

GOLDACRES
CHANGE THE WAY YOU SPRAY



Prairie Evolution
Operators Manual

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Revision number: 1.4
28/01/2011

Part #: GA5061420

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Chapter I

INTRODUCTION

Welcome

Congratulations on your purchase of a Goldacres sprayer. The Goldacres brand has been established through more than a quarter of a century of supplying Australian farmers with quality, innovative and technologically advanced spraying equipment - designed in Australia for Australian conditions.

Goldacres not only produce Australia's finest range of spraying equipment - we value the relationship with the owners of our equipment. We are pleased to have you as a Goldacres owner and look forward to making your spray applications as efficient as possible.

Please use this comprehensive resource to gain a full understanding of your equipment, and don't hesitate to contact your Goldacres dealer or Goldacres for further information.



Roger Richards
Engineering Manager

Goldacres Ballarat

Terms and Conditions

Interpretation

1. In terms and conditions:
- (1) "Goldacres" or "Pathway" means Goldacres Trading Pty. Ltd. A.C.N. 061 306 732 trading as Goldacres Agricultural Equipment (its successors and assigns) which is the seller of the Goods;
- (2) "Purchaser" means the purchaser of the Goods;
- (3) "Goods" means the products and, if any, the services sold or provided by Goldacres/Pathway to the Purchaser;
- (4) "GST Act" and "GST" are given the meanings referred to in a New Tax System (Goods and Services Tax) Act 1999.
- (5) "PPSA" means the Personal Property Securities Act 2009 (Cth) (as amended);
- (6) Nothing in these terms and conditions shall be read or applied so as to exclude, restrict or modify or have the effect of excluding, restricting or modifying, any condition, warranty, guarantee, right or remedy implied by law (including the Competition and Consumer Act 2010) and which by law cannot be excluded, restricted or modified.

General

2. (1) The Goods and all other products or services provided by Goldacres/Pathway are provided subject to these terms and conditions. These terms and conditions and any terms and conditions incorporated herein by virtue of clause 3 hereto shall prevail over all other terms and conditions of the Purchaser or otherwise to the extent of any inconsistency.
- (2) These terms and conditions may not be modified or amended without the expressed written consent of Goldacres/Pathway endorsed by the Managing Director of Goldacres Trading P/L.

Additional Terms and Conditions

3. From time to time Goldacres/Pathway may provide additional or extended warranties in respect of certain goods and/or services. Where such additional or extended warranties are provided to a Purchaser in writing they will be incorporated into these terms and conditions provided that in the event of any inconsistency between these terms and conditions and the terms of any additional or extended warranty, the provisions of the additional or extended warranty shall prevail.

Goldacres/Pathway quotations.

4. Unless previously withdrawn, Goldacres/Pathway quotations are open for acceptance within the period stated therein or, when no period is stated, with 14 days only of the quotation date. Goldacres/Pathway reserves the right to refuse any order based on any quotation within 7 days of receipt of the order.

Packing

5. The cost of any special packing and packing materials used in relation to the Goods shall be at the Purchaser's expense notwithstanding that such cost may have been omitted from any quotation.

Shortage

6. The Purchaser waives any claim for shortage of any Goods delivered if a claim in respect thereof has not been lodged with Goldacres/Pathway within (7) seven days from the date of receipt of the Goods by the Purchaser.

Specifications, etc: Catalogues, etc: Quantities

7. All specifications, (including but not limited to: drawings, particulars of weights, volumes, capacities, dimensions, load factors) are approximate only and any deviation shall not be taken to vitiate any contract with Goldacres/Pathway or form any claim against Goldacres/Pathway. The descriptions, illustrations, and performances contained in catalogues, price lists and other advertising matter do not form part of the contract of sale of the Goods. Where specifications, drawings or other particulars are supplied by the Purchaser, Goldacres/Pathway' price is made on estimates of quantities required. Should there be any adjustments in quantities above or below the quantities estimated by Goldacres/Pathway and set out in a quotation, then any such increase or decrease shall be adjusted on a unit rate basis according to unit prices set out in the quotation.

Performance, Capacities, Chemicals, Liquids, Application Methods, Environmental Effects

8. Any performance, volumes, and/or capacity figures given by Goldacres/Pathway are estimates only. Goldacres/Pathway shall be under no liability for damages for failure to obtain such figures unless specifically guaranteed in writing and any such written guarantee shall be subject to the recognised tolerances applicable to such figures. The suitability of chemicals and other liquids for any application and the application methods and the environmental effects shall be the sole decision and responsibility of the Purchaser and the user of the Goods. Goldacres/Pathway gives no warranty as to the suitability of any chemicals or other liquids for any application, nor the application methods nor the environmental effects, which may result from the use of the Goods. Goldacres/Pathway shall be under no liability for damages arising out of the use of any chemicals, liquids, or mixtures in the Goods nor for any application, nor for the application methods nor for the environmental effects, which may result from the use of the Goods.

Delivery/Service Times

9. The delivery times and service times made known to the Purchaser are estimates only and Goldacres/Pathway shall not be liable for late delivery, non-delivery or delay and under no circumstances shall Goldacres/Pathway be liable for any loss, damage or delay occasioned by the Purchaser or its customers arising from the late or non-delivery or late installation of the Goods.

Loss or damage in transit

10. Goldacres/Pathway is not responsible for any loss or damage to Goods in transit. Goldacres/Pathway shall render the Purchaser such assistance as may be necessary to press claims on carriers provided that the Purchaser shall have notified Goldacres/Pathway and the carriers immediately the loss or damage is discovered on receipt of Goods and shall lodge a claim on the carrier within three days of the date of receipt of the Goods. Insurance of Goods in transit is the responsibility of the Purchaser.

Limit of Liability

11. (1) Goldacres/Pathway liability for Goods manufactured by it is limited to:
- (a) where the law implies consumer guarantees into these terms and conditions pursuant to Part 3.2 Division 1 of Schedule 2 to the Competition and Consumer Act 2010 (C'th") ("consumer guarantees") which cannot be excluded and Goldacres/Pathway breaches a consumer guarantee, the loss and damage the Purchaser is entitled to at law which cannot be excluded by these terms and conditions;

and, in all other cases

- (b) making good any defects by repairing the same or at Goldacres/Pathway option by

replacement within a period not exceeding either 1000 hours or twelve calendar months, whichever comes first, after the Goods have been dispatched provided that:

- (i) the defects have arisen solely from faulty materials or workmanship;
 - (ii) the Goods have not received maltreatment inattention or interference;
 - (iii) accessories of any kind used by the Purchaser are manufactured or approved by Goldacres/Pathway;
 - (iv) where applicable, the seals on the Goods remain unbroken;
 - (v) there has been no improper adjustment, calibration or operation;
 - (vi) the use of accessories including consumables, hardware or software (not manufactured by Goldacres/Pathway) has been approved in writing by Goldacres/Pathway;
 - (vii) no contamination or leakage has been caused or induced;
 - (viii) any modification to the Goods have been authorised in writing by Goldacres/Pathway;
 - (ix) there has been no inadequate or incorrect use, storage, handling or application of the Goods;
 - (x) there has been no use or operation of the Goods outside of the physical, electrical or environmental specifications of the Goods;
 - (xi) there has been no inadequate or incorrect site preparations;
 - (xii) there has been no inadequate or improper maintenance of the Goods;
 - (xiii) it has not been caused by fair wear and tear; and
 - (xiv) firstly the Goods have been thoroughly inspected and any damage (from whatever cause) to the Goods (and in particular – the structure, welding, seams, bolts, booms) has been repaired prior to the Goods being operated, used driven or moved and on each occasion the tanks are filled; and
 - (xv) there has been no failure to comply with the requirements of all present or future laws or regulations relating to the Goods and/or the use and/or the operation of the Goods; and
 - (xvi) there has been no failure to maintain a record of hours of operation (which record shall contain full details of all inspections, repairs and maintenance) and produce same to Goldacres/Pathway at the time of the claim;
 - (xvii) the defective Goods or any damaged part of the Goods are promptly returned free of cost to Goldacres/Pathway or a representative of Goldacres/Pathway;
 - (xviii) all warranty related repairs have been carried out with the prior authorisation of Goldacres/Pathway;
- (2) If Goods or any part thereof are not manufactured by Goldacres/Pathway, in particular engines, engine accessories, transmissions, transfer cases, differentials, tyres, tubes, batteries, radios and UHF's, the guarantee of the manufacturer thereof shall be accepted by the Purchaser and is the only guarantee given to the Purchaser in respect of the Goods or that part provided always that this clause does not seek to exclude the consumer guarantees;
 - (3) In the case of hydraulic systems, Goldacres/Pathway shall replace defective parts in accordance with clause 11(1) of these conditions, provided that the failure of the part was not related to contamination within the system, Goldacres/Pathway shall not be liable for labour in the case of repairing hydraulic system defects;
 - (4) Goldacres will not accept liability for damage attributed to fair wear and tear including but not limited to fair wear and tear to nozzles, chains, belts, filters, brake pads, polyethylene bushes and liquid pump valves, valve O-rings, diaphragms and seals;
 - (5) Goldacres/Pathway shall not be liable for and the Purchaser releases Goldacres/Pathway from any claims in respect of faulty or defective design of any Goods supplied unless such a design has been wholly prepared by Goldacres/Pathway and the responsibility for any claim has been specifically accepted by Goldacres/Pathway in writing and in any event Goldacres/Pathway liability hereunder shall be strictly limited to the replacement of defective parts in accordance with paragraph 11(1) of these conditions provided always that this clause does not seek to exclude the consumer guarantees;
 - (6) Except as provided herein, all express and implied warranties, guarantees and conditions under statute or general law as to the merchantability, description, quality, suitability or fitness of the Goods for any purpose or as to design, assembly, installation, materials or workmanship or otherwise are hereby expressly excluded and Goldacres/Pathway shall not be liable for physical or financial injury, loss or damage or for consequential loss or damage of any kind arising out of the supply, layout, assembly, installation or operation of the Goods or arising out of Goldacres/Pathway negligence or in any other way whatsoever;
 - (7) The benefit of any warranty provided under these terms and conditions shall only be available to the Purchaser and shall not be transferable by the Purchaser;
 - (8) The warranties provided under these terms and conditions do not extend to second hand or used Goods that may be sold by Goldacres/Pathway.
12. Goldacres/Pathway liability for breach of a consumer guarantee is hereby limited (in the case of goods and services not used for personal, domestic or household purposes) to:
 - (1) in the case of Goods, any one or more of the following:
 - (a) the replacement of the Goods or the supply of equivalent Goods;
 - (b) the repair of the Goods;
 - (c) the payment of the cost of replacing the Goods or acquiring the equivalent Goods;
 - (d) the payment of having the Goods repaired; or
 - (2) in the case of services;
 - (a) the supplying of the services again; or
 - (b) the payment of the cost of having the services supplied again.

Prices

13. (1) Unless otherwise stated in writing by Goldacres/Pathway, all prices quoted by Goldacres/Pathway are inclusive of GST for supplies within Australia and exclusive of GST for exports outside of Australia. Prices quoted are those ruling at the time of quotation or the date the price is given and are based on rates of freight, insurance, customs, duties, taxes, exchange, shipping expenses, sorting and stacking charges, cartage, cost of materials and other charges affecting the cost of production ruling on that date and any alterations thereto either before acceptance of or during currency of the contract shall be to the Purchaser's account.
- (2) For the purpose of 38-185 of the GST Act, the day upon which the seller gives the invoice for the supply shall be the date of the invoice.

Payment

14. (1) The purchase price in relation to the Goods and the cost of the service shall be payable without deduction and or set off and payment thereof shall be made on or before the thirteenth day of the month following the delivery of the Goods or performance of

- the services unless other terms of payment are expressly stated in writing.
- (2) A decreasing or increasing adjustment and or the issuing of an adjustment note, pursuant to Division 21 and Division 29-C of the GST Act, shall not, in any way, constitute a release, waiver, and or forgiveness of the debt incurred by the Purchaser.

Interest on overdue payments

15. If Goldacres/Pathway is not paid for any Goods or services on the due date specified in this agreement without prejudice to any other right or remedy, all outstanding money shall bear interest at the rate set, pursuant to the Penalty Interest Rates Act, Victoria, 1986, as such money, together with interest shall be recoverable forthwith from the Purchaser.

Rights in relation to Goods.

16. (1) Title to the Goods supplied by Goldacres/Pathway to the Purchaser shall remain with Goldacres/Pathway until the total amount due in respect of the Goods and all monies owing to Goldacres/Pathway have been paid in full (the "Debts"). Risk in the Goods shall pass to the Purchaser upon delivery.
- (2) The Purchaser shall have the right to resell Goods but only as fiduciary agent and trustee for Goldacres/Pathway by way of bona fide sale at full market value and in the ordinary course of its business.
- (3) Until all the Debts have been paid in full:
- (a) the Purchaser shall take custody of the Goods as trustee, fiduciary agent and bailee for Goldacres/Pathway;
- (b) the Purchaser shall keep the Goods separate from any other goods and properly marked, stored, protected and insured;
- (c) the Purchaser must hold all of the money it receives ("Proceeds"):
- (i) from the sale of any property into which Goods supplied have been incorporated; and
- (ii) from the sale of Goods or provision of services including the Goods supplied by the Goldacres/Pathway as bailee, fiduciary agent and trustee for Goldacres/Pathway, but the Purchaser need not hold on trust any money exceeding the amount of the Debts at the time the money is received.
- (d) The Purchaser expressly acknowledges that it is bound by the fiduciary obligation created in the preceding paragraph and acknowledges that:
- (i) it must hold the Proceeds on trust for Goldacres/Pathway;
- (ii) it must place the whole of the Proceeds in an account separate from its own moneys (the "Proceeds Account");
- (iii) it must maintain the Proceeds Account separate from its own moneys at all times.
- (iv) it must maintain proper records for the Proceeds Account.
- (v) it must not assign or encumber any book debts arising from sales made in circumstances set out in clauses 16(c)(i) and (ii) or do any other act in derogation of Goldacres/Pathway's legal or beneficial interests; and
- (vi) it must account to Goldacres/Pathway on demand for all moneys standing to the credit of such account.
- (e) For the purposes of identification of different consignments of Goods purchased from Goldacres/Pathway and receipt of Proceeds, the Purchaser agrees that the principle of "Last In, First Out" shall be applied to any items that cannot be distinguished.
- (f) Goldacres/Pathway may trace the Proceeds in equity.
- (4) Goldacres/Pathway may at any time, without notice to the Purchaser and without prejudice to any other rights which it may have against the Purchaser, terminate any contract connected with the Goods and the bailment referred to in clause 16(3) and enter upon any premises owned or occupied by the Purchaser where Goldacres/Pathway reasonably believes the Goods may be stored, and repossess the Goods without liability for any damaged caused, and subsequently dispose of the Goods at Goldacres/Pathway's discretion if:
- (a) the Debts are not paid in accordance with these terms and conditions or any other contract or arrangement between Goldacres/Pathway and the Purchaser; or
- (b) Goldacres/Pathway receives notice of or reasonably believes that:
- (i) a third person may attempt to levy execution against the Goods; or
- (ii) the Purchaser is insolvent (within the meaning of the Corporations Act 2001) or bankrupt; or
- (iii) the Purchaser has entered into any arrangement or composition with its creditors, gone into liquidation, or has appointed a receiver, a receiver and manager or administrator.
- (5) If after repossession under clause 16(4) Goldacres/Pathway sells the Goods, Goldacres/Pathway shall account to the Purchaser for any proceeds of sale (less expenses of repossession and sale) that exceeds the amount of the outstanding Debts.
- (6) If any Goods belonging to Goldacres/Pathway are disposed of by the Purchaser or an insurance claim is made in respect of them, Goldacres/Pathway shall be entitled to trace the sale or insurance proceeds, which proceeds shall be held by the Purchaser in a separate bank account on trust for Goldacres/Pathway.
- (7) The Purchaser agrees and acknowledges that in the event it sells Goods to a third party on account, it will include in its terms and conditions of sale a provision under which the Purchaser retains title to the Goods until such time that the total amount due in respect of the Goods and all monies owing to the Purchaser have been paid in full by that third party debtor. The Purchaser also agrees and acknowledges that in these instances, it will register its PMSI in accordance with the PPSA in respect of its security interest in the Goods.

PPSA provisions

17. (1) The Purchaser acknowledges that these terms and conditions constitute a security agreement for the purposes of section 20 of the PPSA and that a security interest exists in all Goods (and any associated Proceeds from their sale) previously supplied by Goldacres/Pathway to the Purchaser (if any) and in all future Goods (and any associated Proceeds from their sale) that may be supplied to the Purchaser by Goldacres/Pathway.
- (2) The Purchaser acknowledges that Goldacres/Pathway has a first ranking purchase money security interest ("PMSI") (as defined in section 14 of the PPSA) in the Goods and the Purchaser must not jeopardise such ranking (whether by act or omission).
- (3) The Purchaser acknowledges that it has received value as at the date of first delivery of the Goods and has not agreed to postpone the time for attachment of the security interest (as defined in the PPSA) granted to Goldacres/Pathway under these terms and conditions.
- (4) The Purchaser will execute documents and do such further acts as may be required by Goldacres/Pathway to register the security interest granted to Goldacres/Pathway under these terms and conditions under the PPSA.

- (5) Until ownership of the Goods passes, the Purchaser must not give to Goldacres/Pathway a written demand or allow any other person to give Goldacres/Pathway a written demand requiring Goldacres/Pathway to register a financing change statement under the PPSA in respect of Goldacres/Pathway's interest in the Goods.
- (6) The Purchaser must indemnify Goldacres/Pathway and on demand reimburse Goldacres/Pathway for all costs and expenses incurred by Goldacres/Pathway in respect of these terms and conditions including but not limited to Goldacres/Pathway registering its security interest in the Goods, lodging, discharging or amending any financing statement or financing change statement, or otherwise complying with the PPSA.
- (7) The Purchaser agrees (other than as provided in these terms and conditions) not to sell, lease, mortgage, deal with, dispose of or create or attempt to create any other security interest in or affecting the Goods unless and until the Purchaser's Debts have been satisfied.
- (8) The Purchaser waives its rights under the following provisions of Chapter 4 of the PPSA:
- (a) to receive a notice on enforcement action against liquid assets (section 121(4));
- (b) to receive a notice to seize collateral (section 123);
- (c) to receive a notice of disposal of Goods by Goldacres/Pathway purchasing the Goods (section 129);
- (d) to receive a notice to dispose of Goods (section 130);
- (e) to receive a statement of account following disposal of Goods (section 132(2));
- (f) to receive a statement of account if no disposal of Goods for each 6 month period (section 132(4));
- (g) to receive notice of any proposal of Goldacres/Pathway to retain Goods (section 135(2));
- (h) to object to any proposal of Goldacres/Pathway to either retain or dispose of Goods (section 137(2));
- (i) to redeem the Goods (section 142);
- (j) to reinstate the security agreement (section 143);
- (k) to receive a notice of any verification statement (section 157(1) and section 157(3));
- (9) The rights Goldacres/Pathway may have under the PPSA are supplementary and in addition to those set out in these terms and conditions and do not derogate from the rights and remedies of Goldacres/Pathway under these terms and conditions or under any other statute or under general law.
- (10) The Purchaser must give 10 business days prior written notice of any proposed change in the Purchaser's name or other identifying characteristics and details.

Purchasers property

18. Any property of the Purchaser under Goldacres/Pathway's custody or control shall be entirely at the Purchaser's risk as regards loss or damage caused to the property or by it.

Storage

19. Goldacres/Pathway reserves the right to make a reasonable charge for storage if delivery instructions are not provided by the Purchaser within (14) fourteen days of a request by Goldacres/Pathway for such information.

Returned Goods

20. Goldacres/Pathway shall not be under any obligation to accept Goods returned by the Purchaser and will do so only on terms to be agreed in writing in each individual case.

Goods sold

21. All Goods to be supplied by Goldacres/Pathway shall be described on the purchase order agreed by Goldacres/Pathway and the Purchaser and the description on such purchase order modified as so agreed shall prevail over other descriptions including any Purchaser's specification or enquiry.

Cancellation

22. No order may be cancelled except with the consent in writing and on terms, which will indemnify Goldacres/Pathway against all losses.

No waiver

23. The failure of any party to enforce the provisions of these terms and conditions or to exercise any rights expressed in these terms and conditions shall not be a waiver of such provisions or rights and shall not affect the enforcement of this agreement. The exercise by any party of any of its rights expressed in this agreement shall not preclude or prejudice such party from exercising the same or any other rights it may have irrespective of any previous action taken by that party.

Force Majeure

24. If by reason of any fact, circumstance, matter or thing beyond the reasonable control of Goldacres/Pathway is unable to perform in whole or in part any obligation under these terms and conditions then Goldacres/Pathway shall be relieved of that obligation under these terms and conditions to the extent and for the period that it is so unable to perform and shall not be liable to the Purchaser in respect of such inability.

Passing of risk

25. Risk in the Goods shall pass to the Purchaser upon delivery of the Goods to the Purchaser or collection of the Goods by the Purchaser's agent or carrier as the case may be.

Exclusion of liability

26. To the extent permitted by law Goldacres/Pathway shall not be liable to the Purchaser in contract or in tort arising out of, or in connection with, or relating to, the performance of the Goods or any breach of these conditions or any fact, matter or thing relating to the Goods or error (whether or not it is negligent or a breach of contract) in information supplied to the Purchaser or a user before or after the date of the Purchaser's or user's use of the Goods and Goldacres/Pathway shall be under no liability for damages arising out of the use of any chemicals, liquids, or mixtures in the Goods, nor for any application, not for the application methods nor for the environmental effects, which may result therefrom or from the use of the Goods.

Exclusion of representations and arrangements

27. To the extent permitted by law the terms and conditions supersede and exclude all prior and other discussions, representations (contractual or otherwise) and arrangements relating to the supply of the Goods or any part thereof including, but without limiting the generality of the foregoing, those relating to the performance of the Goods or any part thereof or the results that ought to be expected from using the Goods.

Place of contract

28. The contract for sale of the Goods and the provision of the services is made in the State of Victoria and the Purchaser agrees to submit all disputes arising with Goldacres/Pathway to the courts of such State and any court competent to hear appeals therefrom.

Chapter 2

SAFETY

General

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

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

Danger

You will be killed or seriously hurt if you don't follow instructions

Warning

You can be seriously hurt if you don't follow instructions

Caution

You can be hurt if you don't follow instructions

Note

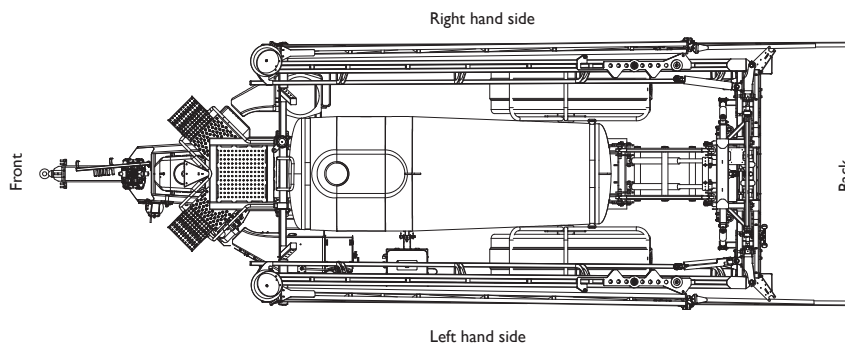
Is used to notify people of installation, operation or maintenance information that is important but not hazard related.

The Operator

All operators 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 operators manual prior to using this equipment.

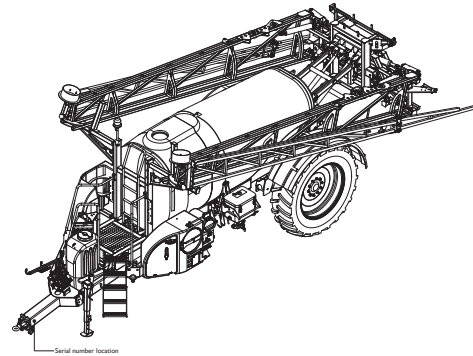
All new operators should be trained in an area without bystanders or obstructions and become familiar with the sprayer prior to operation.

Machine Orientation



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.



Safety Precautions

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.

Warnings

- Any unauthorised modifications to this equipment may affect its function and create a serious safety risk.
- Keep clear of overhead obstructions – especially power lines 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.

Warnings (continued)

- 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 1 kg 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 are removed. Often hazardous air borne particles and fumes are generated from welding and heating.

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

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.

Safe use of chemicals

The safe use of AgVet chemicals with this equipment is the responsibility of the owner/operators. All operators should be trained in the safe use of AgVet chemicals. Goldacres suggest that a relevant ChemCert course is completed by owners/operators prior to operation of this equipment as a spray unit.

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 AgVet 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.

uncontrolled fluid discharge which may be hazardous.

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

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

Personal Protective Equipment (PPE)

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

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 chemicals 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 and animals.

Fluids under pressure

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.

Safety 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 owner operator to replace damaged and/or missing safety decals.

Regularly review safety decals with operators. It is very important to ensure that all new machine components and replacement parts include

current hazard identification decals.

Replacement safety decals can be ordered from your Goldacres dealer or directly from Goldacres. Part numbers and descriptions of the decals on this machine can be found in the parts manual supplied.

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.

Chapter 3

GENERAL INFORMATION & SPECS

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. 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:

Prairie Evolution sprayers are supplied standard with a Raven SCS4400 automatic rate controller. 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 the Raven controller 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.

As standard Prairie Evolution sprayers are fitted with:

1 x Suction filter (30 mesh)
2 x Pressure filters (1 x 80 & 1 x 100 mesh)
Nozzle strainers (50 mesh)

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 42 metres in width. Tri Tech booms (24 - 42 metres) feature hydraulic lift and fold, with control from the cabin of your tractor. Individual wing tilt is available as an option.

Goldacres Tri Tech 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 your Goldacres dealer, Goldacres, or as a free download from the TeeJet website: www.teejet.com

Axles

Prairie Evolution 4000, 5000 & 6500 litre sprayers are fitted with rigid axles as standard and Air Bag suspension is an option. 7500 and 8500 litre models have air bag suspension fitted standard. Braked axles are available as an option.

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

The 12 volt compressor is powered up when the ignition is switched on. 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

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.

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.

Wheels and 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:

- 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).
- 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).
- Determine what tyre size and ply is on the sprayer.
- 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.

Tyre Size	Ply	Rated Pressure (KPa)	Rated Capacity (Kg)	Cyclic Loading Pressure (KPa)	10km/hr (Rated tyre capacity Kg when the sprayer is moving)	20km/hr	30km/hr	40km/hr
18.4x38	16	240	4400	322	8228	5720	5060	4752
20.8x42	16	220	4500	286	8415	5850	5175	4860
24.5x32	16	220	4500	286	8415	5850	5175	4860

Hydraulics

Electric over hydraulic spool valves are optional on Prairie Evolution models. 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 Evolution 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.

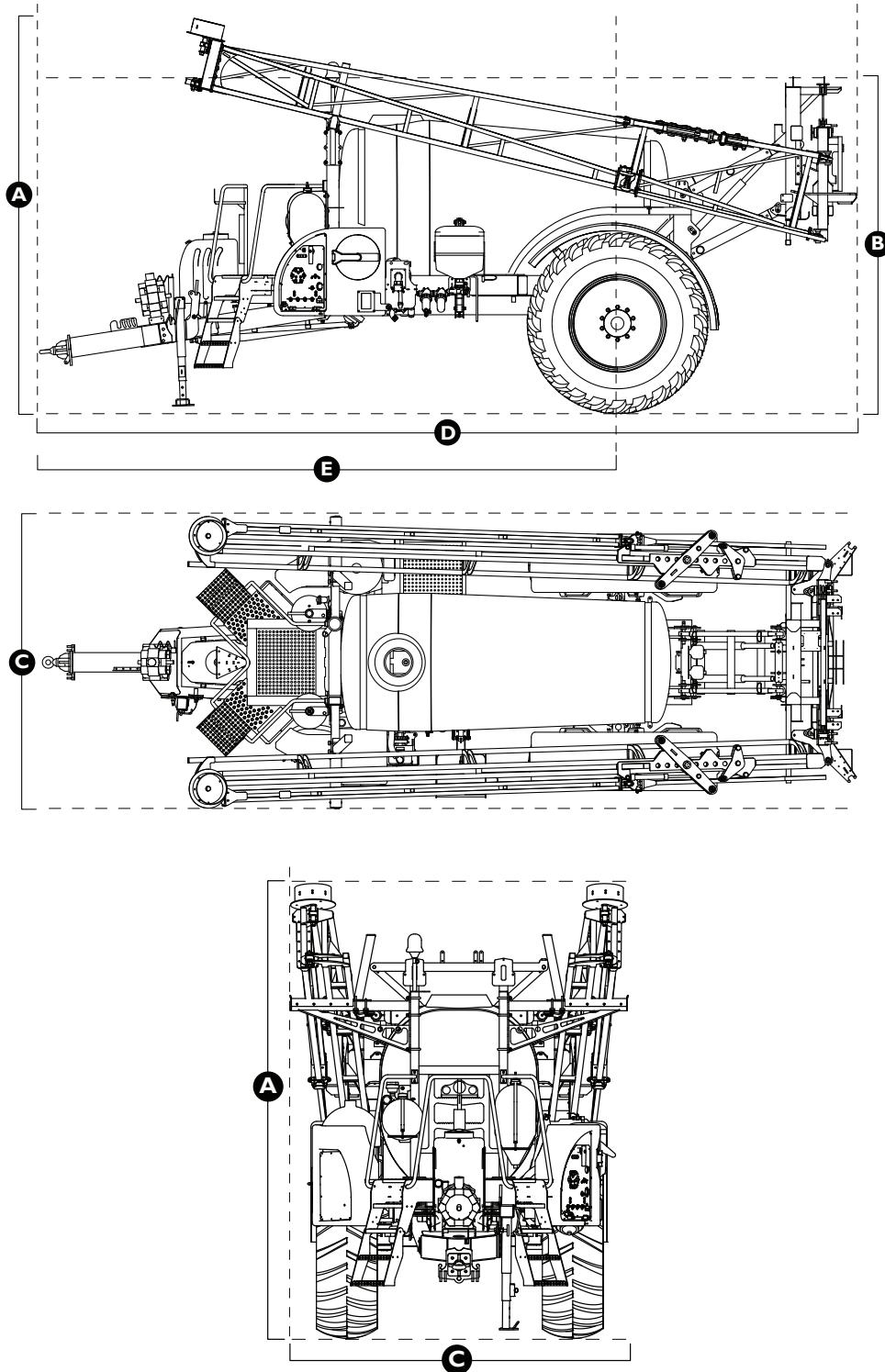
This system senses a change in flow, and or pressure, and causes the pump to compensate by varying the pump flow. In these circuits no oil is bypassed as only the oil required is being sent to the valve.

Dimensions

The following information is provided as a guide only.

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

and dimensions are accurate for your sprayer it is recommended that you measure and weigh your sprayer individually.



Model	Boom size	Weight	A Front Height	B Rear Height	C Width	D Total Length	E Wheelbase
4024	24m		2800	3150	2550	8350	5950
4028	28m		3900	3150	2550	8550	5950
4030	30m		3900	3150	2550	9250	5950
4033	33m		4200	3150	3300	9150	5950
4036	36m		4200	3150	3300	9400	5950
5024	24m		2800	3150	2550	8350	5950
5028	28m		3900	3150	2550	8550	5950
5030	30m		3900	3150	2550	9250	5950
5033	33m		4200	3150	3300	9150	5950
5036	36m		4200	3150	3300	9400	5950
6524	24m		3800	3150	2550	8950	6450
6528	28m		3800	3150	2550	9750	6450
6530	30m		3800	3150	2550	9850	6450
6533	33m		4200	3150	3300	9750	6450
6536	36m		4200	3150	3300	9750	6250
7524	24m	Dimensions not available. Please contact Goldacres.					
7528	28m						
7530	30m						
7533	33m						
7536	36m						
8530	30m	Dimensions not available. Please contact Goldacres.					
8533	33m						
8536	36m						
8542	42m						

Chapter 4

PRE-OPERATION

Drawbar connections

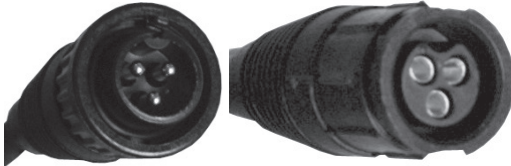
The standard drawbar connections are as shown in the pictures below. It is important that the dielectric grease (supplied with each sprayer) is applied to electrical connections prior to connection. This assists with lubrication and prevention of corrosion on these connections.



Raven SCS4400 male & female connectors



Tail light connection



Raven male and female speed sensor connections



Hydraulic hose connections



Male and female Deutsch connections



Safety chains

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.

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 Raven Console 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.

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 - 500 rpm. Do not exceed 540 RPM.

To set the pump speed:

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

Fitting the PTO shaft

Wide angle PTO shafts are fitted as standard to Prairie Evolution 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

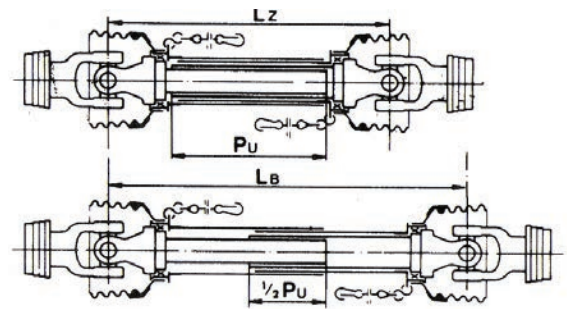
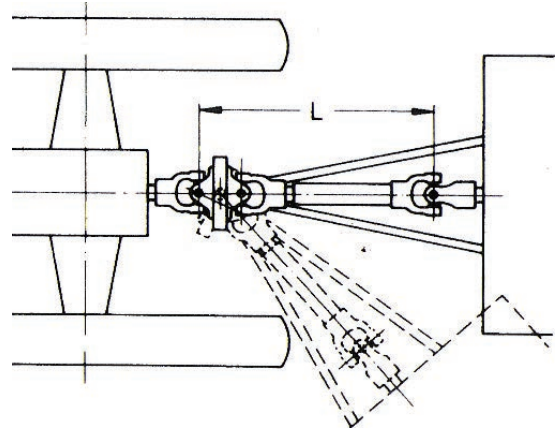
Coupling the PTO shaft

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.



Mounting the consoles

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.

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.

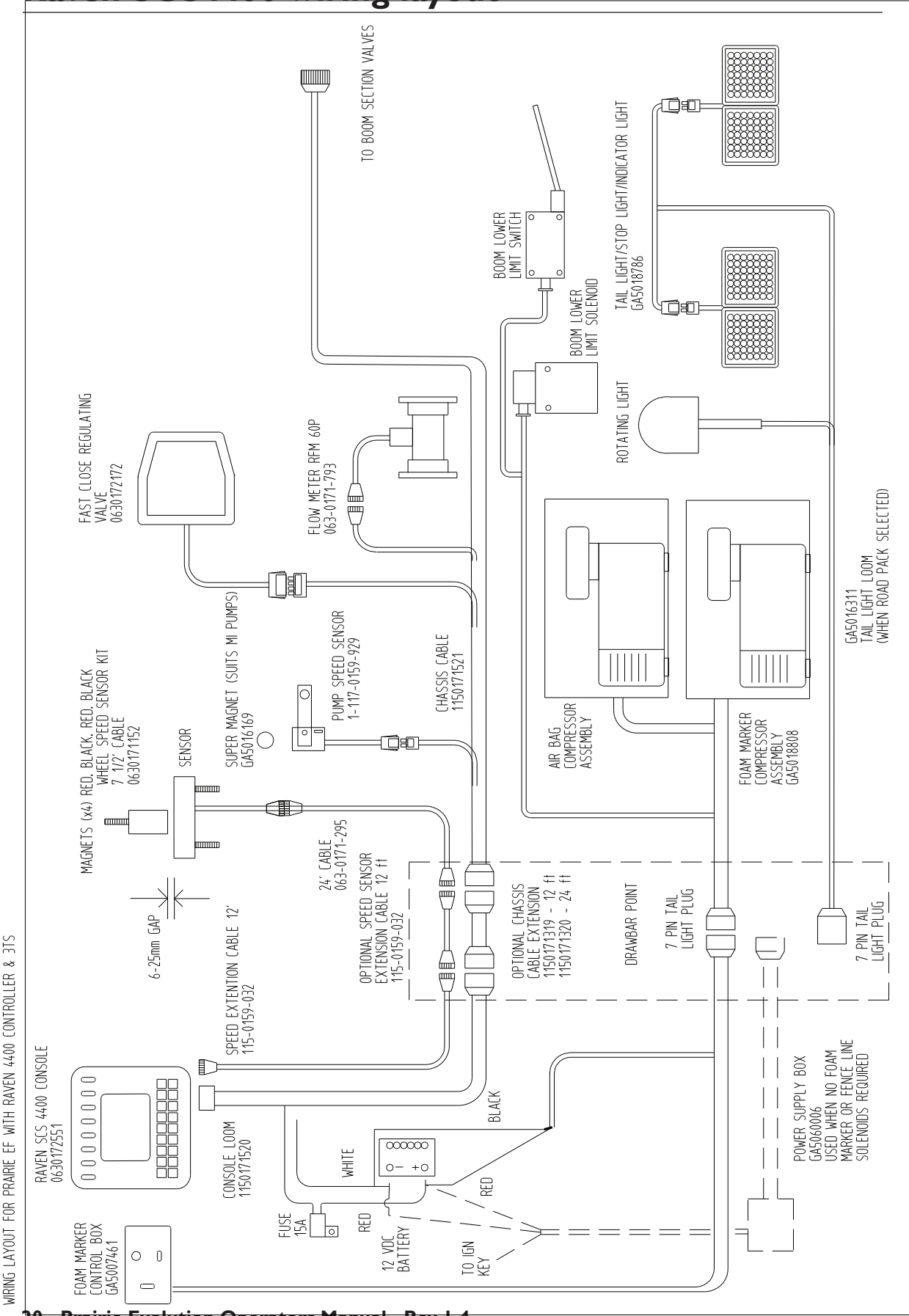
To connect to the battery:

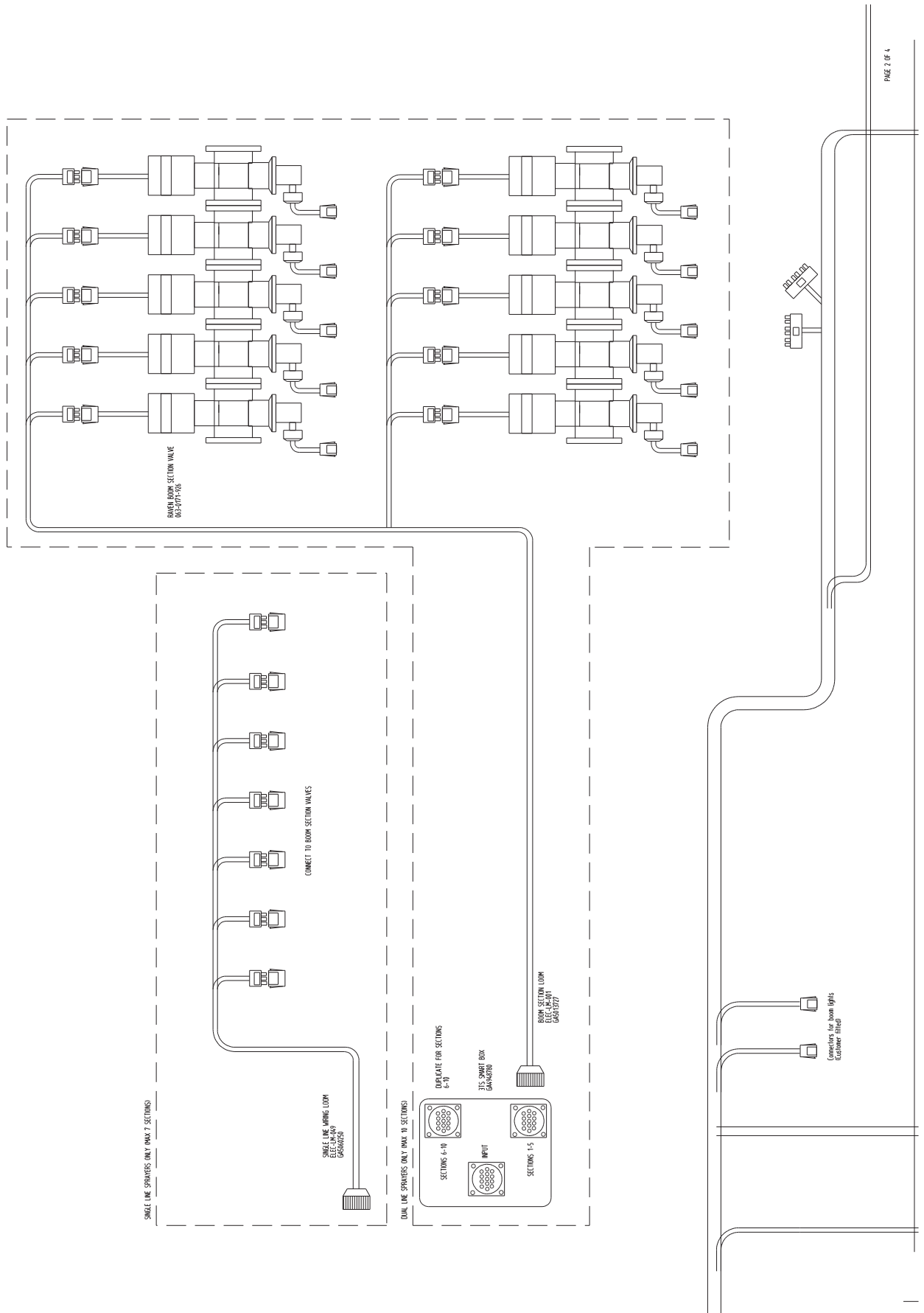
With the consoles mounted in the cabin, turn the power switch to OFF and route the red (+) and white (-) battery wires to a 12v battery. Attach the

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 a short.

Raven SCS4400 wiring layout





Chapter 5

CALIBRATION

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.

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:

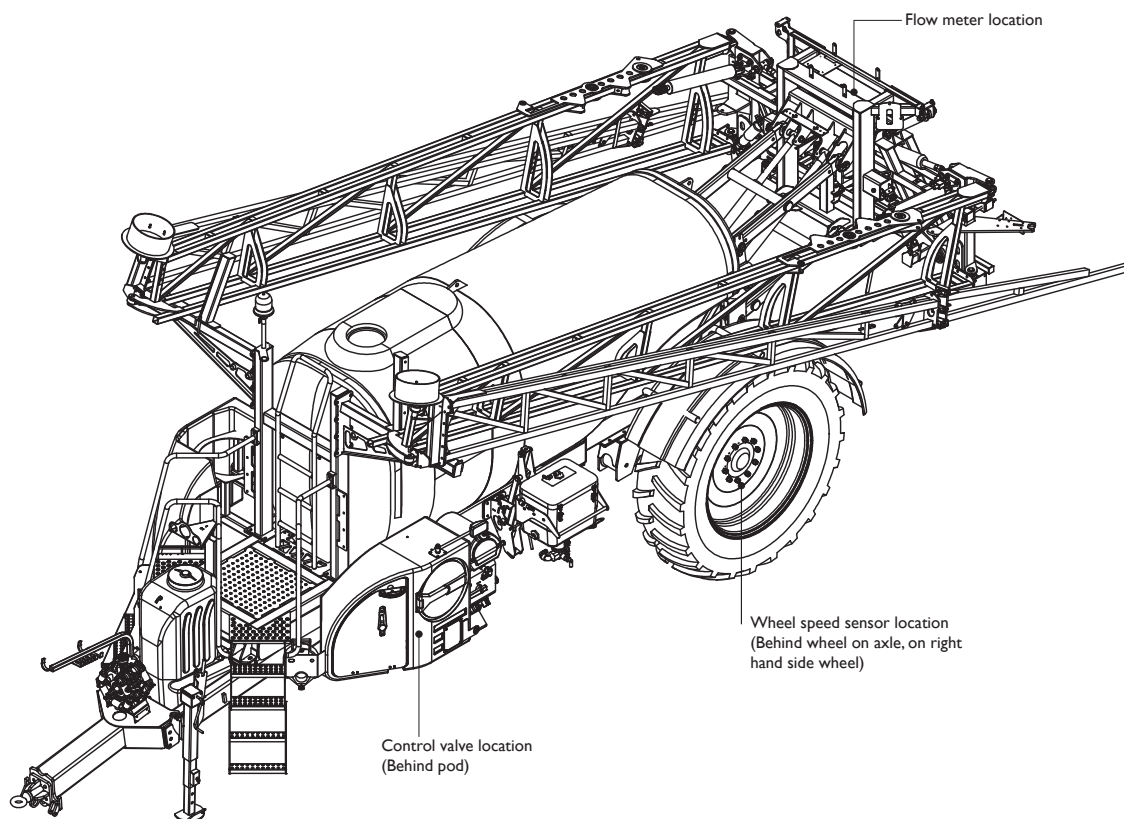
Boom 1 Cal	
Boom 2 Cal	
Boom 3 Cal	
Boom 4 Cal	
Boom 5 Cal	
Boom 6 Cal	
Boom 7 Cal	
Speed Cal	
Meter Cal	
Valve Cal	
Rate 1	
Rate 2	
Tier 1	
Tier 2	

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

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

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

Control valve, speed sensor & flow meter locations



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.

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.

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.

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 SCS4400 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.

Press Enter to start

3. Adjust the screen contrast, as directed by the console.
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).

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 "VALVETYPE" "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, VALVETYPE, 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 on 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 SENSORTYPE

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.

NEW [SPEED CAL] VALUE = OLD [SPEED CAL] VALUE X 100

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 calculating 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.

9. Record the distance that the console displays once the 100 metres has been travelled.

10. 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. RPM 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 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 submenu 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 used 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 used 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. For example: 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 XRI 10015 and XRI 10025 nozzles fitted to the sprayer the minimum pressure that the XRI 10025's can cut in at is 1.0 bar. The flow rate for an XRI 10025 nozzle at 1.0 bar is 0.57 Lt/min. The maximum operating pressure for an XRI 10015 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 XRI 10025 would cut in at slightly less than 3 bars if the first set point was programmed at the 0.57 Lt/min.

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 XRI 10015 and XRI 10025 at one bar together ($0.34 + 0.57 = 0.91$ 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 XRI 10025 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 broadcast 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 "PERCENT 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 broadacre boom fitted with XR1 1002 nozzles.

The minimum recommended pressure for an XR nozzle is 1 bar. The flow rate for an XR1 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 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.

There is only one pressure gauge fitted to the sprayer; this gauge is reading the return pressure.

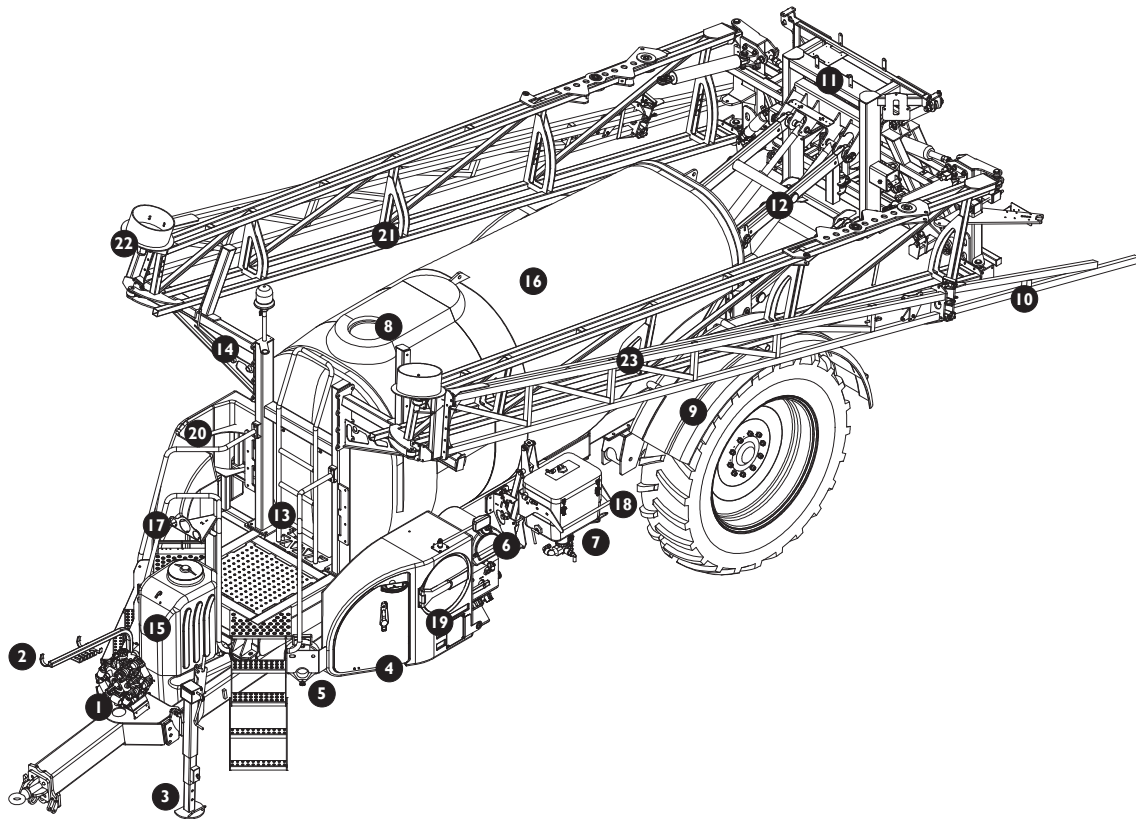
You will need:

- 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 6

OPERATION

Key features



Number	Feature
1	Diaphragm pump
2	Drawbar connection arm
3	Mechanical jack
4	EZ control
5	Fill point
6	Hand wash tank
7	Induction hopper
8	Main tank lid
9	Mudguard <i>(optional)</i>
10	Boom tip
11	Flow meter & hydraulic spool valves <i>(where fitted)</i>

Number	Feature
12	Boom paralift
13	Ladder
14	Boom rest
15	Flush water tank
16	Main tank
17	Pressure gauge
18	Pressure filters
19	Storage locker
20	Right hand pod
21	Boom inner wing
22	Boom cable drum
23	Boom outer wing

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EZ Control key functions (continued)

Pressure delivery	Use
<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 pressure 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.

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 fill functions 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 lever 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.

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 lever ON.

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

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 - 500 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.

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 & 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 lever 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.

Decontamination

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

Information specific to your circumstances, the spraying equipment being used and the chemicals

being applied should be provided by your agronomist 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

End of program

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

- Clean the sprayer thoroughly as described under "END OF DAY" tasks.
- With the sprayer attached to the towing vehicle, carry out a thorough observation to determine if there is any damage to the sprayer.
- Park the sprayer in a position where it will not be affected by frosts, and preferably out of direct sunlight.
- Ensure the main tank and any other tanks fitted are empty.

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.

- 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 towing and braking capacity to tow the sprayer.
2. All relevant transport regulations must be adhered to when transporting the sprayer: (ie: speed regulations, oversize signs, flashing light, etc.) It is the operator's responsibility to know the relevant regulations.
3. Make sure the sprayer is securely hitched to the tractor.
4. Ensure that the boom is securely supported when travelling and that the isolation ball valves on the hydraulic lift cylinders are closed.

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 7

BOOM

General

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

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

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

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

CAUTION: All chemicals have corrosive properties to some degree. Prevent damage to the machine by always consulting the chemical MSDS or the chemical supplier for advice concerning the corrosive properties of the chemical. It is the responsibility

of the operator to carry out preventative and ongoing maintenance to the machine, particularly while applying chemicals with highly corrosive properties. Machine components should be coated with a suitable protectant prior to use, and then washed down, thoroughly, immediately after every application. Consult the supplier of the substance if you require specific advice about the effectiveness of any particular protectant to prevent premature degradation of machine components.

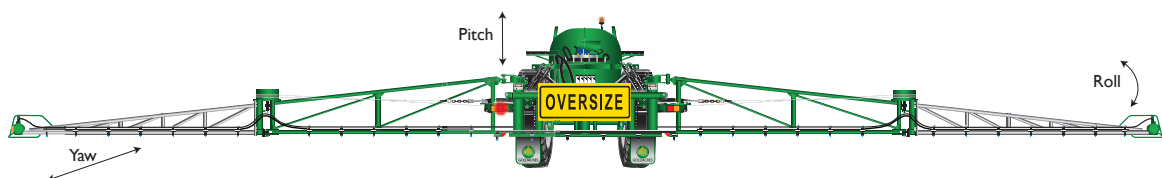
Tri Tech booms feature a unique (patented) boom suspension system.

This system provides suspension in three directions:

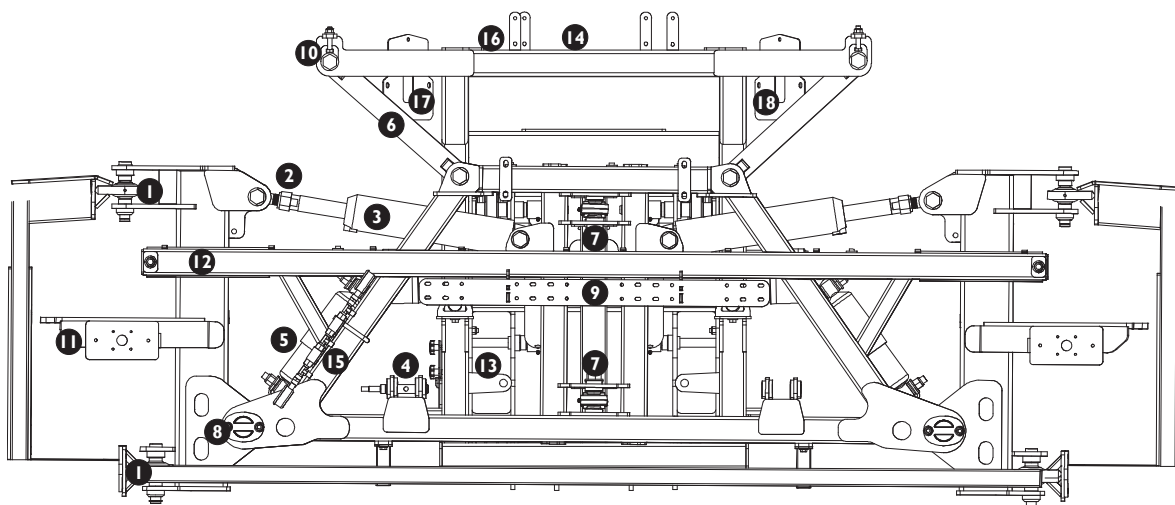
Pitch: Hydraulic cylinders and accumulators dampen the vertical boom movement encountered over rough ground conditions.

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

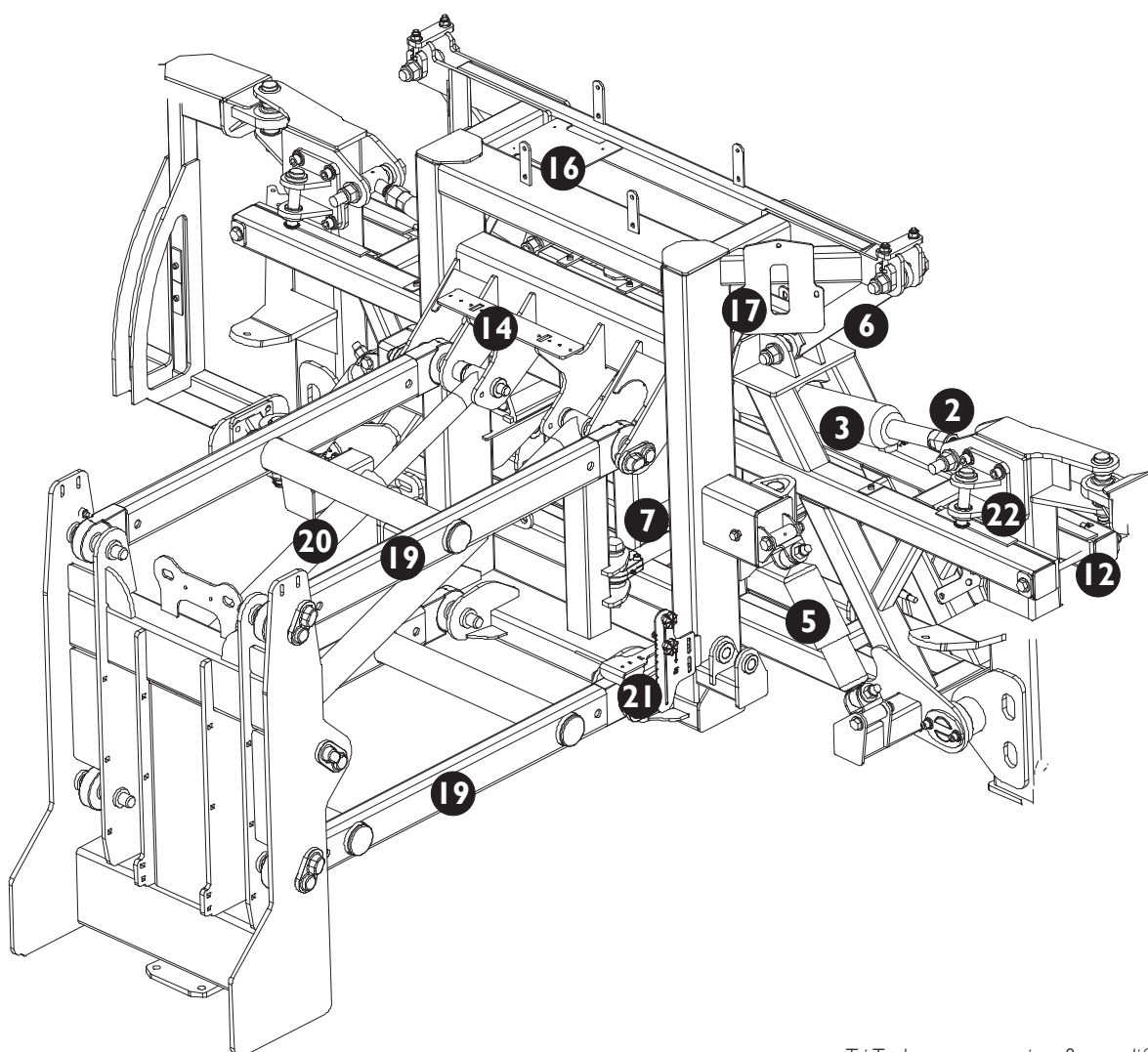
Yaw: Shock absorbers and springs overcome the erratic whipping movement, which creates undue stress on the boom frame and uneven spray application. (Hydraulic Yaw suspension is an option)



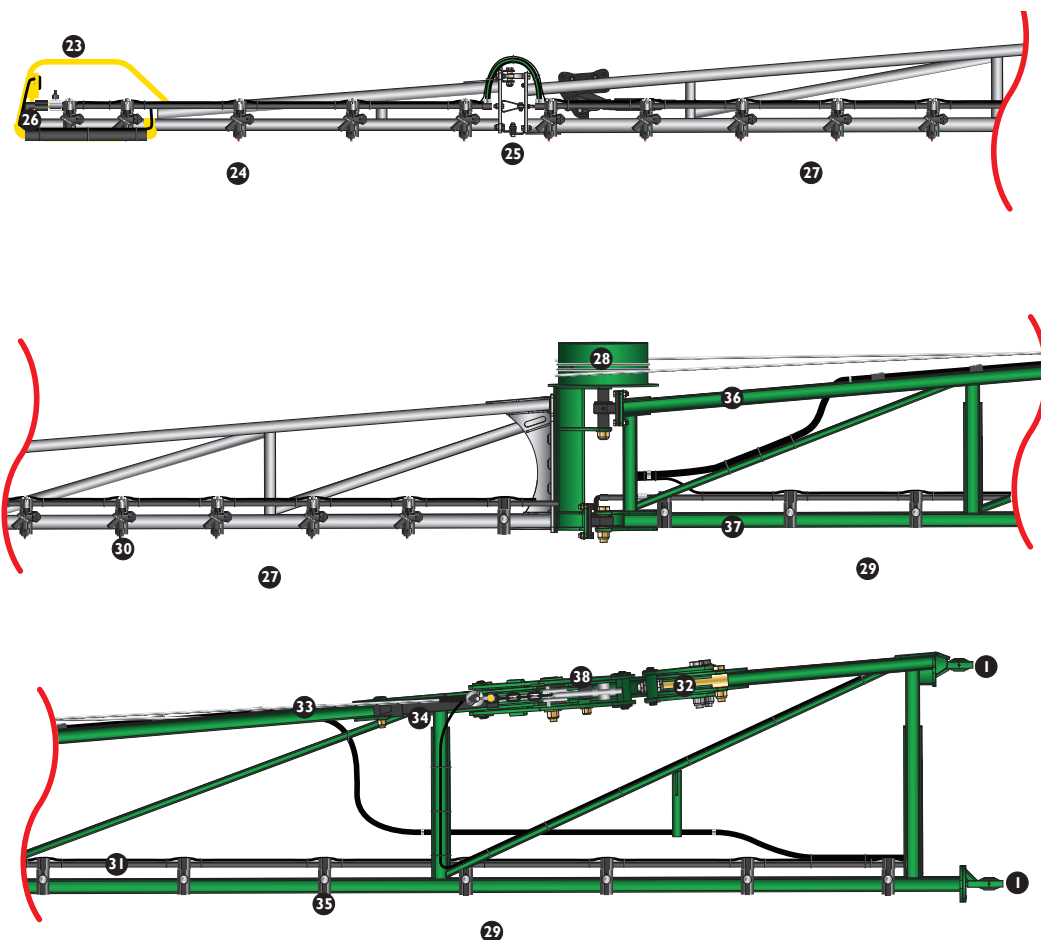
Boom key features



Tri Tech centre section



Tri Tech centre section & paralift



Tri Tech boom wings

Number	Feature
1	Boom rose end
2	Tilt arm adjuster
3	Tilt cylinder (option)
4	Yaw spring (or cylinder) mount
5	Roll shocker
6	Diagonal delta links
7	Lineal delta links
8	Tilt pin (60mm)
9	Boom section controls
10	Boom alignment adjuster
11	Tail light mounting plate
12	Tilt arm wear strips
13	Hydraulic yaw accumulators (option)
14	Hydraulic spool valves (option)
15	Hydraulic yaw controls (option)
16	Flow meter
17	Accuboom node (option)
18	Autoboom node (option)
19	Paralift arms

Number	Feature
20	Lift cylinders
21	Boom lower limit switch
22	Bolt on fold cylinder mount
23	Boom end protector
24	Boom wing tip
25	3D breakaway
26	Fenceline jet
27	Boom aluminium outer
28	Boom cable drum
29	Boom steel inner
30	Nozzle & bracket (Trijet pictured)
31	Boom line
32	Adjuster for fold ram
33	Boom cable
34	Hydraulic fold cylinder - for bi-fold
35	Adjustable nozzle bracket
36	Boom top chord (R.H.S)
37	Boom bottom chord (R.H.S)
38	Cable adjuster

Boom overview

Centre Section

The Tri Tech centre section is made up of two components, the paralift rear and the boom centre section. The two are held together by delta links. These links allow the boom to be suspended in order to provide roll and 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 2 large springs (1 each side) and 2 dampener shockers to limit the recoil of the yaw springs. These springs must be tensioned all the way. 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.

Hydraulic raise and lower

The paralift on a Tri Tech boom enables the boom to be raised and lowered to maintain a consistent 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.

Hydraulic fold

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

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 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 this chapter.

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.

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

Three dimensional breakaway

TriTech 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 this chapter.

Boom protection brackets

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 protection brackets are fitted correctly.

Three tier system (3TS)

The 3TS system (when fitted) uses twin boom lines and the Raven SCS4400. 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.

Boom options

Fence line jets

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).

Hydraulic yaw suspension

Refer to hydraulic yaw suspension section.

Bi-fold

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

For example a 36 metre Tri Tech boom fitted with the bi-fold option would fold back into 18 metres swath width for easier spraying in tight situations.

Ultraglide

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.

Hydraulic tilts

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.

Boom operation

Folding

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. Take care not to fold/unfold booms too fast, as damage can be caused.

Un-folding

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.

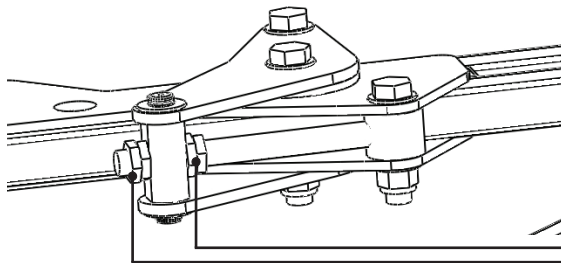
NOTE: The booms must be folded continuously without stopping and starting during the sequence.

Boom adjustment

Alignment of inner steel boom

1. Open the boom fully into the working position.
2. Continue to press the unfold button or hold the hydraulic remote open to ensure the fold cylinders are phased completely.
3. Look along the inner booms between the cable drums to assess the alignment.

All booms must be 50mm forward of the centre section at the cable drums. A string line can also be used for measuring the lead of the inner boom.



4. If adjustment is required, loosen the two lock-nuts on the boom fold adjuster bolt at the rear of the boom.
5. To adjust the boom forward, tighten the outer adjuster nut. To adjust the boom rearward, tighten the inner adjuster nut
6. When the boom is in the required position tighten both locknuts to hold in place.
7. Follow this process for both inner booms.

A Tighten nut to adjust the boom backward.

B Tighten nut to adjust the boom forward.

Alignment of outer aluminium boom

1. When adjustment of the inner booms is complete the outer booms can now be aligned.
2. 12-24m Delta booms must be 30-50mm, 24-30m Tritech booms must be 30-50mm and 33-36m booms must be 50mm forward of the inner booms.
3. To align the outer booms, the cable adjusters are used. To pull the outer boom forward the turnbuckle that is connected to the cable damper springs at the front of the boom must be shortened. At the same time the rear cable adjuster bolt must be lengthened.

4. To adjust the outer boom rearward the rear cable adjuster must be shortened and the turnbuckle at the front lengthened.
5. Once correct alignment has been achieved the cable spring tension must be set so there is a **3mm gap** between the coils.

Note: It is advised that all threads are lubricated prior to making adjustments.

Note: If cable adjustments run out the cable must be rotated on the drum hinge by loosening the cable retaining u-bolts.

Alignment of outer aluminium boom - folded position

24-36m 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.

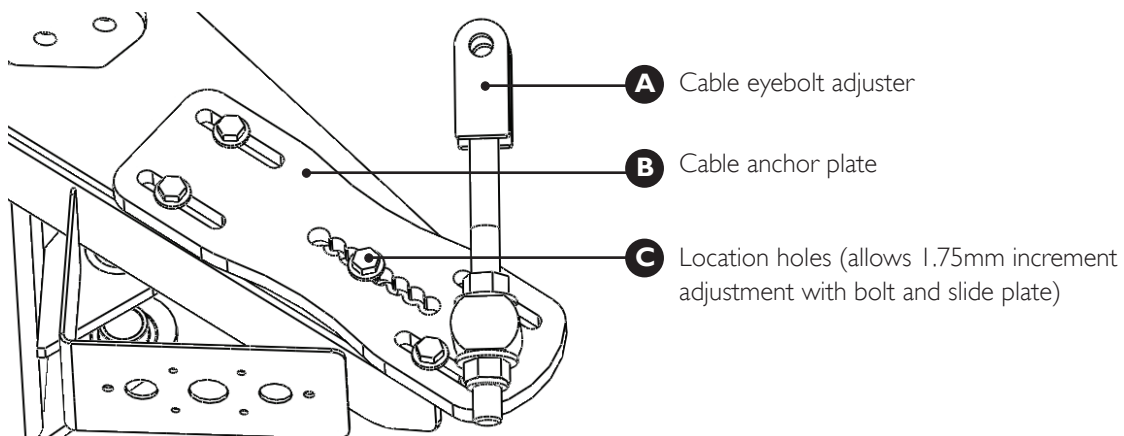
- Fold in the boom. If the outer boom arm does not come in all the way against the inner boom arm and contact the bump stop then the

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 install the bolts (C) and tighten.
- Spring tension may be altered slightly when this plate is moved. Check there is a 3mm gap in the spring coils and adjust if required.

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



Vertical boom alignment (working position)

When the boom is in the working position, the inner and outer boom should be level or slightly increasing in height from the centre section to give a consistent and even spray application height. A new boom may be susceptible to stretching or sagging as the components are worn in. Several adjustment may be required in the first 12 months of operation until the boom settles.

Inner Booms

- The boom centre section must be level with the chassis before any boom adjustments are made. The centre of the centre section should line up with the centre of the paralift when look from the rear. This can be done by either shortening or lengthening the centre section adjuster bolt at the top delta links, or by adding weight discs to the boom tip.
- The inner booms must be adjusted first so

they are the same height as the centre section or slightly increasing in height from the centre section (to allow for boom stretch) .These adjustments are made by lengthening or shortening the tilt adjusters on the tilt cylinder..

- To lengthen or shorten the tilt adjusters, the weight of both the booms will need to be supported.
- When any adjustments are completed. Ensure the lock nuts are tight.

Outer Booms

- The height of the outer booms in the working position are adjusted by adding or removing shims at the cable drum.
- The cable drum mounts are assembled in manufacturing with 6-7 shims at the upper and lower bearing blocks.
- If the outer boom hangs lower than the inner boom, remove shims from the upper mount

until the booms are level. If the outer boom is too high remove shims from the lower bearing block. Retension the retaining bolts to 65Nm when all adjustments are complete.

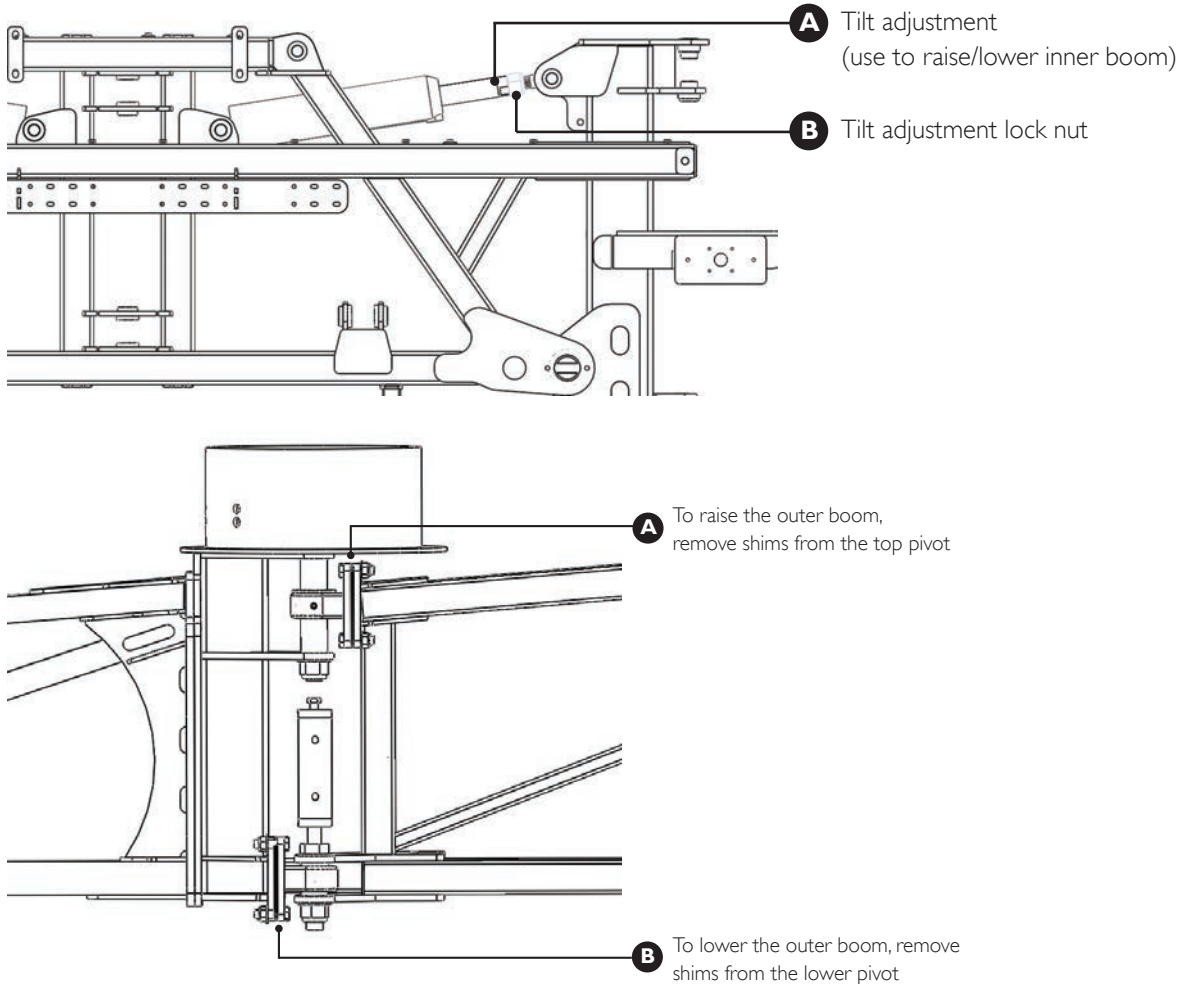
- The boom cables may need to be loosened to enable easier removal of the shims.

24-30m booms:

1 shim added = 10-20mm @ boom end

33-36m booms:

1 shim added = 20-30mm @ boom end



Vertical boom alignment (folded position)

When the booms are folded up in the transport position, the full weight of the booms must be supported by the inner boom. The outer aluminium boom may sit on the boom rest rubber but must not support any weight.

Inner Booms

- If the boom sits level in the working position but when folded up, one side is lower than the other, there is one adjustment that can be made.

- Shims can be placed at the bottom boom mount of the lowest boom - refer to diagram A. This will lift the boom in the open position.
- If the boom is not level in the working position, the most likely cause is this is an out of balance boom. Refer to previous boom adjust information.

Note: This process should not be required as once they are set in manufacturing, they should not change

When the booms are folded up in the transport position, the outer boom must saddle onto the inner boom. If this alignment of out the outer boom will

not saddle correctly and will not be supported in transport.

The boom support saddle is bolted to the outer boom and when folded, couples to the inner boom. This saddle must slide onto the inner boom freely to prevent damage to the booms.

Note: This process will be required in the first 6 months of operation as the booms stretch and wear in.

Outer Booms

- If the outer boom hangs too low in the folded position shims must be added to the cable drum

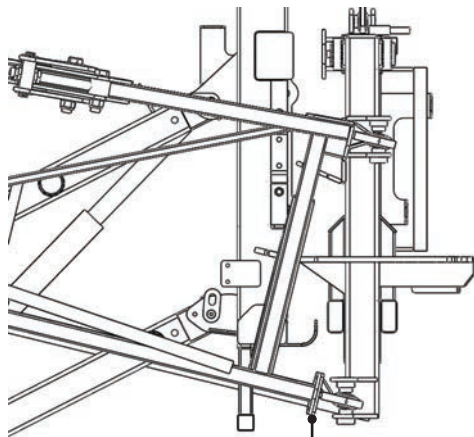


Diagram A

Place shims here

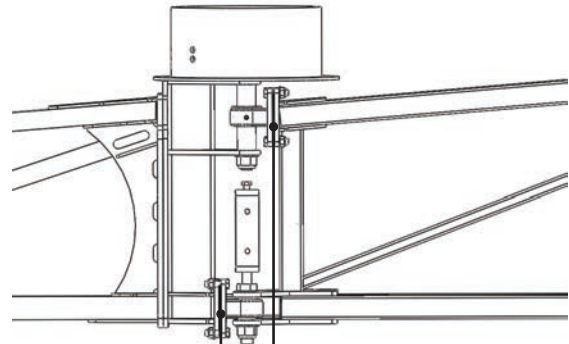
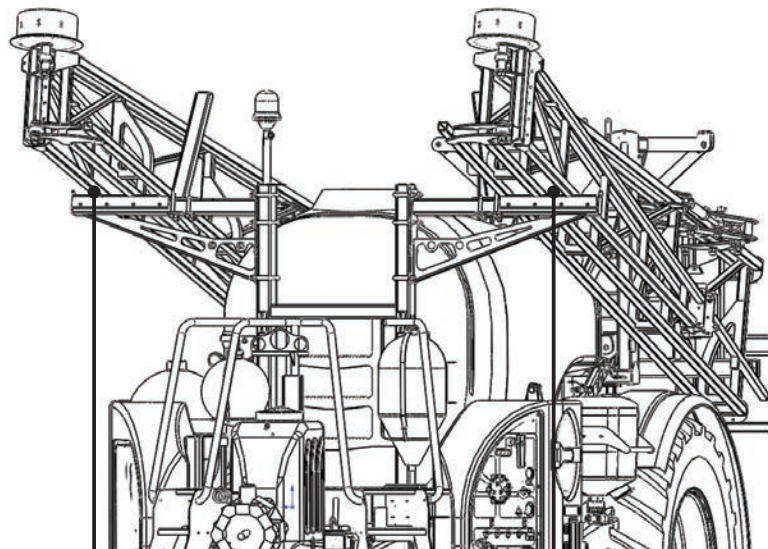


Diagram B

Place shims at both pivots

- To lower the outer boom in the folded position, remove shims from both the upper and lower pivots.
- 1 x 1mm shim at the upper and lower pivots equals approximately 15mm change in height.



Booms must contact rests at the same time

Three dimensional breakaway

Initial setup

1. Open the boom fully into the working position and lower to a good working height.
2. Close the ball valves on the two hydraulic lift cylinders for safety purposes.
3. The main hinge mounting plate must be a specific distance from the boom end plate. Measure from the centre of the closest retaining bolt to the boom end plate. This must measure 160mm as shown in the diagram.
4. The bottom mounting plates must have a 4mm gap between them. This can be adjusted by loosening the retaining bolts and sliding these plates to achieve the required gap.

5. The turnbuckle must now be adjusted. This determines the initial breakaway force required when an object is struck.

Measure from the top of the bottom boom chord to the centre of the pivot bolt 'A'.

Measure from the top of the bottom cord to the centre of pivot point 'B'.

Subtract measurement 'A' from measurement 'B'.

This must be 17-18mm. If this is less than 17mm, shorten the turnbuckle. If it is greater than 18mm

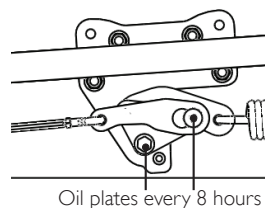
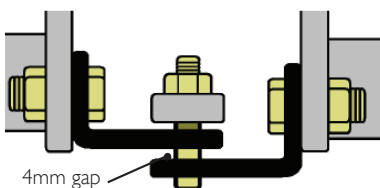
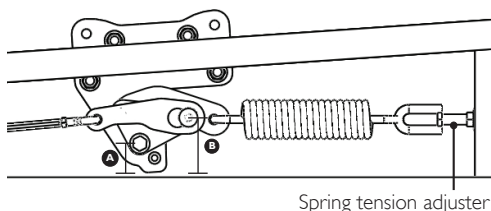
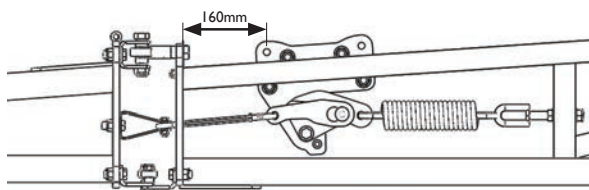
the turnbuckle must be lengthened.

6. The spring tension must be adjusted so there is a 1-2mm gap between the coils. This applies the ideal amount of resistance when breaking away. The spring tension can be adjusted by tightening or loosening the adjustable eyebolt.

To check the tension a spring fish scale can be used by hooking it on the boom tip. It should require about a 5kg force to breakaway.

Maintenance

1. Two things are critical in ensuring the breakaway functions correctly. The vertical measurement (17-18mm) shown in step 5, and the tension of the spring.
2. Should the spring eyebolt reach maximum adjustment without applying sufficient tension on the spring, the spring may need to be replaced or the hinge mounting plate may need to be moved closer to the end of the boom.
1. If either of these adjustments are made, the turnbuckle must be readjusted.
3. To ensure smooth and long lasting operation of your breakaway mechanisms they must be oiled every 8 hours if not adequately lubricated it may lead to premature failure of components.



Hydraulic yaw suspension

About

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 therefore 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 circuit

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. (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.

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 lift 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 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.
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.
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.

Chapter 8

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

Pressure and flow rate are too low?

Common causes

Excessive bypass on pressure manifold
Supply to pump is restricted
Pump

Common solutions

- 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?

Common causes

Bypass line is restricted or blocked.

Common solutions

- 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?

Common causes

Blocked filters of nozzles
Flow loss due to resistance in lines, valves and filters.

Common solutions

- 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?

Common causes

Nozzles

Common solutions

- Check nozzle chart for correct nozzle size

Pressure is fluctuating?**Common causes**

Air leak on suction side of pump
Incorrect pump speed
Faulty pump valves

Common solutions

- Check suction pump for air leaks
- Adjust pump speed so it is between 400 -500rpm
- Replace pump valves

Pump pressure is pulsating?**Common causes**

Air accumulator pressure is incorrect (if fitted)
Air accumulator diaphragm has a leak (if fitted)
Incorrect pump speed
Air leak on suction side of pump

Common solutions

- Reset the pressure in air accumulator
- Replace air accumulator diaphragm
- Adjust pump speed so it is between 400 - 500rpm
- Check pump suction for air leaks

Pump oil is becoming milky?**Common causes**

Cracked diaphragm

Common solutions

- Replace all diaphragms

Pump oil is changing colour and becoming black or dark grey?**Common causes**

Old oil

Common solutions

Replace oil

Pump is noisy?**Common causes**

Low oil level
Air accumulator pressure set incorrectly (if fitted)
Insufficient lubrication on PTO shaft
Worn bearings
Damaged pump valves
Pump suction line has air leak or is restricted

Common solutions

- 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 are cracked?**Common causes**

PTO shaft not sliding freely or incorrect length
Extremely cold weather can cause liquid in the pump to freeze

Common solutions

- Check PTO shaft length and lubricate
- Check for ice in the pump and let defrost if required

Damaged universal joint?**Common causes**

The shaft is too long
PTO shaft is inadequately lubricated

Common solutions

- Shorten shaft
- Lubricate PTO shaft and uni joints

PTO shaft bent or excessively vibrating?**Common causes**

PTO shaft is too short

Common solutions

- Replace PTO shaft

Flowmeter and controller

Application rate is inaccurate, unstable or zero?

Common causes

Incorrect console calibration
Inconsistent wheel speed reading
Inconsistent spraying volume
Faulty control valve. Check by using manual inc/dec flow control

Common solutions

Recalibrate console
Test wheel speed sensor
Replace flow meter
Replace control valve

Speed sensor display is inaccurate, unstable or zero?

Common causes

Incorrect speed calibration
Corroded wheel speed sensor cable pins
Wheel speed sensor not set up correctly

Faulty cable

Common solutions

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

Volume display is inaccurate, unstable, zero or not changing?

Common causes

Incorrect speed calibration
Corroded wheel speed sensor cable pins
Wheel speed sensor not set up correctly

Faulty cable

Common solutions

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

Flowmeter appears to be not working?

Common causes

Flowmeter is seized or blocked

Common solutions

Remove and clean any foreign materials so the turbine spins freely

Application rate or pressure will not alter?

Common causes

Flowmeter is seized or blocked

Common solutions

Test valve manually and replace if required

Control valve has failed?

Common causes

Replace control valve

Common solutions

Temporary solutions:

Fast Close Valve: Remove the motor from the 3 way ball valve and manually adjust the flow by turning the shaft with a spanner.

Standard Valve: 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.

Flowmeter failing to give accurate readings?

If the flowmeter fails to give accurate readings, the following procedures should occur:

Adjust the spraying pressure by putting the flow control switch into manual and using the increase decrease switch to adjust to the desired pressure as shown on the pressure gauge on the sprayer

Drive the sprayer at a constant speed in order to apply the required application volume as determined by the nozzle selection chart

The sprayer should then be operated to empty the tank. Once the sprayer is empty of chemical, partially fill the tank with fresh water so that tests can be performed in order to correct the problem. Repair or replace the flowmeter as soon as possible.

Console is not working?

Common causes

No power supply

Common solutions

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 37(+) on the 37 pin plug going into the console (should be at least 12v)

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:

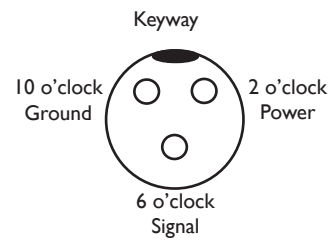
- Remove electric motor from three way fast close valve, and manually rotate valve until desired spraying pressure is achieved.
- Drive the sprayer at a constant speed (as measured by the tractor) in order to apply the required application volume as determined by the nozzle selection chart.

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.

Testing the speed sensor cable:

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

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



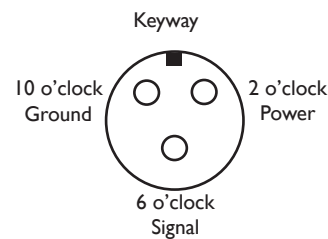
Voltage readings

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

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

Testing the 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)

Tanks, chassis and wheels

The drawbar of the sprayer has become noisy and loose?

Common causes

Worn, or missing, plastic insert in towing eye

Common solutions

Replace plastic insert

Induction hopper

Induction hopper is not performing as well as it should?

Common causes

Insufficient flow to venturi in the hopper bottom

Air leaks on induction system

Common solutions

Check the pressure supplied to the hopper bottom about is 400KPa (58psi)

Check all hoses, clamps, and cam lever fittings are sealed

Chem probe and transcal

Transcal is not working or is working too slow?

Common causes

Air leak in the vacuum system

The volume of water supplied to the Venturi

Common solutions

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.

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?

Common causes

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.

Common solutions

When use of the Transcal is complete, make sure the venturi probe tap is turned off and let the tank vent.

The sight tube on the Transcal is not giving a true indication of the tank level?

Common causes

Probe or envirodrum couplers turned on

Common solutions

Ensure the tap on the Probe or Envirodrum coupler is turned off before evaluating the tank level.

Tri-Tech Boom

Inner and outer wing are not inline with each other when the boom is unfolded?

Common causes

Boom cables are not adjusted correctly

Common solutions

Adjust boom cables to realign booms

Booms will not fully fold to the boom rests?

Common causes

Insufficient lubrication

Fold cylinder mounts have moved

Common solutions

Lubricate all boom pivots

Adjust fold cylinder mounts

Booms unfold unevenly?

Common causes

Air trapped in the phasing cylinders

Common solutions

Unfold booms completely and hold hydraulic lever for approx 10 seconds. This will purge any air out of the phasing cylinder

Outer boom does not line up with the inner wing when unfolded?

Common causes

Boom adjustment

Common solutions

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?

Common causes

Folding or unfolding of booms is too fast

Folding or unfolding of booms while the sprayer is still moving

Tilt operation

Common solutions

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.

Boom adjustment table

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

Smart Steer

The red warning light is permanently on?

Common causes

The centre calibration figure is not set correctly

Common solutions

Re-calibrate the centre position on the console

When the system is on, the sprayer wheels are reacting erratically?

Common causes

Wheel speed sensor may not be operating correctly

Common solutions

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?

Common causes

The steering angle sensor may be loose

The minimum coil current may be set too low.

Common solutions

Tighten sensor and linkages

Consult your Goldacres dealer

The sprayer doesn't follow the tractor wheel tracks accurately?

Common causes

The yaw sensor connectors may have moisture in them

The yaw sensor could be faulty

Common solutions

Disconnect yaw sensor. Clean and dry connector

Replace yaw sensor

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.

Chapter 9

LUBRICATION & MAINTENANCE

Maintenance schedule

Frequency	Maintenance tasks
8hr	Check pump oil level & condition
8hr	Check tyre pressure
8hr	Check wheel nuts are torqued correctly to 320 ft/lb
8hr	Grease tilt arm pivot pins
8hr	Grease cable drum bearing block pivots
8hr	Clean pressure and suction filters if blocked
8hr	Clean airbag and foam marker compressor air filter
8hr	Clean direct chemical injection air filter <i>(where fitted)</i>
8hr	Grease pump PTO shaft universal joint nipples
25hr	Grease cable adjuster pivots
25hr	Grease wheel bearings
50hr	Grease pump PTO shaft inside 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

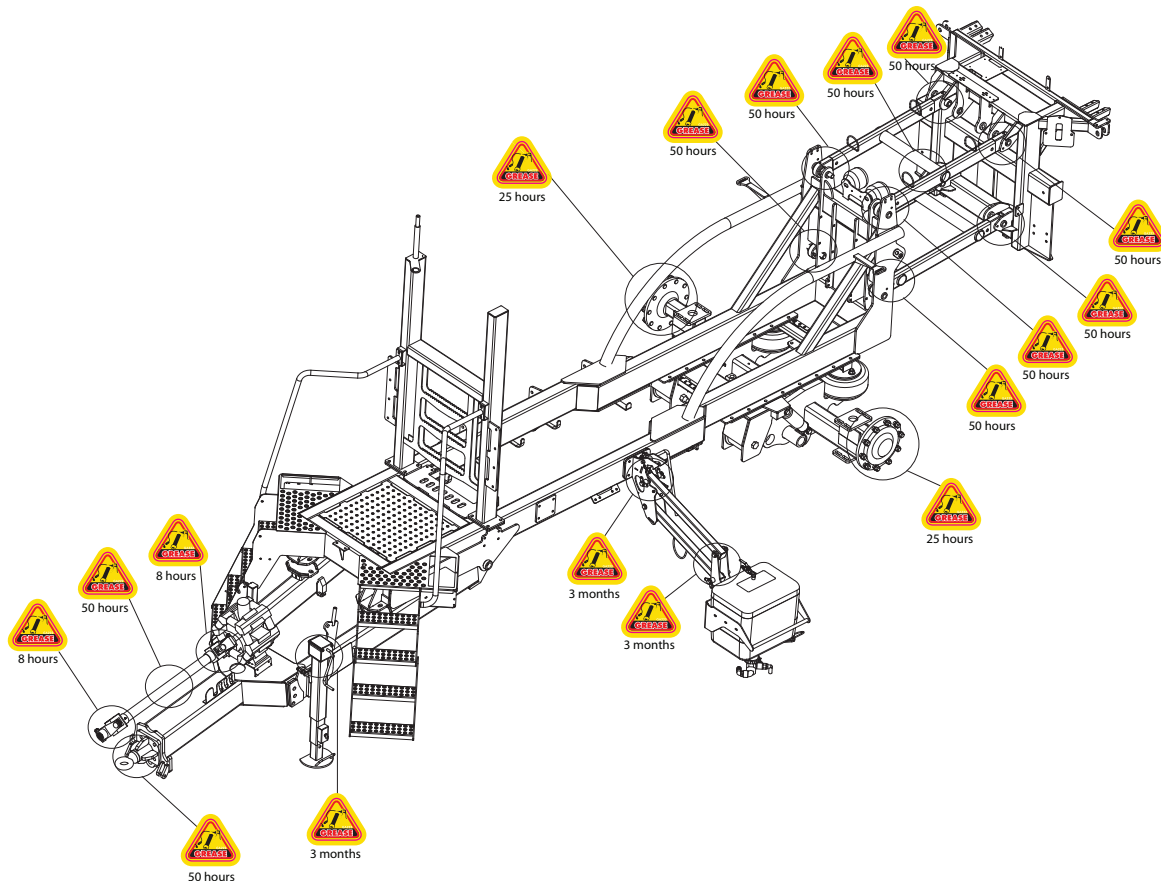
Lubrication

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.

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

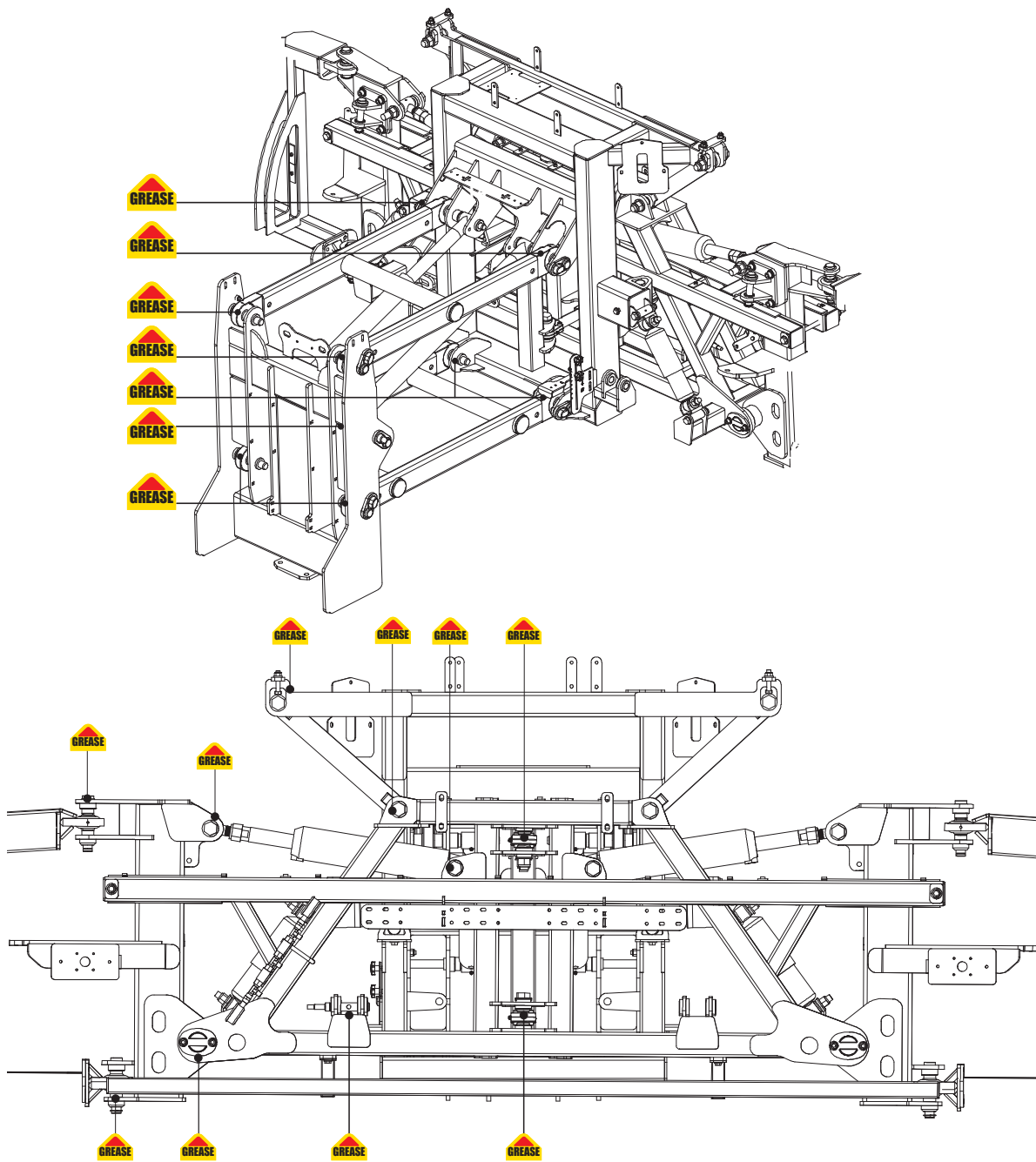
Chassis and PTO shaft grease points



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

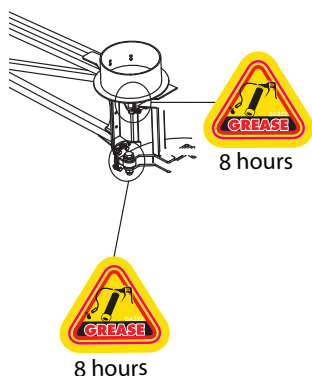
NOTE: The drawing above does not show hydraulic cylinders. Each hydraulic cylinder has a grease nipple located at each end. These points should be greased on a 8 hourly basis.

Boom centre section grease points



Location	Grease Interval
Boom rose ends	8 hourly
Hydraulic cylinder ends (wing tilt, lift, fold, hydraulic yaw)	8 hourly
Tilt pins	8 hourly
Diagonal delta link pins	8 hourly
Lineal delta link pins	8 hourly
Paralift pins	8 hourly

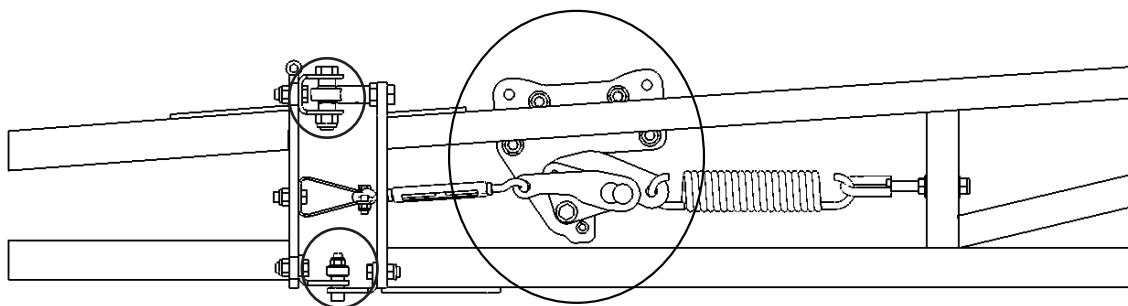
Cable drum grease points



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 8 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 (500 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.

Pump

8 Hrs

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 110 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.

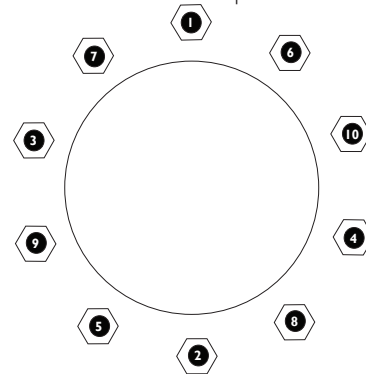
Chassis, wheels, tyres and axles

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 Evolution 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. The hydraulic cylinders must have 50mm of travel remaining.

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.

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
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.
10. Do not over-tighten nut.

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.

Hydraulic fold cylinders *Continued*

To do this:

Open the boom right out and continue to hold the control lever in that position for 10-15 seconds until the rams are synchronised. The air bleed cap should also be loosened from time to time to remove air from the system.

Airbag suspension

The airbag suspension consists of a 12 volt air compressor; one ride height valve, two airbags, shock absorbers, an axle (used as the air reservoir) and the axle frame.

The 12v compressor is powered up when the ignition is switched on. The electrical system is protected by a 20Amp blade fuse which is located in the ignition relay box in the cabin harness.

Adjusting the system pressure

The compressor has a pressure cut out switch which regulates the pressure to cut in at 70-75psi. The cut out pressure can be adjusted by compressing the contact spring to achieve the required maximum pressure. It is recommended that a cut out pressure of 90-95psi is set.

NOTE: The compressor has a recommended duty cycle of 10 minutes. If there is an air leak in the system or the cut out pressure is set too high the compressor may run for an excessive period of time causing the compressor to wear prematurely.



Adjusting the ride height

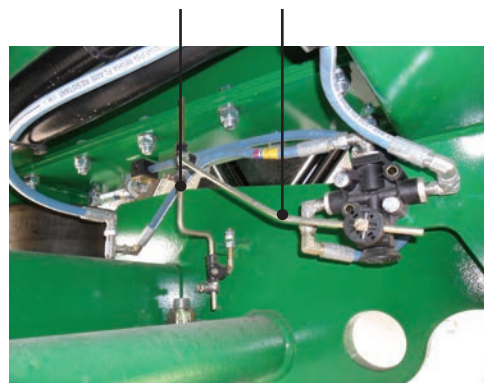
The ride height valve is used to regulate the air pressure within the airbags to achieve a consistent ride height.

The ride height valve is located in the inside of the left hand suspension arm.

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.

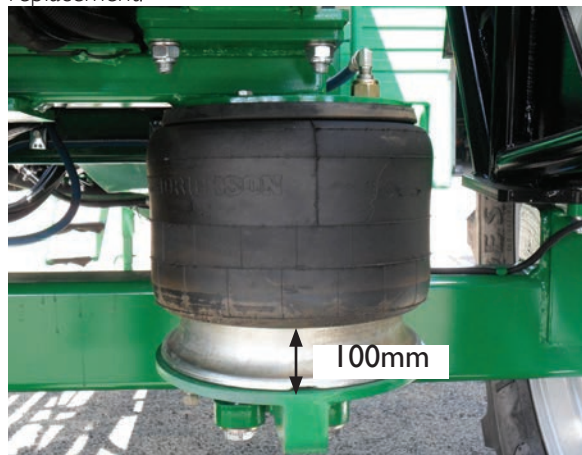
The ride height can be adjusted by loosening the clamps attached to the upright rod on the ride height valve linkage. Slide the valve arm up or down the upright rod to either raise or lower the ride height.

Upright rod Valve arm



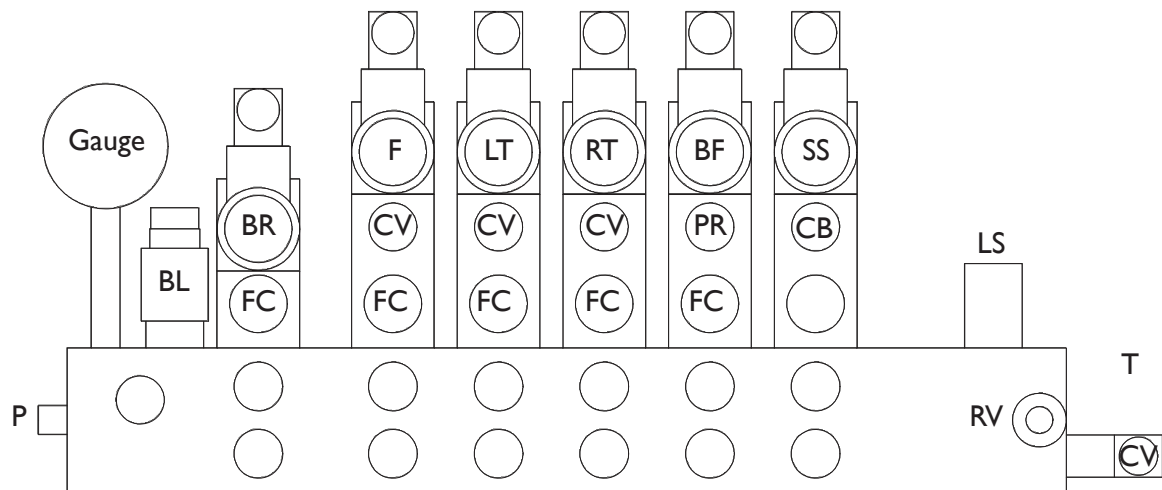
The recommended ride height is 100mm from the fully deflated position. The upright rod must be kept as close to vertical. Should the upright rod be too far forward or backward the ride characteristics will be affected considerably.

The ride height valve has a dead band position where the valve will not let air in or out of the airbags. Over time the seals in the ride height valve may wear causing this dead band to decrease. If this is the cause the ride height will require readjustment or possibly replacement.



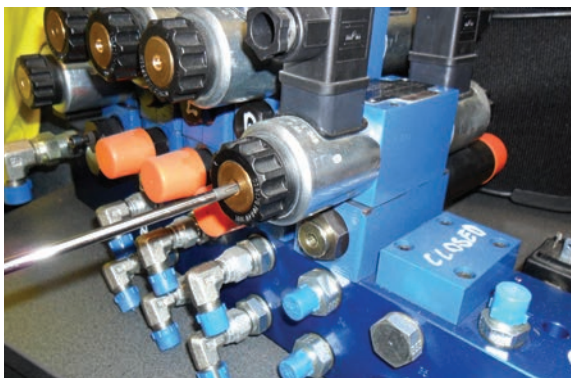
Electric over hydraulic spool valves

CV	- Check Valve	T	- Return to Tank	F	- Boom Fold
FC	- Flow Control	LC	- Load Sense	LT	- Left Tilt
PR	- Pressure Reducing Valve	RV	- Relief valve	RT	- Right Tilt
CB	- Counter Balance Valve	BL	- Boom Lower	BF	- Bi-fold
P	- Pressure	BR	- Boom Raise	SS	- Smart Steer



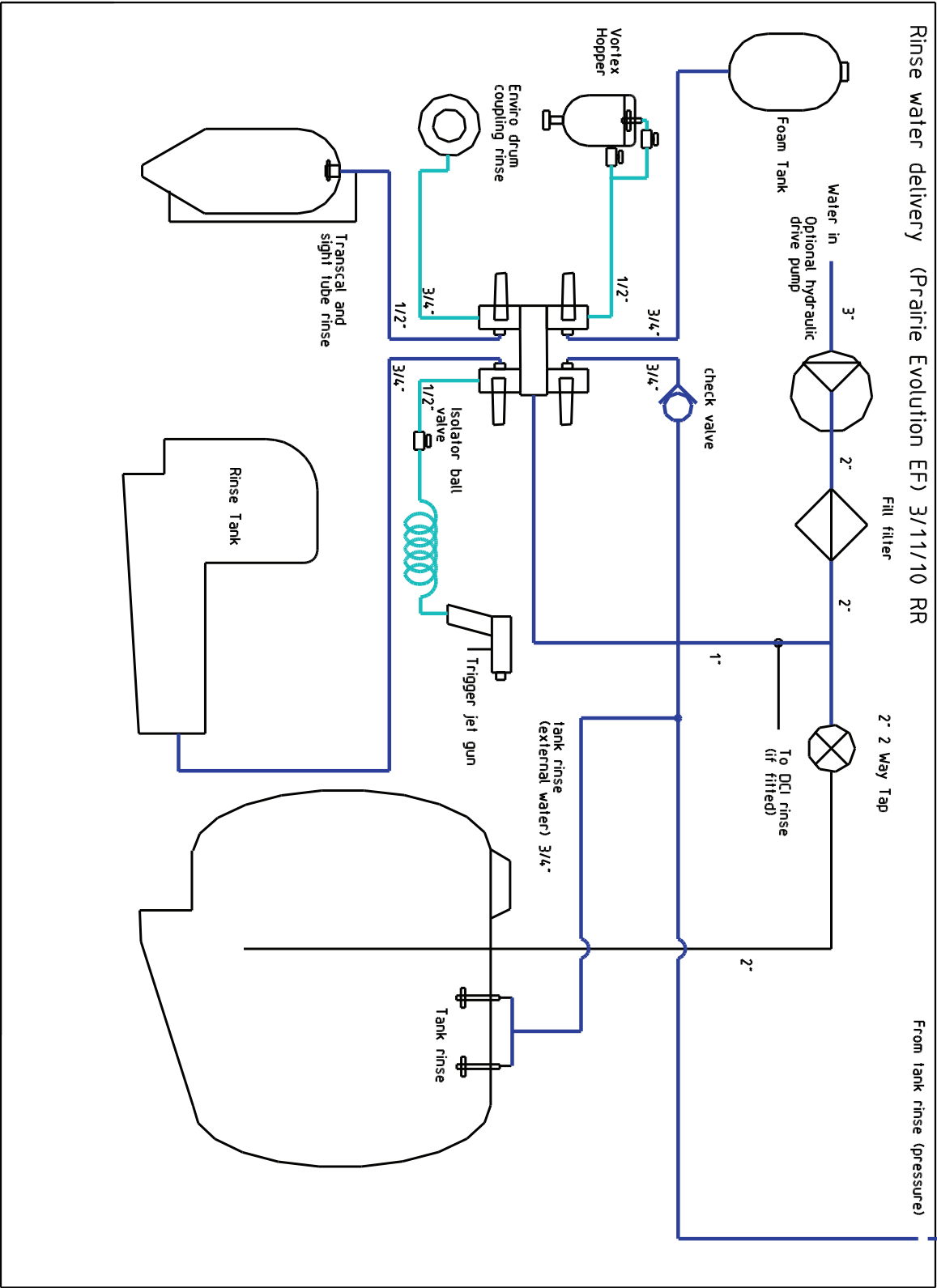
Electric over hydraulic spool valves have a manual override in the case of an electrical fault. The hydraulic function can be operated by manually moving the spool with a screw driver as shown below.

To adjust the boom function speed remove the orange cap from the flow control valve. Using 10mm spanner and a 5mm Allen key adjust the hydraulic flow until the required speed is achieved. Screw in to slow down, out to speed up.

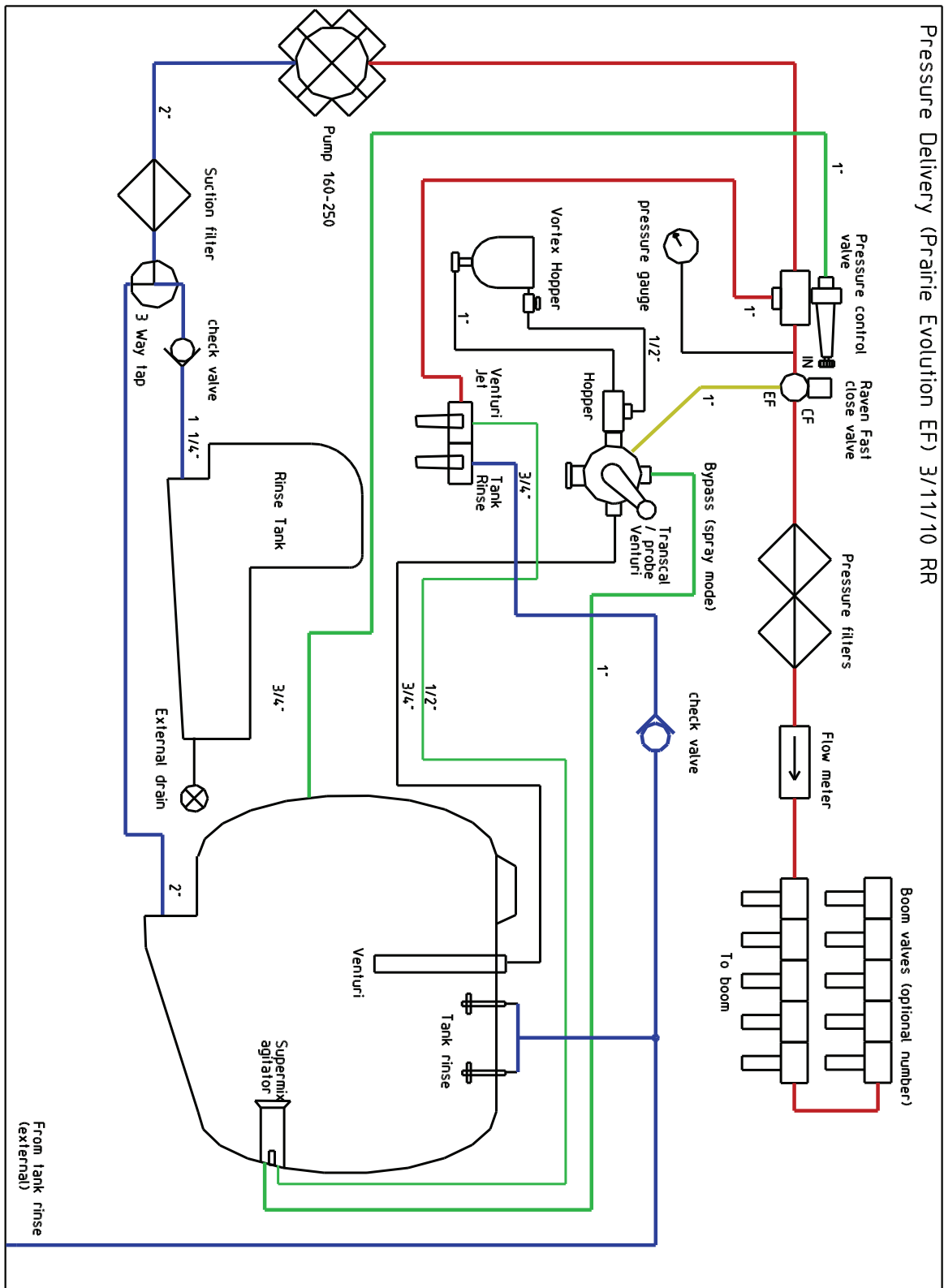


Plumbing schematics

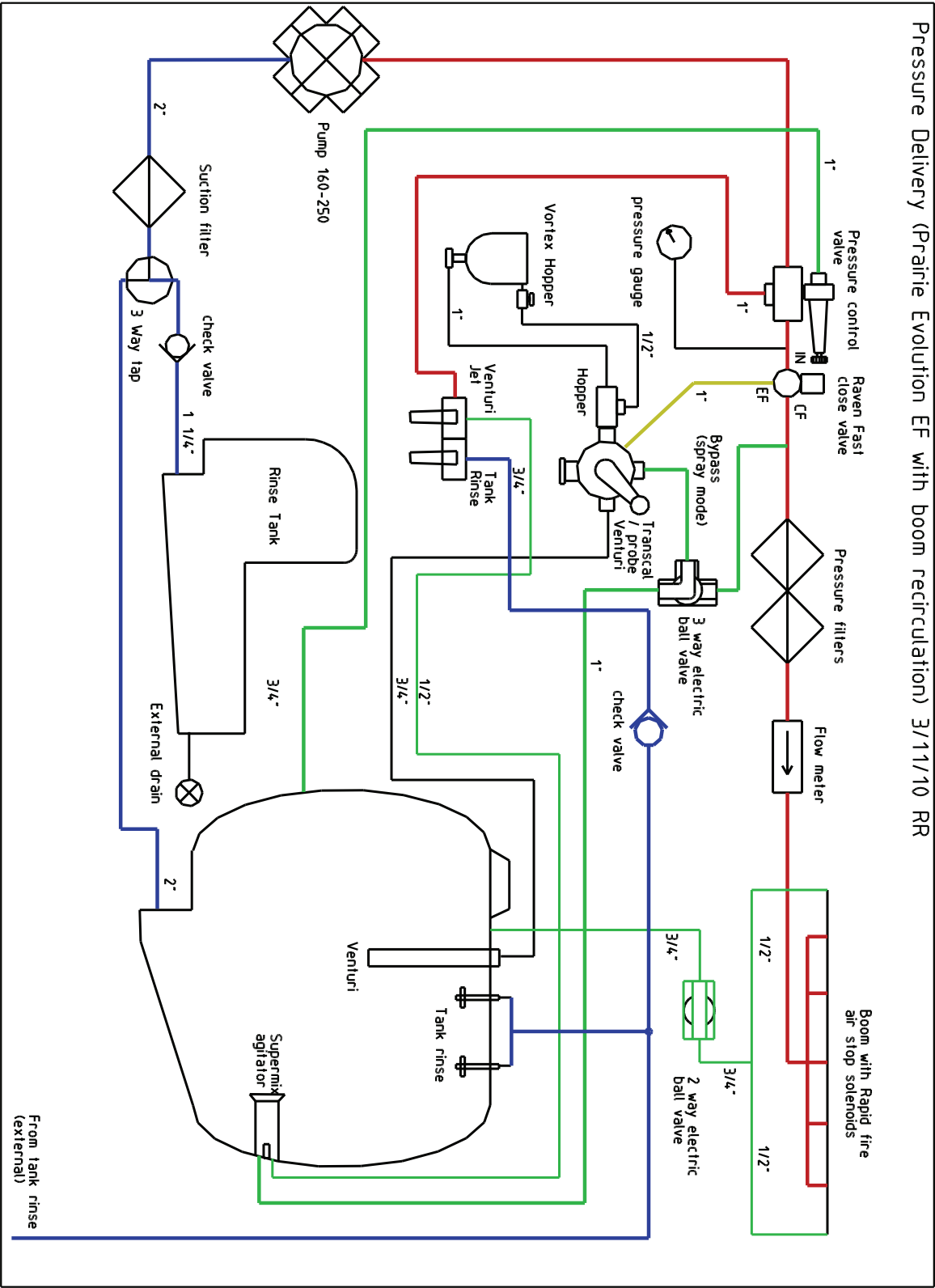
Rinse water delivery



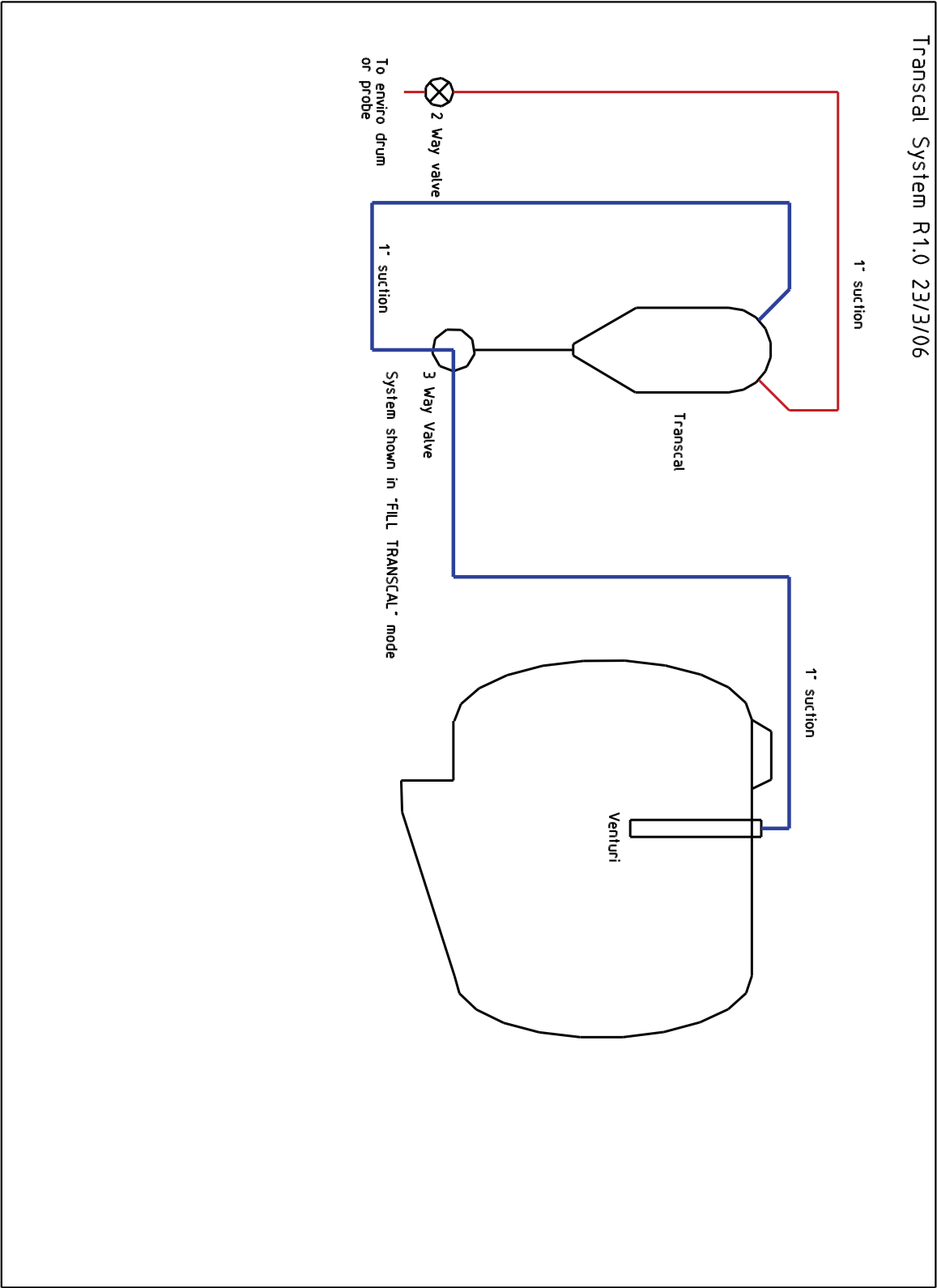
Pressure delivery



Pressure delivery - with Rapidflow



Pressure delivery - Transcal



Chapter 10

OPTIONAL ACCESSORIES

General Information

The following pages provide information on Goldacres optional accessories available on this equipment.

Please note: These options may not be fitted to your equipment unless ordered.

CHEMICAL INDUCTION PROBE

Overview

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.

Key Features



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.

NOTE: This item is intended for the induction of liquid chemicals only.

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 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 500 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

Overview

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.

Key Features



Reference Number	Function
1	Rinse tap
2	Tank rinse nozzle
3	Level indicator 60L
4	Drain tap



Reference Number	Function
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 located on the EZ control.
5. Ensure the bypass line ball valve and the chemical probe ball valves are closed.
6. Operate the pump at the speed necessary to generate at least 70-80 psi delivery pressure (as displayed on the sprayer pressure gauge). Do not run faster than 500 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.

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

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 and "R" clip in the mechanism.

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 so that it is horizontal.
- 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

Overview

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.

Key Features



Operation

NOTE: The Transcal is intended for the induction of liquid chemicals only.

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 speed necessary to generate 85 psi delivery pressure (as displayed on the manifold pressure gauge). Do not run faster than 500 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.

When finished:

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

Transferring chemical without measuring

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

To do this you:

1. Release the cam lever fitting from the rear of the Transcal station and connect either the probe or the envirodrum line.
2. Place the probe in the chemical drum and open the ball valve on the chemical probe, or connect to the envirodrum and engage the Micromatic handle.
3. Turn the venturi valve on the pressure delivery station 'ON' 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'.

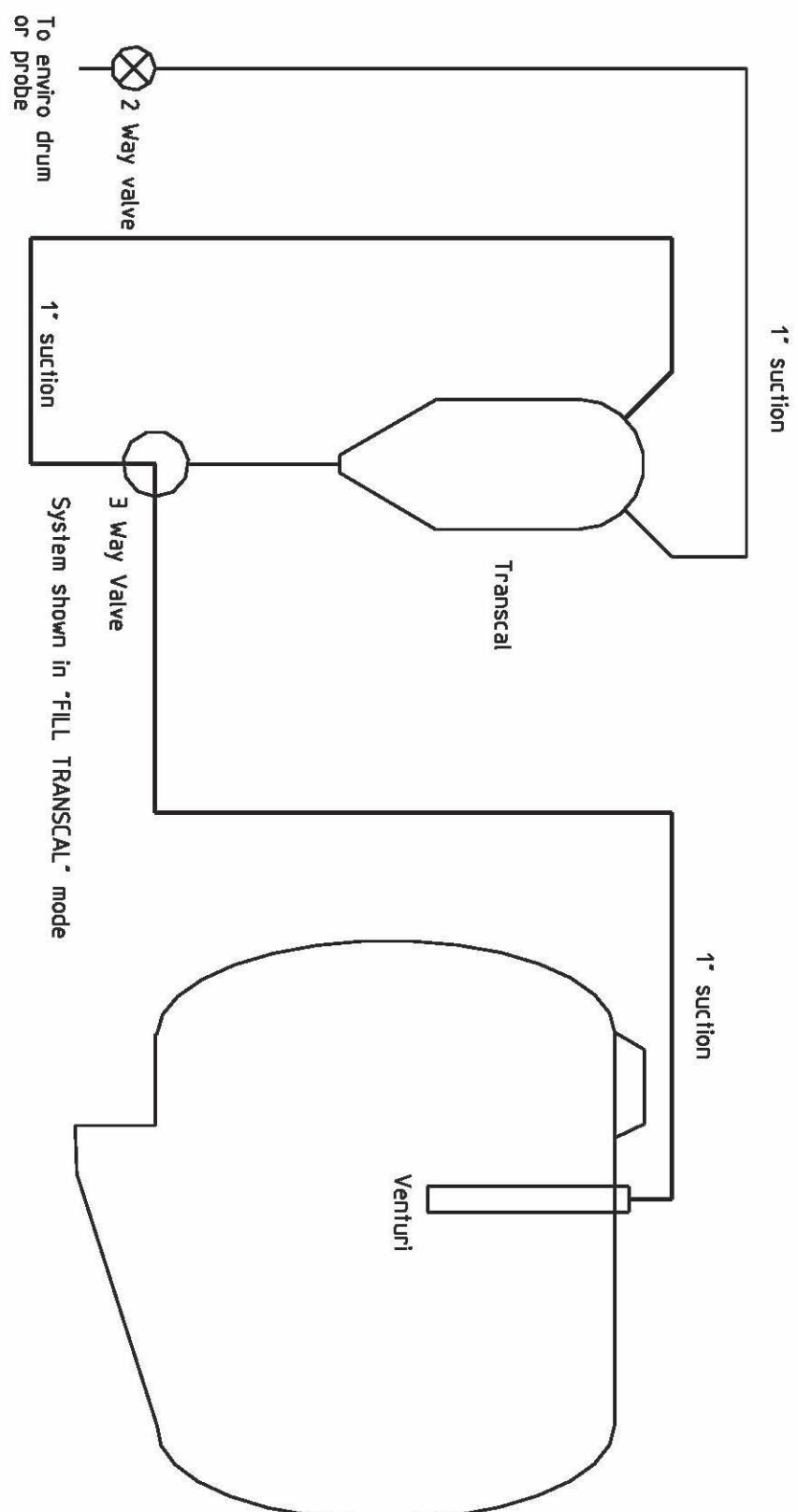
Rinse the Transcal:

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:

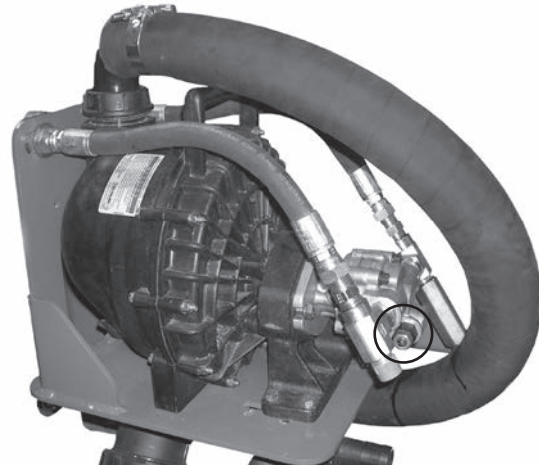
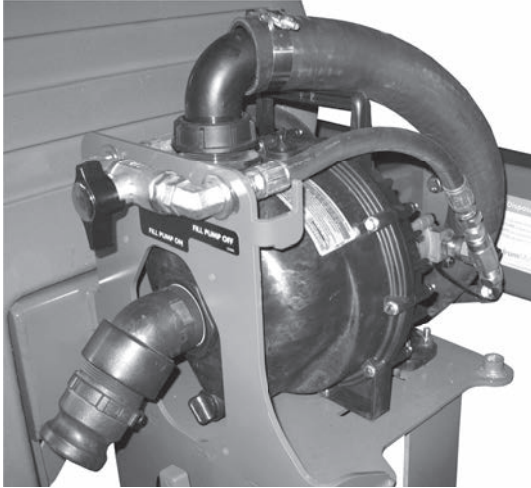
1. Turn off venturi
2. Open probe ball valve
3. Open Transcal ball valve to empty Transcal
4. Vent for 30 seconds then close

Transcal System R1.0 23/3/06



HYDRAULIC FILL PUMP

Key Features



Suction and 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 (3")

A smaller size delivery line can be used but will reduce pump output.

Setting pump RPM

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 of oil @ 2000 psi.

With open centre tractor hydraulic systems:

- Before starting the tractor open the oil bypass adjustment screw (as circled in picture above)
- 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, lock down 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 (Oil bypass screw circled above).
- 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:

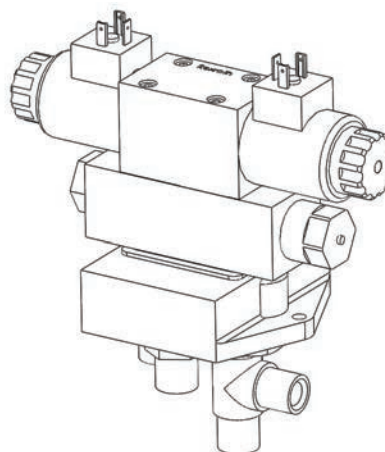
- Do not run the pump dry or un-primed for extended periods, otherwise seal damage will result.
- The amount of oil fed to a hydraulic centrifugal pump directly determines its RPM'S and thus the liquid pressure at which the pump operates.
- Excessive oil flow will cause the hydraulic motor to over-rev,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

Attach fill hose to quick fill point.

Ensure that the fill pump bypass ball valve is in the "fill pump OFF" position.

Ensure that pump is primed prior to starting.



Activate fill pump with toggle switch located on the EZ control panel.

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).

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

Attach fill hose to quick fill point.

Ensure that the fill pump bypass ball valve is in the "fill pump OFF" position.

Ensure that pump is primed prior to starting.

Activate fill pump by engaging tractor hydraulic remote lever.

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).

Once the required amount of water has been transferred, rotate the ball valve to "fill pump OFF" position and then disengage tractor remote.

EXACTA FOAM MARKER

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 (Evolution models only), take the lid off on all other models.
6. 'OPEN' the 'foam marker fill' valve. Fill the exacta foam water tank with only clean soft water.
7. Continue to bottom-fill the foam tank until the desired amount has been transferred.
8. When the desired amount of water has been transferred to the foam tank, turn the 'foam marker fill' valve 'OFF'.
9. Turn the 'foam marker breather' valve 'CLOSED'.
10. Turn the fresh water pumping system off.
11. Fill the concentrate tank with only Goldacres foam concentrate.

12. All adjustments of the control valve should be

within plus or minus $\frac{1}{2}$ 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.

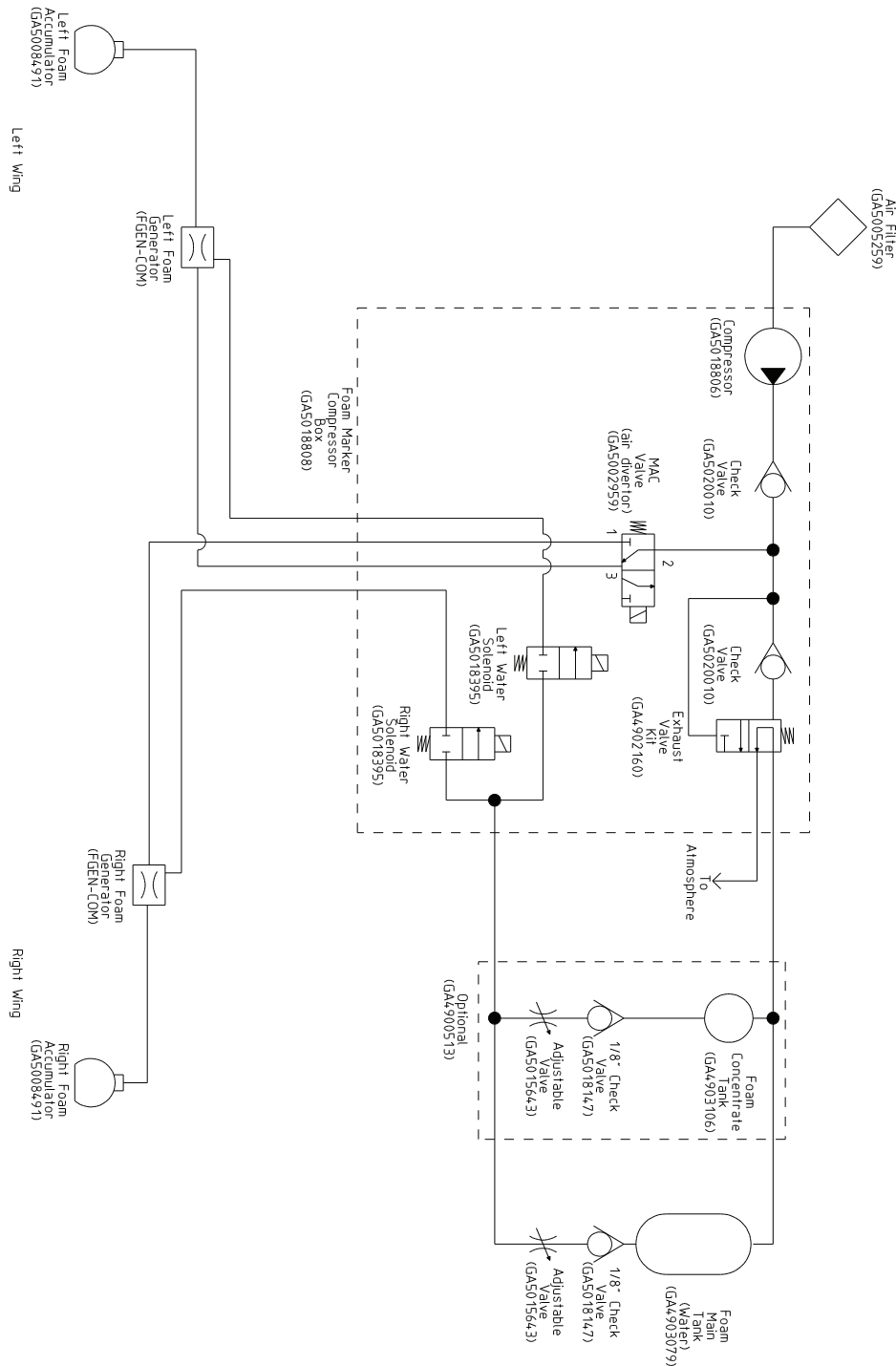
Bleeding the concentrate line when the foam concentrate tank empties:

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

Foam marker schematic



DIRECT CHEMICAL INJECTION

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 & 500 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" cam lock fitting (photo) as shown in the DCI Quickstart guide. 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.

Let's 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 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. 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

Raven SCS4400 DCI programming

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 the injection module: Product type, valve type, meter cal, value cal, rate cal 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.

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.

- 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 VALUE” 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 DCI 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 submenu 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 submenu 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 used 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

Changing 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

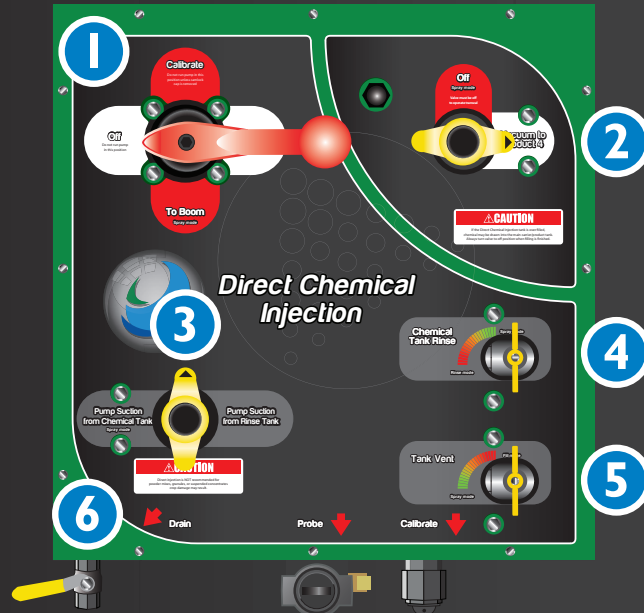
NOTE: If the console displays "check control node 2 or 3" when reconnecting an injection module at any stage;

- 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 curser 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.

DCI Quickstart Guide

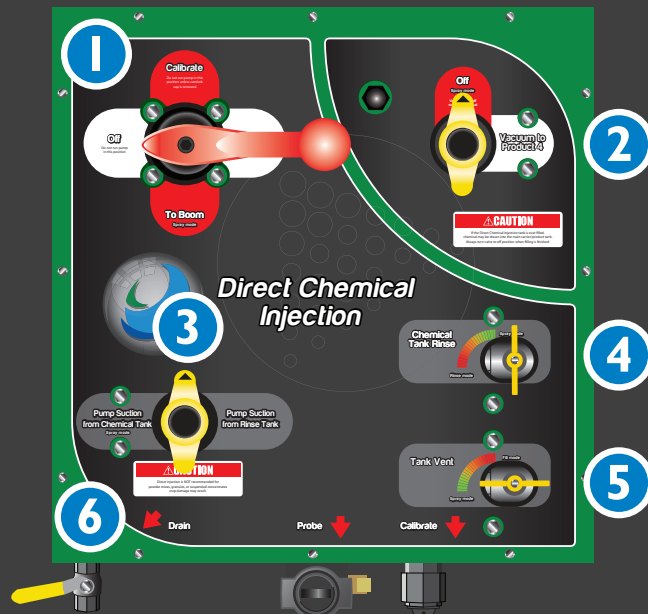
Fill

1. Move handle to Off
2. Move handle to Vacuum to Product 1
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



Empty

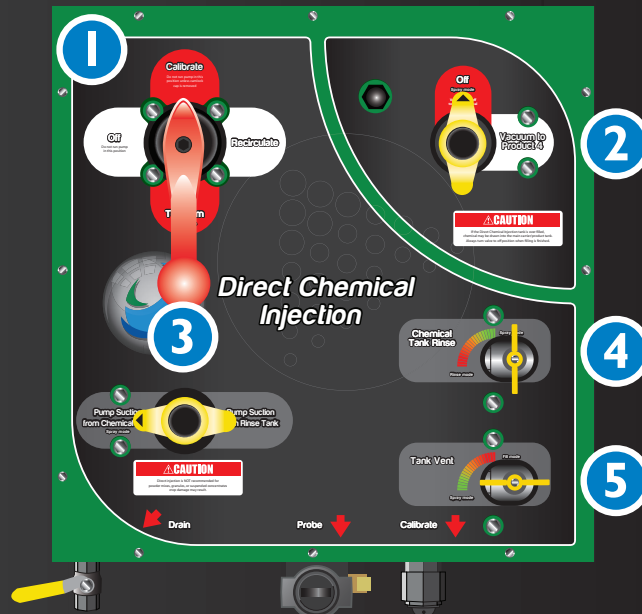
1. Move handle to Off
2. Move handle to Off (SPRAY MODE)
3. Move handle to Middle
4. Move handle to Chemical Tank Rinse (SPRAY MODE)
5. Move handle to Tank Vent (SPRAY MODE)
6. Move Drain handle to "On" position



DCI Quickstart Guide - continued

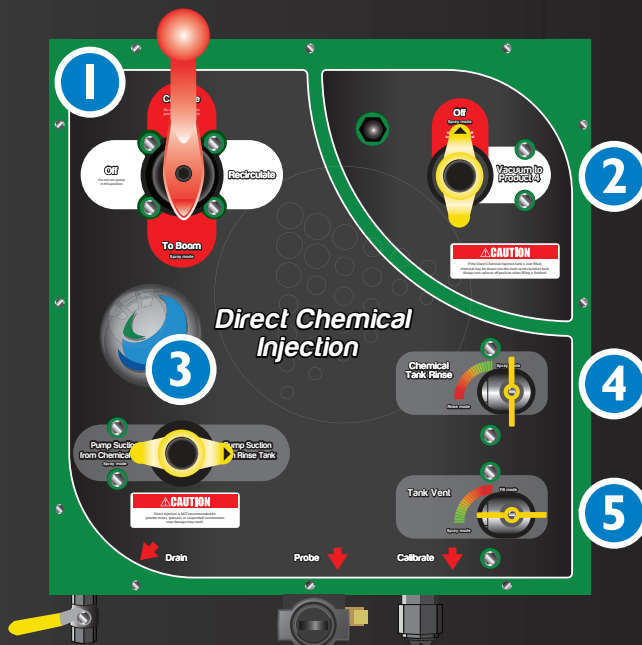
Calibrate

1. Move handle to To Calibrate
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)



Flush

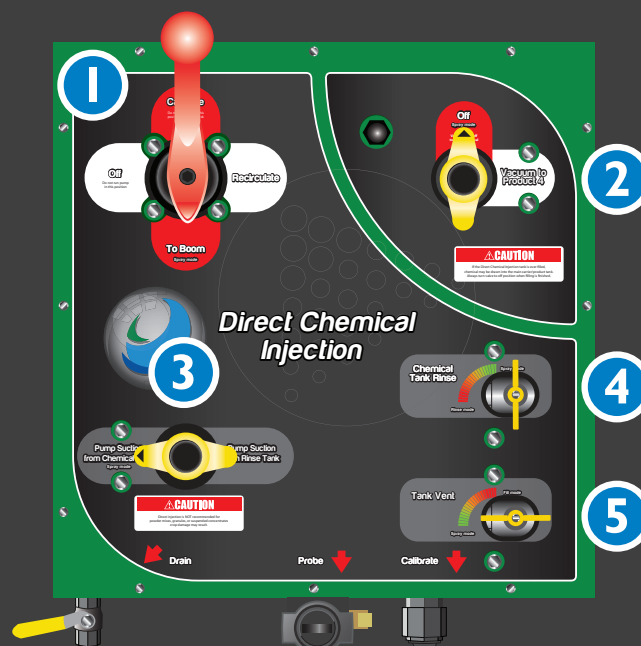
1. Move handle to To Boom (SPRAY MODE)
2. Move handle to Off (SPRAY MODE)
3. Move handle to Pump Suction from Rinse Tank
4. Move handle to Chemical Tank Rinse (SPRAY MODE)
5. Move handle to Tank Vent (SPRAY MODE)



DCI Quickstart Guide - continued

Spray

1. Move handle to 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)



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.

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 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.

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.

Centred:

Centered position is the same as driving a sprayer without steering. To center, simply turn the switch to auto then back to manual and the wheels will return to their calibrated center.

Transport:

Transport mode is the same as driving a sprayer without steering. It is used for high speed transport. Centre the wheels (as above) and have the switch in either the manual or off position. The ball valves on the steering cylinder must be closed.

Reversing:

Centre the wheels as above and have the switch in either the manual or off position.

WARNING: DO NOT reverse the sprayer unless the Smart Steer switch is in the manual or off position. Otherwise damage to the sprayer can occur.

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 the tractor turned off, turn the hydraulic tap located on the steering cylinder to the on position.
3. Start your tractor and power up the smart steer system. With the steering in manual mode, repeatedly press the crab left switch, until the trailer wheels have reached full lock left. Once this process has completed, again with the steering in manual mode, repeatedly press the crab right switch, until the trailer wheels have reached 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).

Operation - continued

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 prove this has worked, while

Troubleshooting

I HAVE NO AUTO STEERING?

In manual mode check the crab function.

IF THE CRAB FUNCTION IS WORKING...

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 not the case there could be a problem with your speed sensor alignment, it 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.

Technical Fault Finding

NO STEERING, NO MANUAL CRAB

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 fuses: inspect the fuses in the fuse box and make sure they are all working.

5. When the unit stationary there will be no automatic steering function. Ground speed must be detected to start the auto-steer process. Even if the yaw sensor is moved the steering will not react.

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.

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 THE CRAB FUNCTION IS NOT WORKING...

Making sure the ball valve on the cylinder is on. And your pin (if fitted) is removed from the machine as though the machine was ready for work.

Check you have a power supply to the transistor box. A quick way of testing this is to see if the light on the speed sensors is illuminating. If you have power, use a multi meter to check whether there is power at the plug, on the top of the solenoid. While operating the crab (left or right) function there should be 12v between terminal 1 and terminal 2. If there is power 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 at least 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, a bent or broken cylinder or the high speed travel locks are not engaged (pin or ball valve).

- 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.

Technical Fault Finding

- 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.

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 on steering cylinder are on: Check the ball valve(s) located above the steering cylinder are turned on and are parallel with the hose.

POWER BUT NO OUTPUT 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.

NO STEERING, MANUAL CRAB WORKS

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.

Both speed sensors not working

- 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+.

No yaw power

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

ERRATIC STEERING

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.

Calibration error

- When travelling in a straight line and the machine seems to be tracking either too far to the left or too far to the right and this is consistent during turning it is a calibration issue.

Recalibrate the machine by straightening the wheels in manual crab mode, turn the tractor off. Within ten seconds of turning the tractor back on press the calibration button. To prove this has worked, while stationary, operate the steering switch from manual to automatic then back to manual again and the wheels should not move. If they do move, the calibration has not worked. Repeat procedure.



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