer is securely hitched to the tractor.

If the sprayer is to be disconnected from the tractor:

1. Ensure the main tank and any other tanks are empty.
2. Lower the jack and wind down until weight is taken off tractor.
3. Remove drawbar pin.
4. Remove safety chains.
5. Disconnect all drawbar connections between the sprayer and the tractor (i.e. tail lights, foam marker lines, electric controls etc.)
6. Where fitted, remove the PTO shaft from both the sprayer and the tractor.
7. Protect hydraulic hoses and electrical connections.

NOTE: Store the sprayer in a suitable location to prevent freezing. If the sprayer is to be left where freezing may occur, cover the pump and flow meter with a material bag and empty pump and flow meter of all water (run the pump dry for 15-20 seconds). Make sure any ice has thawed before using sprayer.

END OF PROGRAM

If the sprayer is to be stored for a long period of time without use, there are several tasks that need to be performed.

- Clean the sprayer thoroughly as described under "END OF DAY" tasks.
- With the sprayer attached to the towing vehicle, carry out a thorough observation to determine if there is any damage to the sprayer.
- Park the sprayer in a position where it will not be affected by frosts, and preferably out of direct sunlight.
- Ensure the main tank and any other tanks fitted are empty.
- Lower the jack and wind until weight is taken off tractor.
- Remove drawbar pin.
- Remove safety chains.
- Disconnect all drawbar connections between the sprayer and the tractor (i.e. tail lights, foam marker lines, electric controls etc.)
- Where fitted, remove the PTO shaft from both the sprayer and the tractor and store with the sprayer.
- If necessary, remove consoles from cabin and store in a safe and secure location.
- Protect hydraulic hoses and electrical connections.

TRANSPORTING THE SPRAYER

1. Make sure the tractor has sufficient lifting and braking capacity to tow the sprayer.
2. All relevant transport regulations must be adhered to when transporting the sprayer. (ie: speed regulations, oversize signs, flashing light, etc.) It is the operator's responsibility to know the relevant regulations.
3. Make sure the sprayer is securely hitched to the tractor.
4. Ensure that the boom is securely supported when travelling and that the tail/indicator lights on the sprayer are connected via the 7-pin trailer plug (if fitted on sprayer)
5. Where a road pack has been installed connect tail light plug.

CAUTION: Take care when reversing with the sprayer attached. If driver visibility is restricted use another adult, with a clear view to the rear of the sprayer, to give reversing directions.

CAUTION: It is the operator's responsibility to know the tare weight and gross weight of the sprayer. Contact Pathway/Goldacres dealer to ascertain a more precise tare weight for your sprayer if unsure. If any alterations are made to the sprayer, it is the operator's responsibility to know the tare weight and the gross weight of the modified sprayer at all times.

CHAPTER 6

DELTA BOOM

GENERAL

All booms present a number of safety hazards due to their operation - the operator should read and fully understand the safety instructions in this manual prior to operation.

Goldacres Delta booms have been designed and built to ensure many years of trouble free service. Aluminium outer boom sections reduce the overall weight of the boom and aid in providing a superior boom ride and longevity.

CAUTION: Goldacres do not endorse use of this machine for spraying at speeds greater than 20 km/hr

CAUTION: Before adjusting the boom alignment, the hydraulic fold circuit must be free of air. Hydraulic circuits that contain air can make the boom appear that it is too far forward. Adjustment of the boom without "bleeding" the hydraulic circuit first will result in a boom that quickly reverts to hanging out of alignment to the back.

CAUTION: All chemicals have corrosive properties to some degree. Prevent damage to the machine by always consulting the chemical MSDS or the chemical supplier for advice concerning the corrosive properties of the chemical. It is the responsibility of the operator to carry out preventative and ongoing maintenance to the machine, particularly while applying chemicals with highly corrosive properties. Machine components should be coated with a suitable protectant prior to use, and then washed down, thoroughly, immediately after every application. Consult the supplier of the substance if you require specific advice about the effectiveness of any particular protectant to prevent premature degradation of machine components.

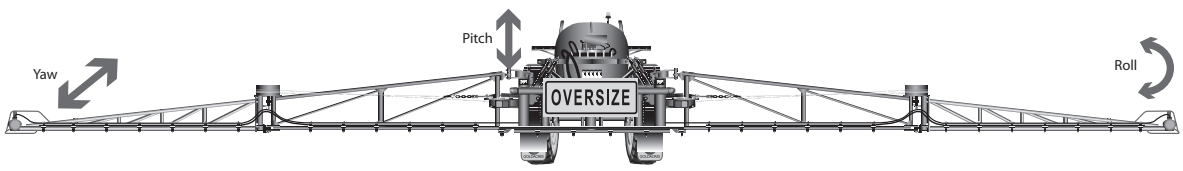
Delta booms feature a unique (patented) boom suspension system.

This system provides suspension in three directions:

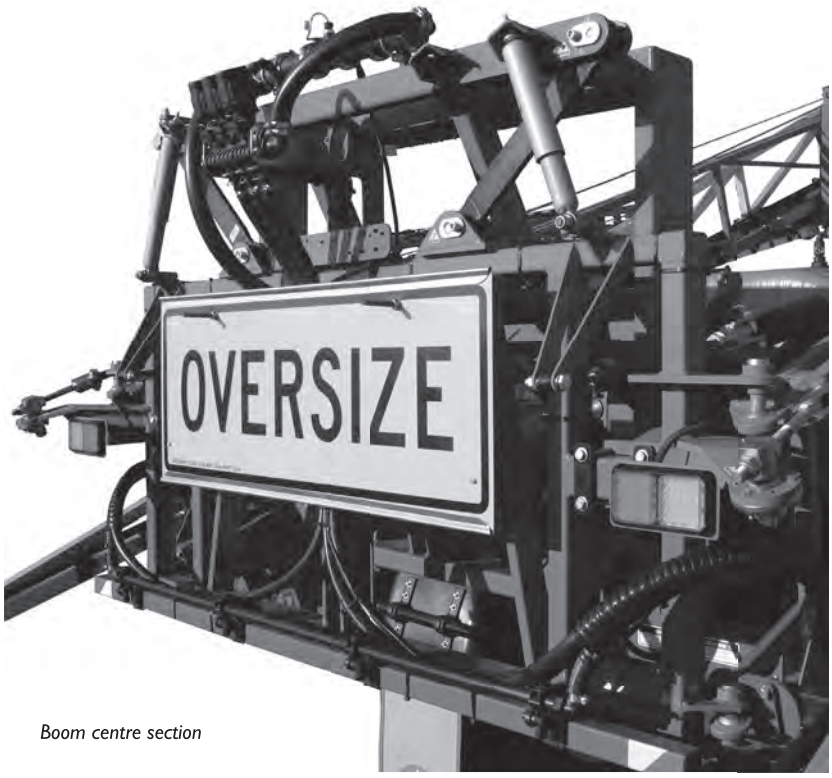
Pitch: Compression coil springs and shock absorbers dampen the vertical boom movement encountered over rough ground conditions.

Roll: Shock absorbers help maintain con stant boom height over sloping and uneven ground.

Yaw: Shock absorbers and springs over come the erratic whipping move ment, which creates undue stress on the boom frame and uneven spray application.

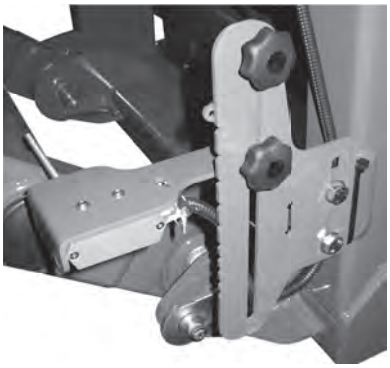


BOOM KEY FEATURES



Boom centre section

Paralift side shot



Boom height limit switch

BOOM KEY FEATURES

Boom wing

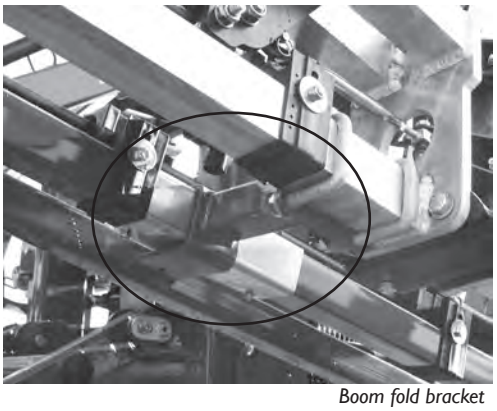
Boom outer wing

3D breakaway hinge with boom end protector fitted

BOOM KEY FEATURES

Boom rest

Boom protectors



Boom fold bracket

Cable drum / boom pivot

Boom bump stop

BOOM LIFT

The hydraulic lift on the Delta boom enables the boom to be raised and lowered to maintain a constant boom height above the target.

Delta booms on the Special EF feature a paralift rear which uses two hydraulic cylinders to perform the lift, while also acting as a component providing the vertical suspension. Each hydraulic cylinder has a gas charged accumlator which also assists in improving the boom ride. The "boom ride height switch" allows the operator to adjust the minimum ride height of the boom. Boom maintenance information can be found in the "maintenance" chapter of this manual.

The hydraulic lift also enables the boom to be raised prior to folding and then used to

BOOM FOLD

Delta booms hydraulic fold feature, allows the boom to opened and closed from within the tractor cabin via the tractor hydraulic system.

The boom fold sequence is as below:

1. Starting with the boom in the working position, use the lever/switch in cabin to raise the boom sufficiently high enough to clear boom rests when folded.
2. Use the lever/switch to fold the boom completely in.
3. Lower the boom until the boom just touches the rests
4. Then continue to lower the boom a further 100mm so as to put sufficient weight onto the rests. The rests need to be positioned high enough to allow the boom to lower 100mm without the boom resting on the tyres.

NOTE: Booms must not be folded, or unfolded, while the sprayer is moving. When the boom is between fully open and fully closed , there can be large stresses placed on many boom components. If the sprayer is moving and hits a bump, severe damage to the boom can occur.

UNFOLDING THE BOOM

The boom unfold sequence is as below:

1. Raise the boom sufficiently to clear the boom rests.
2. Use the lever/switch in cabin to unfold the boom so that the boom is aligned with the centre section.
3. Lower the boom to the desired height above the target.

HYDRAULIC CYLINDERS

Hydraulic phasing cylinders are used in the folding operation of the boom. This ensures that both sides of the boom are synchronised and open and close together so that the weight distribution is the same for both sides of the boom.

As hydraulic fluid enters one hydraulic cylinder, it acts upon the first ram and causes it to move. This motion results in an amount of fluid entering the second hydraulic cylinder which causes it to move an equivalent distance. There is also a flow restrictor for each ram so that the hydraulic fluid will enter and leave the respective cylinders at a controlled rate. This has the effect of slowing down the rate of fluid transfer and thus causes the boom to open and close more slowly - protecting the boom from damage. If the phasing cylinders do not fold together, information on re-phasing the rams can be found in the "maintenance" chapter.

BOOM BALANCE

The Delta boom suspension system causes the boom to adpot the same plane as the spray tanker. If one side is heavier than the other, the boom will tend to hang lower on the heavy side, so both sides need to be balanced for the boom ends to be of the same height.

To acheive this, a boom counterweight (as pictured) can be included on the boom and placed strategically so that it compensates and balances the boom. The counterweight can have more weight added and/or be moved to balance the boom correctly.

BOOM CABLES

Boom cables are a critical part of the Delta boom and it is important to ensure that boom cables are correctly adjusted prior to operation.

Loose boom cables can cause boom damage by allowing the outer boom section to hang out of alignment or to 'break away' too easily. This can shorten the sprayers life by placing unnecessary stresses on the boom, lift and chassis.

The cable tension can be checked by inspecting the cable springs, which must have a 2-3mm gap between the coils. Boom alignment can be checked by visually inspecting the straightness of the boom. Further information on boom adjustment and alignment can be found in the "maintenance" section.

MOTORISED BOOM VALVES

Motorised boom valves are fitted as standard and are mounted on the boom centre section at the rear of the sprayer. Motorised boom valves feature a 12 volt motor that opens or closes a stainless steel plunger and thus opening or closing flow to the boom sections as required.
In the event of console or valve failure, unscrew the top cap of valve then check that the fuse (3 amp) is ok.

Boom valves

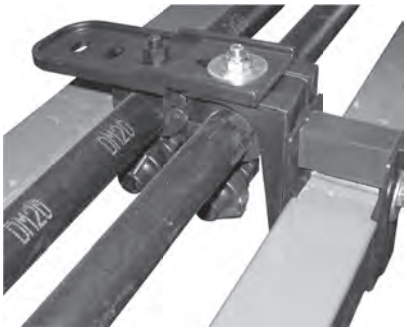
NOZZLES

The standard nozzle spacing on Goldacres booms is 500mm. Nozzles are mounted on brackets that are adjustable for different nozzle types. Nozzles are mounted so that they are protected from ground hits should the boom make contact with the ground.

As information regarding nozzles is specific to those being used in your application, no specific reference is made to nozzle application rates or types in this operator's manual. Goldacres suggest the use of a current TeeJet nozzle selection catalogue for reference to nozzle sizes, outputs, spray patterns and general spraying information. For more technical information on the function of spray nozzles and factors affecting their performance you can also use the TeeJet "User's guide to spray nozzles".

The TeeJet nozzle selection catalogue and Users guide to spray nozzles are available from Goldacres dealers, or as a free download from the TeeJet website:

www.teejet.com

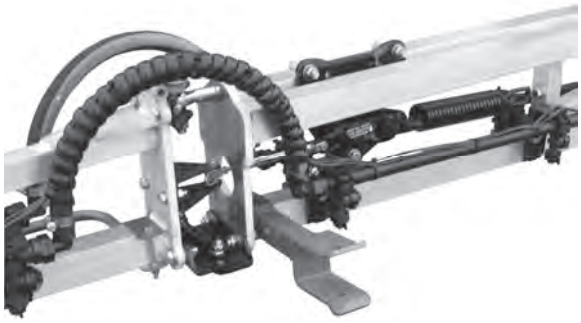


Nozzle bracket mounted on boom

3D BREAKAWAY HINGE

Tri Tech booms feature the unique three dimensional breakaway hinge which allows the tip to "break" forward, backward and upward if an obstruction is hit. The 3D breakaway hinge aims to eliminate any further damage to the remainder of the boom should an obstruction be hit.

It is important that the 3D breakaway hinge is properly adjusted when in operation. Adjustment instructions can be found in the "maintenance" chapter.



BOOM PROTECTORS

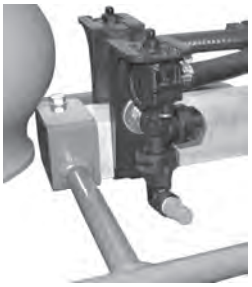
Stainless steel boom protectors are fitted on the boom to protect the boom when resting on the boom rests for transport. It is important to ensure that the boom protectors are fitted correctly.

Correctly fitted boom protectors

FENCE LINE JETS (Option)

Goldacres offer manually and electrically operated fence line jets. The 'fenceline' jet is designed to enable the operator to spray right up to the boundary fence without having the boom too close to the fence.

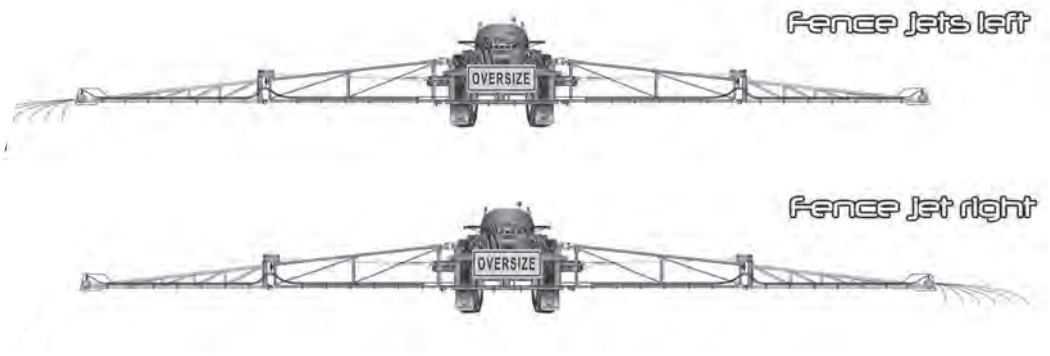
The angle of the off-centre jet can be altered to suit particular applications but it should enable the boom to be inside the fence by about 1 metre and still be able to spray to the fence. This should prevent operators from putting the boom into the fence, especially important when the boom is relatively new and the operator is not familiar with the width of the boom. The fenceline jet should be turned off after the end of the first lap and this can be done either manually via a tap or remotely via an optional electric solenoid (controlled in the cabin).



Remote fence line jet

Remote fence line jet solenoid

Manually operated fence line jet solenoid

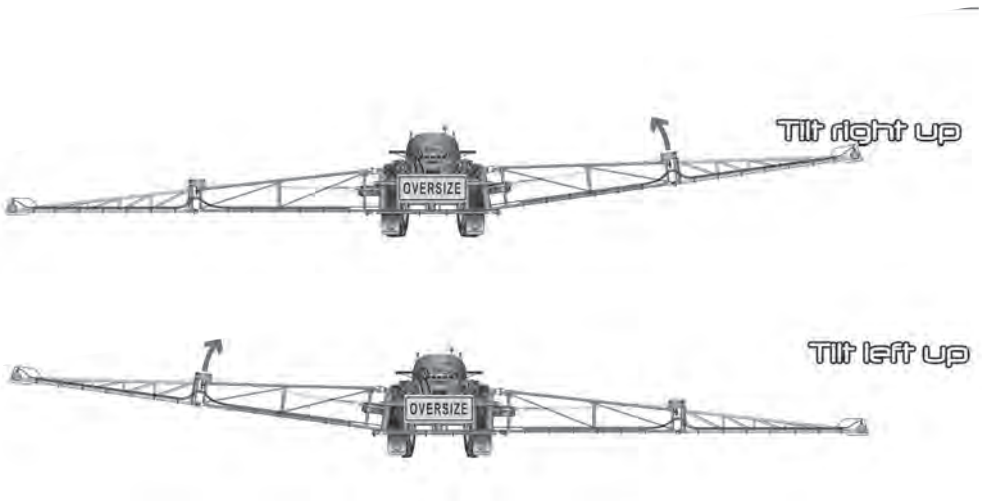


BOOM TILT (Option)

Delta booms can incorporate a hydraulic tilt option, which allows the individual boom sides to be raised independently when in the working position. This serves to provide greater variability of boom height control to compensate for undulating ground conditions. Boom tilts are operated from a lever in the cabin.

The use of tilt cylinders should be kept to a minimum as the the tilt operation affects the balance of the boom causing a rocking of the whole boom assembly.

NOTE: On Delta booms a different centre section is required to have the tilt option.



CHAPTER 7

TRI-TECH BOOM

GENERAL

All booms present a number of safety hazards due to their operation - the operator should read and fully understand the safety instructions in this manual prior to operation.

Goldacres Tri-Tech booms have been designed and built to ensure many years of trouble free service. Aluminium outer boom sections reduce the overall weight of the boom and aid in providing a superior boom ride and longevity.

CAUTION: Goldacres do not endorse use of this machine for spraying at speeds greater than 20 km/hr

CAUTION: Before adjusting the boom alignment, the hydraulic fold circuit must be free of air. Hydraulic circuits that contain air can make the boom appear that it is too far forward. Adjustment of the boom without "bleeding" the hydraulic circuit first will result in a boom that quickly reverts to hanging out of alignment to the back.

CAUTION: All chemicals have corrosive properties to some degree. Prevent damage to the machine by always consulting the chemical MSDS or the chemical supplier for advice concerning the corrosive properties of the chemical. It is the responsibility of the operator to carry out preventative and ongoing maintenance to the machine, particularly while applying chemicals with highly corrosive properties. Machine components should be coated with a suitable protectant prior to use, and then washed down, thoroughly, immediately after every application. Consult the supplier of the substance if you require specific advice about the effectiveness of any particular protectant to prevent premature degradation of machine components.

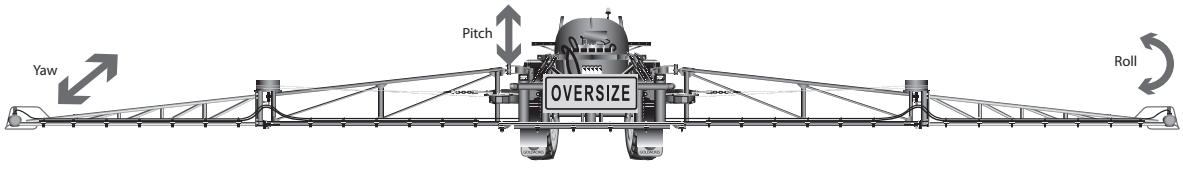
Tri Tech booms feature a unique (patented) boom suspension system.

This system provides suspension in three directions:

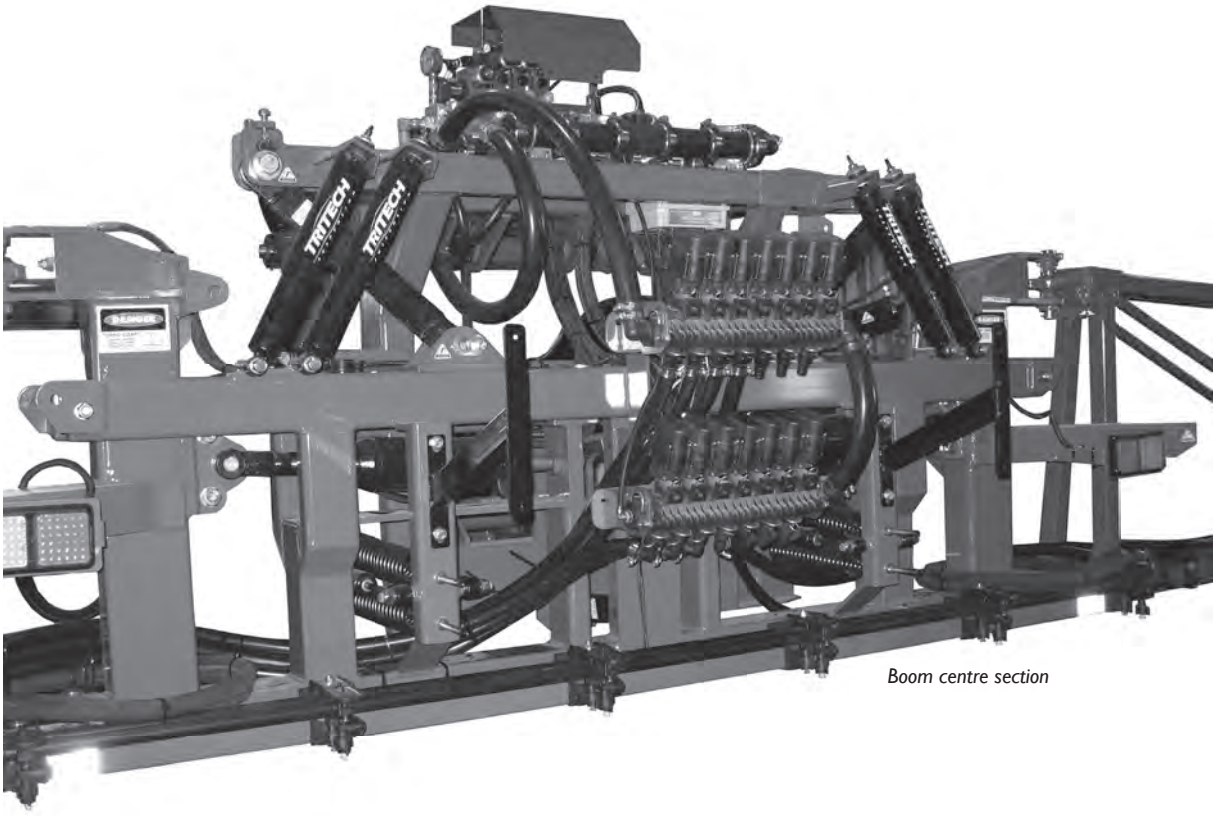
Pitch: Hydraulic cylinders and accumulators dampen the vertical boom movement encountered over rough ground conditions.

Roll: Shock absorbers help maintain con stant boom height over sloping and uneven ground.

Yaw: Shock absorbers and springs over come the erratic whipping move ment, which creates undue stress on the boom frame and uneven spray application. (Hydraulic Yaw suspension is an option)

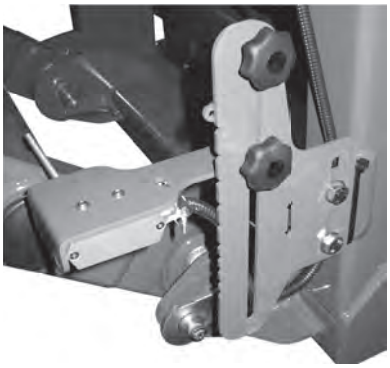


BOOM KEY FEATURES



Boom centre section

Paralift side shot



Boom height limit switch

BOOM KEY FEATURES

Boom wing

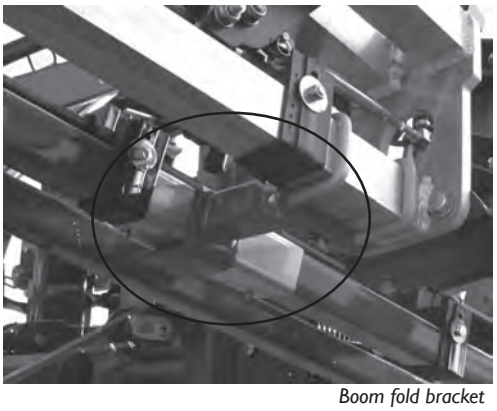
Boom outer wing

3D breakaway hinge with boom end protector fitted

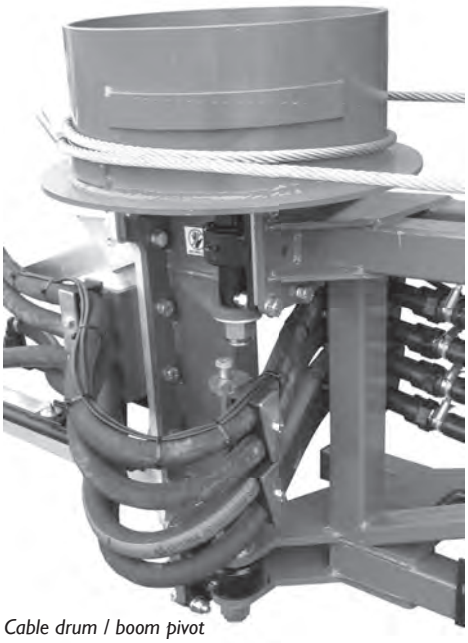
BOOM KEY FEATURES

Boom rest

Boom protectors



Boom fold bracket



Cable drum / boom pivot

Boom bump stop

BOOM CENTRE SECTION

The Tri Tech centre section is made up of two components, the paralift rear and the boom centre section as shown on page 7-3. The two are held together by delta links. These links allow the boom to be suspended to provide roll or yaw. suspension

Roll suspension is when the boom pitches up and down at the tips. Yaw suspension is when the boom moves fore and aft at the tips. If the boom did not feature yaw suspension there would be excessive stresses exerted on the booms and centre section when cornering or corrections of line are made. The yaw suspension allows the chassis of the sprayer to move left and right without any movement being transferred to the boom. The paralift rear will move with the centre of the sprayer but the boom centre section will remain static or level as it rotates around the delta links connecting it to the paralift rear.

The boom yaw is dampened by 4 large springs (2 each side) and 4 dampener shockers to limit the recoil of the yaw springs. These springs must be tensioned to have at at least 3-4mm gap between the centre coils. If the springs are not tensioned correctly the boom will be able to yaw excessively and the springs may be damaged. If a spring is damaged, both opposing springs must be replaced at the same time.

The overall yaw travel is limited by rubber bumpers mounted to the paralift rear. If the boom centre section yaws excessively the centre section will contact these and cushion the travel by collapsing the block. If the block collapses totally the yaw travel will be stopped. If the boom is continually yawed excessively this block will wear out and require replacement.

BOOM LIFT

The paralift on a Tri Tech boom enables the boom to be raised and lowered to maintain a constant boom height above the target.

Tri Tech booms feature a paralift rear which uses two hydraulic cylinders to perform the lift, while also acting as a component providing the vertical suspension. Each hydraulic cylinder has a nitrogen charged accumlator which also assists in improving the boom ride. The "boom limit" height switch allows the operator to adjust the minimum ride height of the boom. Boom maintenance information can be found in the "maintenance" chapter of this manual.

The hydraulic lift also enables the boom to be raised prior to folding and then used to lower the boom onto the boom rests.

BOOM FOLD

Tri Tech booms hydraulic fold feature, allows the boom to opened and closed from within the tractor cabin via the tractor hydraulic system.

The boom fold sequence is as below:

1. Starting with the boom in the working position, use the lever/switch in cabin to raise the boom fully.
2. Use the lever/switch to fold the boom completely in.
3. Lower the boom until the boom just touches the rests
4. Then continue to lower the boom a further 100mm so as to put sufficient weight onto the rests. The rests need to be positioned high enough to allow the boom to lower 100mm without the boom resting on the tyres or mudguards.

NOTE: Booms must not be folded, or unfolded, while the sprayer is moving. When the boom is between fully open and fully closed , there can be large stresses placed on many boom components. If the sprayer is moving and hits a bump, severe damage to the boom can occur.

NOTE: The booms must be folded continuously without stopping and starting during the sequence.

UNFOLDING THE BOOM

The boom unfold sequence is as below:

1. Raise the boom fully to clear the boom rests.
2. Use the lever/switch in cabin to unfold the boom so that the boom is aligned with the centre section.
3. Lower the boom to the desired height above the target.

NOTE: The booms must be folded continuously without stopping and starting during the sequence.

HYDRAULIC FOLDING CYLINDERS

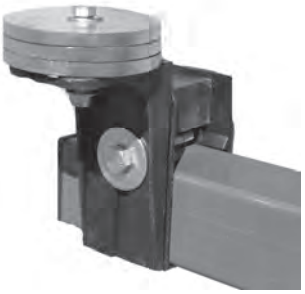
Hydraulic phasing cylinders are used in the folding operation of the boom. This ensures that both sides of the boom are synchronised and open and close together so that the weight distribution is the same for both sides of the boom.

As hydraulic fluid enters one hydraulic cylinder, it acts upon the first ram and causes it to move. This motion results in an amount of fluid entering the second hydraulic cylinder which causes it to move an equivalent distance. There is also a flow restrictor for each cylinder so that the hydraulic fluid will enter and leave the respective cylinders at a controlled rate. This has the effect of slowing down the rate of fluid transfer and thus causes the boom to open and close more slowly - protecting the boom from damage. If the phasing cylinders do not fold together, information on re-phasing the rams can be found in the "maintenance" chapter.

BOOM BALANCE

The Tri Tech boom suspension system causes the boom to adpot the same plane as the spray tanker. If one side is heavier than the other, the boom will tend to hang lower on the heavy side, so both sides need to be balanced for the boom ends to be of the same height.

To acheive this, a boom counterweight (as pictured) can be included on the boom and placed strategically so that it compensates and balances the boom. The counterweight can have more weight added and/or be moved to balance the boom correctly.



BOOM CABLES

Boom cables are a critical part of the Tri Tech boom and it is important to ensure that boom cables are correctly adjusted prior to operation.

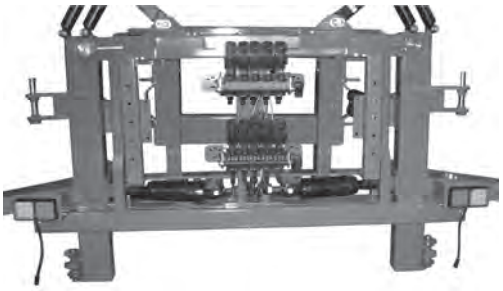
Loose boom cables can cause boom damage by allowing the outer boom section to hang out of alignment or to 'break away' too easily. This can shorten the sprayers life by placing unnecessary stresses on the boom, lift and chassis.

The cable tension can be checked by inspecting the cable springs, Further information on boom adjustment and alignment can be found in the "maintenance" section.

MOTORISED BOOM VALVES

Motorised boom valves are fitted as standard and are mounted on the boom centre section at the rear of the sprayer. Motorised boom valves feature a 12 volt motor that opens or closes a stainless steel plunger and thus opening or closing flow to the boom sections as required.
In the event of a valve failure, unscrew the top cap of valve then check that the fuse (3 amp) is ok.

Boom valves



Bare centre section showing boom valve location

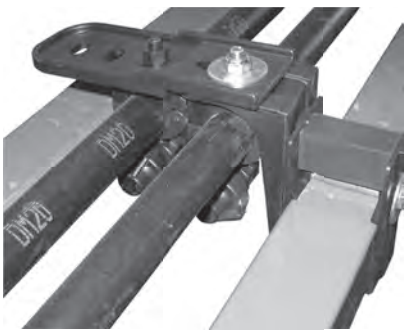
NOZZLES

The standard nozzle spacing on Goldacres booms is 500mm. Nozzles are mounted on brackets that are adjustable for different nozzle types. Nozzles are mounted so that they are protected from ground hits should the boom make contact with the ground, obstructions or crop.

As information regarding nozzles is specific to those being used in your application, no specific reference is made to nozzle application rates or types in this operator's manual. Goldacres suggest the use of a current TeeJet nozzle selection catalogue for reference to nozzle sizes, outputs, spray patterns and general spraying information. For more technical information on the function of spray nozzles and factors affecting their performance you can also use the TeeJet "User's guide to spray nozzles".

The TeeJet nozzle selection catalogue and Users guide to spray nozzles are available from Goldacres dealers, or as a free download from the TeeJet website:

www.teejet.com

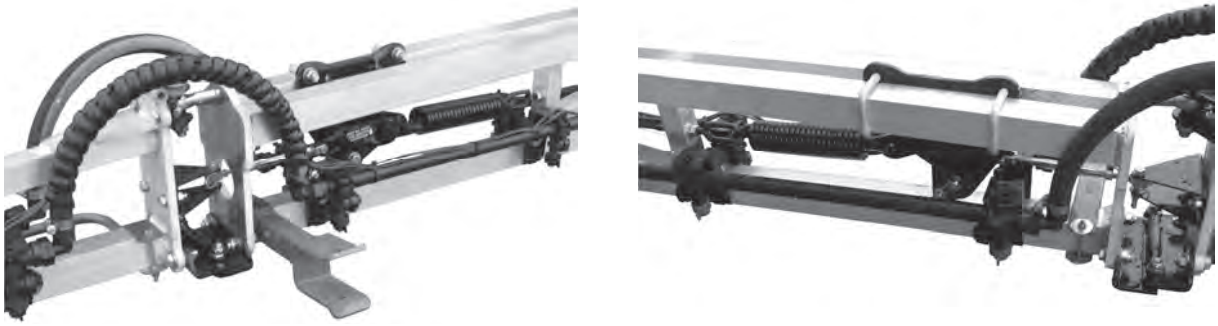


Nozzle bracket mounted on boom

3D BREAKAWAY HINGE

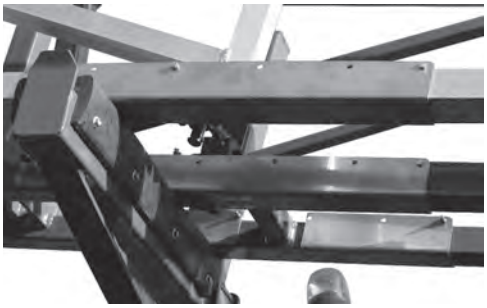
Tri Tech booms feature the unique three dimensional breakaway hinge which allows the tip to "break" forward, backward and upward if an obstruction is hit. The 3D breakaway hinge aims to eliminate any further damage to the remainder of the boom should an obstruction be hit.

It is important that the 3D breakaway hinge is properly adjusted when in operation. Adjustment instructions can be found in the "maintenance" chapter.



BOOM PROTECTORS

Stainless steel boom protectors are fitted on the boom to protect the boom when resting on the boom rests for transport. It is important to ensure that the boom protectors are fitted correctly.



Correctly fitted boom protectors

DUAL LINE BOOMS WITH 3TS (Option)

A Three Tier System (3TS) consists of two complete and totally separate boom lines on the same boom frame. As an example a conventional 30 metre boom has one boom line with 60 nozzle outlets (2 per metre) across its width. A 3TS boom replicates this first line with a second line also consisting of 60 nozzles giving a total of 120 nozzles for both lines.

When a conventional boom starts spraying at low speeds, the pressure at the nozzle is correspondingly low. As the sprayer accelerates the pressure at the nozzles also increases as the Raven controller adjust the flow rate to maintain the correct application rate. As you may be aware, nozzles have a suggested maximum pressure range in which they should be operated. For example: The suggested minimum and maximum pressure range of an XR 11002 TeeJet nozzle is 100 kPa to 400 kPa. If the nozzle is operated above this range then the potential for spray drift is dramatically increased due to the excessive number of finer droplets produced. The rate of nozzle orifice wear also rises as the pressure extends outside the optimum range. The conventional boom therefore has a limitation as to the maximum speed it can operate before the nozzles start to work outside their optimum pressure range.

A 3TS utilises two different sized nozzles in each of its two lines. It starts off on the boom line with the smaller nozzles i.e. 110015's in the same manner as the conventional boom. This is referred to as the first tier. As the sprayer accelerates the pressure at the nozzle increases to maintain the given spray rate, but at a predetermined flow rate (example 350 kPa) the Raven controller simultaneously turns off this first line whilst turning on the second boom line containing larger nozzles i.e. 110025's. This is referred to as the second tier. If the sprayer continues to accelerate the pressure in this second line also increases to a second predetermined point and the Raven controller then turns both lines on i.e. 110025's + 110015's. This is referred to as the third tier. The combined flow rate of the two sets of nozzles 110025 + 110015 = 11004 allows scope for the sprayer to accelerate even further if required.

As the sprayer slows the reverse occurs. The Raven controller turns off the 110015's leaving only the 110025 operating then turns off the 110025's whilst simultaneously turning back on the 110015's as the sprayer slows.

Not unlike automatic gear changes in a vehicle, where the transmission selects gears to maintain engine RPM's in the optimum range, the 3TS automatically select nozzle sizes to maintain the pressure in the optimum range.

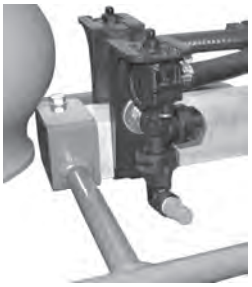
The whole system is controlled by the Raven SCS4400 which has 3TS compatibility as a standard feature. It's simply a matter of programming into the SCS4400 console the two predetermined flow rates at which point you wish the tiers to change. Nothing else needs to be done by the operator, and it is a very simple system to operate.

For information on 3TS boom tier programming refer to the "calibration" section of this manual.

FENCE LINE JETS (Option)

Goldacres offer manually and electrically operated fence line jets. The 'fenceline' jet is designed to enable the operator to spray right up to the boundary fence without having the boom too close to the fence.

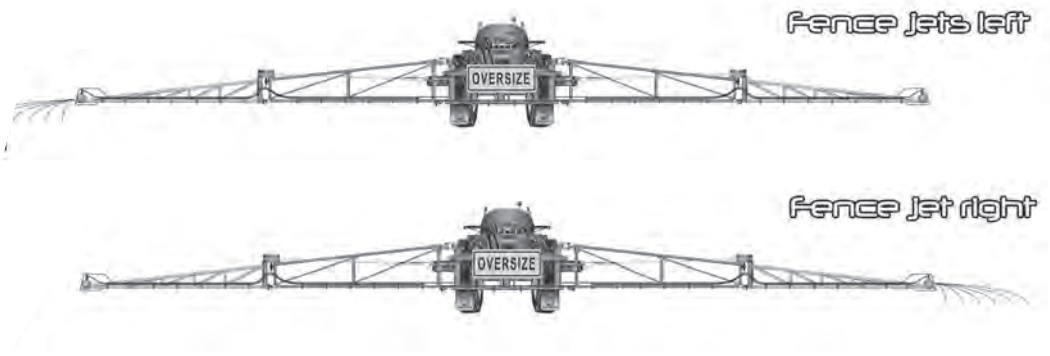
The angle of the off-centre jet can be altered to suit particular applications but it should enable the boom to be inside the fence by about 1 metre and still be able to spray to the fence. This should prevent operators from putting the boom into the fence, especially important when the boom is relatively new and the operator is not familiar with the width of the boom. The fenceline jet should be turned off after the end of the first lap and this can be done either manually via a tap or remotely via an optional electric solenoid (controlled in the cabin).



Remote fence line jet

Remote fence line jet solenoid

Manually operated fence line jet solenoid



HYDRAULIC YAW SUSPENSION (Option)

Hydraulic yaw suspension is designed to control the yaw movement of the boom centre section. In place of the conventional system, which uses 4 springs and 4 dampers, the hydraulic yaw option uses 2 hydraulic cylinders and nitrogen filled accumulators to centre and dampen the yaw movement.

The two hydraulic cylinders and accumulators are charged with hydraulic pressure and then closed off to create a seperate circuit which acts as the yaw suspension.

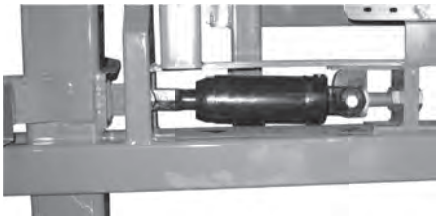
Further information on hydraulic yaw can be found in the "maintenance" section.

BOOM TILT (Option)

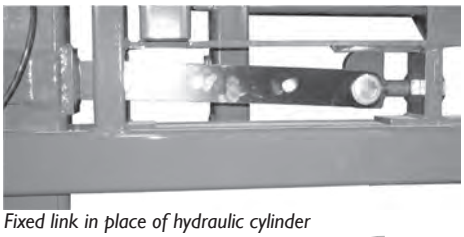
Tri Tech booms can incorporate a hydraulic tilt option, which allows the individual boom sides to be raised independently when in the working position. This serves to provide greater variability of boom height control to compensate for undulating ground conditions. Boom tilts are operated from a lever or switch in the cabin. (depending on hydraulic system fitted).

The use of tilt cylinders should be kept to a minimum as the the tilt operation affects the balance of the boom causing rocking of the whole boom assembly.

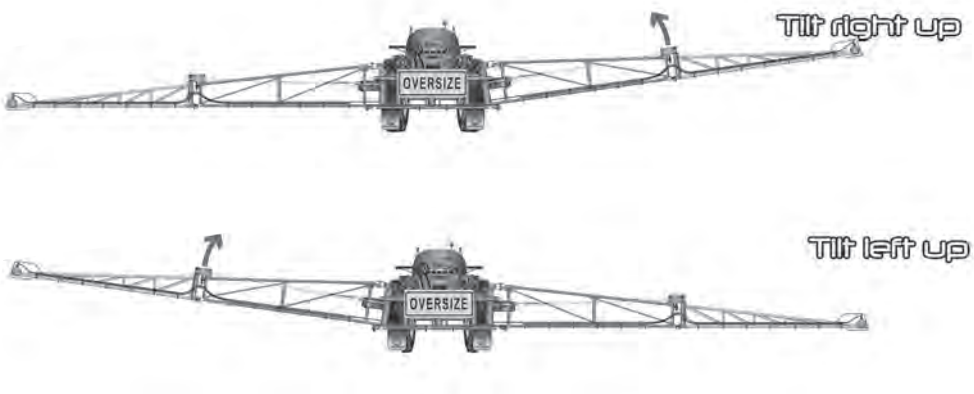
Where hydraulic tilts are not fitted, a fixed link is placed in substitute for the tilt cylinder.



Hydraulic tilt cylinder fitted



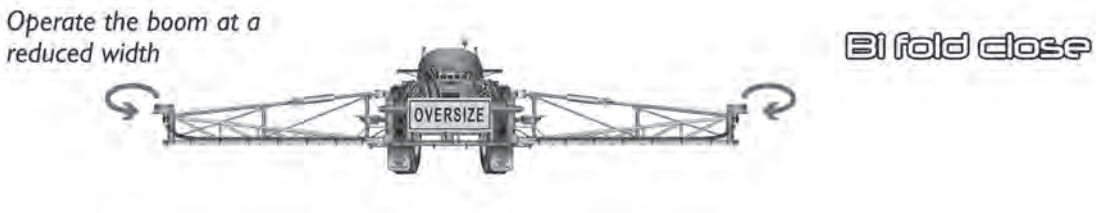
Fixed link in place of hydraulic cylinder



BI FOLD (Option)

Tri Tech booms can incorporate a hydraulic bi-fold option which allows the boom outer sections to be folded in to make the entire boom smaller.

For example a 36 metre Tri Tech boom fitted with the bi-fold option would fold back into 18 metres swath width for easier spraying in tight situations.
Specific information on the bi-fold option can be found in the "bi-fold" chapter at the rear of this manual.

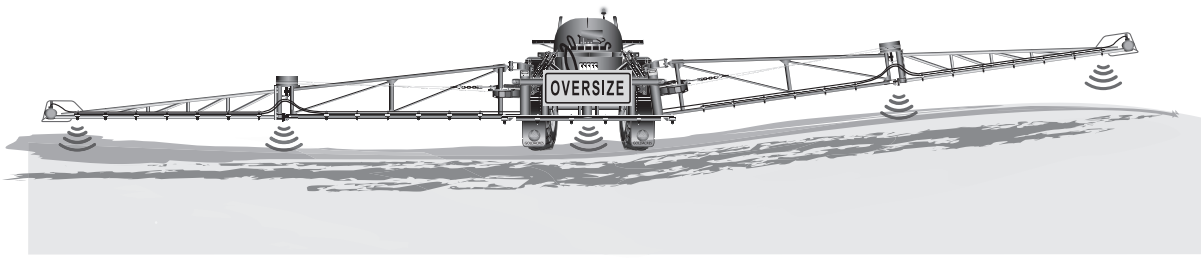


ULTRASONIC BOOM HEIGHT LEVELLING (Option)

The Goldacres ultrasonic boom height levelling system allows you to spray more precisely by automatically adjusting the height of your boom as you travel across the paddock. The operator sets a desired height above the target

This means that you spend less time watching your booms and trying to prevent them from hitting the ground or crop. Ultraglide detects changes in target height and adjusts your boom accordingly. The ultrasonic sensor detects the height of the target and adjusts the boom height with the hydraulic tilt cylinders to suit the preset height.

Further information on ultrasonic boom height levelling can be found in the "ultraglide" section at the rear of this manual.



CHAPTER 8

CALIBRATION

GENERAL

Spraying is a complex task, that is affected by many variables. It is the responsibility of the operator to be familar with spraying variables and to understand the spraying process prior to operation.

In general, the operator should know:
- The target application rate.
- The required operating (spray) pressure.
- The speed of travel.
- The desired droplet size.

To make the spray application as accurate as possible, it is critical that your spray equipment is regularly calibrated.

The Raven automatic controller is designed to improve the uniformity of spray applications. Raven controllers will monitor and control the determined application volume, but prior calculations will be required to ensure spraying pressures do not exceed operating parameters. (Refer to Teejet catalogue) The Raven system comprises a console, flowmeter, speed sensor and liquid flow control valve.

As the sprayer is moving, the console records ground speed and then calculates the amount of flow required to maintain the respective application rate at that speed. The console monitors the amount of flow being used via the flowmeter and then determines if the flow is correct for that speed. Flow adjustments are made by the control valve which varies the amount (volume) of by-pass and thus the volume being applied via the boom is controlled.

When the console is in the automatic mode, as the ground speed increases, the flow to the booms required to maintain the application volume will be increased. This will result in the pressure (as displayed on the gauge) increasing. Conversely, as the ground speed decreases, the required flow to the booms, as well as the pressure, decreases.

When the console is in the manual mode, as the ground speed increases, the pressure and flow will remain constant and the application volume will decrease. Similarly, as the ground speed decreases, again the pressure and flow will remain constant and the application rate will increase.

Record your console calibration information in the table below for future reference:

SI	
SP1	
C-SD	
Boom 1 Cal	
Boom 2 Cal	
Boom 3 Cal	
Boom 4 Cal	
Boom 5 Cal	
Boom 6 Cal	
Boom 7 Cal	
Speed Cal	
Meter Cal	
Valve Cal	
Rate 1	
Rate 2	
Tier 1	
Tier 2	
Tier 3	
DCI 1	
DCI 2	
DCI 3	

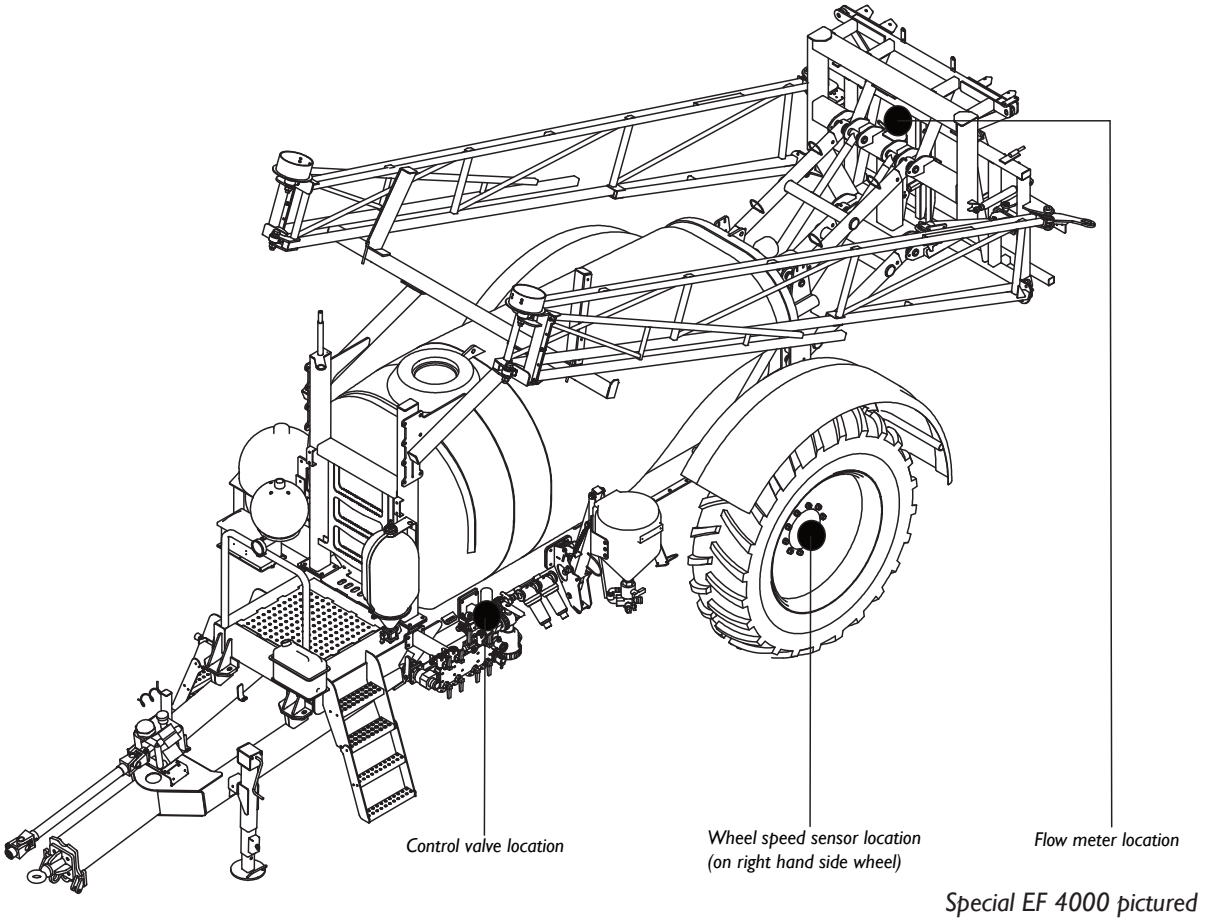
Useful formulas:

$$\text{L/Min (per nozzle)} = \frac{\text{L/ha} \times \text{km/hr} \times W}{60{,}000}$$

$$\text{L/ha} = \frac{60000 \times \text{l/min (per nozzle)}}{\text{Km/hr} \times W}$$

$$\text{Km/hr} = \frac{\text{Metres} \times 3.6}{\text{Time (seconds)}}$$

OVERVIEW



Special EF 4000 pictured

CONTROL VALVE

The control valve is located behind the EZ control fill and pressure manifold.

The control valve regulates the flow going to the boom sections directed via the console. It controls the flow to the boom by regulating the amount of liquid that bypasses back to tank.

FLOWMETER

There is a flowmeter on the sprayer, with a calibration number attached to it on a white tag. The number that is applicable is the one in square brackets, i.e. [185]. Note this number down as this is the number that should be entered as the Meter Cal. number.

The flowmeter must be flushed with fresh water before the sprayer is left unused for an extended period of time. Also do not allow water to freeze in the flowmeter as this can damage the housing.

The Flowmeter should be checked at the start of every spraying season and periodically during the season. The simplest way to check the accuracy of the flowmeter is to fill the tank to a previously determined volume mark (usually top fill marking) and then empty the tank through the flowmeter (i.e. via a self-test). Compare the reading from the flowmeter with the previous known volume. If there is a relatively large discrepancy (i.e. more than 50 litres out of a 3000 litre tank), the flowmeter should be removed from the sprayer, disassembled and the condition of the turbine checked and cleaned (make sure it spins freely). The flowmeter should then be reassembled and replaced on the sprayer. Perform the volume check again and if there is still a discrepancy, the Meter Cal No. can be changed.

i.e. If volume reads 3100 litres instead of 3000 litres and the original Meter Cal value is 185.
New Meter Cal value =
185 x 3100 / 3000 = 191

The flow meter is located at the rear of the sprayer, on the boom centre section, above the boom valves.

Flowmeter mounted on sprayer

SPEED SENSORS

Raven automatic rate controllers can utilise a speed reading from:

- A wheel speed sensor
- GPS receiver
- Radar speed sensor

Wheel speed sensor:

The wheel speed sensor is fitted to the right hand side wheel of the sprayer and uses four magnets (2 north pole (red) and 2 south pole (black)) fitted onto the rims to measure speed.

Wheel speed sensor

A north and south magnet must pass the sensor before a pulse is counted. The sensor must be mounted between 12mm & 19mm from the face of the magnet to receive a reading. The magnets must pass directly through the centre of the sensor face.

The speed calibration figure on the console indicates a measurement of the circumference of the wheel as it rolls across the ground. The wheel speed sensor detects when the wheel completes one revolution and the console calculates the distance the wheel travels - therefore giving a km/hr reading.

If the ground speed display reading is incorrect the calibration and sensor condition must be checked (see the troubleshooting section)

GPS receiver

If a GPS unit is fitted, GPS ground speed can be obtained and used in place of the wheel speed sensor.

To receive a speed reading from the GPS unit a **pulsed niema** string must be connected to the speed cable of the console. The console must then be set up to accept GPS speed. This is called radar in the console calibration settings. When using GPS the console speed cal figure is 200 initially and then can be fine tuned from this figure. See "calibration" chapter for further information on console setup.

Radar speed sensor:

The console can also utlise a radar signal for ground speed reading.

A "T harness" can be fitted to the tractor radar harness to send a pulsed signal to the console speed harness. The console must be setup to receive speed as "Radar."

When using a radar the console speed cal figure is 200 initially and then can be fine tuned from this figure. See "calibration" chapter for further information on console setup.

RAVEN SCS440/450 CALIBRATION

The following information is applicable for the SCS 440 and SCS 450 consoles:

Initially displaying "SP 1" and "CAL" (440 Console)

STEP 1: Press [ENTER] to lock in "SP 1" (Wheel-Drive or Drive-Shaft Speed Sensor) For Radar Speed Sensor, toggle to "SP 2" by pressing [CE] then [ENTER]

STEP 2: Press [ENTER] to lock in "C-SD" (Standard Valve)

NOTE: These 2 steps are very important because the system will appear to function properly but if the units are incorrect the quantities will be very inaccurate. If an error has been made whist calibrating these 2 steps, turn the console off then turn back on again with [CE] pressed and all information will be cleared. To see what has been programmed, depress [SELF TEST] (440 and 450 Console) for about 5 seconds and the programmed information should be displayed (flashing and toggling)

STEP 3: (440 CONSOLES ONLY)
Press [BOOM CAL 1] then [ENTER]
Enter Boom Section 1 in Centimetres, Press [ENTER] (For example 6m = 600 cm. Press [6] then [0] then [0])

Most booms are plumbed into a minimum of 3 sections and the console needs to know the width of each section so that when a section is turned off the console can reduce the width of the boom accordingly in order to calculate only the area that is sprayed. To measure the boom width for each section, count the number of nozzles in each section and multiply by the nozzle spacing. i.e. 12 nozzles in one section at 50 cm (½ metre) spacings = 12 * 0.5m = 6 metres.

STEP 4: Press [BOOM CAL 2] then [ENTER]
Enter Boom Section 1 in Centimetres, Press [ENTER]
(For example 6m = 600 cm. Press [6] then [0] then [0])

STEP 5: Press [BOOM CAL 3] then [ENTER]
Enter Boom Section 1 in Centimetres, Press [ENTER]
(For example 6m = 600 cm. Press [6] then [0] then [0])

NOTE: If only one or two boom sections are to be used, enter "0" for width of boom section not being used

STEP 3: (450 CONSOLES ONLY)
Press [BOOM CAL] then [ENTER]
Enter Boom Section 1 in Centimetres, Press [ENTER]
(For example 6m = 600 cm. Press [6] then [0] then [0])

The Raven 450 console has provisions for handling up to 5 boom sections. To measure the boom width for each boom section, count the number of nozzles in each section and multiply by the nozzle spacing. i.e. 12 nozzles in one section at 50 cm (½ metre) spacings = 12 * 0.5m = 6 metres.

STEP 4: Press [1] to select boom section 2 (b-02) Key in Boom Section 2, then press [ENTER]

STEP 5: Insert remaining boom sections by using toggle [☐] & [☐] buttons [1] or [2] If a boom section is not needed, enter a "0" for the length.

STEP 6: (440 and 450 consoles)
Press [SPEED CAL] then [ENTER]
Enter Speed Cal in Decimetres (1metre =

10 decimetres)
Press [ENTER] (eg 477)

Speed Cal is the distance measured by 10 revolutions of the Speed Sensor Wheel. This is best done with the tank half full of water (best simulates average between full and empty) and measured on ground that is typical to what will be encountered when spraying. Also note the tyre pressure when this procedure is performed. This tyre pressure needs to be maintained for the speed cal to be accurate. The speed cal should be checked at the start of every spraying season as the speed cal may need to be altered to compensate for tyre wear, etc.

NOTE: For 440 and 450 console with 4 wheel magnets (2 red and 2 black) - measure distance and multiply by 10 (to convert into decimetres)
For 440 and 450 console with 2 wheel magnets (1 red and 1 black) - measure distance and multiply by 10 (to convert into decimetres) then multiply by 2

STEP 7: Press [METER CAL] then [ENTER]
Enter Meter Cal for litres. Press [ENTER] (eg 185)

Meter Cal is the Calibration number on the Flow Meter white tag. The required number for litres is the number in square brackets.

STEP 8: (440 and 450 Console)
Press [VALVE CAL] then [ENTER]
Enter "2123"
Press [ENTER]

STEP 9: (440 and 450 Console)
Press [RATE 1] then [ENTER]
Enter Rate 1 (litres per hectare)
Press [ENTER] (eg 60)

STEP 10: (440 and 450 Console)
Press [RATE 2] then [ENTER]
Enter Rate 2 (litres per hectare)
Press [ENTER] (eg 75)

NOTE: Rate 2 can be the same as Rate 1 if only the one rate is to be used.

STEP 11: (OPTIONAL FOR 440 AND 450 CONSOLE)
Press [VOL/TANK] then [ENTER]
Enter the Volume in Tank at start of spraying
Press [ENTER] (eg 3000)

STEP 12: (OPTIONAL FOR 440 AND 450 CONSOLE)
Press [TIME] then [ENTER]
Enter the time of the day. Press [ENTER] (egg 10:30)

STEP 13: (WHERE HYDRAULIC DRIVE IS FITTED TO SPRAYER PUMP)
Press [SPEED] and hold down for 5 seconds until speed value begins to flash. When the pump is fitted with hydraulic drive, the flashing 'speed' figure represents the pump's RPM.

TO ZERO INFORMATION WHEN ENTERING NEW FIELD

When entering a new field, the previous data in the console can be changed to zero so that the new data is current for that field only.

NOTE: *WRITE DOWN ALL NECESSARY DATA BEFORE REMOVING DATA FROM CONSOLE MEMORY*

To zero out data in Area and Volume:
STEP 1: Write down the previous information for Area and Volume

STEP 2: Press Area or Volume (Total or Field for 440 & 450 consoles)

STEP 3: Press [ENTER]

STEP 4: Enter "0"

STEP 5: Press [ENTER]

The Area and Volume will now count from zero for the new field. If using a 440 console, the Area and Volume can have sub-totals (that is new data for every new field or tank load) as well as keeping total data (that is data that has not been changed to zero and has accumulated).

SELF-TEST SIMULATION

By simulating speed, the Raven controller can be tested without having to move. The Raven works in rate (i.e. litres per hectare) and a speed is required in order to calculate a rate. The self-test simulation provides the console with a simulated speed even though the sprayer is stationary and thus the console will be able to display a rate.

This self-test should be performed when first testing the system so that the operator can become familiar with the working system.

STEP 1: (440 and 450 Console) Press [SELF TEST] then [ENTER]
Enter speed (i.e. 12.0 for 12 km/h)
Press [ENTER]
Press [SPEED] to verify speed

The sprayer will now operate so that it can be tested. Switch the boom sections on and off to see that the system compensates and the applied rate returns to the required rate. The self-test will cancel when motion from the vehicle is detected by the speed sensor. For radar speed sensor, disconnect the speed cable going into the back of the console in order to do a self-test.

JUG TEST PROCEDURE

The method of carrying out the jug test is as follows:

NOTE: There may be a noticeable difference between pressure shown on main spray pressure gauge on sprayer and the gauge installed on the boom. This is due normal pressure loss through the circuit.

You will need:

- A calibrated measuring container that can measure the medium in litres, in 10 ml increments. e.g. 0.45 Lt.
- A timing device showing seconds.
- A pressure gauge mounted at the nozzle tip to verify the system pressure being delivered at the nozzle. Pathway/ Goldacres part numbers QJ4676-45-1/4-NYR & Q590-2-NY will mount a suitable gauge to the nozzle body bayonet fitting. (Not including gauge).

1. Check the plumbing system for kinked or obstructed hoses and repair or replace any hoses that restrict the normal flow of the liquid.
2. Start your sprayer
   a. For sprayers not fitted with a spray application controller, set the boom operating pressure to the pressure at which you expect to spray.
   b. For sprayers fitted with a spray application controller, initiate a 'self test' procedure and set the application rate and speed to the settings depicted in your "Rate Chart" at which you expect to spray.
3. Then place the jug under one of the nozzles, for 1 minute (exactly) and then record the volume of liquid collected.
4. Repeat the test over a representative sample of the jets in each boom section
5. Compare the volume collected from each nozzle to the stated volume in your rate chart. It should be no more than plus or minus 10% of the volume stated in your Nozzle Supplier's rate chart
6. In the event that any of your nozzles do not deliver the required volume, a further investigation is required which may include, but not be limited to:
   a. Cleaning the nozzles, using the method recommended by the nozzle supplier.
   b. Replacing the nozzles. (TeeJet advise that nozzles that flow greater than +10% of their stated volume are 'worn out' and should be replaced.)
   c. Cleaning nozzle filters.
   d. Replacing filters.
   e. Replacing pump diaphragms.
   f. Replacing the pump.
   g. Ensuring that the application rate required does not exceed the maxi mum flow and pressure parameters of the sprayer.

CHAPTER 9

LUBRICATION & MAINTENANCE

MAINTENANCE SCHEDULE

Frequency	Maintenance tasks
8hr	Check pump oil level & condition
8hr	Check tyre pressure
8hr	Check wheel nuts are torqued correctly to 320 ft/lb
8hr	Grease tilt arm pivot pins
8hr	Grease cable drum bearing block pivots
8hr	Clean pressure and suction filters if blocked
8hr	Clean airbag and foam marker compressor air filter
8hr	Clean direct chemical injection air filter
8hr	Grease pump PTO shaft universal joint nipples
25hr	Grease cable adjuster pivots
25hr	Grease wheel bearings
50hr	Grease pump PTO shaft safety cover
50hr	Grease boom mount rose ends
50hr	Grease all delta links on centre section
50hr	Grease paralift arm rose ends
50hr	Towing eye
50hr	Grease boom lifting cylinders
150hr	Check wheel bearings for sideways movement
300 - 350hrs	Change pump oil
3 months	Check bolts on axle bearing caps
3 months	Check the condition of the brakes extensively
3 months	Grease jack
3 months	Grease braked axle cam shaft bearing lightly
Yearly	Clean wheel bearings, inspect, re-grease and set rolling torque
Yearly	Carry out a complete decontamination of the sprayer
Yearly	Check pump air accumulator pressure is 690psi

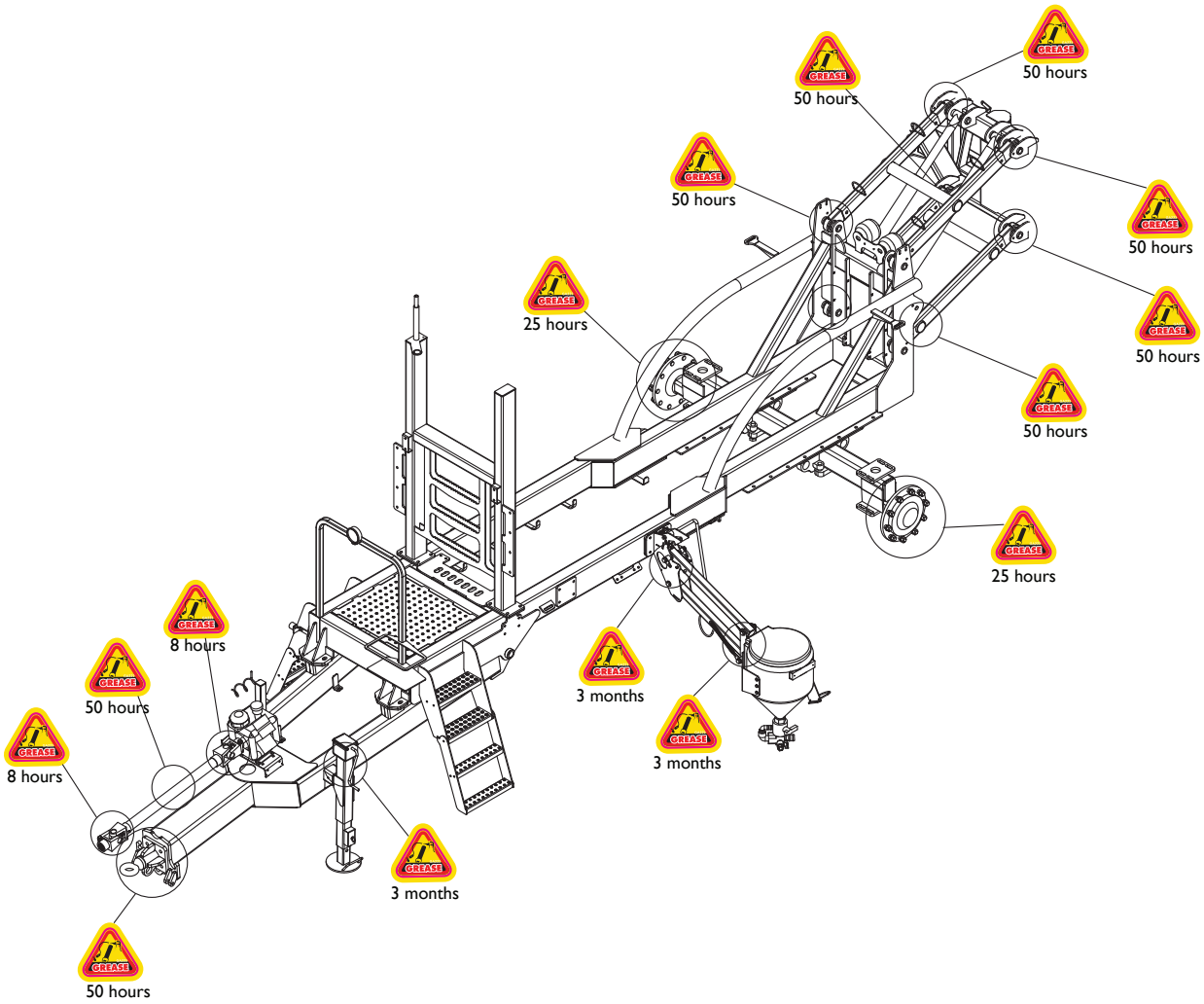
LUBRICATION

Goldacres recommend that a quality multi purpose grease should be used when lubricating your equipment.

A SAE 30W40 engine oil should be used in the diaphragm pump.

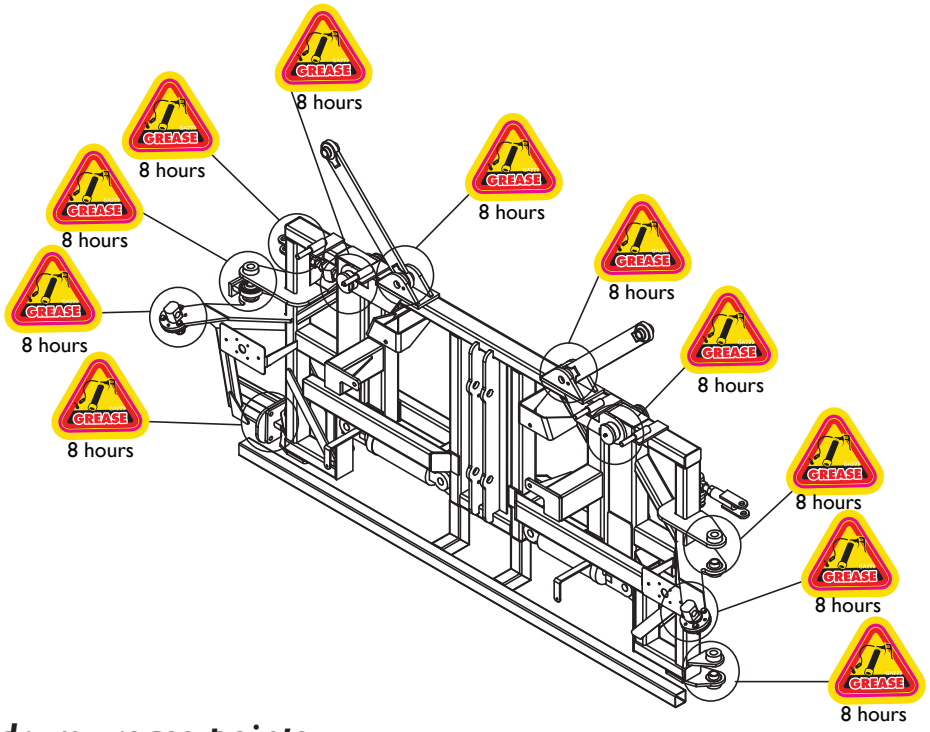
The pictures below outline key lubrication points. Please note the pictures do not show hydraulic cylinders, all hydraulic cylinders (excluding wing tilt cylinder) have grease points at the clevis'.

Chassis & PTO grease points

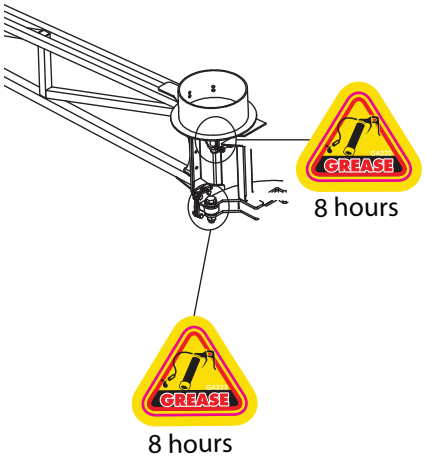


Location	Grease Interval
PTO Shaft universal joints	8 hourly
Wheel bearings	25 hourly
Hitch	50 hourly
PTO telescopic shaft	50 hourly
Paralift arm rose ends	50 hourly
Boom lift cylinders	50 hourly
Jack	3 monthly
Induction hopper pivots	3 monthly
NOTE: *The drawing above does not show hydraulic cylinders. Each hydraulic cylinder has a grease nipple located at each end. These points should be greased on a 50 hourly basis.*	

Boom centre section grease points

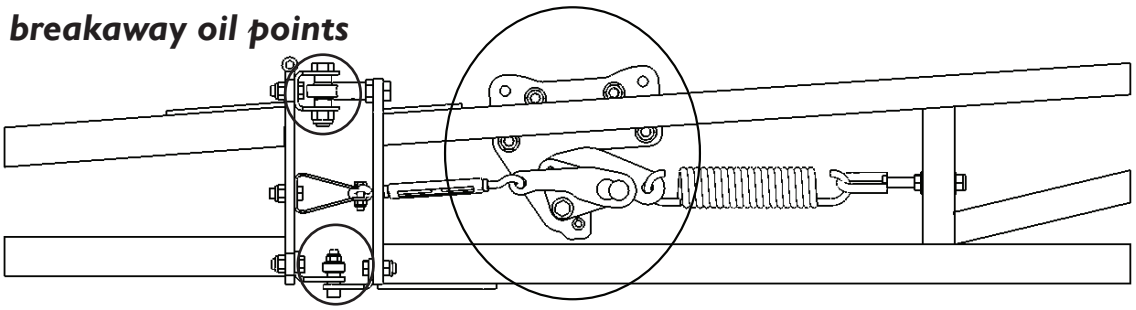


Cable drum grease points



Location	Grease Interval
Cable adjuster pivots	8 hourly
Cable drum bearing block pivots	8 hourly
Tilt arm pivot pins	8 hourly
Cable adjuster pivots	25 hourly
Boom mount rose ends	50 hourly
Delta links	50 hourly
NOTE: *The drawing above does not show hydraulic cylinders. Each hydraulic cylinder has a grease nipple located at each end.These points should be greased on a 50 hourly basis.*	

3D breakaway oil points

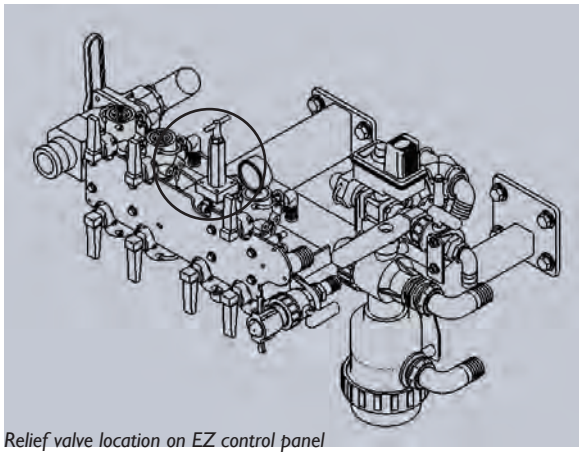


Location	Oil Interval
Pivot points on 3D breakaway	8 hourly

MAINTENANCE

PRESSURE RELIEF VALVE

The pressure relief valve provides relief when the pressure exceeds a pre-determined value. Altering the adjusting stem will affect the setting at which the relief valve will come into operation. Turning the stem clockwise will increase the pressure relief setting. GoldAcres pre-sets the pressure to approximately 110psi and this should not be altered. To check or alter this setting, turn the pump 'OFF' and unwind the relief valve. Turn the solenoids 'OFF', and then close all control manifold ball valves so that all flow passes through the relief valve. Run the pump at maximum operating speed (540 RPM) and slowly screw the relief in until the pressure is achieved. Tighten the nut on the adjusting stem so that this setting is maintained. If the relief setting is too low, too much flow is allowed to bypass back to the tank and it will limit the maximum obtainable pressure.



Relief valve location on EZ control panel

PUMP

8 Hours

Check pump oil level and condition:

50 Hrs

Pump oil should be changed after the first of operation.

Pump oil level should be between the two level makers on the oil reservoir. If the oil level continually gets low or is turning milky, there is possibly a split in a diaphragm. The oil will need to be drained and all the diaphragms replaced. Use SAE 30W40 oil. Rotate the pump manually (by hand) to remove any air locks while filling. Do not over fill.

Grease pump PTO shaft: Shaft universal nipples and telescope nipple must be greased every 8 Hrs. The cover must be greased every 40 Hrs to ensure it spins freely on the shaft.

300-350 Hrs

Change Pump oil: Pump oil should be changed very 300-350 Hrs. Use SAE 30W40 oil. On an RO160 or RO320 pump the drain plug in between the two pump mounts underneath the pump. An RO250 has the drain plug on the drive shaft face below the shaft.

Seasonally

Check pump air accumulator pressure (690psi): The air pressure in the air accumulator must be maintained to the correct pressure. If the accumulator constantly looses pressure, the valve or diaphragm may need replacing. To recharge the accumulator, charge it to 690 psi then run the pump at normal operating RPM. Looking at the pressure gauge, release some pressure until there is as little pulsation as possible. This will ensure a very even and constant pressure delivery.

CHASSIS, WHEELS, TYRES & AXLES

8 Hrs

Check tyre pressure: It is very important to maintain correct tyre pressures to optimize

sprayer stability. To determine the required tyre pressure, refer to the tyre specification chart in the general information section of the operator manual. If the tyre has a constant leak, the valve may be loose or need replacing, or the tyre may have a puncher.

Check wheel nuts are torqued correctly: Wheel nuts must be checked every 8 Hrs and re-torqued to 320 ft lb if required. Follow the below sequence to ensure an even torque distribution.

25 Hrs
Grease wheel bearings: Grease is applied to the ADR axle via a grease nipple on the front of the hub.

150 Hrs
Check wheel bearings for sideways movement: To check the wheel bearings for free play, jack up that side of the sprayer until the wheel can spin freely. Rock the wheel from side to side. If the is any movement the bearings will need to be tightened or replaced.

3 months
Grease jack: There are two grease nipples on the Prairie and Prairie Advance jack. One on the winding mechanism and one on the jack swing pivot. Both need to be greased every three months to ensure easy operation.

Check bolts on axle bearing caps: Bearing cap must be regularly checked and tightened if required. If dust is able to enter the axle bearings it could cause the bearings to fail. If the gasket on the dust cap is damaged or not sealing properly it must be replaced.

Checking brake condition and servicing of braked axles:

Brake maintenance and adjustments

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

Check the actuator and return spring mountings, check the actuator stroke and return travel and check they operate and release correctly.

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

Check for hydraulic fluid and air leaks.

Checking brake clearance and wear

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

Check the brake wear and the clearance between the brake linings and the drum visually through the inspection hole in the dust cover at the rear of the drum. It is probable that the linings are worn when the actuator travel has increased significantly.

Check the thickness of the brake linings (minimum allowable 5mm)

The brake shoes should be replaced as soon as the minimum lining thickness is reached.

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

Lubricate brake cam shaft bearings with grease, lightly to avoid grease deposits on the brake linings and drums.

Adjusting brakes with fixed levers
Take up the slack when the actuator stroke reaches about two thirds of the maximum travel.

To take up the slack, turn the lever by one or more splines, ensuring that the brakes are not touching when released (to prevent

overheating the brakes).

Never change the linkage position for the actuator on the lever without authorization from the vehicle manufacturer as the vehicle will have been tested with the actuator at this position (the brake operating levers have several holes, always use the original hole).

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

Adjusting brakes with adjustable levers
Take up the slack when the actuator stroke reaches about two thirds of the maximum stroke. To take up the slack, turn the adjustment screw on the lever to adjust the relative position of the cam and the lever. NB. The actuator brakes by pushing the lever to turn it in a particular direction. The screw must be adjusted so that the cam moves in this direction to take up the slack.

The direction in which the screw must be turned depends on the configuration. Ensure that the brakes are not touching when released (to prevent overheating the brakes).

Never change the linkage position for the actuator on the lever without authorization from the vehicle manufacturer as the vehicle will have been tested with the actuator at this position (the brake operating levers have several holes, always use the original hole)

Seasonally
Clean wheel bearings, inspect, re-grease and set bearing pre-load:
If the axle bearings have become worn or damaged and need replacing, the following procedure should be followed.

- Remove the bolts from the bearing dust cap and clean out as mush grease as possible.
- Remove the split pin and castle nut and washer.
- Slide the outer bearing and hub off the axle. Bearing puller may be required
- Remove the inner bearing.
- If the seal is also to be replaced, remove it as well.
- Clean all existing grease from the axle and the hub and wash in petrol.
- Insert new rear seal.
- Load the two new bearings with grease prior to fitting on the axle. Ensure grease has penetrated completely through the bearing.
- Slide new inner bearing onto shaft.
- Place hub back onto axle and fill cavity with grease.
- Insert new outer bearing.
- Fit washer and do nut up firm.
- Perform the pre-load test on the hub to determine how tight to set the nut.

The pre-load needs to be 12kg. This test is performed by tying string or rope to a stud and wrapping it around the outside of all the studs. With a set of tension scales connected to the rope, pull the scales. The hub should begin to rotate at 12kg. Tighten or loosen the nut to achieve the required setting. Fit split pin and bolt the bearing dust cap in place.

Removing a wheel from the sprayer:

- The sprayer must be hitched to the appropriate towing vehicle.
- The engine of the towing vehicle must be turned off and the park brake applied.
- Chock the wheel(s) that is/are not to be removed with an appropriate item to prevent the sprayer from moving.
- With a wheel nut wrench, loosen all the wheel nuts on the wheel that you wish to remove (Do not remove wheel nuts until the tyre is off the ground).
- Place a jack on level, firm and stable

foundation under the sprayer axle and between the two axle bolts near the wheel to be removed. The jack may need to have a large piece of timber or steel placed under it so that the jack will not sink.
- Use the jack to raise the sprayer axle such that the wheel is off the ground.
- Place an auxiliary jack block under the sprayer so that if the jack fails the sprayer will not fall.
- Remove all wheel nuts and remove wheel from sprayer. Be careful that the wheel does not fall on any person and cause bodily harm.
- Ensure that the sprayer is stable when being left for an extended period of time.

Replacing a wheel onto the sprayer:

- Make sure the sprayer is stable when supported with the jack and the jack block in place and hitched to the appropriate towing vehicle.
- Make sure the wheel is in a satisfactory condition to use and that the tyre is inflated to the correct tyre pressure.
- Clean the surface between the wheel and the hub.
- Carefully lift repaired/new wheel up so that the holes in the rim centre go over the wheel studs on the wheel hub.
- Carefully put the wheel nuts on and tighten them finger tight.
- With a wheel nut wrench tighten wheel nuts alternately and evenly to a torque rating of 320ft lb.
- Remove the jack block from under the sprayer.
- Carefully lower the sprayer slowly with the jack until the tyre touches the ground.
- Retighten the wheel nuts to the required torque rating.
- Let the jack completely down so that all weight is taken off the jack and remove jack (and any supports placed under the jack) from under the sprayer.
- Remove wheel chocks that were placed to the front and rear of the opposite wheel (to prevent it from moving).
- Check tyre pressure before moving sprayer.
- Retighten wheel nuts to the required torque rating:
  - One hour after fitting the tyre.
  - Before filling main spray tank.
  - After the first tank load.

BOOMS

8 Hrs
Grease tilt arm pivot pins.
Grease cable drum bearing block pivots.
Clean pressure and suction filters

25 Hrs
Grease cable adjuster pivots:

50 Hrs
Grease boom mount rose ends:

Grease all delta links on centre section.

Grease paralift arm rose ends.

Clean Airbag, Foam Marker and DCI compressor air filters: ***8 Hrs***

The compressor air filters are mounted on the RHS boom rest.

If the compressor filter element is not cleaned and becomes blocked then damage may result to the compressor through overheating.

Rotate the outer cover anticlockwise to remove. When removing filter element, be very careful not to let any dust fall into the line.

Adjusting boom ride height switch on paralift booms:

The ride height switch is used to adjust the minimum boom height. The switch is located on the bottom of the left hand side of the boom paralift.

To adjust the switch:

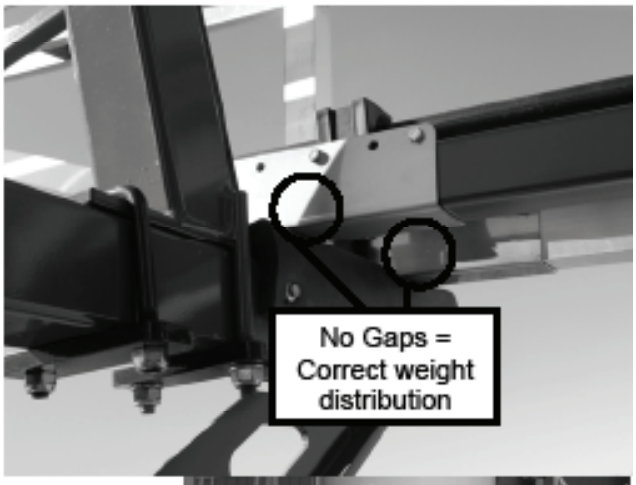
1. Loosen the two adjustment knobs on ride height bracket
2. By lowering the switch the minimum boom height is increased.
3. Each notch gives approximately 100mm of boom height adjustment.
4. Once adjusted tighten knobs.

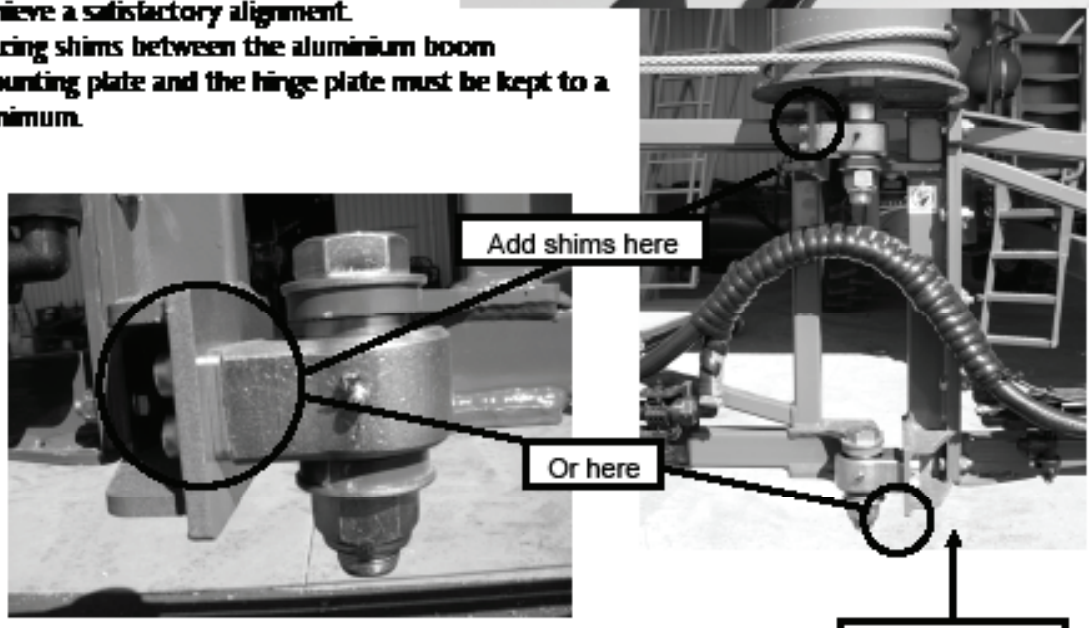
CORRECT ADJUSTMENT OF BOOM OUTER SECTION

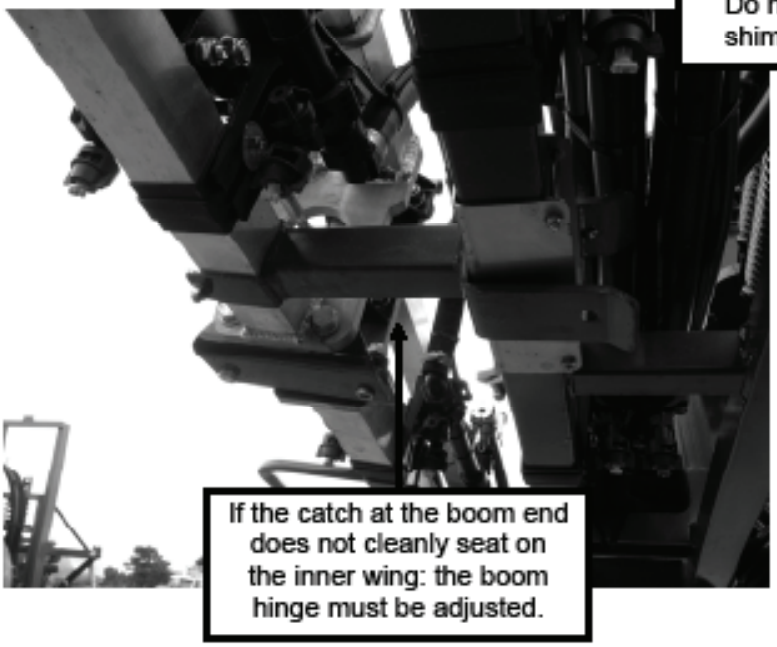
When booms are seated in the transport position it is most important to ensure that the weight of the inner and outer boom sections is shared equally.

If the weight of the folded boom is supported by the outer section excessive stress is applied to the boom and to the hinge under the cable drum.

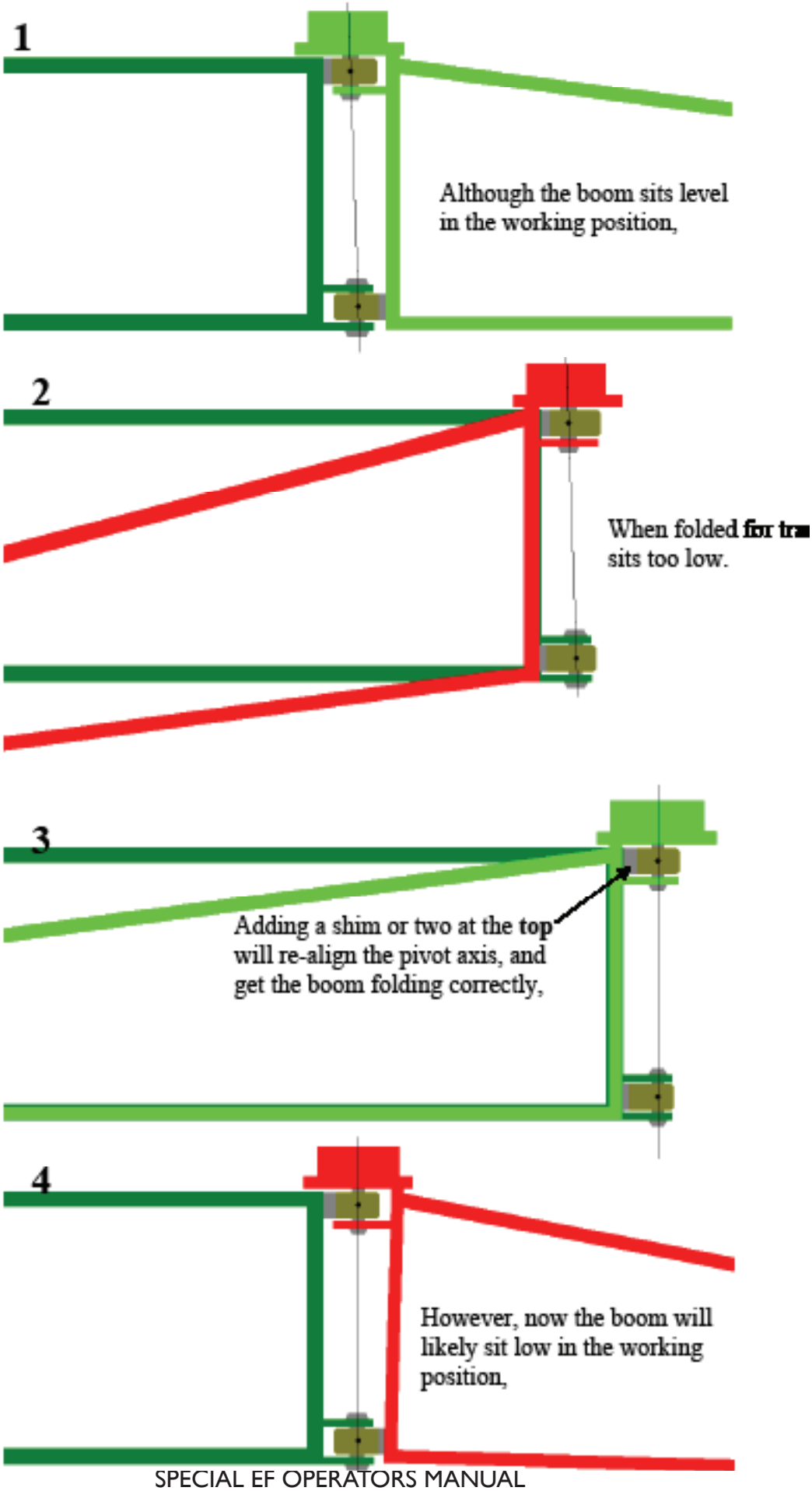
Careful adjustment of the shims on the boom hinge, will in most cases achieve a satisfactory alignment. Placing shims between the aluminium boom mounting plate and the hinge plate must be kept to a minimum.

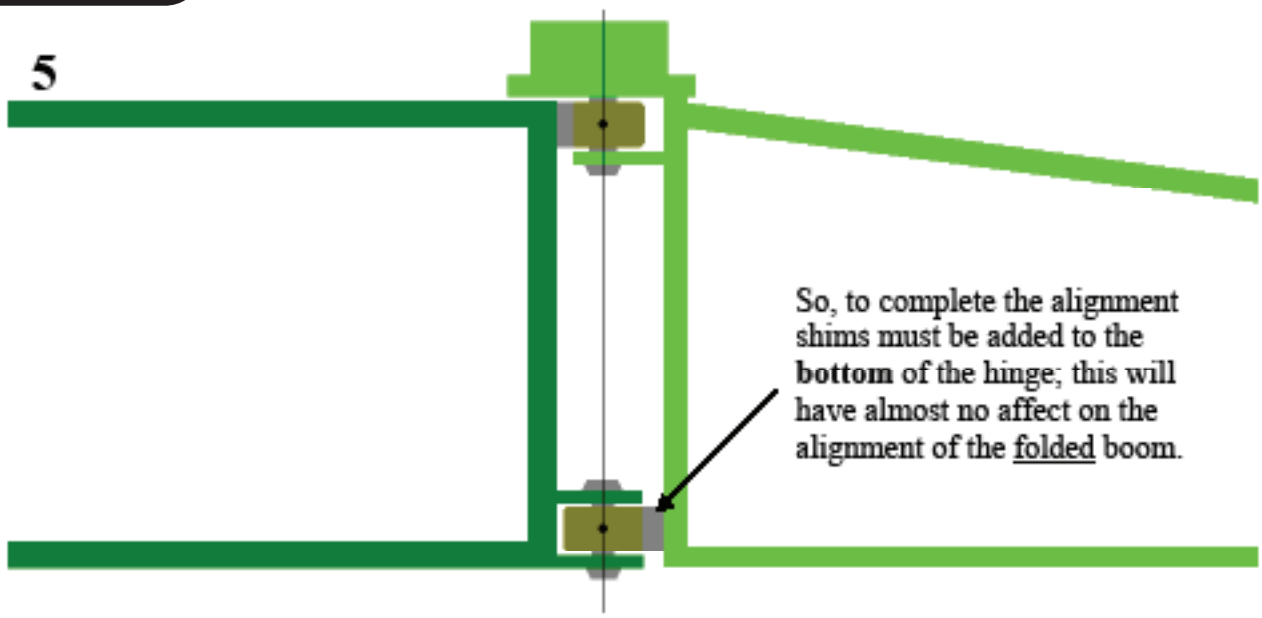






ILLUSTRATED EXAMPLE SCENARIO:





EXAMPLE SCENARIO SUMMARY:

1. Adding or removing shims at the top of the hinge will alter the pivot axis and position of the outer boom wing, a good rule of thumb for adjusting the folded boom is:
   - 1 shim at the hinge = 15mm at the boom end. (24m boom)

   Or,
   - 1 shim at the hinge = 7mm at the boom end. (18m boom)

2. Adding or removing shims at the bottom of the hinge only affects the position of the unfolded boom, at the same ratio as shown above. A shim on the bottom of the hinge has only a fraction of this affect on the position of the folded boom.

3. Always adjust the shims at the top of the hinge first, i.e. correct the *pivot axis*. Remember: adjusting the shims at the bottom of the hinge will not affect the alignment of the folded boom any great amount. Therefore: there is no point getting your boom straight in the working position only to throw it out when re-aligning the folded boom!

FURTHER EXAMPLES

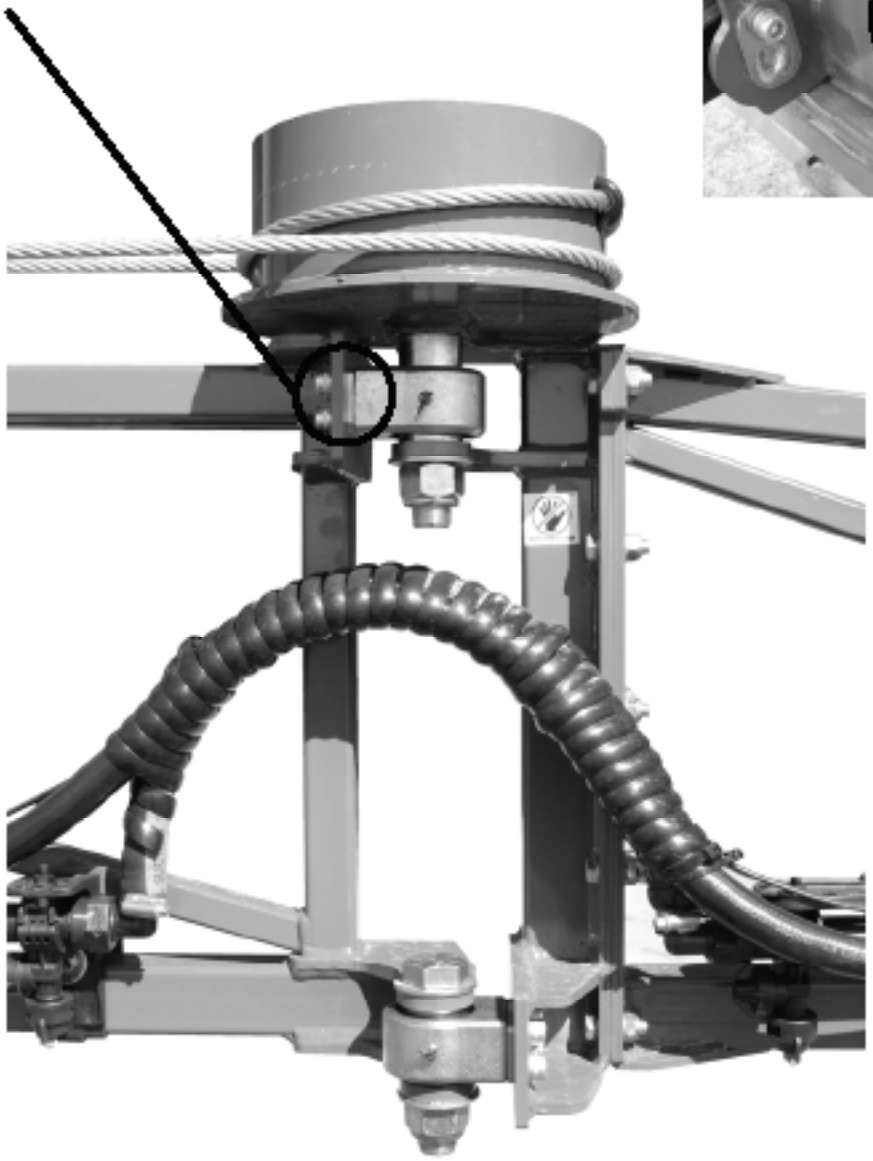
Boom sags when in working position, and is also too low when folded.	Add the required shims to the top hinge to set the pivot axis straight, and then add shims to the bottom of the hinge to correct the now even lower outer section.
Boom sits well in working position but is too high when folded.	Remove required amount of shims from the top of the hinge to set the pivot axis straight, then remove shims from the bottom of the hinge to ensure the open boom is flat.

Procedure for adjusting shims at the top of the hinge:

NOTE: Goldacres recommends a two person minimum for this job, always wear appropriate safety equipment.

1. Inspect the boom in the folded and unfolded positions to determine the amount of adjustment required.

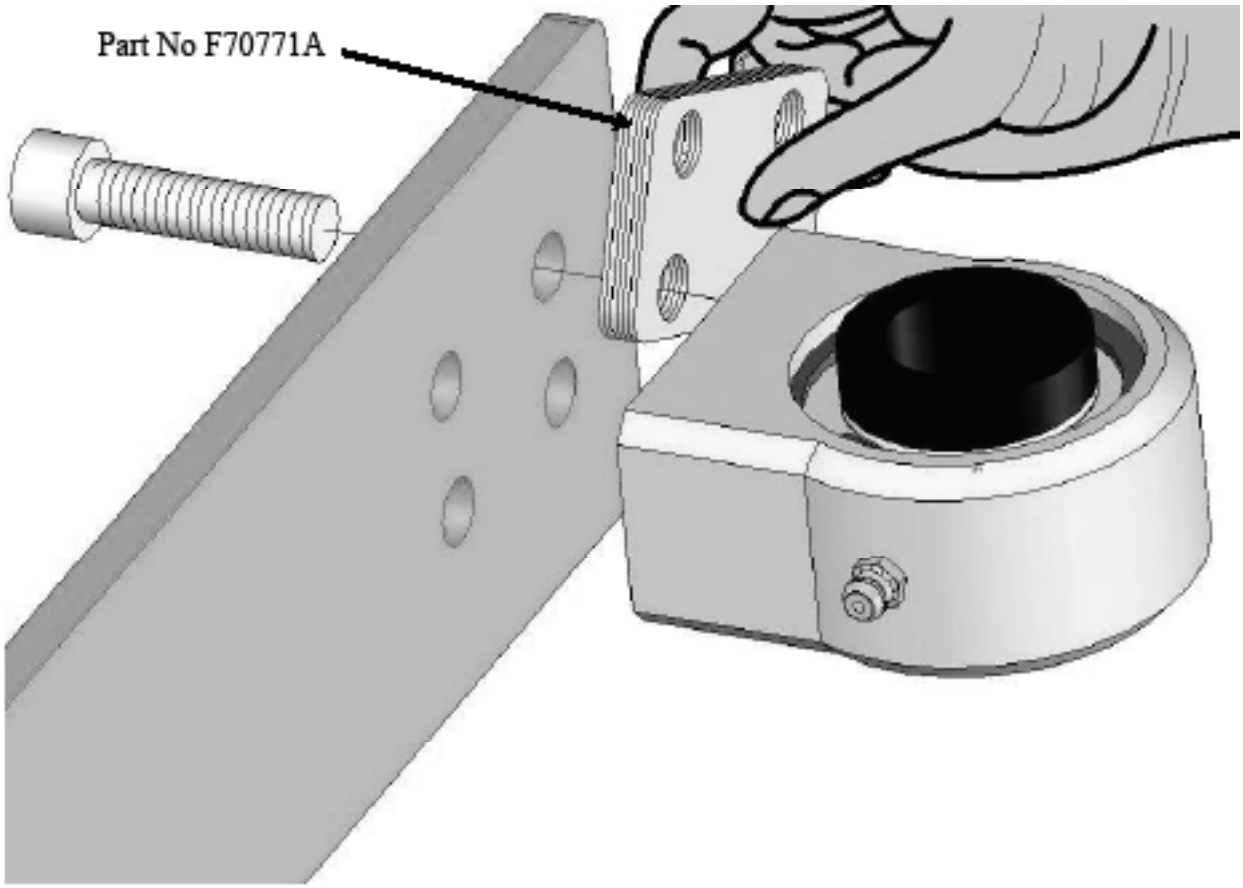
2. Fully unfold the boom into the working position ensuring it is completely straight.
3. Place support stands under the inner wings on both sides of the sprayer.
4. After lowering the boom onto the stands, close the tap on the hydraulic lift cylinder.
5. Lower the boom onto the support stands.
6. Loosen the bolts on the top of the hinge.



7. With an assistant applying downward pressure to the boom end, completely remove the bolts, catching the shims as they fall.

CAUTION:
Do not allow the outer boom section to move about while the hinge bolts are undone, as the hinge joint may rotate at the lower bearing housing. We have determined this method to be the safest and easiest way to align the shims and insert the first bolt, whilst minimising the risk of crushed fingers.

8. After adding the required amount of shims to the stack, reinsert the stack as shown below.

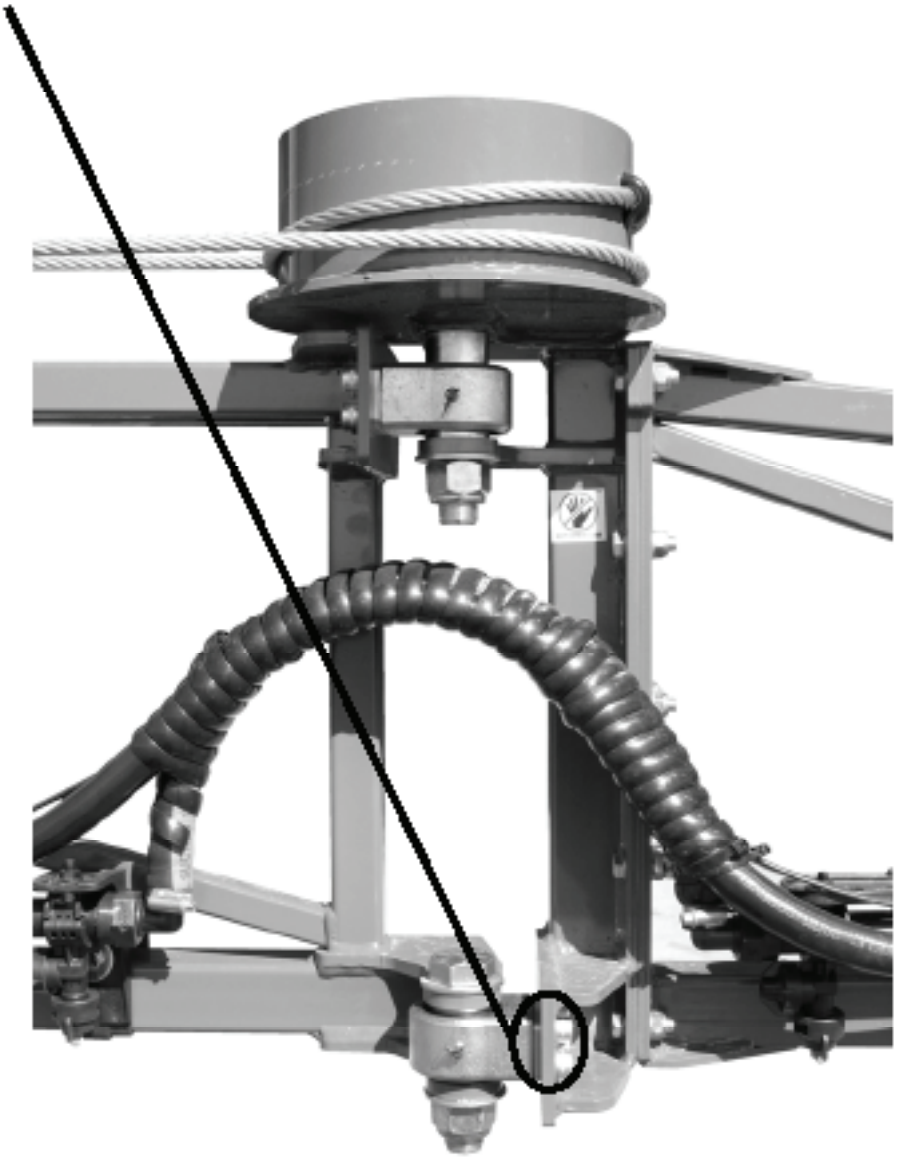


9. Insert the first bolt and finger tighten.
10. Rotate the shims and position the second bolt diagonally opposite to the first.
11. After positioning the last two bolts the assistant may now release the pressure on the boom.
12. Tighten the bolts consecutively to 55lb ft (65Nm) going around again checking the torque.
13. Open the tap on the hydraulic lifting cylinder, raise and fold the boom checking the correct alignment has been achieved.

NOTE:
These procedures should be performed for both sides of the boom.
Procedure for adjusting shims at the bottom of the hinge:

1. Inspect the boom in the folded and unfolded positions to determine the amount of adjustment required.
2. Fully unfold the boom into the working position ensuring it is completely straight.
3. Place support stands under the inner wings on <u>both sides</u> of the sprayer.
4. Lower the boom onto the support stands.

5. Loosen the bolts on the bottom of the hinge.

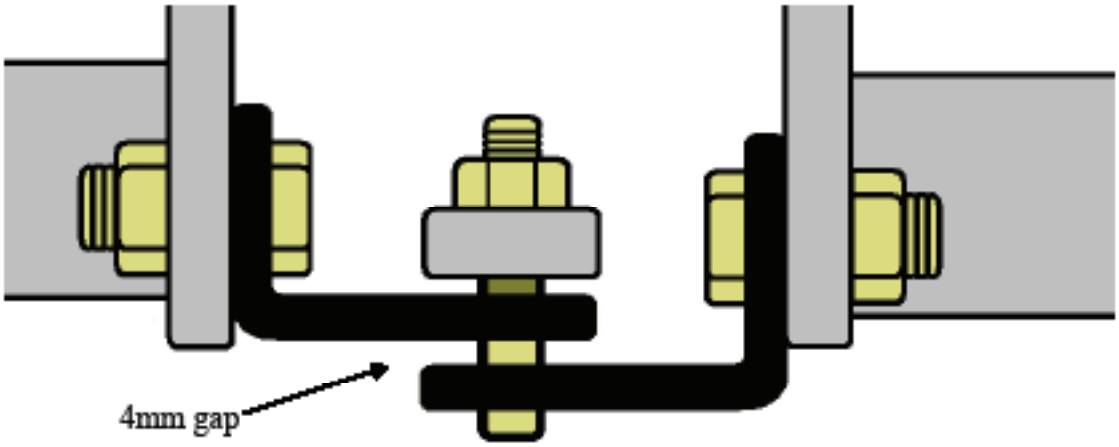


6. With an assistant lifting the boom end, completely remove the bolts, catching the shims as they fall.
7. After adding the required amount of shims to the stack, reinsert the stack as shown in the previous section.
8. Insert the first bolt and finger tighten.
9. Rotate the shims and position the second bolt diagonally opposite to the first.
10. After positioning the last two bolts the assistant may now release the boom.
11. Tighten the bolts consecutively to 55lb ft (65Nm) going around again checking the torque.
12. Open the tap on the hydraulic lifting cylinder, raise and fold the boom checking the correct alignment has been achieved.

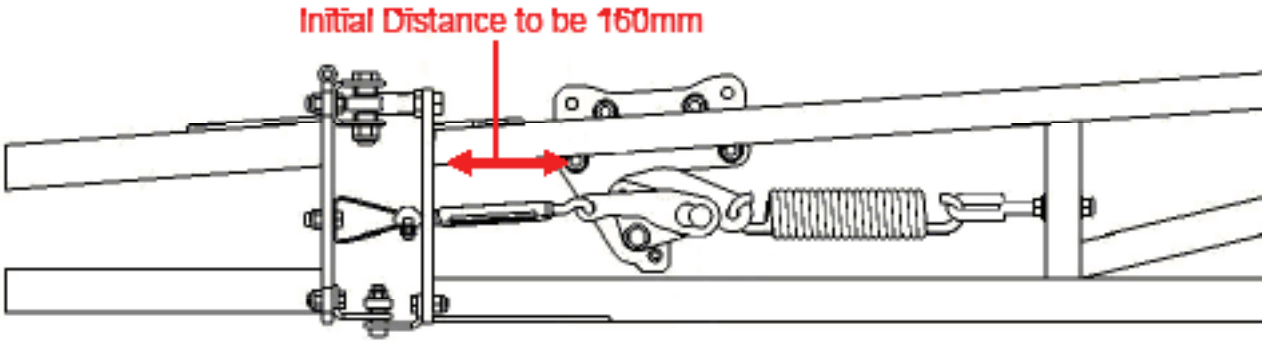
THREE DIMENSIONAL BREAKWAY

Three dimensional Breakaway Initial Setup Instructions

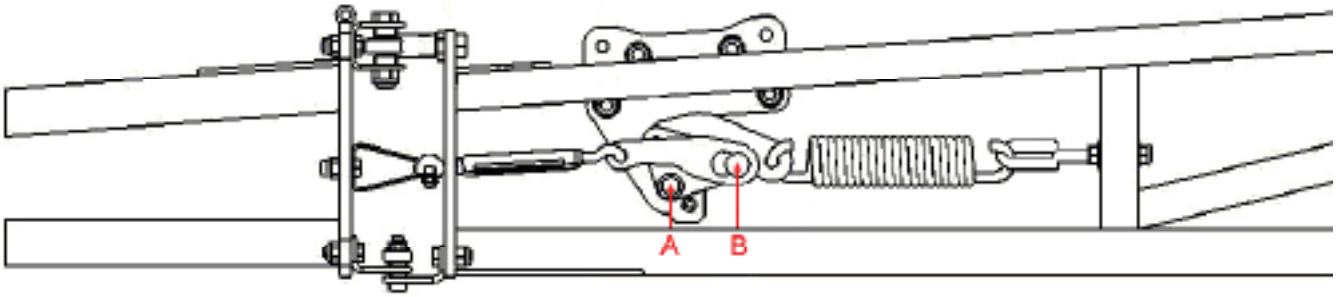
1. With the boom in the working position isolate the hydraulics by closing the ball valves on the lift cylinders, chock the tyres front and rear and remove the keys from the ignition.
2. When the bottom mounting plates are fitted there must be a clearance of 4mm between the bottom of the outer plate and the top of the inner plate.



3. Locate the pivot mounting plate and its retaining u-bolts. Position the outer u-bolt so that the centre of the bottom thread is 160mm from the inner edge of the mounting plate. Tighten both u-bolts up once the plate is in this position.

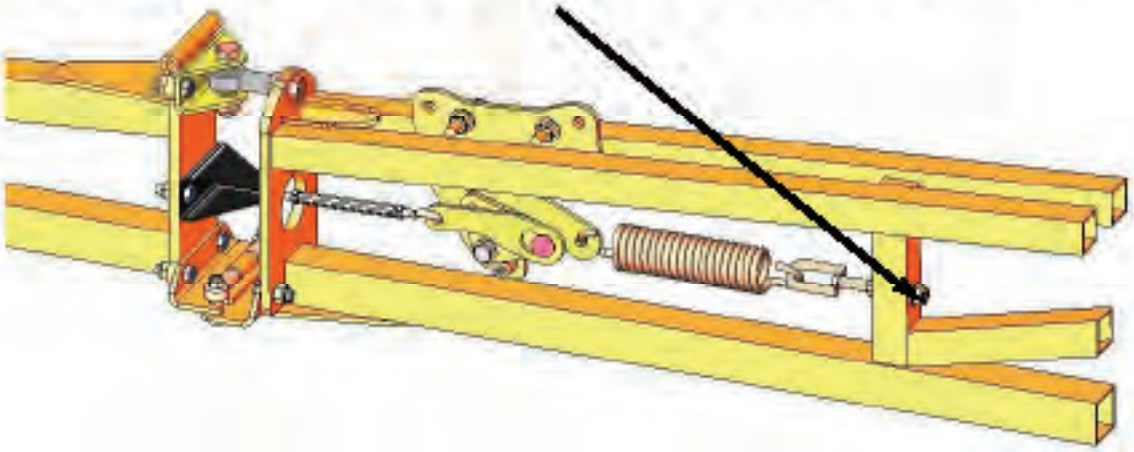


record this measurement. The turn buckle must be adjusted until the difference between the two measurements is 17-18mm. This distance is critical as it determines the force needed to initially break the hinge away. If the distance between the two centres is less than 17mm it will be very hard to break away. If the distance is more than 18mm the hinge will breakaway easily and may become floppy.



B-A=MUST=17mm to 18mm

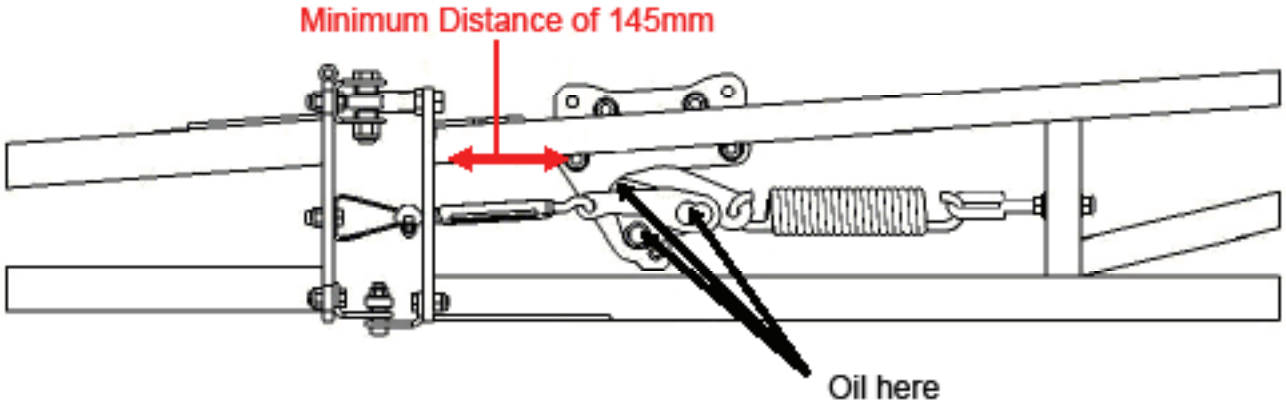
5. Adjust the spring by tightening the eye bolt until a load of 5kg pulling force is required to break the hinge away from the rest position. To check this, connect a spring scale to the very end of the breakaway tip and pull the hinge out of its rest position.



3D BREAKAWAY MAINTENANCE INSTRUCTIONS

1. Two things are critical in ensuring the 3D boom breakaway functions correctly: the vertical measurement shown in step 4 of the initial setup instructions must be between 17mm and 18mm; also of equal importance is the spring tension, adjusted with the eye bolt shown in step 5.
2. Should the eye bolt on the spring reach the limit of its adjustment; and the desired tension has not been reached, the option remains to reposition the mechanism mounting plate closer to the end of the boom. This will allow for more adjustment of the spring tensioning eye bolt.

NOTE:
If the mechanism mounting plate is moved it is important to adjust the turnbuckle so that the vertical measurement shown in step 4 of the initial setup instructions is still 17mm to 18mm.



NOTE:
There is only about 15mm of adjustment available in the turnbuckles; therefore the minimum measurement from the lower u-bolt thread to the inside of the breakaway mounting plate can only be 145mm

- **After repositioning the mechanism mounting plate and adjusting the turnbuckle and spring tension, it is found that the desired breakaway tension has not been reached; the spring will need to be replaced. Contact your local Goldacres dealer for spare parts.**

3. **Finally, to ensure the breakaway functions smoothly and with minimal wear it is important to regularly oil the mechanism at the three pivots, ideally these points should be oiled before each use of the sprayer.**

FILTERS:

Suction filter

Pressure filters

WARNING: Always wear gloves if removing or cleaning filters.

If in-line filters have been fitted to replace nozzle filters, always unfold and lower the boom before attempting to unscrew any filter.

It is essential to maintain all filters and filter screens in good condition. Filter screens that are not regularly cleaned can severely impede liquid flow and delivery pressure. If the screens are in anyway damaged, they can allow foreign material into the pumping system which can result in damage to the pump, solenoids, valves and cause blockages in nozzle tips. Also, if the screens are not properly fitted, air can enter the pumping lines which will reduce pump performance. All filter screens should be cleaned after every spraying operation.

Filter screens are best cleaned with a soft brush in clean water or by compressed air after washing.

WARNING: Read and heed the chemical label regarding protective clothing when cleaning any filter.

To clean the suction filter:

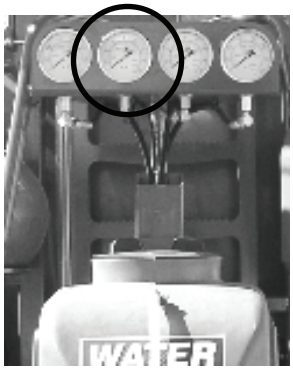
1. Wear gloves and other recommended protective clothing.
2. Ensure that the pump is turned 'OFF' and the pump three-way ball valve is turned 'OFF' to prevent flow to the filter.
3. Carefully unscrew filter nut and remove bowl.
4. Remove screen and clean.
5. Check for damage to screen, bowl, body and o-ring.
6. Place screen back in position.
7. Make sure o-ring is in position for proper seal.
8. Replace bowl and screw nut on.
9. Do not over-tighten nut.

To clean pressure filter:

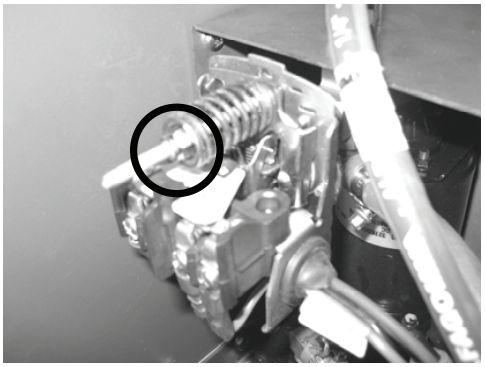
1. Wear gloves and other recommended protective clothing.
2. Ensure that the pump is turned 'OFF' and the pump 3-way ball valve is turned 'OFF' to prevent flow to the filter and pump.
3. Ensure that the supermix agitator ball valve is 'OPEN' (will release any residual pressure)
4. Carefully unscrew filter nut and remove filter bowl.
5. Remove screen and clean.
6. Check for damage to screen, bowl, body and o-ring.
7. Place screen back in position.
8. Make sure o-ring is in position for proper seal.
9. Replace bowl and screw nut on.

AXLES WITH AIRBAG SUSPENSION

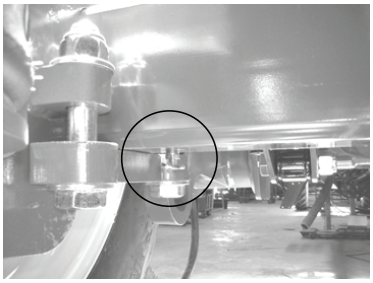
The air bag suspension consists of a 12 volt air compressor, two ride height valves, 2 air bags, shock absorbers, axle (used as air reservoir) and hosing.
The 12 volt compressor is powered up when the ignition is switched on. A 20amp fuse is fitted to the ignition relay box to protect the compressor circuit.



The compressor has a pressure cut out switch fitted to it which cuts the power to the compressor when the axles (reservoir) recommended pressure is achieved. When the pressure in the reservoir drops below 70psi the compressor will start again. The pressure cut out switch can be adjusted by turning the nut at the end of the spring to apply more or less pressure to the contact spring. The recommended maximum pressure to run in the air bag system is **90 psi**. If the compressor runs continually there may be an air leak present. All hoses and fittings must be checked and repaired if necessary.



The filter must be mounted on its side to prevent debris falling down the supply hose when the element is removed.



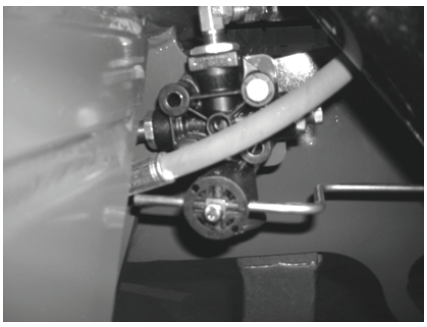
The axle is used as an air reservoir. Condensation is created when air is compressed, for this reason the air bag axle must be drained daily to expel any moisture.

The two ride height valves fitted to the axle allow air to flow in to or out of the air bags. This maintains a set ride height of the tanker as well as providing suspension. As the tanker weight increases, e.g. filling the tank, the ride height valve allows air to flow from the axle reservoir into the air bag, therefore increasing the pressure in the air bag. As the tanker weight decreases, e.g. emptying the tank, the ride height valve allows air to exhaust out of the air bag therefore decreasing air pressure in the air bags. The ride height valves are very important to maintain a smooth ride and to eliminate chassis roll. If the suspension had fixed springs or dampers, the ride of the tanker would be soft and rolling when empty, but hard and rigid when full. By using the ride height valves and air bags, a more stable even ride can be achieved between an empty and full tank.

A correctly functioning GoldAcres air bag system compressor will not run constantly. In normal operating conditions the compressor will cycle at approximately 10 minutes intervals.

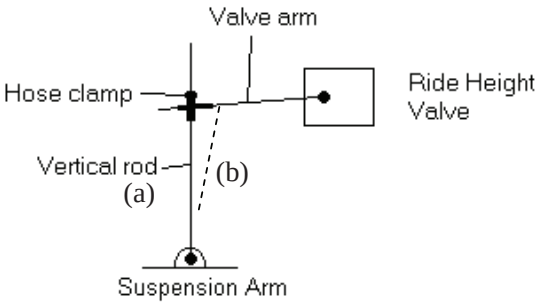
ADJUSTING RIDE HEIGHT VALVES

The ride height valves are used to adjust the air pressure within the air bags to maintain the correct ride height. The ride height valves are located on the suspension arm mounting plates. These must be adjusted to the exact same height on each side to prevent the airbags counteracting each other. If one air bag is higher than the other it will cause the opposite ride height valve to exhaust and air pressure will be lost from the air bag reservoir. This will cause the compressor to run constantly. The air bag height must be checked at regular intervals to maintain the system in good working condition.

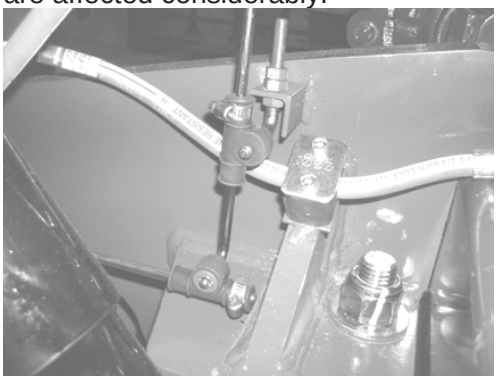


The ride height can be adjusted by loosening the hose clamp attached to the vertical rod on the end of the ride height valve and then moving the valve arm in the required direction.

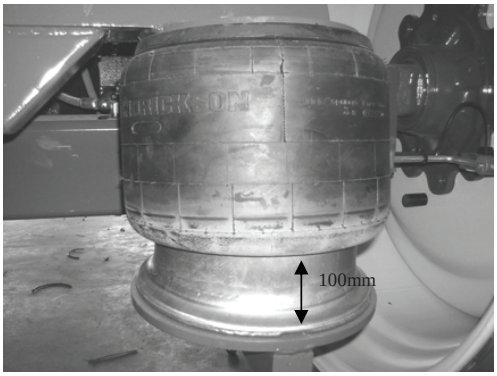
- To raise the machine, this arm should be moved up the vertical rod.
- To lower the machine, move the arm down the vertical rod.



Note: The recommended ride height of the airbags is 100mm from the fully deflated setting. It is also important to keep the Vertical rod (a) positioned vertically. Should the vertical rod lean backwards or forwards such as (b), the ride characteristics of the airbags are affected considerably.

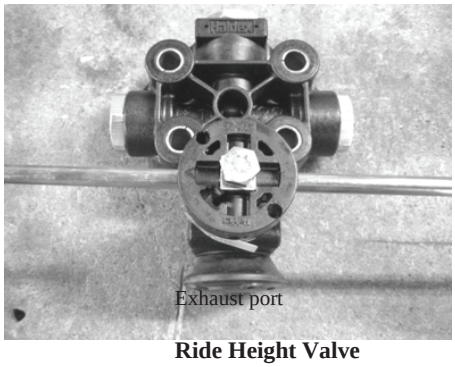


Ride height valve adjuster



100mm from deflated

The ride height valves have a “Dead Band” position on them. This is the position where the valve will sit when no air is being let in to the air bag or out of the air bag. Over time the seals may wear or harden and cause this “Dead Band” to decrease. If the dead band position decreases the ride height valve may leak air out the exhaust port. The air bag height should be changed slightly higher or lower if this eventuates. If the ride height valve continues to leak it must be replaced.

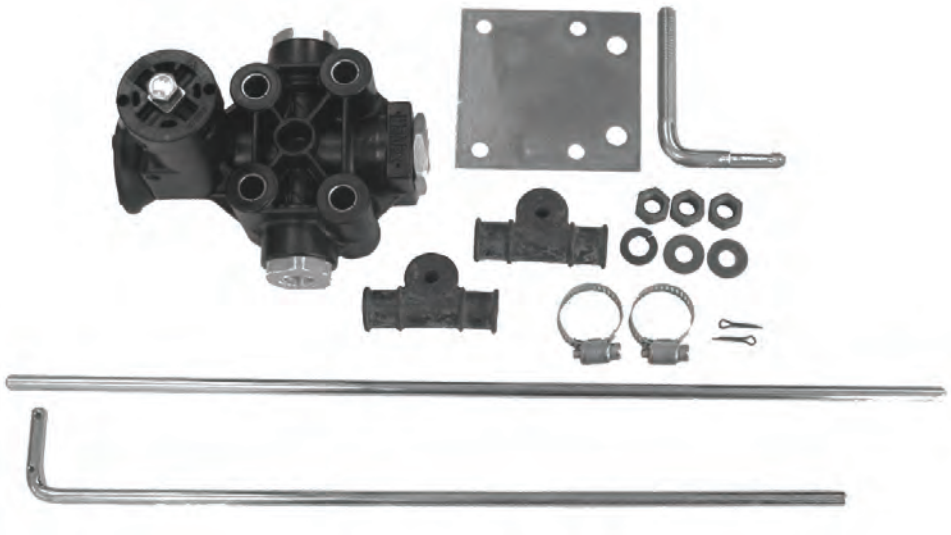


Ride Height Valve

To ensure correct boom alignment it is important that the air bag suspension is level.

GA5010867 - Ride height levelling valve replacement.

Fitting ride height levelling valve to airbag axle



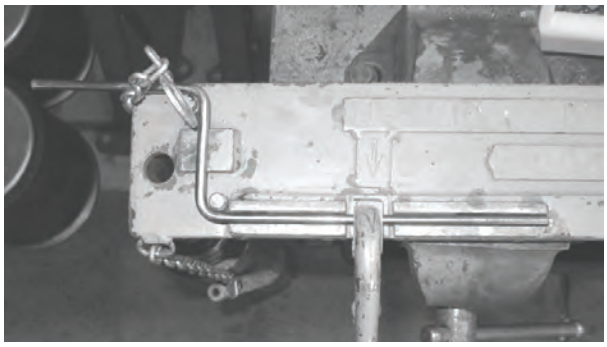
1. Fit the two S49-0404, 90 Deg Elbows to the valve so they are both on about 45° in the direction shown.

Port 1- Always air inlet
Port 21- Supply to Airbag (RH side only)
Port 22- Supply to Airbag (LH side only)

2. Fit the brass plug GA5048770, 1/4 NPT male taper plug

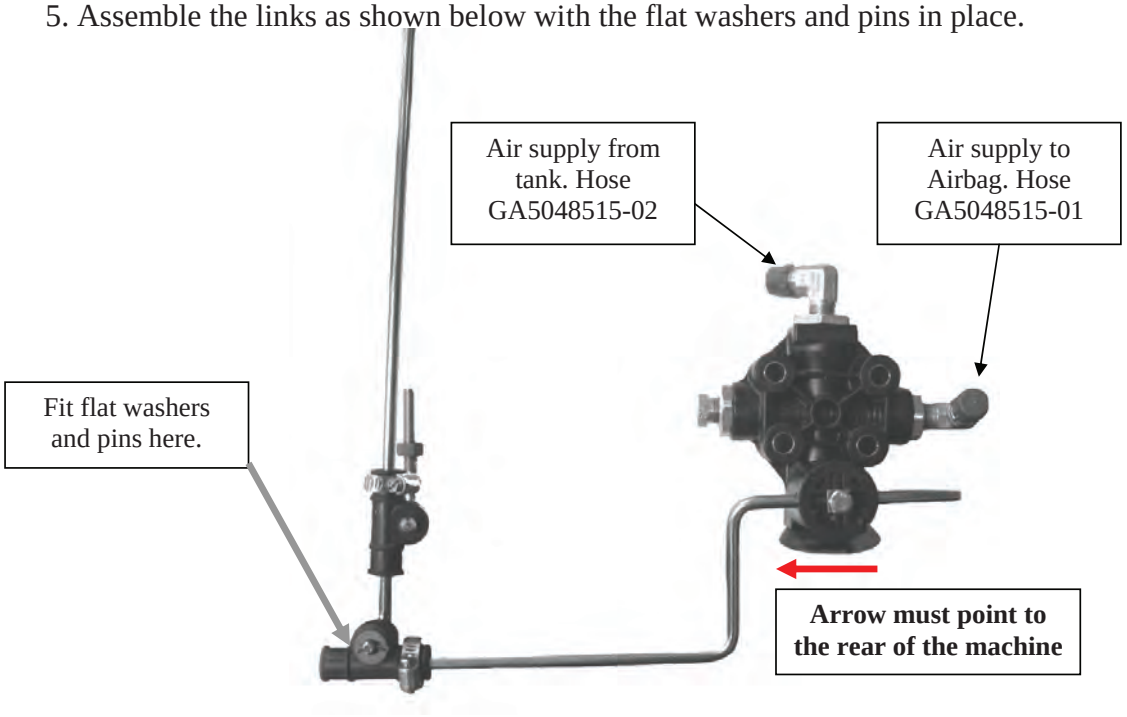
NOTE: There is one valve on each side of an airbag axle so therefore the valves must be assembled as a mirror image of each other.

3. The plain straight link rod must be manually bent as shown below using the Goldacres jig.

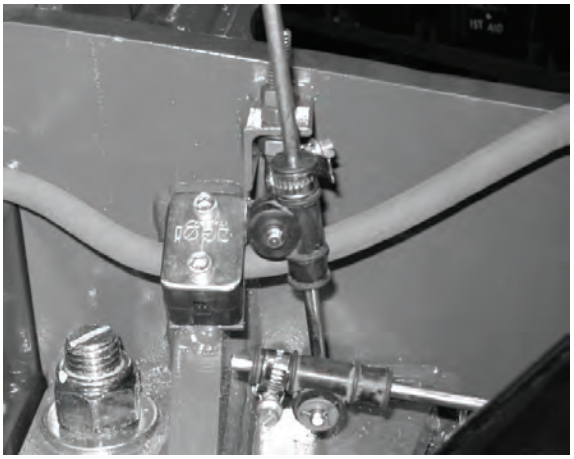


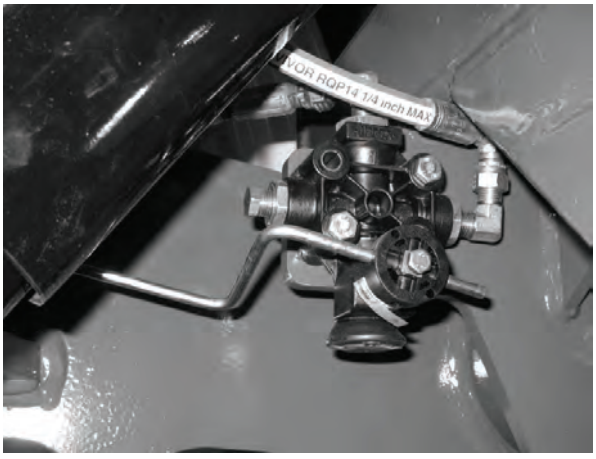
4. When fitting the link rod to the valve the **arrow must be pointing to the rear of the machine** in the direction shown above.

5. Assemble the links as shown below with the flat washers and pins in place.



6. Bolt the valve to the airbag frame using two M8 x 75 bolts and nyloc nuts. Put the links in place and insert the threaded rod through the bracket that is welded to the side of the airbag frame with one nut and the spring washer on the bottom. Lock this in place by screwing the other two nuts on and lock them together.





7. Adjustments may need to be made to the links to make the machine ride height correct and level.

HYDRAULIC CYLINDERS

If the sides of the boom do not fold together so that they become out of line, the hydraulic rams will need to be re-phased.

To do this:

- Open the boom right out and continue to hold the control lever in that position for several seconds until the rams are synchronised. The air bleed cap (as pictured) should also be loosened from time to time to remove air from the system.

- We recommend that periodical re-phasing of the rams is good practice, as this not only ensures that the rams are working in tandem, but that any air that may be trapped in the rams is also forced out of the hydraulic lines.

CHAPTER 10

TROUBLESHOOTING

GENERAL

The following troubleshooting information is provided as a reference when your sprayer is not functioning correctly.

To ensure that you receive the best possible service, it is recommended that you exhaust all applicable troubleshooting solutions shown in this chapter prior to calling your dealer, or Goldacres, for service advice

Parts information and schematics can be found in the parts manual supplied.

DIAPHRAGM PUMP

Problem	Common Causes	Common Solution
Pressure and flow rate are too low	• Excessive bypass on pressure manifold • Supply to pump is restricted • Pump	• Verify console calibration settings. • Check the pressure relief valve setting on pressure manifold. • Close the ball valve labelled bypass, if the pressure increases on the pump gauge there is a problem with the control valve • Measure the flow per minute coming out of one nozzle and check the nozzle chart for the correnspondingflow. • Check the fast close valve is rotating the full 90 degrees when the boom valves are switched off. • Suctton filter may be blocked • Check tank sump and suction line blockages • Check suction line for air leaks • Check pump speed • Check oil for colour change. If the oil appears milky, a diaphragm will be damaged and needs to be replaced. • Check valves in pump.
Pressure and flow rate are too high	Bypass line is restricted or blocked..	• Verify console calibration settings. • Check for restriction in bypass line. • Check pump speed is not too fast.
The pressure on my gauge is higher than the nozzle flow indicates	• Blocked filters of nozzles • Flow loss due to resistance in lines, valves and filters.	• Check and clean all pressure and nozzle filters • Recalibrate console to allow for pressure loss
The flow rate is correct but my pressure is too low or high.	Nozzles	Check nozzle chart for correct nozzle size.
Pressure fluctuation	• Air leak on suction side of pump • Incorrect pump speed • Faulty pump valves	• Check suction pump for air leaks • Adjust pump speed so it is between 400 -540rpm • Replace pump valves
Pump pressure pulsating	• Air accumulator pressure is incorrect • Air accumulator diaphragm has a leak • Incorrect pump speed • Air leak on suction side of pump	• Reset the pressure in air accumulator • Replace air accumulator diaphragm • Adjust pump speed so it is between 400 - 540rpm • Check pump suction for air leaks

Problem	Common Causes	Common Solution
Pump oil is becoming milky	• Cracked diaphragm	• Replace all diaphragms
Pump oil is changing colour and becoming black or dark grey	• Pump is overheating	• Check pump speed and oil level
Pump is noisy	• Low oil level • Air accumulator pressure set incorrectly • Insufficient lubrication on PTO shaft • Damaged pump valves • Pump suction line has air leak or is restricted	• Refill or replace oil • Recharge air accumulator to specified pressure • Grease PTO shaft • Replace all bearings • Replace pump valves • Clean suction filter and check for leaks in suction lines
Pump housing or mountings cracked	• PTO shaft not sliding freely or incorrect length • Extremely cold weather can cause liquid in the pump to freeze	• Check PTO shaft length and lubricate • Check for ice in the pump and let defrost if required
Damaged universal joint	• The shaft is too long • PTO shaft is inadequately lubricated	• Shorten shaft • Lubricate PTO shaft and uni joints
PTO shaft bent or vibrating excessively	• PTO shaft is too short	• Replace PTO shaft

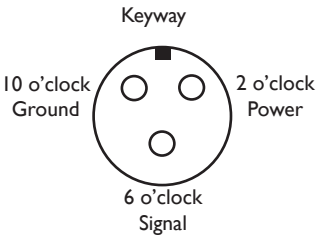
FLOWMETER & CONTROLLER

Problem	Common Causes	Common Solution
Application rate is inaccurate, unstable or zero	• Incorrect console calibration • Inconsistent wheel speed reading • Inconsistent spraying volume • Faulty control valve. Check by using manual inc/dec flow control	• Recalibrate console • Test wheel speed sensor • Replace flow meter • Replace control valve
Speed sensor display is inaccurate, unstable or zero	Incorrect speed calibration Corroded wheel speed sensor cable pins Wheel speed sensor not set up correctly Faulty cable	Recalibrate console speed Clean cable pins Ensure that wheel speed magnets are on wheel and that clearance is 12-19mm Test cable as per instructions following

Instructions for testing speed sensor cable

1. Change speed cal number to 1000 with the [Speed Cal] key
2. Press [distance] key
3. With a jumper wire (ie: paper clip) short between 6 o'clock and 10 o'clock sockets with a "short" then "no short" motion. Each time contact is made the [distance] total should move up in increments of 1 or more.
4. If the distance does not count up, perform test at the next connector closer to the console. If this next test works, the previous section of cable must be faulty and should be replaced.
5. Perform above voltage checks
6. Change [speed cal] number back to previous number

NOTE: Speed sensor is not repairable and will need to be replaced if faulty.



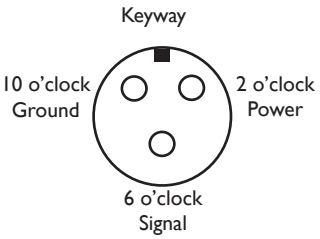
Voltage readings

10 o'clock to 6 o'clock (+5v DC)

10 o'clock to 2 o'clock (+5v DC)

Instructions for testing meter cal cable

1. Change meter cal number to 1 with the [Meter Cal] key
2. Press [total volume] key and place boom switches ON
3. With a jumper wire (ie: paper clip) short between 6 o'clock and 10 o'clock sockets with a "short" then "no short" motion. Each time contact is made the [total volume] should move up in increments of 1 or more.
4. If total volume does not count up, perform test at the next connector closer to the console. If this next test works, the previous section of cable must be faulty and should be replaced.
5. Perform above voltage checks
6. Change [meter cal] number back to previous number



Voltage readings

10 o'clock to 6 o'clock (+5v DC)

10 o'clock to 2 o'clock (+5v DC)

Problem	Common Causes	Common Solution
Volume display is inaccurate, unstable, zero or not changing	• Meter calibration is incorrect • Flowmeter cable pins are corroded • Flowmeter is pointing the wrong way • Faulty cable	• Reset meter calibration • Replace flowmeter plugs & pins • Disconnect flowmeter and reinstall in the correct orientation • Manually test the cable
Flowmeter appears not to be working	• Flowmeter is seized or blocked	• Remove and clean any foreign materials so the turbine spins freely
If the flowmeter fails to give accurate readings, the following procedures should occur: • Adjust the spraying pressure by putting the flow control switch into manual and using the increase decrease switch to adjust to the desired pressure as shown on the pressure gauge on the sprayer • Drive the sprayer at a constant speed in order to apply the required application volume as determined by the nozzle selection chart • The sprayer should then be operated to empty the tank. Once the sprayer is empty of chemical, partially fill the tank with fresh water so that test can be performed in order to correct the problem. Repair or replace the flowmeter as soon as possible.		
Application rate or pressure will not alter	• Faulty control valve	• Test valve manually and replace if required
Control valve has failed	• Replace control valve	Temporary solutions: *Dual line plumbing:* Remove the motor from the 3 way ball valve and manually adjust the flow by turning the shaft with a spanner. *Single line plumbing:* Close the bypass line ball valve in front of the control valve. Adjust the ball valve in front of the electric control valve until the desired spraying pressure is shown on the pressure gauge. If the desired spraying pressure is not able to be acheived with the ball valve, adjust the relief valve setting in order to acheive the desired pressure.
Console is not working	• No power supply	• Check loom connection at the back of the console • Check connection to battery terminals • Check the fuse in the back of the console is not blown • With a multi meter, check the voltage potential across pins 1 and 16 on the 16 pin plug going into the console (should be at least 12v)

Problem	Common Causes	Common Solution

If the Raven console fails so that it is not able to control the boom valves, and control valve, the following procedures should be adhered to:

1. Disconnect console from console cable.
2. Disconnect console cable from power source (i.e. battery).
3. Remove the plunger and spring from the solenoids. (This will open the boom valves)

To start and stop spraying through the nozzles, start and stop the pump.

NOTE: Care should be taken because there is no agitation while the nozzles are not spraying.

For base model sprayers:

- Adjust the manual pressure relief valve to alter the spraying pressure to the desired pressure as shown by the pressure gauge on the sprayer. If the desired spraying pressure is not able to be achieved, alter the pressure relief valve setting so as to achieve the desired pressure (i.e. alter the adjusting stem).

For sprayers fitted with a dual boom:

- Remove electric motor from three way fast close valve, and manually rotate valve until desired spraying pressure is achieved.
- Drive the sprayer at a constant speed (as measured by the tractor) in order to apply the required application volume as determined by the nozzle selection chart.

The sprayer should then be able to be operated in order to empty the tank. Once the sprayer is empty of chemical, partially fill the tank with fresh water (no chemical) so that testing can be performed in order to correct the problem. Repair or replace the console as soon as possible.

CHEM PROBE & TRANSCAL

Problem	Common Causes	Common Solution
Transcal is not working or is working too slow	• Air leak in the vacuum system • The volume of water supplied to the venture probe is not sufficient	• Check all hose clamps and fittings are tight • Check there are no kinked hoses and the water pressure is about 100psi

To isolate the area of possible air leak:

Step 1: First check the operation of the chemical probe only. That is by-pass the Transcal tank. If this will transfer water at a minimum of 30lt/min then this part of the system is okay.

If not check for air leaks at:

- Cam lever fitting at the probe.
- Hose fittings.
- Venturi – the venturi can suck air (less vacuum) where the black drop-pipe connects to the orange venturi.
- The venturi may also suck air where the 'lay flat' hose joins the bottom of the black PVC drop pipe.

Step 2: Check Transcal tank. If the probe is working successfully but the Transcal tank system won't work then the air leak areas to check are:

- The Tank lid. This lid may tighten against the metal bracket above the tank and not the tank itself. Also the top of the tank needs to be clean and smooth for the lid to seal. Also check the lid for cracks and condition of the seal.
- Fitting at the base of the Transcal tank.
- Any hoses and connectors.

Step 3: If probe works correctly and Transcal tank works correctly when using suction probe but envirodrum will not operate, check for air leaks in envirodrum fitting (this must be thoroughly cleaned after each use) and check interior pipes in the envirodrum for air leaks or damage.

Problem	Common Causes	Common Solution
IN SUMMARY: First: Check the flow of water into venturi. Then: 1. Check the probe only. 2. Check the probe and Transcal. 3. Check Transcal and envirodrum section. • Tests must be done with water because the speed of the transfer is affected by the increased viscosity of the chemical. • The old foot valve at the bottom of the drop pipe caused some problems, and this has been replaced by 'lay flat' tube on all new sprayers. GoldAcres can supply a service kit to retro-fit old sprayers to the new 'lay flat' tube. • When fitting lay flat do not distort the drop pipe when tightening clamp or an air leak can develop. It will not be possible to fit the back nut to the venturi when lay flat is fitted. Do not remove drop pipe from venturi except for resealing.		
The Transcal tank has deformed and sucked in.	Residual vacuum left in tank when it is not in use. This is especially important when spraying in warm weather or when the sprayer is parked overnight.	When use of the Transcal is complete, make sure the venturi probe tap is turned off and let the tank vent.
The sight tube on the Transcal is not giving a true indication of the tank level.		Ensure the tap on the Probe or Envirodrum coupler is turned off before evaluating the tank level.

INDUCTION HOPPER

Problem	Common Causes	Common Solution
Induction hopper is not performing as well as it should	• Insufficient flow to venturi in the hopper bottom • Air leaks on induction system	• Check the pressure supplied to the hopper bottom about is 400KPa (58psi) • Check all hoses, clamps, and cam lever fittings are sealed

EXACTA FOAM MARKER

Problem	Common Causes	Common Solution
There is insufficient or poor quality foam on one side only	• Insufficient air or water flow at the foam generator • Foam generator could be blocked • Air diverter solenoid could be blocked	• Compare to the other side to determine if the solenoids are working properly. • Disassemble foam generator and clean out. • Remove and clean air diverter solenoid
There is insufficient or poor quality foam on both sides	• Dirty or hard water • Stale foam concentrate • Insufficient power supply to air compressor • Insufficient air flow from compressor • Air or water hose blocked • Filter under foam tank blocked • Solenoids not opening or closing • Foam generator not performing • Needle valve settings are incorrect • Tank contents may be contaminated	• Drain water and replace with clean, soft water • Drain and refill with fresh concentrate • Check power supply to compressor. Should be minimum 12V to solenoids and all connectors • Check and/or replace compressor flapper valves and clean compressor filter • Check all hoses for kinks and blockages • Clean filter screen • Check diaphragm and replace if necessary • Check and clean filter screen in foam generator • Reset if required • Drain and refill tanks

DELTA BOOM

Problem	Common Causes	Common Solution
Inner and outer wing are not inline with each other when the boom is unfolded	• Boom cables are not adjusted correctly	• Adjust boom cables to realign booms
Booms will not fully fold to the boom rests	• Insufficient lubrication • Fold cylinder mounts have moved	• Lubricate all boom pivots • Adjust fold cylinder mounts
Boom unfold unevenly	Air trapped in the phasing cylinders	Unfold booms completely and hold hydraulic lever for a few seconds. This will purge any air out of the phasing cylinder
Outer boom does not line up with the inner wing when unfolded		Fold the boom out and note the position the outer boom is in. Fold the boom in to transport position and note position outer boom is in. Follow the table below to adjust boom so it sits level in the out (work) position and to have the bottom chords sitting parallel in the folded (transport) position.
Booms are showing signs of bending components and welds cracking	• Folding or unfolding of booms is too fast • Folding or unfolding of booms while the sprayer is still moving • Tilt operation	• Reduce the hydraulic flow to the folding cylinders • Do not fold or unfold the boom while the sprayer is still moving • Tilt operation should be kept to a minimum. If the tilt operation is too fast, reduce the oil flow.
Booms are showing signs of bending components and welds cracking	• Folding or unfolding of booms is too fast • Folding or unfolding of booms while the sprayer is still moving • Tilt operation	• Reduce the hydraulic flow to the folding cylinders • Do not fold or unfold the boom while the sprayer is still moving • Tilt operation should be kept to a minimum. If the tilt operation is too fast, reduce the oil flow.

TANKS, CHASSIS & WHEELS

Problem	Common Causes	Common Solution
The drawbar of the sprayer has become noisy and loose	• Warn or missing plastic insert in towing eye	• Replace plastic insert.

OPTIONAL EQUIPMENT SUPPLEMENTS

CHEMICAL INDUCTION HOPPER 40lt

GENERAL

The Chemical Induction Hopper is an alternative method of transferring chemical into the main spray tank. The hopper can be lowered to a more convenient height for adding chemicals. The chemical can either be in liquid form or granular form and once in the hopper the chemical can then be easily transferred into the main spray tank. The hopper facilitates drum rinsing with fresh water and the hopper itself can be rinsed and all rinsate then transferred into the tank.

The hopper transfers the chemical via venturi effect. Water from the main spray tank is pumped under the bottom of the hopper where it passes through a venturi fitting under the hopper. This causes a suction effect and when the bottom of the hopper is open (via the hopper tank valve) the tank contents are drawn into the flow from the pump passing under the hopper and then transferred into the middle of the main spray tank. This eliminates chemical attack resulting from high concentrations of chemical coming into contact with spray components.

NOTE: The level indicator should be used as a guide only.

OVERVIEW

Reference Number	Function
1	Drum rinse nozzle
2	Tank rinse nozzle
3	Level indicator 40L
4	Drain tap
5	Hopper tank ball valve
6	Drum rinse nozzle

OPERATION

To operate the induction hopper:

1. Add at least 500 litres of clean water to the main spray tank. Initially there needs to be a sufficient amount of water in the tank in order for the pump delivery to create the venturi effect via the venturi fitting. This will also ensure that agitation takes place when the remaining water is added.
2. Lower the hopper for convenience. (Check that the delivery hose to the hopper is not restricted or kinked).
3. Ensure that the red handle on the pump three-way ball valve is pointing towards the main tank sump.
4. Open the induction hopper ball valve and (if required) the supermix agitator ball valve.
5. Ensure the bypass line ball valve and the chemical probe ball valves are closed.
6. Operate the pump at the lowest speed necessary to generate at least 58 psi delivery pressure (as displayed on the sprayer pressure gauge). Do not run faster than 540 RPM.

   NOTE: The higher the pump delivery pressure, the greater the venturi suction and the quicker the hopper will transfer the chemical. The delivery pressure should not exceed 100 psi as determined by the pressure relief valve setting.

7. The wash down hose is also useful for ensuring all chemical is clear of the hopper (only available when fresh water coming into the fill station)
8. Put the required amount of chemical into the hopper (liquid or granular). Wear the necessary protective clothing and use the required safety equipment to avoid exposure to chemicals.
9. Open the hopper tank ball valve at the bottom of the hopper by turning the yellow handle up. The chemical should be now transferring to the main spray tank.
10. Rinse all chemical drums and the hopper as per the rinsing instructions.

When finished using the hopper:

- Close the hopper tank ball valve at the bottom of the hopper by turning the yellow handle so that it is horizontal.
- Turn the bypass valve 'ON'.
- Turn the induction hopper valve 'OFF'.
- Ensure that the agitator valve is 'ON'. The sprayer should always be agitating until spraying begins.
- Raise the hopper to its transport position and replace the retaining pin in the mechanism.

VORTEX CHEMICAL INDUCTION HOPPER

GENERAL

The Chemical Induction Hopper is an alternative method of transferring chemical into the main spray tank. The hopper can be lowered to a more convenient height for adding chemicals. The chemical can either be in liquid form or granular form and once in the hopper the chemical can then be easily transferred into the main spray tank. The hopper facilitates drum rinsing with fresh water and the hopper itself can be rinsed and all rinsate then transferred into the tank.

The hopper transfers the chemical via venturi effect. Water from the main spray tank is pumped under the bottom of the hopper where it passes through a venturi fitting under the hopper. This causes a suction effect and when the bottom of the hopper is open (via the hopper tank valve) the tank contents are drawn into the flow from the pump passing under the hopper and then transferred into the middle of the main spray tank. This eliminates chemical attack resulting from high concentrations of chemical coming into contact with spray components.

NOTE: The level indicator should be used as a guide only.

OVERVIEW

Reference Number	Function
1	Rinse tap
2	Tank rinse nozzle
3	Level indicator 60L
4	Drain tap
5	Hopper tank ball valve
6	Drum rinse nozzle
7	Fresh water mixing valve
8	Anti aeration device

OPERATION

To operate the induction hopper:

1. Add at least 500 litres of clean water to the main spray tank. Initially there needs to be a sufficient amount of water in the tank in order for the pump delivery to create the venturi effect via the venturi fitting. This will also ensure that agitation takes place when the remaining water is added.
2. Lower the hopper for convenience. (Check that the delivery hose to the hopper is not restricted or kinked).
3. Ensure that the red handle on the suction selection three-way ball valve is pointing towards the main tank sump.
4. Open the induction hopper flip valve and (if required) the supermix agitator ball valve.
5. Ensure the bypass line ball valve and the chemical probe ball valves are closed.
6. Operate the pump at the lowest speed necessary to generate at least 58 psi delivery pressure (as displayed on the sprayer pressure gauge). Do not run faster than 540 RPM.

   NOTE: The higher the pump delivery pressure, the greater the venturi suction and the quicker the hopper will transfer the chemical. The delivery pressure should not exceed 100 psi as determined by the pressure relief valve setting.

7. The wash down hose is also useful for ensuring all chemical is clear of the hopper (only available when fresh water coming into the fill station)
8. Put the required amount of chemical into the hopper (liquid or granular). Wear the necessary protective clothing and use the required safety equipment to avoid exposure to chemicals.
9. Open the hopper tank ball valve at the bottom of the hopper by turning the yellow handle up. The chemical should be now transferring to the main spray tank.
10. Rinse all chemical drums and the hopper as per the rinsing instructions.

When finished using the hopper:

- Close the hopper tank ball valve at the bottom of the hopper by turning the yellow handle so that it is horizontal.
- Turn the bypass valve 'ON'.
- Turn the induction hopper flip valve 'OFF'.
- Ensure that the agitator valve is 'ON'. The sprayer should always be agitating until spraying begins.
- Raise the hopper to its transport position and replace the retaining pin in the mechanism.

RINSING

To rinse the Induction Hopper and chemical drums with fresh water from the external water delivery station:

1. Lower the hopper. (Check that the delivery hose to the hopper is not restricted or kinked).
2. Make sure that all valves on the EZ control external water delivery station are 'OFF'.
3. Make sure that the Hopper Rinse valve on the top of the hopper is 'OFF'.
4. Connect the fresh water fill hose to the quick-fill coupling.
5. Operate the fresh water pumping system between 72 and 100 psi.
6. Turn the Induction Hopper valve on the Pressure delivery station 'ON'.
7. Open the hopper tank valve at the bottom of the hopper by turning the yellow handle 'UP'.
8. Ensure that the hopper drain tap, also located at the bottom of the hopper, remains 'CLOSED'.
9. To rinse a drum, push the drum over the rinsing nozzle located in the top of the hopper.
10. To rinse the hopper, turn the Hopper Rinse valve on the side of the hopper 'ON'. Close this valve when the hopper has been rinsed.

When the hopper is empty:

- Remove any chemical drums that have been rinsed from the hopper.
- Turn the hopper tank valve at the bottom of the hopper 'OFF' by turning the yellow handle 'UP'.
- Turn the Induction hopper valve on the EZ control Pressure Delivery station 'OFF'.

Drain the hopper of any remaining liquid using the hopper drain tap at the bottom of the hopper.

The hopper can be rinsed and the rinsate emptied through the hopper drain ball valve rather than transferred into the main spray tank.

To do this:

1. Ensure the fresh water filling supply pump system is operating.
2. Open the hopper rinse valve on the top of the hopper.
3. 'OPEN' the hopper tank ball valve at the bottom of the hopper by turning up the yellow handle so that it is vertical, removing the rinsate from the hopper.
4. Open the hopper drain valve.

CAUTION: Do not have the sprayer pump operating.

NOTE:

- Take proper safety precautions to avoid any contact with rinsate when draining, as it may contain chemical residue.
- Be careful as to where the rinsate is being deposited as it may contain chemical residue.
- This procedure will not rinse the hose from the bottom of the hopper to the main tank.

CHEMICAL PROBE

GENERAL

A simple method of transferring chemical into the sprayer tank is via the chemical probe. The chemical probe enables the chemicals to be transferred with minimal exposure to the operator. The probe is used in conjunction with the Venturi filler (located on the top of the tank) which creates the required suction on the pressure side of the pump.

The viscosity of the chemical being transferred will affect the rate of suction flow and hence the amount of time required to transfer the chemical. Water and air have low viscosities whereas molasses is an example of a highly viscous liquid. The higher the viscosity of the liquid, the longer it takes to transfer via the chemical probe. If the viscosity of a chemical is such that it takes too long to transfer, dilute the chemical with water, which will reduce the viscosity, and then transfer the solution.

The chemical should be transferred after about 20% to 50% of the required water quantity has been added to the sprayer tank. This will ensure that agitation takes place when the remaining water is added.

The end of the probe is not flat so that the probe, when placed flat against the bottom of the container, will not restrict the flow of chemical.

OVERVIEW

Chemical Probe

OPERATION

WARNING: It is critical that the chemical probe venturi continues to operate for a minimum of 30 seconds following use. This will ensure that no chemical is left in the line prior to the probe being disconnected.

To operate the chemical probe:

1. Add 20 percent of the tank's volume of clean water to the main spray tank. Initially there needs to be a sufficient amount of water in the tank in order for the pump delivery to create the venturi effect via the venturi filler.
2. Ensure that the red handle on the pump 3-way valve is pointing towards the suction hose coming from the main tank sump.
3. Connect probe via cam lever fitting.
4. 'OPEN' the venturi and agitator valves.
5. Close the bypass and induction hopper valves.
6. Operate the pump at the lowest speed necessary to generate at least 85 psi delivery pressure (as displayed on the sprayer pressure gauge). Do not run faster than 540 RPM. The higher the pump delivery pressure, the greater the venturi suction and the quicker the probe will transfer the chemical. The delivery pressure should not exceed 100 psi as determined by the pressure relief valve setting.
7. Place probe in chemical.
8. 'OPEN' the valve on the probe.
9. The chemical should be now transferring to the sprayer tank via the venturi filler.
10. When all of the chemical has been transferred, rinse the chemical container with water and transfer the rinsate to the sprayer tank via the probe. This should ensure that the entire chemical is transferred and that the probe, venturi filler and connecting suction hose are cleaned.
11. When finished, 'CLOSE' the valve on the probe and the venturi valve, 'OPEN' the bypass valve, keep the agitator valve 'OPEN' and disconnect the probe. Once chemical has been transferred into the main spray tank the sprayer should always be agitating until spraying begins.

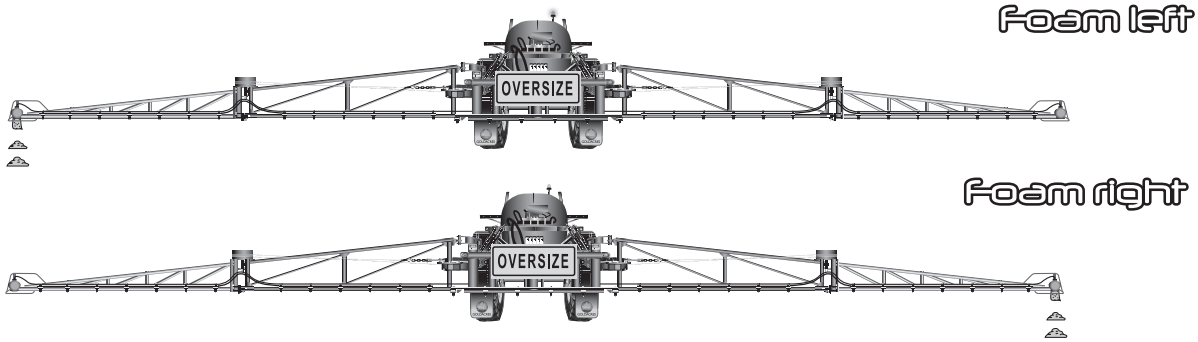
EXACTA FOAM MARKER

GENERAL

Exacta Foam WITH direct injection
The "Exacta" foam marking system with Direct Injection features the foam concentrate and water being contained in separate tanks.

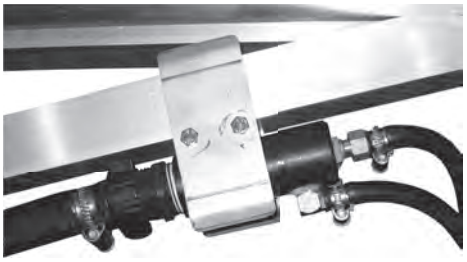
With this system the foam concentrate is injected directly into the water line which is then mixed with air in the foam generator along the boom. The generated foam is then forced to the accumulator at the end of the boom.

Both the foam concentrate tank and foam water tank are pressurised by back pressure (typically around 70 kPa). A control valve (needle valve) in the foam concentrate line regulates the amount of concentrate used. A control valve (needle valve) is used to vary the amount of water being delivered which enables variability in the foam composition to suit appropriate spraying conditions.
The system is controlled electrically via the foam control console from the cabin. The compressor/diverter unit is mounted on the sprayer and thus the compressor noise is not a problem for the operator.



FOAM GENERATOR

The foam generator comprises an air entry port in the end, which passes air through the generator aiding the delivery of the liquid in a side port. The air shears the liquid and both fluids then pass through a screen where the foam is formed. The loose foam is then compressed in the 19mm hose before emerging in the accumulator at the end of the line. The bore of the air entry port has been precisely drilled to maximize air pressure in the system as well as maximize the venturi effect on the liquid entry point. These holes must not be altered.



The foam line from the foam generator to the accumulator must be 19mm (3/4") diameter hose and four metres long. This gives the foam time to pack to a fine, light consistency.

FOAM ACCUMULATOR

The foam accumulator has been designed to optimize the size of the foam blob, thus increasing its visibility.

COMPRESSOR

The compressor is mounted in a sealed box on the right hand rinse tank frame.

COMPRESSOR AIR FILTER

The compressor air filter is located on the top of the sealed box

If the compressor filter element is not cleaned and becomes blocked then damage may result to the compressor through overheating.

FOAM CONCENTRATE

It is most important that Goldacres foam marker concentrate is used exclusively in Goldacres foam marking systems. Problems associated with other brands of concentrate can lead to inadequate quantities of foam being produced and poor quality foam being generated.

With the Exacta Direct Injection system, our foam concentrate is specially formulated to minimise gumming up of valves and lines and its viscosity is more temperature stable than other brands.

Please ensure you have good stocks of concentrate on hand at all times.

NOTE: The addition of alcohol based dyes to colour foam can result in much less foam being produced than with standard white foam.

USING THE FOAM MARKER

STANDARD NEEDLE VALVE SETTINGS

WATER:
Booms 24 metres and larger:
Open the water valve 12 turns.

CONCENTRATE:
Booms 24 metres and larger:
Open the concentrate valve up to 4 turns.

Start with half this amount and open the concentrate in only quarter turn intervals until the correct foam consistency is reached. Allow up to 5 minutes for each needle adjustment to take effect.

To successfully use the exacta foam marking system, it is essential to observe the following points:

1. Make sure that initially all ball valves on the external water delivery station are turned 'OFF'.
2. If filling of the main spray tank is not required at the same time, turn the red handle on the fill ball valve 'OFF'.
3. Connect the fresh water fill hose to the quick-fill coupling.
4. Operate the fresh water pumping system (make sure pressure does not exceed 200 kPa).
5. 'OPEN' the 'foam marker breather' valve.
6. 'OPEN' the 'foam marker fill' valve. Fill the exacta foam water tank with only clean soft water.
7. Continue to bottom-fill the foam tank until the desired amount has been transferred.
8. When the desired amount of water has been transferred to the foam tank, turn the 'foam marker fill' valve 'OFF'.
9. Turn the 'foam marker breather' valve 'CLOSED'.
10. Turn the fresh water pumping system off.
11. Fill the concentrate tank with only GoldAcres foam concentrate.
12. All adjustments of the control valve should be within plus or minus ½ a turn or similar.
13. Always allow sufficient time for the altered foam to come out of the accumulator.
14. If the foam is too runny, close the water valve slightly, if the foam is stiff and has air holes, open the water valve slightly. Loose foam is desirable when spraying in crops where the foam needs to sit on top of the crop in order to be visible. Tight foam is desirable when the foam needs to be visible for an extended period of time and when the spraying conditions are relatively hot and windy.
15. Regularly inspect the foam marker lines, to ensure they are free of foreign matter.
16. Periodically remove and clean the filter. The foam marker filter is located underneath the foam marker tank. To remove the filter, ensure the appropriate protective clothing is being worn. Close the foam tank ball valve, loosen the filter bowl, remove the filter and clean. Replace the filter and tighten the filter bowl.
17. Periodically check the condition of the one-way valve in the compressor/diverter unit.

WARNING: Ensure that the foam marker breather is 'OPEN' or the lid of the foam marker water tank may be expelled.

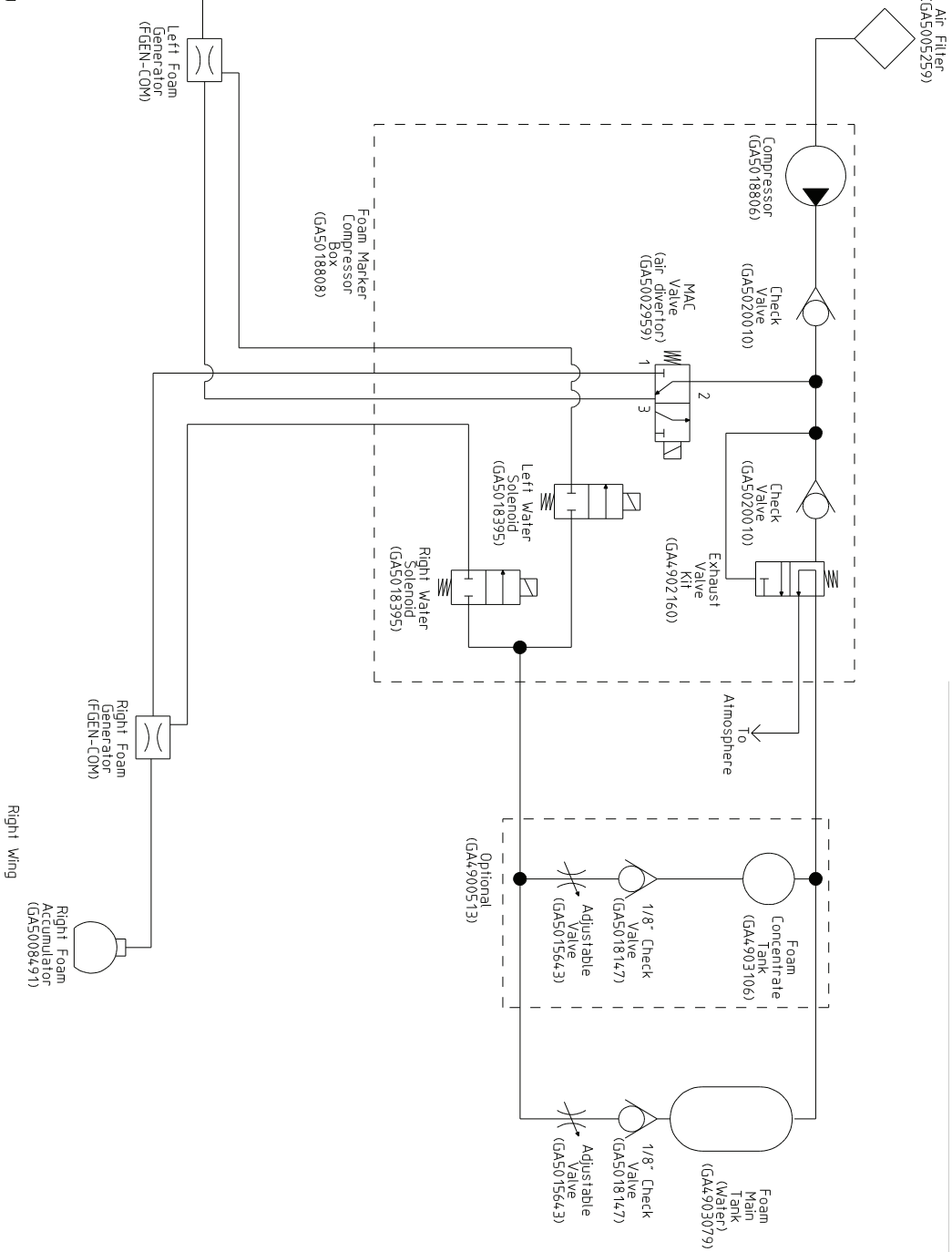
NOTE: If either the water tank or the foam concentrate tank empties, it's possible that flow from the other tank (foam water or foam concentrate) can siphon into the empty tank. To prevent this, as soon as either the foam water tank or foam concentrate tank empties, shut the ball valve at the bottom of both tanks. Re-fill the tanks prior to the next spraying operation.

Bleeding the concentrate line when the foam concentrate tank empties:
If the foam concentrate tank empties, it will take a few minutes for the concentrate to feed through the lines to the compressor/ diverter unit. To reduce this time, the concentrate can be bled to minimize water wastage.

To bleed the foam concentrate:

1. Close the concentrate needle valve ½ turn at a time and record the number of turns until the needle valve is closed.
2. Open the needle valve several turns more than the previous setting.
3. When the concentrate comes through, fully close the concentrate needle valve, and then re-open the valve to the setting recorded from step 1).

EXACTA FOAM MARKER SCHEMATIC



TRANSCAL

GENERAL

The Transcal volumetric measuring system is designed to provide a measuring facility without the need for an auxiliary pump and flowmeter. When used in conjunction with the venturi chemical probe, or micromatic fitting, the required volume of chemical can be transferred out of the chemical container into the Transcal tank.

The chemical can then be transferred into the main spray tank via venturi suction by simply turning a valve and there is no undiluted chemical coming into contact with any pump or complex components. The system can be used with most types of chemical containers (including the envirodrum closed transfer system).

NOTE: The calibration markings on the Transcal tank should be used as a guide only. The Transcal system requires a vacuum to operate. Any air leaks in the tank lid, hoses or cam lever seals will affect the performance or cause total failure to operate.

WARNING: Do not fill Transcal tank past the 45 litre mark.

WARNING: Do not use the Transcal tank to store chemicals when spraying.

OVERVIEW

MEASURING CHEMICAL INTO THE TRANSCAL TANK

1. Remove the cam lever plug and connect the chemical probe line or the Micromatic coupler to the cam lever fitting.
2. Ensure that the yellow T-handle on the Transcal station is aligned to 'FILL'.
3. Add approximately 10% of the tanks volume of clean water to the main spray tank.
4. Ensure that the red handle on the pump 3-way valve is pointing towards the suction hose coming from the main tank sump.
5. 'OPEN' the agitator and venturi valves on the pressure delivery station.
6. 'CLOSE' the bypass and induction hopper valves on the pressure delivery station.
7. 'OPEN' the chemical probe valve at the Transcal station.
8. Operate the pump at the lowest speed necessary to generate 100 psi delivery pressure (as displayed on the sprayer pressure gauge). Do not run faster than 540 RPM. The higher the pump delivery pressure, the greater the venturi suction and the quicker the probe will transfer the chemical. The delivery pressure should not exceed 100 psi as determined by the pressure relief valve setting.
9. Place the probe in the chemical drum and open the valve on the chemical probe or connect the Micromatic fitting to the outlet on the envirodrum and push the handle down so that it locks into position and opens the valve on the envirodrum.
10. The chemical should now be transferring into the Transcal tank.
11. When the required amount of chemical has been transferred, 'CLOSE' the valve on the chemical probe. Remove it from the chemical drum and then 'OPEN' the valve on the chemical probe again.

If chemical has been transferred from an envirodrum, push the handle on the Micromatic coupling down slightly and then up. This will make the handle lift up and close the valve on the envirodrum. This should be done when doing successive fills into the Transcal tank. When finished transferring chemical, turn the fitting in order to release it from the envirodrum.

WHAT TO DO IF THE TRANSCAL TANK IS OVERFILLED

CAUTION: Ensure that the appropriate protective clothing is worn, as per the chemical label.

In the event of over-filling the Transcal tank, a small piece of supplied black 25mm hose can be fitted to the ball valve on the bottom of the Transcal to drain away any excess chemical. To perform this you:

1. Turn the Transcal 'T' handle on the Transcal station to 'OFF'.
2. Close the venturi valve on the EZ control pressure delivery station.
3. With the Transcal 'T' handle on the Transcal station to 'OFF', and wearing the appropriate safety clothing, undo the cam lever fittings on the ball valve on the bottom of the Transcal station and remove the black 25mm hose. This is behind the Transcal station cover and can be accessed from underneath.
4. Attach the short length of black drain hose via the cam lever connection.
5. Place an appropriate container under the drain hose.
6. Turn the 'T' handle on the Transcal station to 'EMPTY'.
7. After draining the required amount of chemical, remove the drain hose, replace the vacuum supply hose and resume operating the Transcal. The raw chemical should be returned to the original container.

TRANSFERRING CHEMICAL FROM THE TRANSCAL TANK TO THE MAIN TANK

Once the required amount of chemical is in the Transcal tank, transfer it into the sprayer tank:

1. Ensure that the venturi valve on the pressure delivery station is 'ON'.
2. The Transcal tank needs to be vented when emptying. Remove the chemical probe from the container and open the valve on the chemical probe, or open the Micromatic fitting.
3. Turn the 'T' handle on the Transcal station to 'EMPTY'.
4. The chemical should now transfer into the main spray tank.

When finished:

1. The Transcal tank and probe or Micromatic coupler should be thoroughly rinsed (see rinsing instructions on the pages following).
2. Turn the 'T' handle on the Transcal station 'OFF'.
3. Turn the valve on the probe 'OFF'.
4. Turn the venturi valve 'OFF'.
5. Turn the bypass valve 'ON'.
6. Ensure that the agitator valve is 'ON'.
7. Keep the agitator valve 'ON' until spraying begins.
8. Disconnect the probe or envirodrum line and replace the cam plug in the cam lever fitting.

TRANSFERRING CHEMICAL WITHOUT MEASURING

The chemical can be transferred from the chemical container into the main spray tank (bypassing the Transcal tank) without the chemical being measured (i.e. by emptying full containers). This will reduce the time taken to transfer the chemical.

To do this you:

1. Release the cam lever fitting from the rear of the Transcal station and connect either the probe or the envirodrum line.
2. Place the probe in the chemical drum and open the ball valve on the chemical probe, or connect to the envirodrum and engage the Micromatic handle.
3. Turn the venturi valve on the pressure delivery station 'ON' 100 psi (see previous instructions).
4. The chemical will now transfer from the chemical drum into the main sprayer, bypassing the Transcal.
5. When the required amount of chemical has been transferred, close the ball valve on the chemical probe and remove it from the chemical drum or release the Micromatic fitting.
6. When finished, the probe or Micromatic coupler should be thoroughly rinsed (see following instructions).
7. Turn the venturi valve 'OFF'.
8. Turn the bypass valve 'ON'.
9. Ensure that the agitator valve is 'ON'. The sprayer agitator should be maintained until spraying begins.
10. Disconnect the probe or envirodrum line from the sprayer and re-attach black suction hose to the rear of Transcal station.

RINSING

Rinse the chemical probe line:
If you're wanting to rinse the Transcal lines after using the chemical probe.

1. Fill a suitable container with fresh water (and any applicable decontaminating agent), at least 50 litres of fresh water should be sucked through for sufficient cleaning.
2. Remove the cam lever plug and connect the chemical probe line to the cam lever socket at the Transcal station.
3. Turn Chemical Probe valve to 'ON'.
4. Place the probe into the container with fresh water and open the valve on the chemical probe.
5. Turn the yellow 'T' 'handle on the Transcal station to 'EMPTY''.
6. Operate the Transcal venturi around 100 psi.
7. The fresh water should now transfer to the Transcal tank and then into the main spray tank cleaning the lines from the chemical probe to the Transcal tank and to the main spray tank.

When finished:

- Turn the valve on the chemical probe line 'OFF'.
- Turn the chemical probe valve 'OFF'.
- Turn the yellow 'T' handle 'OFF'.
- Turn the venturi valve 'OFF'.
- Ensure that the agitator valve is 'ON'.

Disconnect the line from the Transcal tank to the probe from the cam lever fitting and replace the cam plug.

Rinsing the envirodrum line
To rinse the Transcal lines after using the Micromatic coupler.

1. Connect the Micromatic coupler to the Micromatic rinsing socket.
2. Connect the envirodrum suction line to the cam lever socket on the sprayer.
3. Turn Chemical Probe valve to 'ON'.
4. Open the 'Envirorum Coupling Rinse' valve on the external water delivery station so that the fresh water cleans both the Micromatic coupler and the line to the Transcal tank.
5. Turn the venturi 'ON' at 100 psi.
6. The fresh water will now rinse through the Micromatic fittings to the Transcal tank and then into the main spray tank.
7. When there has been sufficient cleaning with fresh water (at least 5 minutes of cleaning), close the Envirodrum Coupling Rinse valve.

When finished:

- Turn the chemical probe valve 'OFF'.
- Turn the yellow 'T' handle 'OFF'.
- Turn the venturi valve 'OFF'.
- Ensure that the agitator valve is 'ON'.

Rinse the Transcal:

1. Continue to have the sprayer pump operating and the Transcal venturi system operating at 100 psi.
2. Ensure that the tank is vented by turning the yellow 'T' handle on the Transcal station to 'EMPTY'.
3. Turn the 'Transcal Flush' valve on the external water delivery station 'ON'.
4. The tank and sight tube should be rinsed and the rinsate transferred to the main spray tank.
5. Rinse the Transcal tank for as long as recommended on the chemical label, or at least two minutes.
6. Close the 'Transcal Flush' valve when tank is sufficiently rinsed and the rinsate should all have been transferred to the main spray tank.

FILL FLOW METERS

GENERAL

Fill flow meters allow operator's to measure more precise amounts of water into the main spray tank. This is particularly useful when quantities less than the total capacity are to be used.

Goldacres offer two types of fill flow meters - the Raven flow max 220 and the Teejet 70 series.

The Raven Flow Max 220 is an "inline" flow meter that has cam lock couplings fitted allowing it to be easily connected in with your existing fill hose. The Flow Max 220 is capable of reading flows from 50 - 758 l/min. A 3.6v battery is used to store the required information.

The Teejet 70 series uses a remote mounted console, which Goldacres mount within the storage locker on the pod for protection.

The Teejet 70 series allows the operator to input a required quantity of water - the flow meter will then count up until it reaches the preset quantity and the control valve blocks off flow to the main tank.

Raven Flowmax 220

Teejet 70 series mounted in storage locker

RAVEN INDUSTRIES
FLOW CONTROLS DIVISION

FLOWMAX 220 QUICK START GUIDE

OPERATION

Turn on FLOWMAX 220 by pressing ⏻ key.

> **NOTE:** Without activity, FLOWMAX 220 will shut off automatically after 90 seconds. After power down, depress ⏻ key to re-start FLOWMAX 220. (Flow pulse will not re-start the display).

METER CAL has been entered at the factory. Changing of the CAL number is required only after field replacement of display assembly and/or flowmeter.

DISPLAY TITLES

Flow -- Flow Rate will flash (vol/min)
US -- Volume in gallons
SI -- Volume in liters
"690" -- Adjustable Meter Calibration # (preset at factory)
VOL 1 -- Total Volume #1 gallons [liters]
VOL 2 -- Total Volume #2 gallons [liters]
VOL 3 -- Total Volume #3 gallons [liters]
CLR V1 -- Clear Volume 1
CLR V2 -- Clear Volume 2
CLR V3 -- Clear Volume 3
Lo BAT -- Limited battery life remaining

Depress ⏻ key to initiate the display. Depress the ▲ TOTAL key to toggle through VOL1, VOL2, and VOL3.

Depress ▼ RATE key to display Flow Rate in gallons/min [liters/min].

ENTERING DATA
To Clear Volume Totals:

1. Depress ▲ TOTAL key until "VOL1" is displayed.
2. Depress ⏻ key.
3. Display will flash "CLR V1" (depress ▲ TOTAL key to toggle between CLR V1, CLR V2, or CLR V3).
4. Depress ⏻ key (VOL1 will re-set to zero).

To Enter Meter Cal:

1. Depress ▼ RATE key.
2. Depress ⏻ key.
3. Depress ▼ RATE key until the METER CAL # is displayed.
4. Depress ⏻ key ("C" will appear on the right side of the display).
5. Depress ▼ RATE key to decrease Meter Cal # or depress ▲ TOTAL key to increase Meter Cal #.
6. Depress ⏻ key to program adjusted Meter Cal #.

TO CHANGE FROM "US" TO "SI"

1. Depress [▼ RATE] key.
2. Depress [⏻] key.
3. Depress [▼ RATE] key until "US" is displayed.
4. Depress [⏻] key ("C" will appear on the right side of the display).
5. Depress [▲ TOTAL] key to toggle from "US" to "SI".
6. Depress [⏻] key to program either "US" or "SI" setting.

CALCULATING "METER CAL"

The Flow Meter calibration number is stamped on the tag attached to each FLOWMAX 220. Write do for future reference when programming the FLOWMAX 220.

To convert original METER CAL from gallons to desired units of measure (oz, lbs, or liters), se CONVERSIONS. Write down this calibration number for future reference when programming the FL

METER CAL CONVERSIONS

To convert the METER CAL number simply divide the original number (number printed on FLOWMAX 2 desired conversion factor.

FOR EXAMPLE:

$$\frac{\text{Original METER CAL No.}}{128} = \text{METER CAL No. for displays in Fluid Ounces}$$

$$\frac{\text{Original METER CAL No.}}{3.785} = \text{METER CAL No. for displays in Liters}$$

$$\frac{\text{Original METER CAL No.}}{\text{Weight of one gallon}} = \text{METER CAL No. for displays in Pounds}$$

LIQUID CONVERSIONS

U.S. Gallons x 128 = Fluid Ounces
U.S. Gallons x 3.785 = Liters
U.S. Gallons x 0.83267 = Imperial Gallons
U.S. Gallons x 8.34 = Pounds (Water)

BATTERY REPLACEMENT

FLOWMAX 220 is operated with a 3.6 volt lithium AA battery. The battery does not need to be within specifications or installed to retain current totals. "Lo BAT" will flash on the display indicating limited re life.

BATTERY INSTALLATION

1) Remove 4 screws from display screen.
3) Remove battery from back of display screen.
4) Insert new battery in back of display screen (observe polarity).
5) Replace display screen on to FLOWMAX 220 (check o-ring alignment).
6) Re-install the 4 screws.

NOTE:	Battery must be 3.6V, 1.5V batteries will not power the display.

INSTALLATION

1) Install FLOWMAX 220 in flow line with proper flow direction verified.
2) If display cover is upside down, remove cover, rotate, then re-install.

TeeJet 70 Series Flowmeter
90-02324

Console Programming:

1. Press 'PRO' to switch display screen on.
2. The flowmeter calibration number must be entered. This number is located on the flow meter ID sticker. To do this, press 'PRO' and hold down for 3 seconds. Using the up and down arrows adjust the number so it matches the flow meter calibration figure (pulses/liter).

3. Press and hold 'PRO' to go back to main screen.
4. To set the target volume, press 'PRO' so the target value flashes. Use the arrows to adjust the valve. Press 'PRO' when value is reached.

5. Press the up and down arrows simultaneously to switch off.

Flowmeter Operation:

1. Press 'PRO' to switch display screen on.
2. To begin measuring flow into the sprayer tank, ensure '>L' next to the target volume is flashing. You can now apply flow through the fill system. The actual volume on the bottom line should begin increasing.

Note: If '>L' is not flashing when the Teejet electric ball valve is fitted, the 'Actual' volume will not count.

3. Once the target volume has been reached, an alarm will activate. Stop water flow and press 'CLR' to silence the alarm.
4. To reset the actual volume, press and hold 'CLR'.
5. When operation is complete, press the up and down arrows to turn console off.

GOLDACRES

Smart Farmers Choose Goldacres

Goldacres Trading Pty Ltd 1-3 Morang Crescent Mitchell Park 3355
Phone: 03 5342 6399 | Fax: 03 5342 6308 | www.goldacres.com.au