

GOLDACRES
Smart Farmers Choose Goldacres



Advance EF 4000 | 5000 | 6500 | 8000
Prairie EF 4000 | 5000 | 6500

OPERATOR'S MANUAL

CONTENTS



- Chapter 1 - Introduction
- Chapter 2 - Safety
- Chapter 3 - General information & specs
- Chapter 4 - Pre-operation
- Chapter 5 - Operation
- Chapter 6 - Tri Tech Boom
- Chapter 7 - Calibration
- Chapter 8 - Lubrication & Maintenance
- Chapter 9 - Troubleshooting

Optional Equipment Supplements

- Chemical probe
- Vortex induction hopper
- Transcal
- Exacta foam marker
- Fill flow meters
- Hydraulic fill pump
- Direct chemical injection
- Dual product
- Twin line spot spray
- Joystick
- Raven 4070 Controller
- Smart Steer
- Ultraglide

CHAPTER I

INTRODUCTION

Introduction	I-3
Contact details	I-3

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Chapter	Current Revision	Revision Date
1 - Introduction	3.0	09/04/2010
2 - Warranty & Registration	3.0	09/04/2010
3 - Safety	3.0	09/04/2010
4 - General info & specifications	3.0	09/04/2010
5 - Pre-operation	3.0	09/04/2010
6 - Operation	3.0	09/04/2010
7 - Tri Tech boom	3.0	09/04/2010
8 - Calibration	3.0	09/04/2010
9 - Lubrication & maintenance	3.0	09/04/2010
10 - Troubleshooting	3.0	09/04/2010
12 - Chemical probe	3.0	09/04/2010
13 - Vortex induction hopper	3.0	09/04/2010
14 - Transcal	3.0	09/04/2010
15 - Exacta foam marker	3.0	09/04/2010
16 - Fill flow meters	3.0	09/04/2010
17 - Hydraulic fill pump	3.0	09/04/2010
18 - Direct chemical injection	3.0	09/04/2010
19 - Dual product	3.0	09/04/2010
20 - Twin line spot spray	3.0	09/04/2010
21 - Joystick	3.0	09/04/2010
22 - Raven 4070 controller	3.0	09/04/2010
23 - Smart steer	3.0	09/04/2010
24 - Ultraglide	3.0	09/04/2010

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.

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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.

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CHAPTER 2

SAFETY

General	2-2
The operator	2-2
Safety precautions.....	2-3
Warnings.....	2-3
Cautions	2-5
Notes	2-5
Safe use of chemicals	2-7

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 should 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 familiar 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.

ENTANGLEMENT IN ROTATING DRIVE LINES

Rotating drives can cause serious injury or even death when entanglement occurs. Keep hands, feet, hair and 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.

When heating and welding components, ensure that all paint and other such materials



WARNINGS (Continued)

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	3-2
Identification	3-6
Orientation	3-6
Dimensions	3-8
Parts ordering.....	3-9
Decals	3-10

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 regulating 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 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 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 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 (50 mesh)
- A fill filter (200 mesh) (standard on Prairie Advance) is also available.

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 (18 - 24 metres) and Tri Tech booms (24 - 36 metres) 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 individual 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.

The rated pressure and capacity, shown in the chart below, is applicable when the machine is stationary. The cyclic loading pressure & km/hr is applicable for machines that are loaded and moving.

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 any other tanks on the sprayer 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.

GOLDACRESTYRE CHART

Tyre Size	Ply	Rated Pressure (KPa)	Rated Capacity (Kg)	Cyclic Loading Pressure (KPa)	10km/hr	20km/hr	30km/hr	40km/hr
					(Rated tyre capacity Kg when the sprayer is moving)			
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
18.4x42	14	240	3650	312	6825	4745	4197	3942
18.4x38	16	240	4400	322	8228	5720	5060	4752
18.4x42	16	241	3600	313	6732	4680	4140	3888
20.8x38	14	220	3875	286	7246	5037	4456	4185
20.8x42	14	220	4125	286	7713	5362	4744	4455
20.8x38	16	220	4500	286	8415	5850	5175	4860
20.8x42	16	220	4500	286	8415	5850	5175	4860
24.5x32	16	220	4500	286	8415	5850	5175	4860

Note: The table above only refers to diagonal cross ply tyres. For tyres other than those listed above refer to the manufacturer's recommendations.

Axles:

Prairie sprayers are fitted with rigid axles as standard - in track widths of 2 to 3 metres.

Advance sprayers are fitted, as standard, with air bag suspension. Braked axles are available as an option.

The air bag suspension consists of a 12 volt air compressor, a ride height valve (8000Lt has 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 (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:

Advance sprayers are fitted with electric over hydraulic spool valves as standard equipment. Spool valves allow the use of a number of hydraulic functions on the sprayer with only one set of tractor remotes. The hydraulic functions are then controlled from an electric switch box in the cabin. The valve block is located at the rear of the sprayer above the boom valves.

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

A brief overview of the different hydraulic systems follows (Further information on your specific system should be supplied by your dealer if required).

Open Centre Systems:

Open centre systems have a constant flow of oil from the tractor. Any flow not being used by the hydraulic circuit will be bypassed through the system and sent back to tank.

Closed Centre

(pressure compensated) Systems:

Tractors fitted with closed centre, pressure compensated, hydraulic systems have a variable displacement pump which only delivers flow at the rate necessary to maintain a specified pressure.

Closed Centre Load Sensing Systems:

A closed centre load sensing system is a variation of the pressure compensated system and are commonly designed to reduce hydraulic circuit heat generation.

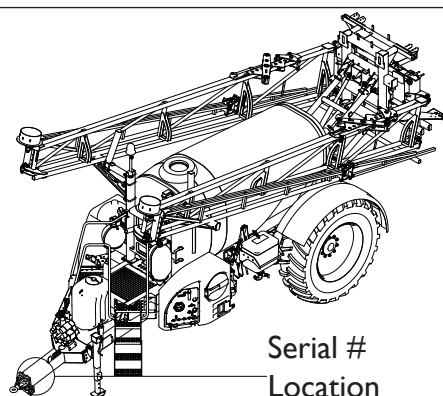
This system senses a change in flow, and or pressure, and causes the pump to compensate by varying the pump flow. In these circuits no oil is bypassed as only the oil required is being sent to the valve.

Optional Equipment:

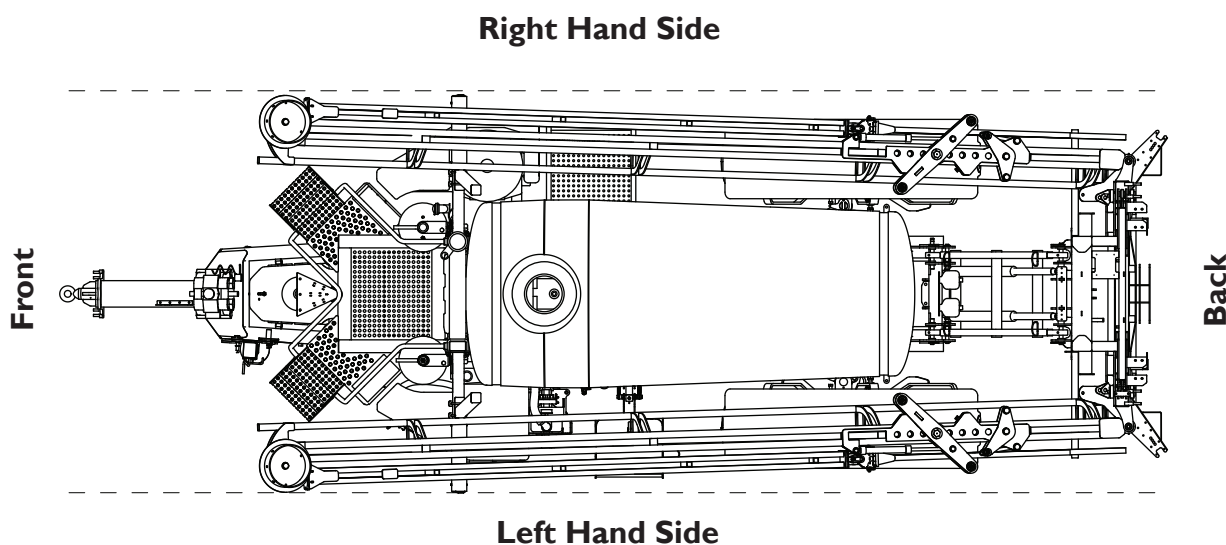
An extensive range of optional equipment is available for fitting to Goldacres sprayers. Specific information regarding optional equipment fitted to your machine can be found in the rear of this manual.

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

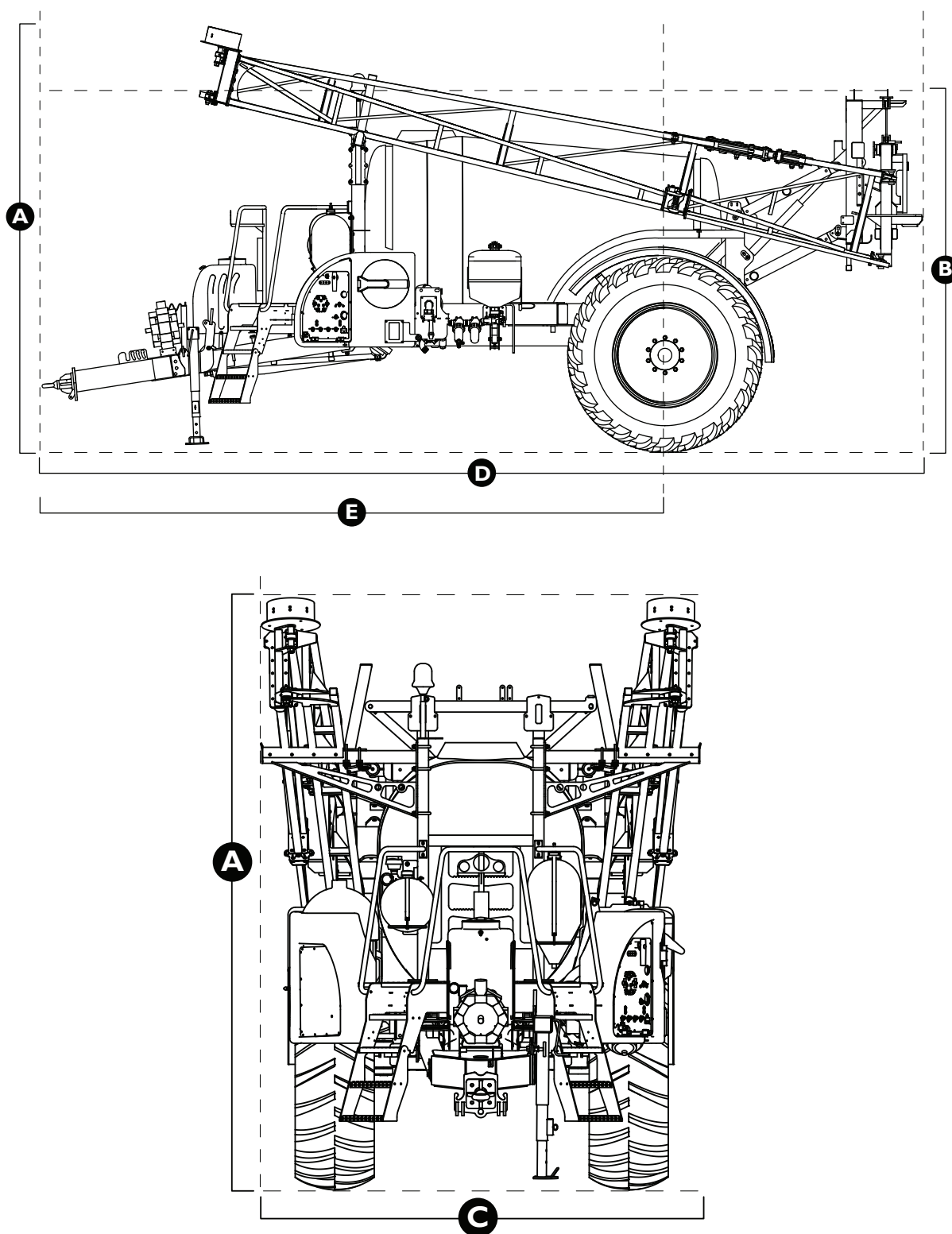


DIMENSIONS

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

your sprayer it is recommended that you measure and weigh your sprayer individually.

Variations in weights and dimensions may occur without notification. To ensure that the weights and dimensions are accurate for



Boom size (M)	A Front Height	B Rear Height	C Width	D Total Length	E Wheelbase
4000lt					
24	2800	3150	2550	8350	5950
28	3900	3150	2550	8550	5950
30	3900	3150	2550	9250	5950
33	4200	3150	3300	9150	5950
36	4200	3150	3300	9400	5950
5000lt					
24	2800	3150	2550	8350	5950
28	3900	3150	2550	8550	5950
30	3900	3150	2550	9250	5950
33	4200	3150	3300	9150	5950
36	4200	3150	3300	9400	5950
6500lt					
24	3800	3150	2550	8950	6450
28	3800	3150	2550	9750	6450
30	3800	3150	2550	9850	6450
33	4200	3150	3300	9750	6450
36	4200	3150	3300	9750	6250
8000lt					
24	3600	2900	3500	9300	6100
28	3600	2900	3500	9300	6100
30	3600	2900	3500	9300	6100
33	3900	2900	3500	9600	6100
36	3900	2900	3500	9600	6100

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 there 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	4-2
Fitting the PTO shaft.	4-3
Drawbar connections	4-4
Mounting the consoles	4-4
Connecting the consoles	4-5
Wiring layout - Raven SCS450 console	4-7
Wiring layout - Raven SCS4400 & 3TS.	4-8
Boom section valves in 3TS layout. .	4-9
Joystick wiring.	4-10
Advance wiring schematic	4-12

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.

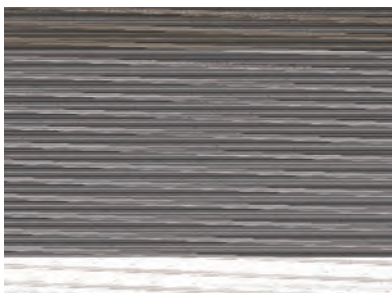
Step 1: Ensure that the tractor is suitably rated to safely tow the sprayer and that the drawbar pin size matches the hitch on the sprayer. The standard hole size is 50mm. A replaceable insert (Part number GA4582455) can be purchased to reduce the slack if required.

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 transferred 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 lubrication 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.

NOTE: The wide angle joint must be connected to the tractor PTO shaft.

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.

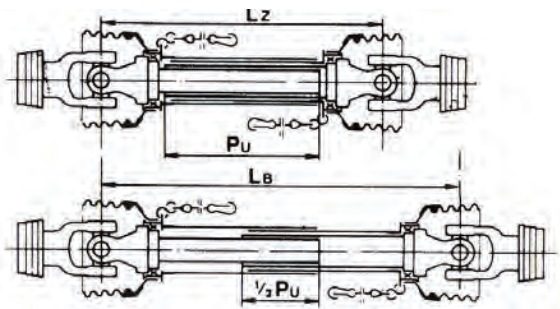
Disconnection of the sprayer from the tractor is the reverse of the above instructions.

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 (P_u) available when fully compressed (L_z). The maximum PTO operating length is shown on the diagram below as L_b



PTO shaft length adjustment

To adjust the length:

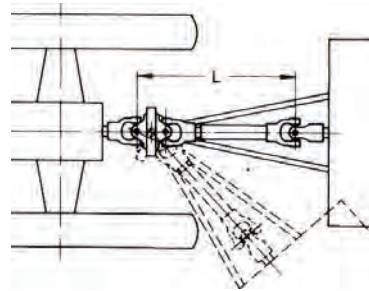
1. Hold the shafts next to each other in the shortest working position and mark them.
2. Shorten the inner and outer guard tubes equally.
3. Shorten inner and outer sliding profiles by the same length as the guard tubes.
4. Round off all sharp edges and remove burrs.
5. Grease sliding profiles before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

NOTE: It is important that enough “travel” is allowed in the PTO shaft to ensure that it does not collapse fully when travelling through a ditch etc and cause damage to the pump.

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:

Depress the [speed] button on the Raven 440/450 console for five seconds to display speed.

On the Raven 4000 series consoles this must be set up through the data menu.



Hydraulic drive pump



Hydraulic drive pump - needle valve

DRAWBAR CONNECTIONS

The standard drawbar connections are as shown in the pictures below. It is important that the dielectric grease (supplied with each sprayer) is applied to electrical connections prior to connection. This assists with lubrication and prevention of corrosion on these connections.



Raven SCS440/450 male & female connectors



Raven SCS4400 male & female connectors



Raven male and female speed sensor connections



Male and female Deutsch connections



Tail light connection



Hydraulic hose connections



Safety chains

(For connections applicable for Raven SCS4070 controllers, joystick control and/or direct chemical injection please refer to appropriate sections at rear of this manual.)

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

CONNECTING THE CONSOLES

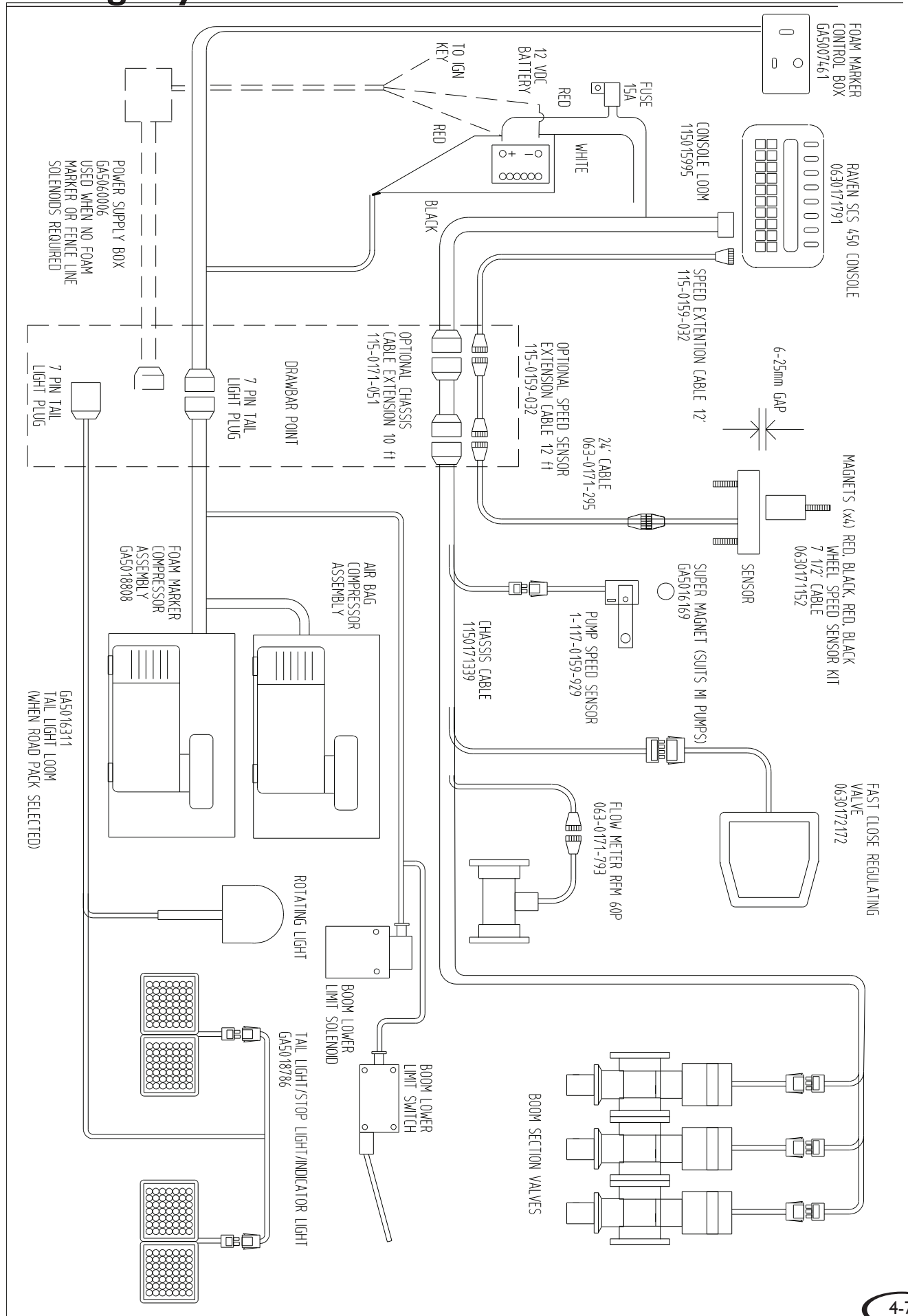
The consoles should be connected as per the electrical schematics following. These schematics provide you with a layout of all connections to ensure that the system is properly connected prior to operation.

To connect to the battery:

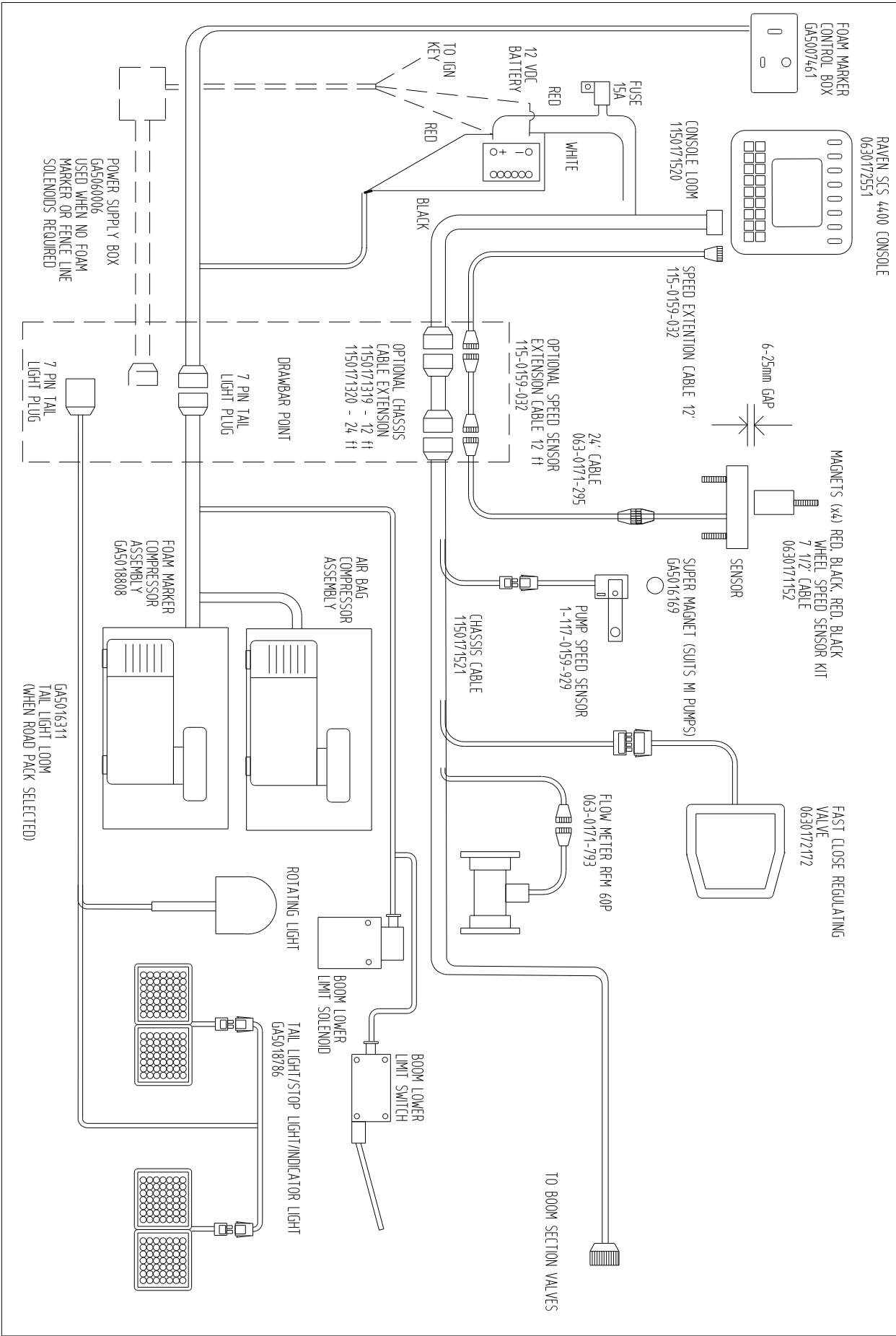
With the consoles mounted in the cabin, turn the power switch to OFF and route the red (+) and white (-) battery wires to a 12v battery. Attach the white battery wire to a negative terminal and the red battery wire to a positive terminal.

NOTE: The negative should be connected last to prevent the chance of short

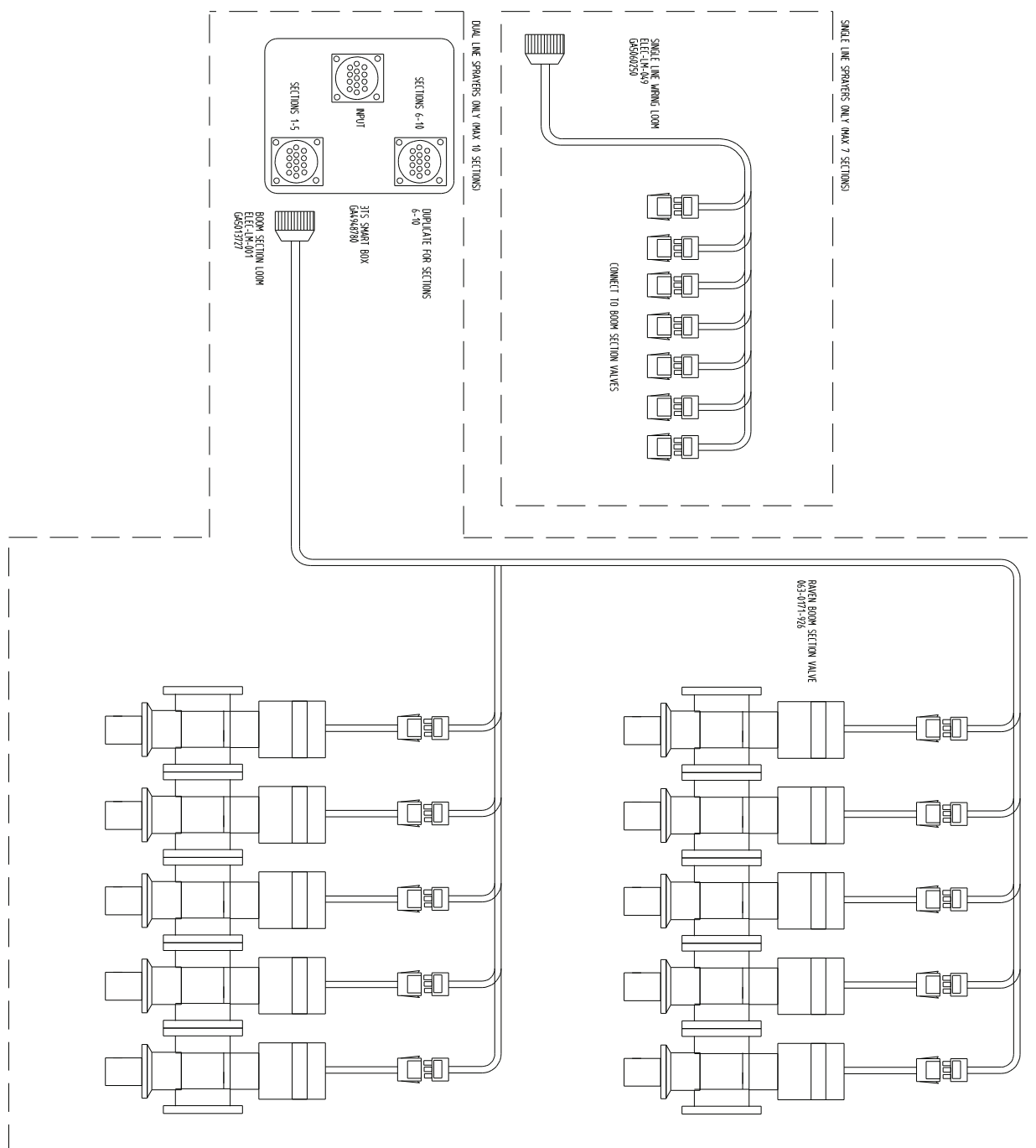
Wiring Layout - Raven SCS 450 console



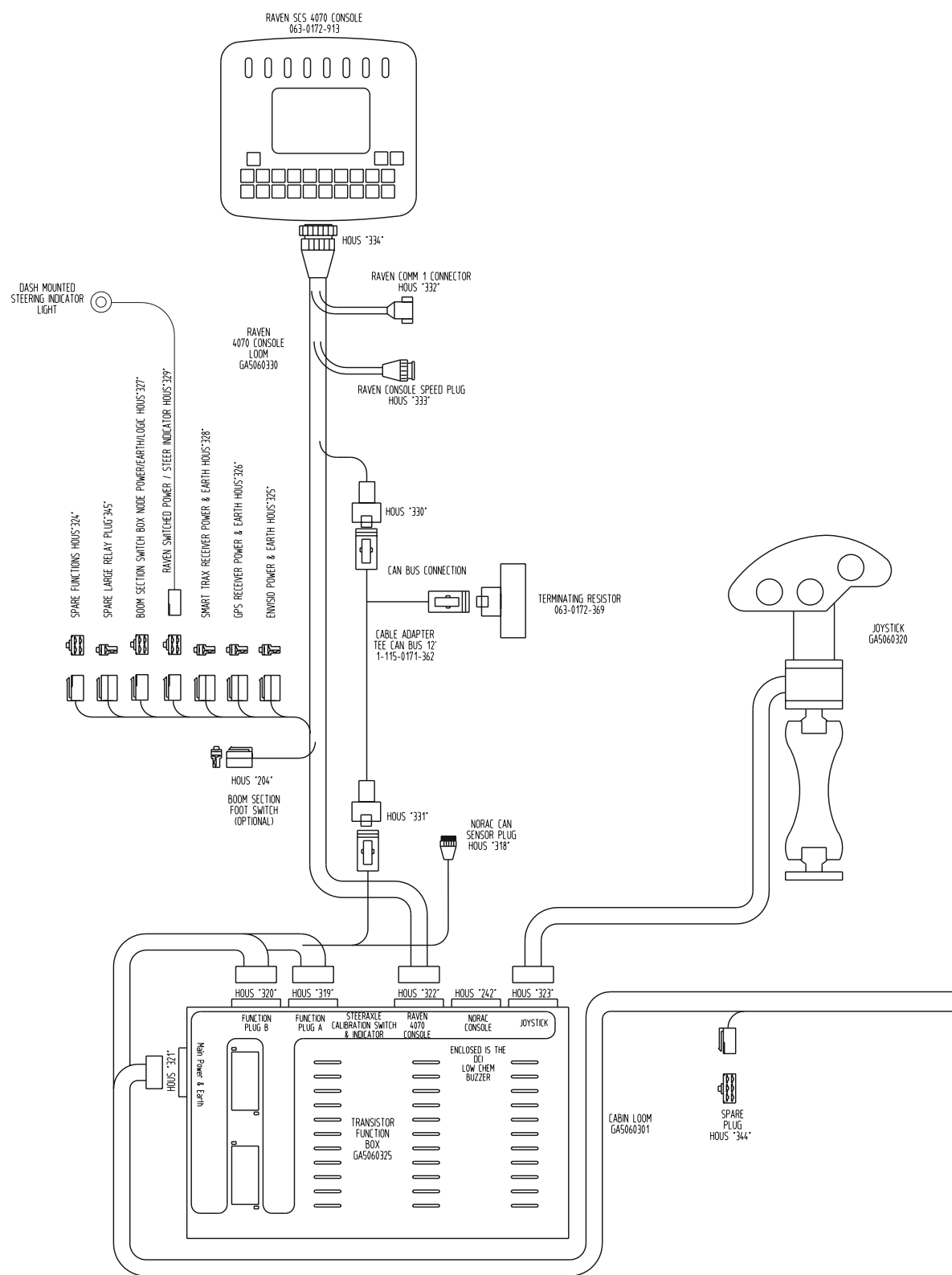
Wiring Layout - Raven SCS4400 & 3TS



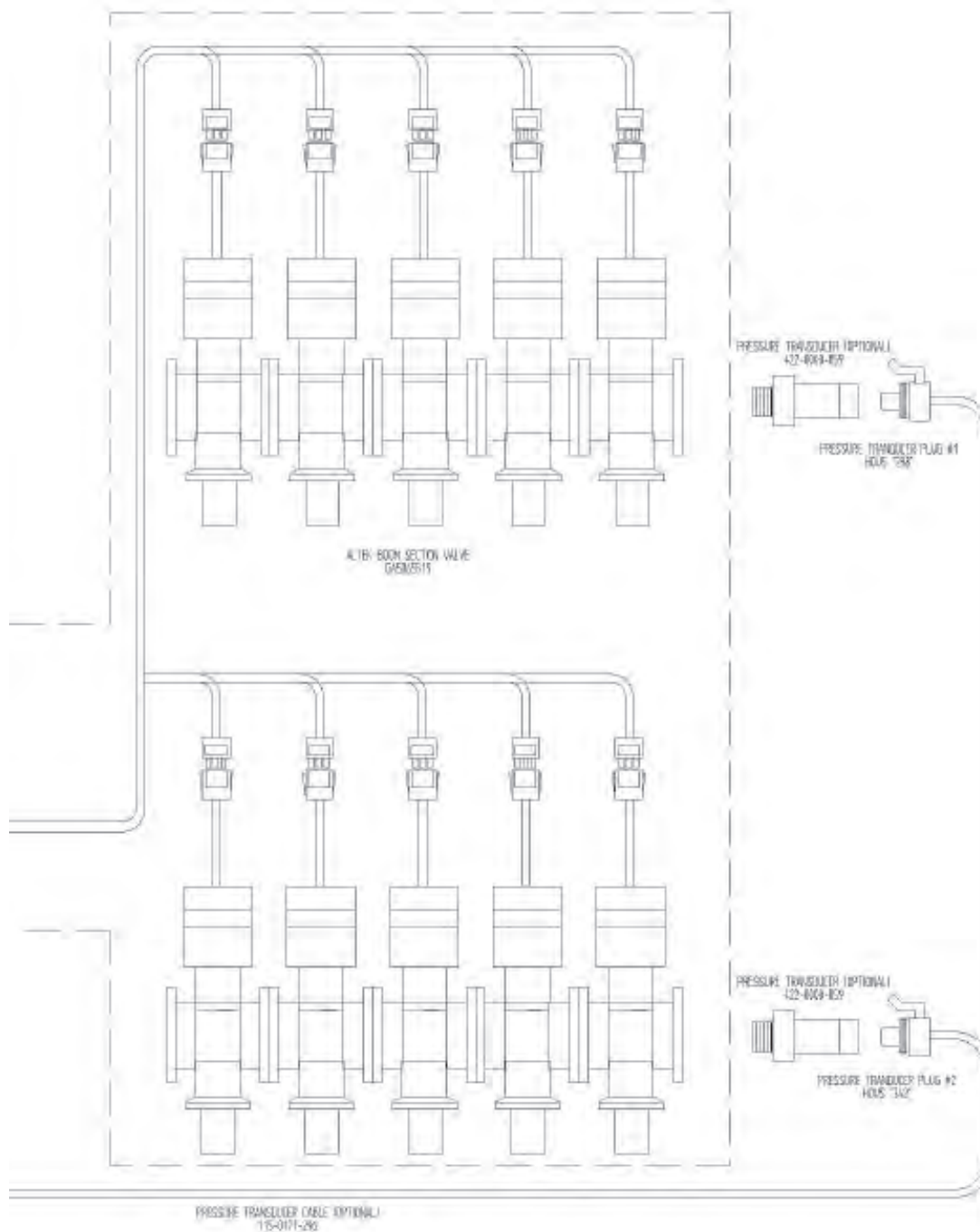
Boom section valves in 3TS layout



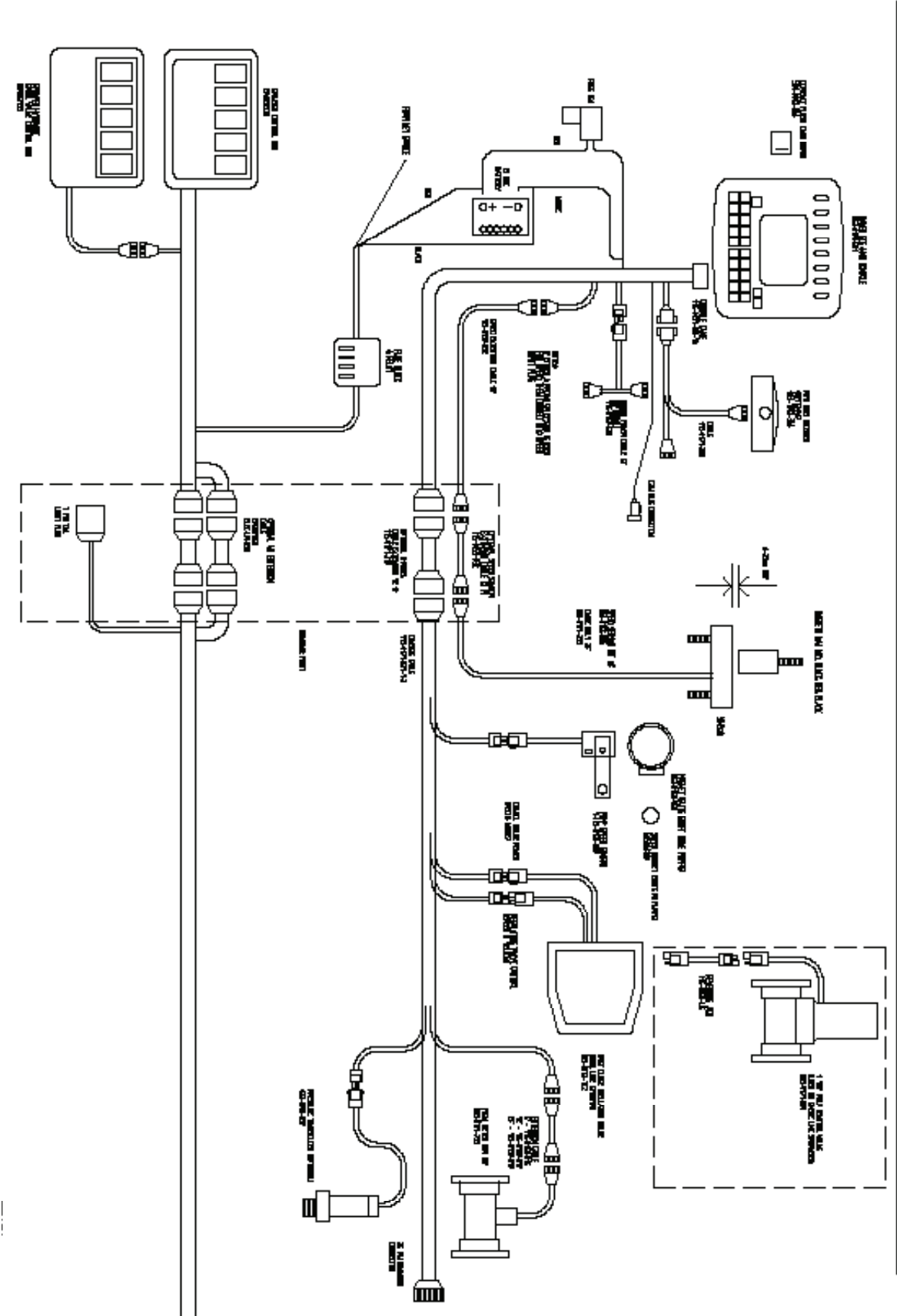
ADVANCE EF WIRING SCHEMATIC (JOYSTICK WIRING)



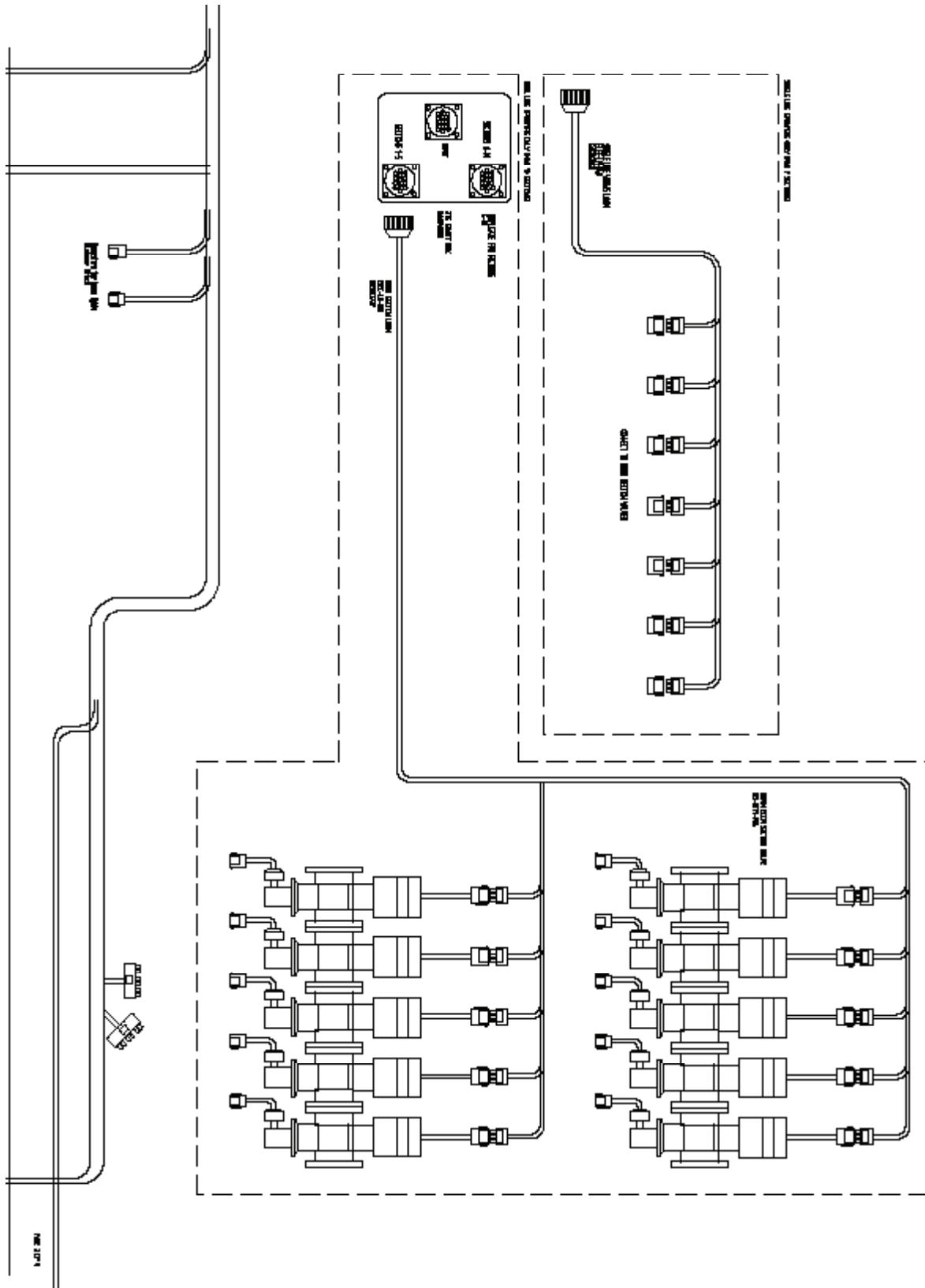
ADVANCE EF WIRING SCHEMATIC (JOYSTICK WIRING)



ADVANCE EF WIRING SCHEMATIC



ADVANCE EF WIRING SCHEMATIC

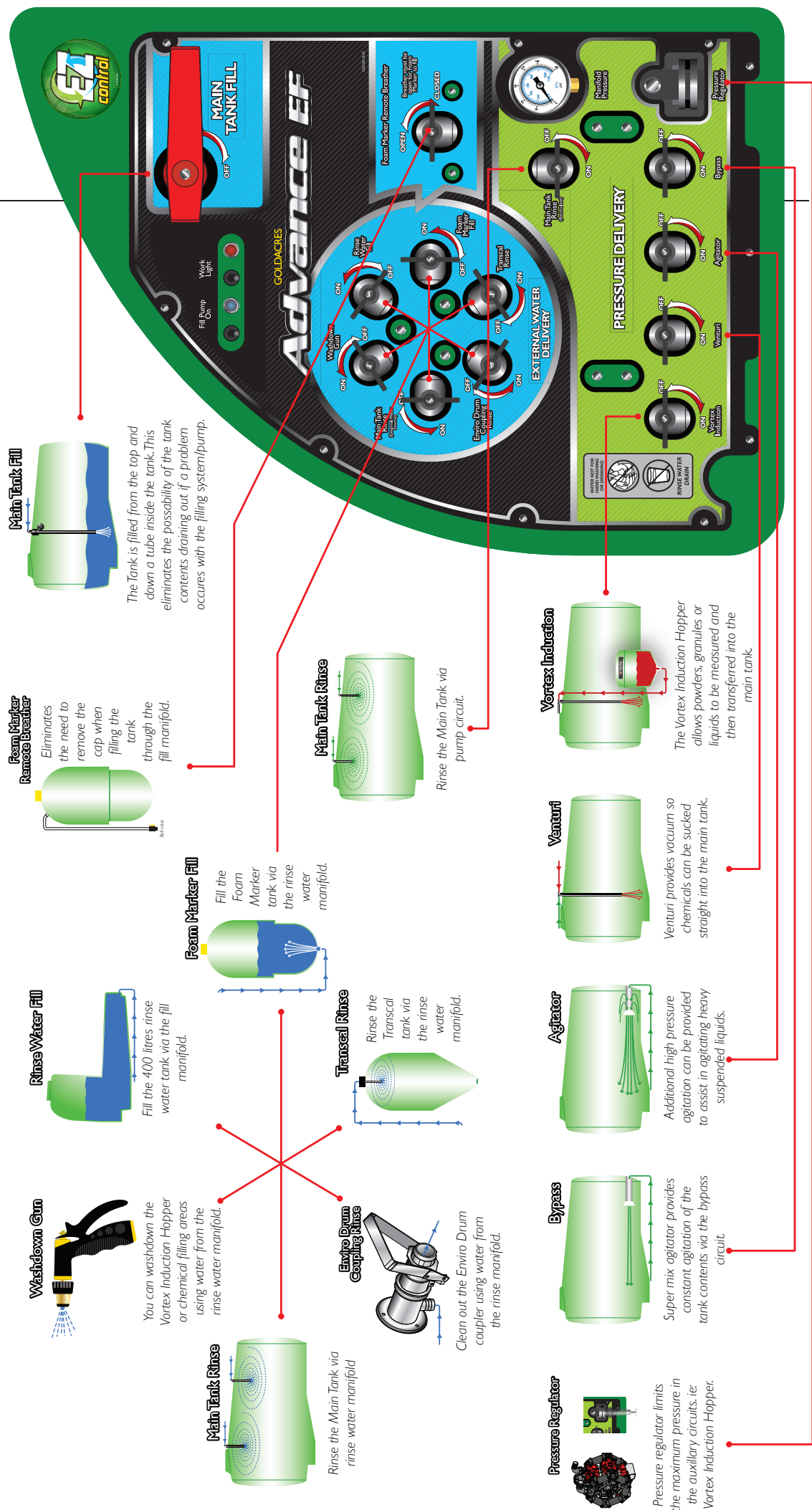


CHAPTER 5

OPERATION

EZ control fill station (Prairie Advance).	
.....	5-2
EZ control fill station (Prairie)	5-4
Machine key features	5-6
Filling	5-7
Spray application	5-8
Agitation	5-8
Flushing	5-9
Decontamination	5-9
End of day	5-10
End of program	5-11
Transporting the sprayer	5-11

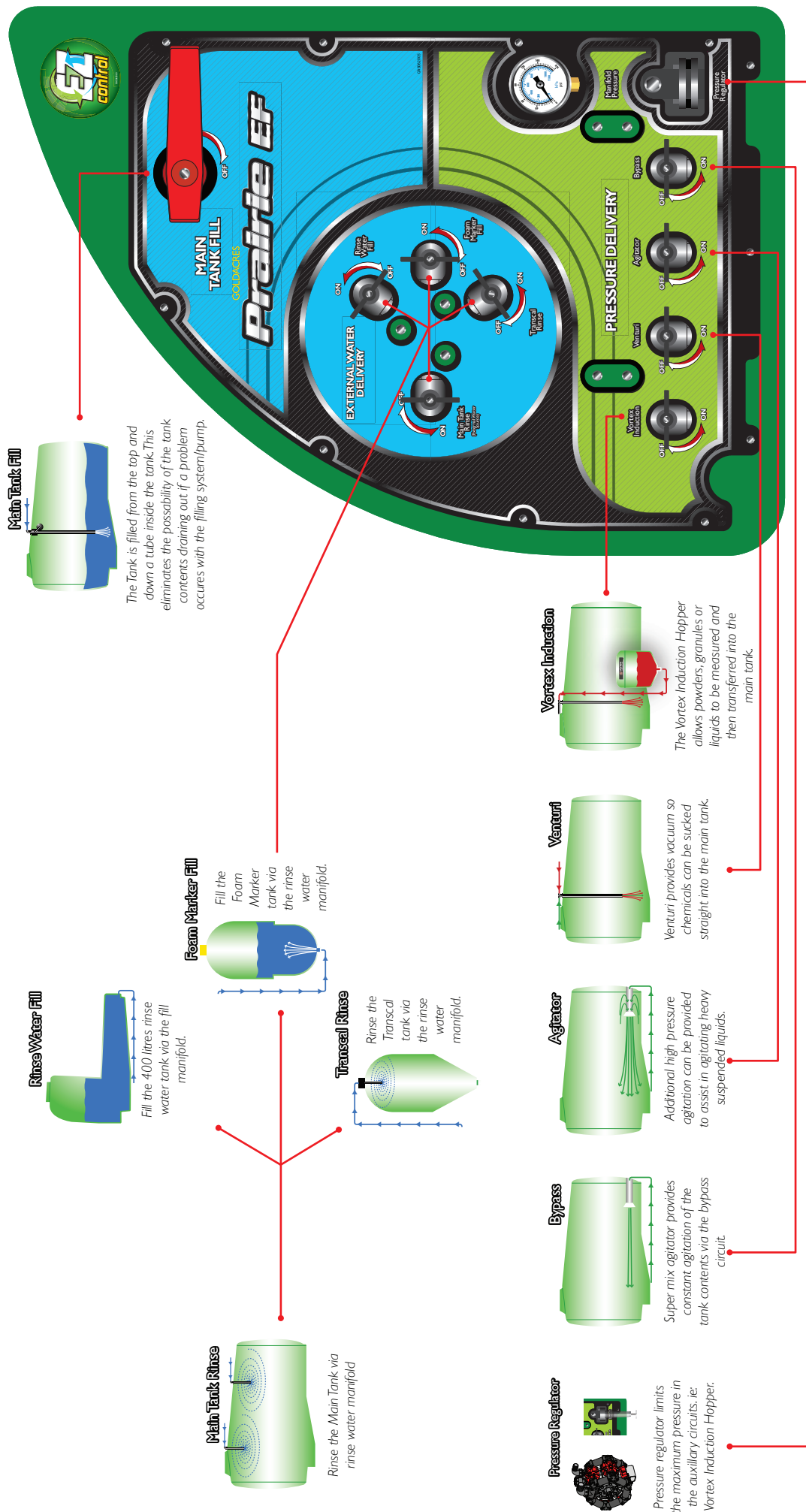
EZ CONTROL FILL STATION (ADVANCE)



EZ CONTROL FILL STATION (PRAIRIE ADVANCE EF)

External water delivery	Use
functions. <i>These functions are only available when external water is being pumped into the system.</i>	
Main tank fill	Used to direct external water delivery, coming from quick fill, to main tank. When main tank fill is ON the other functions of the external water delivery station can be used, however they will not be under pressure as only a small amount of flow will be directed to the external water delivery station.
Main tank rinse (external water source)	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.
Washdown gun	With the washdown gun ON, the trigger jet gun (located near the quick fill) can be utilised for wash down if required.
Rinse water fill	Used to fill the rinse water tank.
Foam marker fill	Used to fill the foam marker tank.
Foam marker remote breather	Prior to filling the foam water tank, opening this breather will allow the tank to vent when filling.
Transcal rinse	Allows external fresh water to be used in rinsing the transcal circuit.
Enviro drum coupling rinse	With the micromatic/envirodrum coupling connected to the enviro rinse coupling, having this function ON, will allow fresh water to circulate through the coupling.
Pressure delivery <i>These functions only available when the main spray pump is operating - pressuring the system.</i>	
Vortex induction	Turn ON to use vortex induction hopper
Venturi	Turn ON to use chemical probe or transcal
Agitator	Turn ON to activate agitator
Bypass	Turn ON bypass when in spray mode
Pressure regulator	The pressure regulator allows the operator to set the relief pressure of the fill manifold (max 110psi)
Manifold pressure gauge	Indicates the manifold pressure
Main tank rinse (recirculate)	Turning ON allows flow to recirculate through system for a more thorough flushing/decontamination.
Other	
Fill pump on	Turns on hydraulic fill pump which is controlled from spool valves.
Work light	Turns on the work light

EZ CONTROL FILL STATION (PRAIRIE)



EZ CONTROL FILL STATION (PRAIRIE)

External water delivery functions.

These functions are only available when external water is being pumped into the system.

Use

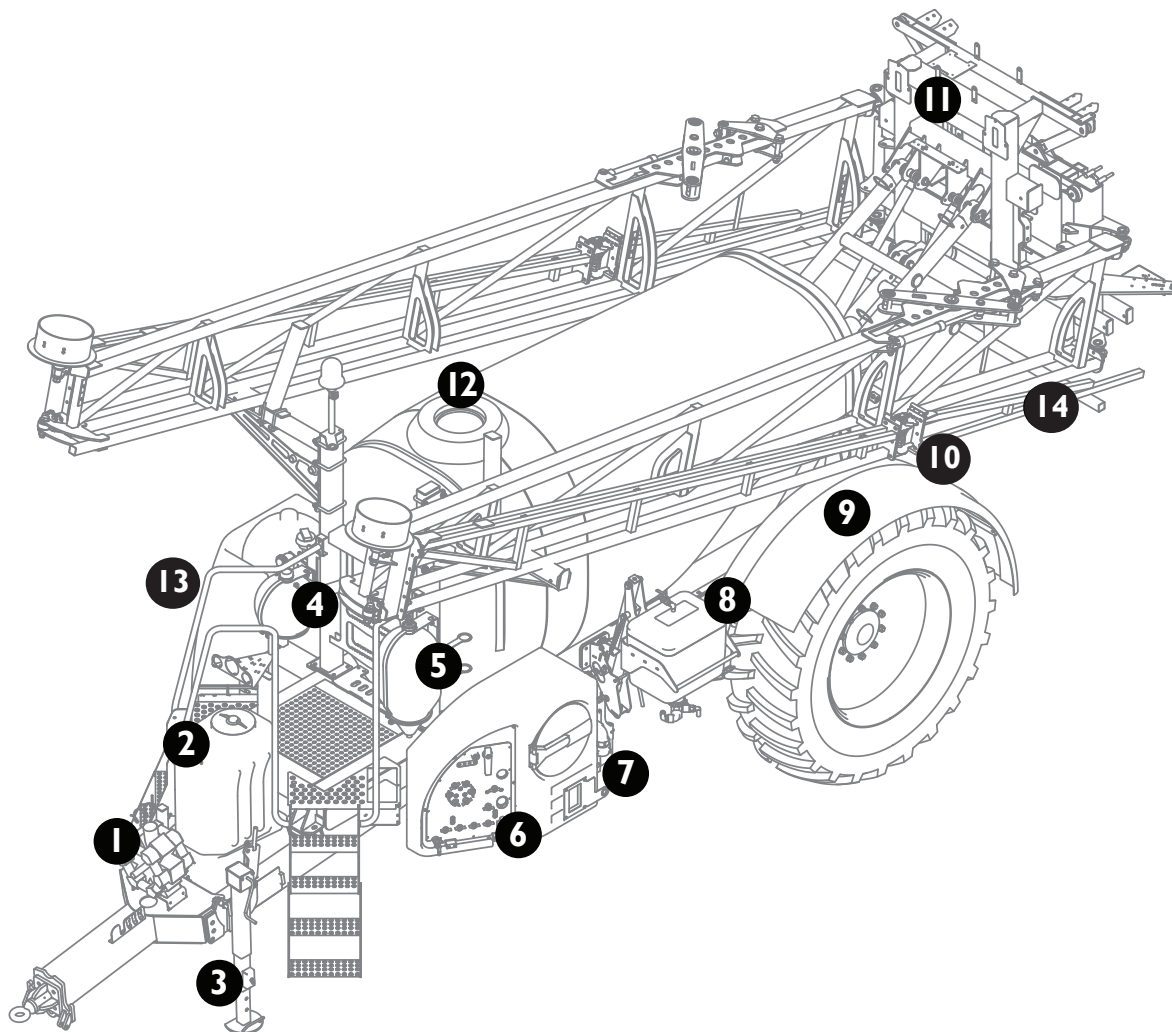
Main tank fill	Used to direct external water delivery, coming from quick fill, to main tank. When main tank fill is ON the other functions of the external water delivery station can be used, however they will not be under pressure as only a small amount of flow will be directed to the external water delivery station.
Main tank rinse (external water source)	Turning on this function allows the use of the tank rinse nozzles (where fitted) with larger quantities of fresh water making it useful for a more thorough flushing/decontamination.
Rinse water fill	Used to fill the rinse water tank.
Foam marker fill	Used to fill the foam marker tank (Tank must be removed prior to filling)
Transcal rinse	Allows external fresh water to be used in rinsing the transcal circuit.
Enviro drum coupling rinse	With the micromatic/envirodrum coupling connected to the enviro rinse coupling, having this function ON, will allow fresh water to circulate through the coupling.

Pressure delivery

These functions only available when the main spray pump is operating - pressuring the system.

Vortex induction	Turn ON to use vortex induction hopper
Venturi	Turn ON to use chemical probe or transcal
Agitator	Turn ON to activate agitator
Bypass	Turn ON bypass when in spray mode
Manifold pressure gauge	Indicates the manifold pressure
Pressure regulator	The pressure regulator allows the operator to set the relief pressure of the fill station manifold. (Max 110 psi)

MACHINE KEY FEATURES



Number	Feature
1.	Diaphragm pump
2.	400lt flush water tank
3.	Jack
4.	Sight tube
5.	Transcal tank (option)
6.	EZ control - fill station
7.	Quick fill point
8.	Vortex chemical induction hopper (option)
9.	Mudguards (option)
10.	3D breakaway hinge
11.	Boom valves & hydraulic spool valves (where fitted)
12.	Main tank lid
13.	Compressor pod
14.	Wing tip

FILLING

When filling the sprayer 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 or via a hydraulically driven fill pump mounted on the sprayer (for hydraulic fill pump information refer to chapter at the rear of this manual). If a fill flow meter has been fitted, refer to the operation chapter at the rear of this manual for further information.

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) & that other fill functions are OFF.
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 ball 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 ball valve as labelled.
3. When filling the foam marker tank, ensure that the foam marker breather has been turned to OPEN - or the cap has been removed (Prairie EF models)
4. When the required amount of water has been transferred, turn the appropriate valve to OFF.
5. When all functions have been performed, turn the fresh water pumping 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 running at 400 - 540 rpm with the agitator running in order 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

NOTE: The bypass ball valve must be open while spraying.

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. 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 achieve 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 quantity 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 5000 litres in the tank with a 250l/min pump agitate for $5000/250 = 20$ minutes.

To agitate while spraying:

Have the bypass ball valve and agitator ball valves OPEN.

NOTE: The bypass ball valve must be open while spraying.

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 ball 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. Hold increase button for 15-20 secs. This will ensure that fast close 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.

NOTE: If the pressure gauge increases dramatically, slow down pump RPM

To flush entire system (pump, boom & 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

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 ball 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 delivery hose externally.
11. Now follow the instructions for boom flushing as above - keep ball valve drawing from main tank.

by your agronomist or chemical supplier.

Follow the flushing instructions above, while using the appropriate decontaminating agent for the chemicals being used.

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 up 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). It is also suggested that a small quantity of anti freeze be added to the main tank and circulated through the sprayer to minimise the chance of freezing.

Make sure any ice has thawed before using sprayer.

END OF SPRAYING 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.
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. 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

TRI-TECH BOOM

General	6-2
Boom key features	6-3
Boom lift	6-6
Boom fold	6-6
Unfolding the boom	6-6
Hydraulic cylinders	6-7
Boom balance	6-7
Boom cables	6-7
Motorised boom valves	6-8
Nozzles	6-8
3D breakaway hinge	6-9
Boom protectors	6-9
Dual line boom with 3TS	6-10
Fence line jets	6-11
Hydraulic yaw suspension	6-11
Boom tilt	6-12
Bi-fold	6-12
Ultrasonic boom height levelling . .	6-13

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.

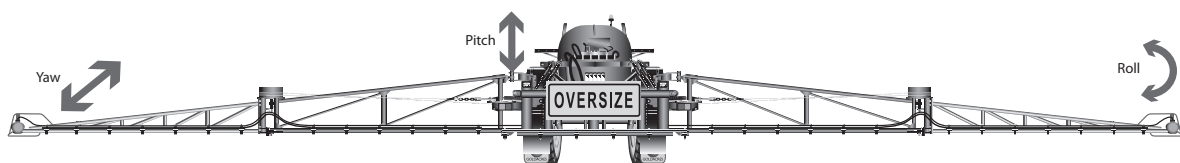
Tri Tech booms feature a unique (patented) boom suspension system.

This system provides suspension in three directions:

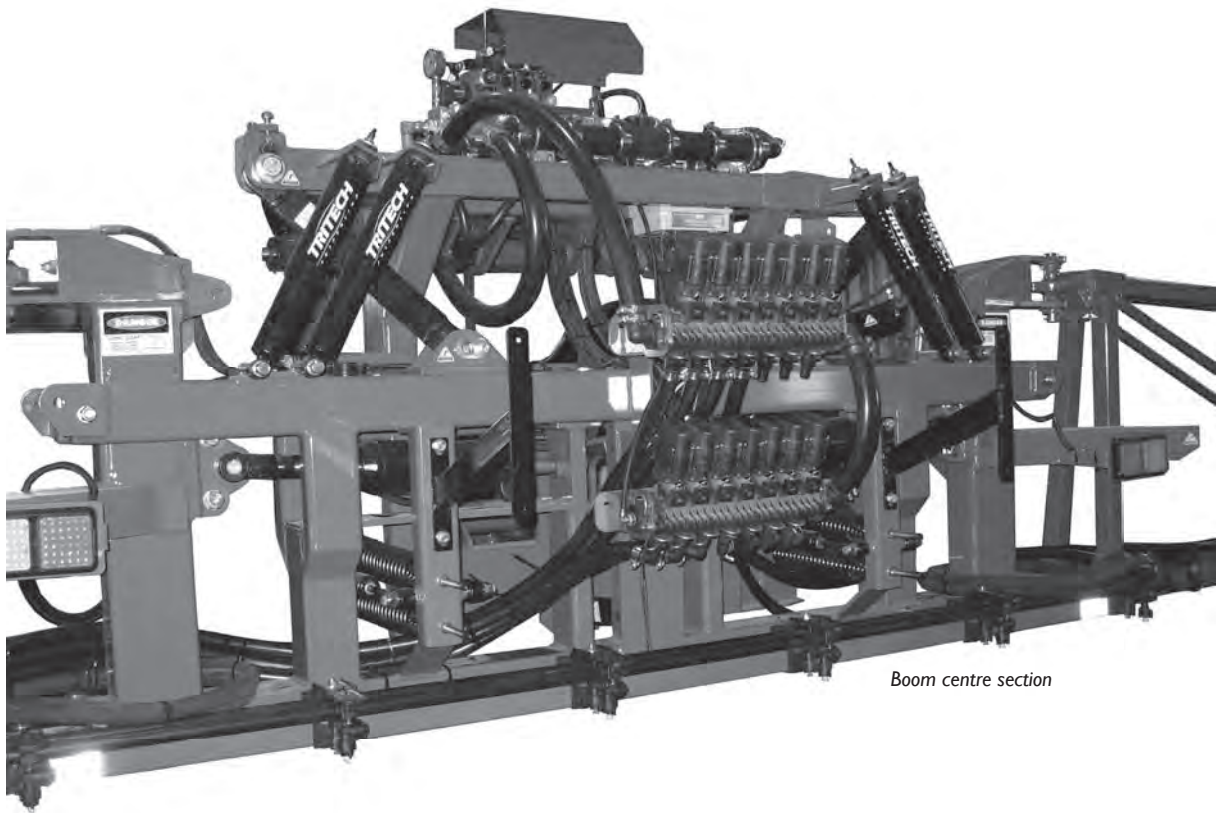
Pitch: Hydraulic cylinders and accumulators dampen the vertical boom movement encountered over rough ground conditions.

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

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



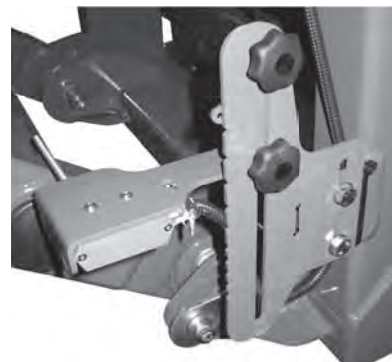
BOOM KEY FEATURES



Boom centre section



Paralift side shot



Boom height limit switch

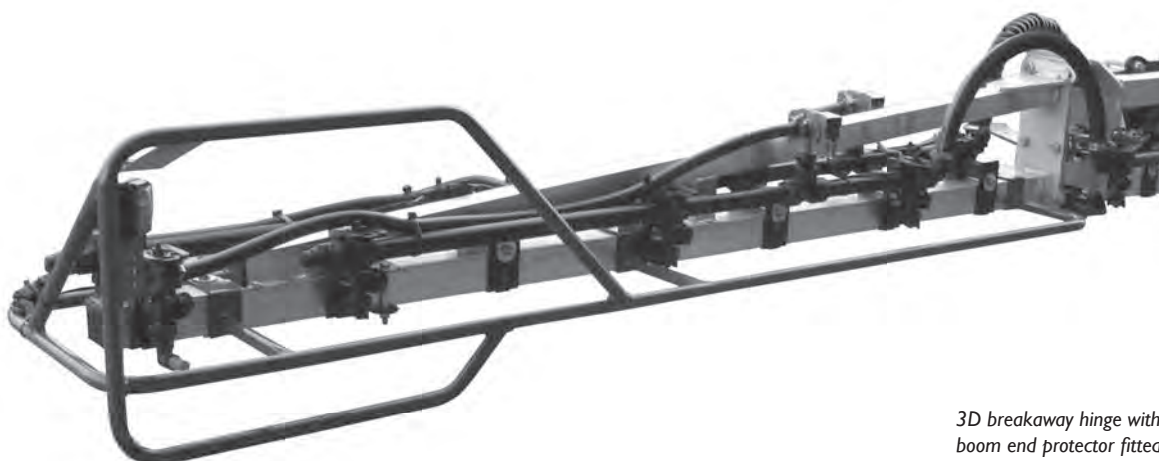
BOOM KEY FEATURES



Boom wing

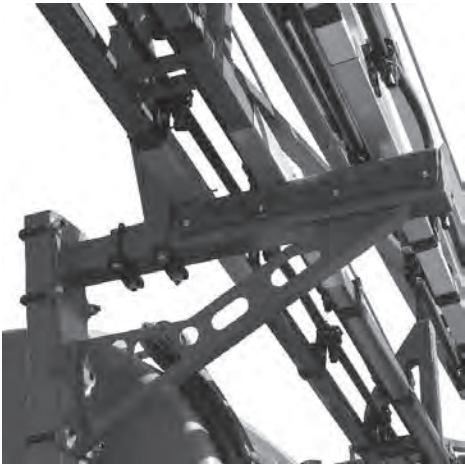


Boom outer wing



*3D breakaway hinge with
boom end protector fitted*

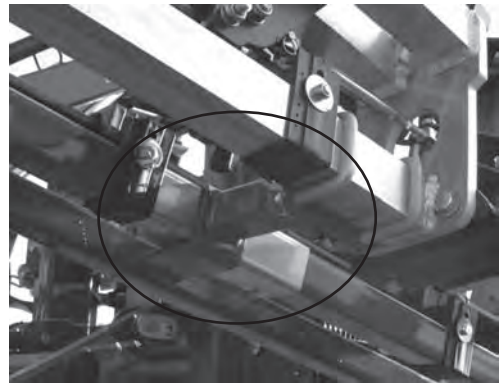
BOOM KEY FEATURES



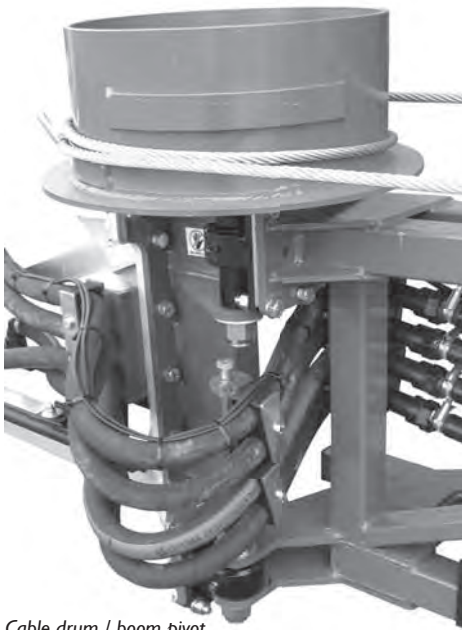
Boom rest



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 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 accumulator 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 adopt 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 achieve 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.

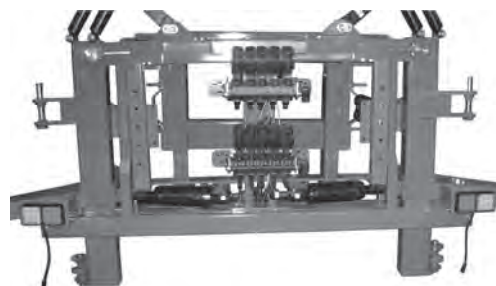
Loose boom cables can cause boom damage by allowing the outer boom section to hang out of alignment or to ‘break away’ too easily. This can shorten the sprayers life by placing unnecessary stresses on the boom, lift and chassis.

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.



Bare centre section showing boom valve location



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, 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



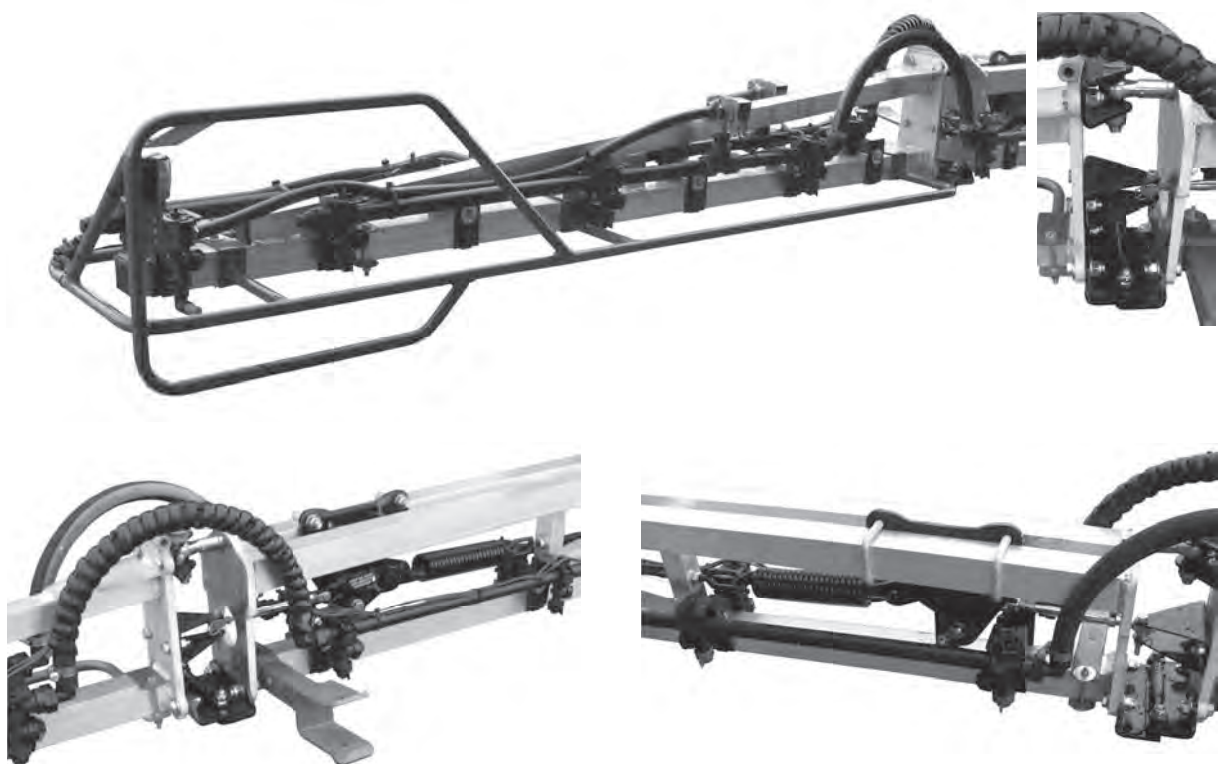
Nozzle bracket mounted on boom



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).



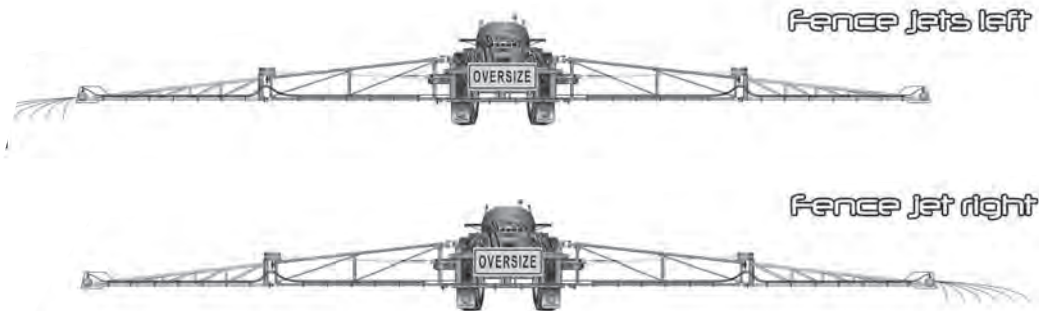
Remote fence line jet



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 separate circuit which acts as the yaw suspension.

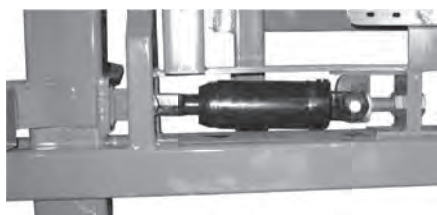
Further information on hydraulic yaw can be found in the "maintenance" section.

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 tilt operation affects the balance of the boom causing rocking of the whole boom assembly.

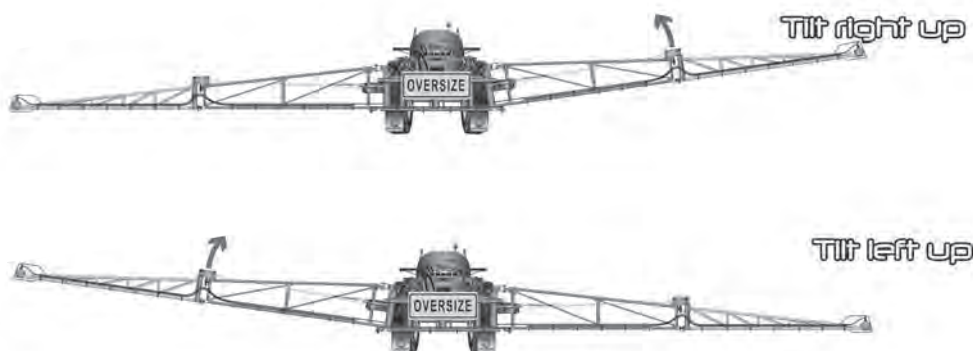
Where hydraulic tilts are not fitted, a fixed link is placed in substitute for the tilt cylinder.



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.

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.

For example a 36 metre Tri Tech boom

Operate the boom at a reduced width



BI fold close

ULTRASONIC BOOM HEIGHT LEVELLING (Option)

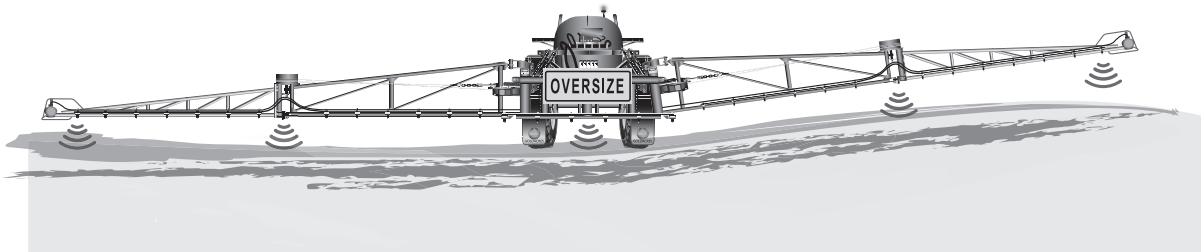
The Goldacres ultrasonic boom height levelling system allows you to spray more precisely by automatically adjusting the height of your boom as you travel across the paddock. The operator sets a desired height above the target

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 7

CALIBRATION

General	7-2
Overview	7-3
Control valve	7-3
Flowmeter.....	7-4
Speed sensors.....	7-5
Raven 440/450 console calibration..	7-6
Jug test.....	7-20

GENERAL

Spraying is a complex task, that is affected by many variables. It is the responsibility of the operator to be familiar 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:

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	

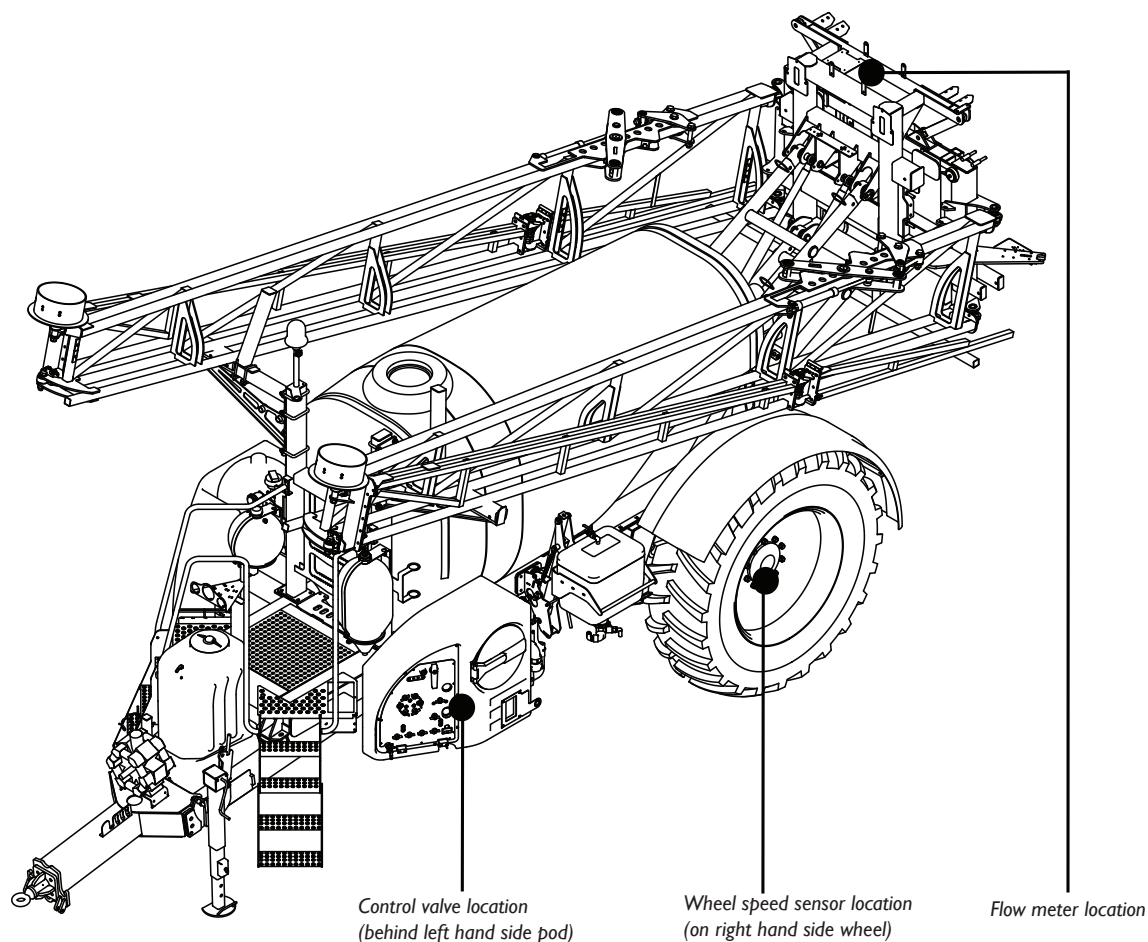
Useful formulas:

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

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

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

OVERVIEW



CONTROL VALVE

The fast close valve is located behind the left hand side pod.

The fast close 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.

The fast close valve is a positive ball valve which means it can control flow infinitely to the boom from 0 l/min to the maximum pump output.

The fast close valve can be operated in manual mode from the console for boom priming, flushing and also trouble shooting.



Fast close valve

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 =
 $185 \times 3100 / 3000 = 191$

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 utilise 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) or "C-FC" (Fast close valve) depending on the valve fitted.

NOTE: The fast close valve is the valve that is fitted as standard.

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 whilst 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 ($\frac{1}{2}$ metre) spacings = $12 * 0.5\text{m} = 6$ 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 (The 6th switch is not used). 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 ($\frac{1}{2}$ metre) spacings = $12 * 0.5\text{m} = 6$ 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 (1 metre = 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" (standard valve) "743" (fast close valve)
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.

RAVEN 4400&4070 CONSOLE CALIBRATION

The following information is a condensed version of the Raven installation and service manual. It is designed to provide sufficient basic information to enable the new unit to be calibrated before spraying is commenced. For more detailed information about console features, consult the Raven installation and operational manual.

It is imperative that the Raven console is correctly programmed, as the system will only work as accurately as the programmed information entered. The Raven 4000 series consoles are very similar however there may be slight differences during calibration - for specific information please refer to the Raven operator's manual supplied with the machine.

NOTE: While proceeding through the initial console programming write down all relevant calibration values for future reference.

The following steps are very important because the system will appear to function properly but be very inaccurate if values are incorrectly entered.

STEP 1: TURNING THE CONSOLE ON

1. Turn the console 'ON' by momentarily depressing the [POWER] key.
2. Instruction for adjusting the contrast should now be displayed

NOTE: If this is not displayed or if an incorrect entry is made during programming turn the console power switch 'OFF' depress and hold the [CE] key while turning the power switch back "ON". This procedure resets the console.

3. Adjust the screen contrast as directed by depressing and holding the or keys.
4. When the desired contrast is achieved

depress the [ENTER] key.

5. The display should now flash the word "CAL" and prompt for a "UNIT OF MEASURE" to be selected.

STEP 2: UNITS OF MEASURE

1. Momentarily depressing the [CE] key repeatable at this stage toggles the console through the "UNITS OF MEASURE" selection.
2. To operate in litres/hectare ensure "UNITS SI METRIC HECTARES" is display.
3. Then depress the [ENTER] key to lock it in.
4. The console will now prompt for a "PRODUCT TYPE" to be selected.

STEP 3: PRODUCT TYPE

1. Momentarily depressing the [CE] key repeatedly at this stage toggles the console between "LIQUID" and "GRANULAR" control selections.
2. Sprayers require the selection of "LIQUID CONTROL" to function correctly. (Granular control would be selected when using a fertilizer spreader or air seeders).
3. Ensure "LIQUID CONTROL" is displayed then depress the [ENTER] key to lock it in.
4. The console will now prompt for a "VALVE TYPE" to be selected.

STEP 4: VALVE TYPE

To select the correct valve type: Labelling on the side of the flow control valves provides information on the "VALVE TYPE" ("VALVE CAL" information is also on the label and will be required in step 6 below).

Momentarily depressing the [CE] key

repeatedly at this stage toggles the console through the various valve types.

1. Ensure correct "VALVE TYPE" is displayed as labelled on the valve then depress the [ENTER] key to lock it in.
2. The console will now prompt for a "METER CAL" value to be entered.

STEP 5: METER CAL

All Raven flow meters are pre-calibrated. The calibration tag is attached to the transducer wire directly adjacent to the flow meter. The metric calibration number is the number in [square brackets] i.e. [185].

To enter the meter calibration figure first:

1. Depress the [ENTER] key.
2. The console will now display "E" enter symbol on the bottom right hand side of the calibration screen.
3. Key in the correct calibration number (i.e. 185).
4. Depress the [ENTER] key again to lock it in.
5. The console will now prompt for a "VALVE CAL" value to be entered.

NOTE: When entering any calibration figures during the calibration process the [ENTER] key must first be depressed momentarily to display the "E" enter symbol. The "E" indicates the console is ready to accept a calibration figure. After keying in a figure the [ENTER] key must be depressed again to lock the new value in before moving on to the next step.

STEP 6: VALVE CAL

The [VALVE CAL] value is located on the side of the flow control valve together with the "VALVE TYPE" "FAST CLOSE VALVES" have a value of [743].

To enter the value calibration figure:

1. Depress the [ENTER] key to display the "E" enter symbol.

2. Key in the appropriate [VALVE CAL] calibration number as printed on the side of the flow control valve.
3. After keying in the appropriate valve calibration number depress the [ENTER] key again to lock it in.
4. The console will now prompt for a [RATE CAL] number to be entered.

STEP 7: APPLICATION RATE

[RATE CAL] is the rate (litres/hectare) desired for the particular application

NOTE: Before entering an application rate consult the nozzle application chart (in the operators manual or the Tee Jet catalogue) to ensure the rate is within the speed and pressure capabilities of the nozzles fitted to the boom.

To enter a [RATE CAL]:

1. Depress the [ENTER] key to display the "E" enter symbol.
2. Key in the desired application rate (i.e. 50 Lt/ha).
3. Depress [ENTER] again to lock it in.
4. The console will now prompt for a "SPEED SENSOR TYPE" to be entered

NOTE: If the console detects the presence of a 2nd product it will automatically interrupt the programming procedure at this point and request values be entered for PRODUCT TYPE, VALVE TYPE, METER CAL, VALVE CAL, and RATE for this 2nd product. The console will then revert back to STEP 8 if a 3rd product is not detected. If a 3rd is detected the console will automatically request the information be entered for this product before continuing no to STEP 8 below.

For SCS 4400 console connected to a chemical injection pump/s see separate section on SCS 4400 chemical injection pump programming, in the "DCI" chapter for further details.

STEP 8: SPEED SENSOR TYPE

Before proceeding in this step first identify which type of speed sensor the console is connected to.

Radar speed sensor or Raven GPS:

1. Momentarily depress the [CE] key repeatedly to toggle through the selection of "SPEED SENSOR TYPES" until "SPEED SENSOR RADAR SP-2" is displayed.
2. Depress the [ENTER] key to lock it in and the console will now prompt for a "SPEED CAL" number to be entered.

For sprayers fitted with a Wheel Drive or Tail Shaft speed sensor:

1. Momentarily depress the [CE] key repeatedly to toggle through the selection of "SPEED SENSOR TYPES" until "SPEED SENSOR WHEEL SPEED SP-1" is displayed.
2. Depress the [ENTER] key to lock it in.
3. The console will now prompt for a "SPEED CAL" number to be entered.

STEP 9: SPEED CAL

Before a [SPEED CAL] figure can be entered a speed calibration value must first be ascertained. The method for calculating a speed calibration figure varies depending on the type of speed sensor the console is connected to

For consoles connected to a radar speed sensor: Use an arbitrary [SPEED CAL] value of [152]

To enter this value:

1. Depress the [ENTER] key to display the "E" enter symbol.
2. Key in the appropriate [SPEED CAL] number.
3. Depress the [ENTER] key again to lock it in.
4. The console will now prompt for a

"BOOM CAL 1" number to be entered.

NOTE: This is an arbitrary value only and will require correcting; using the following procedure, once the remainder of the programming procedure is completed.

To recalibrate a [SPEED CAL] value once initial console programming is complete:

1. Accurately mark and measure 100 metres.
2. With the power switch "on" and all other switches "Off"
3. Depress the [DISTANCE] key.
4. Depress the [ENTER] key to display the "E" enter symbol.
5. Key in a "0" value.
6. Then depress the [ENTER] key again to lock it in.
7. Drive the 100 metres, being careful not to accelerate or decelerate too suddenly.
8. Record the distance that the console displays once the 100 metres has been travelled.
9. The distance should read 100. If it reads between 99 or 101 this calibration value will be correct. If the distance reads any other value perform the following procedure.

$$\text{NEW [SPEED CAL] VALUE} = \frac{\text{OLD [SPEED CAL] VALUE} \times 100}{\text{RECORDED DISTANCE}}$$

NOTE: Redo the distance check again to confirm the new [SPEED CAL] value is correct.

FOR CONSOLE CONNECTED TO A RAVEN GPS

Use a Speed Cal figure of [785] (standard speed cal figure for all Raven GPS units).

To enter this value:

1. Depress the [ENTER] key to display the "E" enter symbol.
2. Key in the appropriate [SPEED CAL] number.
3. Depress [ENTER] again to lock it in.
4. The console will now prompt of a

“BOOM CAL 1” value to be entered. This value can be checked once initial console programming is complete by using the same procedure for recalibrating a [SPEED CAL] value for a radar speed sensor above.

For consoles connected to wheel drive speed sensors: A wheel speed calibration value is calculated by measuring 10 revolutions of the wheel. This is best done with half a tank of water to simulate an average between full and empty and measured on ground that is typical to what will be encountered when spraying (not on a hard road). Also ensure the tyres are inflated correctly as tyre pressures play a large part in influencing the rolling circumference of the wheels and correspondently the [SPEED CAL] value. The [SPEED CAL] figure should be checked at the start of every season and adjusted if necessary to compensate for tyre wear.

To measure 10 revolutions of the tyre:

1. Mark the bottom of the tyre and the ground at the corresponding point then drive the sprayer forward until the wheel has completed 10 revolutions and the mark on the tyre is at the bottom again.
2. Mark the ground again at this point then measure the distance between the two marks on the ground in meters.
3. Multiply this figure by 10 (to convert into decimetres).
4. The result is the [SPEED CAL] value to be entered into the console.

For example: if a distance of 47.7 metres is measured for the 10 revolutions (between the two marks on the ground) then the [SPEED CAL] value to be entered into the console will be $47.7 \times 10 = [477]$.

To enter this value:

1. Depress the [ENTER] key to display the “E” enter symbol.
2. Key in the appropriate [SPEED CAL]

number.

3. Depress [ENTER] again to lock it in.
4. The console will now prompt for “BOOM CAL 1” value to be entered.

This value can be checked once initial console programming is complete by using the same procedure for recalibrating a [SPEED CAL] value for a radar speed sensor above.

For sprayers fitted with tail shaft speed sensor:

Use an arbitrary [SPEED CAL] value of [155]

To enter this value:

1. Depress the [ENTER] key to display the “E” enter symbol.
2. Key in the appropriate [SPEED CAL] number.
3. Depress [ENTER] again to lock it in.
4. The console will now prompt for a “BOOM CAL 1” value to be entered.

NOTE: This is an arbitrary value only and will require correcting, using the following procedure, once the remainder of the programming procedure is completed.

To recalibrate a [SPEED CAL] value once initial console programming is complete:

1. Accurately mark and measure 100 metres.
2. With the power switch “on” and all other switches “OFF”.
3. Depress the [DISTANCE] key.
4. Depress the [ENTER] key to display the “E” enter symbol.
5. Key in a value of “0”.
6. Depress the [ENTER] key again to lock it in.
7. Drive the 100 metres, being careful not to accelerate or decelerate too suddenly.
8. Record the distance that the console displays once the 100 metres has been travelled.
8. Record the distance that the console displays once the 100 metres has been

travelled.

9. The distance should read 100. If it reads between 99 or 101 this calibration value will be correct. If the distance reads any other value perform the following procedure.

$$\text{New [speed cal] value} = \frac{\text{Old [speed cal] value} \times 100}{\text{Recorded distance}}$$

STEP 10: BOOM SECTIONS

The console needs to know the width of each section so it can calculate;

1. The total flow rate required.
2. The area applied.

As boom sections are turned on or off the console increases or decreases the theoretical width of the boom accordingly in order to calculate the correct flow rate (total Lt/min to the boom) and the total area sprayed.

To measure the 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 50cm (½ metre) spacings = 12 x 0.5m = 6m

All Boom Sections must be entered in Centimetres (for example 6m = 600cm) so the correct Boom Cal in this example would be 600.

To enter a [BOOM CAL] figure for boom 1:

1. Ensure boom 1 is displayed.
2. Depress the [ENTER] key to display the "E" enter symbol.
3. Key in the boom width in centimetres for boom 1.
4. Depress the [ENTER] key to lock it in.

NOTE: At this point the console does not proceed automatically to boom 2.

5. To proceed to Boom 2 depress the key momentarily.

6. Depress [ENTER] and key in the calibration figure for boom 2.

7. Depress the [ENTER] key again to lock it in.

Depress the key and continue entering the [BOOM CAL]'s in the remaining boom sections. If a boom section is not utilised ensure "0" is entered in that section or the console will fail to function correctly.

INITIAL PROGRAMMING IS NOW COMPLETE.

If the sprayer is fitted with the 3TS option see the separate section on Raven SCS 4400 3TS dual boom operation and programming.

NOTE: Each time the console power switch is turned "on" the products automatically default to the "OFF" mode. Before commencing spraying the product must be changed to the "AUTO" mode.

To change to the "AUTO" mode:

1. Momentarily depress the [PRODUCT ON/OFF] key to turn the product "ON". At this point the console should read "AUTO NOBM" (auto no boom).
2. If it reads "MAN NOBM" (manual no boom) momentarily depress the [AUTO/MANUAL] key to switch to the product to the auto mode.

The "NOBM" (no boom) component automatically disappears when the console senses the switching "on" of a boom section.

If you wish to change a calibration figure for Boom Cal, Speed Cal, Meter Cal, Valve Cal or Rate Cal (application rate) at any time simply depress the appropriate key i.e. [BOOM CAL], then the [ENTER] key to display the "E" enter symbol, key in the new calibration number and depress the [ENTER] key again to lock it in.

If you wish to view the Units of Measure, Product Type, Valve Type or Speed Sensor Type depress and hold down the [SELF TEST] key and the console will flash through the various values entered. If you wish to change the Units of Measure, Product Type, Valve Type or Speed Sensor Type continue holding down the [SELF TEST] key for 20 seconds until the console stops on "UNITS OF MEASURE" and flashes "CAL". Once "CAL" is displayed release the [SELF TEST] key.

At this point repeatedly depressing the [CE] key momentarily will toggle the console through the various options in each step and depressing the [ENTER] key will lock it in and/or move on to the next step. To exit this function at any time continue momentarily depressing the [ENTER] key until the console reverts back to "SELF TEST" and discontinues flashing "CAL".

STEP 11: PUMP RPM (Required if pump is hydraulically driven).

For RPM to be displayed on the console screen the sprayer must be fitted with a pump RPM sensor.

To activate the pump RPM display on the console screen:

1. Depress the [DATA MENU] key to display the data sub menu at the bottom of the screen. The word "SERIAL" will be highlighted.
2. Depress [DATA MENU] key again and the highlight will move down to "PRODUCT".
3. Momentarily depress the key repeatedly to move the cursor down until page 2 is displayed.
4. Continue momentarily depressing the key repeatedly until the cursor is adjacent to "PUMP CAL".
5. Depress the [ENTER] key to display the to display the "E" (enter symbol).
6. Key in a value of pulses per revolution (normally one)

7. PRM should now be displayed in the top right hand corner of the screen.

8. Depress a volume or area key to exit the data sub menu and return to the operational screen.

STEP 12: LOW FLOW LIMIT

This feature, when activated, stops the console controlling the flow rate below an assigned limit to prevent boom line pressure falling too low resulting in fan angle collapse or nozzle check valve closure.

This feature is particularly useful in rowcrop situations to prevent 'under- application' at the start and end of a row.

In this mode the console effectively defaults to an 'over-application' mode during periods when the sprayer is unable to maintain the minimum speed required for a particular application rate.

NOTE: This feature must not be used with chemicals that have poor crop selectivity and will cause damage to the crop if 'over-applied'. Check with your chemical supplier for more details on chemical/crop selectivity before using this feature.

The SCS 4400 also has the added ability to control to this minimum flow rate value. To activate this feature a minimum flow rate value must be calculated and entered into the console.

To calculate a minimum flow rate refer to the relevant nozzle chart for the nozzle type/size fitted to the sprayer. Nozzle charts can be found in the operator's manual or the TeeJet catalogue.

From the nozzle chart determine the flow rate of the nozzle used at the minimum recommended operating pressure. Multiply this figure by the total number of nozzles fitted to the entire boom line to obtain the "LOW FLOW LIMIT" value.

NOTE: This minimum flow rate value is automatically proportioned as boom sections are turned on and off. Thus a minimum pressure will be maintained regardless of boom section status.

Entering a Low Flow Limit value:

1. Depress the [DATA] key to bring up the data submenu at the bottom of the screen. The word "SERIAL" will be highlighted.
2. Depress the [DATA] key again to highlight "PRODUCT".
3. Momentarily depress the key repeatedly to move the cursor adjacent to "LOW LIMIT".
4. Depress the [ENTER] key to display the "E" (enter symbol).
5. Enter the "LOW FLOW LIMIT" value calculated.
6. Depress the [ENTER] key again to lock it in.
7. Depress a volume or area key to exit the data sub menu and return to the operational screen.

STEP 13: TO ZERO INFORMATION WHEN STARTING A NEW LOAD

When starting a new load, the previous Area and Volume data in the console can be reset using the following procedure;

"TANK VOLUME" gives the operator a reference as to the number of litres left in the tank as the load is progressively applied to the field. For this feature to function correctly the estimated volume in the tank must be entered before application of the new load is commenced. (A Raven Fill-flow meter can be WARNING: the [self test] feature should never be used with chemical in the tank used to more accurately determine tank volume particularly if using partial tank loads

1. Depress the [VOLUME TANK] key.
2. Depress the [ENTER] key to display the "E" enter symbol.

3. Enter the volume of liquid actually in the tank at the start of the load.
4. Depress [ENTER] again to lock it in.

NOTE: The console will subtract the litres used (count down) from this value as the load is applied to the field giving the operator a reference as to the number of litres left in the tank.

TO ZERO OUT DATA IN AREA AND VOLUME:

NOTE: Before resetting the Area and Volume functions record any previous data in the console that maybe applicable for future use.

To reset an Area or Volume value:

1. Depress the relevant key relating to the value to be reset. For example [TOTAL AREA], [TOTAL VOLUME], [FIELD AREA] or [FIELD VOLUME].
2. Depress the [ENTER] key to display the "E" enter symbol.
3. Enter a value of "0" to reset the particular function.
4. Depress the [ENTER] key again to lock it in.

The Area and Volume will now count up from zero for the new field.

[FIELD AREA] and [FIELD VOLUME] are generally use as sub-totals for [TOTAL AREA] and [TOTAL VOLUME].

For example if applying several tank loads to the one area [FIELD AREA] and [FIELD VOLUME] can be use to record data for the current tank load while the [TOTAL AREA] and [TOTAL VOLUME] can be used to record accumulative data for the whole area. If [TOTAL AREA] and [TOTAL VOLUME] are used to accumulate data do not reset them until starting a new area.

WARNING: The [self test] feature should never be used with chemical in the tank.

WARNING: Do not use the self test function with the booms in the transport position.

To simulate a speed:

1. Depress the [SELF TEST] key momentarily.
2. Depress [ENTER] key to display the “E” enter symbol.
3. Key in a desired test speed. Note this feature has a decimal point so a “0” needs to be added when entering a whole figure. For example 1, 6 and 0 for 16 Kph.
4. Depress the [ENTER] key again to lock it in.

A desired test speed should now be displayed in the speed window at the lower left corner of the display

Spraying can now be simulated by simply turning on the boom switches.

The [SELF TEST] feature will automatically clear itself when motion is detected from the speed sensor.

NOTE: Some radar and GPS units may sense motion when the sprayer is stationary thus continually clear this function. To counteract this simply unplug the speed sensor at the back of the console whilst using this function.

Using the flowmeter to calibrate the tank:

1. Enter in the Meter Cal value as given on the white Calibration sticker on the Flowmeter.
2. Enter all the other calibration information needed to enable the console to work.
3. Fill the tank to the top mark with water (i.e. 2500 or 3000 etc.). Make sure the tank is level.
4. Make sure the Total Volume reads “0”

Press [TOTAL VOLUME] then [ENTER]
Enter “0” then [ENTER]

5. Perform a self-test. (Choose a relatively

high speed and high rate so that the tank will empty relatively quickly but make sure the pressure does not exceed 60 psi).

6. When the tank is empty press [TOTAL VOLUME] to read what the Raven Flowmeter says the tank holds.
7. If there is a large discrepancy (i.e. the difference between theoretical tank volume and Flowmeter volume is greater than 100 litres), alter the Meter Cal value accordingly.
eg. If volume reads 3100 litres instead of 3000 litres and the original Meter Cal value is 185.

New Meter Cal value =
 $185 \times 3100 \div 3000 = 191$

8. Enter in new Meter Cal value and repeat procedure (Step 3 to Step 6). Continue to re-iterate the Meter Cal value until the desired volume accuracy is achieved
9. Write down the appropriate Speed Cal value for future reference.
10. Re-fill the tank to the top mark and perform the self test again. Stop the self test after every 200 litres has been pumped out (read by pressing [TOTAL VOLUME] and check how the water level compares with the appropriate tank calibration mark.
(i.e. after 200 litres has been pumped out there is 2800 left in a 3000 litre tank). There may need to be extra marks put on the tank to indicate where the actual tank calibration levels are.

3TS (Boom tier programming)

NOTE: 3TS boom tier programming can only be carried out if initial console programming has been completed (see SCS 4400 console programming).

For boom tiering to operate flow rate values (litres/min) have to be entered into the console. The console automatically starts on the first tier when the boom master switch is turned “on” but it needs reference points entered to be able to determine when it should change to the second and third tiers. Thus to achieve the three tiers two flow rate values have to be entered.

Before these figures can be entered the maximum flow rate (litres/min in total to the boom) for each tier must be calculated.

Using a nozzle chart determine the flow rates (for a single nozzle) at which point you wish the console to change tiers. These points are best determined by ascertaining the minimum pressure and thus the corresponding flow rates at which point you wish the next nozzle to cut in. Care must be taken to ensure these minimum pressure/flow rate settings do not exceed the maximum recommended operating pressure of the preceding nozzle.

For example: If you had XR110015 and XR110025 nozzles fitted to the sprayer the minimum pressure that the XR110025's can cut in at is 1.0 bar. The flow rate for an XR110025 nozzle at 1.0 bar is 0.57 Lt/min. The maximum operating pressure for an XR110015 is 4.0 bars at which point the flow rate is 0.68 Lt/min so this combination of nozzles overlaps nicely. In actual fact the XR110025 would cut in at slightly less than 3 bars if the first set point was programmed at the 0.57 Lt/min. (See table page 25).

To determine the second set point of the 3rd tier, first ascertain the minimum

pressure you wish the combination of the two nozzles to operate at. Then add the corresponding flow rates at this pressure for the two nozzles together to form the second set point.

For example: If you wanted the 3rd tier to cut in at one bar you would add the flow rates for the XR110015 and XR110025 at one bar together ($0.34 + 0.57 = 0.91 \text{ Lt/min}$) Again care must be taken to ensure this minimum pressure/flow rate setting does not exceed the maximum recommended operating pressure/flow rate of the preceding nozzle. At 0.91 Lt/min the preceding XR110025 nozzle would be operating at slightly over 2.5 bars before the 3rd tier would cut in. Again a nice overlap.

NOTE: The flow rate values entered into the console for the tier interchange points must be the sum total of all the nozzles on one entire boom line.

For example: A 30 metre boom with 50cm nozzle spacings has 60 nozzles on one boom line, therefore $60 \text{ nozzles} \times 0.57 \text{ Lt/min} = 34.2 \text{ Lt/min}$ which would be the tier 1 max rate value for the example above.

The tier 2 max rate would be $60 \times 0.91 \text{ Lt/min} = 54.6 \text{ Lt/min}$.

NOTE: The above example is based on a 30 metre broadacre boom. Some booms may have different nozzle spacings or layout (i.e. row crop) so it's important to count the total number of nozzles on the first line to ensure the correct Tier Value is calculated and entered.

The pressure figure of one bar is an example only. Other trigger point pressures may be selected.

NOTE: Care must be taken to ensure there is sufficient pressure overlap between the tiers otherwise spray drift or poor efficacy may result.

NOTE: The consoles won't accept tier values containing decimal points so values calculated with decimal points require rounding off to the nearest whole figure before entering.

TO ENTER THE TIER VALUES:

1. Depress and hold down the [BOOM CAL] key for 5 seconds until "TIER 1 HIGH VOL PER MIN" is displayed.
2. Depress the [ENTER] key to display the "E" (enter symbol).
3. Key in the first tier interchange value and depress [ENTER] again to lock it in.
4. To enter the second tier interchange point depress the key and "TIER 2 HIGH VOL PER MIN" will be displayed.
5. Depress the [ENTER] key again to display the "E" (enter symbol).
6. Key in the second tier interchange value and depress [ENTER] again to lock it in.
7. Depress the key again and "PERCENTAGE TIER DISABLE" will be displayed.

The default setting for this function is "10" which means the tiers will overlap 10% above the entered tier values on the 'up-change' and 10% below on the 'down-change'.

This function is useful if the sprayer is operated at a speed and/or rate that coincides with a tier change point. If this scenario occurs the console will tend to hunt between tiers unless a percentage overlap figure is entered. Maintaining the 10% tier disable value at this point will reduce this 'hunting' tendency.

Keep in mind that the pressures will rise over and fall under the set tier value by

the percentage entered. For example if a value of 10% is entered the pressure will rise 10% above the set tier interchange point before a tier 'up-change' will occur and correspondingly fall 10% below the value before 'down- changing'. If using this function ensure the tier interchange points are calculated with this expanded pressure range in mind otherwise the sprayer may operate outside the recommended operating pressure range of the nozzle.

If the nozzles or tier values selected allow for very little or no pressure overlap a "PERCENT TIER DISABLE" value of "0" must be selected:

1. To enter a "PERCENT TIER DISABLE" value depress the [ENTER] key to display the "E" (enter symbol).
2. Key in the desired percentage overlap and depress the [ENTER] again to lock it in.
3. Press a volume or area key to exit this function and return to the operational screen.

SCS 4400 and 2TS

The SCS 4400 3TS system can be set up to operate in a 2TS mode if the operator wishes to use the same size nozzles in both boom lines.

In the 2TS mode the console will start the sprayer on one line then turn the second line on in conjunction with the first at a predetermined point. It effectively does away with the first tier interchange point of the 3TS system where one boom line is turned "on" whilst the other is turned "off" (obviously this step is superfluous if the same size nozzles are fitted to both boom lines).

To set the console up in the 2TS mode:

1. Depress and hold down the [BOOM CAL] key for 5 seconds until "TIER 1 HIGH VOL PER MIN" is displayed.
2. Depress the [ENTER] key to display the "E" (enter symbol).
3. Key in a value of "1".
4. Depress the [ENTER] key again to lock it in.

By entering a value of "1" the console will automatically proceed and start on the second tier.

To calculate the second tier interchange value:

From the nozzle chart in the operator's manual or the TeeJet catalogue locate the minimum recommended operating pressure and corresponding flow rate (Lt/min) for the nozzle size and type fitted to the sprayer.

NOTE: If operating the sprayer in the 2TS mode the same size and type of nozzles should be fitted to both boom lines.

Multiply this value by 2 then by the total number nozzle on one entire boom line. For example: Using a 30 Mt broadcast boom fitted with XRI 1002 nozzles.

The minimum recommended pressure for an XR nozzle is 1 bar. The flow rate for an XRI 1002 nozzle at 1 bar is 0.46 Lt/min. Thus the second tier interchange value will be $0.46 \times 2 \times 60$ (2 nozzles/meter) = 55.2.

NOTE: The console will not except tier values containing decimal points so round any values calculated with decimal points off to the nearest whole number before entering. So the value entered in this example would be 55.

Continuing on from above to enter the second tier interchange point:

1. Depress the key and "TEIR 2 HIGH VOL

PER MIN" will be displayed.

2. Depress the [ENTER] key again to display the "E" (enter symbol).
3. Key in the second tier interchange value and depress [ENTER] again to lock it in.
4. Depressing the key again will display "PERCENT TIER DISABLE" (see instruction above on setting this value).
5. Depress and volume or area key to exit this function and return to the operational screen

NOTE: That if either tier value is set to zero then the boom valves will not open.

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.

This is only one pressure gauge fitted to the sprayer, this is reading the return pressure.

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 maximum flow and pressure parameters of the sprayer.

CHAPTER 8

LUBRICATION & MAINTENANCE

Maintenance schedule	8-2
Lubrication	8-3
Maintenance general	8-5
Boom outer adjustment	8-10
3D breakaway	8-16
3D breakaway maintenance	8-17
Airbag axles	8-19
Filters	8-23
Hydraulic cylinders	8-24

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 at an equal pressure to the spraying pressure

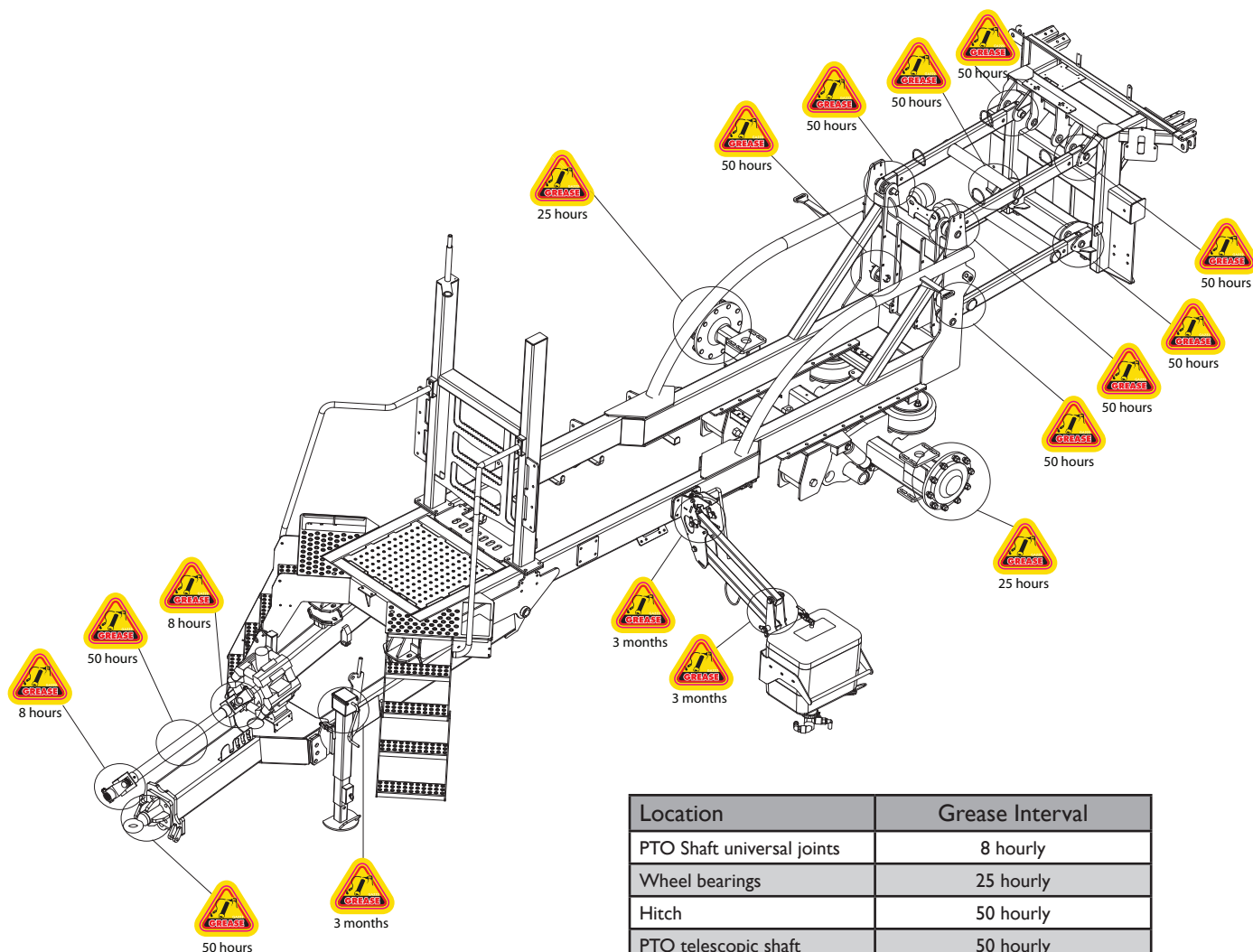
LUBRICATION

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.

Chassis & PTO grease points

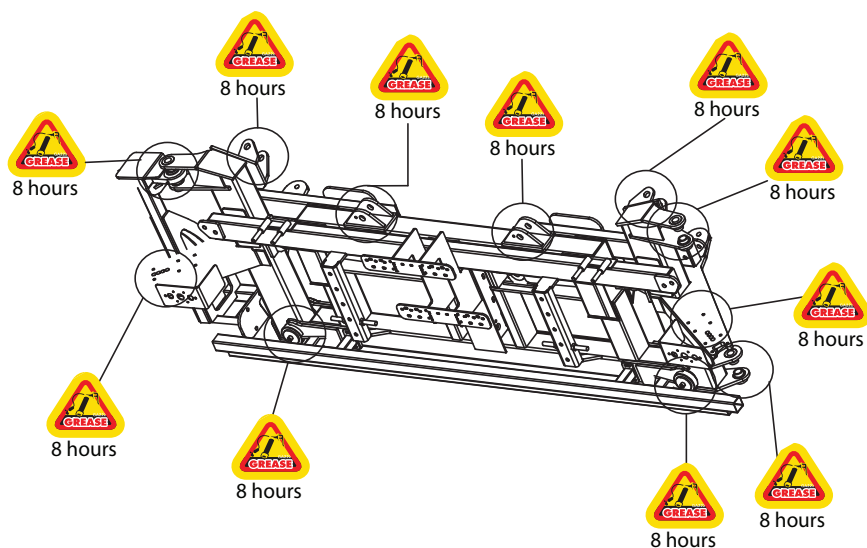
The pictures below outline key lubrication points. Please note the pictures do not show hydraulic cylinders, all hydraulic cylinders (excluding wing tilt cylinder) have grease points at the clevis'.



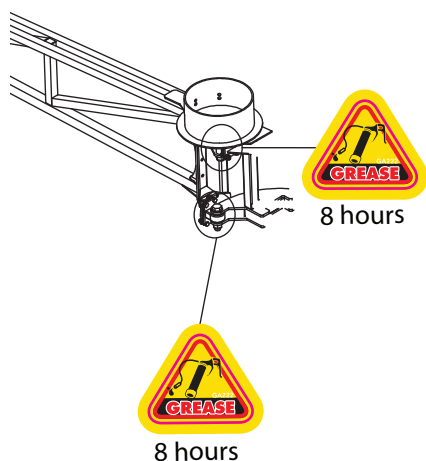
Location	Grease Interval
PTO Shaft universal joints	8 hourly
Wheel bearings	25 hourly
Hitch	50 hourly
PTO telescopic shaft	50 hourly
Paralift arm rose ends	50 hourly
Boom lift cylinders	50 hourly
Jack	3 monthly
Induction hopper pivots	3 monthly

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



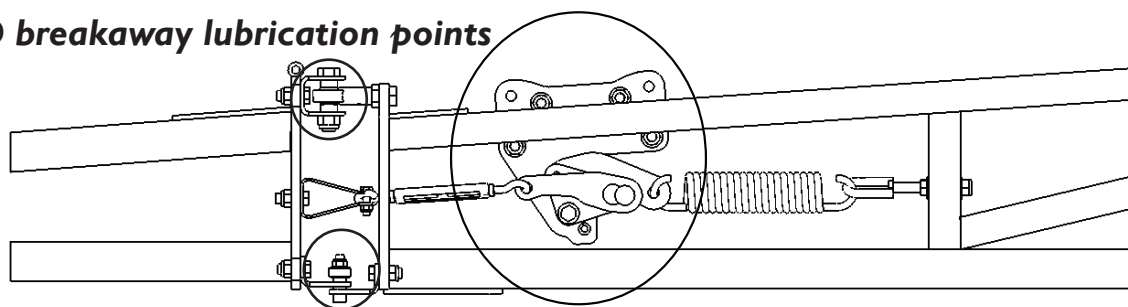
Cable drum grease points



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 lubrication points

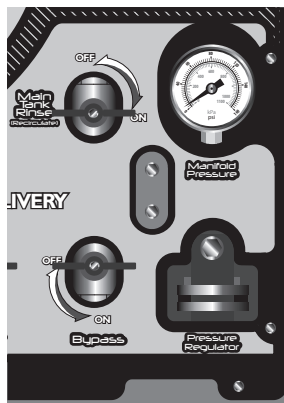


Location	Oil Interval
Pivot points on 3D breakaway	8 hourly

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 turn relief valve counter clockwise. 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 turn the relief valve clockwise 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, excessive flow will be 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 50 hours 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 every 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 (where fitted) pressure (approx 110psi) the air pressure in the air accumulator must be maintained to the correct pressure. If the accumulator constantly loses 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.

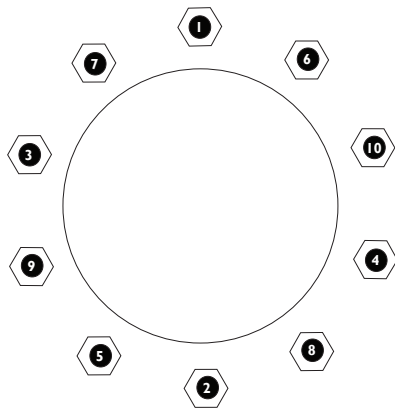
CHASSIS, WHEELS, TYRES & AXLES

8 Hrs

Check tyre pressure: It is very important to

maintain correct tyre pressures to optimize sprayer stability and the load rating. 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 puncture.

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 sequence below 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 there 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. Do not clean with compressed air.

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 wheel as per instructions.

- Remove the bolts from the bearing dust cap and clean out as much 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 solvent.
- Insert new rear seal.
- Pack 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.
- Grease the hub until grease emerges from the seal.

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.

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.

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.

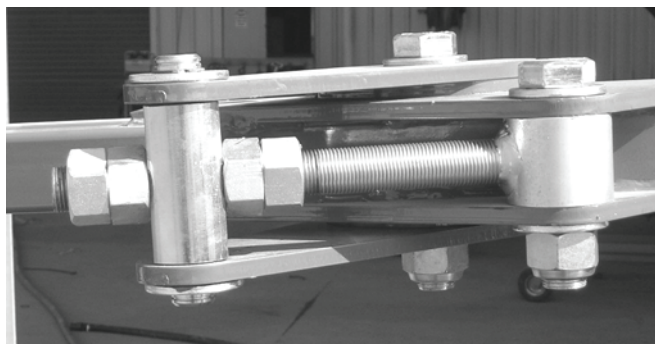
To adjust the switch:

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.

Boom Adjustments

Alignment of the inner (steel) boom section:

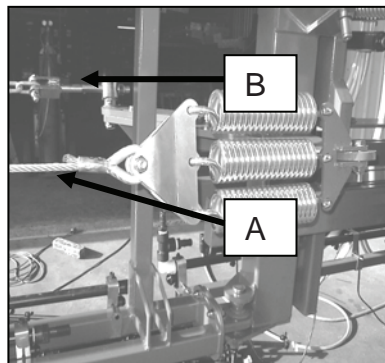
1. Open the boom fully into the working position.
2. Look along the boom from tip to tip. The steel booms at the cable drums must be slightly forward of the centre section.



3. Loosen both lock-nuts on the boom adjustment plate.
4. Adjust the boom by moving the bracket along the thread by tighten or loosening the nuts.
5. When the boom is aligned slightly forward of the centre section tighten both lock-nuts.

Alignment of the outer (alloy) boom section:

1. Open the boom to the fully open, working position.
2. Look along the boom tip to tip. The alloy booms must hang slightly forward of the steel booms. If the booms hang too far forward or rearward of the steel boom twisting forces will be exerted on to the top and bottom chords of the steel boom.



3. There is tension adjustment on both ends of the boom cable (front and rear). Alternately tighten or loosen the cable tension adjuster (A) or the turn-buckle at (B).
4. To adjust the boom rearward tighten the cable tensioner on the rear of the boom.

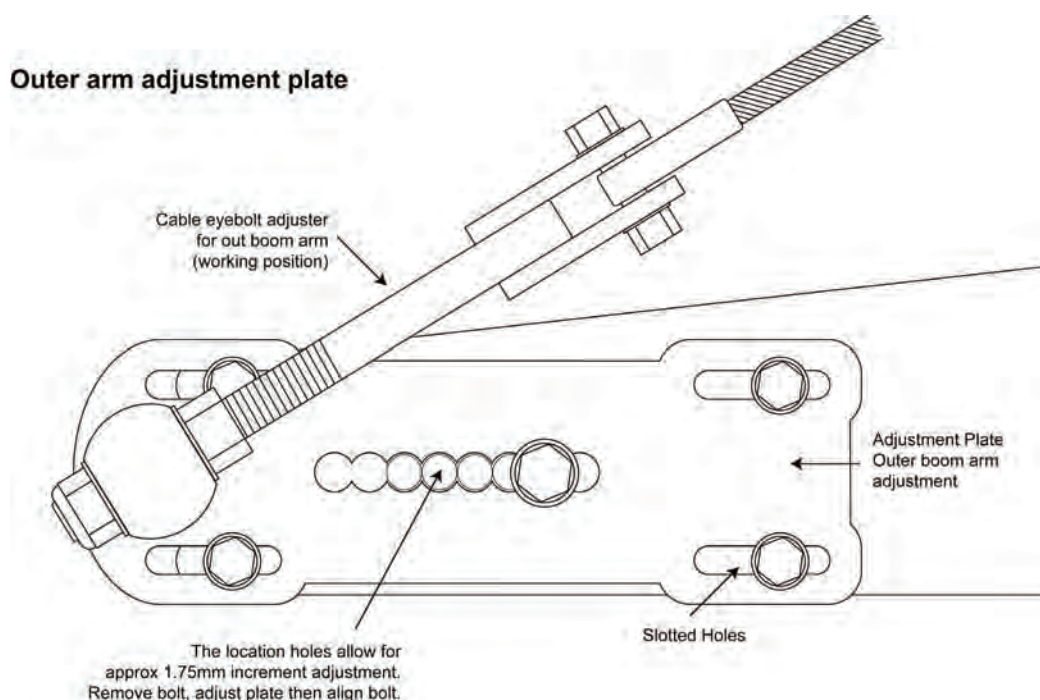
Outer boom arm adjustment plate: (24m + TriTech booms without Bi-Fold option)

- The eyebolt cable adjuster aligns the outer boom arm in the working position; the adjustment plate is designed to adjust the outer boom arm in the folded position.
- The eyebolt adjuster will follow the same orientation as the boom when folding and unfolding. For example, when the boom is in the operating position the eyebolt adjuster should be horizontal in line with the boom. With the boom folded, the eyebolt adjuster should be pointing forward in a raised position, again following the line of the boom.
- Fold in the boom. If the outer boom arm does not come in all the way against the inner boom arm and contact the bump stop then the adjustment plate will need to be moved out. If the outer boom arm contacts the bump stop too early and places too much tension on the cable then the adjustment plate needs to be moved inwards.
- To adjust the plate the boom has to be in the working position. Have someone pull

back on the outer boom arm to release the tension on the cable whilst you make adjustments to the plate. When adjustment is completed ensure the outer boom arm is released carefully so it does not spring forward dangerously. Re-adjust the cable eyebolt to realign the outer boom arm whilst still in the working position before folding the boom and re-checking the alignment in the folded position.

- Repeat the procedure if necessary until the outer boom arm assumes the correct alignment in both the working and folded positions. When this has been achieved drill the two non-slotted holes through the bottom plate install the bolts and tighten.

NOTE: If the outer boom arm contacts the bump stop too early and too much tension is placed on the cable, then the hydraulic cylinder may fail to bring both arms all the way in, or damage the boom arms and cable.



5.To adjust the booms so that the boom hangs forward tighten the cable turnbuckle at the front of the boom.

NB: it is advised to lubricate the threads of the cable adjusters when tensioning the cables.

NB: if cable adjustment runs out the cable will have to be rotated around the cable drum. Loosen the u-bolts that secure the cable to do this.

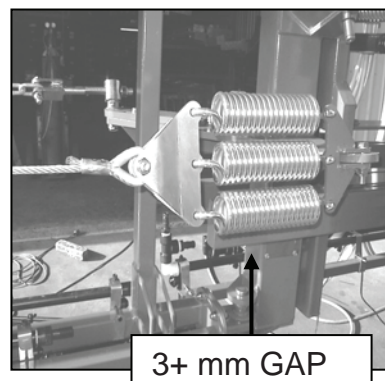
6.When the boom is correctly aligned the spring tension will have to be verified.

7.Ensure all lock-nuts are tightened.

Boom cable tension adjustments:

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 boom life by placing unnecessary stresses on the boom, Para lift and chassis.

- The cable tension can be checked by inspecting the cable springs, which must have a 2-3mm gap between the coils. The tension of the cable affects the rigidity of the boom (i.e. how much the outer wing moves around when the boom is folded and unfolded).
- The boom alignment can be checked by visually inspecting the straightness of boom sections.
- If the boom cable springs don't have at least 2-3mm gap between the centre coils the cable must be tensioned.
- If the alloy boom is correctly aligned, as per "Alignment of the outer (alloy) boom section" the front and rear adjusters must be tensioned evenly so to not misalign the alloy outer
- If the boom is out of alignment use the cable adjusters to align the boom as per "Alignment of the outer (alloy) boom section" as then tension front and rear adjusters evenly till the correct tension is obtained.

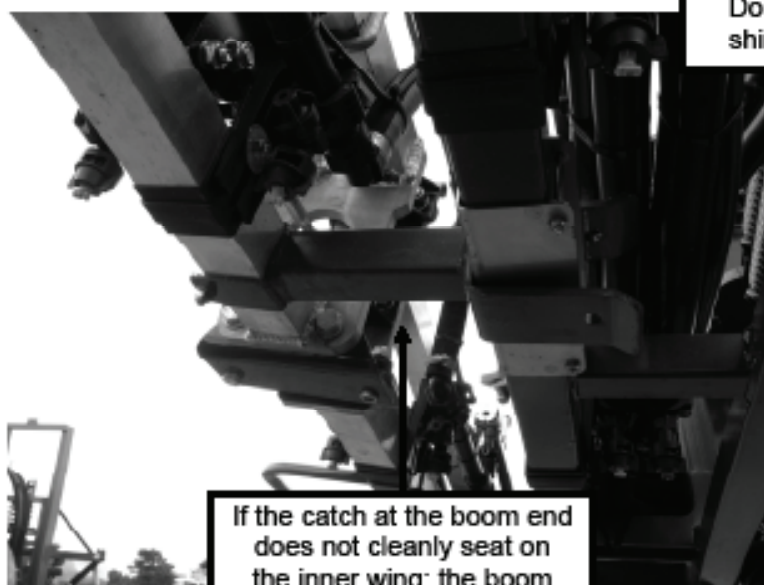
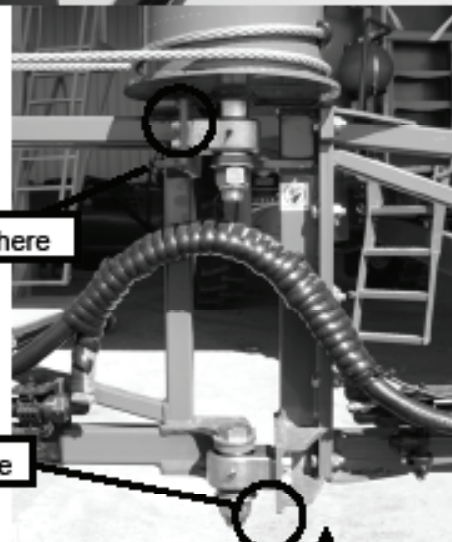
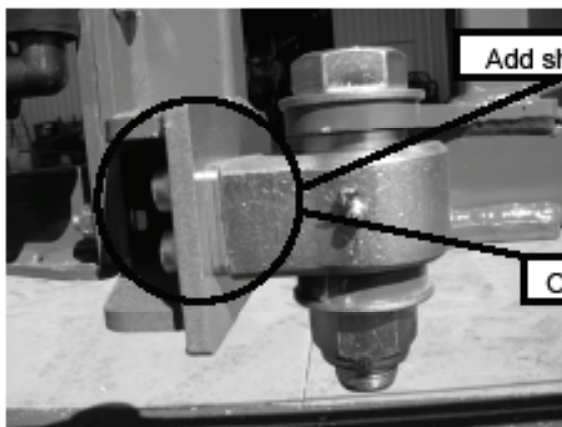
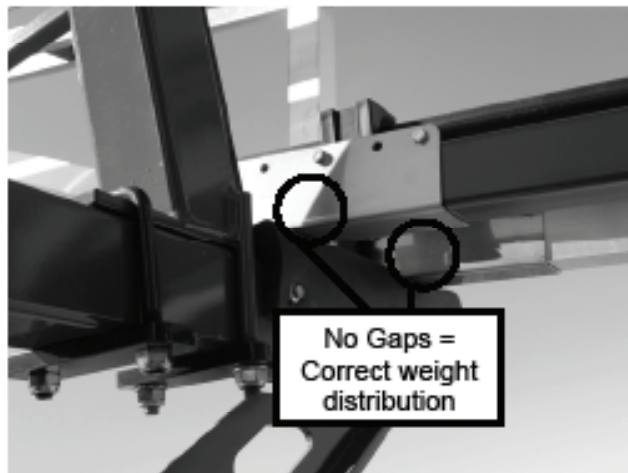


CORRECT ADJUSTMENT OF BOOM OUTER SECTION

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.

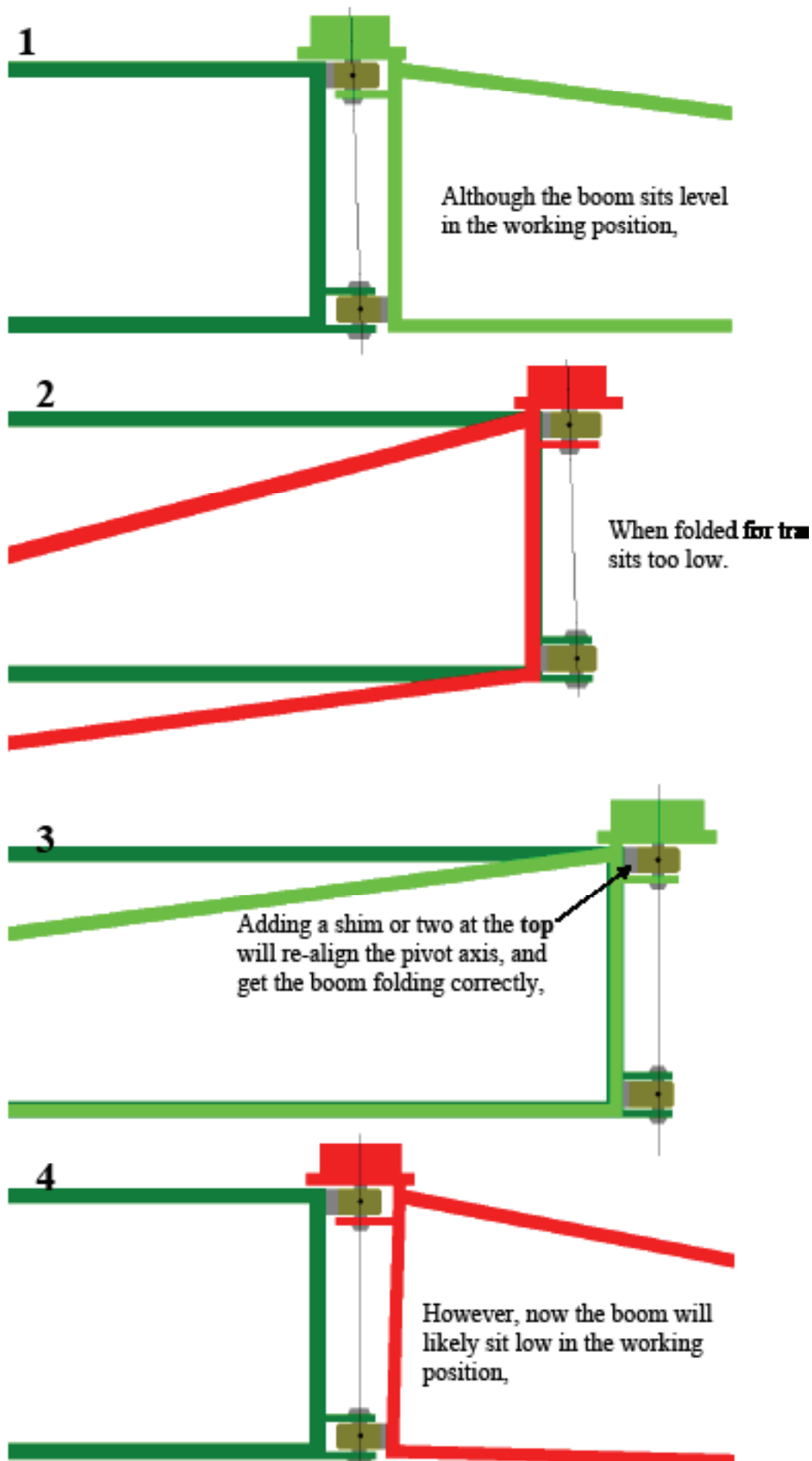
If the weight of the folded boom is supported by the outer section excessive stress is applied to the boom and to the hinge under the cable drum.

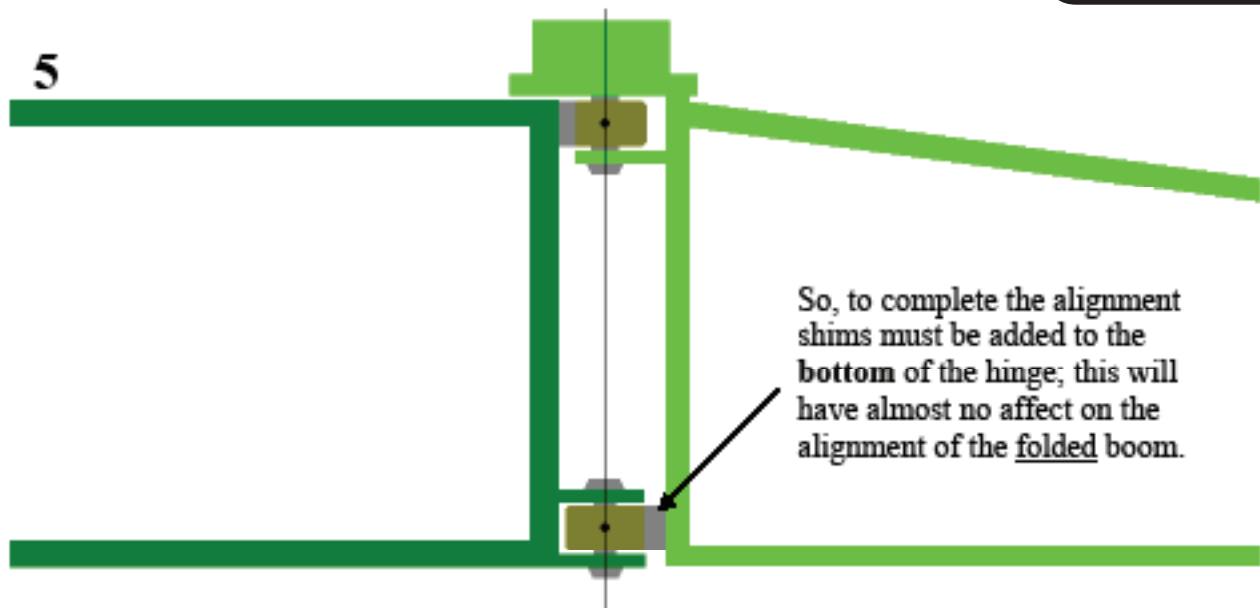
Careful adjustment of the shims on the boom hinge, will in most cases achieve a satisfactory alignment. Placing shims between the aluminium boom mounting plate and the hinge plate must be kept to a minimum.



If the catch at the boom end does not cleanly seat on the inner wing: the boom hinge must be adjusted.

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.

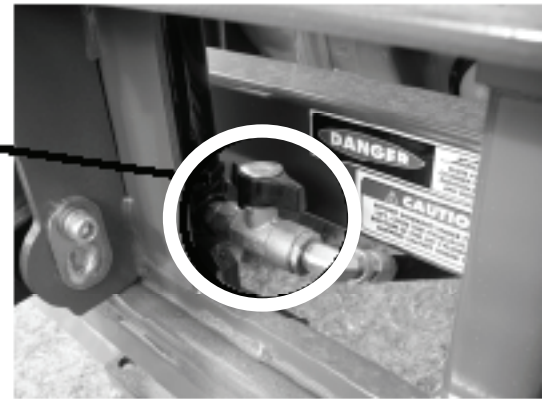
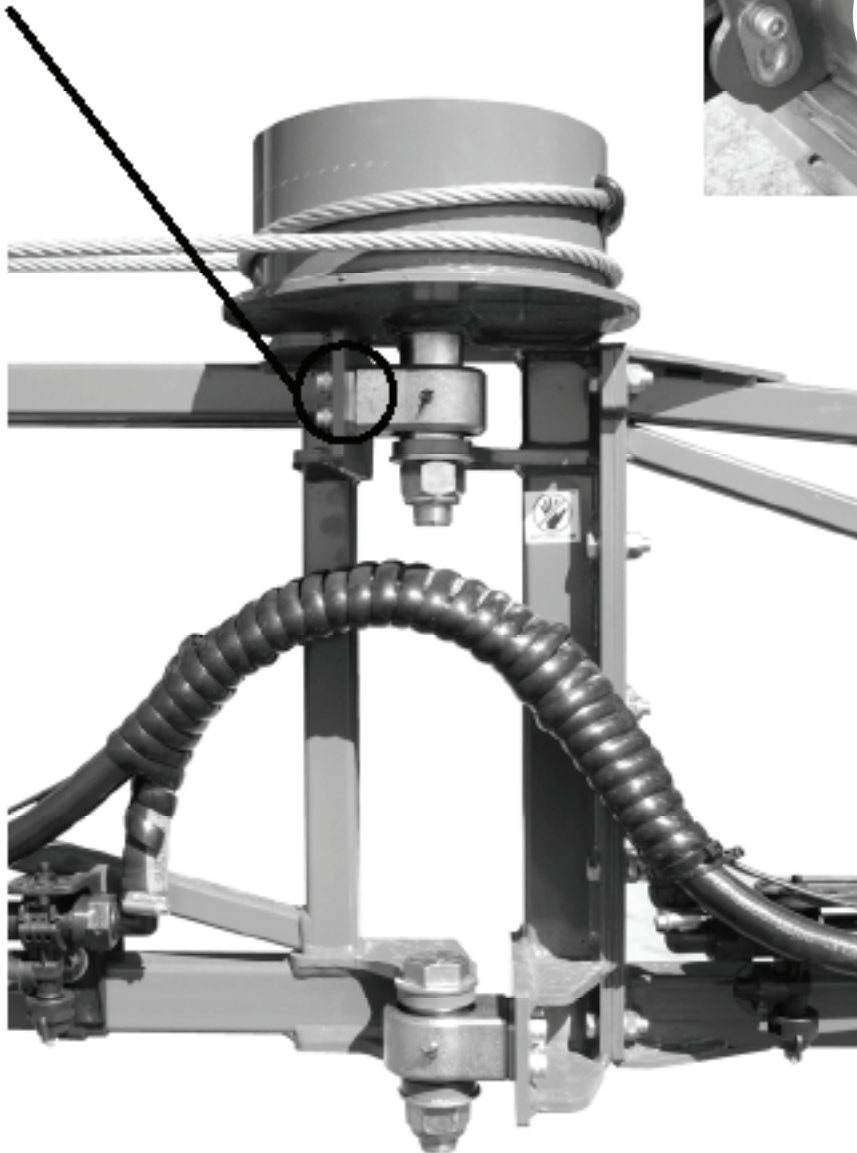
Remove required amount of shims from the top of the hinge to set the pivot axis straight, then remove shims from the bottom of the hinge to ensure the open boom is flat.

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.

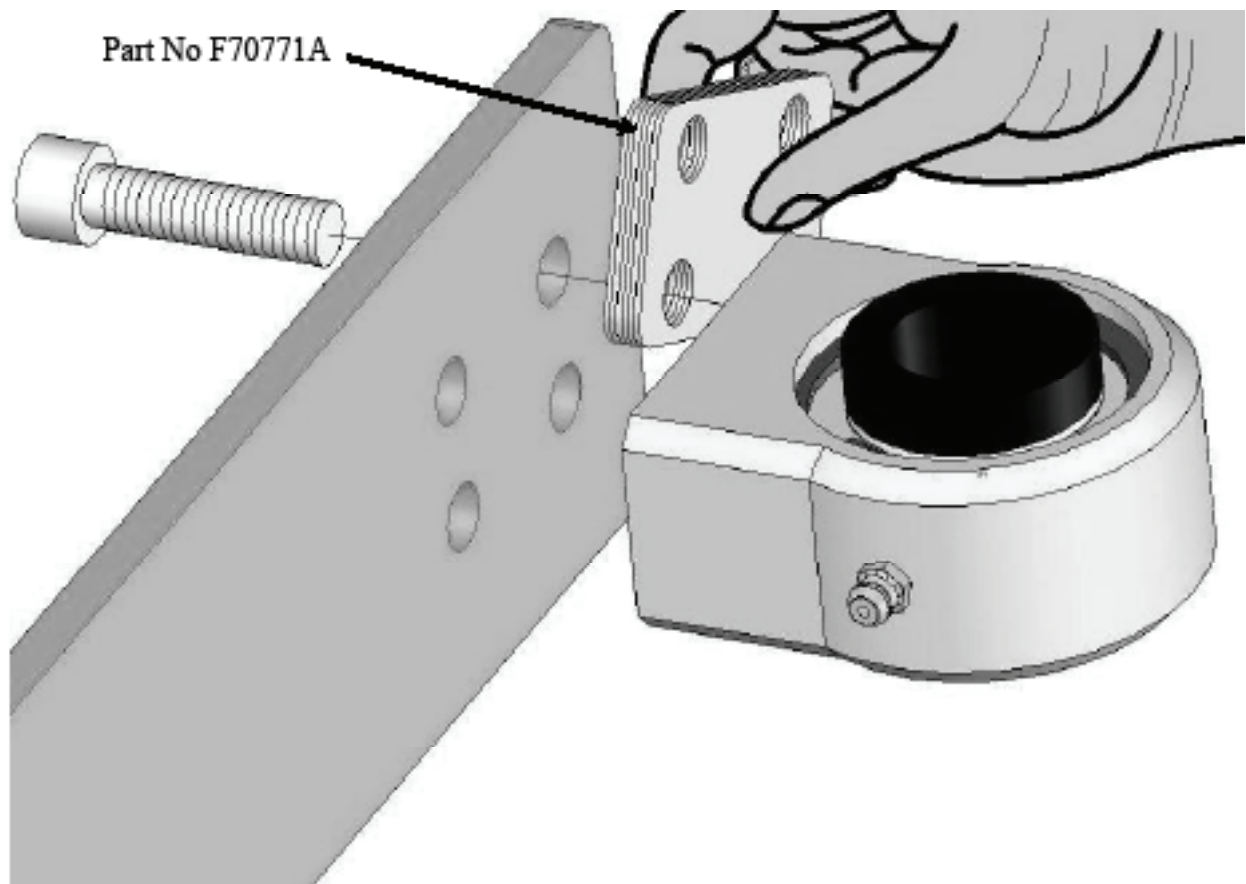


7. With an assistant applying downward pressure to the boom end, completely remove the bolts, catching the shims as they fall.

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.

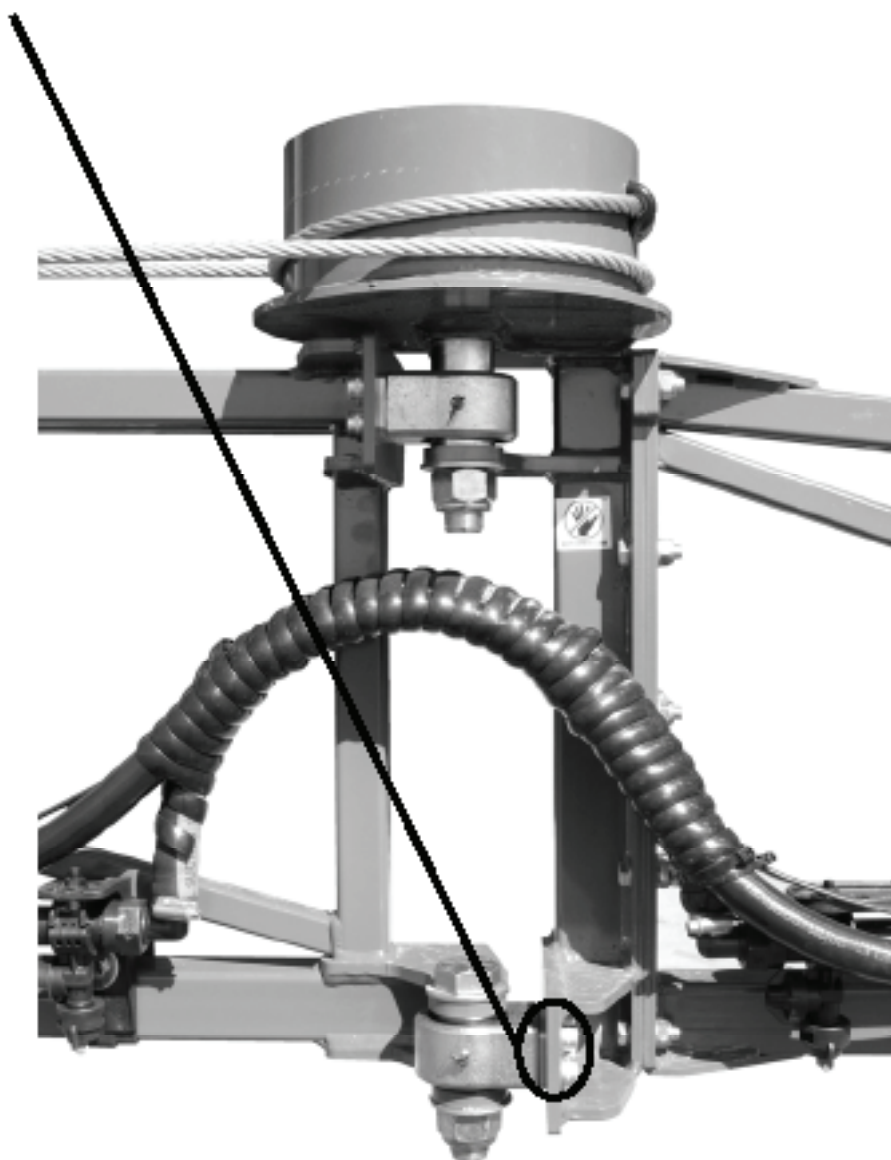
NOTE:

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 both sides of the sprayer.
4. Lower the boom onto the support stands.

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



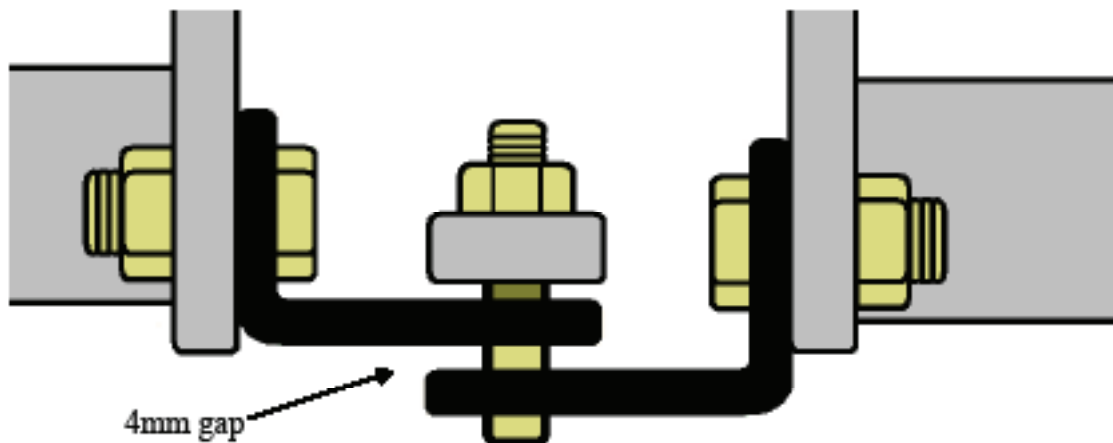
6. With an assistant lifting the boom end, completely remove the bolts, catching the shims as they fall.
7. After adding the required amount of shims to the stack, reinsert the stack as shown in the previous section.
8. Insert the first bolt and finger tighten.
9. Rotate the shims and position the second 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

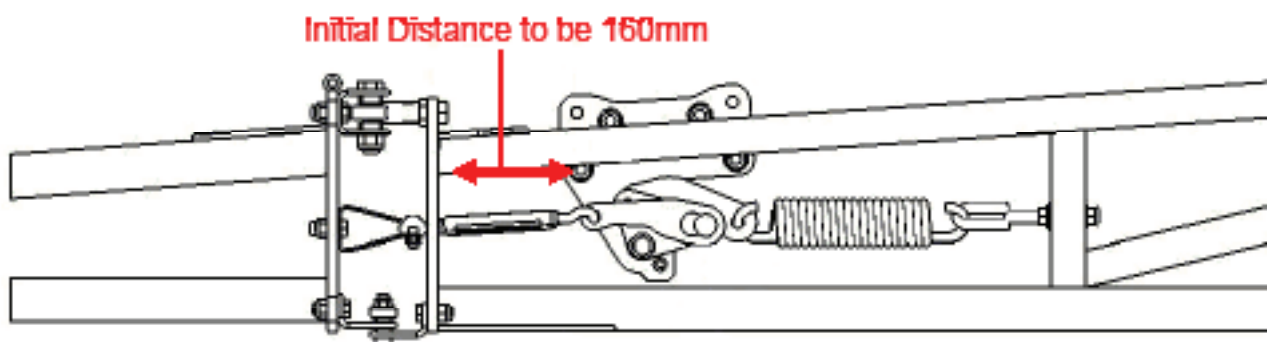


Three dimensional Breakaway Initial Setup Instructions

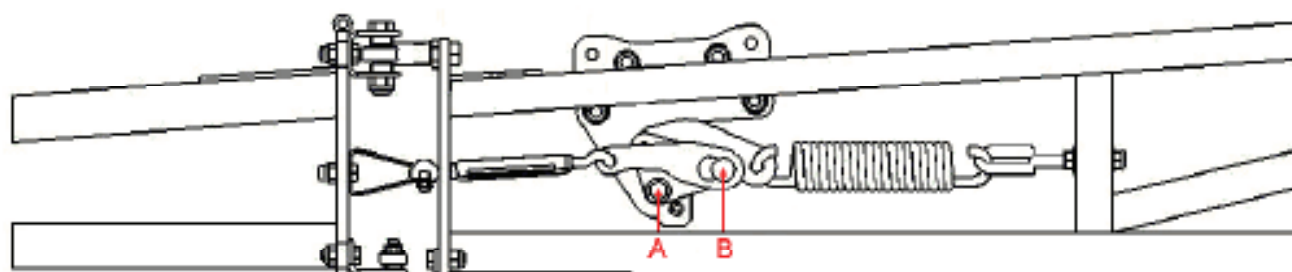
1. With the boom in the working position isolate the hydraulics by closing the ball valves on the lift cylinders, chock the tyres front and rear and remove the keys from the ignition.
2. When the bottom mounting plates are fitted there must be a clearance of 4mm between the bottom of the outer plate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

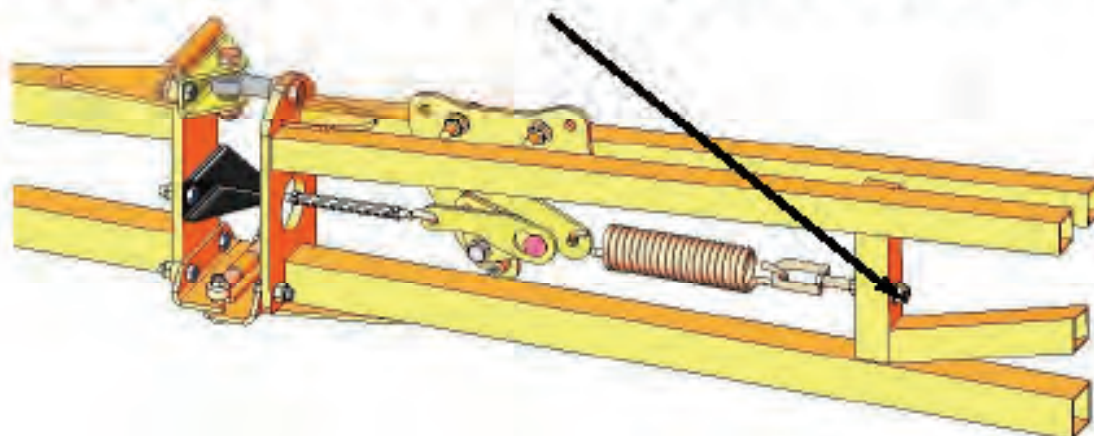


record this measurement. The turn buckle must be adjusted until the difference between the two measurements is 17-18mm. This distance is critical as it determines the force needed to initially break the hinge away. If the distance between the two centres is less than 17mm it will be very hard to break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



$B-A = \text{MUST} = 17\text{mm to } 18\text{mm}$

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.

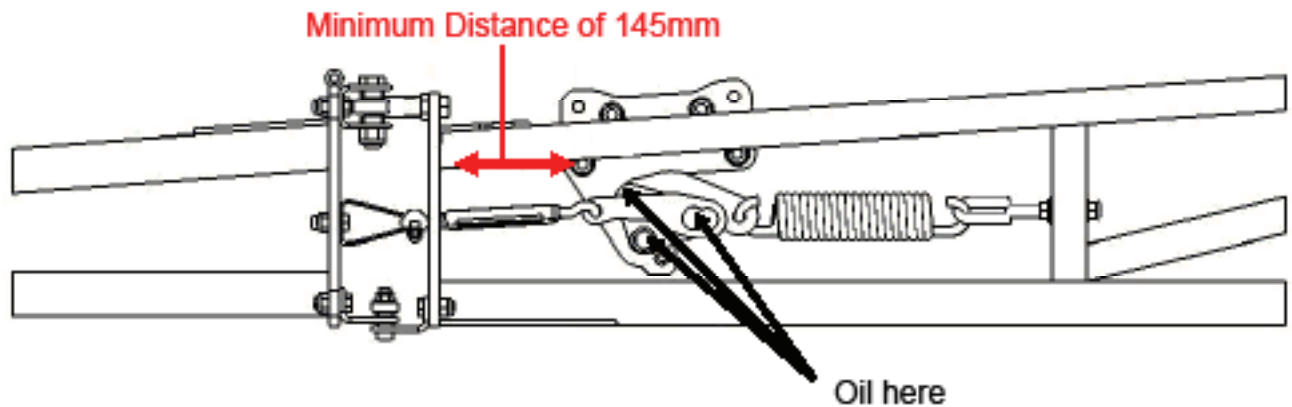


3D BREAKAWAY MAINTENANCE INSTRUCTIONS

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.

Axles with airbag suspension:

The air bag suspension consists of a 12 volt air compressor, one ride height valve, two 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.

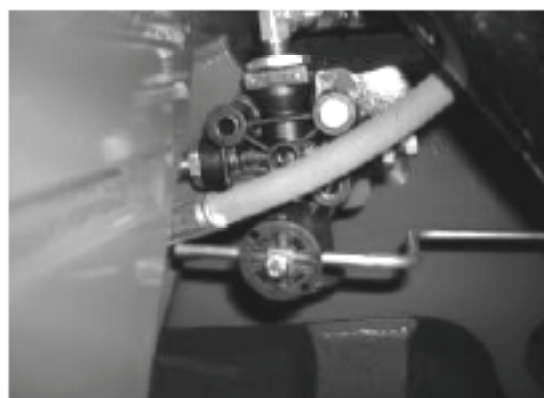
The compressor has a pressure cut out switch fitted to it which cuts the power to the compressor when the axles (reservoir) recommended pressure is achieved. When the pressure in the reservoir drops below 70 psi the compressor will start again. The pressure cut out switch can be adjusted by turning the 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.

NOTE: If the compressor runs continually, there may be an air leak present. All hoses and fittings must be checked and repaired if necessary.



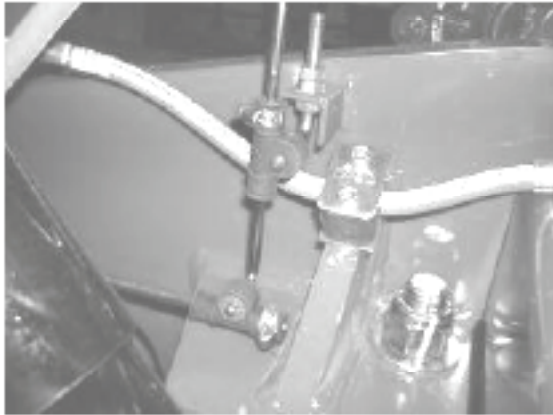
Adjusting the ride height valve:

The ride height valve is used to adjust the air pressure within the air bags to maintain the correct ride height. The ride height valve is located on the left suspension arm. The air bag height must be checked at regular intervals to maintain the system in good working condition.

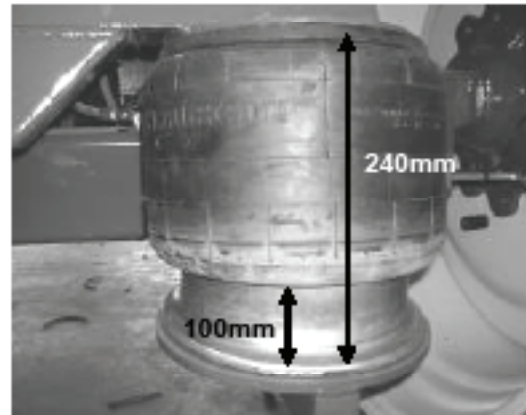


The ride height can be adjusted by loosening the hose clamp attached to the vertical rod on the end of the ride height valve and then moving the valve arm in the required direction.

The recommended ride height of the airbags is 100mm from the fully deflated setting. It is important to keep the Vertical rod positioned vertically. Should the vertical rod lean back or forwards, the ride characteristics of the airbags are affected considerably.



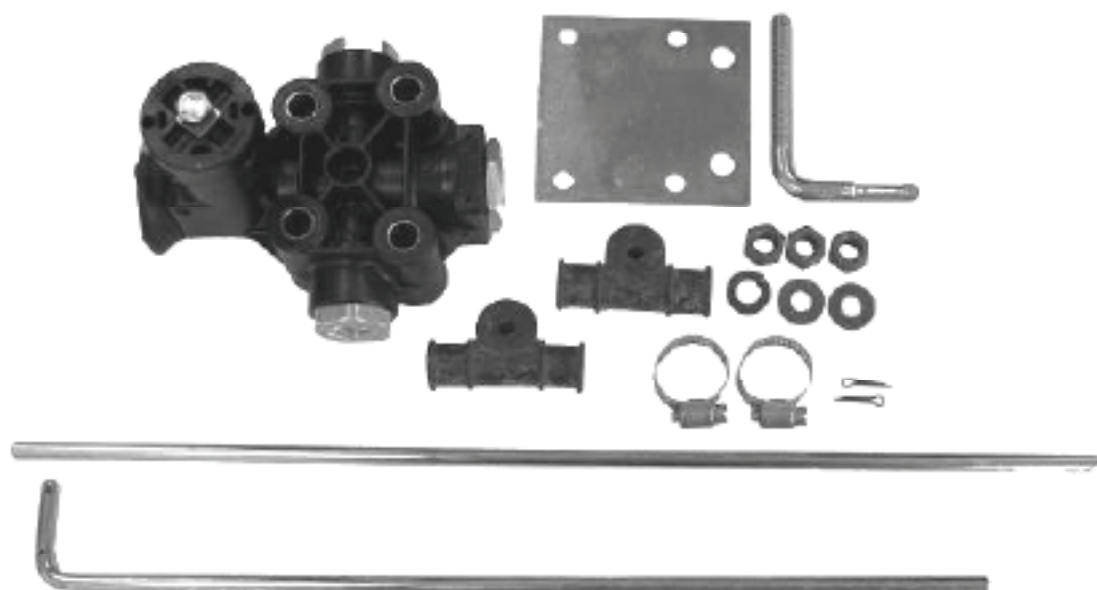
Ride height valve adjuster



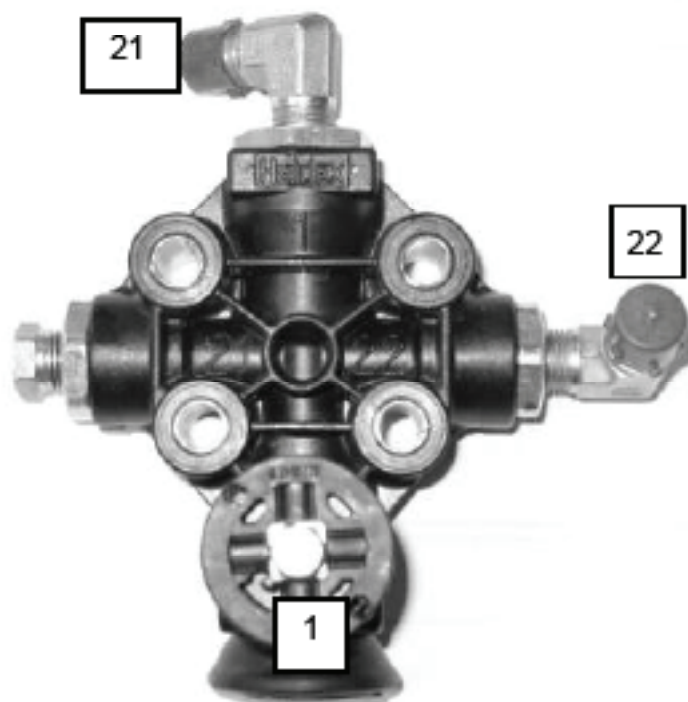
100mm from deflated

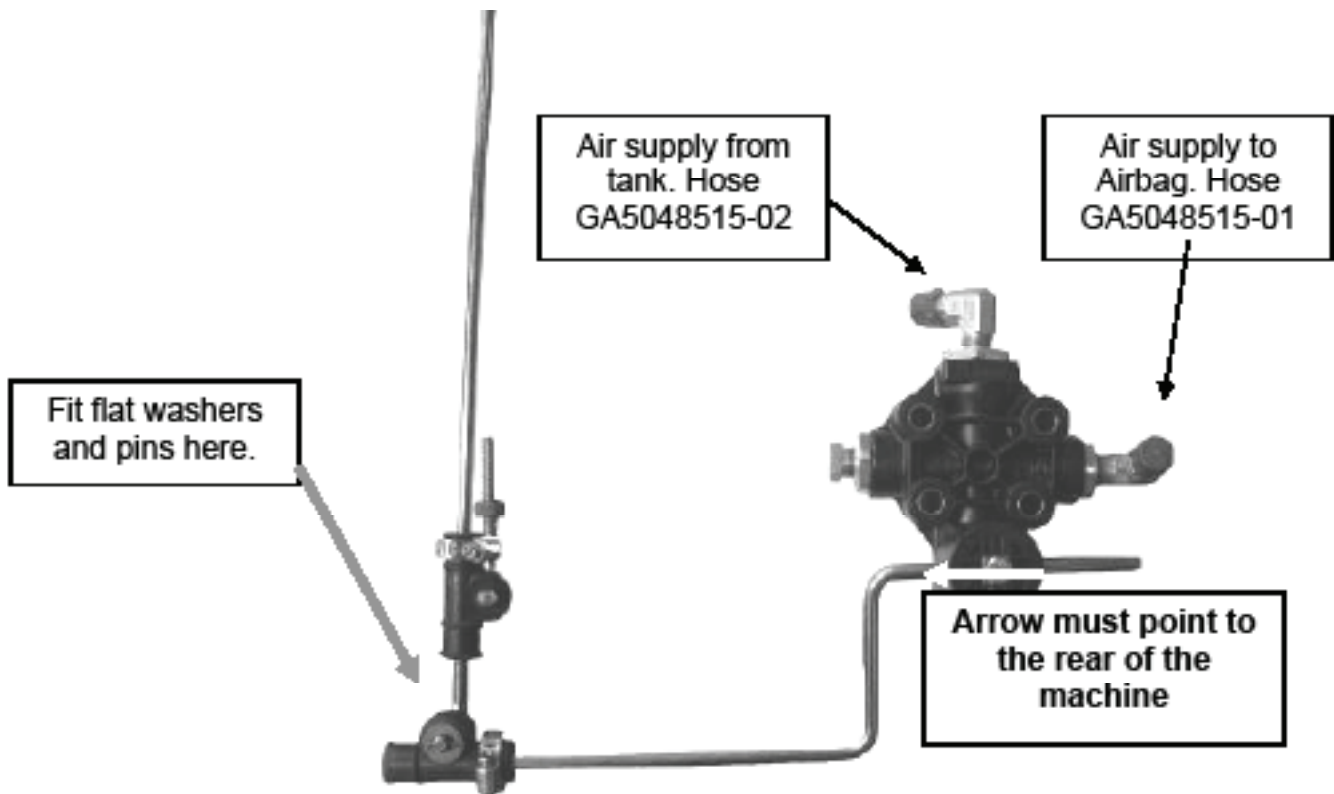
The ride height valve has a "Dead Band" position. This is the position where the valve will stop and no air is being let in to the air bag or out of the air bag. Over time the seals may wear or harden and cause this "Dead Band" to decrease. If the dead band position decreases the ride height valve will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

Fitting new ride height levelling valve to airbag axle

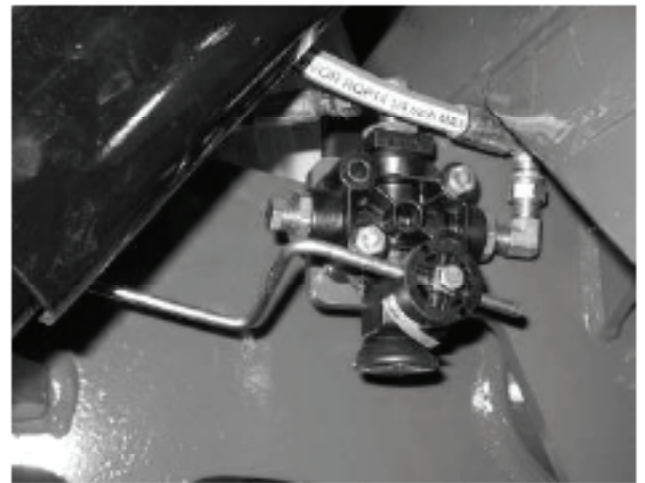
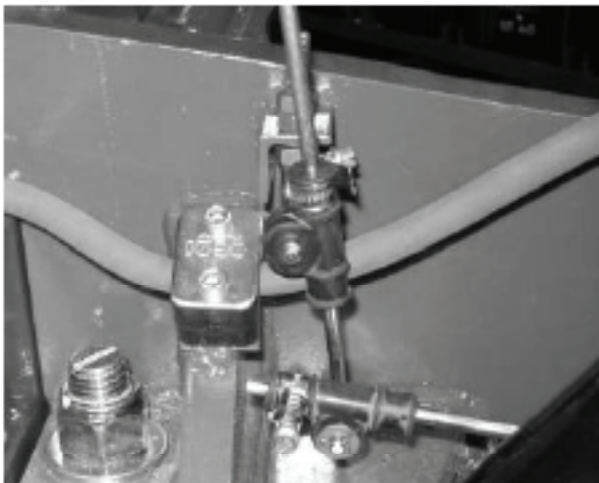


1. Fit the two 549-0MM, 90 Deg Elbows to the valve so they are both on about 45° the direction shown.
Port 1- Always air inlet.
Port 21- Supply to Airbag (RH side only).
Port 22- Supply to Airbag (LH side only).
2. Fit the brass plug GA5048770, 1/4 NPT male taper plug.
3. When fitting the link rod to the valve the arrow must be pointing to the rear of the machine in the direction shown above.
4. Assemble the links as shown below with the flat washers and pins in place.





5. Bolt the valve to the airbag frame using two MB 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.



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

FILTERS:



2" Fill filter



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 suction 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. Also remove small cap on bottom of pressure filter to relieve 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.

To clean the fill filter screen:

1. Clean the filter prior to connecting the filling hose to fill the sprayer.
2. Turn the 'fill 3-way ball valve to 'OFF'.
(Vertical)
3. Carefully unscrew filter 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. Screw on filter bowl.

HYDRAULIC FOLD 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.



HYDRAULIC YAW SUSPENSION

Large booms, and booms fitted with Weedseeker sensors, may have hydraulic yaw suspension fitted. This is a system that replaces the yaw springs and dampers with hydraulic cylinders and nitrogen filled accumulators. This system maintains a more rigid ride in the centre section limiting small variations in the yaw on heavier booms.

The hydraulic yaw system is a closed hydraulic circuit. The base of the right hand yaw cylinder is connected via hydraulic hoses to the rod end of the left hand cylinder with a nitrogen charged (70 bar) accumulator which is connected via a “t” piece into the cross over hose. The base of the left hand cylinder is connected via hydraulic hose to the rod end of the right hand cylinder with a nitrogen charged (70 bar) accumulator which is connected via a “t” piece into the cross over hose.

If the boom yaws to the left, the right hand cylinder will try to compress. This will push oil out of the base of the right hand cylinder into the rod end of the left hand cylinder also into the accumulator against the 70 bar precharge pressure. Because the hydraulic yaw is a closed circuit the oil movement is restricted by the precharge pressure in the accumulator. This precharge pressure is what restricts the boom yaw movement trying to hold the boom centralised. If the boom yaws to the right the opposite action occurs.

The circuit precharge needs to be monitored and maintained. Gauges on the accumulators display the closed loop hydraulic yaw pressure. This pressure should be maintained at 100 bar.

BLEEDING THE HYDRAULIC YAW CIRCUIT

When the hydraulic yaw system is installed, or any components are replaced, the closed loop hydraulic circuit needs to be bleed of any air, the maximum pressure set, system charged and the booms aligned.

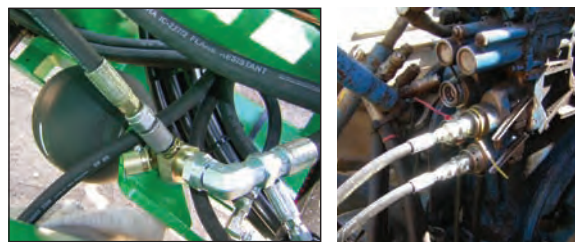
1. Park the machine on a flat level surface, engage the parking brake and chock the sprayer wheels.
2. Open the boom into the working position and lower to the minimum working height. (Ensure there is ample room in front and behind the boom as it will be required to oscillate.)
3. Isolate the boom lift cylinders by rotating the paralift cylinder ball valves to the OFF position.



4. Remove the pressure gauges from the quick connect port on the accumulators.



5. Connect the bleed hose (supplied in the sprayer kit) to quick connect ports on the accumulators.



6. Couple the pioneer connectors to an external hydraulic source, such as a tractor.

7. Using the external hydraulic source, oscillate the boom back and forth ensuring to hold the boom at its extremities for approximately 30 seconds. Start by activating the hydraulic source in one direction. The boom will oscillate forward and stop when the hydraulic cylinder is fully extended. Hold the hydraulic supply in position for at least 30 seconds to ensure that the hydraulic cylinder is fully extended. Move the hydraulic source in the opposite direction until the opposite cylinder is fully extended, again hold in position for 30 seconds to ensure the cylinder is fully extended. Repeat this at least 15-20 times to bleed any air from the system.



8. When oscillations are complete move the boom into a perfect centred position.



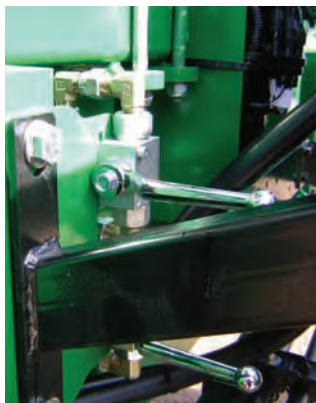
9. Remove the bleed hoses from the external hydraulic source and from the quick connect ports on the accumulators.

10. Re-fit the hydraulic pressure gauges to the quick connect ports.

SETTING THE PRESSURE REDUCING VALVE

When the hydraulic yaw system is installed, or any components are replaced, the closed loop hydraulic circuit needs to be bled of any air, the maximum pressure set, system charged and the booms aligned.

1. Park the machine on a flat level surface, engage the parking brake and chock the sprayer wheels.
2. Open the boom into the working position and lower to the minimum working height.
3. Isolate the boom left cylinders by rotating the paralift cylinder valves to the off position.
4. Open the hydraulic yaw “charge” ball valves.



5. Identify the pressure reducing valve.



6. Loosen the adjustment lock nut and turn the set screw counter clockwise until it comes up against its stop.



7. Activate the boom circuit and maintain a constant pressure. This will generate maximum hydraulic oil pressure in the sprayer hydraulic circuit.
8. With the hydraulic circuit engaged turn the set screw IN clockwise until the hydraulic yaw pressure gauges indicate 100 bar. If the pressure is exceeded the closed loop circuit must be “cracked” to bleed off any excess pressure.

CAUTION: Take care when working with hydraulic oil under pressure. Ensure that excess oil is drained into a container.

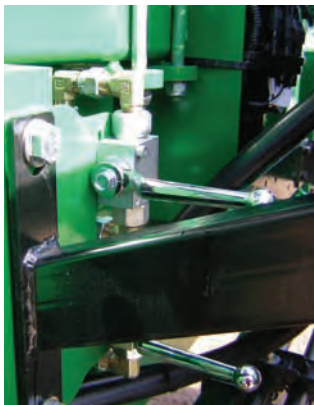


9. Once the set screw is set to the correct pressure, tighten the lock nut. Ensure that the set screw is held firmly in position to prevent the pressure fluctuating.
10. When the pressure is correctly set, charge the circuit as per the correct instructions.

CHARGING THE HYDRAULIC YAW SYSTEM

When the hydraulic yaw system is installed, or any components are replaced, the closed loop hydraulic circuit needs to be bled of any air, the maximum pressure set, system charged and the booms aligned.

1. Park the machine on a flat level surface, engage the parking brake and chock the sprayer wheels.
2. Open the boom into the working position and lower to the minimum working height.
3. Isolate the boom left cylinders by rotating the paralift cylinder valves to the off position.
4. Open the hydraulic yaw “charge” ball valves.



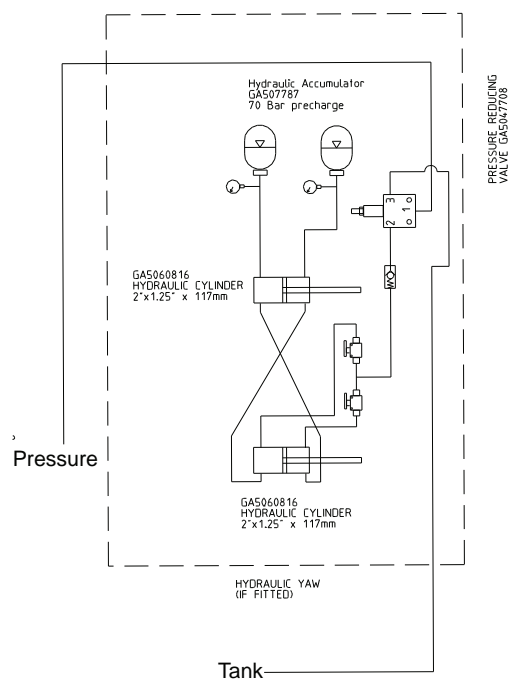
7. Ensure that the boom is sitting level or aligned correctly. If one side of the yaw is sitting forward of the other “open” the “charge” ball valve and push the boom around to align it and even the cylinders out, once aligned “close” the “charge” ball valves. Check the pressure gauges are still at 100 bar.

5. Activate the boom lift circuit and maintain constant pressure for 30-60 seconds. This will generate maximum hydraulic oil pressure in the sprayer hydraulic circuit.

NOTE: The pressure reducing valve in the circuit limits the main hydraulic pressure to 100 bar entering the hydraulic circuit.

6. After 30-60 seconds release the lift circuit and isolate the hydraulic yaw “charge” ball valves by rotating them to OFF position. The pressure gauges in the hydraulic yaw circuit should be reading 100 bar.

HYDRAULIC YAW CIRCUIT



CHAPTER 9

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	<ul style="list-style-type: none"> Excessive bypass on pressure manifold Supply to pump is restricted Pump 	<ul style="list-style-type: none"> 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 corresponding flow. Check the fast close valve is rotating the full 90 degrees when the boom valves are switched off. Suction 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..	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Blocked filters of nozzles Flow loss due to resistance in lines, valves and filters. 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Air leak on suction side of pump Incorrect pump speed Faulty pump valves 	<ul style="list-style-type: none"> Check suction pump for air leaks Adjust pump speed so it is between 400 -540rpm Replace pump valves
Pump pressure pulsating	<ul style="list-style-type: none"> Air accumulator pressure is incorrect Air accumulator diaphragm has a leak Incorrect pump speed Air leak on suction side of pump 	<ul style="list-style-type: none"> 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

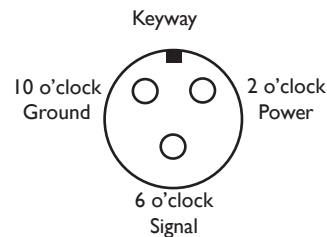
Problem	Common Causes	Common Solution
Pump oil is becoming milky	<ul style="list-style-type: none"> Cracked diaphragm 	<ul style="list-style-type: none"> Replace all diaphragms
Pump oil is changing colour and becoming black or dark grey	<ul style="list-style-type: none"> Pump is overheating 	<ul style="list-style-type: none"> Check pump speed and oil level
Pump is noisy	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> PTO shaft not sliding freely or incorrect length Extremely cold weather can cause liquid in the pump to freeze 	<ul style="list-style-type: none"> Check PTO shaft length and lubricate Check for ice in the pump and let defrost if required
Damaged universal joint	<ul style="list-style-type: none"> The shaft is too long PTO shaft is inadequately lubricated 	<ul style="list-style-type: none"> Shorten shaft Lubricate PTO shaft and uni joints
PTO shaft bent or vibrating excessively	<ul style="list-style-type: none"> PTO shaft is too short 	<ul style="list-style-type: none"> Replace PTO shaft

FLOWMETER & CONTROLLER

Problem	Common Causes	Common Solution
Application rate is inaccurate, unstable or zero	<ul style="list-style-type: none"> Incorrect console calibration Inconsistent wheel speed reading Inconsistent spraying volume Faulty control valve. Check by using manual inc/dec flow control 	<ul style="list-style-type: none"> Recalibrate console Test wheel speed sensor Replace flow meter Replace control valve
Speed sensor display is inaccurate, unstable or zero	<ul style="list-style-type: none"> Incorrect speed calibration Corroded wheel speed sensor cable pins Wheel speed sensor not set up correctly Faulty cable 	<ul style="list-style-type: none"> 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



Voltage readings

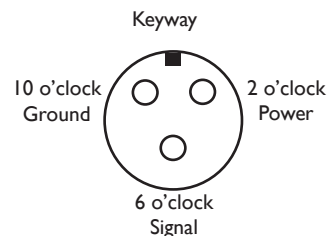
10 o'clock to 6 o'clock (+5v DC)

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

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

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	<ul style="list-style-type: none"> • Meter calibration is incorrect • Flowmeter cable pins are corroded • Flowmeter is pointing the wrong way • Faulty cable 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Flowmeter is seized or blocked 	<ul style="list-style-type: none"> • Remove and clean any foreign materials so the turbine spins freely
<p>If the flowmeter fails to give accurate readings, the following procedures should occur:</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Faulty control valve 	<ul style="list-style-type: none"> • Test valve manually and replace if required
Control valve has failed	<ul style="list-style-type: none"> • Replace control valve 	<p>Temporary solutions:</p> <p><i>Dual line plumbing:</i> Remove the motor from the 3 way ball valve and manually adjust the flow by turning the shaft with a spanner.</p> <p><i>Single line plumbing:</i> 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 achieved with the ball valve, adjust the relief valve setting in order to achieve the desired pressure.</p>
Console is not working	<ul style="list-style-type: none"> • No power supply 	<ul style="list-style-type: none"> • 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
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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.

SMART STEER

The smart steer system has a built in diagnostic tool that can tell the operator if a problem has occurred and what the problem is. Next to the steer axle calibration switch is a small red light. This light is what gives the operator feedback about the steering status. If an error occurs the light will flash several times and then pause, it will then flash again and pause. The number of flashes refers to the error. See the table below.

Number of flashes	Description of error
1	Sprayer steering angle sensors either open or short circuit.
2	Tractor mounted yaw sensor out of range. Check connections.
3	Can't drive steering solenoid A. Check hydraulic spool valve.
4	Can't drive steering solenoid B. Check hydraulic spool valve.
5	Sprayer steering angle sensor is out of range for centre position. Must be no more than +/- 4.5 degrees. Adjustment of steering sensor linkage is required.

SMART STEER

Problem	Common Causes	Common Solution
The red warning light is permanently on	<ul style="list-style-type: none"> The centre calibration figure is not set correctly 	<ul style="list-style-type: none"> Re-calibrate the centre position on the console
When the system is on, the sprayer wheels are reacting erratically	Wheel speed sensor may not be operating correctly	Jack up the sprayer and rotate the wheel. There is an LED light on the sensor that should pulse if working correctly
The wheels do not return the centre position exactly	<ul style="list-style-type: none"> The steering angle sensor may be loose The minimum coil current may be set too low. 	<ul style="list-style-type: none"> Tighten sensor and linkages Consult your Goldacres dealer
The sprayer doesn't follow tractor wheel tracks accurately	<ul style="list-style-type: none"> The yaw sensor connectors may have moisture in them The yaw sensor could be faulty 	<ul style="list-style-type: none"> Disconnect yaw sensor. Clean and dry connector Replace yaw sensor

CHEM PROBE & TRANSCAL

Problem	Common Causes	Common Solution
Transcal is not working or is working too slow	<ul style="list-style-type: none"> Air leak in the vacuum system The volume of water supplied to the venture probe is not sufficient 	<ul style="list-style-type: none"> 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
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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.
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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	<ul style="list-style-type: none"> Insufficient flow to venturi in the hopper bottom Air leaks on induction system 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Insufficient air or water flow at the foam generator Foam generator could be blocked Air diverter solenoid could be blocked 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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

TRI TECH BOOM

Problem	Common Causes	Common Solution
Inner and outer wing are not inline with each other when the boom is unfolded	<ul style="list-style-type: none"> Boom cables are not adjusted correctly 	<ul style="list-style-type: none"> Adjust boom cables to realign booms
Booms will not fully fold to the boom rests	<ul style="list-style-type: none"> Insufficient lubrication Fold cylinder mounts have moved 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Folding or unfolding of booms is too fast Folding or unfolding of booms while the sprayer is still moving Tilt operation 	<ul style="list-style-type: none"> 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.

Outer wing position (Out)	Outer wing position (Folded)	Top pivot shim adjustment	Bottom pivot shim adjustment
UP	UP	NIL	REMOVE SHIMS
UP	DOWN	ADD SHIMS	NIL
LEVEL	UP	REMOVE SHIMS	REMOVE SHIMS
DOWN	DOWN	NIL	ADD SHIMS
DOWN	UP	REMOVE SHIMS	NIL
LEVEL	DOWN	ADD	ADD

Booms are showing signs of bending components and welds cracking	<ul style="list-style-type: none"> Folding or unfolding of booms is too fast Folding or unfolding of booms while the sprayer is still moving Tilt operation 	<ul style="list-style-type: none"> 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.
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TANKS, CHASSIS & WHEELS

Problem	Common Causes	Common Solution
The drawbar of the sprayer has become noisy and loose	<ul style="list-style-type: none">• Worn or missing plastic insert in towing eye	<ul style="list-style-type: none">• Replace plastic insert.

OPTIONAL EQUIPMENT SUPPLEMENTS

Chemical Probe
Vortex induction hopper
Transcal
Exacta foam marker
Fill flow meters
Hydraulic fill pump
Direct chemical injection
Dual product
Twin line spot spray
Smart Steer
Raven SCS4070 controller
Joystick controller
Ultraglide

CHEMICAL PROBE

General
Overview
Operation

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



Chemical Probe connection point

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. Close all ball valves and set pressure to 110psi.
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 pressure gauge mounted on the side pod). 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. Induct clean water to rinse probe vacuum hose.
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.

VORTEX CHEMICAL INDUCTION HOPPER

General
Overview
Operation
Rinsing.....

GENERAL

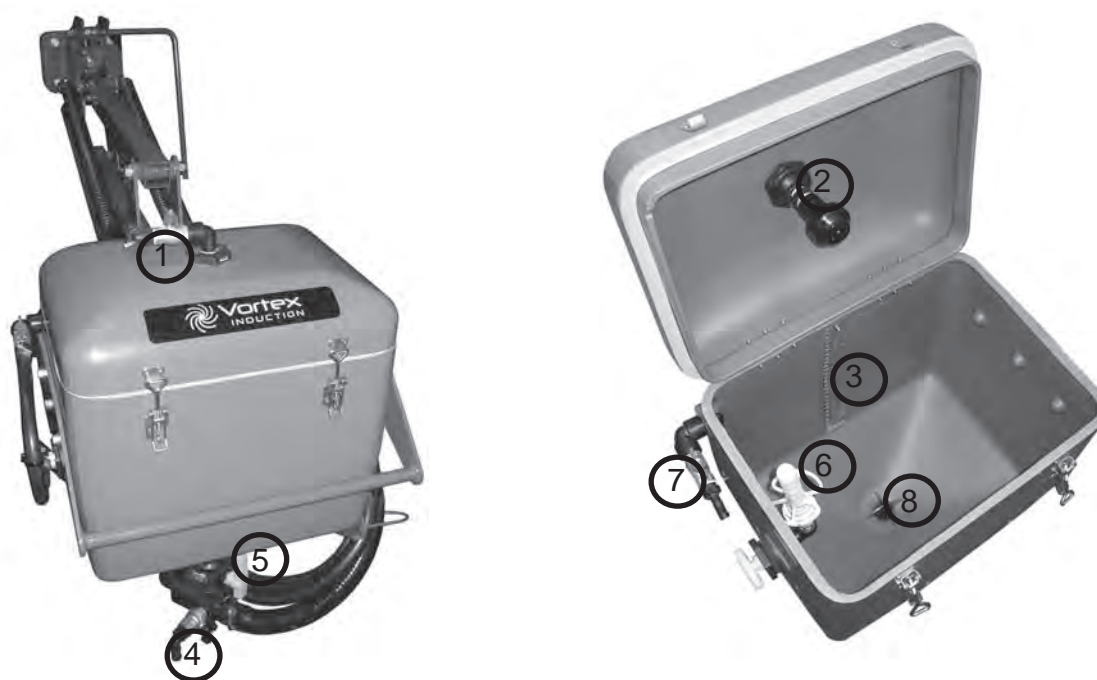
The Chemical Induction Hopper is an alternative method of transferring chemical into the main spray tank. The hopper can be lowered to a more convenient height for adding chemicals. The chemical can either be in liquid form or granular form and once in the hopper the chemical can then be easily transferred 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 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 70-80 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 110 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.

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 70 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 top 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.

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.

WARNING: Do not level tank under vacuum.

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 total 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. Close all ball valves and set pressure to 110psi.
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 85 psi delivery pressure (as displayed on the manifold 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 110 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. This will drain residual chemical from hose.

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.

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.

When finished:

1. The Transcal tank and probe or Micromatic coupler should be thoroughly

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' 85 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 85psi.
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 'Envirodrum 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 85psi.
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 85psi.
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.

To vent tank:

1. Turn off venturi
2. Open probe ball valve
3. Open transcal ball valve to empty transcal
4. Vent for 30 seconds then close

EXACTA FOAM MARKER

General
Foam Generator
Foam Accumulator
Compressor
Compressor air filter
Foam concentrate
Using the foam marker
Exacta foam marker schematic

GENERAL

Exacta Foam **WITH** direct injection

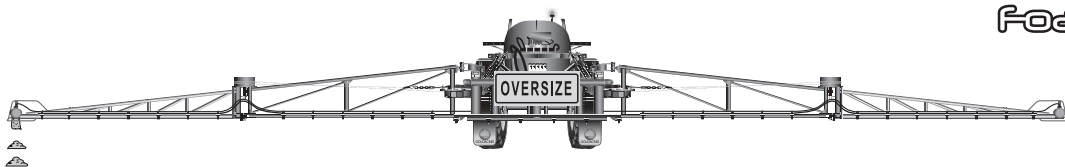
The “Exacta” foam marking system with Direct Injection features the foam concentrate and water being contained in separate tanks.

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.

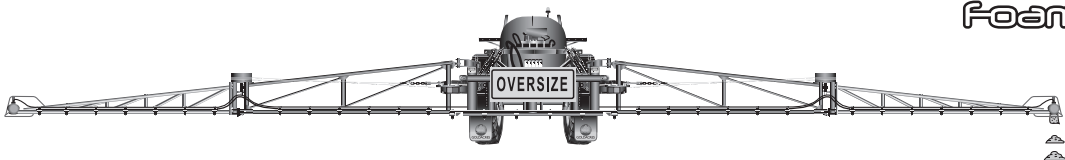
Both the foam concentrate tank and foam

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.



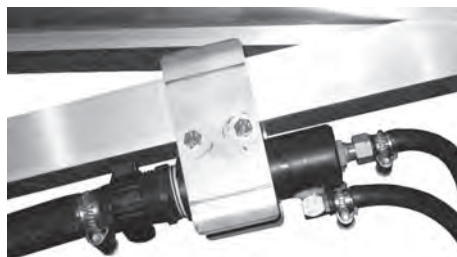
Foam left



Foam right

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 and supply backpressure.

FOAM ACCUMULATOR

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



COMPRESSOR

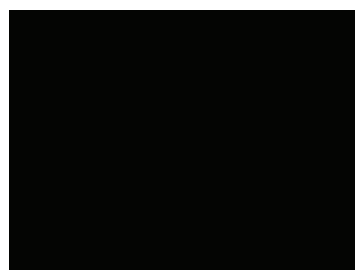
The compressor is mounted in the right hand side pod and is powered by 12V from the tractor.



COMPRESSOR AIR FILTER

The compressor air filter is located on the right hand side boom rest.

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



EXHAUST VALVE

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 (Advance models only).
6. 'OPEN' the 'foam marker fill' valve (Cap on Prairie models). 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 $\frac{1}{2}$ 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 water 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 brass screen, remove the filter and clean.
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. Regularly check valves.

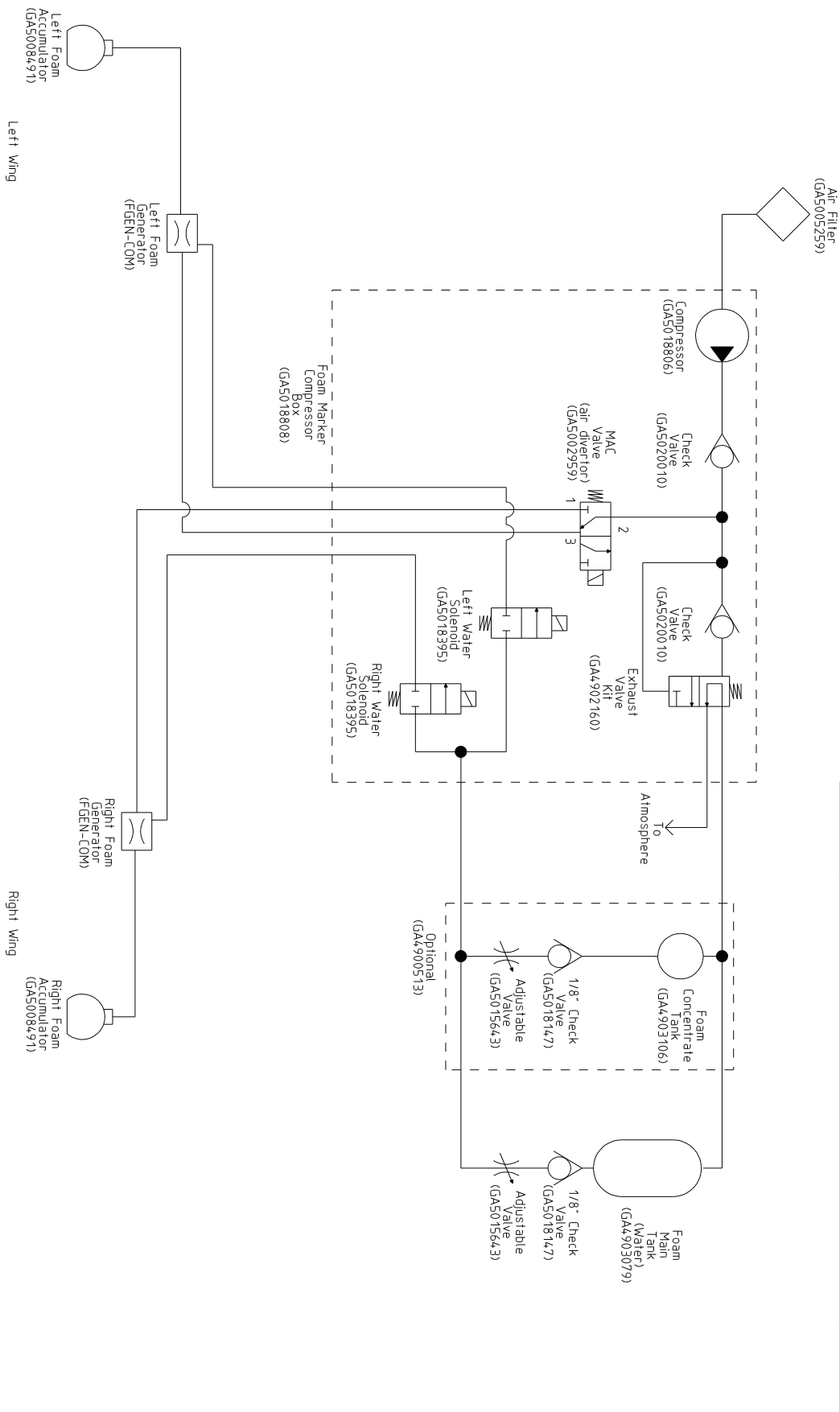
Bleeding the concentrate line when the foam concentrate tank empties:

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 $\frac{1}{2}$ 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



FILL FLOW METERS

General
Flowmax 220
Teejet 70 series

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.



Raven Flowmax 220

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 (option) blocks off flow to the main tank.




Teejet 70 series mounted in storage locker



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  key to toggle through VOL1, VOL2, and VOL3.








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

ENTERING DATA







To Clear Volume Totals:

1. Depress  key until "VOL1" is displayed.
2. Depress  key.
3. Display will flash "CLR V1" (depress  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  key.
2. Depress  key.
3. Depress  key until the METER CAL # is displayed.
4. Depress  key ("C" will appear on the right side of the display).
5. Depress  key to decrease Meter Cal # or depress  key to increase Meter Cal #.
6. Depress  key to program adjusted Meter Cal #.

TO CHANGE FROM "US" TO "SI"

1. Depress  key.
2. Depress  key.
3. Depress  key until "US" is displayed.
4. Depress  key ("C" will appear on the right side of the display).
5. Depress  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 down for future reference when programming the FLOWMAX 220.

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

METER CAL CONVERSIONS

To convert the METER CAL number simply divide the original number (number printed on FLOWMAX 220) by the desired conversion factor.

FOR EXAMPLE:

Original METER CAL No. = METER CAL No. for displays in Fluid Ounces
128

Original METER CAL No. = METER CAL No. for displays in Liters
3.785

Original METER CAL No. = METER CAL No. for displays in Pounds
Weight of one gallon

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 value. 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.



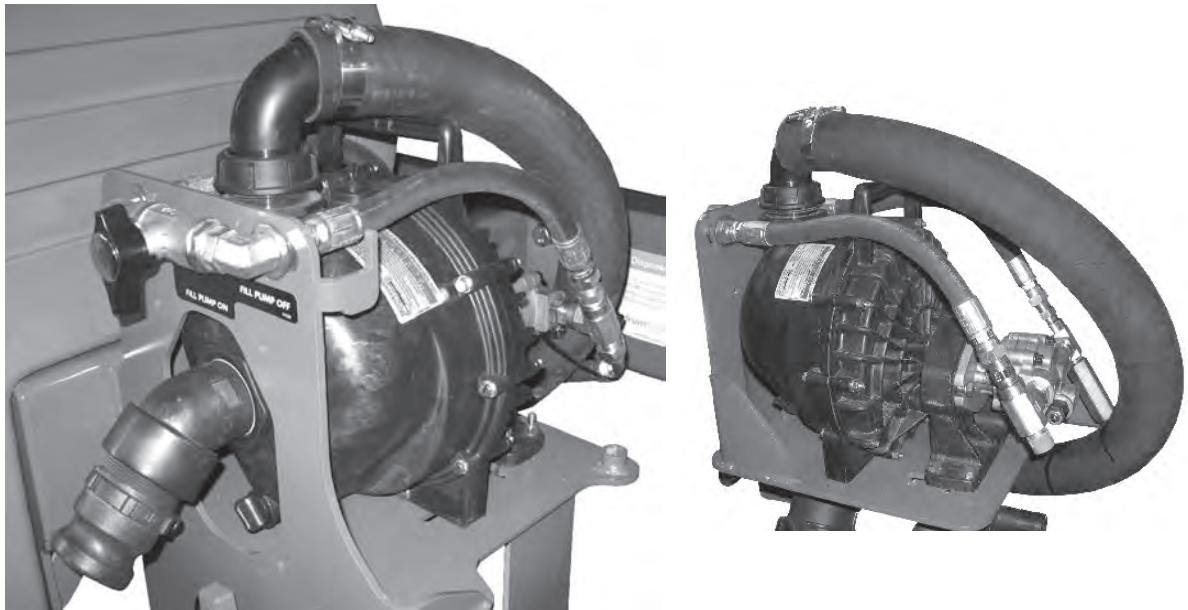
Note: If '>L' is not flashing when the TeeJet electric ball valve is fitted, the 'Actual' volume will not count.

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.

HYDRAULIC FILL PUMP

Overview
Suction & delivery lines.
Hydraulic information.
Operation

OVERVIEW



SUCTION & DELIVERY LINES

- Use good quality suction hose and fittings that will not collapse or leak air under suction.
 - If pumping water from structures other than a storage tanks, we recommend the use of an appropriate sized floating filter equipped with a check valve.
 - It is essential the suction line to the pump is the same size as the suction port (2")
- A smaller size delivery line can be used but will reduce pump output.

HYDRAULIC INFORMATION

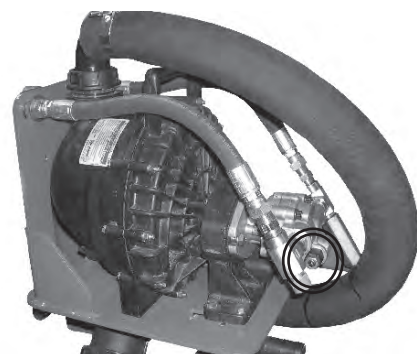
WARNING: Do not run the pump with the water delivery line closed (deadheaded) for prolonged periods, as pump overheating and seal damage will result. Pump should never be run empty.

The hydraulic fill pump requires approximately 40 litre per minute @ 2000 psi.

With open centre tractor hydraulic systems;

- Before starting the tractor open the oil bypass adjustment screw (see diagram below for location of oil bypass screw).
- Start the tractor and engage the pump.

- Turn the adjustment screw in to increase the pump RPM'S until it is running just fast enough to prime.
- When properly primed close the water delivery line to dead head the pump Continue adjusting the bypass



screw until the water pressure reaches a maximum 3.4 bar.

- Once this is achieved, lockdown the bypass screw and reopen the pump water delivery line.

Tractors with closed centre hydraulic systems;

- The oil bypass adjustment screw should be screwed all the way in and locked down (See diagram above for location of oil bypass screw)
- The flow control valve on the tractor (hare and tortoise) used to set the hydraulic oil flow.
- Before starting the pump on a closed centre hydraulic system, ensure this screw is fully closed and locked down.
- Set the flow control valve on the tractor to its lowest setting (tortoise).
- Start the tractor and engage the pump.
- Adjust the flow control valve on the tractor until the pump is running just fast

enough to prime.

- When properly primed, close the water delivery line to deadhead the pump, Continue to adjust the oil flow until the water pressure reaches a maximum 3.4 bar.
- Once this is achieved re-open the pump water delivery line.

WARNING: If the pump bypass screw is not closed when operated on a closed centre hydraulic system the tractor will pump excessive volumes of oil to compensate. This will cause the hydraulic oil to overheat, which may result in damage to the pump and tractor transmission.

OPERATION

WARNING: Do not pump flammable or hazardous liquids with hydraulic fill pumps.

IMPORTANT: Before starting the pump for the first time, fill the pump chamber and suction hose with water and ensure the delivery line is open. This will aid in initial pump priming and reduce the likelihood of seal damage. The pump chamber can be filled through either the 1/2" or delivery port on the top of the pump.

NOTES:

- Do not run the pump dry or un-primed for extended periods, otherwise seal damage will result.
- The amount of oil fed to a hydraulic centrifugal pump directly determines its RPM'S and thus the liquid pressure at which the pump operates.
- Excessive oil flow will cause the hydraulic motor to over-rev, resulting

in damage to the pump and hydraulic motor. It is imperative to set the correct oil flow to the hydraulic motor every time the pump is connected to the tractor.

Instructions for machines fitted with electric over hydraulic operated fill pumps:

1. Attach fill hose to quick fill point.
2. Ensure that the fill pump bypass ball valve is in the "fill pump OFF" position.
3. Ensure that pump is primed prior to starting.
4. Activate fill pump with toggle switch located on the EZ control panel.
5. Slowly turn fill pump bypass ball valve to the "fill pump ON" position. (This valve allows you to regulate the rate of fill with more or less hydraulic flow as required).
6. Once the required amount of water has

been transferred, rotate the ball valve to “fill pump OFF” position and then switch off toggle switch.

Instructions for machines not fitted with electric over hydraulic spool valves

1. Attach fill hose to quick fill point.
2. Ensure that the fill pump bypass ball valve is in the “fill pump OFF” position.
3. Ensure that pump is primed prior to starting.
4. Activate fill pump by engaging tractor hydraulic remote lever.
5. Slowly turn fill pump bypass ball valve to the “fill pump ON” position. (This valve allows you to regulate the rate of fill with more or less hydraulic flow as required).
6. Once the required amount of water has been transferred, rotate the ball valve to “fill pump OFF” position and then disengage tractor remote.

DIRECT CHEMICAL INJECTION

Important information
Glossary of terms
Overview
Valve position & function
DCI operation & function.
Raven SCS4400 Programming (Direct Chemical Injection)

IMPORTANT INFORMATION

CAUTION: Chemical reactions can occur when raw chemicals are mixed, e.g: Cross contamination between Round-Up and Treflan can cause a chemical reaction. This reaction evidently will change the liquid state of the Roundup and Treflan. The Roundup turns into a slimy matter and the Treflan crystallizes into a more solidified state.

It is very important to maintain a zero tolerance to cross contaminating these chemicals because even the smallest amount of left over Treflan in a chemical probe that is used to transfer Roundup can cause a major chemical reaction.

Goldacres suggest that you thoroughly flush

chemical probes or have allocated chemical probes for individual chemicals.

Goldacres also suggests that the entire chemical injection system be rinsed with fresh water thoroughly before changing chemicals in that module.

- Direct injection is not recommended for suspended concentrates or powder mixes requiring constant agitation.
- Always consult your agronomist as to the suitability of the chemical to be injected.
- If dilution or mixing of chemicals is required consult the appropriate chemical supplier for product compatibility.

GLOSSARY OF TERMS

CAN – Control Area Network

This is the format used to send information between the spray console (either Raven 4000, Envizio Pro or Viper) and the direct chemical injection node. CAN uses only 2 wires to relay all the information.

Node

This is the term used to describe the microprocessor mounted to the chemical injection pump. The node turns the CAN information into signals that actually control the pump.

Terminator

A CAN terminator is essentially a resistor. The CAN wiring utilizes 2 wire communications with an active shield to reduce interference from outside sources.

Power is induced into the shield and the terminators create a resistance which in turn creates a small current. A terminator is fitted at both ends of the CAN cable and the shield operates between these two points.

LHS

Left hand side as viewed from the rear of the sprayer.

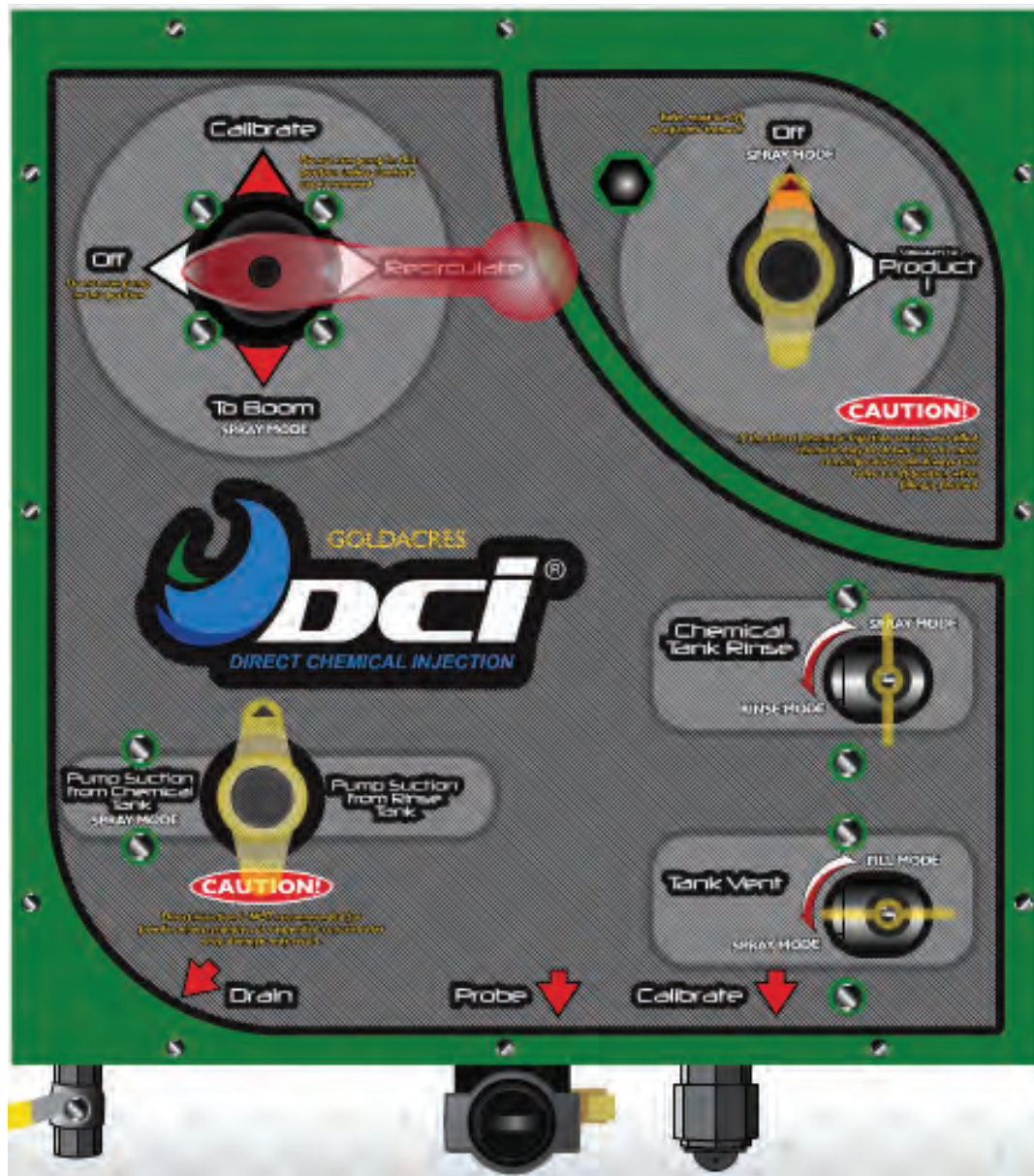
RHS

Right hand side as viewed from the rear of the sprayer.

10 decilitres = 1 litre

The DCI unit is calibrated to decilitres.

OVERVIEW



The DCI unit/s are mounted on the right hand side of the sprayer. It is possible to have up to four units on the sprayer. This allows for four different chemicals to be injected simultaneously into the main spray line. The relevant controls are mounted in front of each tank, except for the fill valve

which is mounted to product 2 tank and is shared between all tanks.

VALVE POSITION & FUNCTION

Click **Learn More** to discover how easy it is to use Direct Chemical Injection (DCI)

dci FILL

- 1 Move handle to **Off**
- 2 Move handle to **Vacuum to Product I**
- 3 Move handle to **Middle**
- 4 Move handle to **Chemical Tank Rinse** (SPRAY MODE)
- 5 Move handle to **Tank Vent** (FILL MODE)
- 6 Connect hose to **Probe**

dci SPRAY

[LEARN MORE](#)

dci EMPTY

[LEARN MORE](#)

dci FLUSH

[LEARN MORE](#)

dci HOME



Single DCI module shown. Up to 3 DCI modules can be added to your sprayer.

Fill Mode

Click **Learn More** to discover how easy it is to use Direct Chemical Injection (DCI)

dci FILL

[LEARN MORE](#)

dci SPRAY

- 1 Move handle **To Boom** (SPRAY MODE)
- 2 Move handle to **Off** (SPRAY MODE)
- 3 Move handle to **Pump Suction from Rinse Tank** (SPRAY MODE)
- 4 Move handle to **Chemical Tank Rinse** (SPRAY MODE)
- 5 Move handle to **Tank Vent** (SPRAY MODE)

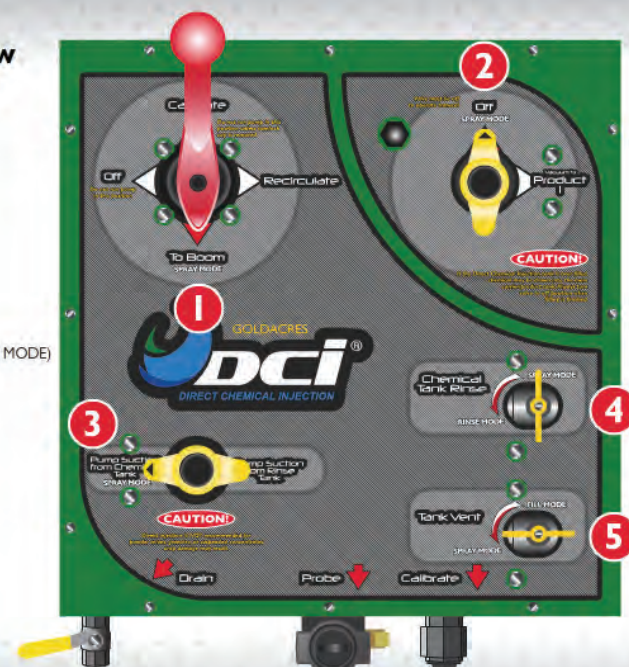
dci EMPTY

[LEARN MORE](#)

dci FLUSH

[LEARN MORE](#)

dci HOME



Single DCI module shown. Up to 3 DCI modules can be added to your sprayer.

Spray Mode

Click Learn More to discover how easy it is to use Direct Chemical Injection (DCI)

dci FILL

LEARN MORE

dci SPRAY

LEARN MORE

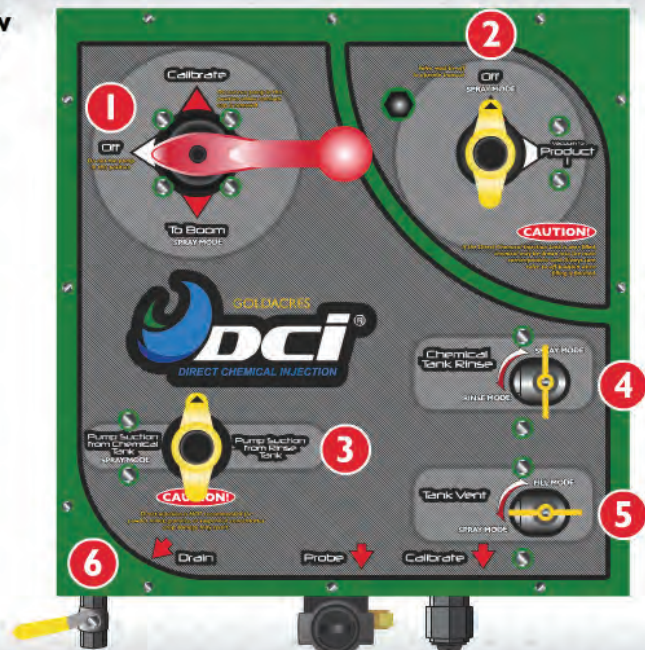
dci EMPTY

- 1 Move handle to **Off**
- 2 Move handle to **Off** (SPRAY MODE)
- 3 Move handle to **Middle**
- 4 Move handle to **Chemical Tank Rinse** (SPRAY MODE)
- 5 Move handle to **Tank Vent** (SPRAY MODE)
- 6 Move **Drain** handle to "On" position

dci FLUSH

LEARN MORE

dci HOME



Single DCI module shown. Up to 3 DCI modules can be added to your sprayer.

Empty Mode

Click Learn More to discover how easy it is to use Direct Chemical Injection (DCI)

dci FILL

LEARN MORE

dci SPRAY

- 1 Move handle **To Boom** (SPRAY MODE)
- 2 Move handle to **Off** (SPRAY MODE)
- 3 Move handle to **Pump Suction from Rinse Tank** (SPRAY MODE)
- 4 Move handle to **Chemical Tank Rinse** (SPRAY MODE)
- 5 Move handle to **Tank Vent** (SPRAY MODE)

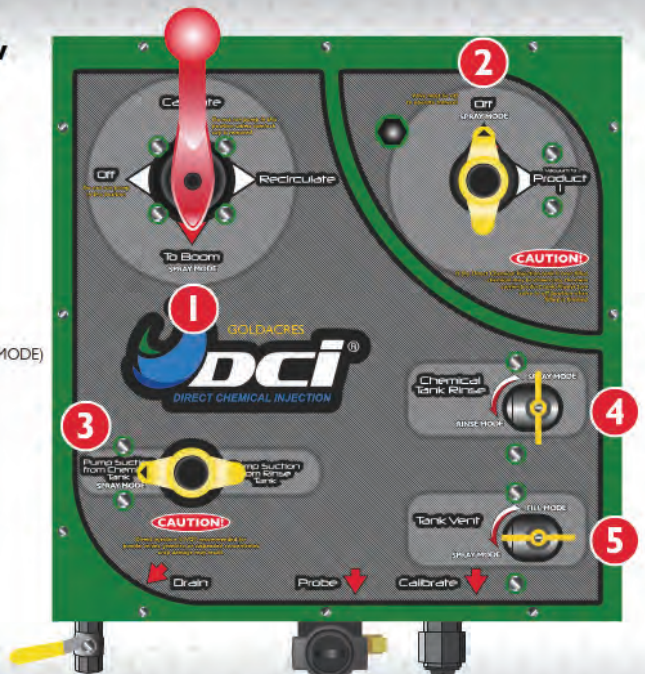
dci EMPTY

LEARN MORE

dci FLUSH

LEARN MORE

dci HOME



Single DCI module shown. Up to 3 DCI modules can be added to your sprayer.

Flush Mode

DCI OPERATION

Filling the chemical tank (s)

The tank filling operation is very similar to the proven TRANSCAL system. By utilising the main diaphragm pump to create water pressure in a venturi, vacuum is applied to the chemical tank. This vacuum in turn draws the chemical out of an enviro drum or container into the chemical tank on the injection module.

CAUTION: If the chemical injection tank is overfilled, chemical will be drawn into the main tank.

Please ensure that when the chemical injection tank is almost full that the suction is turned off.

NOTE: Chemical to be inducted into the injection module (s) is carried out on the right hand side of the sprayer. However, before this can be done some set up work is required on the left hand side. All steps shown below refer to tank number 1 - Repeat these steps for tank number 2.

Step 1. If the sprayer is fitted with a Transcal ensure that the three way ball valve (on the LHS) is turned to the “off” position

Step 2. The main spray tank must contain a minimum of 500L of water. This will ensure that the spray pump has sufficient water to operate the venturi.

Step 3. Set the spray pump running between 400 & 540 rpm. On the left hand side of the sprayer turn the valve labelled “chem probe / Transcal” to the “on” position. This will start the venturi in the top of the tank.

Step 4. Back on the right hand side of the sprayer. Ensure that the chemical tank vent valve is “OFF”. Now set the three way ball valve to “Vacuum to tank 1”.

Step 5. Connect the probe / enviro drum coupling hose to the 1” camlock fitting (photo) as shown. Connect to the container with the chemical to be transferred. Open the ball valve (shown) and the chemical should now be drawn into the tank on the sprayer. Once the desired level has been reached turn off the ball valve.

Step 6. Open the “chemical tank vent” valve. This must be carried out to allow the injection pump to draw

Step 7. Turn off the chem probe / Transcal tap on the LHS and switch off the spray pump.

Priming the pump

Before spraying commences it is important to prime the pump. This will eliminate any air in the system. It can also aid with agitation, however the pump is designed for very low volumes and is not designed as an agitation pump.

Step 1. Set the 4 way rotary valve to the “recirculate” position.

Step 2. Set the pump suction to “pump suction from chemical tank”.

Step 3. Refer to the console programming section relating to self testing. Run the pump for several minutes to remove any air from the lines. The system should now be ready to use.

Lets go spraying

Now that the chemical tank is full and the pump is primed the sprayer is now ready to use.

Step 1. Turn the 4 way rotary valve to “to boom”.

Step 2. Open the “chemical tank vent”

valve.

Step 3. Set the application rate as per the programming section.

You now have confidence that the RAVEN DCI system will be delivering precise amounts of chemical to the boom.

Rinsing the DCI system after use

It is very important that the system is rinsed out correctly after use. Failure to do so may result in damage to the direct chemical injection pump or chemical residue being left in the tank or hoses. There are two methods of rinsing. 1 – Pumping circuit rinse. This would be done if the same chemical is to be used the next day for example. 2 – Complete system rinse. This would be done if the sprayer is not going to be used for a long period or if a chemical change was going to be made.

Pumping circuit rinse

Step 1. Ensure the 4 way rotary valve is set to “to boom”.

Step 2. Set the pump suction to “Pump suction from rinse tank”

NOTE: Ensure there is a sufficient amount of water in the main sprayer rinse water tank.

Step 3. Set the sprayer up as though you were doing a normal boom line rinse. Please refer to section 04 “CHEMICAL INJECTION PROGRAMMING” for details about boom rinsing. Activate the DCI module and turn on the boom valves. Rinse water will now be pumped through the DCI pump and out to the boom. This should be done for at least 10 minutes.

Complete system rinse

Step 1. If there is any chemical left in the chemical tank this can be either drained out using the drain tap (see photo), or pumped

out by setting the 4 way rotary valve to “calibrate” and ensuring the “pump suction from chemical tank” is on. Connect a hose using the calibrate cam lock to the external drum. Set the monitor so the pump is running.

Step 2. Now that the DCI tank is empty the tank can be flushed out. Set the main spray pump suction valve so that water is drawn from the rinse water tank. Set the spray pump running, 400 rpm is sufficient. Now turn on the “chemical tank rinse”. This will force rinse water into the top of the DCI tank through the rinsing nozzle. Once the tank is $\frac{3}{4}$ full turn the tap off. The main spray pump can be switched off now.

Step 3. The pump suction valve should be set to “pump suction from chemical tank”, set the 4 way rotary valve to “recirculate” and set the DCI pump running. Let the pump recirculate for several minutes.

Step 4. The rinsate from the DCI tank can now be either drained out or using the controller, pumped out through the boom.

Step 5. Repeat steps 1 to 4 until you are satisfied that the system is decontaminated.

Rinsing the vacuum line can be achieved by sucking clean water into the tank. Refer to section 1. Filling the DCI tank.

RAVEN 4000 SERIES PROGRAMMING

Direct Chemical Injection

If the console detects the presence of a chemical injection pump during initial console programming it will automatically interrupt the programming procedure after the [RATE CAL] value has been entered for the initial product. At this point it will then request values be entered for:

- PRODUCT TYPE
- VALVE TYPE
- METER CAL
- VALUE CAL
- RATE CAL

for the injection module before reverting back to [SPEED SENSOR TYPE] in the initial console programming.

If the console senses it is connected to two injection pumps it will subsequently request the information for the second unit be entered before reverting back to the initial console programming

If a chemical injection module is connected to the console it will automatically highlight product 2 and display a prompt for "PRODUCT TYPE" to be selected after the [RATE CAL] value has been entered for the initial product (product 1)

CHEMICAL INJECTION PRODUCT TYPE

Momentarily depressing the [CE] key repeatedly at this stage toggles the console between "LIQUID" and "GRANULAR" control selections.

- Chemical injection pumps require selection of "LIQUID CONTROL" to function correctly
- Ensure "LIQUID CONTROL" is displayed then depress the [ENTER] key to lock it in.
- The console will now prompt for a "VALVE TYPE" value to be selected

CHEMICAL INJECTION VALVE TYPE

Momentarily depressing the [CE] key repeatedly at this stage toggles the console through the various valve types

- Injection pumps require selection of "STANDARD VALVE" to function correctly.
- Ensure "STANDARD VALVE" is displayed then depress the [ENTER] key to lock it in
- The console will now prompt for a "METER CAL" value to be entered

CHEMICAL INJECTION METER CAL

Raven chemical injection pumps are pre-calibrated. The pump may have a calibration tag attached quoting a value of 110. This is an imperial calibration value and must be ignored. The correct metric value is [372]

To enter this meter calibration figure

- Depress the [ENTER] key to display the "E" enter symbol.
- Key in the correct calibration figure [372]
- Depress the [ENTER] key again to lock it in.
- The console will now prompt for a "VALVE CAL" value to be entered.

NOTE: Once initial console programming is completed it is recommended that this value be checked using the following procedure.

NOTE: 10 decilitres = 1 litre.

- Fill the injection tank with water
- Place the 3-way tap on the outlet side of the pump to the recirculate (top of tank) position.
- Turn the console [POWER] switch "on"
- Momentarily depress the [PRODUCT SELECT] key repeatedly until the product corresponding to the relevant injection

- pump unit is highlighted
- Momentarily depress the [PRODUCT ON/OFF] key repeatedly to turn the product on
- Momentarily depress the [AUTO/MANUAL] key repeatedly until AUTO/NOBM is displayed
- Enter a [SELF TEST] value equivalent to the normal operating speed i.e. 16 kph (see “Self-Test section in SCS 4400 programming and operation section for further details)
- Depress the [RATE CAL] key to display the “E” enter symbol
- Key in a value of 10 decilitres (1 Lt)
- Depress [ENTER] again to lock it in
- Disconnect the recirculating hose at the top of the injection tank
- Turn the boom master and all the boom section switches “on”

NOTE: Main sprayer pump does not need to be engaged to perform this test function but all boom sectional switches need to be on to simulate the total width of the boom. With the main pump disengaged and the injection pump on by-pass no liquid should exit the nozzles even though the boom valves are on.

- Ensure liquid is flowing from the re-circulation hose to indicate the pump is primed
- Turn off the boom master switch
- Depress the [TOTAL VOLUME] key
- Depress the [ENTER] key to display the “E” enter symbol
- Key in a value of [0] to reset this function
- Depress the [ENTER] key to lock it in
- Place a measuring flask under the end of the re-circulation hose
- Return the boom master switch “on” position
- Run the injection pump until 10 decilitres (1 Lt) [TOTAL VOLUME] is displayed then turn the master switch “off”
- Inspect the measuring flask and note the volume of water collected

- If the [METER CAL] value is correct a litre of water should be collected in the measuring flask
- If not use the formula below to correct the [METER CAL] value

NEW [METER CAL] VALUE =
 OLD [METER CAL] VALUE X 10 VOLUME
 MEASURED IN FLASK

Repeat the above test procedure to confirm the new [METER CAL]

CHEMICAL INJECTION VALVE CAL
 Chemical injection pumps use a standard valve cal of [123]

To enter the value calibration figure:

- Depress the [ENTER] key to display the “E” enter symbol
- Key in the appropriate [VALVE CAL] calibration number [123]
- After keying in the appropriate valve calibration figure depress [ENTER] again to lock it in.
- The console will now prompt for a [RATE CAL] value to be entered.

CHEMICAL INJECTION APPLICATION RATE

Raven Chemical Injection Modules operate in decilitres/hectare. 1 decilitre = 100 millilitres thus there are 10 decilitres to a litre

[RATE CAL] is the rate (decilitres/hectare) desired for the particular chemical application

To enter a [RATE CAL]

- Depress the [ENTER] key to display the “E” enter symbol
- Key in the desired application rate (i.e. 10 decilitres/ha)
- Depress [ENTER] again to lock it in

NOTE: At this point if the console detects a second injection pump it will revert back

to [PRODUCT TYPE] for the second unit so begin the above programming procedure again.

If a second injection pump is not detected the console will revert back to the initial programming phase and prompt for a "SPEED SENSOR TYPE" to be entered. If this is the case revert back to step 8 in the initial console programming instructions

LOW FLOW LIMIT

A Low Flow Limit can be entered for the chemical injection pump independent of the main product (see initial console programming section for details).

To enter a Low Flow Limit value for the chemical injection pump:

- Ensure the correct product is highlighted on the screen. If not depress the [PRODUCT SELECT] key repeatedly until the relevant product is highlighted
- Momentarily depress the [DATA MENU] key to bring up the data submenu at the bottom of the screen. The word "SERIAL" will be highlighted.
- Depress the [DATA MENU] key again to highlight "PRODUCT"
- Depress the key repeatedly to move the cursor adjacent to "LOW LIMIT"
- Depress [ENTER] key to display the "E" (enter symbol)
- Enter the "LOW FLOW LIMIT" value calculated. Remember this figure needs to be entered in decilitres
- Depress the [ENTER] key again to lock it in
- Depress a volume or area key to exit the data sub menu and return to the operational screen.

When a low limit value is entered it is important that the zero speed shut off setting is turned off. The zero speed shut off setting will turn the regulating valve off when low or no speed is registered. With

this setting turned on it is not possible to spray from a stationary position. To set the zero speed shut off to "OFF" the following steps must be followed.

To set "Zero Speed Shut-Off" to OFF.

- Ensure the correct product is highlighted on the screen. If not depress the [PRODUCT SELECT] key repeatedly until the relevant product is highlighted
- Momentarily depress the [DATA MENU] key to bring up the data submenu at the bottom of the screen. The word "SERIAL" will be highlighted.
- Depress the [DATA MENU] key until "CONSOLE" is highlighted.
- Depress the key repeatedly to move the cursor adjacent to "ZERO SPEED"
- Depress [CE] key to change the display from "ON" to "OFF".

Depress a volume or area key to exit the data sub menu and return to the operational screen

TO RESET AREA AND VOLUME INFORMATION FOR THE CHEMICAL INJECTION UNITS WHEN STARTING A NEW APPLICATION

The SCS 4400 has the ability to simultaneously store Area and Volume data for a chemical injection unit independently to that being recorded for the main tank

NOTE: Before resetting the Area and Volume functions for a chemical injection unit record any previous data in the console that maybe applicable for future use.

The Area and Volume functions for the chemical injection units can be reset using the following procedure;

"TANK VOLUME" gives the operator a reference as to the number of decilitres left in the tank as the injected chemical is applied to the field. For this feature to function correctly the estimated volume in

the chemical tank must be entered before application period is commenced.

To reset the chemical injection pump tank volume

- Ensure the correct product is highlighted on the screen. If not momentarily depress the [PRODUCT SELECT] key repeatedly until the relevant product is highlighted
- Depress the [VOLUME TANK] key
- Depress the [ENTER] key to display the “E” enter symbol
- Enter the volume of chemical actually in the tank at the start of the application period. Remember this needs to be entered in decilitres
- Depress [ENTER] again to lock it in

NOTE: The console will subtract the decilitres used (count down) from this value as the load is applied to the field giving the operator a reference as to the number of decilitres left in the tank

TO ZERO OUT DATA IN AREA AND VOLUME:

To reset an Area or Volume values for a chemical injection pump:

- Ensure the correct product is highlighted on the screen. If not momentarily depress the [PRODUCT SELECT] key repeatedly until the relevant product is highlighted
- Depress the relevant key relating to the value to be reset. For example [TOTAL AREA], [TOTAL VOLUME], [FIELD AREA] or [FIELD VOLUME]
- Depress the [ENTER] key to display the “E” enter symbol
- Enter a value of “0” to reset the particular function
- Depress [ENTER] key to lock it in

The Area and Volume will now count up from zero as the application is commenced. [FIELD AREA] and [FIELD VOLUME] are generally use as sub-totals for [TOTAL AREA] and [TOTAL VOLUME].

For example: if applying several tank loads to the one area [FIELD AREA] and [FIELD VOLUME] can be use to record data for the current tank load while the [TOTAL AREA] and [TOTAL VOLUME] can be used to record accumulative data for the whole area. If [TOTAL AREA] and [TOTAL VOLUME] are used to accumulate data do not reset them until starting a new area.

SELF-TEST SIMULATION

The [SELF TEST] feature provides speed simulation for testing an injection unit in the “AUTO” mode whilst stationary.

CAUTION: The boom valves must be open when the injection pumps are switched on otherwise a deadhead situation will occur which may result in a burst delivery line.

Before using the [SELF TEST] feature ensure the individual products are in the “AUTO” mode.

The console automatically defaults all products to the “OFF” mode when the console power switch is turned “on”

To change a product to the “AUTO” mode;

- Ensure the correct product is highlighted on the screen. If not momentarily depress the [PRODUCT SELECT] key repeatedly until the relevant product is highlighted
- Momentarily depress the [PRODUCT ON/OFF] key to turn the product “on”. At this point the console should read “AUTO NOBM” (auto no boom).
- If it reads “MAN NOBM” (manual no boom) momentarily depress the [AUTO/MANUAL] key to switch to the product to the auto mode.

The “NOBM” (no boom) component automatically disappears when the console senses the switching “on” of a boom section

The [SELF TEST] function should be used

- To help familiarize the operator with the Raven chemical injection system before spraying in the field is commenced.
- To test the sprayer after a period of non-use to ensure the system is operating correctly before filling the tanks with chemical
- To help familiarize any new operators with the Raven chemical injection system

THE [SELF TEST] FEATURE SHOULD NEVER BE USED WITH CHEMICAL IN THE TANK

DO NOT USE THIS FEATURE WITH THE BOOMS IN THE TRANSPORT POSITION

To simulate a speed

- Depress the [SELF TEST] key momentarily
- Depress [ENTER] key to display the “E” enter symbol
- Key in a desired test speed. Note this feature has a decimal point so a “0” needs to be added when entering a whole figure. For example 1, 6 and 0 for 16 Kph.
- Depress the [ENTER] key again to lock it in.

A desired test speed should now be displayed in the speed window at the lower left corner of the display

Spraying can now be simulated by simply turning on the boom switches

The [SELF TEST] feature will automatically clear itself when motion is detected from the speed sensor

NOTE: Some radar and GPS units may sense motion when the sprayer is stationary thus continually clear this function. To counteract this simply unplug the speed sensor at the back of the console whilst using this function

Changin the order in which additional product appear on the console screen

If more than one injection unit is connected to the console the order in which they appear as the 2nd and 3rd product on the console screen can be change to suit the operator using the following procedure;

NOTE: The console will automatically allocate the carrier product to the 1st position on the screen

- Momentarily depress the [DATA MENU] key to bring up the data submenu at the bottom of the screen. The word “SERIAL” will be highlighted.
- Momentarily depress the [DATA MENU] key repeatedly until “CAN” is highlighted
- Momentarily depress the key repeatedly to move the curser adjacent to the line “PRESS ENTER TO READRESS PROD NODES”
- Depress the [ENTER] key to begin the reboot process
- The console will now display “REBOOT NODES IN SEQNC, PRESS ENTER WHEN DONE”
- Disconnect the logic power to both injection pumps (the logic power is the smaller of the two sets of red and white wires leading to each pump. Disconnect by either uncoupling the plug or pulling out the 5 amp fuse)
- Wait a few seconds then reconnect the injection units in the order you wish them to assume the 2nd and 3rd position on the screen (note: position 1 will always be taken up by the carrier product)
- Depress the [ENTER] key again to resume normal operation

NOTE: If the console displays “check control node 2 or 3” when reconnecting an injection module at any stage;

- Momentarily depress the [DATA MENU] key to bring up the data submenu at the

bottom of the screen. The word "SERIAL" will be highlighted.

- Momentarily depress the [DATA MENU] key repeatedly until "CAN" is highlighted.
- Momentarily depress the key repeatedly to move the cursor adjacent to the particular product be it either 2 or 3.
- If the communication link is turned "off" the console will display "PROD CONTROL NODE 2 OR 3 NOT INSTALLED".
- At this point momentarily depressing the [CE] key will turn the communication link between the console and the injection pump unit either "on".
- If properly connected and turned "on" a PGM and VER number should be displayed.
- Depress and volume or area key to resume normal operation.

DUAL PRODUCT

Operating instructions

OPERATING INSTRUCTIONS

To operate the sprayer as a SINGLE PRODUCT, (normal spraying) out of a single line from the main tank.

The main pump will draw product from the main tank, through the suction filter. Product will be delivered through to the booms when they are engaged via the fast close.

The main spray pump ball valve must be positioned to direct flow to main product. The other ball valves don't have to be positioned in any particular position if the front pump is not in use. NEVER turn "BYPASS TO" ball valve "OFF" (vertical).

To operate the sprayer as a SINGLE PRODUCT, (weed seeking) out of a single line from the front tank.

The front pump will draw product from the front tank, through the suction filter. Product will be delivered through to the booms when they are engaged via Ramsay valve.

The Main Spray Pump ball valve must be positioned to direct flow to main product. Ball valve. Pressure from front tank must be ON, 2nd product bypass must be ON. "Bypass to" must be positioned to allow flow back to the front tank. NEVER turn "BYPASS TO" ball valve "OFF" (vertical).

To operate the sprayer as a DUAL PRODUCT, (normal spraying and weed seeking) out of two separate lines from both the main tank and the front tank.

The main pump will draw product from the main tank, through the suction filter. Product will be delivered through to the boom when they are engaged via the fast close. The front pump will draw liquid from the front tank through the suction filter to the second boom line via the Ramsay valve.

The main spray pump ball valve must be positioned to direct flow to main product. Ball valve pressure from front tank must be ON, 2nd Product Bypass must be ON. "Bypass To" must be positioned to allow flow back to the front tank. NEVER turn "BYPASS TO" ball valve "OFF" (vertical).

To operate the sprayer as a DUAL PRODUCT, (normal spraying and weed seeking) out of two separate lines from the main tank only.

The main pump will draw product from the main tank, through the suction filter. Product will be delivered through to the boom when they are engaged via the fast close. The bypass liquid from the fast close valve will be directed to the second boom line via the Ramsey valve control.

The main spray pump ball valve must be positioned to direct flow to 2nd Product. Ball valve "pressure from front tank" must be OFF, 2nd Product Bypass must be ON. Bypass To must be positioned to allow flow to the main tank. NEVER turn "BYPASS TO" ball valve "OFF" (vertical).

TWIN LINE SPOT SPRAY

General

Operating instructions

GENERAL

The Goldacres direct chemical injection system can be set up to operate as a twin line spot spray system which allows the operator to spot spray a field with separate chemical/s from one of the boom lines while using the other boom line to broadcast spray.

This spot spraying line is pre-charged with chemical resulting in an instant reaction to line ON and OFF.

A single switch which is located on the main console, controls the boom sections on/off - making it a simple operation to utilise this feature.

OPERATING INSTRUCTIONS

To use the Spot Spray system follow these steps:

1. Turn the top ball valve on (picture 1) and the bottom ball valve off (picture 2)
2. Connect the ½" chemical line coming from the injection product that you wish to use for spot spray onto the mixing chamber that is in-line after the Banjo ball valve.

The chemical lines will be identified with coloured ties on the ½" hose.

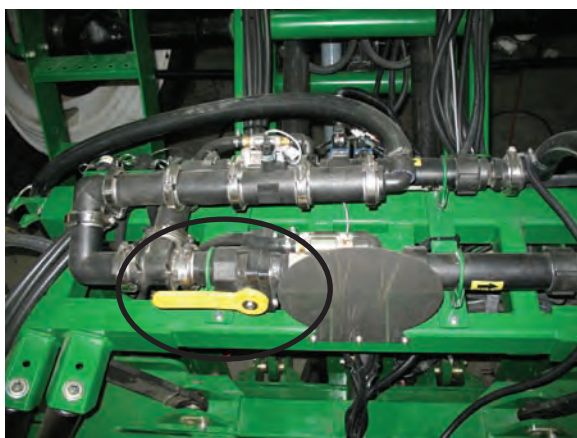
2 ties = Product 2

3 ties = Product 3

4 ties = Product 4

All other injection lines should be left on the opposite mixing chamber assembly.

3. On the Raven SCS4400 or SCS4070 hold



Picture 1



Picture 2

the BOOM CAL button for 10 seconds, now 'Tier 1' should be displayed on the screen.

4. Press ENTER then enter in 1 then press ENTER to confirm. Now press the UP ARROW and 'Tier 2' will be displayed, also Enter this at 1.
5. Now press the DATA MENU button twice so that 'Product' is highlighted, press Enter when the small arrow is pointing at 'Boom select'.
6. Now that you're in the boom select feature you can use the numbers on the keypad to activate which booms sections are used for each product. So for 'Product 1' you will require all the booms to be highlighted from 1-10
7. Press PRODUCT SELECT so that you now have product 2 highlighted if this is not your spot spray chemical only allocate this to the booms sections that you are using, not all boom sections.
8. Press PRODUCT SELECT so that product 3 is highlighted, now assuming this is the spot spray chemical you will need to only allocate this product to boom 10 which is used via the extra switch on the Raven console. Now you should have only boom 10 highlighted
8. If you are using Product 2 as your spot spray chemical or you only have 2 products in total then set product 2 up as product 3 was set up in step 7.
9. Press ENTER to finish the Boom select feature.
10. Press BOOM CAL then use the up arrow to scroll through to boom 10. Now press ENTER and type in the total width of your boom, so if you have a 36mt boom you will type in 3600 and press ENTER to confirm.
11. Set all products you wish to use to ON by selecting that product with the PRODUCT SELECT button and turning them on & off with PRODUCT ON/OFF button.

12. Once all products being used are ON you can now simply control the entire system with the master switch or control the spot spray system separately with the Spot Spray switch.
13. Fill sprayer with water and run a test spray to make sure the spot spray line is turning on correctly and the product dedicated to spot spray is also turning on at the same time.
14. Finally one thing to remember with the spot spray system is that your main tank will be applying double amount of flow while the spot spray line is running. This is done to keep the spray line pressure the same when spot spray is on or off.

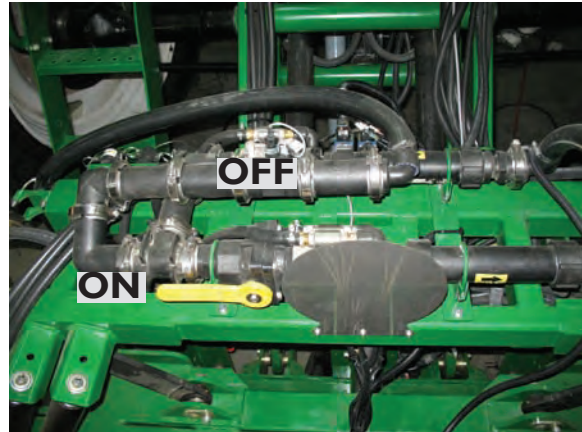
Operation instructions for using sprayer in normal 3TS mode:

1. Turn top ball valve off picture 3 and bottom ball valve on as shown in picture 4.
2. Connect the 1/2" chemical lines all onto the one mixing chamber, this will be the chamber without the Banjo tap in front of it OFF/ON.
3. Press DATA MENU twice on the Raven SCS4400 or SCS4070, press ENTER on PRODUCT SELECT, now un-assign boom 10 for Product 1 and also for the product that was used for spot spray. Press ENTER to finish
4. Press and hold BOOM CAL for 10 seconds until Tier I is displayed, now you can enter Tier 1 & Tier 2 at the vol/min figures that best suit your nozzles.

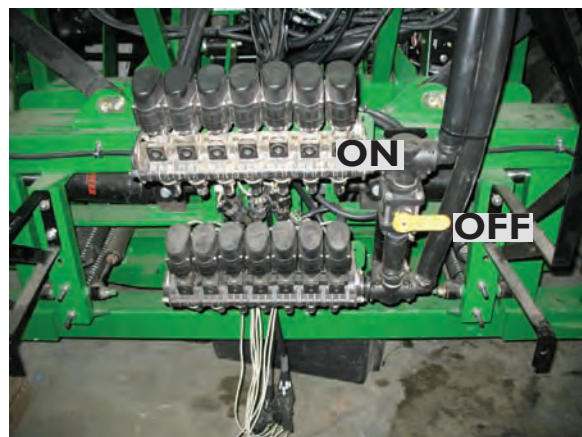
Tier 1 max is the maximum vol/min that line 1 will operate at before it switches over to line 2.

Tier 2 max is the maximum vol/min that line 2 will operate at before both line 1 & line 2 turn on.

5. For normal 3TS operation the Spot Spray switch must be turned ON.



Picture 3



Picture 4

SMART STEER

GENERAL

The Goladacres Smart Steer is a state of the art trailing sprayer tracking system. It is designed to make the sprayer track directly behind the towing vehicle. By effectively creating only one set of wheel tracks, crop damage is greatly reduced.

It is a simple system consisting of a computer, speed sensors, angle sensor and a yaw sensor. The yaw sensor, speed signal and angle sensor simply send signals to the computer which turns this information into output signals that activate the hydraulics accordingly.

The yaw sensor is mounted remotely on the tractor and all the other components are mounted on the sprayer. Using the yaw sensor and the speed sensors, the computer

can calculate the radius of the turn and direct the sprayer onto the same tracks, confirming this by using the angle sensor fitted directly to the steering king pin on the axle.

MODES

Crab:

This is where you can offset the sprayer wheels to run offset from the tractor. You can run the sprayer in a different set of gutters or just simply in the middle of the tractor wheels. It is useful in extremely muddy or extremely dusty conditions.

Manual:

Manual gives you the ability to steer the sprayer where you would like it to go. Useful for getting into and out of hard to access water fill points, also a very handy diagnostic tool.

Automatic:

Once in automatic there is no manual control over the steering of the sprayer. The sprayer will track in line with the rear axle of the tractor. It will only stop steering if the wheels stop rotating or the ground speed is detected at zero.

Center:

Centered position is the same as driving a sprayer without steering. The axle must be centered and ball valves closed for high speed transport. To center, simply turn the switch to auto then back to manual and the wheels will return to their calibrated center.

OPERATION

1. When you are ready to start using the smart steer system, ensure there is no one or no obstacles around the wheels or between the chassis and the wheels. Once you are sure all these areas are clear, you may proceed.
2. With all areas clear and the tractor turned off, turn the hydraulic tap located on the steering ram to the on position.
3. Start your tractor and power up the smart steer system. With the steering in manual mode crab the trailer to full lock left. Once this process has completed, crab the machine to full lock right. This is an indication that the system is working. When you engage the crab functions the computer understands it as a simulation of yaw. Precisely the same as a yaw signal coming from the tractor.
4. Engage the Smart Steer to automatic mode and the system will straighten the wheels ready to begin. This will indicate the system is ready for operation.

CALIBRATION

To recalibrate the machine, straighten the wheels in manual crab mode, turn the tractor off.

Within ten seconds of turning the tractor back on, press the calibration button.

To establish if this has worked, while stationary, operate the steering switch from manual to automatic then back to manual again. The wheels **SHOULD NOT** move.

If they do move, the calibration has not worked. Repeat procedure.

TROUBLESHOOTING

What to do if I have no Auto Steering?

The first thing to do is to put it in manual mode and check the crab function.

If your crab function is working:

Firstly inspect the bracket that the speed sensor is mounted on is not bent or twisted away from its original position. Also check the veins on the disc are not damaged, out of shape or bent. If the bracket looks straight and aligned and the veins look straight, you need to check the speed sensors are receiving a signal.

Without a speed signal the Smart Steer will not work in automatic, you need to check your speed sensors, one way to do this is:

With machine in manual mode, jack the sprayer up using an appropriate jack on a firm solid base. With the wheel just high enough to spin it freely, rotate the wheel (complete rotation to check the whole disc) and inspect the speed sensor (always being careful to keep as far away from the wheels as possible).

The speed sensor has a little orange light on the under side of it. This should blink constantly with the rotation of the wheel.

When a gap on the speed sensor disc passes the sensor the light should be off. When a solid piece passes the sensor, the light it should be on. If this is the not the case there could be a problem with your speed sensor alignment, which should be 3-10mm off the disc. This would most certainly be a problem if you have an intermittent signal. If the sensor is too close to the disc, the light will be constantly on, and too far away from the disc the light will not come on at all.

Another way to check the speed sensor unit itself is to remove the speed sensor and make sure the light is off - then place a piece of metal in front of the sensor (at the target end) and make sure the light turns on.

If your crab function is not working:

Making sure the tap on the ram is on. And your pin (if fitted) is removed from then machine as though the machine was ready for work.

Check you have a power supply to the transistor box. Check the light on the speed sensors. Just as an indication there is power supply then using a multi meter/test light check whether you have power up at the plug on the top of the solenoid. While operating a function there should be 12v between terminal 1 and terminal 2. If there is power up there the electrical system is ok.

If the electrical system is ok, check whether you have hydraulic pressure supplied to the sprayer by simply checking the gauge on your spool block while operating a function such as holding down the raise button. There should be 2500psi in the system.

If you have hydraulic pressure trying to steer the wheels, check that there is no mechanical malfunction such as something seized, something jamming the system or a bent or broken ram.

TECHNICAL FAULT FINDING

Issue: No Steering, No manual Crab

Possible cause - No power:

- Visually inspect loom: Look at the loom and ensure there is no broken wires, stretched harnesses or any other visual damage to the loom or connectors.
- Check fuse(s): Inspect the fuses in the fuse box, and make sure they all are in working condition
- Check Circuit breaker (Joystick loom): Inspect the circuit breaker near the battery on the tractor and make sure it has not tripped.
- Check connection to plc: Inspect the small loom between the plc, trident (pc) and main loom connector. Making sure to check large plug that connects to the microprocessor and the plug that connects to the loom. At the microprocessor there should be 12v+ at pins 1, 27, 41 and 42. There should be 12v-(Ground) at pins 2 and the 28.
- Check drawbar connections: Ensure all the plugs are connected correctly at the drawbar.
- Check the battery and all connections at the battery: Ensure the battery is not flat or partially flat. A minimum of 10 volts.

Issue: No Hydraulic function

- Check hydraulic connections Check all hydraulic connections to the tractor are still securely attached and into the correct ports.
- Check other hydraulic function (Lift, fold etc.)
- Check hydraulic Pressure: While operating a function inspect the pressure on the gauge on the spool valve. Or alternatively operate the bi-fold function and watch the gauge from inside the cabin.
- Check hydraulic flow

- Check load sense
- Check hydraulic oil level of tractor
- Check the ball valves are turned on, on steering cylinder: Check the ball valve(s) located above the steering cylinder are turned on and are parallel with the hose.

Issue: Power but no out-put power

- Check connection to plc: Inspect the small loom between the plc, trident (pc) and main loom connector. Making sure to check large plug that connects to the microprocessor and the plug that connects to the loom.
- Check connection din plugs. Inspect the din plugs on top of the hydraulic solenoids and ensure they are all securely fixed together. With the controller in manual mode, remove the din plugs and test the voltage across pin one and two, with someone operating the function. There should be approximately 12 volts between the two terminals.

Issue: No Steering, manual Crab works

Possible cause: Left Speed Sensor not flashing or not on

- Adjust speed sensor: Ensure the speed sensor and lead are still aligned, have not been bumped and are not damaged; also check the gap between the disc and the sensor (3mm-10mm).
- Simulate speed at sensor plug signal: You can simulate a speed signal on Bodem by rapidly shorting the A and B pin with a paper clip on the sensor lead together. This should appear on Bodem, it will not be steady but there should be a reading.

If there is not a reading inspect the loom.

- Replace Speed sensor: If there is a speed reading appearing on Bodem, (when shorting the pins) there is a fault with the speed sensor. Replace the speed sensor.

Possible cause: Both Speed Sensors Not Flashing

- Check power at 307 pin D: Above the axle there will be a plug labelled 307 (leading to the speed sensors and the angle sensor). A six pin Packard plug off the main loom. Between pin “d” and “f” there should be 12Vdc+.

Possible cause: No yaw power

- Check 12v+: There should be a twelve volt positive supply between the pins “A” and “C” of the yaw sensor connector.

Issue: Erratic Steering

Possible cause: Right Speed Sensor not flashing or not on

- Adjust Speed Sensor: Check the right hand speed sensor gap is between 3mm and 10mm. Ensure the light is flashing on every vein of the disc. If the light is not on check there is a 12V+ supply between pin “d” and “f” on plug 307 above the axle.

Possible cause: Calibration error

- Recalibrate - follow calibration procedure.

BODEM STEERING SOFTWARE

General:

Bodem is computer software used for viewing and changing the inputs of the smart steer microprocessor's program. It is also a very useful diagnostic tool for finding a faulty sensor or a problem with the hardware. It is the only way to see what inputs and outputs the microprocessor is calculating.

Bodem is also used for commissioning a new machine to set up calibrations such as tank size (determining chassis length), wheel size, width of machine, pulses per revolution and hydraulic solenoid valve setup.

Connection:

To connect to Bodem simply insert the dongle into one of the USB ports on your computer and insert your USB/serial adapter into another.

Find the program Bodem 2 in the program menu of windows and open the program Bodem 2.

The first thing Bodem will do, when it initially opens will be: check the dongle, if the dongle is not detected certain features will be inaccessible.

If the dongle is detected Bodem will automatically initiate a connection between your computer and the micro processor. If it does not, or for some reason the connection is lost, to re-initiate the connection click the symbol in the top left hand corner: New connection.

Once finished click this button to disconnect.

Troubleshooting:

Conflict with Baud rate

- No Power to controller: Ensure the Microprocessor has power. A 12v+ supply between pins 1 and 2 of the microprocessor connector.

Conflict with communication port

- USB/Serial connector not connected: Ensure the serial connector is connected and the USB adapter is connected correctly to the computer and the computer is configured to the correct COMPORT.
- USB/Serial connector not configured correctly: Check the computer is connected to the correct COMPORT and Bodem is configured to the exact same comport, must be either comport 1, 2 or 3.

Dongle not detected

- Connect the dongle: Check the dongle software is loaded and the dongle fully inserted to the USB port.

Incorrect speed reading:

There is a faulty speed sensor, possibly left or right may need adjusting if there is an inconsistency. The microprocessor calculates the machine speed by averaging the two speed sensors, if a sensor is not reading the microprocessor cannot calculate an accurate average speed.

No Yaw Signal:

Ensure there is a 12v supply at the yaw sensor

No Angle Feedback:

Faulty sensor on top of the axle linked to the top of the king pin. Check there is a 5volt power supply between pin 1 and 5 on the angle sensor connector.

JOYSTICK

General
Dimensions
Identification
Parts Ordering
Decals

GENERAL

OVERVIEW

JOYSTICK OPERATION

The Goldacres joystick brings up to 21 sprayer functions to your thumb. The following pages give an overview of the joystick's operations. All functions on the sprayer are easily controlled from the switches on the joystick.



Foam left



Foam right



Boom raise



An adjustable limit switch enables the operator to set the lowest height of the boom



Boom lower



Manually steer the wheels to the left. Handy in wet conditions so the sprayer wheels do not run in the tractor wheel tracks



Crab left



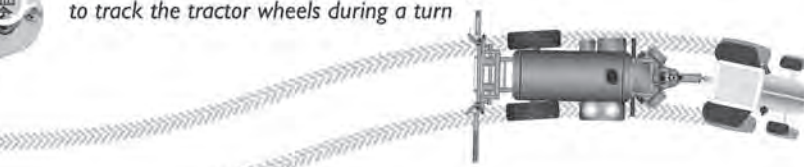
Manually steer the wheels to the right. Handy in wet conditions so the sprayer wheels do not run in the tractor wheel tracks



Crab right



Automatic steering control allows the sprayer to track the tractor wheels during a turn



Steer



Boom wings can be adjusted
to go below horizontal



Boom wings can be adjusted
to go below horizontal



Operate boom at full width



Operate the boom at a
reduced width



Boom end tip LED lights





High mounted rotating light for road transport

Beacon



Switches all boom sections on or off

Boom master switch



Opening the boom is simple as the outer wing opens automatically via the cable fold system

Booms open



Booms closed



Fence jets left



Fence jet right



Switches on the foam marker compressor

Foam



RAVEN SCS 4070 CONTROLLER

General	
Operating instructions	

RAVEN SCS4070 CONTROLLER

GENERAL

The GoldAcres premium control system utilises a combination of state of the art CAN BUS technology and traditional hard wiring. Special care must be taken in the installation of the system into the tractor to avoid interference and correct operation.

The system has also been pre wired to assist with the possible retrofitting of large number extra options.

Depending on the sprayer options selected the current draw on the tractor's electrical system can be quite high. Refer to the table below to determine if the tractor's charging system has sufficient capacity (The system is based on 12 volts dc power supply)

Maximum Current Draw (Amps)

Air bag suspension	15
Liquid control system (including joystick)	50
Rotating light	5
Boom lights 2 x 100W	17
DCI module (each)	20
Ultra glide	10
Foam marker	10
Smart steer	5

For example: A Prairie Advance EF with dual direct injection and foam marker options would require a maximum current draw around 120 amps. Although this is quite high, most functions are only operated for short times and rarely all together. However you must also consider the tractor's own usage, things like air conditioners, lights and radios.

The control system consists of 4 main components that require mounting into the tractor.

These include:

1. Joystick.
2. 4070 controller.
3. Power distribution box.
4. Power solenoid, wiring harness and drawbar connection module.

If smart steer is optioned then a Yaw sensor also needs to be mounted. This will be covered later in this chapter.

The joystick supplied is designed to mount on the right hand side of the tractor seat. The joystick is supplied with a RAM mount to help position the unit in a comfortable position. If required the position of the cable exit can be changed by removing the 3 screws that hold the RAM mount on the base of the joystick. Once removed the 4 screws, holding the base to the joystick, can be removed and the base carefully rotated. When the orientation is correct refit the screws.

The 4070 controller also has a RAM mount supplied. These units are normally mounted on the RHS corner of the cabin where the screen is easily seen. The boom section switches are mounted into this console therefore the console needs to also be in easy reach. Ensure that the console is mounted securely to avoid vibrations damaging the unit.

The power distribution box contains all of the transistors and fuses required to run the entire tractor mounted systems. The box should be mounted with the 5 connectors facing upwards. Ideally, the vent holes and fuses should not be against the wall of the cabin. Access to the Smart Steer calibration switch on the top side of the box also needs to be considered when mounting the unit.

The main tractor harness has 3 points of interest:

1. The solenoid and main 150amp circuit breaker module should be mounted as close to the battery as possible. Red is positive and black is negative. Ensure that the cables between the battery and the circuit breaker are well protected and do not rub against any sharp objects. The blue wire labelled “key ignition wire” must be connected to a circuit on the tractor, which is only active when the tractor ignition key is in either the accessory or running position.
2. Route the wiring loom towards the rear of the tractor and mount the sprayer drawbar connection module. This module houses the main sprayer power and earth connector (large grey connector) and the sprayer communications connector.
3. The final part to the wiring must now enter the cabin and connect to the power distribution box. Insert the connectors to the mating ports in the box.

The main cable to the 4070 console can now be connected. At this point the CAN BUS system needs to be connected. The CAN communication connector is the grey deutsch 4 pin unit. Install the CAN TEE P/N 1150171362 and the CAN terminator P/N 0630172369 into the system. Refer to the system layout drawings.

Once you are satisfied that all the cables are connected correctly then the main circuit breaker reset can be switched on. Check that all is OK. If so then switch the tractor ignition key on and confirm no fuses are blown.

ULTRA GLIDE

WARNING

When starting the machine for the first time, be sure that all persons stand clear, in case a hose has not been completely tightened.

This machine must remain stationary and switched off with the booms unfolded and supported while installation or maintenance is conducted.

CAUTION

Hydraulic Safety

Hydraulics may be under pressure. Never attempt to open or work on a hydraulic system with the equipment running. Care should always be taken when first opening a system that has previously been pressurized.

When disconnecting the hydraulic hoses or purging is required, be aware that the hydraulic oil may be extremely hot and under high pressure. Caution must be exercised. Any work carried out on the hydraulic system must be performed in accordance with the machine manufacturers's approved maintenance instructions. Raven Industries recommends that appropriate protective equipment be worn at all times when working on the hydraulic system. When installing AutoBoom hydraulics or performing diagnostics, maintenance, or routine service, ensure precautions are taken to prevent any foreign material or contaminants from being introduced in the machine's hydraulic system. Objects or materials that are able to bypass the machine's hydraulic filtration system will adversely reduce performance and possibly damage the AutoBoom hydraulic valves.

Electrical Safety

Do not reverse power leads. Doing so could cause severe damage to the equipment. Always make sure that the power leads are connected to the correct polarity as marked. Ensure that the power cable is the last cable to be connected.

CHAPTER

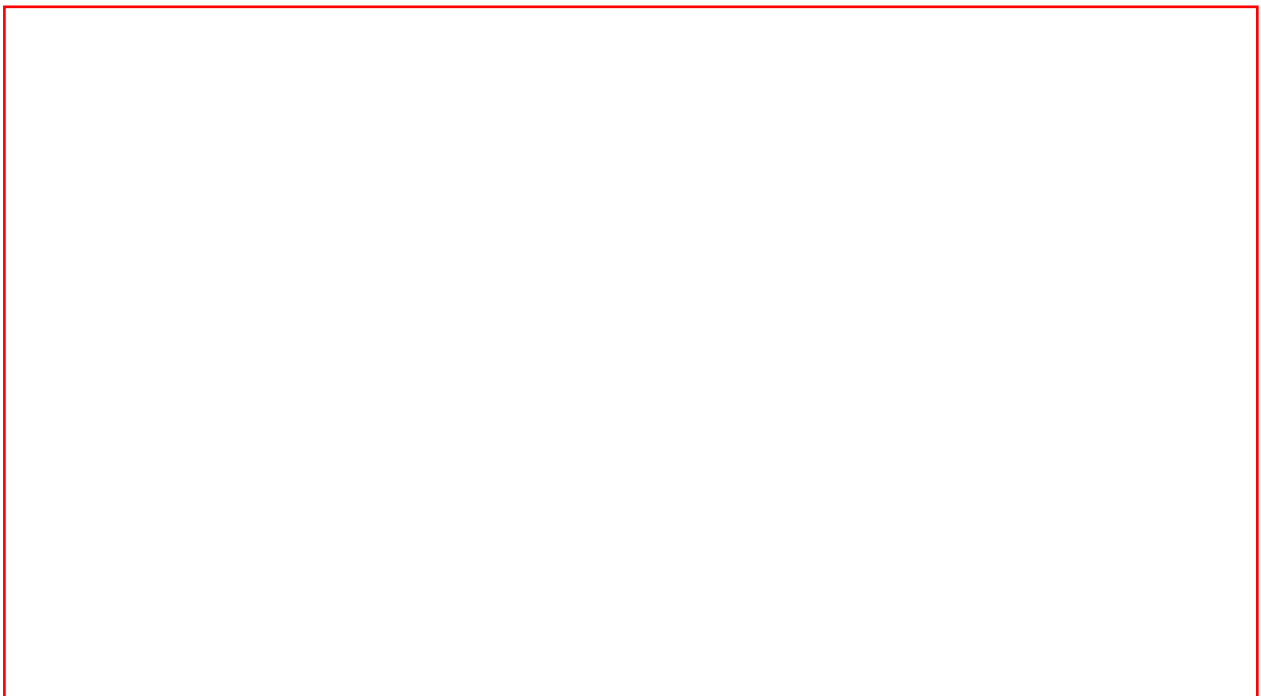
2

Introduction

Congratulations on your purchase of the Raven UltraGlide AutoBoom™ system! The AutoBoom feature, used in conjunction with your Raven controller adjusts the height of your booms automatically. Using your boom's hydraulics, UltraGlide's parallel hydraulic system always keeps the hydraulic valves open, gently balancing the hydraulic cylinders and allowing the booms to raise or lower effortlessly.

When you first install your system, it will need to be calibrated to your controller and your specific vehicle. While calibrating and operating AutoBoom, it is important to make sure the machine is running at sufficient engine RPM so that the hydraulic pump is able to supply full flow to the hydraulic system. On most modern tractors 1500RPM is sufficient

The following instructions are designed to assist you in the proper calibration of your CAN AutoBoom system with the SCS 4400/4070 Series Console. Installation should be fully completed before calibrating the system.



UltraGlide

Calibration

Note: Be sure to have the boom unfolded and approximately at target sensor height. For machines equipped with wheels, the target height should be set such that the wheels are approximately 10" off the ground.

For vehicles or equipment with open center hydraulic valves or if the type of hydraulic system is unknown, all calibration procedures should be done at full engine RPM.

1. To access the AutoBoom Setup menu, press the DATA MENU key until AutoBoom is displayed.
2. Press the CE key to toggle UltraGlide On. Use the DOWN ARROW to move the cursor to CALIBRATE. Press ENTER.
3. Press ENTER on the controller to begin the calibration of the Right boom. CALIBRATING will be flashing during the calibration process. STOP RIGHT CAL will also be displayed while the boom is calibrating. If the calibration needs to be stopped, press the ENTER key again.

Note: The left boom will lift into the air and then fall. This is part of the calibration process. Use caution to be sure the area is clear of people and obstructions before starting this process.

ULTRAGLIDE AUTOBOOM		
- CAL REQUIRED -		
CALIBRATE ULTRAGLIDE		
→ CALIBRATE RIGHT		
- CAL REQUIRED -		
HEIGHT:	28	32
CALIBRATE LEFT		
- CAL REQUIRED -		
SENSITIVITY		10
SPEED		8
PWM FREQUENCY		60
AUTOBOOM MAIN MENU		

Note: If system has already been calibrated, arrow to RESET DEFAULT and press Enter.

4. Press the down arrow on the controller keypad to move to the CALIBRATE LEFT setting. Press ENTER on the controller to begin the calibration of the Left boom. CALIBRATING will be flashing during the calibration process. STOP LEFT CAL will also be displayed while the boom is calibrating. If the calibration needs to be stopped, press the ENTER key again.

5. Once calibration is completed, the following screen will be displayed. Press the down arrow on the controller twice to return to the AutoBoom MAIN MENU.

ULTRAGLIDE AUTOBOOM

SYSTEM CALIBRATED

PSI:	1485	1515
HEIGHT:	28	32

→ PWM FREQUENCY 60

RESET DEFAULTS

AUTOBOOM MAIN MENU

6. The menu options are listed on the main screen.

ULTRAGLIDE AUTOBOOM

	LEFT	CT	RIGHT
PSI:	1468		1472
HEIGHT:	34	34	35

→ ULTRAGLIDE: ON

CALIBRATE

RIGHT : DISABLED

LEFT : DISABLED

SETUP-DIAGNOSTICS

MODE : ULTRAGLIDE

HEIGHT SETTING	35
SENSITIVITY	15
SPEED	25

ULTRAGLIDE AUTOBOOM

	LEFT	CT	RIGHT
PSI:	1468		1472
HEIGHT:	34	34	35

→ CENTR CONTROL: OFF

CENTER RK DISABLED

You can use the AutoBoom Main Menu screen to verify calibration of the system. The sensor height and pressure reading for the left and right booms are displayed at the top of the screen. See the Explanation of Screen Options section on the next page for more information on this screen.

Explanation of Screen Options

Note: *Navigate to the different settings by pressing the up or down arrows on the console keypad*

1. ULTRAGLIDE: This setting is either ON or OFF. Toggle this value with the CE button on the controller keypad.
2. CALIBRATE: Arrow down to this option and pressing Enter will take the system into the Calibration mode. This is not typically necessary after the initial calibration. Refer to the calibration section for more information.
3. RIGHT: This setting is either DISABLED or ENABLED. Toggle this value with the CE button on the keypad.
4. LEFT: This setting is either DISABLED or ENABLED. Toggle this value with the CE button on the keypad.
5. SETUP - DIAGNOSTICS: Press Enter to access Advanced Setup and Diagnostics screens. Refer to “Advanced Setup and Diagnostics Screens” section on page 65.
6. MODE: With a PowerGlide Plus CAN node, the system can only be operated in PowerGlide Plus mode.
7. HEIGHT SETTING: This is the target boom height that AutoBoom will try to maintain during operation. To change this setting, place the arrow next to HT. SETTING and press ENTER. Use the Up and Down Arrows to change the value. When completed, press ENTER.
8. SENSITIVITY: This affects how sensitive the system will be to changes in height. If the field has crop stubble, you may want to set this to a smaller value. This setting can be adjusted to the operator’s preference. Press ENTER and use the Up and Down Arrows to change the value. Press ENTER when complete.
9. SPEED: This affects the speed at which the boom attempts to make its corrections. Press ENTER and then use the Up and Down Arrows to change the value. Press ENTER when complete.
10. CENTER CONTROL: This setting is either ON or OFF and will allow CENTER RACK to be enabled if ON. Touch the CE button to toggle CENTER RACK ON and OFF.

Note: *ON should only be selected for machines equipped with a center ultrasonic sensor and the proper cabling and hardware for center rack control.*

11. CENTER RACK: This setting is either DISABLED or ENABLED. Toggle this value with the CE button on the keypad. This can only be enabled if CENTER CONTROL is ON.

To Adjust Stability:

1. Go to the SETUP-DIAGNOSTICS screen. Press enter.
2. A higher value decreases stability and a lower value increases stability

Note: *For a detailed explanation of Stability, refer to “Advanced Setup and Diagnostics Screens” section on page 65.*

Operation

Be sure the booms are unfolded and ready to spray before enabling AutoBoom. To enable AutoBoom:

1. Using the DATA MENU key, navigate to the AutoBoom screen.
2. Select the UltraGlide setting and toggle the value to ON using the CE key. AutoBoom is now ON but will need to be enabled before the system can control the boom height automatically.
3. AutoBoom can be enabled either by pressing the DOWN arrow on the SCS Console from the main screen or tapping the down functions on the vehicle's switch (if equipped). A double tap down on the switch enables both sides and lowers booms to ground. A double tap up disables and raises both sides. See the Center Rack Control Switch Functions section for information on switch functions for Center Rack Control.
4. The AutoBoom system is now ready to operate.
5. Autoboom can be disabled either by pressing the UP arrow on the SCS Console from the main screen or tapping the up functions on the vehicle's switch (if equipped).

The SCS 4000/5000 Series Console will display the current status of the AutoBoom system in the lower right corner of the screen. The status includes:

- PowerGlide Plus or UltraGlide ON/OFF
- System ENABLED/DISABLED
- PSI (PowerGlide Plus), Set Height (UltraGlide), or Center Height (if equipped).

1	2	3	4	5	6	7	8		
ULTRA Glide ON SYSTEM DISABLED CTR RACK : DIS CENTER HT: 28									

Center Rack Control Switch Functions (Optional for PowerGlide Plus)

The center rack switch can be used for center rack control functions if equipped. With Autoboom ON and Center Rack Control ON, the center switch will operate Autoboom as follows:

Center Down switch:

A single down tap will lower the center rack to the desired spray height, enable the center rack, and then also enable both booms.

Center Up switch:

A single up tap will disable the center rack and disable both the left and right booms.

Two consecutive up taps will raise the center rack to the desired transport height.

Four consecutive up taps will raise the center rack to maximum height and turn Autoboom OFF, and preserve the new transport position as max height.

To set a new transport height:

To set a lower transport height:

While the center rack is returning to transport, tap down once on the center switch where you want the new transport height to be set.

To set the transport height to maximum height:

With the center rack positioned higher than the current transport height and Autoboom not currently returning to transport, tap up twice on the center switch to move the center rack to maximum height.

Note: *Consecutive up or down taps must be performed within 1.5 seconds of each other. Return to height and return to transport positions are measurements relative to crop canopy, not necessarily ground level.*

With Autoboom ON and Center Rack Control OFF, the center switch will operate Autoboom as follows:

Center Down switch:

Two consecutive down taps will lower the center rack to the desired spray height and then enable both booms.

Note: *The Center Rack will not be enabled since Center Rack Control is OFF.*

Center Up switch:

Two consecutive up taps will disable both left and right booms and raise the center rack to the desired transport height.

Four consecutive up taps will raise the center rack to maximum height and turn Autoboom OFF, and preserve the new transport position as max height.

To set a new transport height:

To set a lower transport height: While the center rack is returning to transport, tap down once on the center switch where you want the new transport height to be set.

To set the transport height to maximum height: With the center rack positioned higher than the current transport height and Autoboom not currently returning to transport, tap up twice on the center switch to move the center rack to maximum height.

Note: *Consecutive up or down taps must be performed within 1.5 seconds of each other. Return to height and return to transport positions are measurements relative to crop canopy, not necessarily ground level.*



Building a Platform For Success.

**ULTRAGLIDE CALIBRATION GUIDE FOR
GOLDACRES SPRAYERS**

30-36MT BOOM NO WEEDSEEKER

Sensitivity.....20

Speed.....25

Stability.....12

24-30MT BOOM NO WEEDSEEKER

Sensitivity.....15

Speed.....30

Stability.....60

WEEDSEEKER BOOMS WITH WHEELS FITTED ALL SIZES

Sensitivity.....20

Speed.....30

Stability.....0

Troubleshooting

- **Boom too slow to come back down.**

Take speed up into the 100 range e.g. 140 if speed was originally on 40. This is a different speed range causing the booms to raise/lower quicker than the 0-99 speed table.

- **Boom stability over reacting (opposite boom lifts to high)**

Take stability figure higher if it is a 24-36mt boom

- **Boom waving up and down while moving across field or in the yard**

Take stability figure lower if it is 30-36mt boom

- **Boom gets too close to ground before it reacts**

Increase the speed by 5 and take note of difference

If speed is too high boom will shake while sitting still and stability will be over reacting causing opposite booms to go too high while moving through field

- **Boom waving up and down while moving on smooth field**

Decrease sensitivity by 3 take note of difference

Decrease speed by 5 if sensitivity didn't fix the problem

If sensitivity is too low boom will be "sluggish" to react.

Advanced Setup and Diagnostics Screens

Advanced Options and Diagnostics are also available. These options allow fine tuning of stability control, minimum pressure on booms, and sensor height offsets. Diagnostics allows for visual status of all AutoBoom inputs and outputs.

1. Press DATA MENU until the AutoBoom Main Menu is displayed.

```
ULTRAGLIDE AUTOBOOM

      LEFT   CT   RIGHT
PSI:    1468      1472
HEIGHT: 34     34     35

→ ULTRAGLIDE: ON
  CALIBRATE
  RIGHT : DISABLED
  LEFT  : DISABLED
  SETUP-DIAGNOSTICS
  MODE : ULTRAGLIDE
  HEIGHT SETTING      35
  SENSITIVITY          15
  SPEED                25
```

2. Select the SETUP-DIAGNOSTICS option and press ENTER.

```
ULTRAGLIDE AUTOBOOM

      SETUP MENU
→DIAGNOSTICS
  STABILITY          14
  MIN PRESSURE %     90
  MANUAL DN SPD      10
  MANUAL UP SPD       10
  HT OFFSET OUT       2
  HT OFFSET IN        2
  HT OFFSET CTR       4
  UNITS: US PSI-INCH
  OUTER SENSORS      ENA
  AUTO OFF SECS      20
  AUTOBOOM MAIN MENU
```

Diagnostics allows for visual status of all AutoBoom inputs and outputs. Press ENTER to access. Refer to Diagnostics section for a description.

Stability parameter allows for fine tuning of the control based on the rigidity of the sprayer's center rack. The default value of 20 is recommended for sprayers where the center rack is tight. A value of 5 to 14 is recommended for sprayers where the center rack floats freely. Adjust this value as needed to prevent boom oscillation.

Special Functions:

- **Stability setting of 0:** This disables stability control completely making left and right booms completely independent of each other. The control of both booms when above target is also accelerated to increase the down speed. This setting is useful for machines that have a rigid center rack, and it is desirable to have faster down speeds on the booms.
- **Stability setting of 1:** For stability control this is the same as the stability setting of 10. However, for this setting the control of both booms when above target is also accelerated to increase the down speed whereas setting the stability to 10 does not. This setting is useful for machines that require stability control, and also need faster down speeds on the booms.
- **Stability settings of 2 – 99:** For these settings the down speeds are not increased. There are no special functions for these settings so the higher the number, the more independently the booms control from each other. With a setting as low as 2, you can expect the booms to react almost identically (i.e. raise one side and other side raises with it).
- **Minimum Pressure%** sets a low limit pressure preventing the boom pressure from falling below a percentage of static pressure. This overrides the control if necessary to maintain a low limit pressure on each boom.
- **Height Offsets** (Outer, Inner, and Center) allow for the sensor readings to be adjusted for the mounting location above or below the sprayer tips. Enter a positive value if the sensor is mounted above the sprayer tips, or a negative value if the sensor is mounted below the sprayer tip.
- **Units** allows for pressure units to be selected between PSI or KPA. Press CE to toggle if the console is programmed in metric mode. When programmed in US units, heights will read in inches. When programmed in metric, heights will read in centimeters.
- **Outer Sensors** can be disabled for units equipped with inner sensors. This can be utilized when the outer tips are folded in. Only the inner sensors would then be used for control. Press CE to toggle. Note that the system will require re-calibration upon toggling value.
- The **Auto Off Secs** setting is the time (in seconds) in which the AutoBoom system will be automatically shut off when either the master switch is set to the off position or all boom sections are turned off. Upon turning a boom section, or the Master Switch, back on, AutoBoom is automatically turned on with the booms disabled. The left and right booms will then need to be re-enabled. This setting can be disabled by setting the Auto Off Secs value to zero. The Auto Off Secs value can be set anywhere between 0 and 240.

Manual Control (Not applicable for most machine installations)

The Manual Up/Down Speeds are only applicable for OEM installed AutoBoom systems in which boom tilt functions are solely controlled by the AutoBoom valve.

- **Manual Down Speed** sets the gain at which the boom lowers. The higher the value, the faster the boom will lower. A value of 10 is a recommended starting point. Adjust as needed to set the appropriate lowering speed.
- **Manual Up Speed** sets the gain at which the boom raises. The higher the value, the faster the boom will raise. A value of 10 is a recommended starting point. Adjust as needed to set the appropriate raising speed.
- Touch the Manual Control arrows to manually raise or lower the left or right boom.

Diagnostics

DIAGS:	LT	CT	RT
INPUTS:			
RAISE	OFF	OFF	OFF
LOWER	OFF	OFF	OFF
UNFOLD	OFF		OFF
PSI	1022		1122
HT OUT	31		32
HT IN	30		31
OUTPUTS:			
BLCKR	OFF	V0	OFF
PWM %	30.0	IDLE	30.0
PRESS DATA	MENU TO RTN		
LT BM	CT RK	RT BM	
UP DN	UP DN	UP DN	

The diagnostics screen allows for visual status of all AutoBoom inputs and outputs.

- RAISE and LOWER indicate status of the switches. When depressed, the corresponding switch will indicate ON.
- UNFOLD indicates the status of the unfold proximity switch (if equipped). When equipped, the booms will not enable until the proximity switch is made.
- The PRESSURE and HEIGHT indicate the status of corresponding sensors.
- BLOCKER indicates status of double blocker output.
- PWM% indicates current duty cycle of the proportional control valve.
- BASE PWM% indicates controller's calculation of static duty cycle, or the duty cycle required to hold the boom level.

- Center Rack 2-speed valve (if equipped): V0 is displayed on the screen when this valve is off. When the center rack is Enabled, the screen will display V1 to indicate the valve is on. This valve is not commonly required for center rack control applications.

CHAPTER

8

Troubleshooting

Troubleshooting

Problem 1:

The booms will not enable when tapping left or right down on the switch, but it will enable by using the controller.

Solutions:

1. The boom sense cables are not properly connected to the down coils on the valve stack. Refer to the Diagnostics screen to check input functionality.
2. Verify that there is 12 volts on the down coil wires. Use a volt meter to verify there is a voltage spike while the down switch is held down. It isn't necessary to have the machine running, but the key needs to be switched on.

Problem 2:

The pressure alarm is always on.

Solution:

1. Verify the pressure alarm settings in PowerGlide Plus mode. Refer to the 'Setting Pressure Alarms' section of the Calibration chapter and complete all steps.
2. Check the pressure and tank hoses for proper installation.

Problem 3:

The booms go up when enabling left or right.

Solution:

1. There may be a bad wire connection to the ultrasonic sensors at the main harness or at the sensors themselves.
2. A defective ultrasonic sensor.

Note: *If the sensor loses signal or power, the sensor is programmed to make the boom go up.*

Problem 4:

A hand under one boom sensor makes the other boom react.

Solutions:

1. The left and right ultrasonic sensor wires are reversed.
2. The proportional wires on the valve are reversed.

Problem 5:

The booms oscillate when standing still (UltraGlide mode).

Solutions:

1. The Sensitivity is set too high.
2. The Speed is too high.

Problem 6:

When starting the calibration procedure, the boom goes up, but nothing else happens.

Solutions:

1. This is most typically caused by an error in the wiring connections at the valve. Go to the AutoBoom valve and verify the harnesses labeled for the right and left sides are installed in the corresponding ports on the AutoBoom valve. Refer to the installation instructions for additional information.

Problem 7:

When starting the calibration procedure, the wrong boom goes up.

Solutions:

1. This is most typically caused by an error in the wiring connections at the valve. Go to the AutoBoom valve and verify the harnesses labeled for the right and left sides are installed in the corresponding ports on the AutoBoom valve. Refer to the installation instructions for additional information.
2. This can occur due to an issue with the hydraulic connections to the AutoBoom valve. Refer to the installation manual for assistance in verifying the hydraulic connections.

Problem 8:

The controller will not allow the system to change from PowerGlide Plus to UltraGlide mode.

Solutions:

1. A PowerGlide Plus system can only be changed to UltraGlide if there is an UltraGlide node in the system. A good way to know if you have an UltraGlide system is to check if there are Ultrasonic sensors on the machine.
2. When changing modes, verify that the system is communicating with the sensors. If communication cannot be established, there will be an alarm on the controller. Verify that the sensors are connected.



Problem 9:

The booms appear to be too heavy or too fast.

Solutions:

1. Refer to the operation PowerGlide Plus section for your controller. You may need to adjust the pressure setting.

Frequently Asked Questions

What are good starting parameters for various machines? How do I best tune the system for optimal performance?

Sensitivity: this will range from 12-15, depending on the terrain and canopy conditions. For row crops, it is recommended to set this value lower. This setting adjusts the dead band for the Autoboom control. A lower value makes the booms less reactive even when they are far away from the target height. A higher value will make the booms very reactive to attempt to reach the target height. If sensitivity is set too high the booms will start to over-correct and oscillate above and below the target height.

Speed: this varies with machine (20-40 depending on how fast the booms raise). This setting controls the speed of the hydraulics. A lower value will make the booms raise and lower slower. A higher value will cause the booms to raise and lower faster. If this value is set too high the booms will frequently over-shoot the target height.

Stability: 20-30 is good for "tight booms"; 5-15 for "loose booms". This setting helps to reduce oscillations caused by loose center rack sections. When one boom is raising, the opposite boom is controlled accordingly based on the stability factor. The lower the value, the more the opposite boom will react. A setting of 0 disables stability control.

When tuning parameters, make small adjustments (one to two points) and only adjust one parameter at a time.

How do I tune the stability setting for a sloppy boom versus a tighter boom?

Use a lower number for a loose center rack, and a higher number for tighter center rack. If the system is oscillating, try a lower number. If the system appears very rigid, try a higher number.

How do I run Ultraglide with wheels? I don't understand why the wheels are important.

Set the desired spray height with the sensors i.e. 36". Adjust the wheels so they are a little higher i.e. 30" so they are off the ground. The wheels are then used as a backup to the ultrasonic sensors. When running wheels and sensors in conjunction with one another, sudden machine roll can be accounted for. For instance when going through a ditch, the hydraulics may not be able to react fast enough to raise the boom to account for the body roll. The wheels will simply touch down and prevent the boom from hitting the ground and buying the hydraulics time to catch up. This is usually used when the crop is shorter. When the crop gets too big for the wheels, then simply remove the wheels and slow down when going through drainage ditches, etc. The sensors are only able to "see" what is below them.

How many ultrasonic sensors are recommended?

As more sensors are installed, the better the system can perform. The more area that can be “seen,” the calculations to maintain the set boom height become more accurate. For booms over 100' or in very rugged terrain, four sensors are recommended. If only two sensors are used, a dual sensor kit can be purchased to add two more sensors to the boom. A center sensor can be used for monitoring and/or center rack control (if equipped).

I have a PowerGlide Plus system; can I add ultrasonic sensors to this system?

Yes, an upgrade kit can be purchased and easily installed to turn your current system into an Ultraglide system. You now have the choice of running in PowerGlide plus mode (as before) which will not use the ultrasonic sensor readings or running sensors and wheels together in Ultraglide mode.

My ultrasonic sensor is not indicating a height reading. What should I look for?

Confirm that the sensor is making a “ticking” noise, indicating that it is properly powered and functioning. If so, remove the cover from the sensor and look at the top of the sensor. Confirm that the (T) on the jumper is going to the arrow. The arrow will be located on the connector end of the sensor and should be hooked up on the sensor or the sensor will not work correctly. Two green lights and one yellow will be present on the top of the sensor if the jumper is hooked up correctly. If a red light is present, the jumper is not on correctly.

What are the ultrasonic sensors measuring from?

The ultrasonic sensors are reading off of what they “see” first or the most of (top of canopy). i.e. tall soybeans or wheat off the top of the crop. Short new crop off of the crop, sensors filter through the small crop to the ground. Sensors read off of a sound wave or “echo”. They need to be pointed to the ground so they have feedback. They cannot be pointed at an angle or away; they will not receive any feedback that way.

Where should the manual up/dn speed be set?

These values must be set to 0 when the sprayer stack valves are used for the normal up/dn functions.

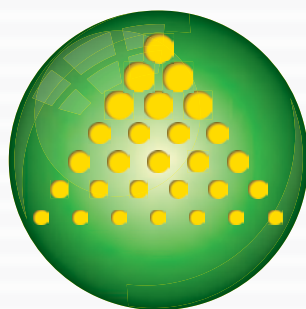
What do the two diagnostic LEDs on the node indicate?

DIAG 1 indicates that the left inner auxiliary sensor is connected. DIAG 2 indicates that the right inner auxiliary sensor is connected. This can be useful with the Envizio Plus to confirm the inner sensors are connected since the inner sensor height readings are not displayed.

How does the AUTO OFF SECS in the 4000 series consoles work?

The Auto Off Secs setting is the time (in seconds) in which the Autoboom system will be automatically shut off when either the master boom switch is set to the off position or all boom sections are turned off. Upon turning ON a boom section (or the Master Switch), Autoboom is automatically turned on with the booms disabled. The left and right booms will then need to be re-enabled. This setting can be disabled by setting the Auto Off Secs value to zero. The Auto Off Secs value can be set anywhere between 0 and 240.





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