PRAIRIE SPRAYER

OPERATORS MANUAL

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AUSTRALIA'S WORLD CLASS AG-SPRAYERS

GOLDACRES

AUSTRALIAN MADE

GOLDACRES

PRAIRIE OPERATOR'S MANUAL

Congratulations on purchasing a GoldAcres sprayer.

GoldAcres aims to provide the agricultural industry with spray equipment, parts, service and information reflecting the best world standards of technology, performance and safety.

Please read this Operator's Manual before using your sprayer. The purpose of this manual is to assist you in safely operating and maintaining your GoldAcres sprayer. It is the responsibility of the owner to ensure that any operator takes the time to thoroughly read and understand the information given in this manual.

GoldAcres would appreciate any comments or suggestions from operators that may lead to improved sprayer performance.
Please address your correspondence to:

Product Services Manager
GoldAcres Trading Pty. Ltd.
1-3 North Western Rd.
St. Arnaud
Victoria 3478
Australia

For warranty purposes and service records, please return the warranty registration card within 14 days of purchase.

SERIAL NO.:

DATE OF PURCHASE:

RESELLER:

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SAFETY WARNINGS

This symbol  denotes a safety warning. Failure to observe the various warnings in this manual may result in personal injury and/or reduced sprayer performance.

READ THE WARRANTY AND TERMS OF CONDITIONS

READ THIS OPERATOR'S MANUAL BEFORE SPRAYING

IT IS THE RESPONSIBILITY OF THE OWNER TO ENSURE THERE ARE NO STICKERS MISSING FROM THE SPRAYER.

CARE SHOULD BE TAKEN WHEN TRANSFERRING LIQUID INTO THE TANK TO ENSURE THE GROSS WEIGHT OF THE SPRAYER DOES NOT EXCEED THE CARRYING, BRAKING AND/OR TOWING CAPACITY OF THE VEHICLE TO WHICH THE SPRAYER IS ATTACHED AS SPECIFIED BY THE VEHICLE MANUFACTURER

NOTE: 1 LITRE (WATER) = 1 KG (WEIGHT)

IT IS IMPERATIVE THAT THE VEHICLE MANUFACTURER'S SPECIFICATIONS BE CHECKED AND ALL INSTRUCTIONS FOR USE BE ADHERED TO AT ALL TIMES

MAKE SURE ALL RELEVANT TOWING REGULATIONS ARE ADHERED TO WHEN TOWING SPRAYER

MAKE SURE SPRAYER COMPLIES WITH ALL RELEVANT ROAD REGULATIONS

SUITABLE CARE SHOULD BE TAKEN WHEN DRIVING WITH SPRAYER ATTACHED TO THE VEHICLE. CONSIDERATION SHOULD BE GIVEN TO BOTH THE CARRYING AND/OR TOWING CAPACITY OF THE VEHICLE AND THE TERRAIN GRADIENTS WHEN DETERMINING THE SPEED AT WHICH THE VEHICLE CAN BE SAFELY DRIVEN

MAXIMUM SPEED WITH TANK LOADED IS 20 KM/H

MAXIMUM SPEED WITH TANK EMPTY IS 40 KM/H

SLOW DOWN WHEN TURNING TO PREVENT EXCESSIVE STRAIN ON BOOM (ESPECIALLY ON BOOMS 24M OR LARGER)

CHECK WHEEL NUTS REGULARLY

ENSURE ALL BOLTS ARE TIGHTENED AND SECURED BEFORE TRANSPORTING AND OPERATING

INSPECT SPRAYER THOROUGHLY FOR DAMAGE AND WEAR BEFORE TRANSPORTING AND OPERATING

LUBRICATE SPRAYER AS PER RECOMMENDED REQUIREMENTS BEFORE OPERATING

NEVER STAND WITHIN RADIUS OF BOOM WINGS

NEVER WORK UNDER HYDRAULICALLY RAISED BOOM

ALWAYS ENSURE BOOM IS SECURELY SUPPORTED WHEN TRANSPORTING

DO NOT TRAVEL WITH BOOM IN FOLDED POSITION UNTIL BOOM IS LOWERED ONTO RESTS

BOOM MUST BE RAISED CLEAR OF RESTS WHEN UNFOLDING OR SERIOUS BOOM DAMAGE MAY RESULT

KEEP CLEAR OF OVERHEAD OBSTRUCTIONS – ESPECIALLY POWERLINES AS CONTACT CAN CAUSE DEATH

BE AWARE OF OVERHEAD OBSTRUCTIONS (IE POWERLINES) WHEN USING TILT CYLINDERS

NEVER OVERFILL PUMP WITH OIL

DO NOT OPERATE PUMP ABOVE 540 RPM

CUT PTO SHAFT TO CORRECT LENGTH TO SUIT TRACTOR BEFORE SPRAYING

MAKE SURE SPRAYER IS PROPERLY SUPPORTED WHEN CHANGING TYRE

NEVER CHANGE TYRE ON A SLOPE OR SOFT UNEVEN GROUND

NEVER GET UNDER THE SPRAYER WHEN IT IS SUPPORTED ONLY BY THE SUPPLIED AND FITTED JACK

DO NOT SUPPORT SPRAYER WITH THE SUPPLIED AND FITTED JACK UNLESS TANK IS EMPTY

NEVER ATTEMPT TO CLEAN NOZZLES BY BLOWING WITH MOUTH

READ THE CHEMICAL LABEL - HEED THE CHEMICAL LABEL

HANDLE ALL CHEMICALS WITH CARE

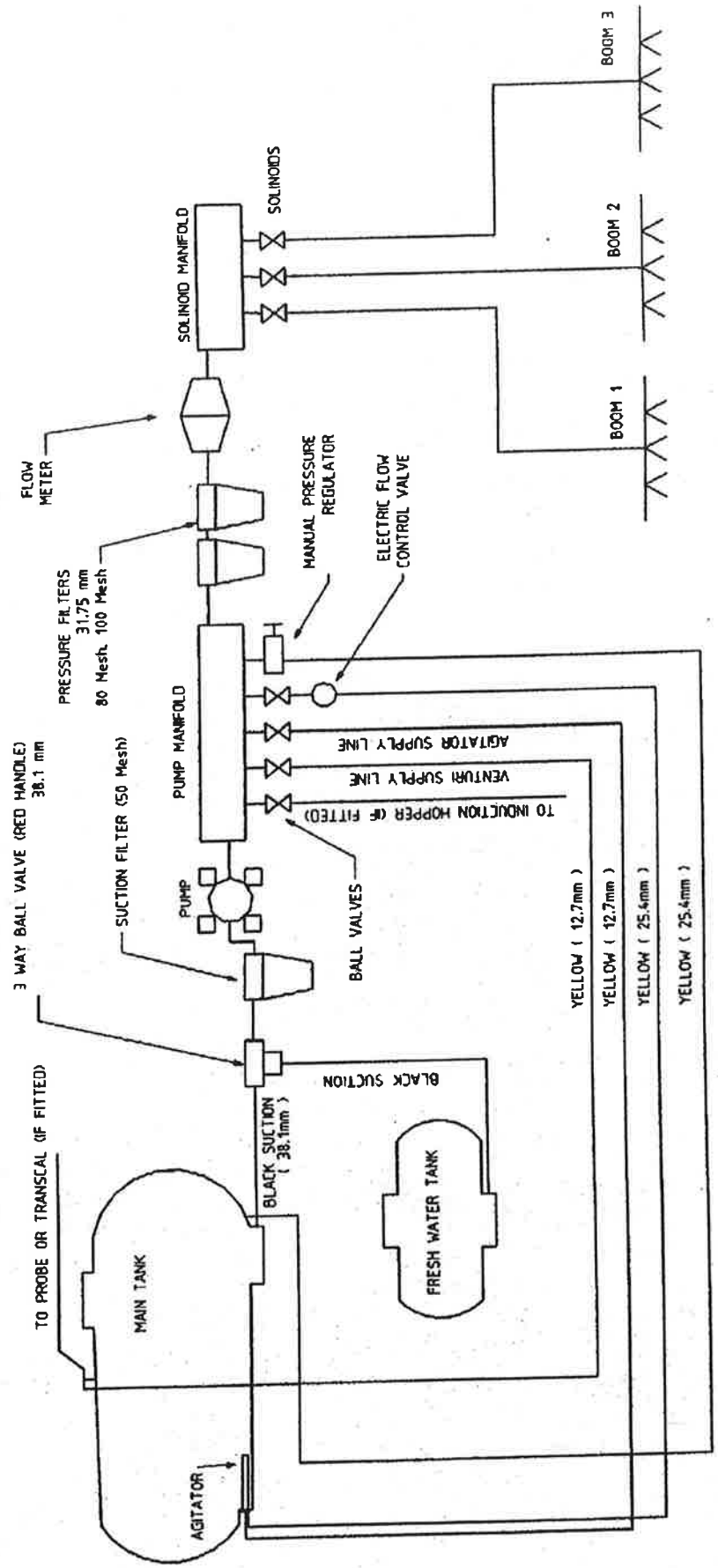
ALWAYS WEAR PROTECTIVE CLOTHING RECOMMENDED ON THE CHEMICAL LABEL PRODUCT

FLUSH CHEMICALS FROM EQUIPMENT IMMEDIATELY AFTER USE

A SUPPLY OF FRESH WATER SHOULD BE WITH SPRAYER AT ALL TIMES

DO NOT OPERATE SPRAYER UNDER THE INFLUENCE OF ANY DRUGS OR TIREDNESS

Prairie Sprayer Plumbing Schematic (Base Model)

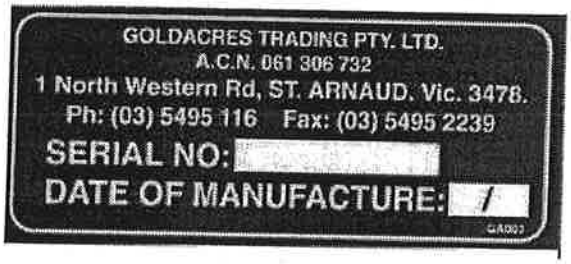


SPRAYER WARNING STICKERS

Thoroughly read and understand all stickers on the sprayer before operation of sprayer. **It is the responsibility of the owner to ensure there are no stickers missing from the sprayer.** Replacement stickers can be ordered.

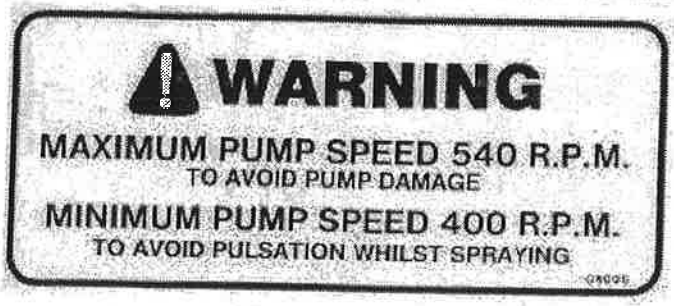
Part No.: GA0001

Part No.: GA0002



Part No.: GA0003

Part No.: GA0004

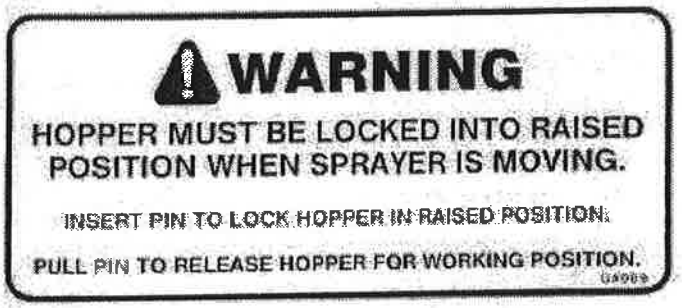


Part No.: GA0005

Part No.: GA006

Part No.: GA007

Part No.: GA008

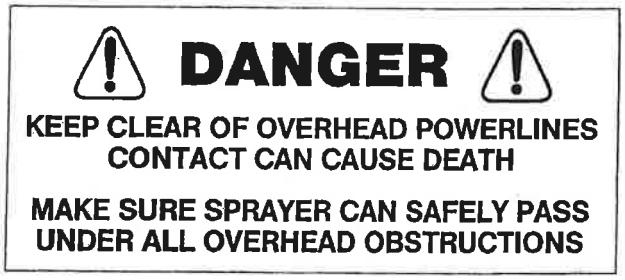


Part No.: GA009

Part No.: GA010

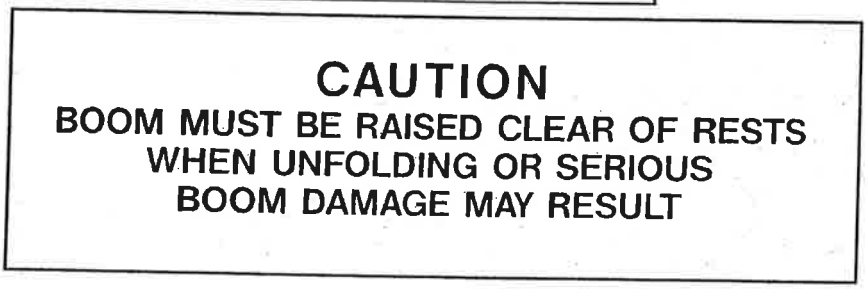
Part No.: BOOM1

Part No.: DRAIN1



Part No.: OHEAD

Part No.: DBF1



Part No.: DBUF1

REMOVE LID WHEN
BOTTOM-FILLING FOAM TANK

Part No.: EXF1

CLEAN AIR FILTER DAILY

Part No.: FMCAF1

WARNING

THE TARE WEIGHT OF THIS SPRAYER IS APPROXIMATELY kg.

MAKE SURE THIS WEIGHT DOES NOT EXCEED THE TOWING CAPACITY OF THE VEHICLE TO WHICH THIS SPRAYER IS ATTACHED.

MAKE SURE THE SPRAYER COMPLIES WITH ALL RELEVANT ROAD REGULATIONS FOR AGRICULTURAL MACHINERY.

Part No.: WEIGHT1

TRANSPORT GUIDELINES

The tare weights of the Prairie sprayers will normally exceed 1,500 kg.
The gross weight of the Prairie sprayers may exceed up to 7,000 kg.

Note: When filling tanks with water, 1 litre of water will add 1 kg of weight

The tare weight of the Ground Glider trailing boom will normally exceed 1,000 kg.

- Contact your sprayer supplier to ascertain a more precise tare weight for your sprayer. **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, again it is the operator's responsibility to know the tare weight and the gross weight of the sprayer at all times;
- Make sure the towing vehicle has sufficient towing and braking capacity to tow the sprayer;
- All relevant towing regulations must be adhered to when towing the sprayer (ie speed regulations, oversize signs, flashing light, etc.). **It is the operator's responsibility to know the relevant towing regulations;**
- The maximum speed of a loaded sprayer (ie with any amount of water in the tank) is 20 km/h;
- The maximum speed of the sprayer with the tanks completely empty and the maximum speed of the Ground Glider trailing boom is 40 km/h. This speed may need to be less according to state speed regulations.

JACK

The jack on the machine is designed to support the sprayer only when the main spray tank is empty.

DO NOT SUPPORT SPRAYER WITH THE SUPPLIED AND FITTED JACK UNLESS MAIN SPRAY TANK IS EMPTY

SAFETY CHAIN

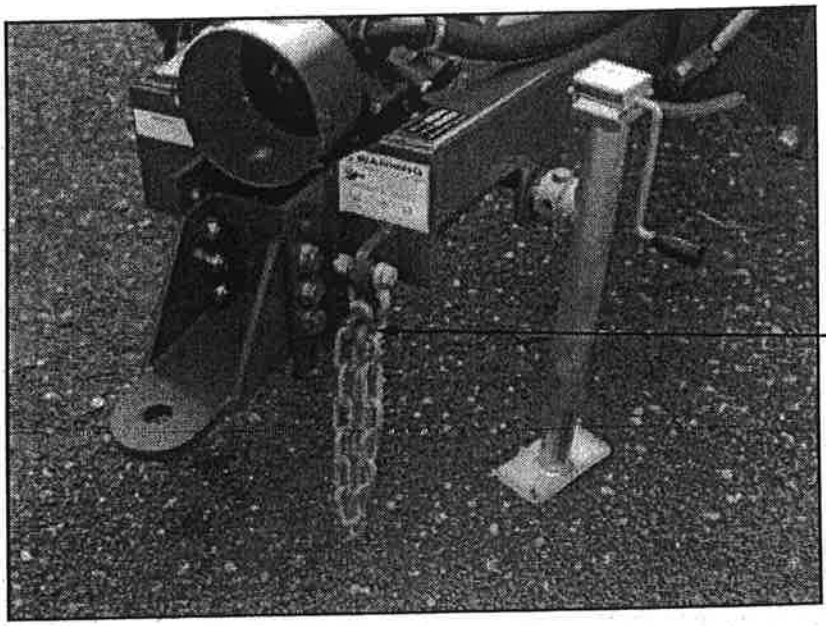
Road safety regulations require towed agricultural vehicles to be fitted with a safety chain when towing.

GoldAcres Prairie tankers and Ground Glider booms are fitted with a 1 metre safety chain. This chain wraps around a suitable member of the towing vehicle and attaches back on itself by means of the 'D' shackle supplied. The chain is constructed from 10 tonne rated alloy links and the 'D' shackles are Grade 'S' alloy shackles made in accordance with AS2741 - 1992.

ALWAYS SECURELY ATTACH SAFETY CHAIN TO TOWING VEHICLE WHEN MOVING SPRAYER

Always allow sufficient length of chain so that when towing the chain will not tighten and pull excessively on the towing vehicle. Also avoid having too much chain such that the chain drags on the ground.

Do not forget to remove the safety chain from the towing vehicle when disconnecting the sprayer from the towing vehicle.



Safety chain and shackles

MAINTENANCE SCHEDULE

GREASE

Proper grease is essential for the sprayer to operate with maximum effectiveness and life-expectancy.

It is important to keep the lubricant and lubricant applicator clean. Wipe all dirt from the fittings before use.

GoldAcres recommends that multi-purpose grease should be used for all lubrications.

Make sure all open-end bearings are lubricated their full length by forcing lubricant into them until it begins to appear at the sides.

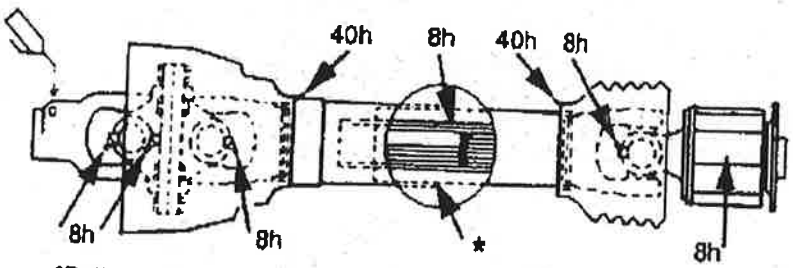
Wheel bearings may need re-packing periodically and the wheels should be checked regularly.

The figures below refer to the frequency of lubrication (in hours) for the respective grease nipple locations.

PTO SHAFT LUBRICATION

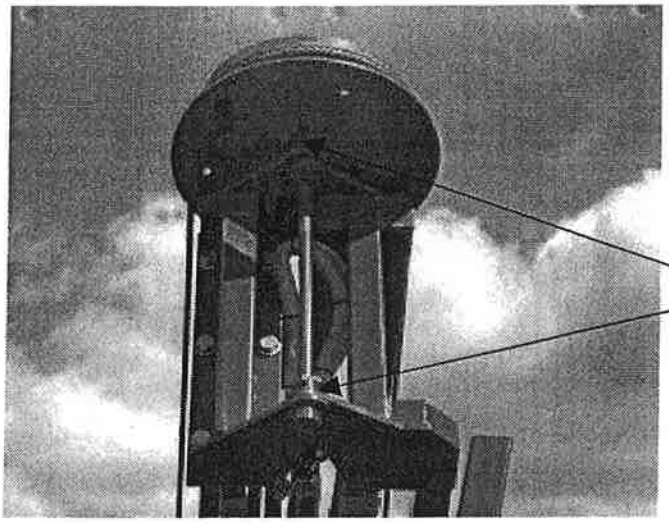
NEVER LUBRICATE THE PTO SHAFT WHILE IT IS RUNNING

MAKE SURE PTO SHAFT IS LUBRICATED AS PER INSTRUCTIONS AND THAT THE GREASE IN THE SHAFT IS KEPT CLEAN



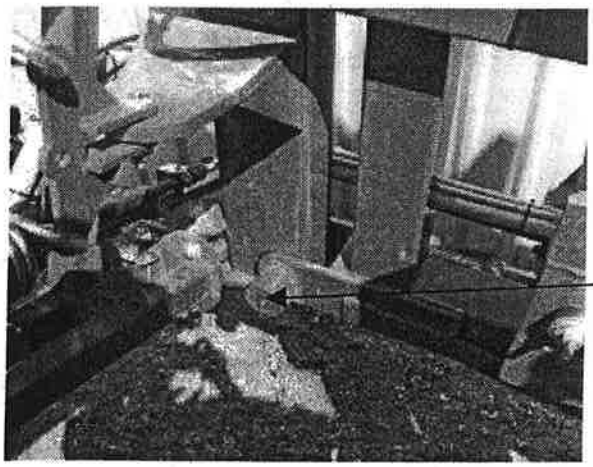
*Pull shaft apart - apply grease to inside of outer Telescopic profile.

DELTA BOOM

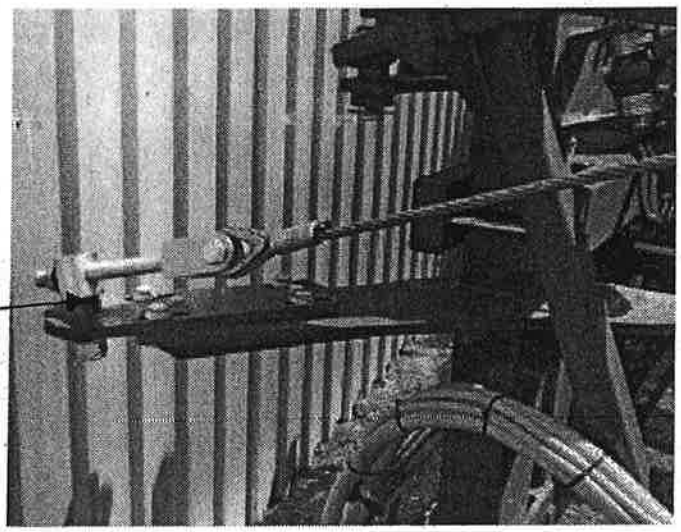


On all sizes of Delta Boom.

8 hours

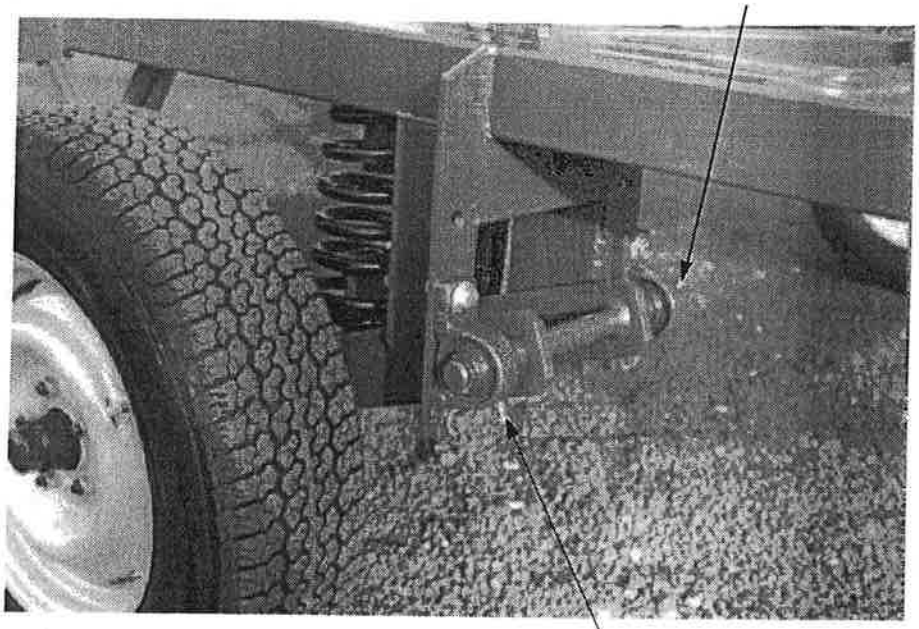


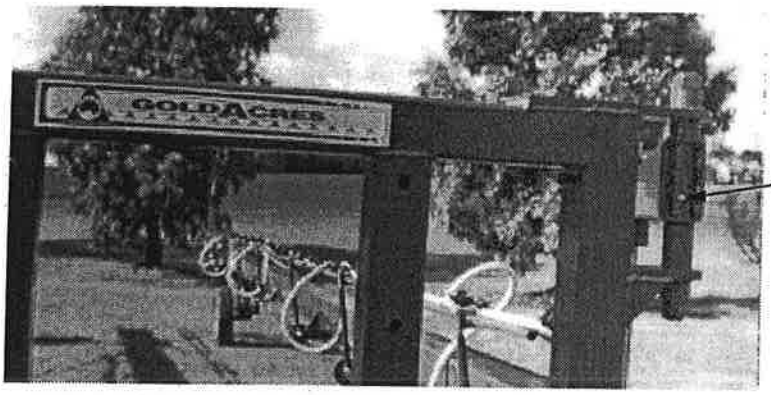
8 hours
24 – 30 m Delta Booms Only

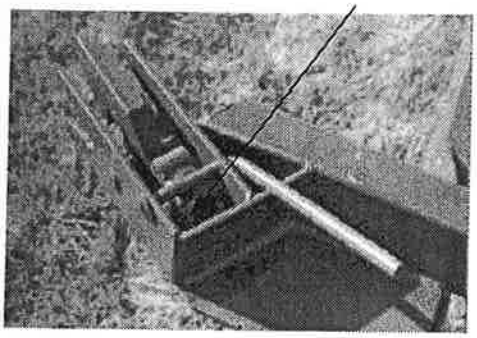


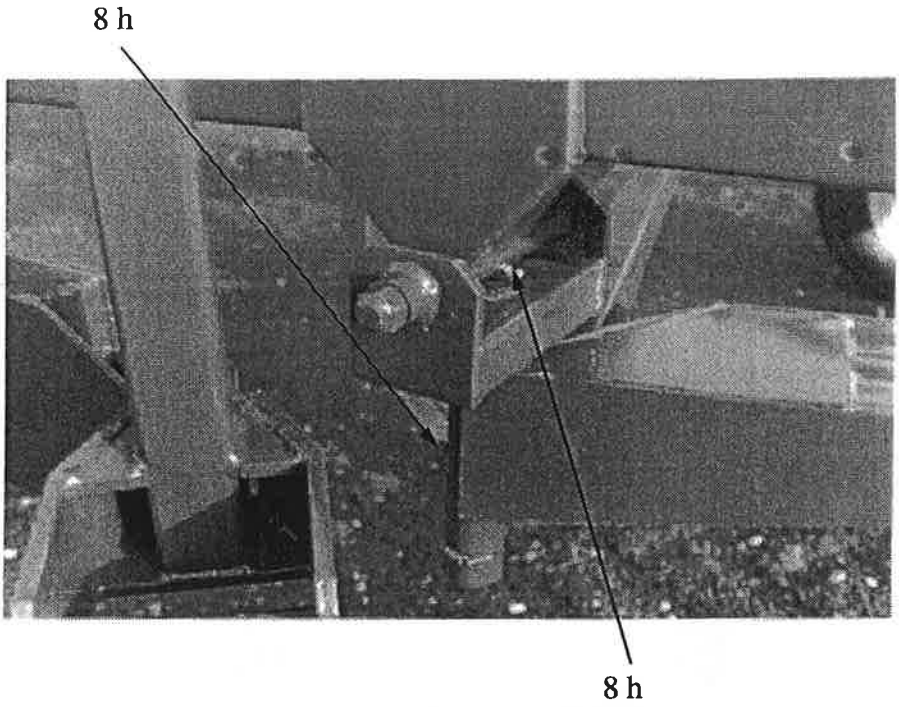
25 hours
24 – 30 m Delta Booms Only

TRAILING BOOM





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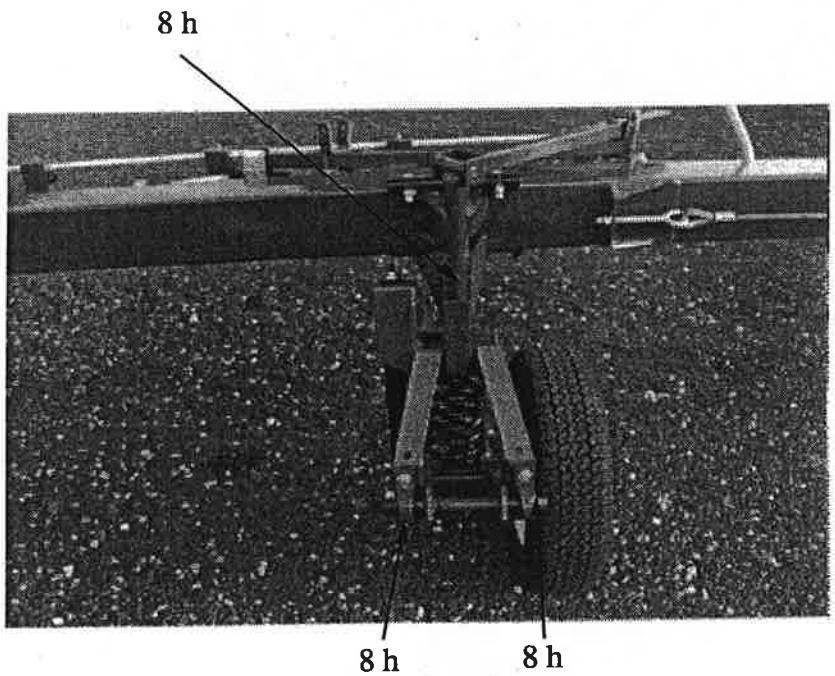
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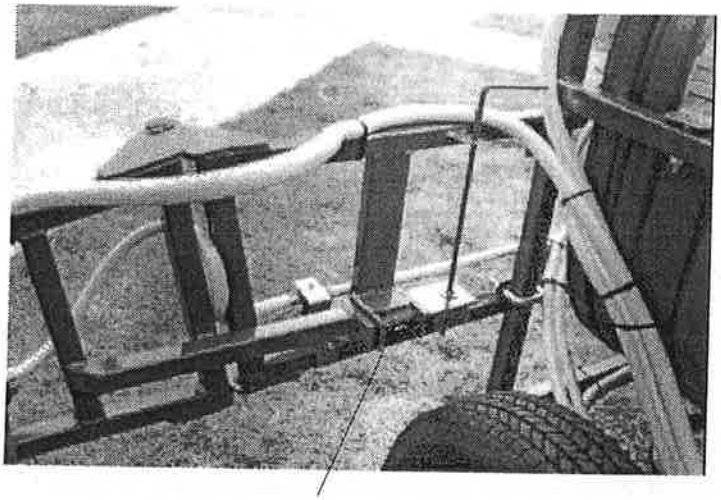
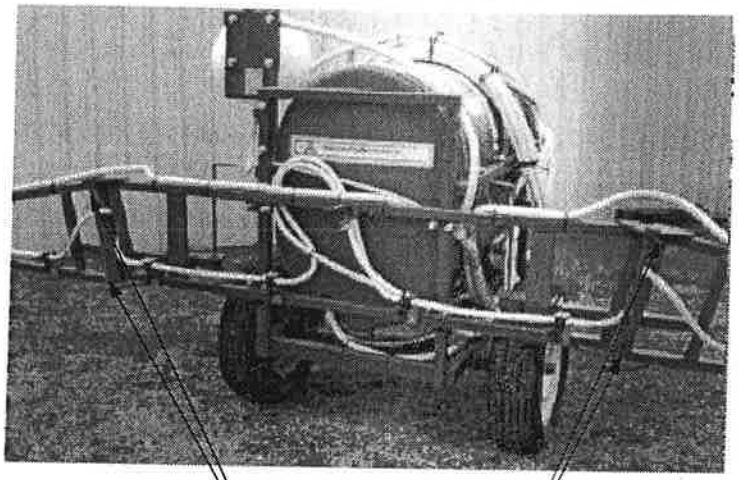
FIXED AND TWIN-LINK BOOMS



12 h



8 h

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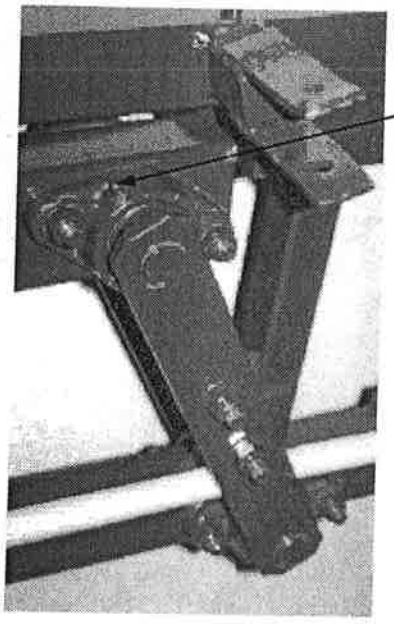


25 h (8 of)
(TWIN-LINK
BOOMS ONLY)

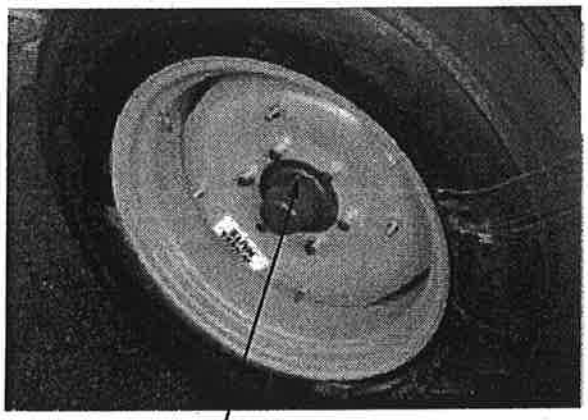
WHEEL / AXLE LUBRICATION

Check the condition of the wheel bearings regularly by determining how much sideways movement is present. Excessive movement usually indicates that the wheel bearing needs repacking, the axle nut needs tightening or that the bearing has been damaged.

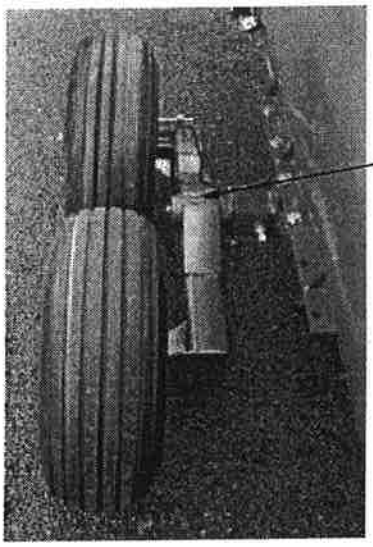
Make sure the axle bolts are tight and that they securely fasten the wheel axles to the sprayer before moving sprayer.

The wheel hubs on most spray tankers have grease nipples fitted to facilitate regular and thorough lubrication. After every 25 hours of operation, remove dust cap and determine how much grease is needed. Then refit dust cap and pump the required amount of grease into the wheel hub.

For tandem axles, lubricate the pivot point every 8 hours of operation.



25h
WHEEL HUB
GREASE NIPPLE



8 h

WHEEL NUTS AND TYRE PRESSURE

The wheel nuts need to be regularly checked and tightened if necessary (check every 8 to 12 hours of operation). The wheel nuts should be checked more frequently when the sprayer is new (ie every 2 to 4 hours).

The wheel nuts should be tightened alternately and evenly to a torque rating of 350 Nm.

The tyre pressure also needs to be checked regularly (check every 8 to 12 hours of operation) and maintained at the required tyre pressure (see the "Tyres, Axles and Wheels" section in this manual).

FLUSHING PUMP SYSTEM WITH FRESH WATER

The sprayer should be flushed regularly so that any components (such as diaphragms, flowmeter) are not exposed to chemical contact for any extended period of time. The system should be flushed with fresh water every day after spraying (see "Flushing Pump System with Fresh Water").

FLOWMETER

The flowmeter should be removed at the end of the spraying season. The flowmeter turbine and turbine hub should be cleaned of all foreign material (such as metal filings and wettable powders which may have hardened n the plastic and metal parts). Check for worn turbine blades, scoring on the turbine shaft and damaged bearings (the turbine should spin freely when assembled correctly). Also check the condition of the flowmeter when inserting back on the sprayer.

LEAVING AND STARTING THE SPRAYER IN COLD CONDITIONS

The sprayer should be kept at all times in an environment where the temperature will not drop so that water freezes (as in the case of frosts). If the sprayer has been in a cold environment, always check to make sure no components have been damaged before spraying begins and that there is no frozen water in the system when starting spraying.

Frozen liquid can damage components when it thaws in a confined cavity (ie in pumps and ball valves).

Exposure to cold environments will tend to reduce the longevity of components such as hose, filters, etc. The cold conditions can cause these components to become more brittle and thus more prone to cracking.

PUMP

Do not leave water in the sprayer pump if frost is expected as iced or frozen water can cause damage to the pump if pumping is attempted. Therefore empty pump of all water (run the pump dry for 15-20 seconds) and cover pump (ie with bag) if a frost is expected. If the water has frozen in the pump and/or in the lines, wait until it has completely thawed before use.

BALL VALVES

After the pump has been run dry, **open all ball valves** to prevent cracking of the ball valve housing, by ice.

FLOWMETER

Make sure the flowmeter is drained to prevent freezing.

TASKS PRIOR TO SPRAYING

- **Read this manual thoroughly;**
- Inspect the sprayer to ensure there is no damage or wear which could lead to injury, further damage or reduce its performance.
- Check all bolts and nuts to make sure they are tight and secure;
- **Carry out scheduled lubrication;**
- Ensure PTO shaft is cut to correct length;
- Make sure the water in the sprayer has not frozen (especially in the pump, flowmeter or control valves);
- Calibrate the sprayer (and console) correctly for each application;
- Clean all filters and nozzles;
- Test the pump with clean water. To start the pump, engage the PTO at the lowest revs possible and then gradually increase revs until the pump reaches its operating speed. **Do not exceed 540 RPM;**
- Check nozzle patterns for irregularities. If there are irregularities, clean the nozzles and replace. If the problem persists they could be worn so remove and replace;
- Check all hoses and fittings for leaks or damage;
- Check tractor oil, water and fuel;
- Make sure the sprayer is securely hitched (ie PTO shaft is properly fitted and safety chain attached);
- If towing on a public road, make sure driver and sprayer comply with all relevant regulations;
- Make sure the towing vehicle has sufficient capacity to tow the sprayer. **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, again it is the operator's responsibility to know the tare weight and the gross weight of the sprayer at all times;
- Always ensure that the boom is securely supported when travelling and that the tail/indicator lights on the sprayer are connected via the 7-pin trailer plug (if fitted on sprayer) **and the safety chain attached;**
- Make sure there is a sufficient quantity of clean water in the fresh water tank in case of a chemical accident;
- Arrange communication with someone who can come to your aid if need be.

SPRAYER OPERATION

- **Before spraying any product, read and heed the instructions on the chemical label, and be sure that the instructions are fully understood. If confusion still arises, contact your local chemical supplier or chemical company;**

- For optimal sprayer set-up, the operator needs to be aware of the correct nozzle, the correct speed at which to travel and the appropriate rate per hectare to apply the product. For this information, refer to the chemical label, the supplier of the product and the Teejet spray catalogue.

- Select the correct sized nozzle for the operation. Refer to the Spraying Systems (Teejet) catalogue.

- Do not fill sprayer in such a manner that it may be possible for water in the tank (may be contaminated with chemical) to enter the water supply;

- **Always read and heed to the label on the chemical container prior to using any product.** The chemical label will outline the safety instructions, mixing requirements and the chemical compatibility;

- The mixing requirements include the minimum amount of water to add, prior to inducting any chemical.

- Begin adding fresh water to the spray tank;

- Start the pump by engaging the PTO at the lowest revs possible and gradually increase revs until the pump reaches its operating speed (operate pump between 400-540 RPM). **Do not exceed 540 RPM**;

- Once reaching the minimum mixing requirement, begin adding the chemical;

- Allow pump to agitate the tank mixture while filling;

- Continue filling the fresh water until reaching the required amount. Never leave spray mixture in the tank for extended periods (ie. overnight).

- Check to ensure the supermix (venturi) agitator is working properly (should be flow in the agitation line and circulation in the tank);

- Keep chemicals agitated until spraying;

- Unfold the boom according to the relevant boom instructions in this manual (Note: the Delta boom must be raised clear of rests when unfolding or serious boom damage may result);

- Recognise any obstructions or irregular surface features in the intended pathway which may affect the boom operation;

- Do not drive sprayer too close to any obstruction (ie fence, tree);

- Do not carry any persons or chemical containers on the sprayer whilst it is moving;

- Correctly use the appropriate control system to apply the required application rate;

- Frequently check nozzle spray pattern whilst spraying;

- When spraying is to be halted for short periods of time, keep the sprayer pump running to provide sufficient chemical agitation.

- Frequently check pump for any changes to oil colour;

- If there are any alterations, especially with pump performance, **STOP IMMEDIATELY.**

END OF SPRAYING DAY TASKS

- When finished spraying for the day, flush the sprayer pump and lines with fresh water, with the boom in the spraying position, as explained under "FLUSHING PUMP SYSTEM FROM THE FLUSH TANK";

- Fold the boom into the transport position (Note: do not travel with the Delta boom in folded position until boom is lowered onto rests);

- Inspect sprayer for damage or wear if it is to be towed on a public road;

- Always ensure that the boom is securely supported when towing, the tail lights on the sprayer are connected via the 7-pin trailer plug (if fitted on sprayer), the safety chain is securely attached and the appropriate vehicle hazard safety precautions are attached (eg oversize sign, flashing light etc.);

- Empty the spray tank by disposing of any residual spray in the appropriate manner. When the tank has been emptied, shut off the pump drive by either disengaging the PTO, or closing the hydraulic supply;

- To clean and decontaminate the sprayer, **read and heed the chemical label on sprayer cleanup.** If the instructions on the label are unclear, consult the chemical manufacturer or supplier;

- Clean all filters at the end of every tank load;

- Clean all nozzles regularly;

- If the sprayer is left attached to the towing vehicle when parking sprayer, make sure the vehicle park brake is applied, the engine turned off and both the vehicle and sprayer is parked on level, firm ground;

- If the sprayer is to be disconnected from the towing vehicle, it has to be securely parked. To suitably park the sprayer:

  a) Park the sprayer on firm, level ground;
  b) **Ensure all spray tanks are empty;**
  c) Place obstructions to both the front and rear of the sprayer wheels (wheel blocks) to prevent the wheels from moving;
  d) Use the sprayer jack to support the front of the sprayer (ie use jack to raise sprayer off the vehicle hitch and remove the hitch pin);
  e) Disconnect all lines between the sprayer and the tractor (ie hydraulic lines, foam marker lines, etc.);
  f) Remove the PTO shaft from both the sprayer and the tractor.

- 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 flowmeter with a material bag and empty pump and flowmeter of all water (run the pump dry for 15-20 seconds). Make sure any ice has thawed before using sprayer;

END OF SEASON TASKS

- 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 SPRAYING DAY TASKS".

- With the sprayer attached to the tow 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.

- To suitably park the sprayer when disconnecting the towing vehicle:

  1) Park the sprayer on firm, level ground;
  2) **Ensure all spray tanks are empty;**
  3) Place obstructions to both the front and rear of the sprayer wheels (wheel blocks) to prevent the wheels from moving;
  4) Use the sprayer jack to support the front of the sprayer (ie use jack to raise sprayer off the vehicle hitch and remove the hitch pin);
  5) Disconnect all lines between the sprayer and the tractor (ie hydraulic lines, foam marker lines, etc.);

- Remove the PTO shaft from both the sprayer and the tractor.

- Remove console from tractor if it is not to be used for a prolonged period.

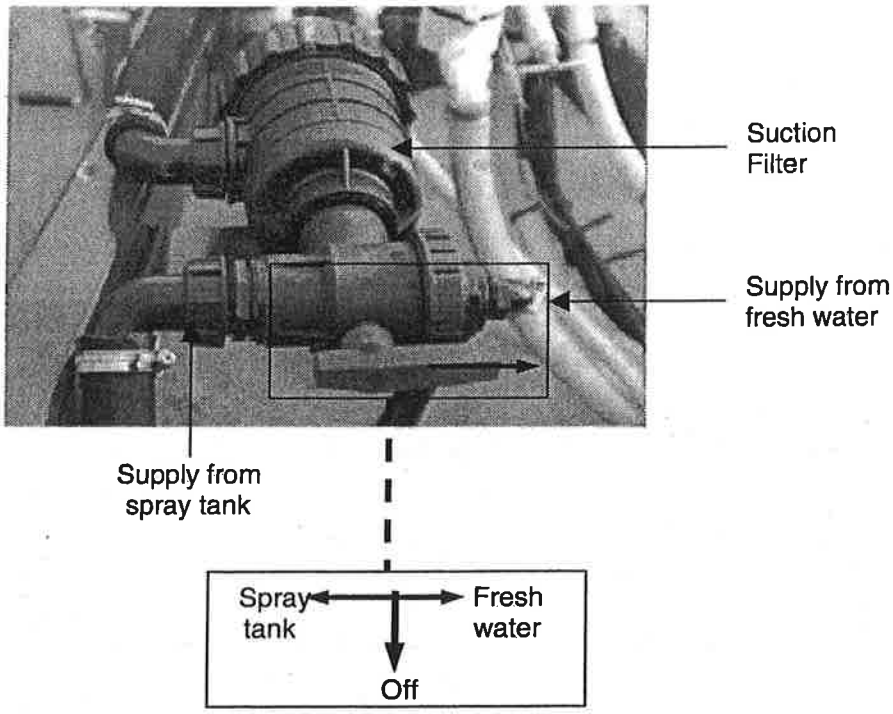
- Periodically check the sprayer to ensure frosts and/or vermin are not damaging the machine, and the tyres are remaining inflated.

FLUSHING PUMP SYSTEM FROM THE FLUSH TANK

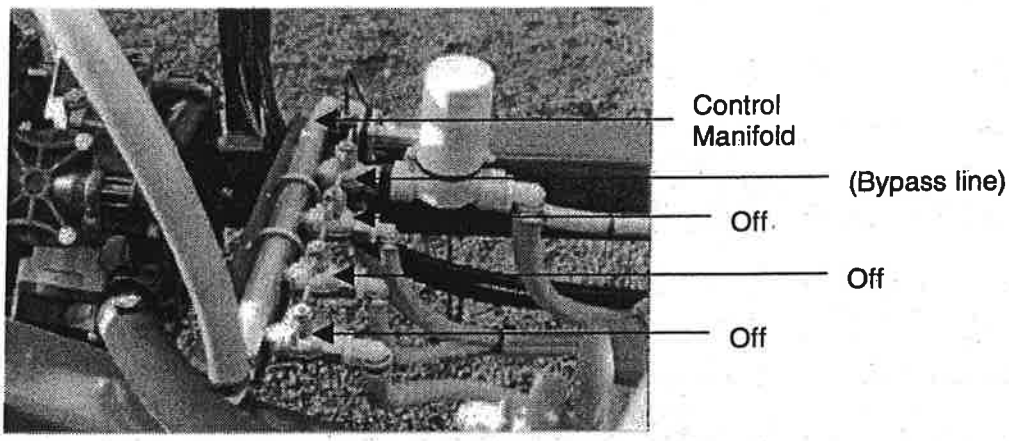
The pumping system must be flushed with fresh water at the end of every day of spraying. Chemical should never be left in the sprayer or pumping system for a prolonged period of time (ie overnight). The pump can be flushed whilst there is chemical in the main tank, but an amount of fresh water will bypass back to the tank when flushing.

The recommended procedure to flush the pumping system is:

1) Turn the red handle on the three-way ball valve on the suction filter, so that it points towards the hose coming from the fresh water tank;



2) Turn all the ball valves on the control manifold off; except for the bypass line (electric pressure regulator line).



3) Ensure the boom is unfolded, in the spraying position;

4) Open the boom sections (ie boom solenoids);

5) **Run the pump at low speed (idle);**

6) Flush a small amount of fresh water through the bypass line, then close the bypass line ball valve.

7) Flush out the nozzles.

PUMP

The pump is critical to the sprayers performance. Its correct operation and maintenance is essential to ensure optimal sprayer performance.

When the pump is operating, the oil should be visible in the bowl.

NEVER OVERFILL PUMP WITH OIL AS DAMAGE TO SEALS AND OIL BOWL MAY RESULT

The pump will perform optimally operating between 400 and 540 R.P.M.. At lower revs excessive pulsation will occur, while pump and diaphragm damage can result at higher revs.

DO NOT OPERATE PUMP ABOVE 540 R.P.M.

Whilst the pump is running, frequently check the oil level and colour. A change in either colour or level indicates probable damage to diaphragm or valves. **STOP THE PUMP IMMEDIATELY.**

Inspect all hoses to make sure they are the correct size, fitted securely and that there is no throttling or leaking.

Prevent starting the pump under pressure.

Make sure that the pump PTO shaft is always protected with its cover to prevent access.

Make sure the strainer in the suction filter is clean and correctly installed.

Regularly lubricate the PTO shaft according to recommendations (see "PTO SHAFT") to prevent the shaft from binding.

Always flush pump with clean water at the end of each spraying day. Prolonged chemical contact can severely damage seals and diaphragms.

Regularly check the pump mounting bolts.

Change the pump oil after the first 50 hours of operation and then after every 300 - 350 hours. Be careful to use the correct oil (use SAE 30W40 motor oil) and do not overfill. Rotate pump manually (by hand) to remove air locks when filling with oil.

Do not leave water in pump if sprayer is to be left in a cold environment. The water may freeze and cause damage to pump if pumping is attempted while water is frozen. Empty pump of all water (run the pump dry for 15-20 seconds) and cover pump (ie with bag) to ensure this situation does not arise. If this has not been done, and there is a possibility there may be frozen water in the pump and/or in the lines, wait until any ice has completely thawed before using pump. **Need to be able to turn pump over by hand before starting pump.**

ALWAYS WEAR PROTECTIVE CLOTHING RECOMMENDED ON THE CHEMICAL LABEL PRODUCT

FLUSH PUMP WITH CLEAN WATER BEFORE DISMANTLING

REMOVE AIR FROM AIR DAMPER CHAMBER BEFORE REMOVING AIR DAMPER CHAMBER COVER

PUMP DIAPHRAGMS

The pump diaphragms are a wearing component to be replaced at some stage. Life expectancy depends upon its operation and maintenance and its suitability for the task.

The main causes of premature diaphragm failure are:

- Blocked or incorrectly fitted suction filter restricting flow to the pump;
- Incorrect air damper chamber pressure;
- Running pump at speeds greater than 540 RPM;
- Exceeding the pressure limit of the pump;
- Failure to wash chemicals from pump after use;
- Incompatibility of the diaphragm material and the chemicals used;
- Insufficient lubrication of PTO shaft or binding of PTO shaft which can cause a side thrust to the internal components of the pump and overheat the pump and diaphragms.

A change of oil colour indicates a pump problem. The oil should be regularly monitored when spraying so that any problem is detected as soon as possible. If the oil goes milky in colour, it is likely the diaphragm has been damaged and the spray mixture has come into contact with the oil. If the oil colour goes black (or dark grey), it is likely the pump has overheated, possibly due to the PTO shaft binding through insufficient lubrication.

Pump diaphragms should be replaced prior to diaphragm failure. For large operations, where the sprayer is used extensively, the pump should be reconditioned once a season, including replacement diaphragms, seals and valve springs.

It is wise to keep a spare pump repair kit (including diaphragms, seals, valve 'o' rings and springs) on hand in case of a breakdown.

To replace a side diaphragm:

- Flush pump with clean water to remove chemical residue, then flush with appropriate decontaminating agent (refer to chemical label for decontamination instructions);
- Run pump dry for 15-20 seconds to remove water;
- Remove all air from air damper chamber by pushing in air valve;
- Remove pump from sprayer;
- Remove pump manifolds and pump heads;
- Drain oil from pump

NOTE: Carefully note the position and orientation of all heads, manifolds and valves when disassembling pump. Failure to reassemble correctly will result in severe pump damage.

- Remove diaphragms;
- Remove cylinder sleeves;
- Flush inside of pump with diesel;
- Visually inspect inner workings of pump;
- Reassemble with new diaphragms (must be correct diaphragms) once satisfied with condition of pump;
- Refill with oil. Rotate pump manually (by hand) to remove air locks. Do not overfill.

AIR DAMPER CHAMBER

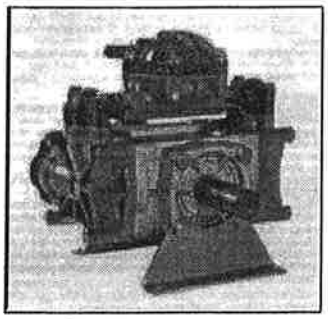
REMOVE AIR FROM AIR DAMPER CHAMBER BEFORE REMOVING AIR DAMPER CHAMBER COVER

It is essential to maintain the correct air pressure in the air damper chamber. If the pressure in the damper chamber is too great or too small there will be excessive pulsation. The correct pressure setting for the air damper chamber should be marginally less than the pump delivery pressure. To find the optimum pressure setting, **with the pump not running**, fill the chamber to about 100 psi (690 kPa). Then operate the pump at the desired speed and pressure and release pressure from the damper chamber until the pump is running relatively smoothly (ie minimum pulsation). Due to the size of the chamber, small releases of air will result in large pressure drops. Release the pressure in very small quantities and never use a hand pump or pressure gauge as these release a significant amount of pressure when disconnecting.

To approximately determine the pressure in the damper chamber, again run the pump at the desired speed and then vary the delivery pressure, via the control valve (pressure regulating valve), until the pump is running with minimum pulsation.

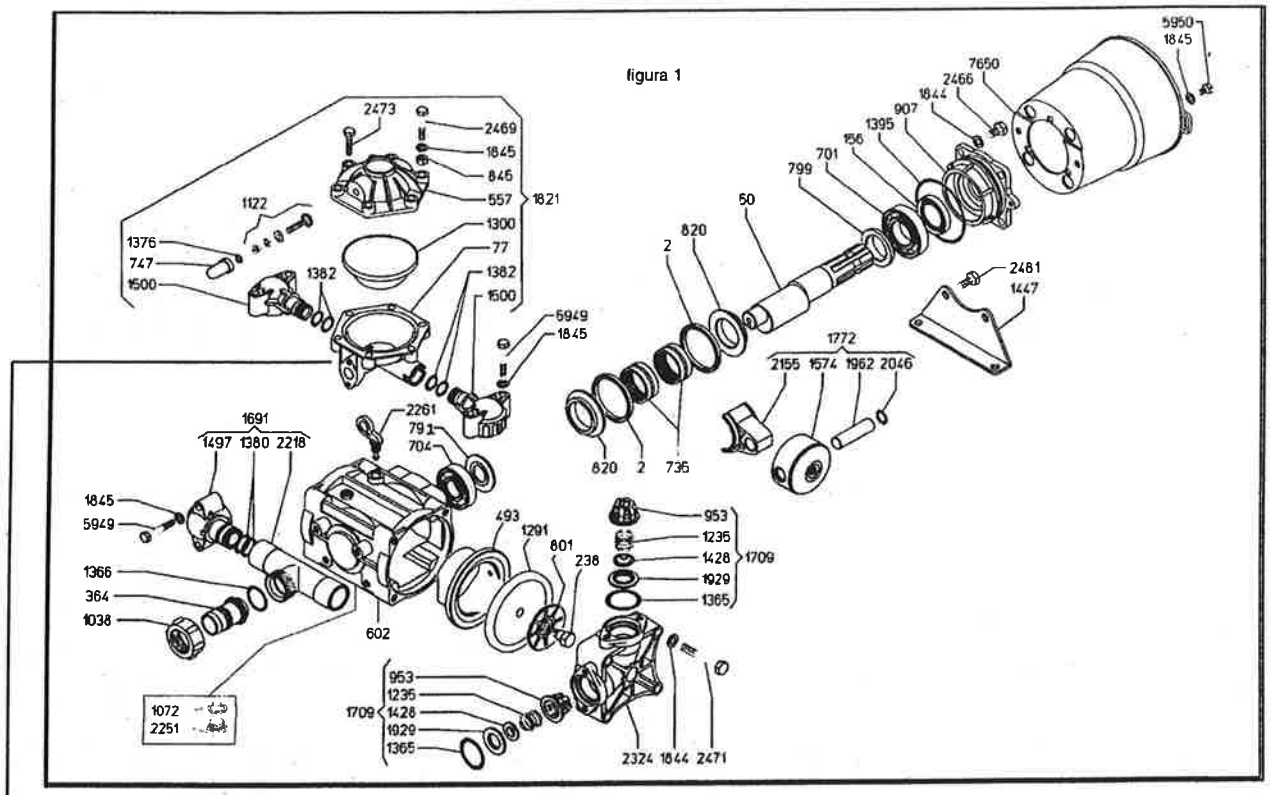
The RO70 pump pulsates the most as it has the longest stroke and only two pistons.

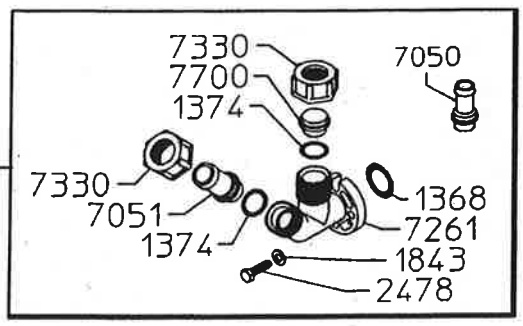
UDOR RO 70 DIAPHRAGM PUMP

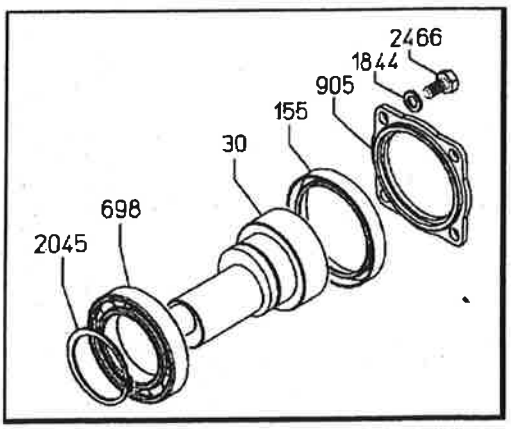


Maximum pump capacity: 78 l/min
Maximum pump speed: 540 RPM
Maximum pressure capacity: 20 bar (284 PSI)
Maximum power requirement: 3.4 KW (4.6 HP)
Oil Type: Motor Oil SAE 30W40
Oil Capacity: 0.60 kg

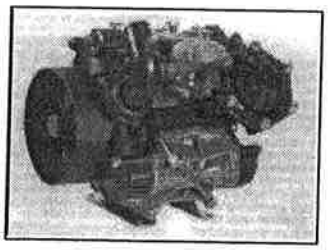
figura 1



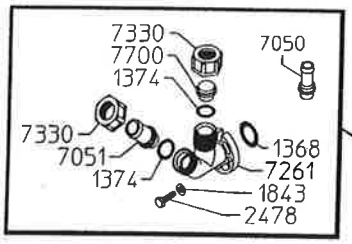


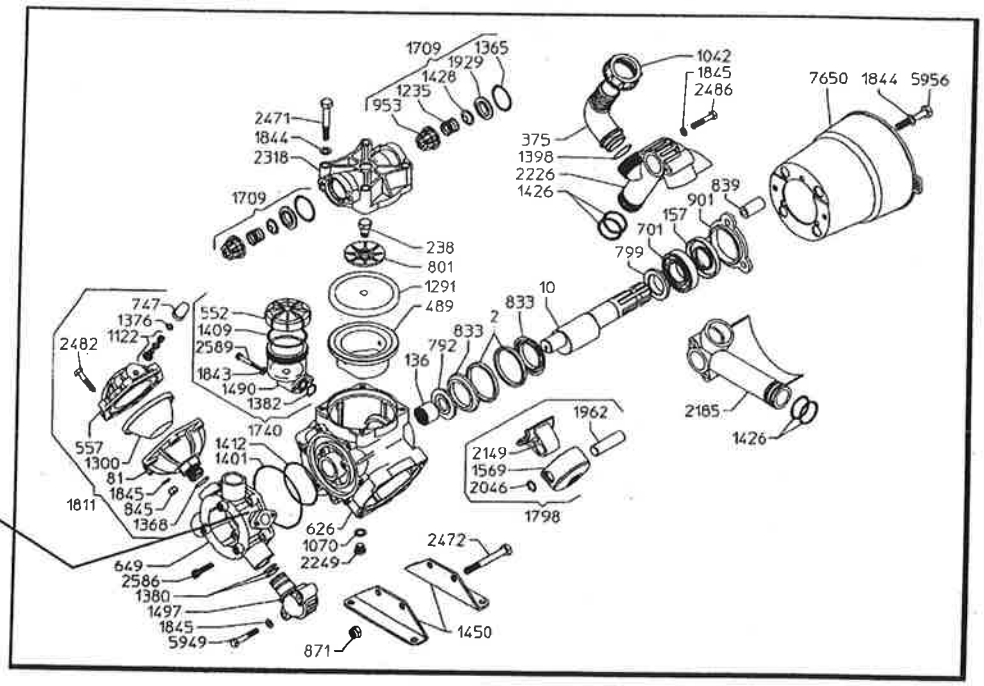


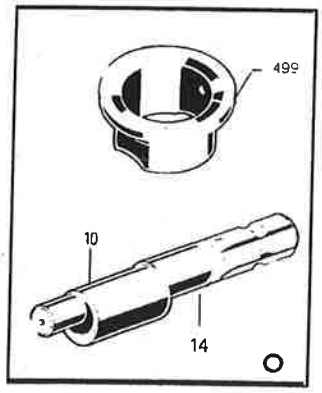
UDOR RO 106 & 121 DIAPHRAGM PUMPS

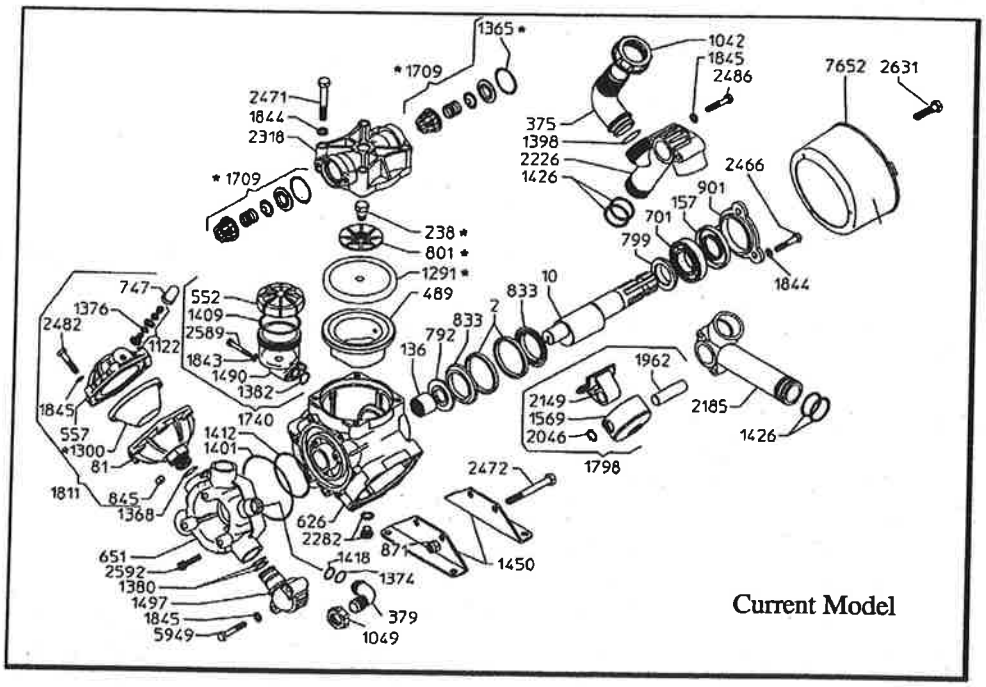


	RO106	RO121
Maximum pump capacity:	105 l/min	120 l/min
Maximum pump speed:	540 RPM	540 RPM
Maximum pressure capacity:	20 bar (284 PSI)	20 bar (284 l)
Maximum power requirement:	5.36 KW (7.3HP)	6.24 KW (8.5HP)
Oil Type:	Motor Oil SAE 30W40	
Oil Capacity:	1.0 kg	1.0 kg

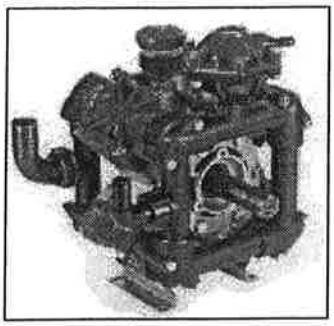




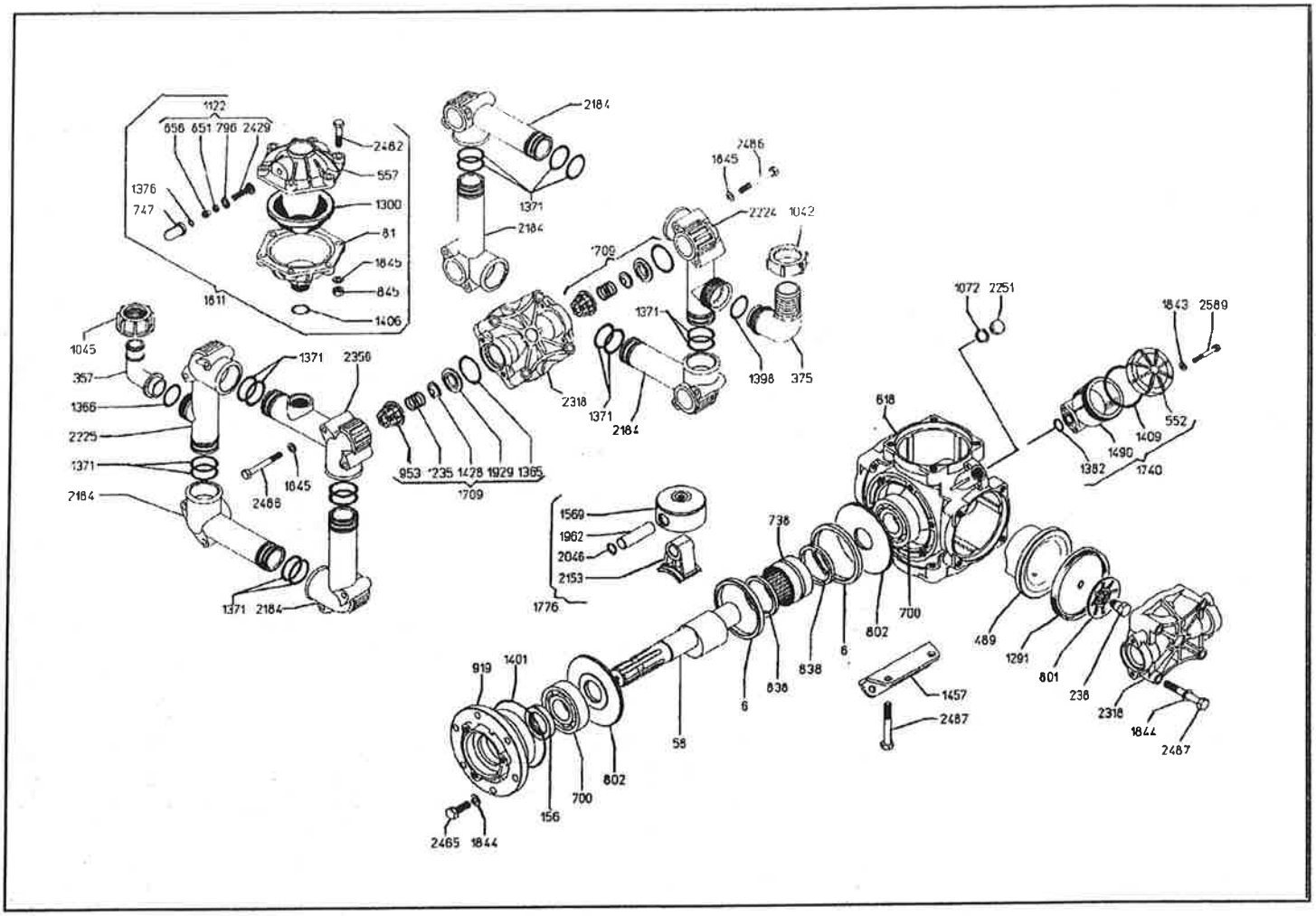




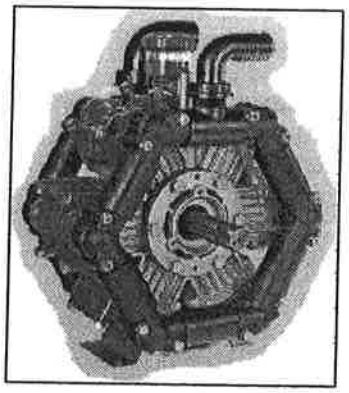
UDOR RO 160 DIAPHRAGM PUMP



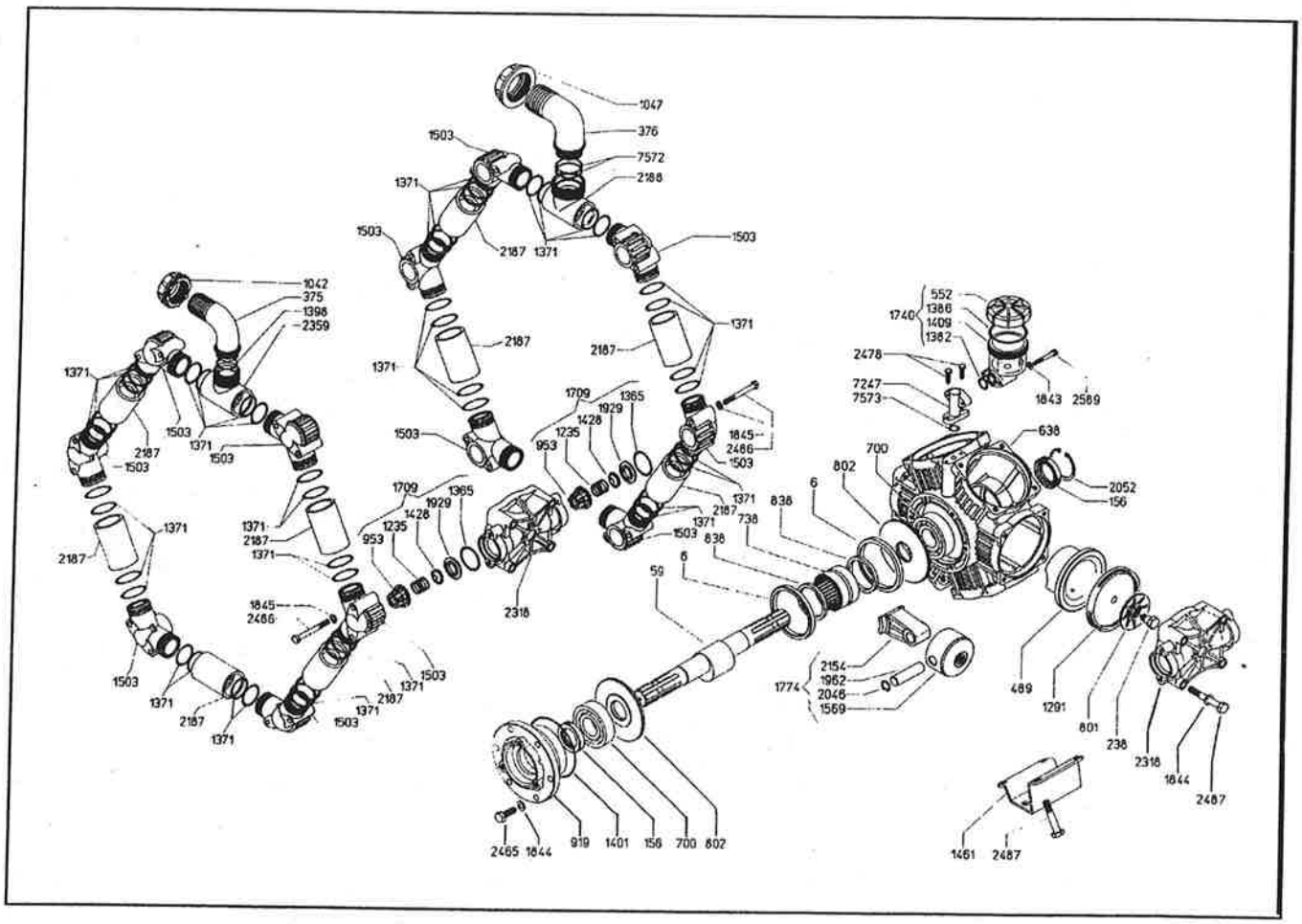
Maximum pump capacity: 158 l/min
Maximum pump speed: 540 RPM
Maximum pressure capacity: 20 bar (284 PSI)
Maximum power requirement: 7.05 KW (9.6HP)
Oil Type: Motor Oil SAE 30W40
Oil Capacity: 1.3 kg



UDOR RO 250 DIAPHRAGM PUMP



Maximum pump capacity: 284 l/min
Maximum pump speed: 540 RPM
Maximum pressure capacity: 20 bar (284 PSI)
Maximum power requirement: 10.58 KW (14.4HP)
Oil Type: Motor Oil SAE 30W40
Oil Capacity: 1.95 kg



PUMP PARTS TABLE

NOTE: The product code incorporates both the position number and the part number; For example, for a product code of **0002-7003000102** the position number is **0002** (the number referred to on the pump drawing) and the part number is **7003000102**

PRODUCT CODE	DESCRIPTION	PRODUCT CODE	DESCRIPTION
0002-7003000102	CON ROD RETAINING RING	0919-7042050167	BEARING SUPPORT FLANGE
0006-7036000108	CON ROD RETAINING RING	0927-7023050179	BEARING SUPPORT FLANGE
0010-7023000259	ECCENTRIC SHAFT	0953-7004060110	VALVE CAGE
0011-7023000260	ECCENTRIC SHAFT	1038-7003060418	SUCTION NUT M42x2
0014-7050000263	ECCENTRIC SHAFT	1042-7600060425	SUCTION NUT 1 1/2"
0050-7027000214	ECCENTRIC SHAFT	1045-7600060432	DELIVERY NUT 1 1/4"
0058-7036000246	ECCENTRIC SHAFT	1072-7004060509	FLAT ALUMINIUM WASHER 17x22x2
0077-7015000309	LOWER AIR CHAMBER	1122-5003060815	AIR VALVE ASSY
0081-7014000315	LOWER AIR CHAMBER	1199-7022080111	KEYSHAFT 10x8x40
0136-7014000607	BEARING HK25-26	1235-7004090135	VALVE SPRING
0156-7004000702	SEAL 35x55x10	1291-7003090302	SIDE DIAPHRAGM
0157-7451000705	SEAL 35x72x10	1300-7015090314	AIR DIAPHRAGM
0238-7003010203	DIAPHRAGM BOLT	1365-7002110101	VALVE O-RING
0357-7003020218	DELIVERY HOSE BARB ELBOW 19	1366-7002110102	O-RING 29.75x3.53
0365-7008020252	HOSE BARB ELBOW 11/4"	1368-7002110104	O-RING 20.63x2.62
0375-7202020278	HOSE BARB ELBOW 38	1371-7004110107	O-RING 34.52x3.53
0489-7014020614	CYLINDER LINER	1374-7011110112	DELIVERY O-RING 17.13x2.62
0493-7012020619	CYLINDER LINER	1376-7010110116	O-RING 6x3
0499-7202020626	CYLINDER LINER	1380-7003110125	O-RING 20.22x3.53
0552-7014020807	OIL BOWL CAP	1382-7015110129	O-RING 16x3
0557-7016020820	AIR CHAMBER COVER	1389-7014110141	SUCTION O-RING 28x3
0602-7003020909	PUMP HOUSING	1391-7021110143	O-RING 71.12x2.62
0618-7036020925	PUMP HOUSING	1395-7040110148	O-RING 88.5x3.53
0626-7023020934	PUMP HOUSING	1398-7014110142	SUCTION O-RING 32x3
0649-7023025702	DELIVERY MANIFOLD	1401-7036110158	O-RING 110x2.5
0700-7004021404	BEARING 6307	1406-7028110117	O-RING 60.33x3.53
0701-7004021405	THRUST BEARING 6207	1409-7046110168	OIL BOWL CAP O-RING 60.33x3.53
0704-7012021409	BEARING 6305	1412-7023110179	O-RING 74.8x2.6
0735-7001021601	CON ROD BEARING NK4220	1426-7021110189	O-RING 36.1x3.53
0738-7036021607	CON ROD BEARING NK55/35	1428-7004120103	VALVE PLATE
0747-7001021801	AIR VALVE COVER	1447-7201120202	MOUNTING BRACKET
0791-7011030110	THRUST WASHER	1450-7014120211	MOUNTING BRACKET
0792-7014030114	THRUST WASHER	1457-7036120229	MOUNTING BRACKET
0799-7014030124	THRUST WASHER	1490-7014120327	OIL BOWL
0801-7003030107	DIAPHRAGM WASHER	1497-7021120336	MANIFOLD END
0802-7036030128	THRUST WASHER	1500-7027120338	MANIFOLD END
0820-7003030201	SPACER RING	1569-7003120506	PISTON
0833-7023030252	SPACER RING	1574-7012120512	PISTON
0838-7036030259	SPACER RING	1607-7021120622	STUD M10x50
0845-7001030301	AIR CHAMBER NUT M8	1709-4004600608	VALVE ASSY
0871-7801030404	NUT M10	1740-4021603301	OIL BOWL ASSY
0901-7014050145	BEARING SUPPORT FLANGE	1772-4012601534	PISTON ASSY
0905-7201050102	BEARING SUPPORT FLANGE	1776-4036601530	PISTON ASSY
0907-7027050118	BEARING SUPPORT FLANGE	1798-4023601524	PISTON ASSY
0916-7021050162	SHAFT ADAPTER	1843-7003140307	WASHER 6.5x13x1.2

PRODUCT CODE	DESCRIPTION
1844-7015140309	FLAT WASHER 10.5x18x2
1845-7002140310	FLAT WASHER 8.5x15x1.5
1929-7003150117	VALVE SPACER
1962-7005150201	GUDGEON PIN 18x64
2046-7001150602	GUDGEON PIN CIRCLIP 18
2149-7023151916	CONNECTING ROD
2153-7036151920	CONNECTING ROD
2155-7003151922	CONNECTING ROD
2184-7036160112	MANIFOLD WITH END
2185-7021160113	SUCTION MANIFOLD
2186-7021160114	SUCTION MANIFOLD WITH END
2218-7003160214	SUCTION MANIFOLD
2224-7036160220	SUCTION MANIFOLD WITH PORT
2225-7036160221	DELIVERY MANIFOLD WITH PORT
2226-7021160222	SUCTION MANIFOLD
2227-7021160223	SUCTION MANIFOLD WITH PORT
2251-7004160302	PLUG 3/8"
2261-7003160323	OIL DIPSTICK
2318-7036160436	CYLINDER HEAD
2324-7027160450	CYLINDER HEAD
2356-7036160515	DELIVERY MANIFOLD WITH PORT
2465-7004180403	BOLT M10x30
2466-7201180406	BOLT M10x20
2469-7605180418	BOLT M8x45
2471-7001180429	BOLT M10x70
2472-7010180431	BOLT M10x90
2473-7015180454	BOLT M8x35
2478-7011180468	BOLT M6x22
2481-7201180407	MOUNTING BRACKET BOLT
2482-7207180409	AIR CHAMBER BOLT M8x40
2486-7112180479	BOLT M8x70
2487-7605180425	BOLT M10x75
2584-7004180506	BOLT M8x20
2586-7207180513	BOLT M8x35
2589-7004180526	BOLT M6x45
5949-7209180472	BOLT M8x50
7051-7201020269	DELIVERY HOSE BARB 19
7261-7201050806	FLANGED DELIVERY OUTLETS
7330-7201060429	DELIVERY NUT 3/4" (RED)
7700-7201160322	DELIVERY OUTLET PLUG
8113-7003090334	SIDE DIAPHRAGM DESMOPAN

PUMP HYDRAULIC DRIVE

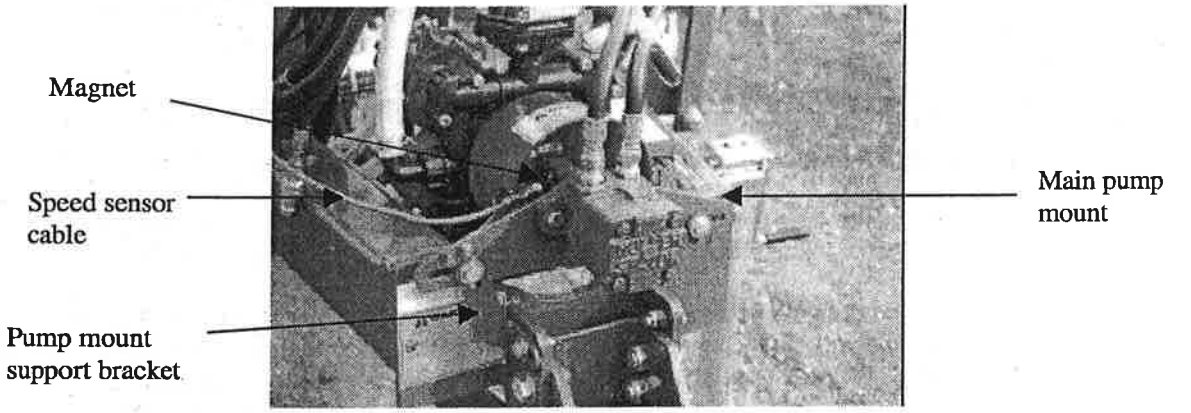
A Hydraulic Pump Drive Kit can be fitted to the diaphragm pump so that the pump is driven via the tractor hydraulic system rather than the tractor PTO.

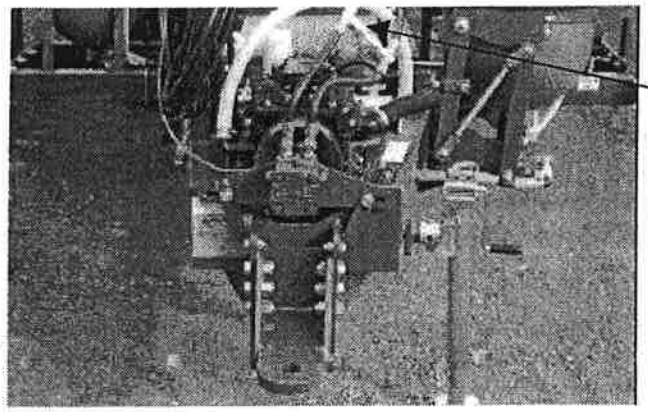
The hydraulic motor is connected to the pump shaft via a 6-spline adaptor.

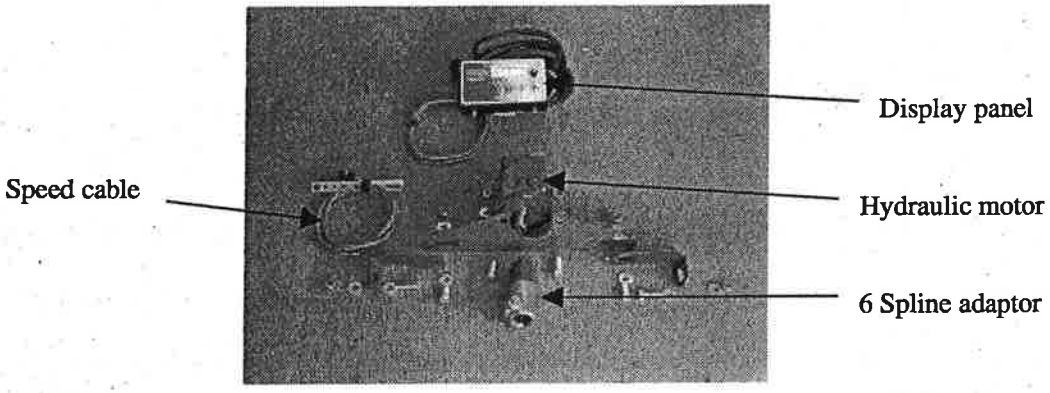
The hydraulic motor is attached to the sprayer frame by means of the pump mounting brackets.

The pump speed is shown on the display panel.

A Bypass Needle Valve is used to regulate the hydraulic flow to the hydraulic motor. This provides the means to regulate the pump speed (along with tractor engine speed and the "Rabbit-Turtle" lever).







PROCEDURE TO INSTALL PUMP HYDRAULIC DRIVE AND SET PUMP SPEED

To set the pump speed when running the pump with the Hydraulic Pump Drive:

1) Make sure the two grub screws used to fasten the 6-spline adaptor to the hydraulic motor are tight;

2) Remove the adaptor bolt and spring washer;

3) Fit the 6-spline adaptor onto the pump 6-spline shaft. Slide the adaptor on so that it goes past the groove in the pump shaft (the pump PTO cover may need to be modified so that the adaptor can slip right up to the front of the pump);

4) Replace the adaptor bolt and spring washer in the adaptor and screw in so that they are tight (need to position the adaptor bolt and washer so that they line up with the groove in the pump shaft). Pull the adaptor back on the pump shaft to make sure it cannot come off the pump;

5) Connect the hydraulic hoses of the hydraulic pump drive to the tractor hydraulic system;

6) Make sure the mounting brackets are securely attached to the sprayer chassis;

7) If fitted on the tractor, adjust the "Rabbit-Turtle" lever on the tractor to the "Turtle" position. This serves to minimize the amount of oil being pumped in the hydraulic system;

8) If using a photo-tachometer to determine pump speed, stick a small piece of reflective tape to the 6-spline adaptor. If using a shaft-speed sensor, make sure the magnet is securely attached to the 6-spline adaptor and the sensor is in place so that the magnet passes the sensor. Also connect the shaft-speed console to the 12 volt tractor power supply;

9) Adjust the bypass needle valve so that it is fully open;

10) Start the tractor at idle and then increase engine revs until running at the desired revs when spraying;

11) Slowly close the needle valve until the pump RPM speed, as displayed on the console, comes up to the required pump speed (maximum 540 RPM). If the pump speed cannot be raised to the desired speed (ie the needle valve is completely shut), slowly adjust the "Rabbit-Turtle" lever closer to the "Turtle" position until the desired pump speed is achieved.

The aim is to pump the least amount of hydraulic oil out of the tractor needed to obtain the required pump speed. This will minimize the amount of the oil heats up.

BE CAREFUL TO AVOID GETTING CAUGHT IN ANY ROTATING COMPONENTS.

DO NOT OPERATE PUMP ABOVE 540 R.P.M.

DO NOT OPERATE PUMP BELOW 400 R.P.M. WHEN SPRAYING

12) Record the orientation of this needle valve (the needle valve has position markings);

This procedure will have to be performed on every tractor used to operate the Pump Hydraulic Drive because each tractor will have varying flow rates.

PTO SHAFT (DRIVE-SHAFT)

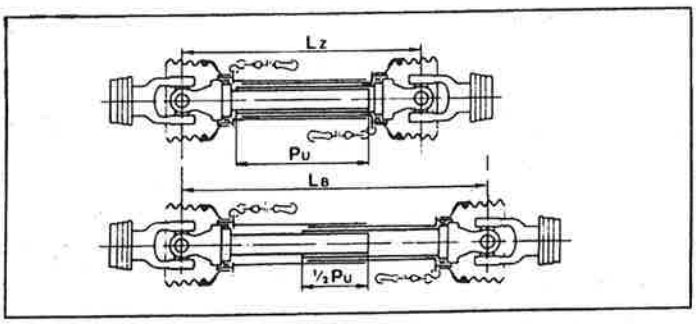
CUT PTO SHAFT TO CORRECT LENGTH TO SUIT TRACTOR BEFORE SPRAYING

ALWAYS KEEP PTO SHAFT SAFETY COVERS IN PLACE

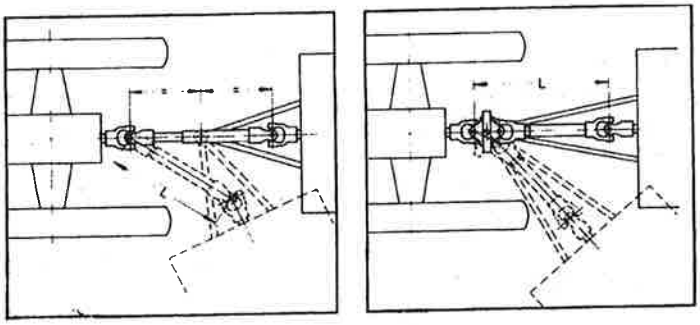
MAKE SURE PTO SHAFT IS LUBRICATED AS PER INSTRUCTIONS AND THAT THE GREASE IN THE SHAFT IS KEPT CLEAN

When hitching a sprayer, especially for the first time, the following critical points concerning the PTO shaft must be considered:

MAXIMUM OPERATING LENGTH L_B
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.

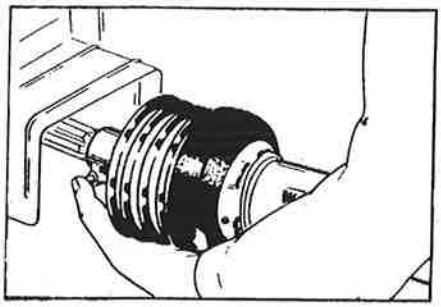


MAXIMUM JOINT OPERATION
Ensure equal joint angles.
Stop operation if joint angle exceeds 25°.



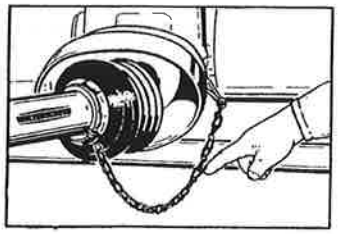
COUPLING THE PTO SHAFT

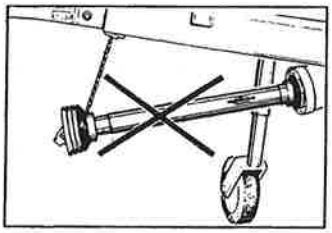
Press in the locking pin and simultaneously push PTO shaft onto pump or tractor PTO shaft until pin engages. Pull PTO shaft back to make sure pin has engaged and the shaft can not come off.



CHAINS

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

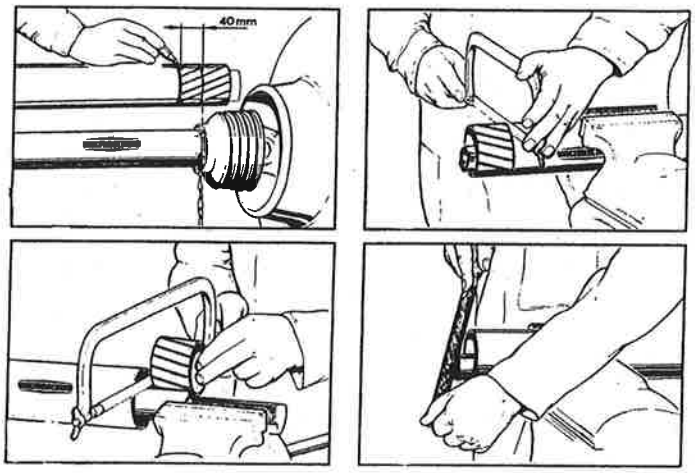




PTO SHAFT LENGTH ADJUSTMENT

To adjust the length:

1) Hold the half-shafts next to each other in the **shortest** working position and mark them;
2) Shorten 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.**



Suitable care must be taken when going through drains, channels, ditches, etc., where extreme angles may be encountered, so that the PTO shaft does not damage the pump or pump mounting.

It is preferable to have the hitching point halfway between the universal joints on the PTO shaft. This will equalize the joint angles when turning.

When attaching shaft to sprayer and tractor, always ensure all guard covers are in place.

Operate the PTO slowly when the PTO shaft is first attached to assess installation.

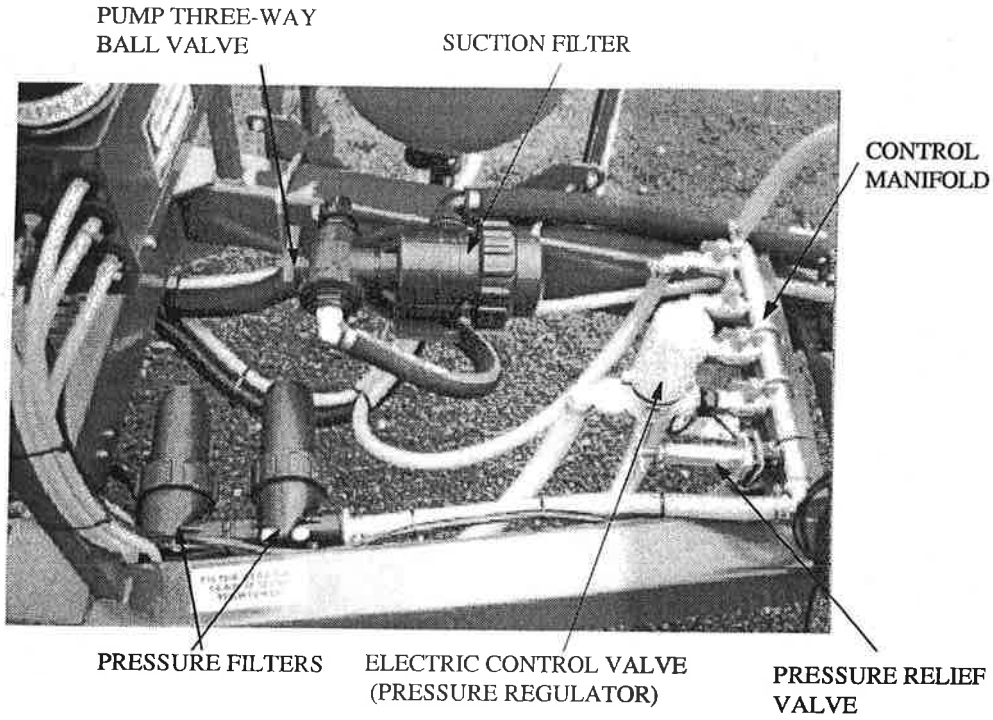
Care should be taken when engaging the clutch so that sudden loading, which can result in pump damage and gear wear, is avoided. Ideally the pump should start from zero pressure.

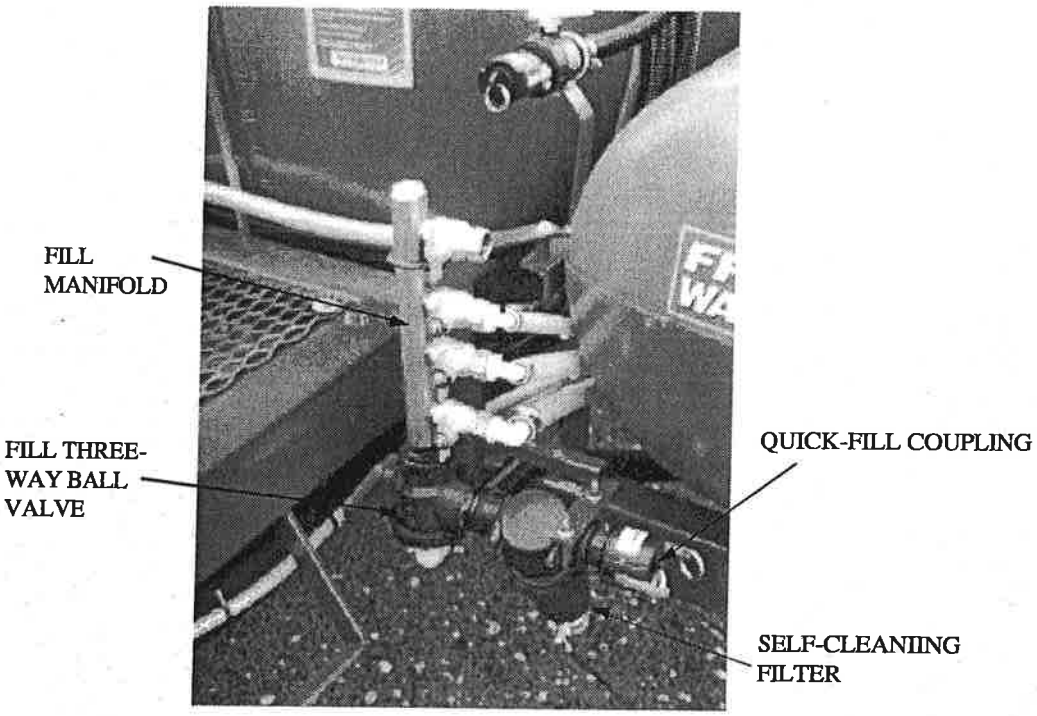
It is essential to maintain lubrication schedule while PTO shaft is in use.

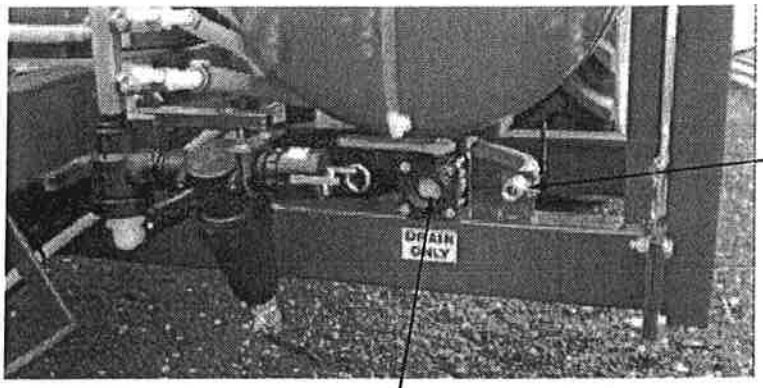
PUMPING SYSTEM

MAXIMUM SYSTEM WORKING PRESSURE – 750 KPA (110 PSI)

MAXIMUM ALLOWABLE SYSTEM PRESSURE BEFORE COMPONENT DAMAGE MAY OCCUR – 1000 KPA (150 PSI)

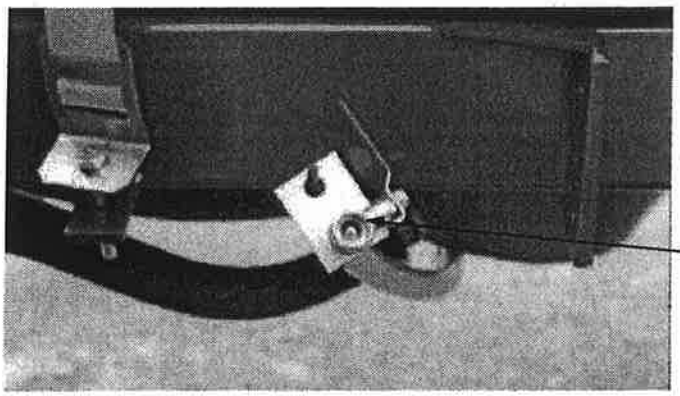






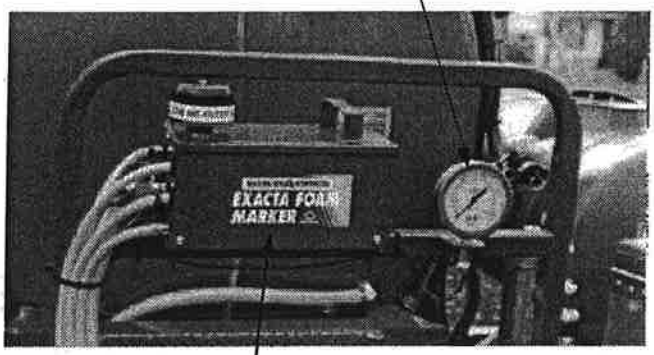
SAFETY FRESH WATER BALL VALVE

QUICK-DRAIN BALL VALVE



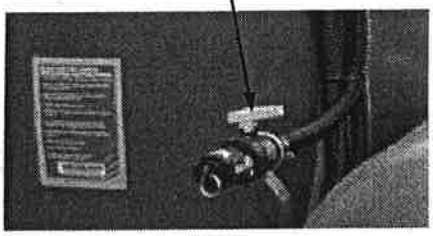
TANK SUMP DRAIN BALL VALVE

PRESSURE GAUGE (PRESSURE MEASURED AT PRESSURE RELIEF VALVE)



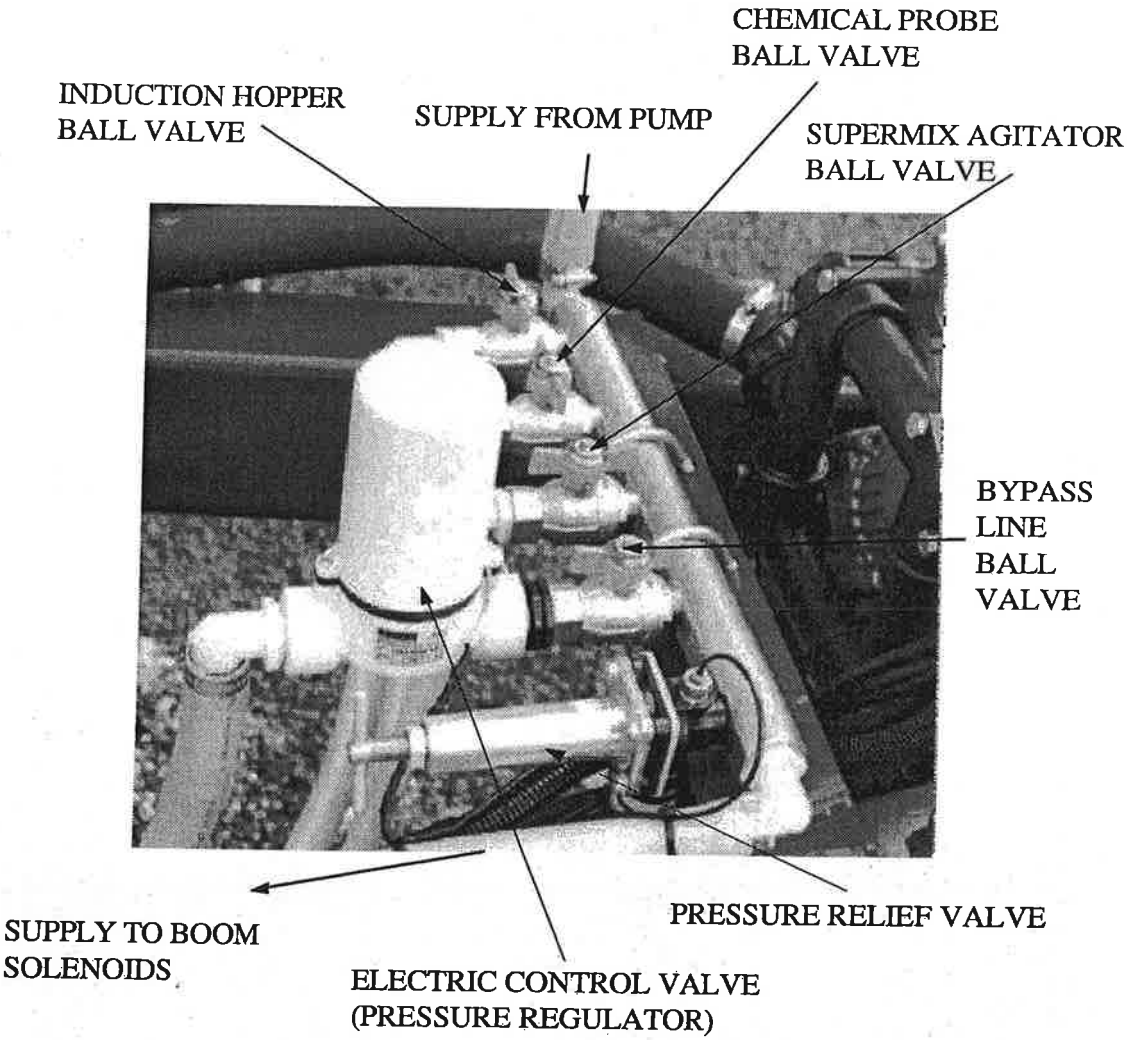
EXACTA FOAM COMPRESSOR/DIVERTER UNIT

CHEMICAL PROBE COUPLING



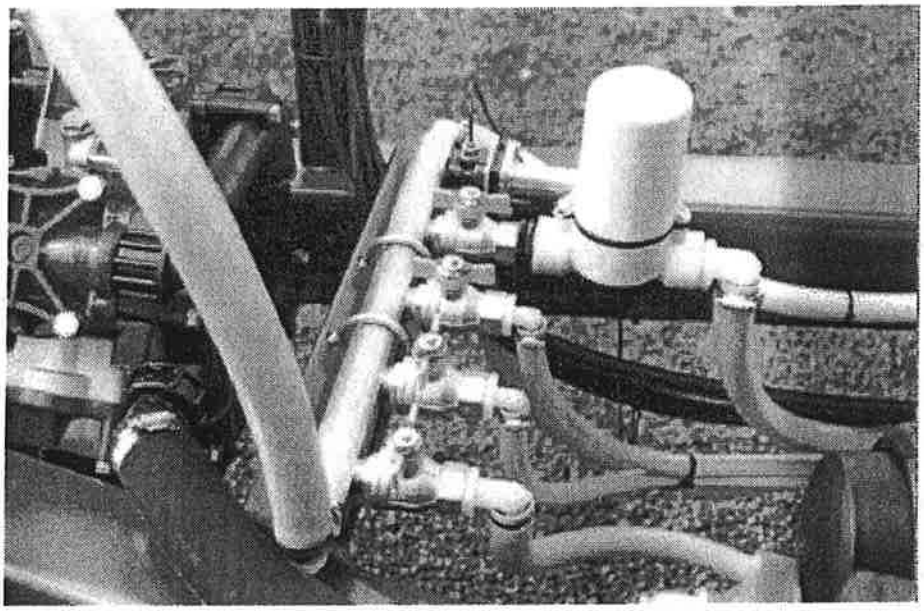
CONTROL MANIFOLD

All the delivery from the pump comes to the control manifold. The distribution of the pump delivery is dependent upon the amount of pump delivery available, the size of the boom and the required application rate.



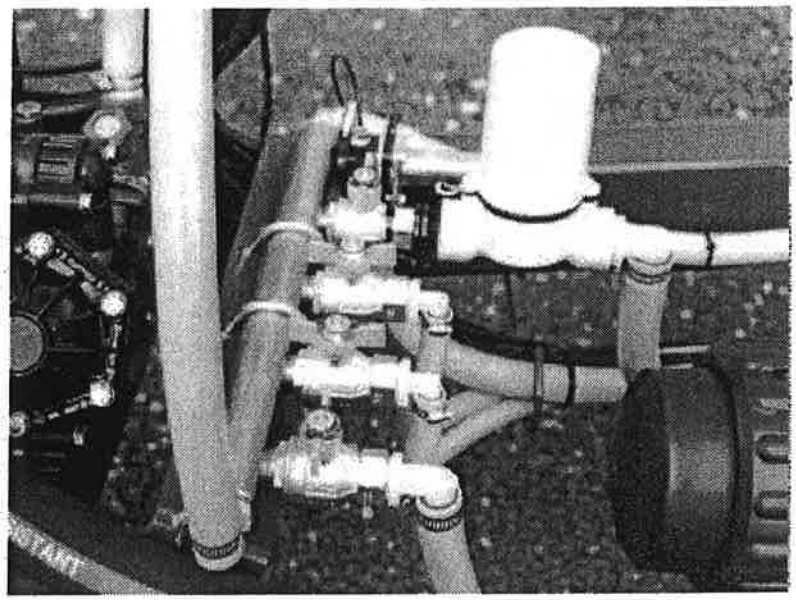
CONTROL MANIFOLD CONFIGURATION WHEN SPRAYING

When spraying, the Bypass Line ball valve and the Supermix Agitator ball valve should be open with both the Chemical Probe ball valve and the Induction Hopper ball valve closed.



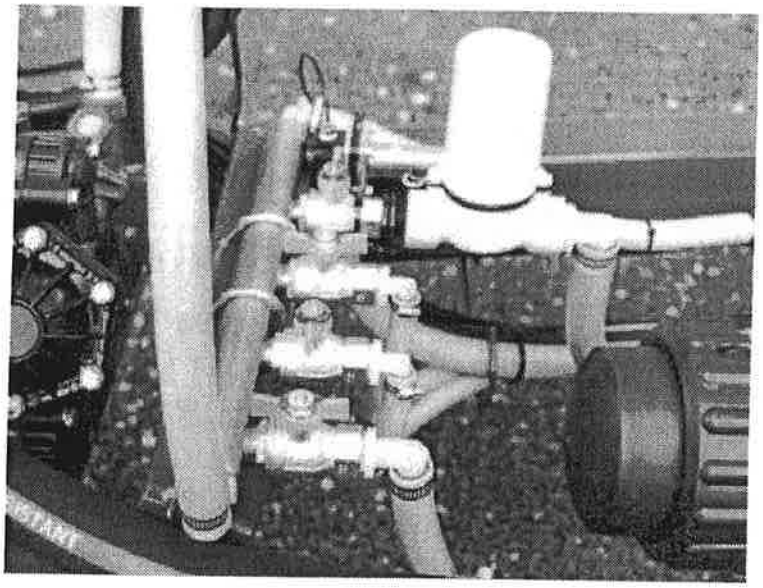
CONTROL MANIFOLD CONFIGURATION WHEN USING THE CHEMICAL PROBE

When using the chemical probe, the Chemical Probe ball valve and the Supermix Agitator ball valve should be open with the Bypass Line ball valve and the Induction Hopper ball valve closed.



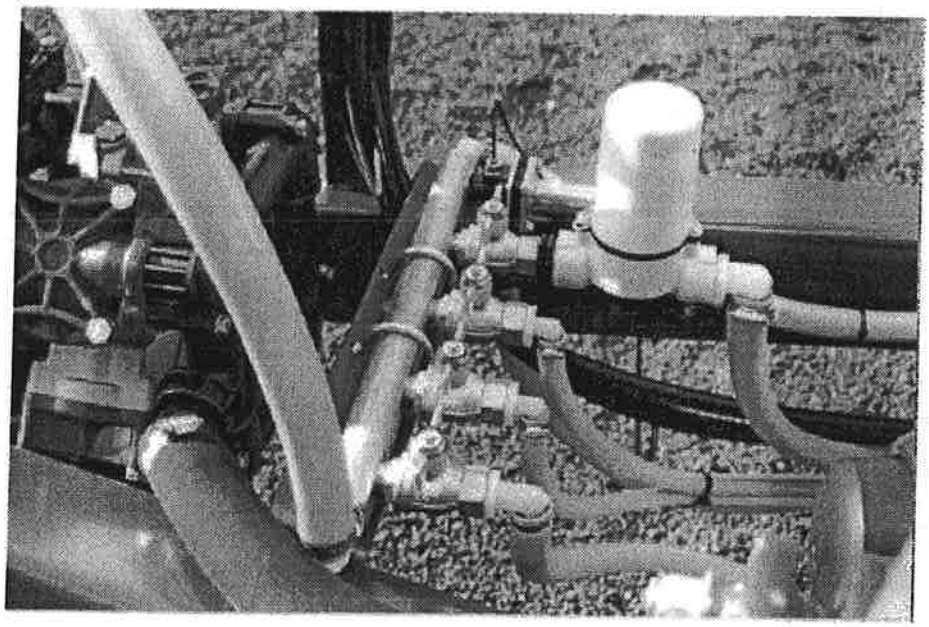
CONTROL MANIFOLD CONFIGURATION WHEN USING THE INDUCTION HOPPER

When using the induction hopper, the Induction Hopper ball valve and the Supermix Agitator ball valve should be open with the Bypass Line ball valve and the Chemical Probe ball valve closed.



CONTROL MANIFOLD CONFIGURATION WHEN SETTING THE RELIEF VALVE OR FLUSHING LINES

When setting the relief valve or flushing the lines with fresh water, all control manifold ball valves need to be closed.

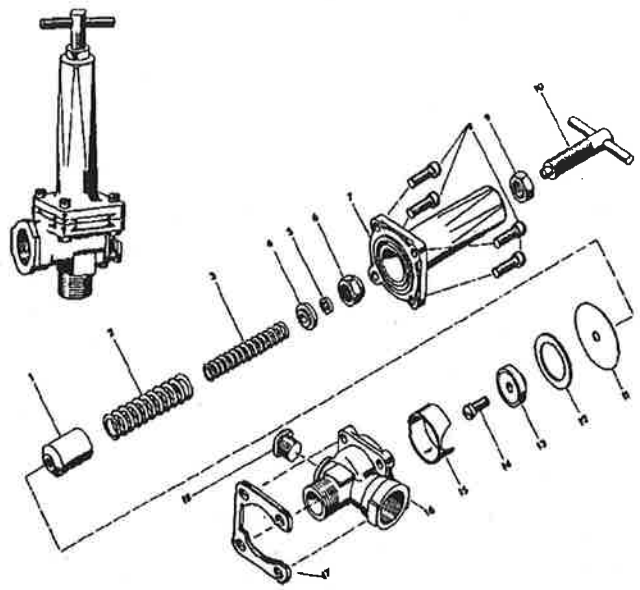


ELECTRIC CONTROL VALVE (PRESSURE REGULATOR)

The Electric Control Valve provides delivery pressure control. Altering the orientation of the butterfly will affect the amount of bypass back to the tank and thus affect the pressure delivered to the boom. Increasing the amount of bypass will decrease the boom delivery pressure and decreasing the amount of bypass will increase the boom delivery pressure.

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 this pressure relief setting. The standard setting for this relief valve is 100 psi (690 kPa) and this is preset by GoldAcres and should not need to be altered. To check or alter this setting, turn the pump off and unscrew the relief valve right out. Have the solenoids off, close all the control manifold ball valves so that all flow passes through the relief valve. Run the pump at maximum operating speed (540 PTO RPM) and slowly screw the relief in until the desired pressure is achieved (100 psi). Tighten the nuts on the adjusting stem so that this setting is maintained. If the relief setting is too low, it causes too much flow to bypass back to the tank and it will limit the maximum obtainable pressure.



ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	CP8367-AL	Aluminium Guide Sleeve	10	CP5896-ALSS	Adjusting Stem
2	CP8373-SS	Stainless Steel Outside Spring	11	CP8366-FA	Fairprene Diaphragm
3	CP8374-SS	Stainless Steel Inside Spring	12	CP8365-304SS	Type 304 Stop Ring SS
4	CP8371-AL	Aluminium Spring Retainer	13	CP8364-NYB	Black Nylon Back Up Seat
5	CP8369-NYB	Black Nylon Washer	14	CP8477-SS	Stainless Steel Screw
6	CP8368-SS	Stainless Steel Adjusting Nut	15	CP8389-304SS	Type 304 Chamber Insert SS
7	CP8362-AL	Aluminium Bonnet	16	CP8361-3/4-NYB	Black Nylon Body
8	CP7688-IZP	Zinc Plated Steel Screws (4)	17	CP9017-IZP	Zinc Plated Steel Clamp
9	CP5898-AL	Aluminium Lock Nut	18	8400-1/4-PPB	1/4" Pipe Plug

FILTERS

It is essential to maintain all filters and filter screens in good condition. Filter screens that are not regularly cleaned can severely impede the flow and thus affect delivery pressure. If the screens are in any way damaged, they can allow foreign material into the pumping system which can result in damage to the pump, solenoids, valves and nozzle tips. Also, if the screens are not properly fitted, they can allow air into the pumping lines which will reduce the performance of the pump.

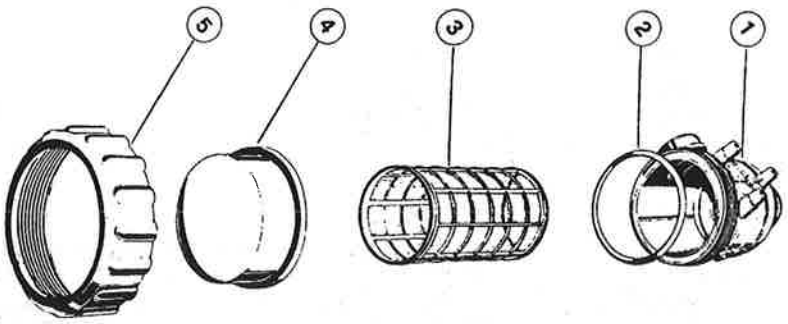
All filter screens should be cleaned after every spraying operation. The best way to clean the filter screen is with a soft brush or compressed air after washing all the chemical residue from the pump.

⚠ WEAR ALL NECESSARY PROTECTIVE CLOTHING WHEN CLEANING ANY FILTER (POSSIBLE EXPOSURE TO CHEMICALS)

SUCTION FILTER

To clean the suction filter:

1) Wear all necessary protective clothing;
2) Ensure that the pump is turned off, the pump three-way ball valve is turned off and there is no chemical residue in the filter;
3) Carefully unscrew filter nut and remove bowl;
4) Remove screen and clean;
5) Check for damage to screen, bowl, body or 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.



ITEM	PART NO.	DESCRIPTION
1	316060.010	1 1/2" Suction Filter Body
2	316000.050	1 1/2" Suction Filter Body O-Ring (126.4x7)
3	316003.030 316000.050	Screen (50 Mesh) (Blue) Screen (80 Mesh) (Grey)
4	316000.020	Filter Bowl
5	316000.040	Filter Nut

PRESSURE FILTER

⚠ WEAR ALL NECESSARY PROTECTIVE CLOTHING WHEN CLEANING ANY FILTER (POSSIBLE EXPOSURE TO CHEMICALS)

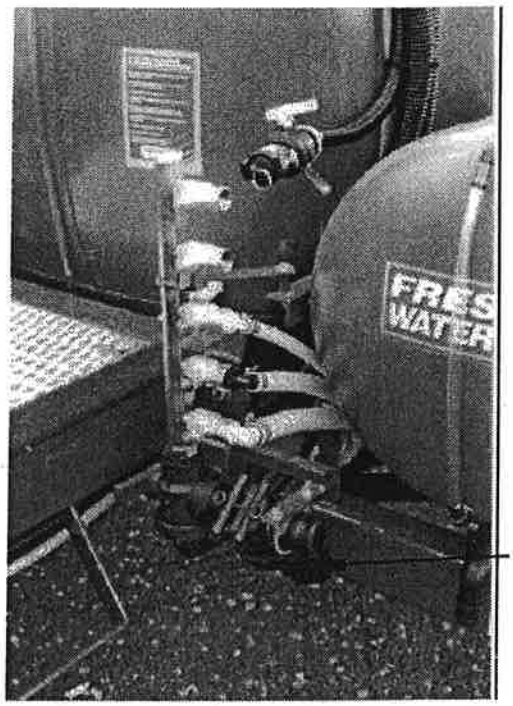
To clean the pressure filter:
1) Wear all necessary protective clothing;
2) Ensure that there is no water in the tank and the pump is not running;
3) Ensure that the Supermix Agitator ball valve is open (will release any residual pressure)
4) Carefully unscrew filter nut and remove filter bowl;
5) Remove screen and clean;
6) Check for damage to screen, bowl, body or o-ring;
7) Place screen back in position;
8) Make sure o-ring is in position for proper seal;
9) Replace bowl on and screw nut on.

FLUSH FILTER

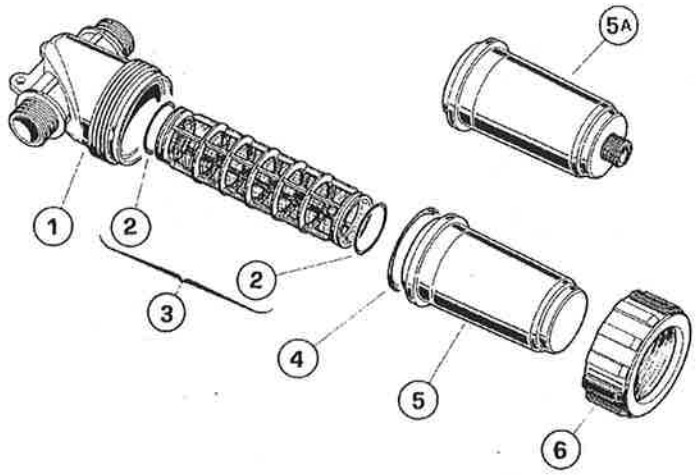
⚠ WEAR ALL NECESSARY PROTECTIVE CLOTHING WHEN CLEANING ANY FILTER (POSSIBLE EXPOSURE TO CHEMICALS)

To clean the flush filter screen:
1) Connect the fill hose to the Quick-Fill coupling;
2) Operate the fresh water pumping system and have the fill three-way ball valve off;
3) Open the Filter Clean ball valve. Flow should be coming through the Filter Clean ball valve which is used to clean the filter screen. Allow the cleaning to occur for at least 10 seconds;
4) When finished, close the Filter Clean valve;
5) Turn the red handle on the fill three-way ball valve to the required position if continuing to fill.

The filter bowl should be removed and the screen cleaned with either a soft brush or compressed air periodically (frequency dependent upon the condition of the fresh water).



Flush filter



ITEM	PART NO.	DESCRIPTION
1	3262360.010 3282050.010	1 1/2" Filter Body (Male) (Self-Cleaning Filter) 1 1/4" Filter Body (Female) (Pressure Filter)
2	G10052	Screen O-Ring (39.69x3.53)
3	326003.030 3260035.030 326004.030	Screen (50 Mesh) (Blue) Screen (80 Mesh) (Grey) Screen (100 Mesh) (Red)
4	G10090	Filter Body O-Ring (74.63x5.34)
5 5A	3262000.020 3262300.020	Filter Bowl (Pressure Filter) Filter Bowl (Self-Cleaning Filter)
6	3262000.050	Filter Nut

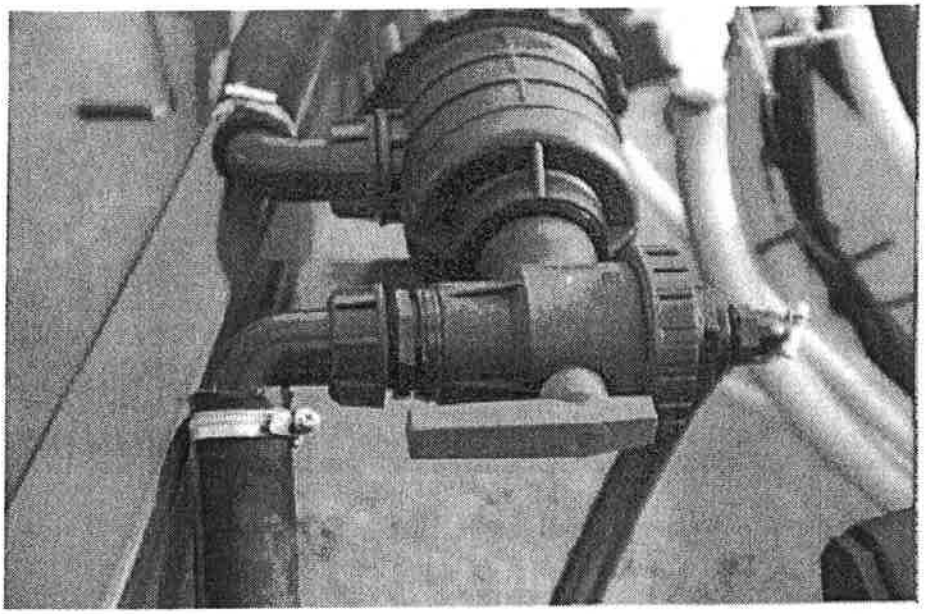
PUMP THREE-WAY BALL VALVE

This three-way ball valve controls from which tank the pump is drawing from, ie either from the main spray tank or from the fresh water tank. The position of the red handle determines which inlet the flow is coming through.

PUMPING FROM THE MAIN SPRAY TANK

To pump from the main tank:

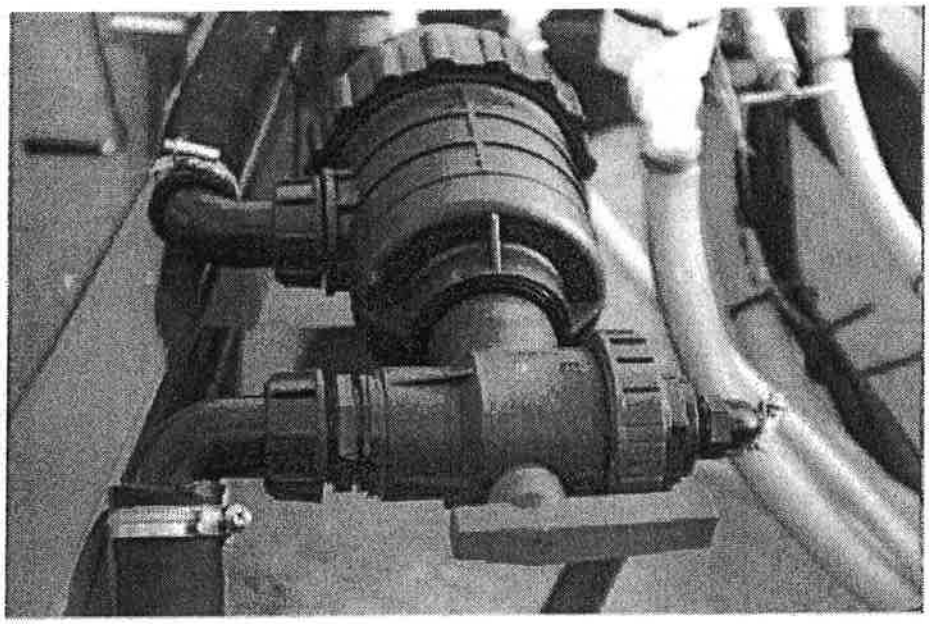
- Red handle points towards suction hose coming from main tank



PUMPING FROM THE FRESH WATER TANK

To flush the lines with fresh water:

- Red handle points towards the hose coming from the fresh water tank

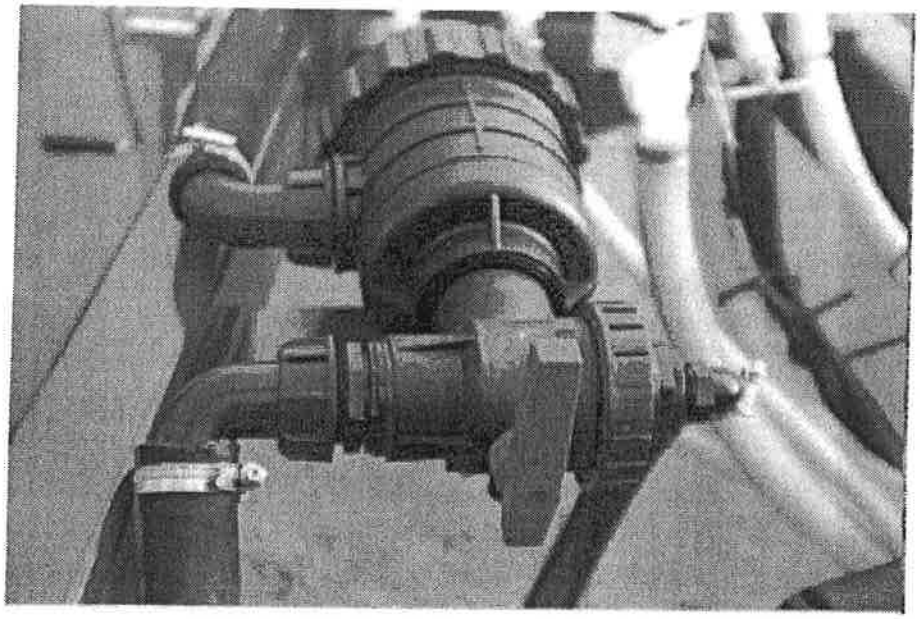


TO NOT PUMP FROM EITHER TANK

To clean the filters or storing sprayer, the flow from both tanks can be shut off:

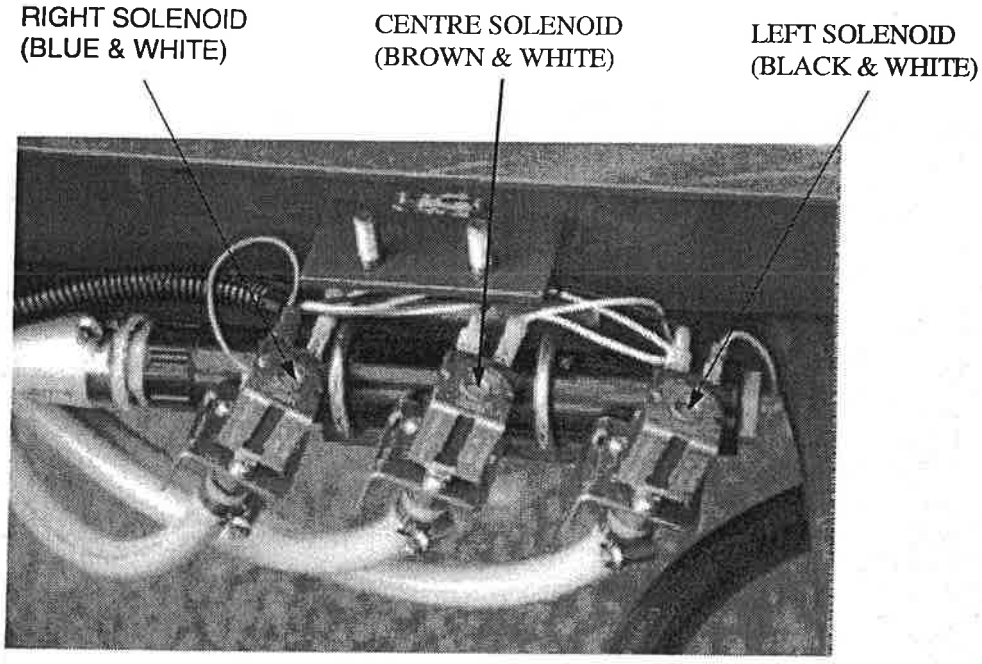
- Red handle points perpendicular to valve

Note: Do not run the pump with the handle in this position



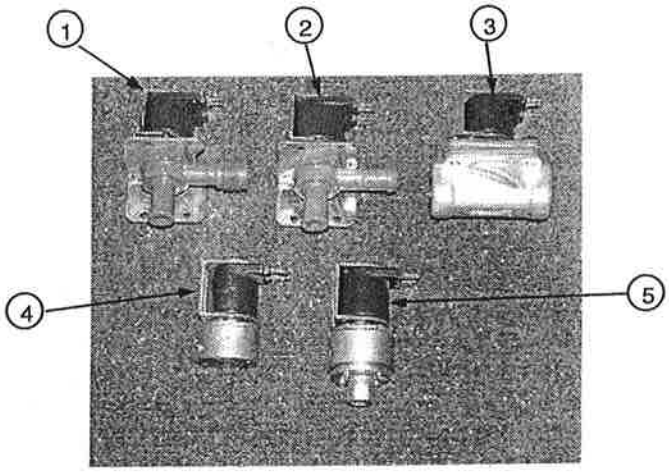
SOLENOIDS

The pilot-operated diaphragm solenoid valves are electrically controlled (via the console) and they control the flow to each boom section respectively.



NOTE: The positive and negative wires to the solenoids must be on the same respective solenoid terminals for each solenoid.

If total console failure occurs, as a temporary measure (so as to be able to empty current tank load) the plunger and spring in the solenoid can be removed (so that the solenoid is always open) and the boom controlled by putting the PTO in and out of gear.



POSITION NO.	DESCRIPTION	HOSE SIZE	PART NO.	TO SUIT:	REPAIR KIT PART NO.
1	12VDC Solenoid - Thread/ Barb	1/2"	ST2-4R-V/2043	Electric Controls	M1682
2	12VDC Solenoid - Barb/Barb	1/2"	ST2-HR-V/1833	Electric Controls	M1682
3	12VDC Solenoid	3/4"	12QW2-V	Electric Controls	M1306
4	12VDC Liquid Solenoid	1/4"	4Q3M-V	Exacta Foam Marker	M1348
5	12VDC Air Solenoid	1/4"	2Q3M3T-NO	Exacta Foam Marker	M2071

FLOWMETER

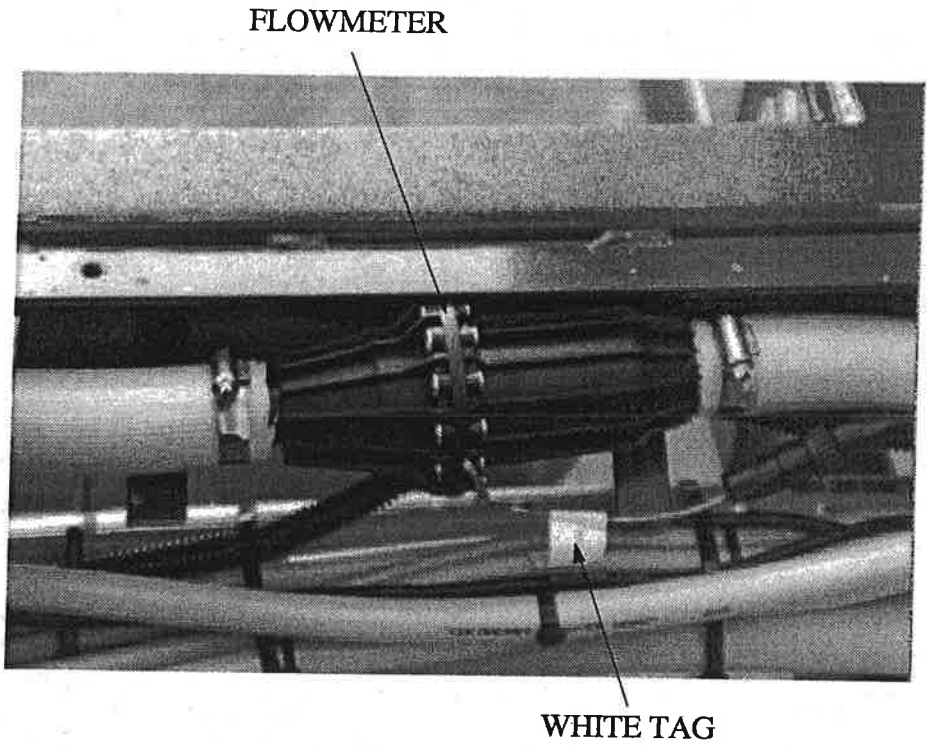
If there is a flowmeter on the sprayer, there will be a calibration number attached to it on a white sticker. The number that is applicable is the one in square brackets, ie [185]. Note this number down as this is the number that should be entered as the Meter Cal. number.

It is important to flush the pumping system with fresh water at the end of every tank load so that chemical does not build up in the flowmeter and possibly damage the bearings. 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 (ie via a self-test). Compare the reading from the flowmeter with the previous known volume. If there is a relatively large discrepancy (ie 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.

ie: If volume reads 3100 litres instead of 3000 litres and the original Meter Cal value is 185

New Meter Cal value = 185 x 3100 ÷ 3000 = 191



AGITATION OF CHEMICALS

It is normal practice to agitate the spray mixture before commencing spraying. The chemicals need to mix uniformly throughout the spray mixture in order to achieve a correct spray application. Agitation is primarily a function of pump capacity, such that the larger the pump, the greater the amount of bypass and hence the greater amount of agitation for a given spraying application. This bypass agitation enters the rear of the tank via the supermix agitator. To assist with the agitation, a pressure line from the control manifold also goes to the supermix agitator at the back of the tank. The pressure relief valve line goes to the front of the tank.

To achieve satisfactory agitation, the following guidelines are recommended:

- Add 500 litres of clean water to the main spray tank;
- Carefully add all chemicals (more water may be needed in the tank initially if adding granular or powder chemicals);
- Add the remaining water (this will then help to mix the chemicals);
- Agitate with pump at operating speed (max. 540 RPM);
- Check to ensure supermix agitator is working (there should be visible circulation of water near the back of the tank near the agitator). If it is not working, wait until sprayer is empty (important) and then unscrew and clean nozzle;
- If chemicals are added after the tank has been filled, or if 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 (ie. for 3000 litres in tank with a 121 litre/min. pump, agitate for 3000 ÷ 121 = 25 minutes approx.).

In order to agitate before spraying:

- Have all boom lines switched off (ie solenoids);
- Operate pump and regulate pressure to near operating pressure;
- Ensure the Supermix Agitator ball valve is open;
- Ensure the Bypass Line ball valve is open.

NOTE: If the pressure is too high when agitating, it is probably because the butterfly in the electric control valve is almost shut and the pressure relief valve is having to bypass too much flow back to the tank. To alter the orientation of the butterfly in the control valve so that it can allow more bypass back to the tank and thus enable agitation to occur at a lower pressure:

a) With the pump off, the three boom switches on and the master switch on, put the Rate1/Rate2/Man switch to Man and the Inc/Dec switch to dec and hold for at least 5 seconds **(440 Console)**

b) With the pump off, the three boom switches on and the master switch on, put the Off/Man/Auto switch to Man and the Inc/Dec switch to dec and hold for at least 5 seconds **(330 Console)**

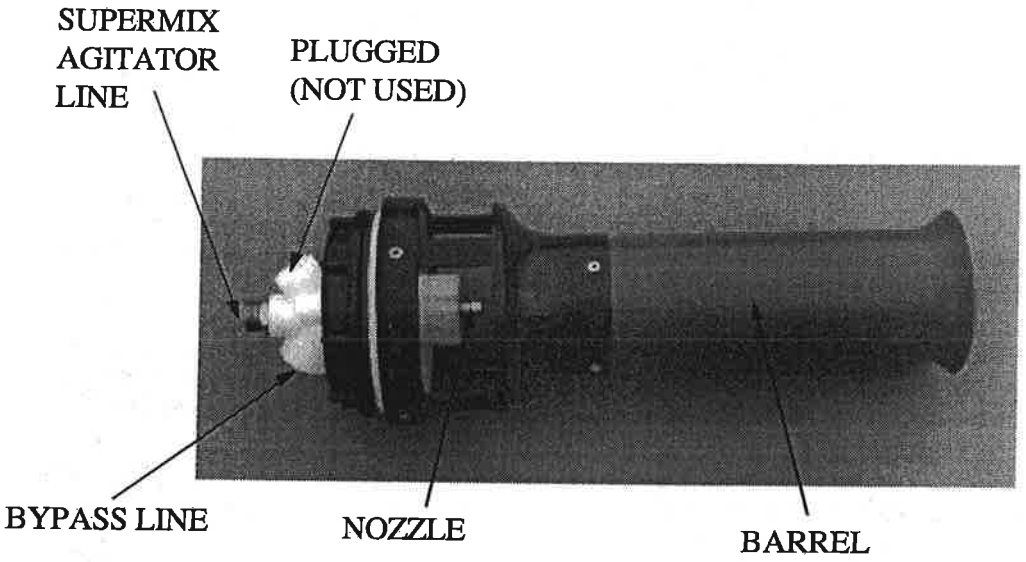
To agitate while spraying:

- With the solenoids on for spraying purposes, have the Bypass Line ball valve and the Supermix Agitator ball valve open.

SUPERMIX AGITATOR

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 then passed back into the tank. To increase this venturi effect, the bypass flow from the electric control valve also passes through the barrel, multiplying the agitation effect.

If there does not appear to be sufficient agitation, it may be because the nozzle is blocked. To check and clean the nozzle, flush the tank out to remove all chemical residue and make sure the tank is then empty (important) and then unscrew the stainless steel insert where the pressure line is attached to. The nozzle can then be cleaned. Screw the stainless steel insert back in and make sure there are no resultant leaks.



TANK RINSING NOZZLES (OPTIONAL)

Tank Rinsing Nozzles can be fitted in the tank (usually two) to provide a method for washing the inside of the tank. This can either be done via the Fill Manifold (thus clean tank with fresh water) or from the delivery side of the pump (thus can clean tank with the required decontaminating agent).

If tank rinsing nozzles are supplied by the fill manifold with fresh water:

1) Empty tank of any chemical solution;

2) Operate the fill manifold pumping system (see Fill System section in this manual);

3) Open the Tank Rinse ball valve on the fill manifold;

4) Close the Tank Rinse ball valve when finished tank rising;

5) Dispose of rinsate in the tank (can pump out through boom or drain out of tank). Be careful as to where the rinsate is being deposited as it may contain chemical residue

If tank rinsing nozzles are supplied by the sprayer pump with the cleaning mixture in the tank:

1) Empty tank of any chemical solution;

2) Add appropriate cleaning mixture to main spray tank;

3) Operate the sprayer pump (pump speed needs to be at least half the maximum pump speed of 540 RPM);

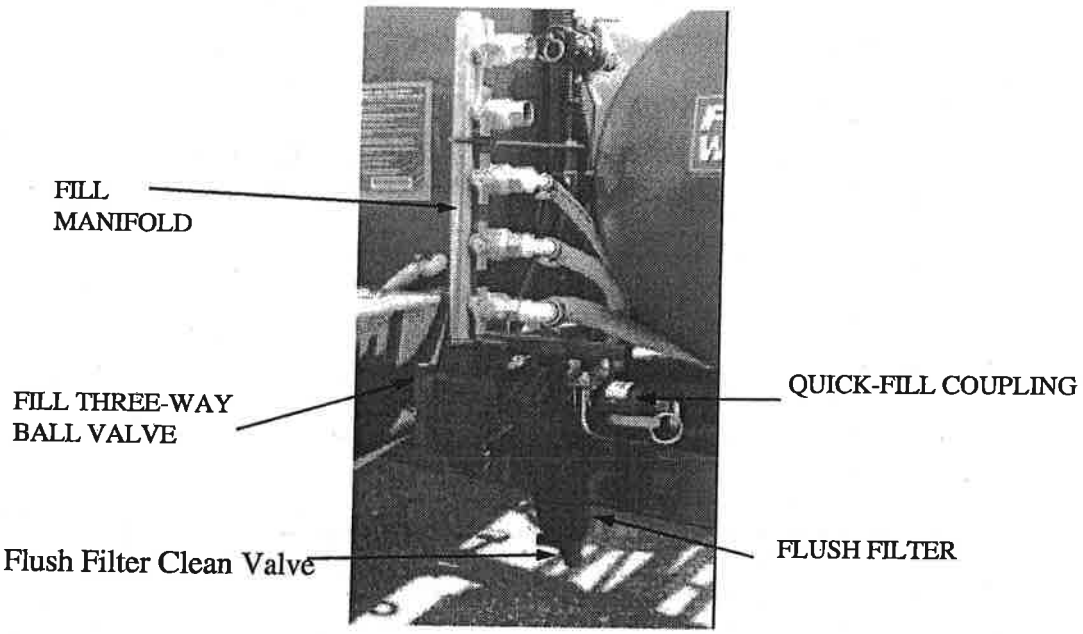
4) Open the Tank Rinse ball valve (either on the control manifold or on a pump outlet);

5) Close the Tank Rinse ball valve when finished tank rinsing;

6) Dispose of rinsate in the tank (can pump out through boom or drain out of tank). Be careful as to where the rinsate is being deposited as it may contain chemical residue.

FILL SYSTEM

The Fill System incorporates the Fill Manifold, the Flush Filter, the Fill Three-Way Ball Valve and the Quick-Fill Coupling. This system provides an easy method of utilising flow from the fresh water pumping supply to fill the various tanks on the sprayer and to rinse chemical drums via the Induction Hopper and the hopper itself (if fitted). The maximum filling pressure provided by the fresh water pumping system should not exceed 690 kPa (100 psi).



FLUSH FILTER

The Flush Filter filters all the fresh water that is used to fill the tanks through the fresh water supply connected to the Quick-Fill Coupling.

When pumping flow to the either the main tank or the Fill Manifold, the Filter Clean valve must always be closed.

⚠ WEAR ALL NECESSARY PROTECTIVE CLOTHING WHEN CLEANING ANY FILTER (POSSIBLE EXPOSURE TO CHEMICALS)

The Flush Filter should be cleaned frequently. To clean the Flush filter screen:

1) Connect the fill hose to the Quick-Fill coupling;
2) Operate the fresh water pumping system and have the fill three-way ball valve off;
3) Open the Flush Filter Clean valve (unscrews). Flow should be coming through the Filter Clean valve which is used to clean the filter screen. Allow the cleaning to occur for at least 10 seconds;
4) When finished, close the Filter Clean valve;
5) Turn the red handle on the fill three-way ball valve to the required position if continuing to fill.

The filter bowl should be removed and the screen cleaned with either a soft brush or compressed air periodically (frequency dependent upon the condition of the fresh water).

TO FILL THE MAIN SPRAY TANK

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.

⚠ Do not fill sprayer in such a manner that it may be possible for water in the tank (may be contaminated with chemical) to enter the water supply.

To fill the main spray tank from the fresh water supply via the Quick-Fill:

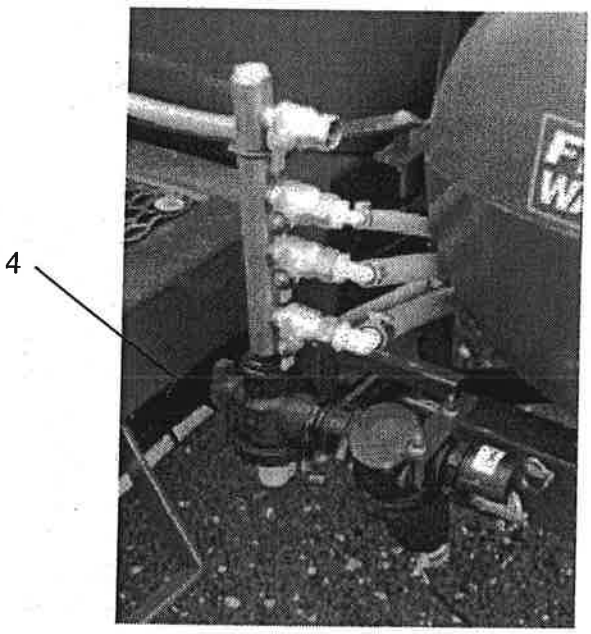
1) Make sure that initially the red handle on the Fill Three-Way Ball Valve is horizontal so that there can be no flow coming out of the tank if it is not empty;

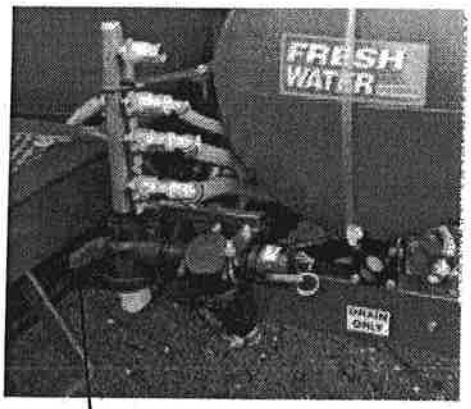
2) Connect the fresh water fill hose to the Quick-Fill Coupling;

3) Operate the fresh water pumping system (make sure pressure does not exceed 100 psi);

4) Turn the red handle on the Fill Three-Way Ball Valve **down** so that the fresh water is directed to the hose going to the top of the main spray tank;

5) When the desired amount of water has been transferred to the main spray tank, turn the red handle so that it is horizontal and thus shuts off any more flow going to the tank.





TO FILL THE FRESH WATER TANK

The standard size fresh water tank holds approximately 200 litres. Make sure this tank always has sufficient water in it in case a chemical accident occurs and fresh water is need to wash chemical from any contaminated persons, clothing or componentry.

To fill the fresh water tank from the fresh water supply via the Quick-Fill and Fill Manifold:

1) Make sure that initially all ball valves on the Fill Manifold are turned off and the red handle on the Fill Three-Way Ball Valve is horizontal;

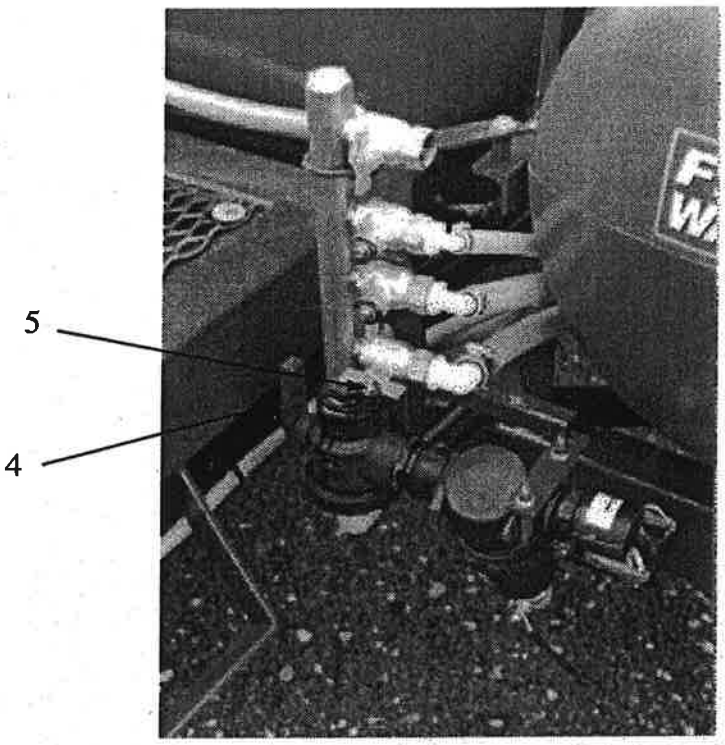
2) Connect the fresh water fill hose to the Quick-Fill Coupling;

3) Operate the fresh water pumping system (make sure pressure does not exceed 100 psi);

4) Turn the red handle on the Fill Three-Way Ball Valve **up** so that the fresh water is directed to the Fill Manifold;

5) Open the Fresh Water Tank Fill ball valve. There should now be flow transferring to the fresh water tank;

6) When the desired amount of water has been transferred to the fresh water tank, shut the Fresh Water Tank Fill ball valve and turn the red handle so that it is horizontal and thus shuts off any flow going to or from the tank.



QUICK-FILL

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.

Do not fill sprayer in such a manner that it may be possible for water in the tank (may be contaminated with chemical) to enter the water supply.
Do not use the Quick-Fill as a drain line.

It is best to fill the sprayer tank on level ground.

QUICK-DRAIN

The main tank should be drained through the Quick-Drain ball valve. This line drains from the side of the tank sump and almost all the tank liquid will drain through this line. There may be a relatively small amount of liquid left in the tank sump and this can be drained via the tank sump drain ball valve.

To drain, open the Quick-Drain ball valve. When finished draining, make sure the Quick-Drain ball valve is closed.

It is best to drain the sprayer tank such that the front of the tank is slightly lower than the back of the tank. This will facilitate a more effective draining.
Be careful where the drainage from the tank is being deposited as it may contain chemical residue.

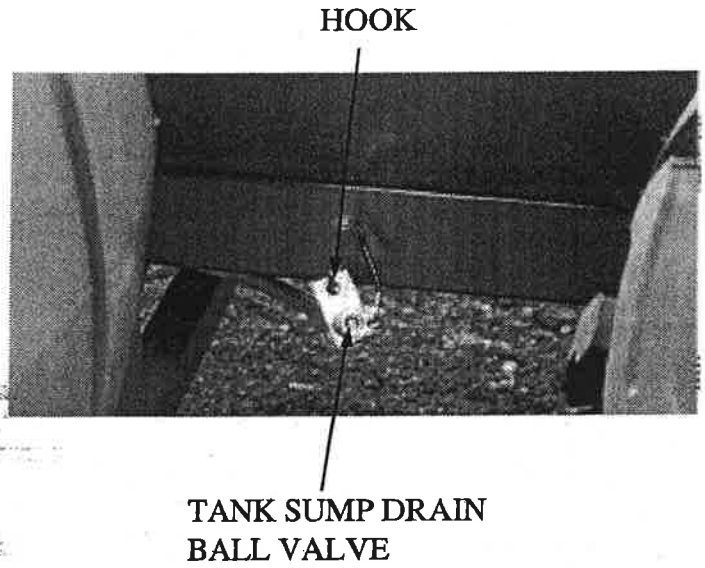
The Quick-Drain is only to be used for draining. Do not fill through the Quick-Drain line.

TANK SUMP DRAIN

The Tank Sump Drain ball valve line is taken from the bottom of the tank sump.

To remove any liquid from the tank sump, unhook the Tank Sump Drain ball valve from the sprayer and let the valve hang down below the bottom of the tank sump. Open the ball valve and the remaining liquid in the sump should flow through the valve. Shut the Tank Sump Drain ball valve when there is no more liquid to be drained and replace the Tank Sump Drain ball valve on its hook on the sprayer, making sure it is securely fastened.

Be careful where the drainage from the tank sump is being deposited as it may contain chemical residue.



OPERATION

Turn on Console by depressing ON. Console turns OFF if no flow is sensed and no key is depressed for 10 minutes.

Toggle to desired category by depressing key labelled: 

SUb – Sub-Total Volume (Increments volume)
ToL – Total Volume (Increments volume)
bAT – Batch Volume (Decrements volume from pre-entered number)
FLO – Flow Rate (vol/min)
CAL – Meter Cal

Meter Cal is the only number that must be entered for Console operation.

ENTERING DATA:

Toggle to desired category and Press [**ENTER**]. Display will flash " **E** ". Enter data one digit at a time, starting with the left digit. Enter each digit by depressing key labelled:  to increment the digit, then depress  to shift it one place to the left. Continue this sequence until all digits are entered, then Press [**ENTER**]. Display will stop flashing.

EXAMPLE:

To enter 1 2 3

1. Press [**ENTER**].
2. Press 2 times key labelled: 
3. Press 1 time key labelled: 
4. Press 2 times key labelled: 
5. Press 1 time key labelled: 
6. Press 3 times key labelled: 
7. Press [**ENTER**].

Display can be reset to " 0 " by entering " 0 " using method shown above.

METER CAL: Need to enter the Meter Cal No. for the fill flowmeter which is located on the white tag attached to the flowmeter. The Meter Cal No. for Litres (in square brackets) is the required value.

eg. 177

GOLDACRES FILLFLOW

The FillFlow has been designed to be able to be coupled onto the sprayer when required and then uncoupled when the filling is complete. It is powered by a 9-volt battery and should last for approximately 400 hours of operation. The flowmeter used with the GoldAcres is an 1 ½" Rapid Check flowmeter.

FLOW CAPACITY

The following flow limits are recommended for the following filling flowmeters. The flowmeter should be sized so as to not be working at the extreme ends of the flow capacities.

The 1 ½:" Rapid Check Flowmeter: 35 – 350 litres per minute

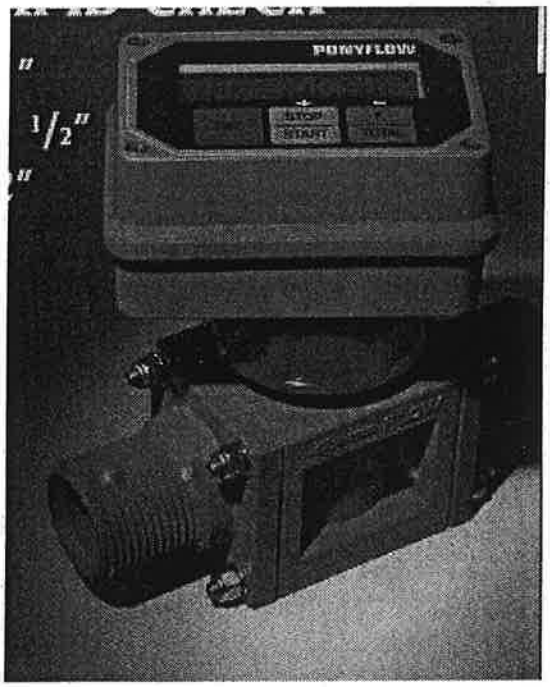
OPERATION

The FillFlow flowmeter is designed to couple onto the Quick-Fill coupling only when fresh water is being pumped through into one of the tanks on the sprayer (main tank, foam tank, fresh water tank or induction hopper tank).

Always disconnect the FillFlow flowmeter from the sprayer when not in use.

Read the Polmac Pony Flow Instruction Booklet for further procedures to operate the Flowmeter.

The GoldAcres FillFlow has cam lever couplings to couple onto sprayer when in use.



CHEMICAL PROBE

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 a venturi filler which creates the required suction on the pressure side of the pump.

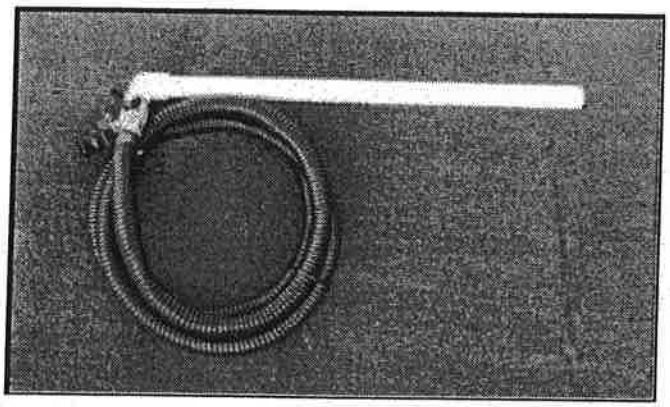
The viscosity of the chemical being transferred will affect the rate of suction flow and hence the amount of time required to transfer the chemical. Water and air have very small viscosities whereas molasses and tar are examples of highly viscous liquids. The higher the viscosity of the liquid, the longer 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.

STANDARD PERFORMANCE TEST

With a 121 litre/min. pump running at approx. 600 kPa the chemical probe will transfer **water** at a minimum rate of approximately 30 litres/min.

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.

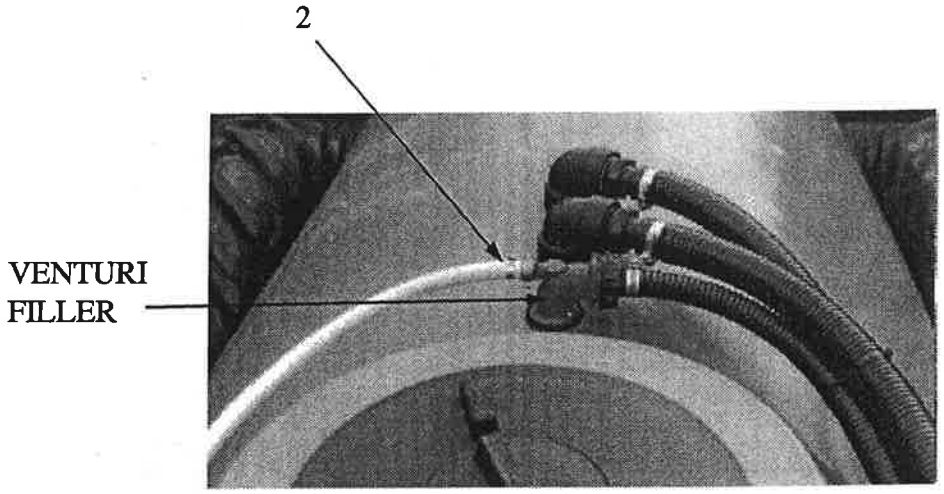


OPERATION

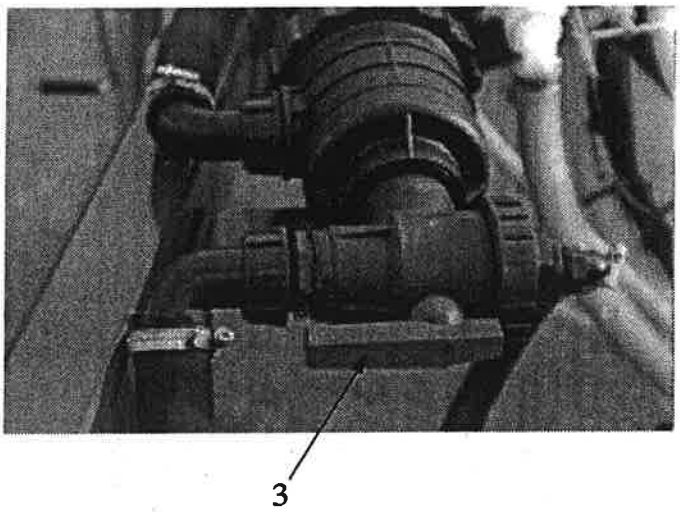
To operate the chemical probe:

1) Add 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 filler;

2) Ensure that a pressure hose from the delivery side of the pump is connected to the venturi filler;



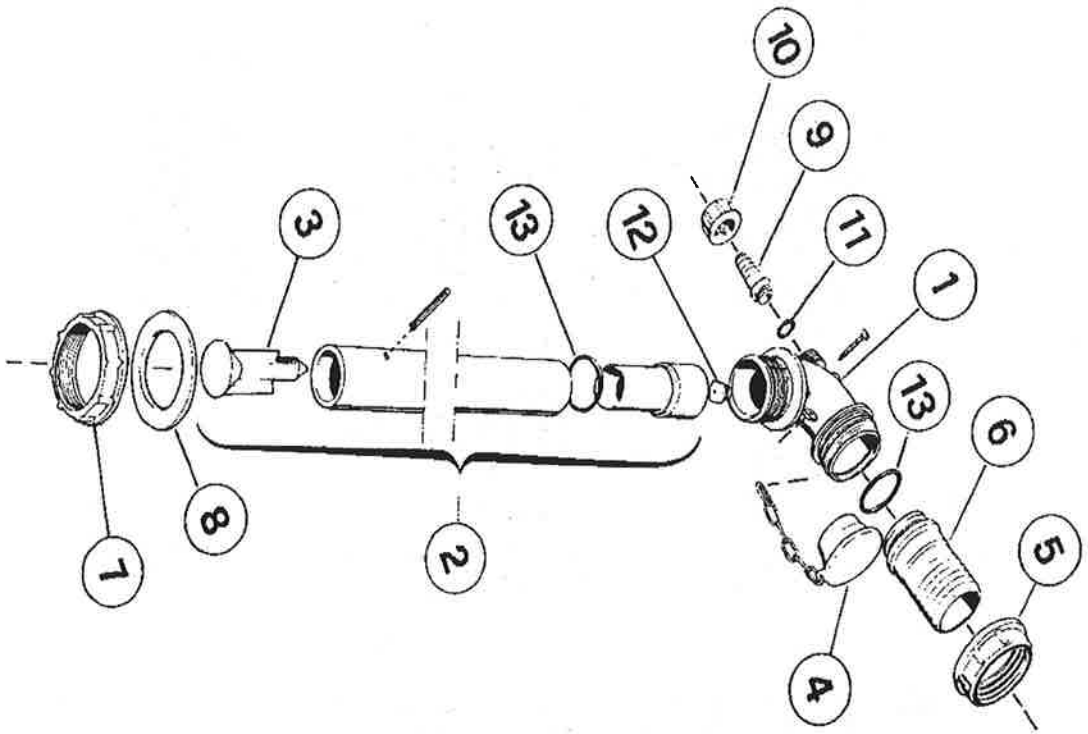
3) Ensure that the red handle on the Pump Three-Way Ball Valve is pointing towards the suction hose coming from the main tank sump (allows pump suction to be from the main tank);



VENTURI FILLER

A venturi filler is used to create suction on the pressure side of the pump. This suction is utilized by the chemical probe to transfer the chemicals from their container to the tank.

The venturi filler is plumbed into the pump delivery line and a venturi effect is created when water is pumped through the filler. The filler has a variable diameter and when the water passes through pipe of decreasing diameter, a pressure differential is created. The fluid velocity increases and pressure decreases and this difference in pressure is used to provide the suction.



ITEM	DESCRIPTION
1	Threaded Union Ejector Body
2	Complete Ejector Pipe
3	Threaded Union Ejector Valve
4	Threaded Union Ejector Cap
5	1 1/4" Fly Nut
6	1 1/4" Hose Barb Fitting
7	1 1/4" Fly Nut
8	1 1/4" Flat Seal
9	1/2" Hose Barb Fitting
10	1/2" Fly Nut
11	O – Ring
12	Low Pressure Nozzle
13	High Pressure Nozzle

TRANS-CAL VOLUMETRIC MEASURING SYSTEM

The Trans-Cal 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, the required volume of chemical can be transferred out of the chemical container into the Trans-Cal tank. This volume can then be transferred into the main spray tank via the same venturi suction action by simply turning a valve. Thus there is no raw chemical coming into contact with any pump or complex componentry. This system can be used with most types of chemical containers (including the Envirodrum closed transfer system).

STANDARD PERFORMANCE TEST

With a 121 litre/min pump running at approx. 600 kPa, the Trans-Cal will transfer **water** (ie from chemical container into Trans-Cal tank or from Trans-Cal tank into main spray tank) at a minimum rate of approximately 30 litre/min.

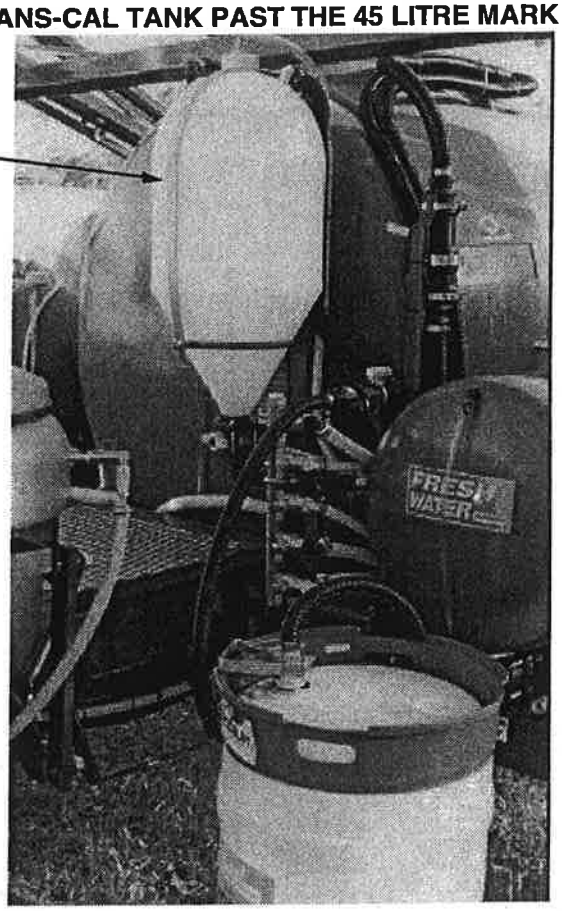
NOTE: The calibration markings on the Trans-Cal tank should be used as a guide only.

WEAR ALL NECESSARY SAFETY PROTECTIVE CLOTHING AND EQUIPMENT WHEN EXPOSED TO CHEMICALS

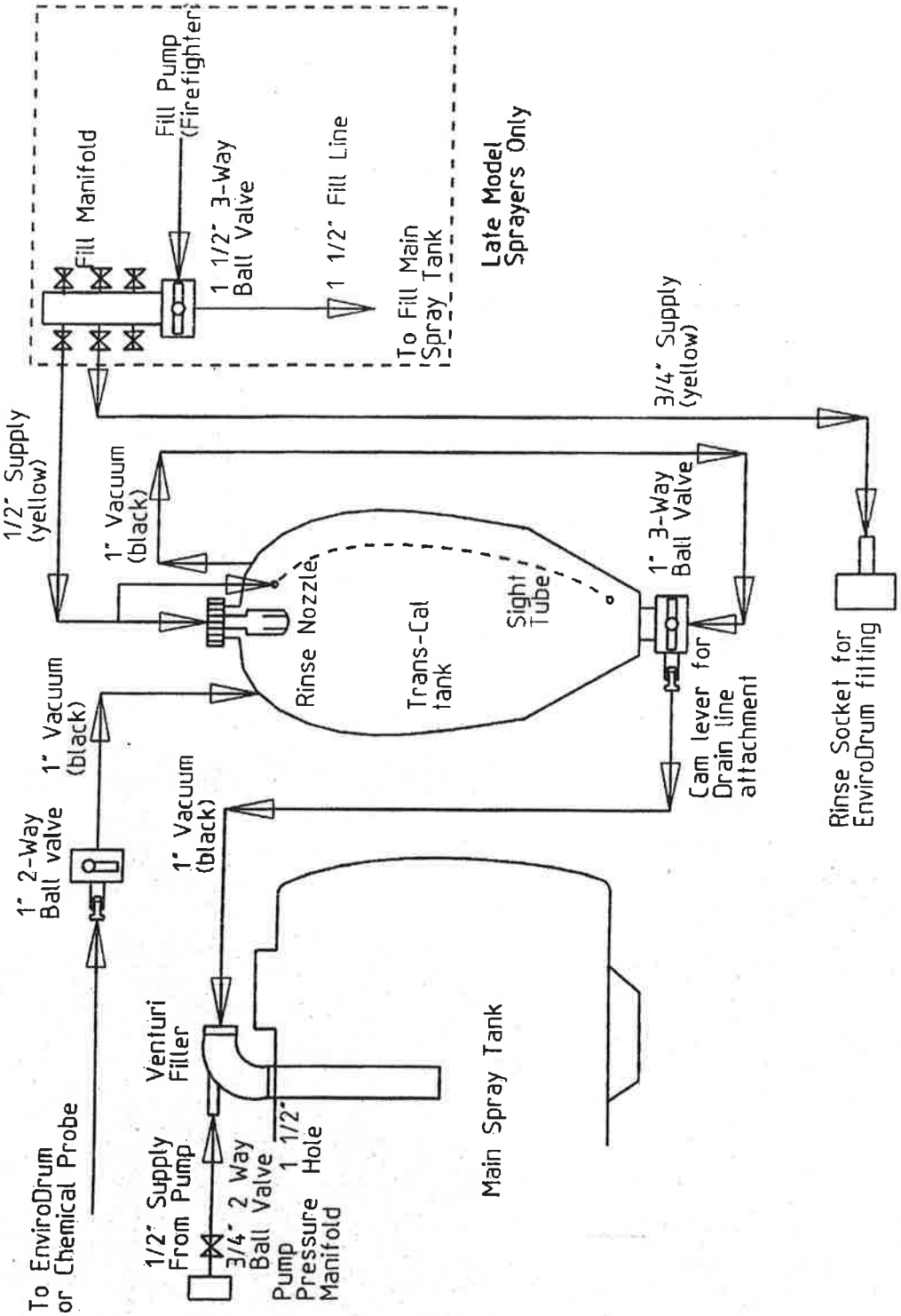
DO NOT USE THE TRANS-CAL TANK TO STORE CHEMICALS WHEN SPRAYING

DO NOT FILL TRANS-CAL TANK PAST THE 45 LITRE MARK

Calibrated tank provides for accurate volume measuring



NB. The Trans-Cal system requires vacuum pressure to operate. Any air leaks in the tank lid, hoses or cam lever seals will affect the performance or cause total failure to operate.


Late Model
Sprayers Only
Fill Manifold
Fill Pump
(Firefighter)
1 1/2" 3-Way
Ball Valve
1 1/2" Fill Line
To Fill Main
Spray Tank
3/4" Supply
(yellow)
1/2" Supply
(yellow)
1" Vacuum
(black)
1" 3-Way
Ball Valve
Rinse Nozzle
Trans-Cal
tank
Sight
Tube
Cam lever for
Drain line
attachment
Rinse Socket for
EnviroDrum filling
1" Vacuum
(black)
1" 2-Way
Ball valve
1" Vacuum
(black)
Venturi
Filler
Main Spray Tank
To EnviroDrum
or Chemical Probe
1/2" Supply
From Pump
3/4" 2 Way
Ball Valve
1 1/2"
Pump
Pressure
Manifold
Hole

OPERATION

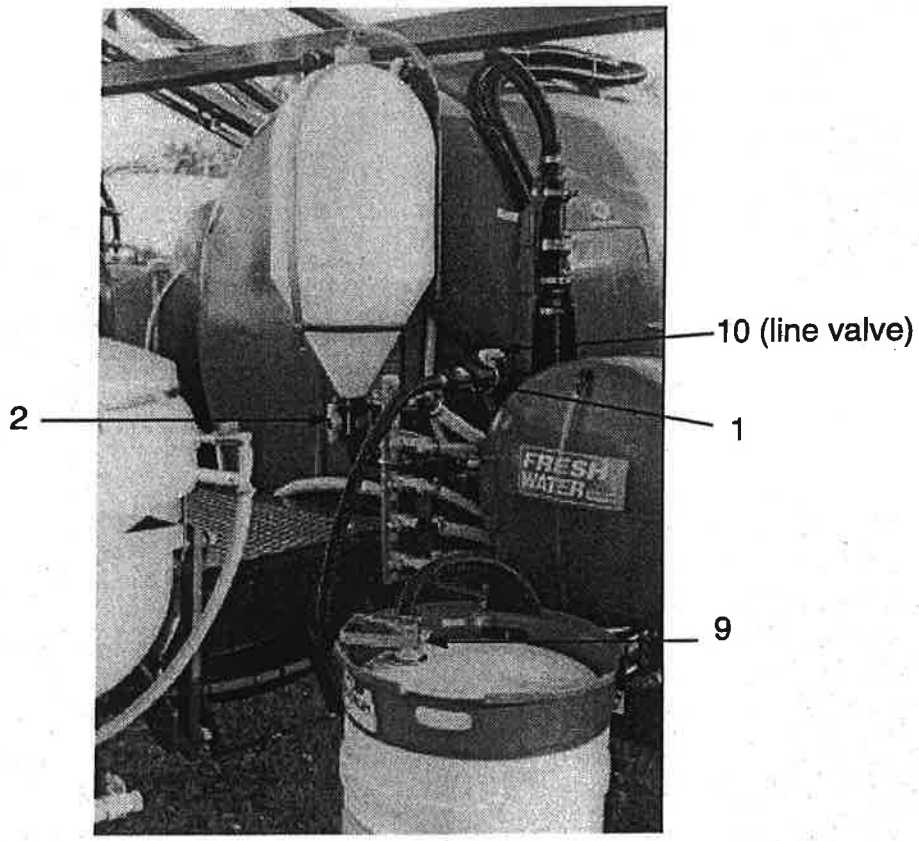
WEAR ALL NECESSARY SAFETY PROTECTIVE CLOTHING AND EQUIPMENT WHEN EXPOSED TO CHEMICALS

TO MEASURE CHEMICAL INTO TRANS-CAL TANK

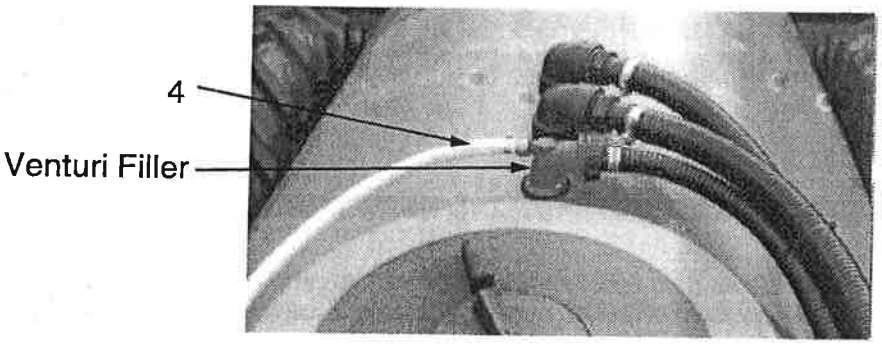
1) Remove the cam lever plug and connect the chemical probe line (or the Envirodrum line with the Micro Matic coupler) to the cam lever fitting in the line to the top of the Trans-Cal tank;

2) Ensure that the yellow T-handle on the 3-way ball valve at the bottom of the Trans-Cal tank is aligned so that the flow arrow is pointing down and thus the bottom port of the valve is open (ie the port where the hose goes to the top of the Trans-Cal tank);

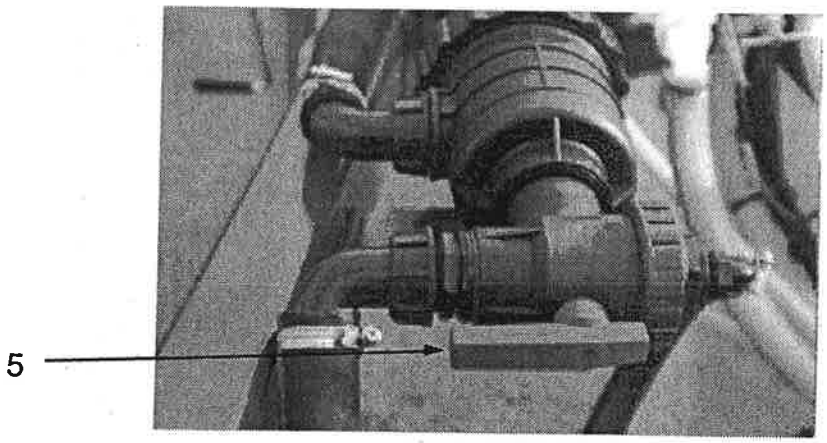
3) Add 500 litres of clean water to the main spray tank. Initially there needs to be a sufficient amount of water in the tank in order for the pump delivery to create the venturi effect via the venturi filler;



4) Ensure that a pressure hose from the delivery side of the pump is connected to the venturi filler;

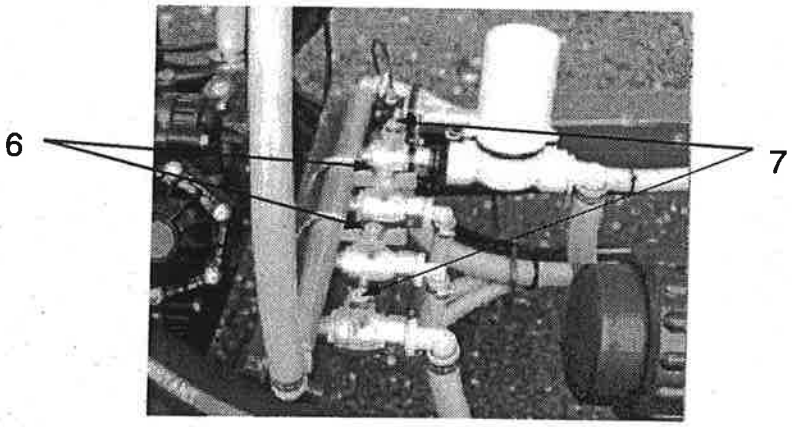


5) Ensure that the red handle on the Pump Three-Way Ball Valve is pointing towards the suction hose coming from the main tank sump (allows pump suction to be from the main tank);



6) Open the Chemical Probe ball valve and the Supermix Agitator ball valve on the control manifold;

7) Close the Bypass Line ball valve and the Induction Hopper ball valve on the control manifold;



8) Turn the yellow handle on the line valve where the chemical probe line (or the Envirodrum line) connects into the cam lever fitting. Open the valve on the chemical probe;

9) Operate the pump at the lowest speed necessary to generate at least 690 kPa (100 psi) delivery pressure (as displayed on the sprayer pressure gauge). Do not run faster than 540 RPM. The higher the pump delivery pressure, the greater the venturi suction and the quicker the probe will transfer the chemical. The delivery pressure should not exceed 100 psi (690 kPa) as determined by the pressure relief valve setting;

10) Place the probe into the chemical drum or connect the appropriate Micro Matic 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;

11) The chemical should now be transferring into the Trans-Cal tank;

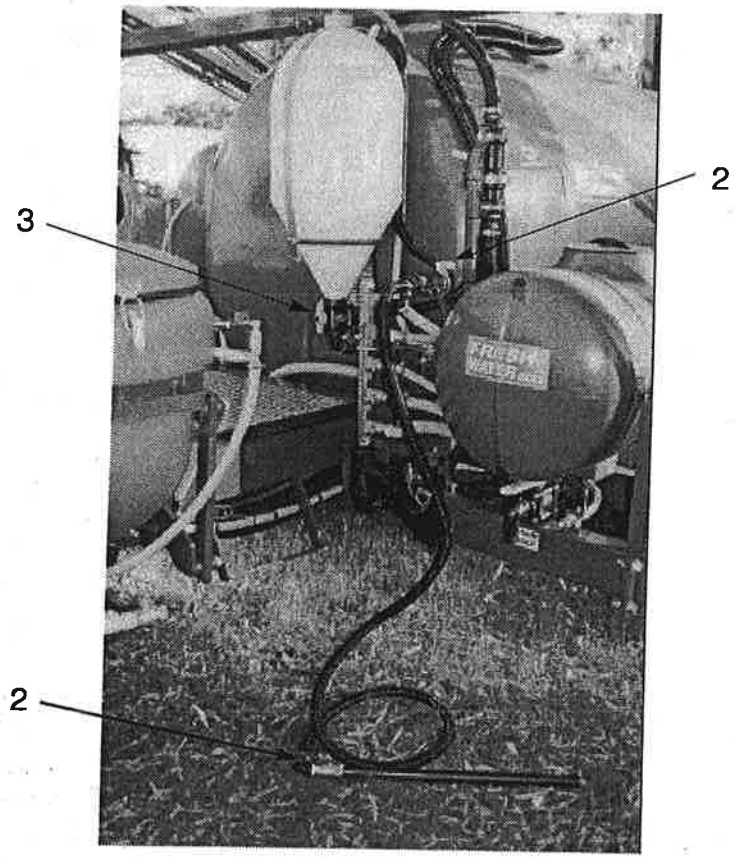
12)) When the required amount of chemical has been transferred into the Trans-Cal tank, close the ball valve on the chemical probe, remove it from the chemical drum and then open the valve on the chemical probe again, or push the handle on the Micro Matic coupling down slightly and then up will cause the handle to come up and close the valve on the Envirodrum. This should be done when doing successive fills into the Trans-Cal tank. When finished transferring chemical, turn the fitting in order to release it from the Envirodrum.

TRANSFERRING THE CHEMCIAL FROM THE TRANS-CAL TANK INTO THE SPRAYER TANK

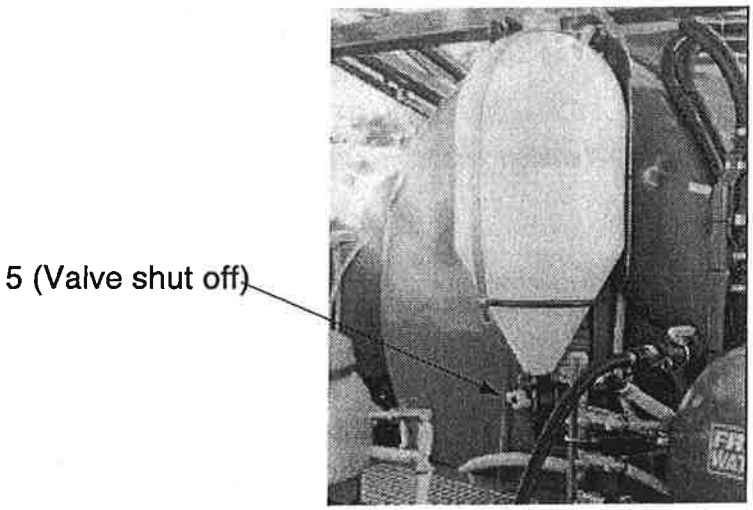
Once the required amount of chemical is in the Trans-Cal tank, to transfer this amount into the sprayer tank:

1) Continue to have the venturi filler system operating at 690 kPa (100 psi) (see previous instructions);

2) **The tank needs to be vented** so that an excessive vacuum pressure does not result. In order to achieve this have the chemical probe out of the chemical container and open the valve on the chemical probe and the line valve (the Micro Matic fitting will allow venting to occur) or disconnect the probe line from the Trans-Cal tank and do not replace the cam plug;
3) Turn the yellow T-handle on the 3-way ball valve at the bottom of the Trans-Cal tank so that the flow arrow is pointing up and thus the top port of the valve is open (ie the port which the bottom of the Trans-Cal tank is attached to);



4) The chemical should now be transferring into the main spray tank;
5) When finished, the Trans-Cal tank and the probe (or Micro Matic coupler) should be thoroughly rinsed (see following instructions). Then shut off the 3-way ball valve at the bottom of the Trans-Cal tank by turning the yellow T-handle on the 3-way ball valve so that it is horizontal. Then the venturi filler system should be stopped (ie close the two valves controlling the flow from the probe, open the Bypass Line ball valve, keep the Supermix Agitator ball valve open, and close the Chemical Probe ball valve). Once chemical has been transferred into the main spray tank the sprayer should always be agitating if possible until spraying begins.
6) Disconnect the line from the Trans-Cal tank to the probe (or envirodrum) 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 (via the Trans-Cal tank) without the chemical being measured (ie to empty full containers). This will reduce the time taken to transfer the chemical and is only applicable when using the chemical probe. To do this:

1) Remove the cam lever plug and connect the chemical probe line to the cam lever fitting in the line to the top of the Trans-Cal tank. Turn the yellow handle on the line valve to open the valve;

2) Place the probe into the chemical drum and open the ball valve on the chemical probe;

3) Turn the yellow T-handle on the 3-way ball valve at the bottom of the Trans-Cal tank so that the flow arrow is pointing up and thus the top port of the valve is open (ie the port which the bottom of the Trans-Cal tank is attached to);

4) Operate the venturi filler system at 690 kPa (100 psi) (see previous instructions);

5) The chemical should now be transferring from the chemical drum, through the Trans-Cal tank and into the main spray tank;

6) When the required amount of chemical has been transferred into the main tank, close the ball valve on the chemical probe and remove it from the chemical drum and then open the valve on the chemical probe again;

7) When finished, the Trans-Cal tank and the probe (or Micro Matic coupler) should be thoroughly rinsed (see following instructions). Then shut off the 3-way ball valve at the bottom of the Trans-Cal tank by turning the yellow T-handle on the 3-way ball valve so that it is horizontal. Then the venturi filler system should be stopped (ie close the two valves controlling the flow from the probe, open the Bypass Line ball valve, keep the Supermix Agitator ball valve open, and close the Chemical Probe ball valve). Once chemical has been transferred into the main spray tank the sprayer should always be agitating if possible until spraying begins.

8) Disconnect the line from the Trans-Cal tank to the probe and replace the cam plug in the cam lever fitting.

RINSING THE TRANS-CAL TANK

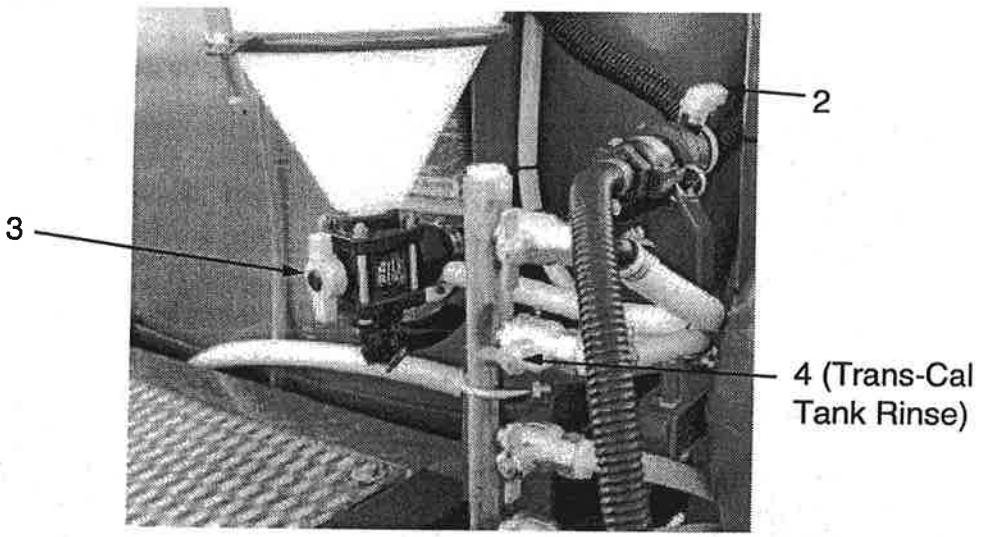
To rinse the Trans-Cal tank:

1) Continue to have the venturi filler system operating at 690 kPa (100 psi);

2) **Ensure that the tank is vented;**

3) Turn the yellow T-handle on the 3-way ball valve at the bottom of the Trans-Cal tank so that the flow arrow is pointing up and thus the top port of the valve is open (ie the port which the bottom of the Trans-Cal tank is attached to);

4) Open the Trans-Cal Tank Rinse ball valve controlling the fresh water flow to the tank rinsing nozzle in the lid of the Trans-Cal tank (supplied via the fill manifold). The tank should now be rinsing with the rinsate being transferred to the main spray tank;



5) Close the ball valve controlling the fresh water flow to the tank rinsing nozzle when tank is sufficiently rinsed and the rinsate should all have been transferred to the main spray tank.

RINSING THE TRANS-CAL LINES

RINSING THE CHEMICAL PROBE LINE

If wanting to rinse the Trans-Cal lines when using the chemical probe;

1) Fill a suitable container with fresh water (and any applicable decontaminating agent), (at least 10 litres of fresh water for sufficient cleaning);

2) Remove the cam lever plug and connect the chemical probe line to the cam lever fitting in the line to the top of the Trans-Cal tank. Turn the yellow handle so that the line valve is open;

3) Place the probe into the container with fresh water and open the ball valve on the chemical probe;

4) Turn the yellow T-handle on the 3-way ball valve at the bottom of the Trans-Cal tank so that the flow arrow is pointing up and thus the top port of the valve is open (ie the port which the bottom of the Trans-Cal tank is attached to);

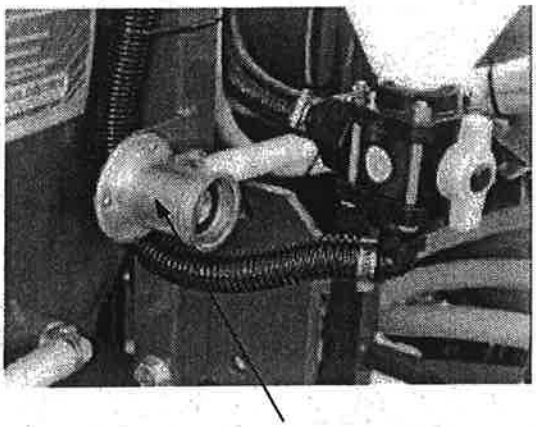
5) Operate the venturi filler system at 690 kPa (100 psi) (see previous instructions);

6) The fresh water should now be transferring to the Trans-Cal tank and then into the main spray tank thus cleaning the lines from the chemical probe to the Trans-Cal tank and to the main spray tank;

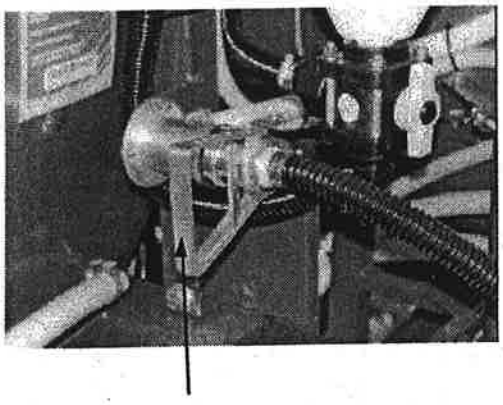
7) When finished, shut off the 3-way ball valve at the bottom of the Trans-Cal tank by turning the yellow T-handle on the 3-way ball valve so that it is horizontal. Then the venturi filler system should be stopped (ie close the two valves controlling the flow from the probe, open the Bypass Line ball valve, keep the Supermix Agitator ball valve open, and close the Chemical Probe ball valve. Once chemical has been transferred into the main spray tank the sprayer should always be agitating if possible until spraying begins).

8) Disconnect the line from the Trans-Cal tank to the probe (or Envirodrum) from the cam lever fitting and replace the cam plug.

RINSING THE ENVIRODRUM LINE



Micro Matic Rinsing Socket



Micro Matic Coupler

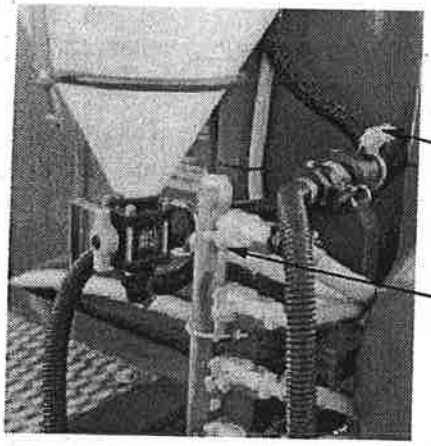
If wanting to rinse the Trans-Cal lines when using the Micro Matic coupler;
1) Ensure the Micro Matic rinsing socket is connected to a fresh water line;
2) Connect the Micro Matic coupler to the Micro Matic rinsing socket;

3) Remove the cam lever plug and connect the Envirodrum line to the cam lever fitting in the line to the top of the Trans-Cal tank. Turn the yellow handle so that the line valve is open;

4) Turn the yellow T-handle on the 3-way ball valve at the bottom of the Trans-Cal tank so that the flow arrow is pointing up and thus the top port of the valve is open (ie the port which the bottom of the Trans-Cal tank is attached to);

5) Operate the fresh water pumping system to the fill manifold. Turn the red handle on the Fill Three-Way Ball Valve up so that the fresh water is directed to the Fill Manifold;

6) Open the Envirodrum Coupling Rinse ball valve controlling the fresh water supply to the rinsing socket (supplied via the fill manifold) so that the fresh water cleans both the Micro Matic coupler and the line to the Trans-Cal tank;



7) Operate the venturi filler system at 690 kPa (100 psi) (see previous instructions);

8) The fresh water should now be transferring through the Micro Matic fittings through the Trans-Cal tank and then into the main spray tank thus cleaning the lines from the Micro Matic coupler to the Trans-Cal tank and to the main spray tank;

9) When there has been sufficient cleaning with fresh water (at least 5 minutes of cleaning), close the ball valve controlling the fresh water supply to the rinsing socket;

10) When finished, shut off the 3-way ball valve at the bottom of the Trans-Cal tank by turning the yellow T-handle on the 3-way ball valve so that it is horizontal. Then the venturi filler system should be stopped (ie close the two valves controlling the flow from the probe, open the Bypass Line ball valve, keep the Supermix Agitator ball valve open, and close the Chemical Probe ball valve). Once chemical has been transferred into the main spray tank the sprayer should always be agitating if possible until spraying begins.

11) Disconnect the line from the Trans-Cal tank to the envirodrum and replace the cam plug in the cam lever fitting in the top of the Trans-Cal tank.

CHEMICAL INDUCTION HOPPER

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 the venturi effect. Water from the main spray tank is pumped under the bottom of the hopper and it passes through a venturi fitting (with a relatively small orifice) under the hopper. This causes a suction effect and when the bottom of the hopper is open (via the hopper tank ball 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.

The hopper calibrator should be used as a guide only.

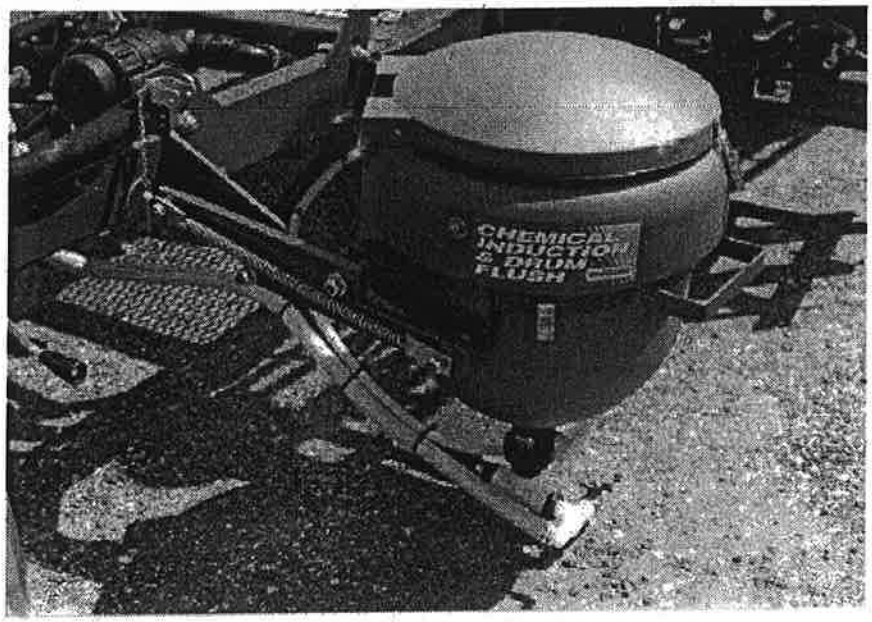
STANDARD PERFORMANCE TEST

With a 121 litre/min pump running at approximately 550 kPa, the induction hopper should transfer **water** at a minimum rate of 50 litres/min.

The chemical should be transferred after approximately 500 litres of water has been added to the sprayer tank. This will ensure that agitation takes place when the remaining water is added.

WEAR ALL NECESSARY SAFETY PROTECTIVE CLOTHING AND EQUIPMENT WHEN EXPOSED TO CHEMICALS

DO NOT USE THE CHEMICAL INDUCTION HOPPER TANK TO STORE CHEMICALS WHEN SPRAYING



INDUCTION HOPPER LOCK

The induction hopper now has as safety lock on it so that the induction hopper can be locked into the raised position whilst the sprayer is moving.

ALWAYS LOCK INDUCTION HOPPER INTO THE RAISED POSITION BEFORE MOVING SPRAYER

TO LOCK THE INDUCTION HOPPER

Raise hopper into transport position and lock hopper in by inserting pin and fastening retaining clip

TO UNLOCK THE INDUCTION HOPPER

Release retaining clip and pull pin out and pull hopper down to lower hopper to the working position

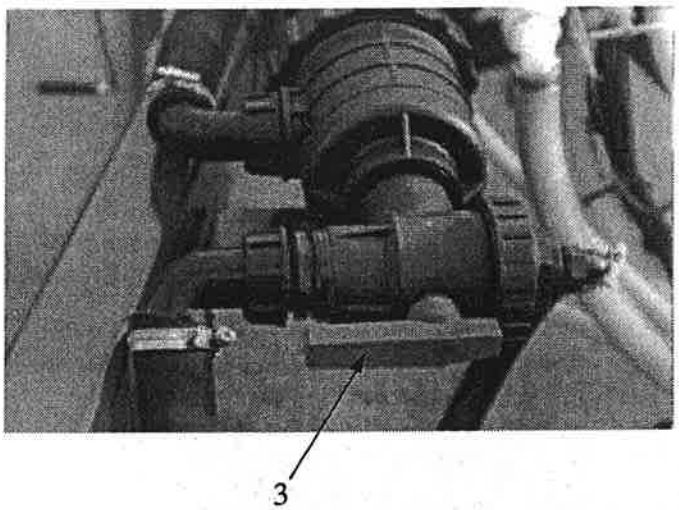
TO TRANSFER CHEMICAL INTO MAIN SPRAY TANK

To operate the induction hopper:

1) Add 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;

2) Ensure that a 25mm pressure hose from the delivery side of the pump, controlled by the Induction Hopper ball valve, is connected to the 3-way hopper manifold at the bottom of the manifold (with no kinks);

3) Ensure that the red handle on the Pump Three-Way Ball Valve is pointing towards the suction hose coming from the main tank sump (allows pump suction to be from the main tank);

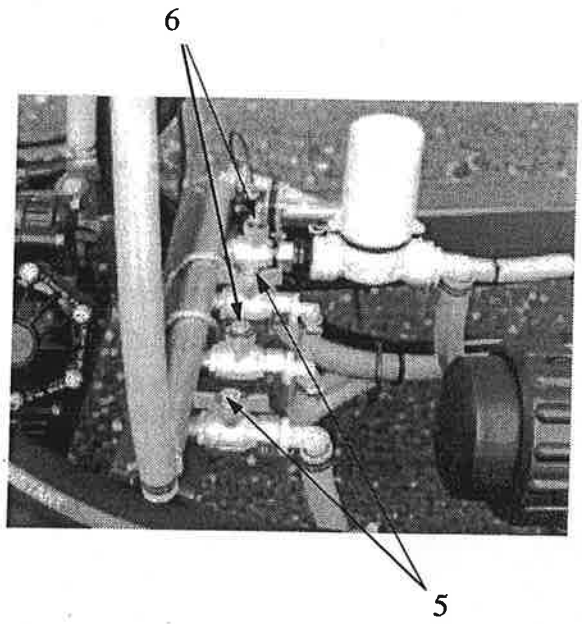


4) Pull the hopper down to its lower height setting for convenience;

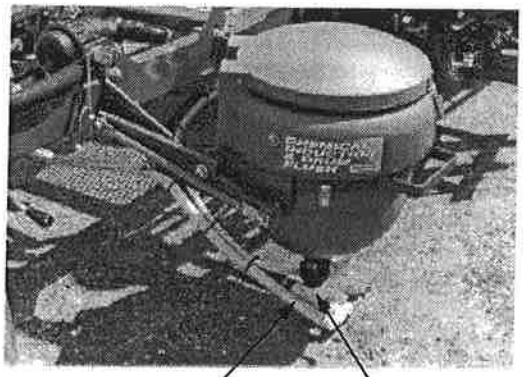
5) Open the Induction Hopper ball valve and the Supermix Agitator ball valve;

6) Close the Bypass Line ball valve and the Chemical Probe ball valve;

7) Operate the pump at the lowest speed necessary to generate at least 500 kPa (75 psi) delivery pressure (as displayed on the sprayer pressure gauge). Do not run faster than 540 RPM. The higher the pump delivery pressure, the greater the venturi suction and the quicker the hopper will transfer the chemical. The delivery pressure should not exceed 100 psi (690 kPa) as determined by the pressure relief valve setting;



LOWERED POSITION

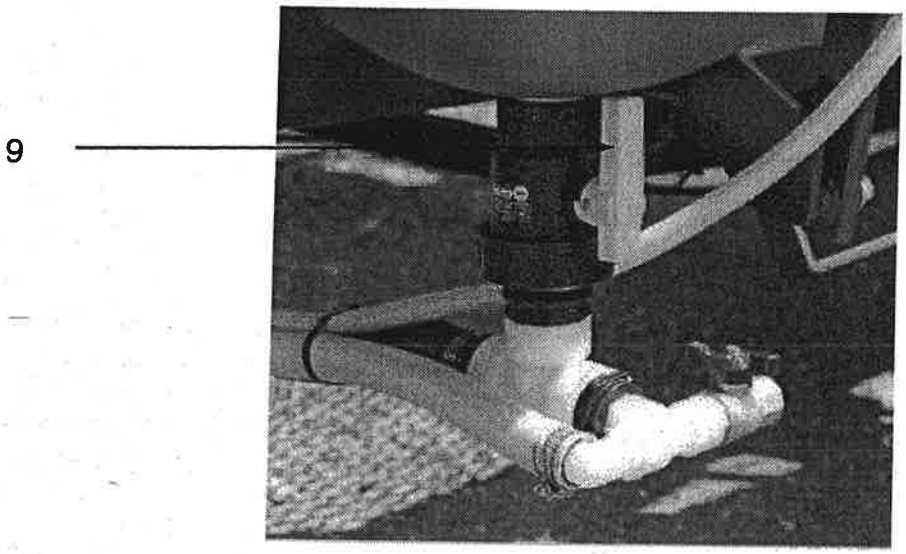


25mm SUPPLY HOSE

3-WAY HOPPER MANIFOLD

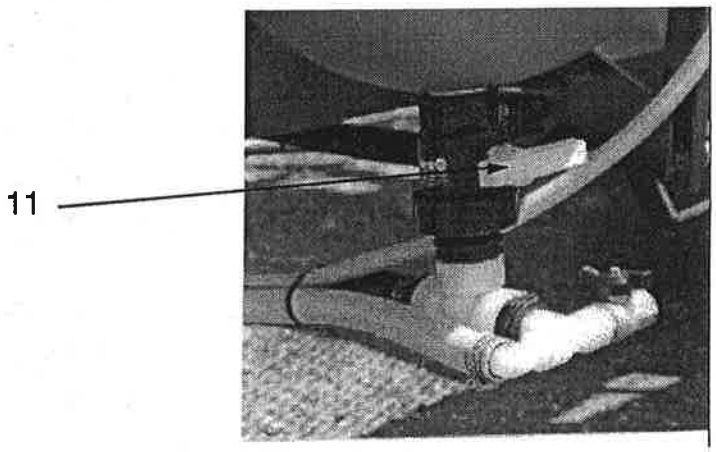
8) Put the required amount of chemical into the hopper (liquid or granular). **Wear the necessary protective clothing and use the required safety equipment when exposed to chemicals**;

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 itself as per the following relevant instruction pages;

11)When finished (transferring chemical, rinsing hopper and rinsing chemical drum), close the hopper tank ball valve at the bottom of the hopper by turning the yellow handle so that it is horizontal.



12)Also when finished, open the Bypass Line ball valve, keep the Supermix Agitator ball valve open, close the Induction Hopper ball valve and raise the hopper to its raised position. Once chemical has been transferred into the main spray tank the sprayer should always be agitating until spraying begins.

NOTE: Make sure the Hopper is empty and is in its raised position before moving sprayer.
Do not store chemical in hopper whilst spraying.

TO RINSE HOPPER

When all the chemical has been transferred, the hopper should be rinsed. To do this:

1) Continue to have the sprayer pump operating, the hopper pulled down to its lower height setting and the Induction Hopper ball valve and the Supermix Agitator ball valve open so that there is flow going through the 3-Way Hopper Manifold at sufficient pressure for the hopper to work effectively (at least 500 kPa);

2) Ensure the fresh water filling supply pump system is operating;

3) Turn the red handle on the Fill Three-Way Ball Valve up so that the fresh water supply is directed to the Fill Manifold;

4) Open the Fresh Water Drum Rinse ball valve on the Fill Manifold;

5) Open the Hopper Rinse valve on the side of the hopper;

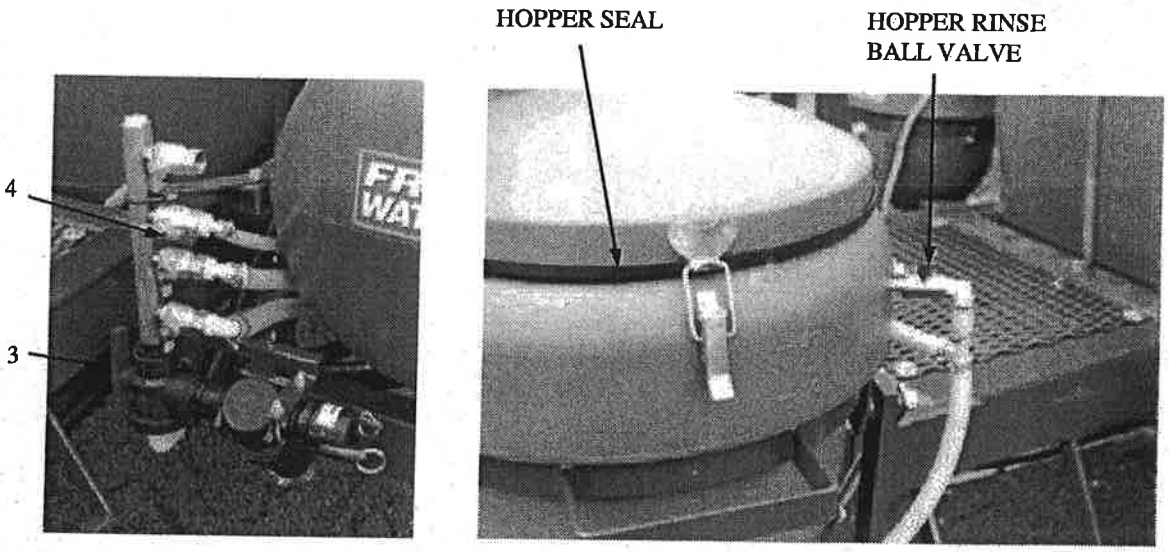
6) Close the hopper tank ball valve at the bottom of the hopper by pulling out the yellow handle horizontal so that the hopper fills with fresh water;

7) Open the hopper tank ball valve at the bottom of the hopper by turning up the yellow handle so that it is vertical. The hopper should now be rinsing with the rinsate transferring to the main spray tank;

8) When finished, close the Hopper Rinsing valve, the hopper knife valve and the Fresh Water Drum Rinse ball valve on the Fill Manifold. Leave the red handle on the Fill Three-Way Ball Valve in its current position if wanting to continue to use the fill manifold, or turn it down (to direct fresh water into the main spray tank) or horizontal (to stop any filling);

9) If finished using the induction hopper, alter the control manifold ball valves to the required configuration for the next operation.

NOTE: The Hopper Seal can be removed for cleaning.



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) Do not have the sprayer pump operating:

2) Ensure the fresh water filling supply pump system is operating;

3) Turn the red handle on the Fill Three-Way Ball Valve so that the water supply is directed to the Fill Manifold;

4) Open the Fresh Water Drum Rinse ball valve on the fill manifold;

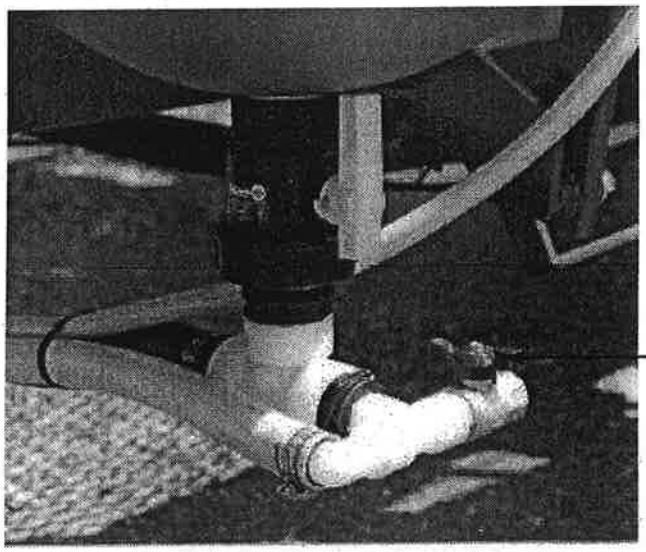
5) Open the Hopper Rinse valve on the side of the hopper;

6) Close the hopper tank ball valve at the bottom of the hopper by turning the yellow handle horizontal so that the hopper fills with fresh water;

7) Open the hopper tank ball valve at the bottom of the hopper by turning up the yellow handle so that it is vertical;

8) Open the Hopper Drain ball valve to remove the rinsate from the hopper. Be careful as to where the rinsate is being deposited as it may contain chemical residue.

NOTE: The Hopper Seal can be removed for cleaning.



TO RINSE CHEMICAL DRUMS

A feature of the induction hopper is the ability to be able to rinse the chemical drums with fresh water.
To do this:

1) Continue to have the sprayer pump operating, the hopper pulled down to its lower height setting and the Induction Hopper ball valve and the Supermix Agitator ball valve open so that there is flow going through the 3-Way Hopper Manifold at sufficient pressure for the hopper to work effectively (at least 500 kPa);

2) Ensure the fresh water filling supply pump system is operating;

3) Turn the red handle on the Fill Three-Way Ball Valve up so that the fresh water supply is directed to the Fill Manifold;

4) Open the Fresh Water Drum Rinse ball valve on the Fill Manifold;

5) Place the chemical drum upside down over the Drum Rinsing Nozzle and push down (to activate the rinsing nozzle);

6) Rinse for the desired amount of time;

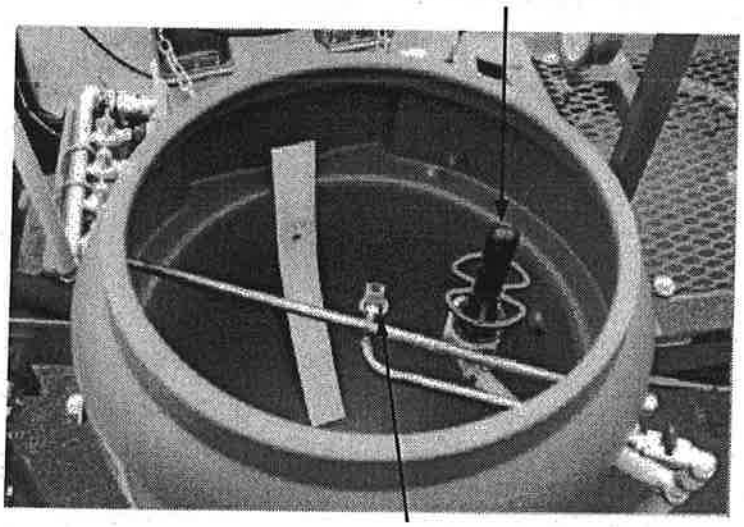
7) Open the hopper tank ball valve at the bottom of the hopper by turning up the yellow handle so that it is horizontal to remove the rinsate from the hopper and into the main spray tank;

8) When finished, remove the chemical drum from the Drum Rinsing Nozzle, close the hopper ball valve and the Fresh Water Drum Rinse ball valve on the fill manifold. Leave the red handle on the Fill Three-Way Ball Valve in its current position if wanting to continue to use the fill manifold, or turn it down (to direct fresh water into the main spray tank) or horizontal (to stop any filling);

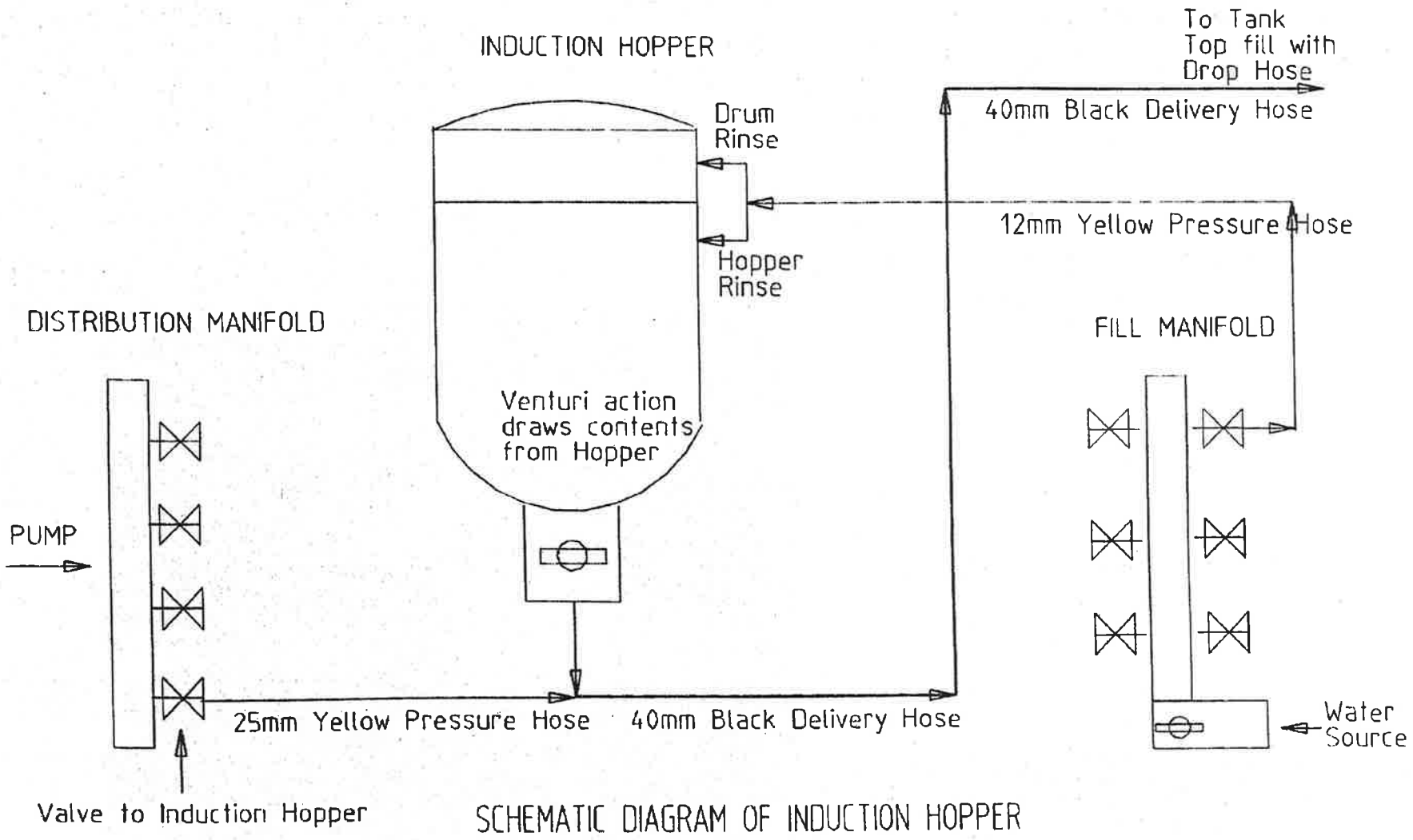
9) Dispose of the chemical drum according to the relevant regulations.

10) If finished using the induction hopper, alter the control manifold ball valves to the required configuration for the next operation.

DRUM RINSING NOZZLE



HOPPER RINSING NOZZLE



SCHEMATIC DIAGRAM OF INDUCTION HOPPER

"EXACTA" FOAM MARKER

The "EXACTA" foam marking system mixes the foam liquid (comprising the foam concentrate and water) with air in the foam generator on the boom. The foam is then forced out of the foam generator to the accumulator at the end of the boom.

Air from the compressor is passed through a small orifice in the foam generator to increase its velocity. This creates backpressure that is used to pressurize the tank (typically to around 70 kPa) which, along with liquid suction via the venturi effect in the foam generator, enables a suitable liquid delivery pressure. A control valve (needle valve) is used to vary the amount of foam liquid being delivered and to vary the foam quality to suit particular spraying conditions. The foam generator is situated near the end of the boom to ensure foam of a high level of consistency and with a short lead-time between starting the foam marker and foam coming out of the accumulator is achieved.

Most of the foam marker controls are electrically operated via the control box situated in the cabin. The compressor/diverter unit is mounted on the sprayer to minimize noise levels. A 7-pin trailer plug connects the foam control box to the compressor/diverter unit.

STANDARD PERFORMANCE TEST

As a guide, 1 litre of foam mixture (ie GoldAcres foam concentrate and water at the rate of 1 to 50) should take approximately 5 minutes to be used when the foam marker is correctly operated and produce 100 litres of foam. I.e. 20 litres of foam per minute;

100 Litre
Exacta Foam
Tank

OPERATION

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

- Add foam marker concentrate to clean, soft water at the rate of **1 to 50** (1 part foam concentrate to every 50 parts water, ie. for 100 litres of water, 2 litres of foam concentrate is required). Rain water is the best to use while bore water and dam water may tend to produce less foam as the water may be harder.
  It is important that the correct rate of 1 to 50 is used;

- It is necessary to adequately mix the foam concentrate and the water.

To achieve this when filling the foam tank via the Fill Manifold:

1) Make sure that initially all ball valves on the Fill Manifold are turned off and the red handle on the Fill Three-Way Ball Valve is horizontal;
2) Connect the fresh water fill hose to the Quick-Fill Coupling;
3) **Remove the lid from the foam tank;**
4) Operate the fresh water pumping system (make sure pressure does not exceed 690 kPa);
5) Turn the red handle on the Fill Three-Way Ball Valve up so that the fresh water is directed to the Fill Manifold;
6) Open the Foam Tank Fill Ball Valve. Water should now flow into the foam tank. Fill to about one-third full;
7) Add the required amount of GoldAcres foam concentrate for the whole tank mix (ie 2 litres of GoldAcres foam concentrate if filling the foam tank full from empty, ie 100 litres);
8) Continue to bottom-fill the foam tank until the desired amount has been transferred. The bottom-filling should serve to adequately mix the concentrate with a minimum of frothing;
9) When the desired amount of water has been transferred to the foam tank, shut the Foam Tank Fill Ball Valve and turn the red handle so that it is horizontal and thus shuts off any flow going to or from the tank;
10) Refit lid to tank, making sure the lid is screwed on securely and that the o-ring is in place inside the lid.

REMOVE LID WHEN BOTTOM FILLING FOAM TANK

When filling the foam tank via the lid, it is best to use a funnel, which extends to the bottom of the tank to minimize frothing:

1) Remove the lid from the foam tank;
2) Fill the tank to about one-third full;
3) Add the required amount of foam concentrate for the whole tank mix (ie 1 litre of GoldAcres foam concentrate if filling from empty, ie 50 litres);
4) Continue to bottom-fill the foam tank until the desired amount has been transferred;
5) Replace the lid on the foam tank (making sure the o-ring is in place).

- If the foam marker concentrate has been allowed to settle in the tank, it will need agitating before operating in order to produce satisfactory foam. If the foam concentrate is not mixed thoroughly it will tend to settle to the bottom of the tank. Consequently, the initial concentrate rate may be too high and then later too low. The best way to agitate is to stir the mixture with an appropriately shaped object. Foam concentrate does not take long to deteriorate when mixed with water, so that it does not produce foam as well. This can happen after only two days so if the foam mixture has been left for an extended period of time and it does not produce good foam, replace the mixture;

- If there is uncertainty regarding the percentage of foam concentrate in the tank mixture, drain the tank and replace with water and foam concentrate;

- Join the 7-pin plugs. Ensure the compressor has the proper 12 Volt battery supply (compressor will pump more air with vehicle running due to increased voltage);

- Switch to '**on**' the Master switch on the Foam Control Box. This will start the compressor (with air being delivered out the left side). As backpressure develops in the air line, the foam tank will begin to be pressurized causing the liquid to be pushed out to the generator. Allow several minutes for this to occur (more when tank is not full). Switch the Left/Right switch to the relevant side. This opens the relevant solenoids in the compressor/diverter Box to allow the air and foam mixture to be delivered to the selected foam generator;

- Adjust the flow control valve on the Compressor / Diverter Box to produce foam of the required foam composition (dense or loose depending on the respective conditions). Turn the control valve completely off. Then turn the valve **5 turns** and the foam should begin to be of reasonable quality. The control valve can then be varied to make the foam lighter or heavier;

- Switch the Master switch to '**off**' and the Left/Right switch to the center position when operation is finished and **shut the Foam Tank ball valve at the bottom of the tank**;

- Regularly inspect the foam marker lines, to ensure they are free of foreign matter;

- Periodically remove and clean the filter. The Foam Marker filter is located underneath the foam marker tank. To remove the filter, ensure the appropriate protective clothing is being worn. Close the Foam Tank Ball Valve, loosen the filter bowl, remove the filter and clean. Replace the filter and tighten the filter bowl;

- Periodically check the condition of the one-way valve in the compressor/diverter unit.

TO ACHIEVE VARYING FOAM TYPES

With the "Exacta" foam marker the foam type can be varied to suit particular spraying conditions. Adjusting the needle valve can vary the foam concentrate and the flow rate of liquid to the foam generator. Other factors that affect foam quality include temperature and water quality.

Altering the flow rate of liquid to the foam generator is the simplest way of varying foam type. Turn the needle valve completely off and then turn it on **5** turns. Next turn the valve to obtain the desired foam type. **All adjustments of the control valve should be within + or – ½ a turn or similar.** Allow sufficient time for the altered foam to come out of the accumulator. If the foam is too runny close the valve slightly, if the foam is stiff and has air holes open the valve slightly.

Always ensure the rate is at **1 to 50** of GoldAcres foam concentrate is maintained (1 part foam concentrate to 50 parts water).

Different spraying conditions require different foam types:

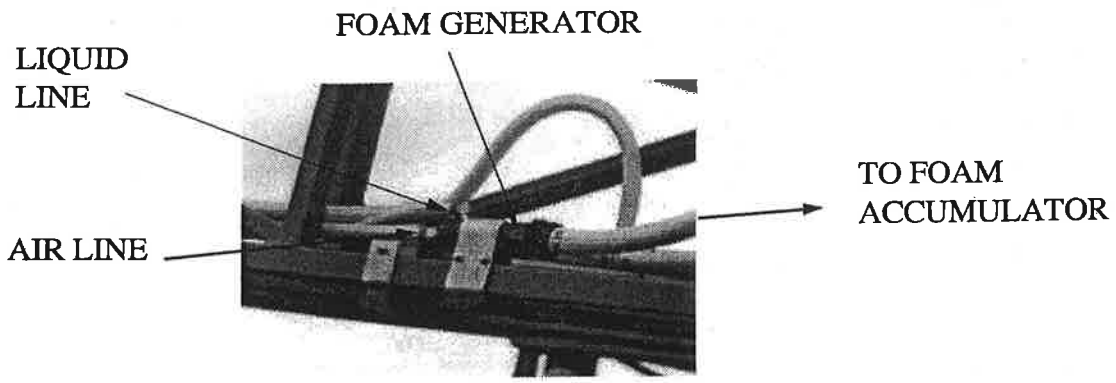
- Loose foam is desirable when spraying in crops where the foam needs to sit on top of the crop in order to be visible;

- 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.

FOAM GENERATOR

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

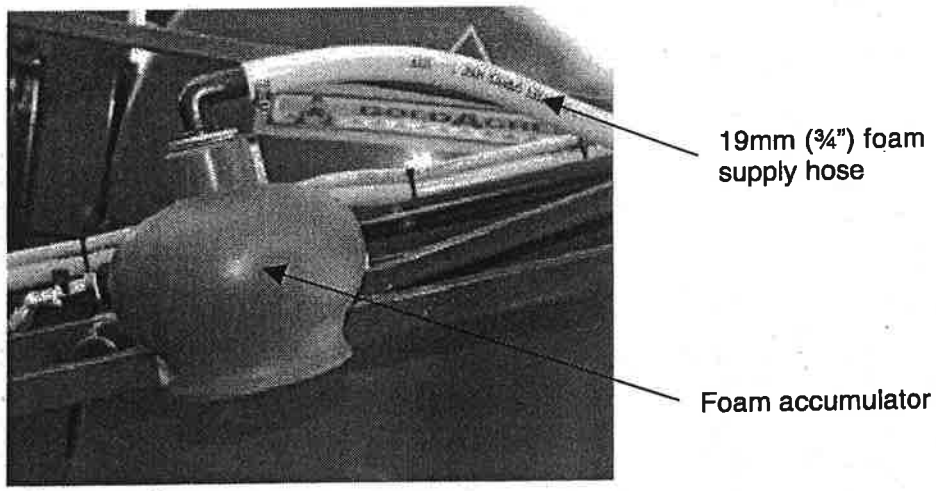
The foam line from the foam generator to the accumulator must be 19mm (3/4") diameter hose and four metres long. This gives the foam time to pack to a fine, light consistency.



FOAM ACCUMULATOR

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

NOTE: The position of the Foam Accumulator is between the last two nozzles on the spray boom (to prevent the accumulator from being dislodged frequently from the boom). This position must be taken into consideration when using the foam to line up the next pass.



EXACTA FOAM FILTER

It is essential to maintain the filter in good condition. A partially blocked filter can impede flow and thus delivery pressure and foam quantity or quality. If the filter is in any way damaged, replace it. Also, if the filter is not properly fitted, it can allow leaking of the foam mixture. The filter should be cleaned daily.

To clean the filter:

1) Close the Foam Tank ball valve, thus isolating the tank from the filter;

2) Carefully unscrew filter bowl;

3) Remove filter strainer and clean strainer with water (under pressure) or toothbrush;

4) Check for damage to strainer, body, seal or bowl;

5) Place strainer back in position;

6) Make sure seal is in proper position;

7) Screw bowl back on (hand tight);

8) Do not over-tighten bowl;

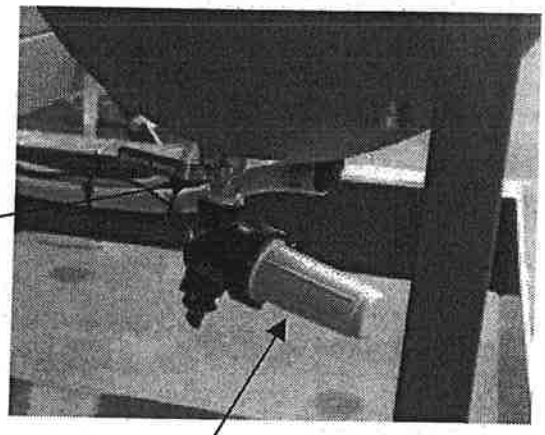
9) Open Foam Tank ball valve when wanting to operate.

DRAIN

Removing the bowl on the filter provides a drain for the Foam Marker Tank. To drain the tank:

- Ensure the Foam Tank Ball Valve is closed;
- Remove the filter bowl and strainer;
- Open Ball Valve and drain tank;
- Wash strainer;
- Replace strainer and filter bowl, then open Ball Valve.

Make sure the seal is not lost when draining.



SAFELY MOUNTING THE FOAM CONTROL CONSOLE

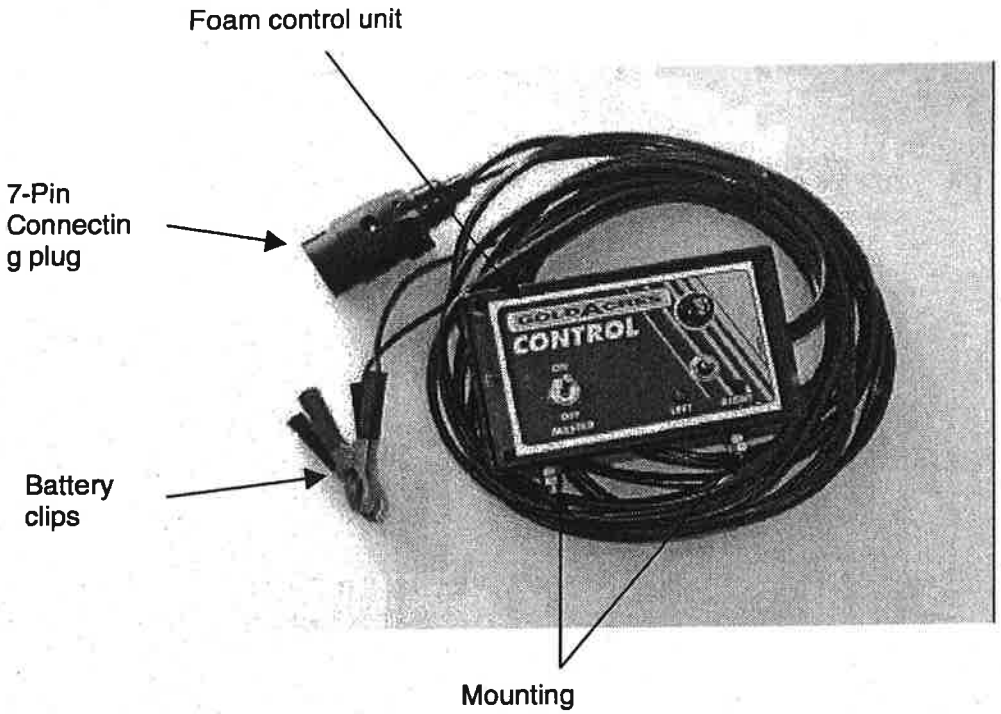
It is important that the Foam Control Console is mounted in the cabin in such a way that it cannot cause harm to the operator, especially if the Foam Control Console becomes a projectile. When for example, the sprayer is disconnected from the vehicle but the cable loom connecting the Foam Control Box (or any console for that matter) to the sprayer is not disconnected, ensure the Foam Control Box will not harm the operator if it becomes a projectile.

Securely install the Foam Control Console in a position within easy reach of the operator. The two bolts at the base of the foam control box are designed to provide adequate mounting.

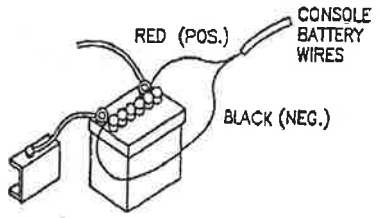
Connect the 7-pin plugs (one attached to the Compressor/Diverter Box, the other attached to the Foam Control Box). Do not use excessive force to connect the plugs as this may damage the pins and thus impair the contact. Carefully push the plugs together so that they lock into position and fit together evenly.

Directly connect the power wires to a 12 Volt battery (see the diagram on the next page). Do not connect to other voltage outlets, as they will not be able to handle the current. Attach the red wire (positive) to the positive terminal and the black wire (negative) to the negative terminal. Do not tie the battery wires close to the existing battery leads or any other electrical wiring.

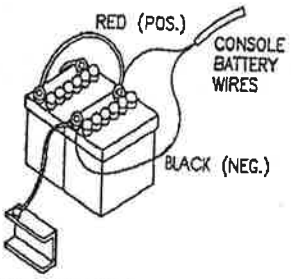
If using two 12 Volt batteries (ie two batteries in parallel) it is best to utilize the power supplied by both batteries (ie connect to positive terminal on battery supplying starter motor and negative terminal on other battery, see the diagrams on the following page).



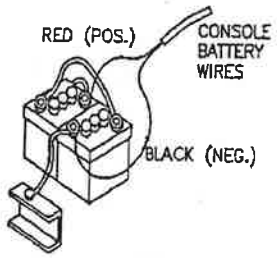
BATTERY CONNECTIONS



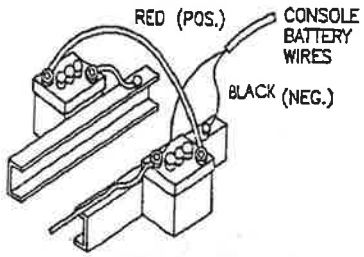
ONE 12–VOLT BATTERY



24–VOLT SYSTEM USING
TWO 12–VOLT BATTERIES

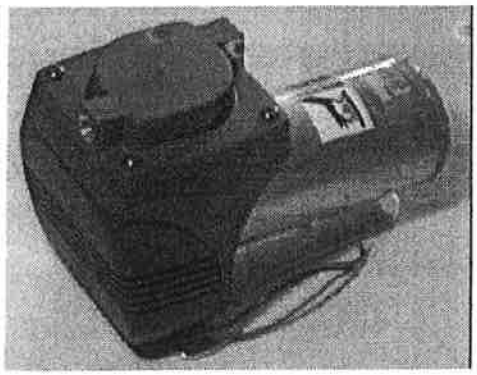


12–VOLT SYSTEM USING
TWO 6–VOLT BATTERIES



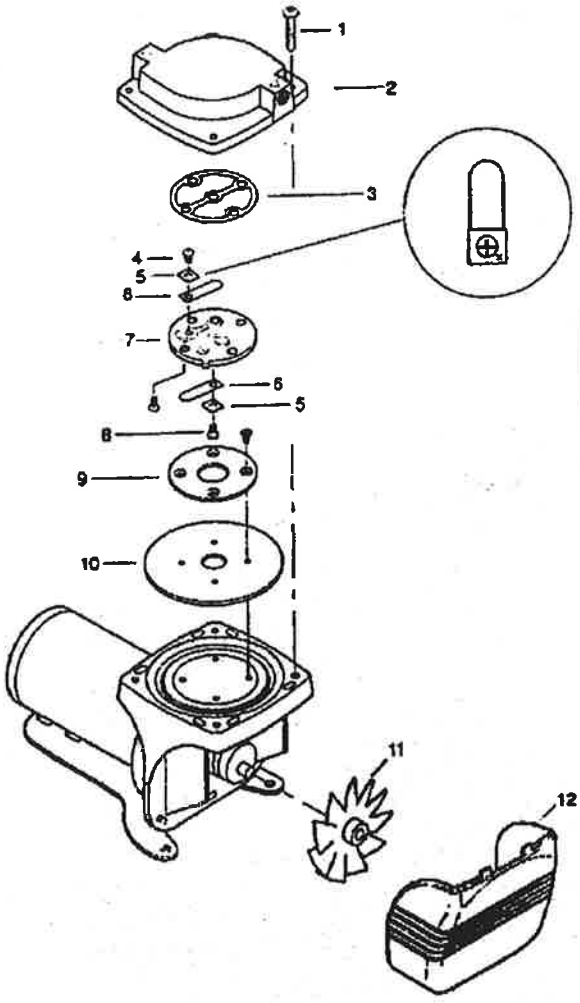
12–VOLT SYSTEM USING
TWO 6–VOLT BATTERIES

FOAM MARKER COMPRESSOR



This compressor is used for both the Exacta and Standard foam markers.

22DI-P103-KGB	Gast bare compressor
22DI-P103-KGB-C	Gast compressor mounted in compressor box for manual (standard) operation.
22DI-P103-KGB-EX	Gast compressor mounted in compressor box including control console for remote operation.



PARTS ORDERING INFORMATION

Ref. No.	Description	Part Qty	Model#
1	Head Screws	4	SCR1001
2	Head	1	HDC1003
•3	Head Gasket	1	ACC1018
•4	Intake Valve Screw	1	SCR1017
•5	Retainer Valve	2	AF795
•6	Valve	2	AF819A
7	Valve Plate	1	VPL1003
•8	Exhaust Valve Screw	1	SCR1015
9	Retainer Plate	1	RPL1001
10	Diaphragm (Neoprene mat'l)	1	DPH1001
11	Fan	1	ACC1001
12	Grille	1	CVR1001
	Service Kit	1	K707

• Denotes parts included in the Service Kit.
Parts listed are for stock models. For specific OEM models, consult the factory.
When corresponding or ordering parts, please provide complete model and serial numbers.

COMPRESSOR AIR FILTER

CLEAN COMPRESSOR AIR FILTER ELEMENT DAILY

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

Clean the element with compressed air - Do not use water to clean element.

FILTER ELEMENT

CHECKING / REPLACING FLAPPER (REED) VALVES

If the compressor is not performing adequately, firstly check the wiring to ensure there is enough voltage reaching the compressor. If the compressor is still not performing, the flapper (reed) valves are prone to wear, therefore check them. If the reed valves are damaged or bent in any way, or if dirt becomes lodged under the reed valves, this will dramatically reduce the performance of the compressor.

The following procedure should be adhered to when checking or replacing reed valves:

(1) Remove head from compressor, by removing the four corner head screws (see pictures on next page);

(2) Label the ports noting the direction of the arrows so you can orient the pump head correctly during reinstallation;

(3) Remove valve plate from head, by removing valve plate screws and center valve screw;

(4) Remove valve screw and valve keeper strip (note the orientation) for both reed valves (top and bottom);

(5) Inspect both flapper (reed) valves;

(6) Replace valve if damaged or bent (available from your nearest GoldAcres dealer or the manufacturer);

(7) Ensure that the surface under the valves is clean;

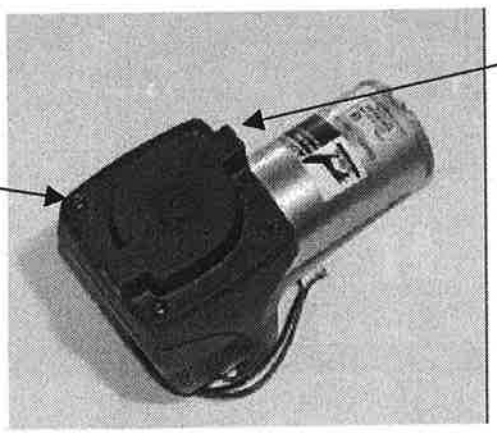
(8) When reassembling flapper (reed) valve, make sure the valve is orientated correctly, covering the proper hole;

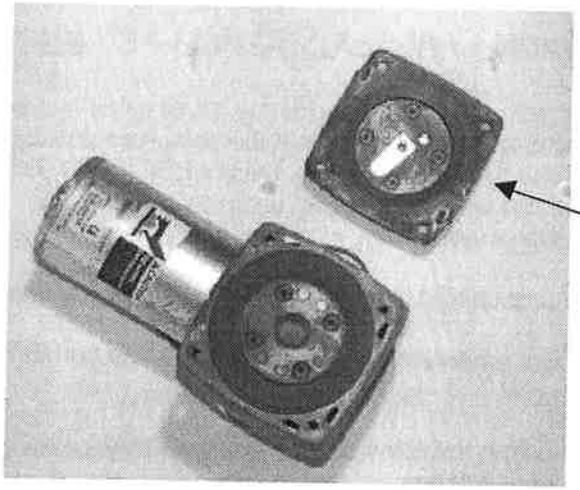
(9) Replace valve keeper strip (with "UP" facing up and away from the reed valve) and screw;

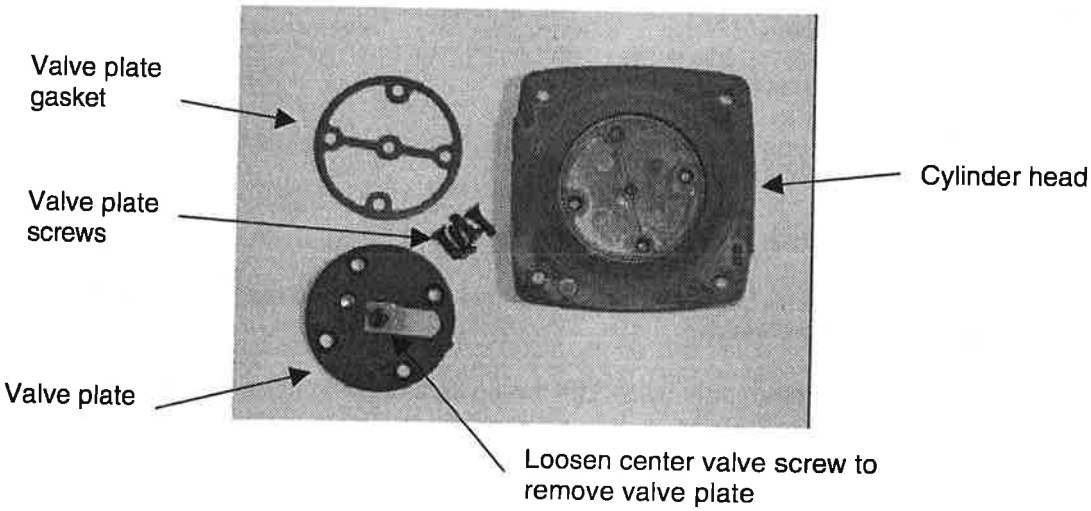
(10) Replace valve plate by lining lug on valve plate with grove in the cylinder head;

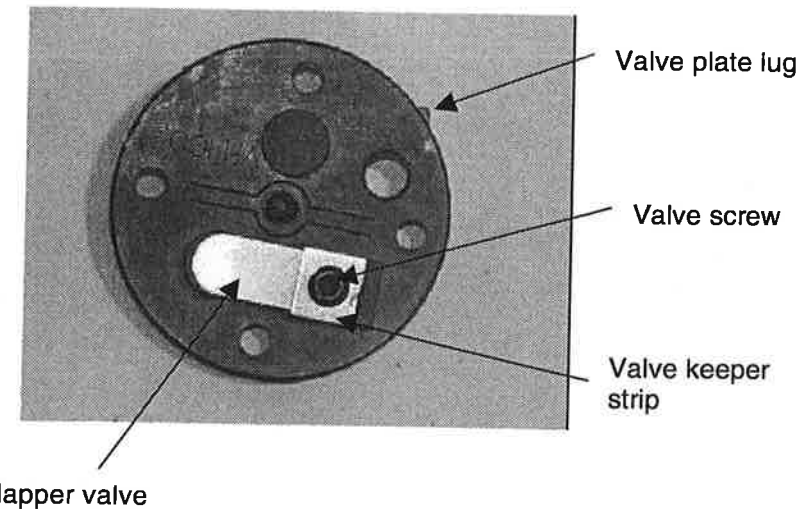
(11) Screw the valve plate screws in;

(12) Replace head and head screws.

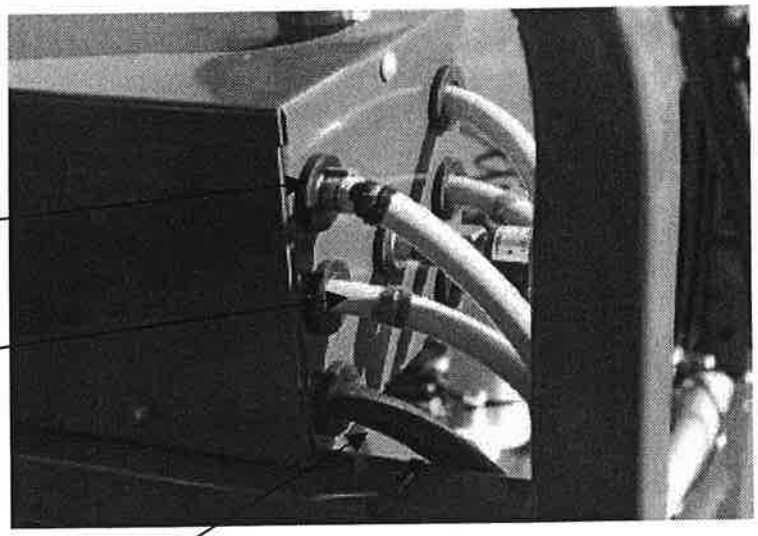



Compressor head

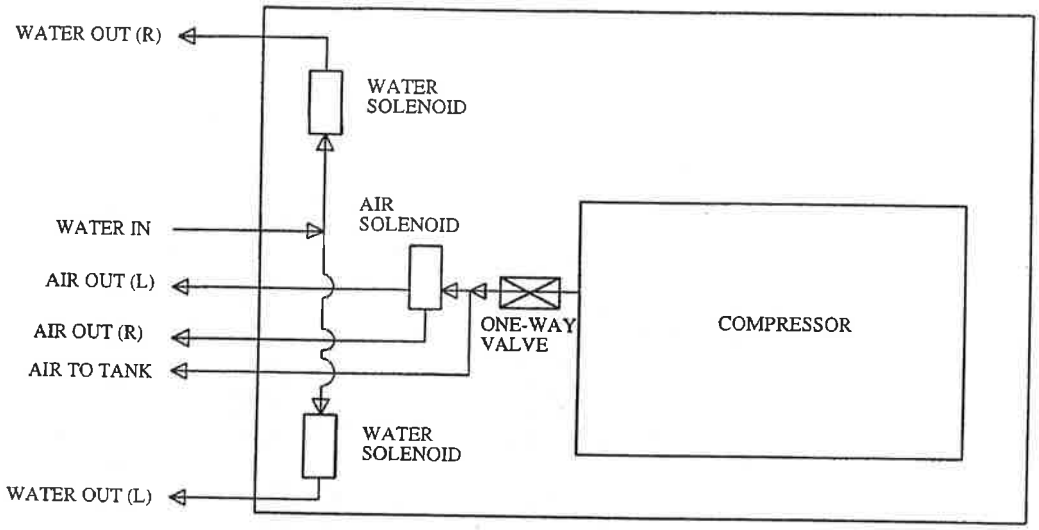

Valve plate gasket
Valve plate screws
Valve plate
Cylinder head
Loosen center valve screw to remove valve plate

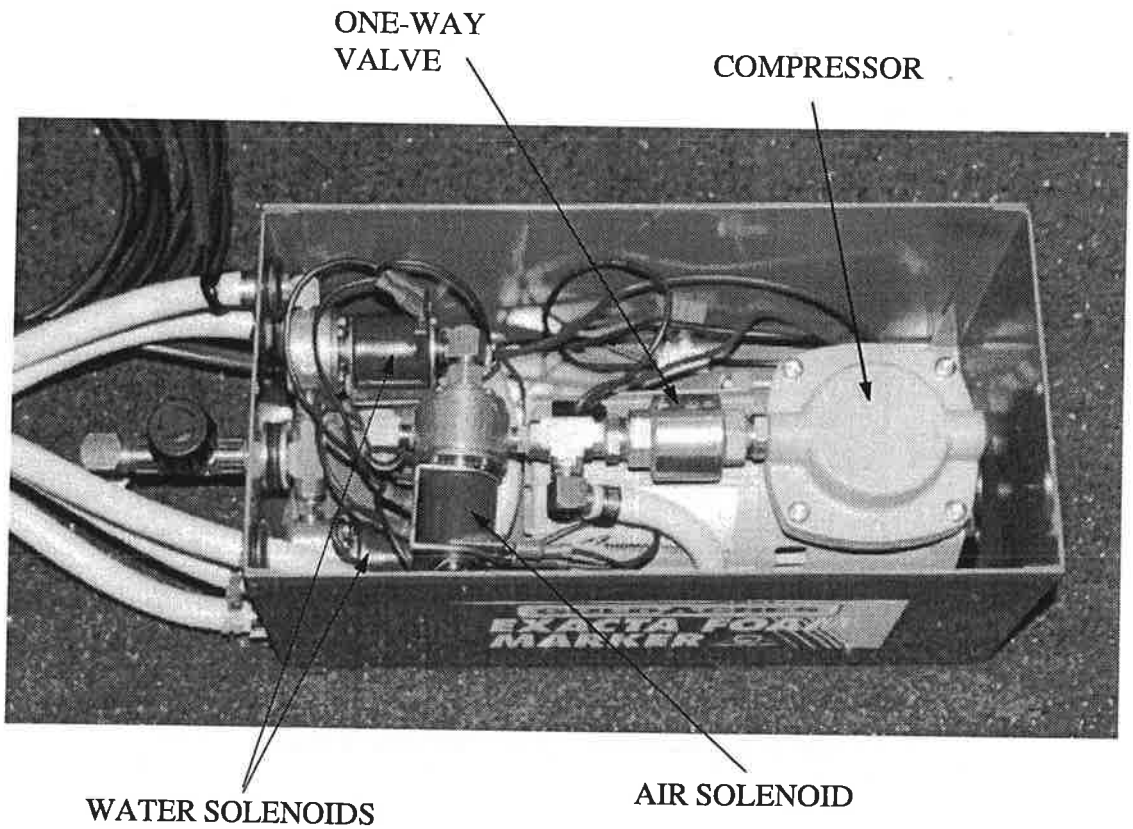

Valve plate lug
Valve screw
Valve keeper strip
Flapper valve

"EXACTA" FOAM MARKER COMPRESSOR/DIVERTER UNIT

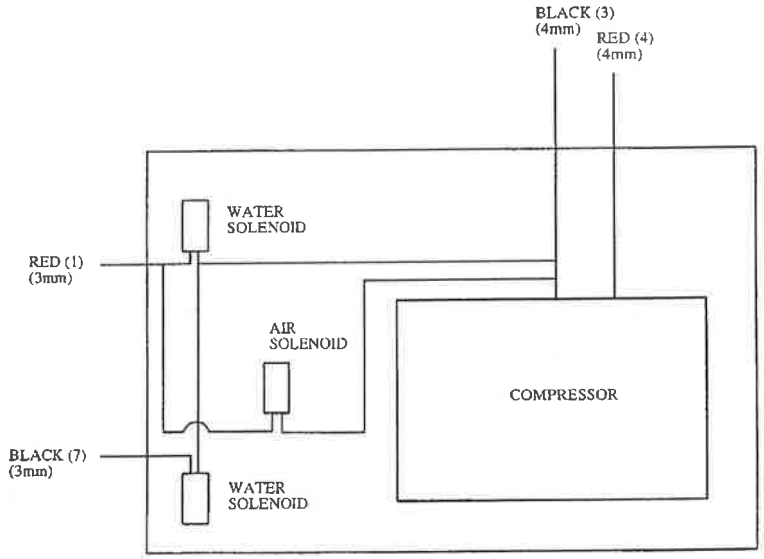


SCHEMATIC LAYOUT OF COMPRESSOR/DIVERTER UNIT

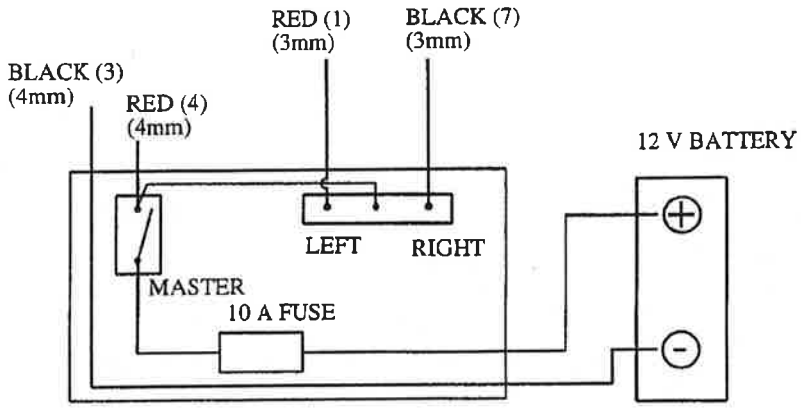




ELECTRICAL WIRING DIAGRAM OF COMPRESSOR/DIVERTER UNIT



ELECTRICAL WIRING DIAGRAM OF "EXACTA" FOAM CONTROL BOX



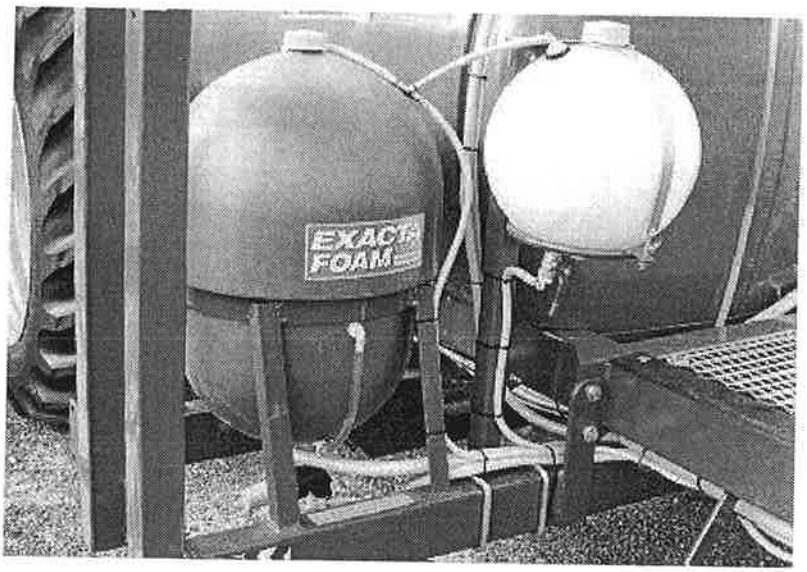
"EXACTA" FOAM MARKER with DIRECT INJECTION

The "Exacta" foam marking system with Direct Injection is a variation of the Exacta foam marker with the added feature of the foam concentrate and water being contained in separate tanks. The foam concentrate is then injected directly into the water line to form the foam liquid and then this foam liquid is mixed with air in the foam generator out on the boom. The foam is then forced under pressure out of the foam generator to the accumulator at the end of the boom. The advantage of this system is that there is not a predetermined amount of foam concentrate mixed with water but rather only what foam concentrate is required is used.

Both the foam concentrate tank and foam water tank is pressurized from system back pressure (typically around 10 psi). A control valve (needle valve) in the foam concentrate line restricts the amount of concentrate used to a constant rate. A control valve (needle valve) is used to vary the amount of water being delivered which enables variability in the foam composition to suit appropriate spraying conditions.

The foam is generated in the foam generator, which is situated on the boom, and then the foam is forced out to the foam accumulators and out on the ground. This results in production of foam of a high level of consistency and with a short lead time between starting the foam marker and foam coming out of the accumulator.

The foam marker controls are electrically operated via the foam control box from the cabin. The compressor/diverter unit is mounted on the sprayer and thus the compressor noise is not a problem for the operator. A 7-pin trailer plug connects the foam control box to the compressor/diverter unit.



OPERATION

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

- Make sure there is sufficient water in the foam water tank and foam concentrate in the foam concentrate tank in order to generate sufficient foam to complete the required spraying application. Note: As a guide, 5l of water combined with 100ml of GoldAcres foam concentrate should supply foam for approximately 25 minutes when the foam marker is correctly operated;

- Connect the 7-pin plugs together (connects the foam control box to the compressor/diverter unit). Ensure the compressor has the proper 12 Volt battery supply (compressor will pump more air with vehicle running due to increased voltage);

- Switch the Master switch on the foam control box to On and initially the Left/Right switch to the central position. This will start the compressor (with air being delivered out the left side). As backpressure develops in the air line, both the foam water tank and the foam concentrate tank will begin to be pressurized causing the required delivery of both the water and the concentrate. The backpressure in the airline sets the pressure in the system. Allow several minutes for this to happen (more when tank is not initially full). Switch the Left/Right switch to the relevant side and this will open the relevant solenoids in the compressor/diverter unit to allow the air and foam mixture to mix in the foam generator and foam will be produced;

- Open the ball valves at the bottom of both the foam water tank and the foam concentrate tank;

- The control valves need to be adjusted correctly in order for the concentration rate to be correct. Turn the control valve completely off. Then turn the water valve **5 turns** and turn the foam valve **1 ½ turns** and the foam should begin to be of reasonable quality. For initial operation, valves may be opened further than this then adjusted back to achieve reasonable quality. The control valves can then be varied to make the foam lighter or heavier.

- Switch the Master switch to Off and the Left/Right switch to the centre position when operation is finished and **shut the ball valve at the bottom of both the foam water and foam concentrate tanks**;

- Regularly inspect the foam water and foam concentrate tanks when empty and always ensure all lines are free of foreign matter;

- Regularly clean and check the condition of the filter at the bottom of the foam water tank;

- Periodically check the condition of the one-way valve in the compressor/diverter unit.

TO PREVENT SYPHONING FROM OCCURING WHEN EITHER THE WATER OR FOAM CONCENTRATE TANK EMPTIES

If either the water tank of the foam concentrate tank empties, it is possible that flow from the other tank (foam water or foam concentrate) can syphon 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 until both tanks contain sufficient liquid for the next spraying application, when the valves then need to be opened.

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 before the foam water is opened so that water is not wasted while it is waiting for the concentrate to reach it.

To bleed the foam concentrate:

- Have the ball valve at the bottom of the foam concentrate tank open and the ball valve at the bottom of the foam water tank closed;
- Switch the Master switch on the foam control box to On and the Left/Right switch to the central position (this will pressurize the tanks);
- Loosen the orifice cap and wait until foam concentrate comes through the line;
- Tighten the cap when the concentrate is detected;
- Open the ball valve at the bottom of the foam water tank and switch the Left/Right switch to the relevant side and allow a few minutes for the foam to come out of the accumulator.

FOAM TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Insufficient / poor quality foam	- Insufficient concentrate or water - Control valve not set correctly - Dirty or hard water used - Water hose blocked or kinked - Air hose blocked or kinked - Air jet blocked - Filter blocked - Insufficient power to compressor/diverter unit - Compressor failing to produce sufficient air	- Check quantity of concentrate and water - Adjust control valve - Flush and replace with clean soft water - Disconnect and flush to remove any blockages and straighten any hose if necessary - Disconnect and blow through with air to remove blockages and straighten any hose if necessary - Check and clean air jet - Check and clean filter - Check terminal connections and 12 volt battery supply - Check/replace compressor reed valves and clean compressor filter

DIRECT INJECTION KIT INSTALLATION

To install the direct injection kit onto a sprayer with the existing GoldAcres Exacta foam marker:

1. Securely bolt foam concentrate bracket on the sprayer undercarriage near the existing exacta foam tank;

2. Insert t-piece into the air-line going to the top of the Exacta foam tank and join hose coming out of the top of the concentrate tank to the t-piece;

3. Replace the ½" hose going from the filter under the exacta foam tank to the needle valve with the supplied ¼" hose. The necessary fittings will have to be replaced to accommodate the ¼" hose;

4. Insert the one-way valves into both the concentrate line and the water line. The one-way valve is designed to prevent flow going back up into the concentrate tank and the exacta tank which now should contain only fresh water. The black mark on the one-way valve marks the end where the flow will come out. This end should be the furtherest end from both the concentrate tank and the Exacta tank. Blow through the valve to make sure the valve will be orientated correctly. The black lining tube will need to be placed over the barbs on the one-way valve so that it can inserted into the ¼" hose;

5. When the hose attached to the existing needle valve is removed, unscrew the needle valve from the compressor box and insert the flow regulator assembly in between the compressor box and the needle valve;

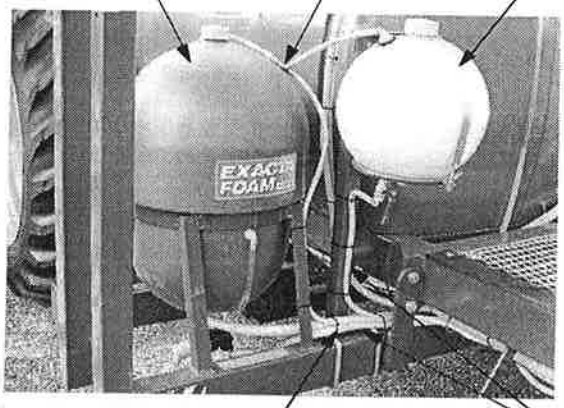
6. Attach the ¼" hose coming from the ball valve at the bottom of the concentrate tank to the needle valve inlet;

7. Tie all hoses down securely with the supplied electrical ties.

Insert T-piece into pressure line to pressurize tank

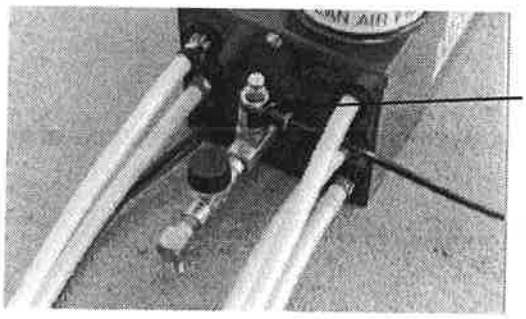
Foam Water tank

Bolt-on Foam Concentrate Tank



Replace 1/2" water hose with 1/4" hose

Insert one-way valve in both the water line and concentrate line



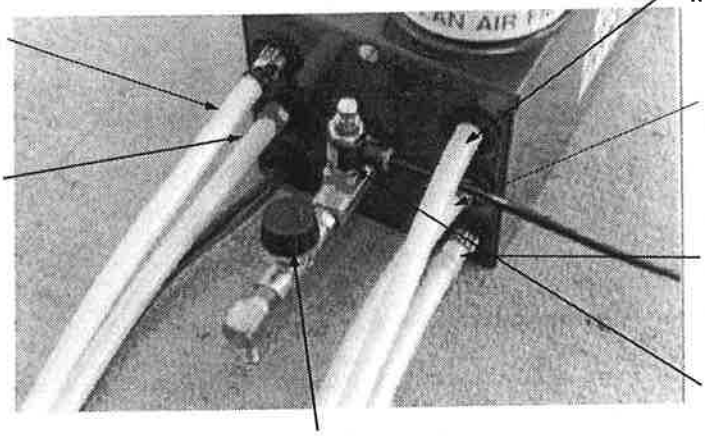
Insert the concentrate line after the existing needle control valve (ie screw in T-piece and new needle valve between the existing needle valve and the compressor box)

ESC6-PT1/4-I

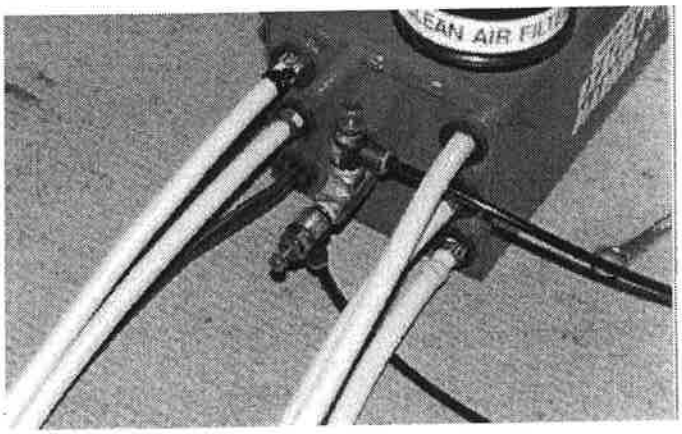
Inlet

Outlet

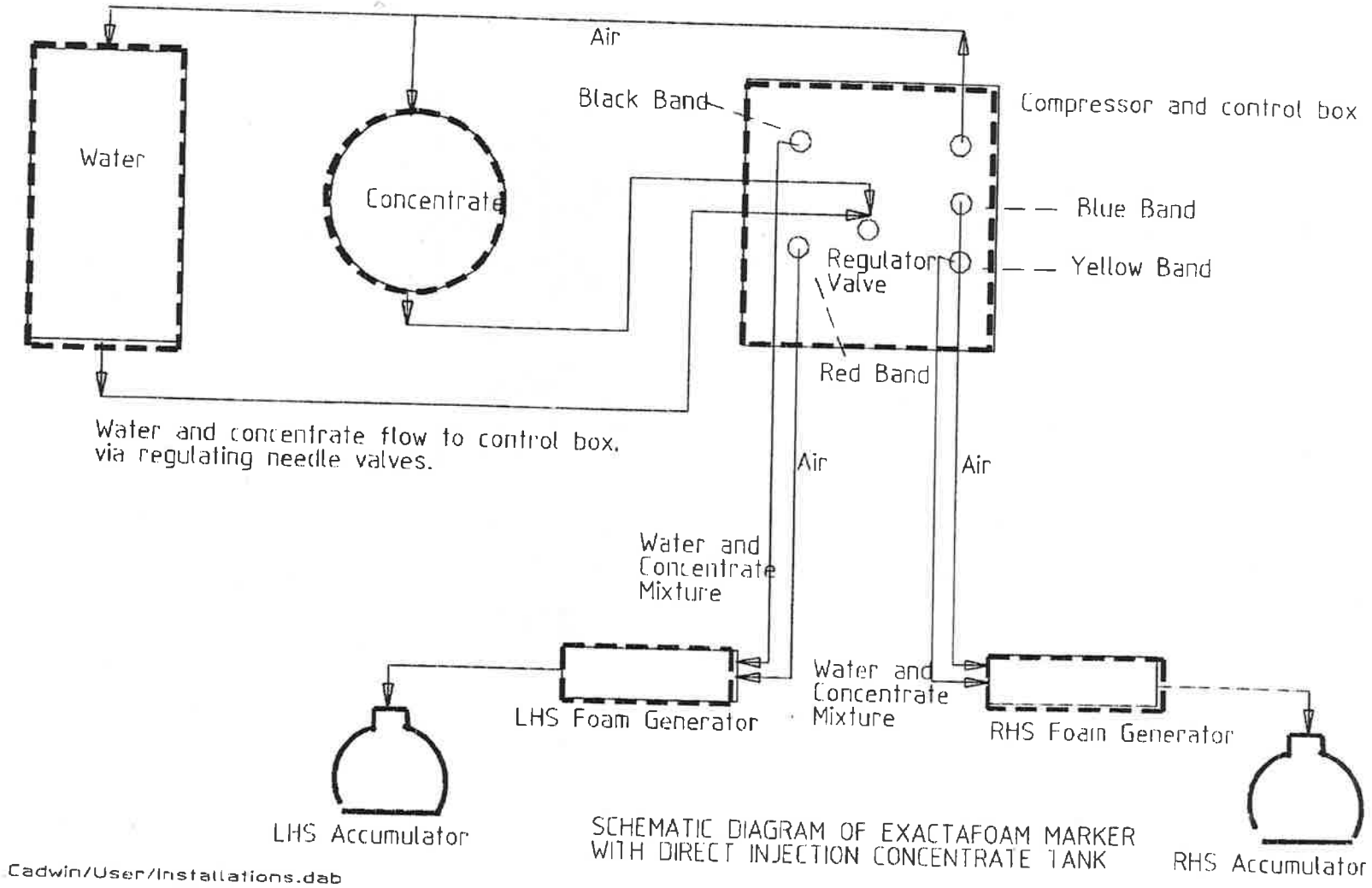
RETROFIT DIRECT INJECTION TO EXISTING EXACTA FOAM MARKER



NEW DIRECT INJECTION EXACTA FOAM MARKER



All lines as for Retrofit Kit



SCHEMATIC DIAGRAM OF EXACTAFOAM MARKER WITH DIRECT INJECTION CONCENTRATE TANK

STANDARD FOAM MARKER

The standard foam marking system incorporates the mixing of the foam liquid (comprising the foam concentrate and water) with air in the foam marker tank. The foam is then forced under pressure out of the tank and down the foam delivery line to the accumulator at the end of the boom.

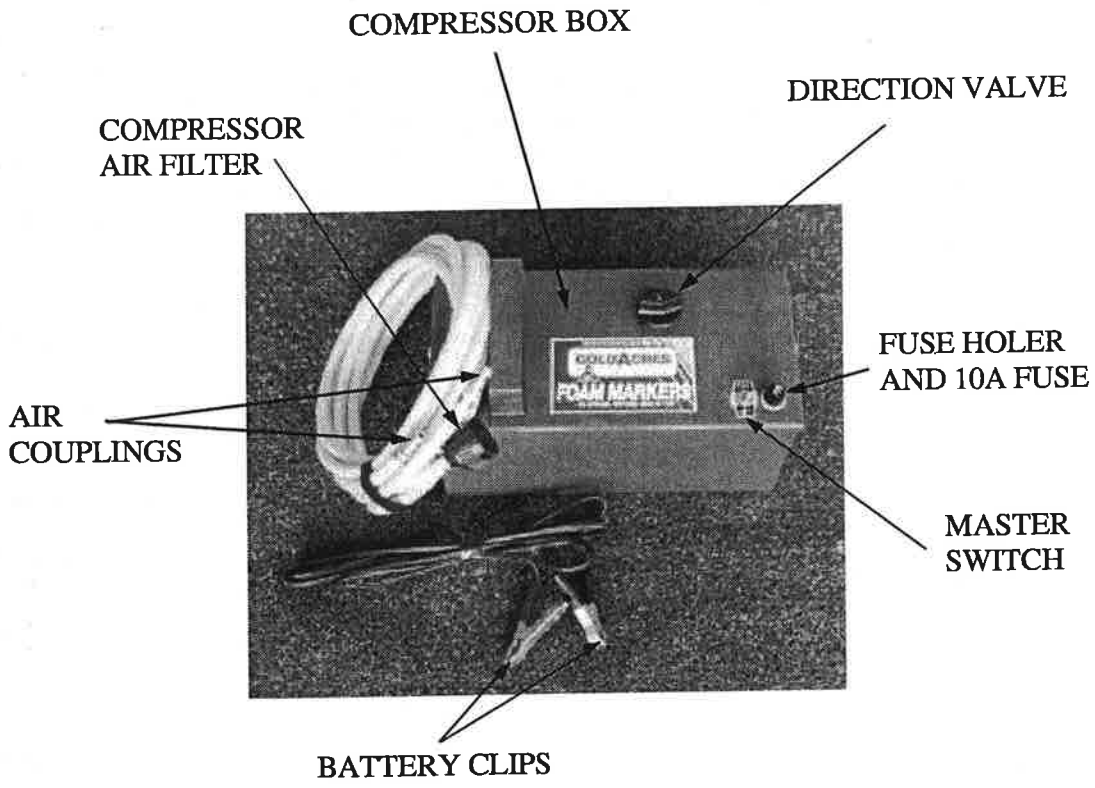
The controls are all on the Compressor Box so it needs to be mounted close to the operator. The air inlet filter should be placed outside the operator's cabin and due to the inherent noise associated with the workings of a compressor, it is advisable to also mount the compressor outside the operator's cabin but within reach of the operator.

STANDARD PERFORMANCE TEST

TEST: Should fill 20 litres in 3 minutes (fill bucket up) @ rate of 1 to 100 (add 10 litres of clean, soft water and 100ml of **GoldAcres concentrate).**

SAFELY MOUNTING THE COMPRESSOR BOX

It is important that the Compressor Box is mounted in the cabin in such a way that it cannot cause harm to the operator under any circumstance. If the sprayer is disconnected from the vehicle but the hoses connecting the Compressor Box (or any console for that matter) to the sprayer is not disconnected, make sure the Compressor Box will not harm the operator if it becomes a projectile.



OPERATION

To have a successful foam marking system, it is essential to observe the following:

- Add foam marker concentrate to clean, soft water at the rate of **1 to 100** (1 part foam concentrate to every 100 parts water, ie. for 50 litres of water, 500 ml of foam concentrate is required). Rain water is the best to use while bore water and dam water will tend to produce less foam as the water is harder. **It is important that the correct rate of 1 to 100 is used;**

- If the foam tank is filled via the lid, then it is best to use a funnel which extends to the bottom of the tank to minimize frothing. Fill the tank to about one-third full. Then add the required amount of foam concentrate for the whole tank mix (ie 500 ml of GoldAcres foam concentrate if filling the 50 litre foam tank full from empty, ie 50 litres). Then continue to fill the foam tank until the desired amount has been transferred. The bottom-filling should serve to adequately mix the concentrate and the fresh water with a minimum of frothing.

Note: Do not forget to replace the lid on the tank and make sure the o-ring is in place;

- Start compressor by switching on the Master switch on the Compressor Box and connect the respective air lines together. Allow a few minutes for the foam to travel to the accumulator and for the foam to be of suitable consistency. Use the Direction Valve on the Compressor Box to determine which side the foam is to come out;

- The quality of the foam is dependent upon concentrate rate, quantity of air, temperature and quality of water. Adding more water to the container (thus reducing the concentrate rate) often improves the foam if there are problems with foam production;

- **Disconnect the air lines between the compressor and the foam tank as soon as the operation is finished to avoid foam mixture entering the compressor;**

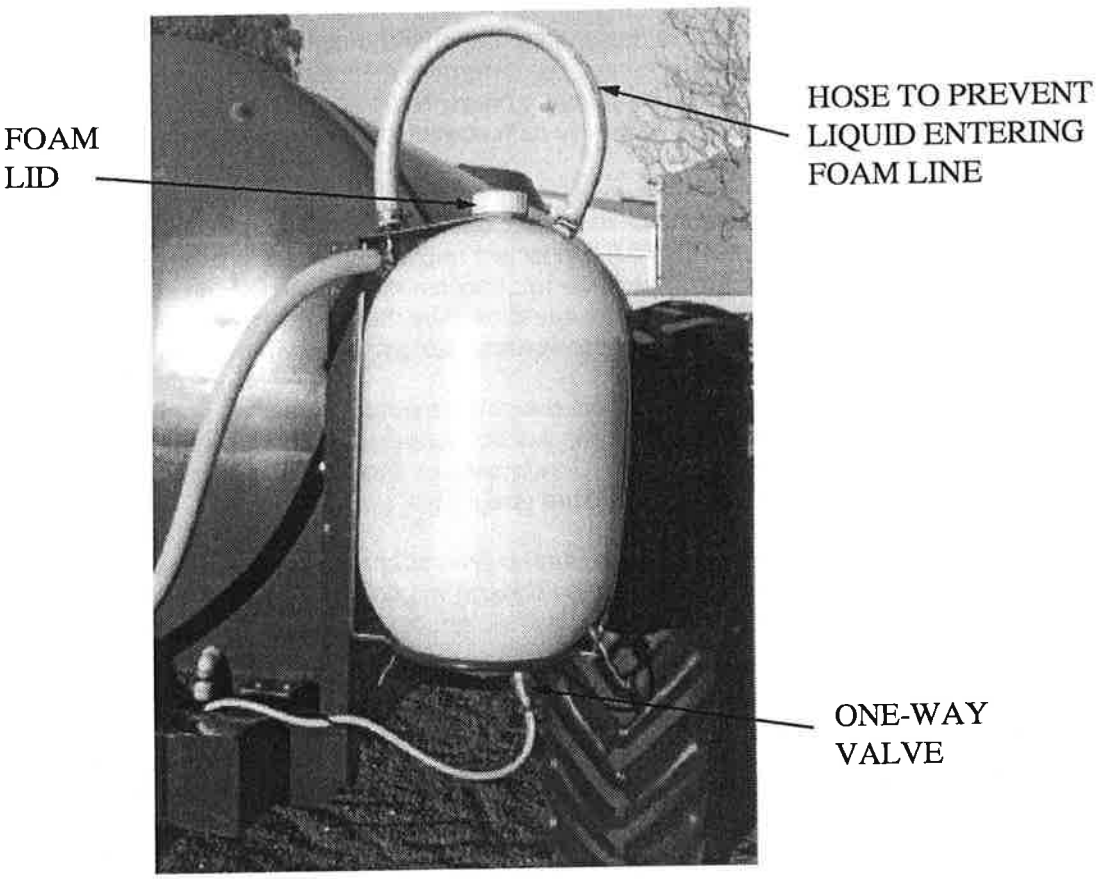
- Foam concentrate does not take long to deteriorate when mixed with water, so that it does not produce foam as well. This can happen after only two days so if foam mixture has been left for an extended period of time and it does not produce good foam, replace the mixture;

- If there is uncertainty regarding what the actual rate is, drain the foam marker tank and replace with water and foam concentrate at the correct rate;

- Regularly flush and drain the container and ensure the air lines are free of foreign matter;

- **Regularly clean and check the condition of the One-Way Valve at the bottom of the foam container;**

- Regularly clean the compressor air filter.



TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Insufficient / poor quality foam	- Incorrect concentrate rate	- Empty tank and refill with correct mixture
	- Stale foam concentrate	- Replace mixture
	- Dirty water used	- Flush and replace mixture using clean water
	- Foam delivery hose blocked	- Disconnect and flush to remove any blockages
	- Air delivery hose blocked	- Disconnect and blow through with air to remove any blockages
	- Insufficient power to compressor	- Check terminal connections and 12 volt battery supply
	- Compressor failing to produce sufficient air	- Check / replace compressor reed valves
		- Check / clean air filter

RAVEN AUTOMATIC MONITOR CONTROLLER

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 calculation 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 estimates 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 altered by the control valve which varies the amount (volume) of bye-pass and thus the volume being applied via the boom.

Therefore when 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, and 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.

MOBILE PHONES MAY INTERFEAR AND/OR DISRUPT AUTOMATIC CONTROLLERS

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 unit to be calibrated before starting to spray. For more detailed information about console features, consult the Raven Installation and Service Manual.

It is imperative that the Raven console is correctly programmed, as the system will only work as accurately as its programmed information.

The following information is applicable for the SCS 440, SCS 450, and SCS 330 console. **Write down all the numbers that are entered when calibrating the console for future reference.**

Initially displaying **"SP 1"** and **"CAL"** **(440 Console)**
"SP 1" **(330 Console)**

STEP 1: **"SI"** (metric units) has been automatically programmed into the updated Consoles

If the console displays **"US"** (ie imperial units)
Press [**CE**] and toggle until **"SI"** is displayed, then Press [**ENTER**]

STEP 2: Press [**ENTER**] to lock in "**SP 1**" (Wheel-Drive or Drive-Shaft Speed Sensor)

For Radar Speed Sensor , toggle to "**SP 2**" by pressing [**CE**] then [**ENTER**]

STEP 3: Press [**ENTER**] to lock in "**C-SD**" (Standard Valve)

For Fast Close Valve (ie for the valve to also be used to close the boom sections instead of solenoids, commonly used with anhydrous ammonia), toggle to "**C-FC**" by pressing [**CE**] then [**ENTER**]

NOTE: These three steps are very important because the system will appear to function properly but if the units are incorrect the quantities will be very inaccurate. If an error has been made whist calibrating these three steps, turn the console off then turn back on again with [**CE**] pressed and all information will be cleared. To see what has been programmed, depress [**SELF TEST**] (**440 and 450 Console**) or [**TOTAL AREA**] (**330 Console**) for about 5 seconds and the programmed information should be displayed (flashing and toggling)

STEP 4: (330 AND 440 CONSOLE ONLY)
Press [**BOOM CAL 1**] then [**ENTER**]

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

Enter Boom Section 1 in Centimetres (for example 6m = 600 cm)

Press [**6**] then [**0**] then [**0**]

Press [**ENTER**] (eg 600)

STEP 5: Press [**BOOM CAL 2**] then [**ENTER**]

Enter Boom Section 2 in Centimetres (for example 6m = 600 cm)

Press [**ENTER**] (eg 600)

STEP 6: Press [**BOOM CAL 3**] then [**ENTER**]

Enter Boom Section 3 in Centimetres (for example 6m = 600 cm)

Press [**ENTER**] (eg 600)

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

STEP 4: (450 CONSOLE ONLY)
The Raven 450 console has provisions for handling up to six boom sections. To measure the boom width for each boom section, count the number of nozzles in each section and multiply by the nozzle spacing.

ie. 12 nozzles in one section at 50 cm (½ metre) spacings = 12 * 0.5m = 6 m

Enter Boom Section 1 (b-01) in centimetres (for example 6m = 600 cm)

Press [**BOOM CAL 3**] then [**ENTER**] then [**6**] then [**0**] then [**0**]

Press [**ENTER**] (eg 600)

STEP 5: Press [^ **1**] to select boom section 2 (b-02)

Key in Boom Section 2, then press [**ENTER**]

STEP 6: Insert remaining boom sections by using toggle buttons [^ **1**] or [v **2**]

If a boom section is not needed, enter a "**0**" for the length.

STEP 7: (330, 440 and 450 consoles)

Press [**SPEED CAL**] then [**ENTER**]

Enter Speed Cal in Decimetres (1m = 10 dm)

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

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

For **330 console** with 4 wheel magnets (2 red and 2 black) - measure distance and multiply by 10 (to convert into decimetres) then divide by 2
For **330 console** with 2 wheel magnets (1 red and 1 black) - measure distance and multiply by 10 (to convert into decimetres)

Press [**ENTER**] (eg 477)

STEP 8: Press [**METER CAL**] then [**ENTER**]

Enter Meter Cal for litres

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

Press [**ENTER**] (eg 185)

STEP 9: Press [**VALVE CAL**] then [**ENTER**] **(440 and 450 Console)**

Enter "2123" (standard Raven spraying value)

Press [**ENTER**]

STEP 10: Press [**RATE 1**] then [**ENTER**] **(440 and 450 Console)**

Enter Rate 1 (**litres per hectare**)

Press [**ENTER**] (eg 60)

STEP 11: Press [**RATE 2**] then [**ENTER**] **(440 and 450 Console)**

Enter Rate 2 (**litres per hectare**)

Press [**ENTER**] (eg 75)

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

STEP 12: (OPTIONAL FOR 440 AND 450 CONSOLE) Press [**VOL/TANK**] then [**ENTER**]

Enter the Volume In Tank at start of spraying

Press [**ENTER**] (eg 3000)

STEP 13: (OPTIONAL FOR 440 AND 450 CONSOLE) Press [**TIME**] then [**ENTER**]

Enter the time of the day

Press [**ENTER**] (eg 10:30)

TO ZERO INFORMATION WHEN ENTERING NEW FIELD

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

WRITE DOWN ALL NECESSARY DATA BEFORE REMOVING DATA FROM CONSOLE MEMORY

To zero out data in Area and Volume:

STEP 1: Write down the previous information for Area and Volume

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

STEP 3: Press [**ENTER**]

STEP 4: Enter "0"

STEP 5: Press [**ENTER**]

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

CALIBRATION INFORMATION

Write down the correct calibration information for future reference.

DATE:

SI –

SP 1 / SP 2–

C-SD –

BOOM CAL 1 –

BOOM CAL 2 –

BOOM CAL 3 –

BOOM CAL 4 –

BOOM CAL 5 –

BOOM CAL 6 –

SPEED CAL –

METER CAL –

VALVE CAL (440/450 Console) –

RATE 1 –

RATE 2 –

SELF-TEST SIMULATION

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

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

NEVER FIRST TEST THE RAVEN SYSTEM WITH CHEMICAL IN THE TANK

STEP 1: Press [**SELF TEST**] then [**ENTER**] **(440 and 450 Console)**

Press [**SPEED**] and hold for at least 5 seconds until " ⌈ " appears
then [**ENTER**] **(330 Console)**

Enter speed (ie 12.0 for 12 km/h)

Press [**ENTER**]

Press [**SPEED**] to verify speed

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

THE RAVEN CONSOLE

It is important that the console is mounted in the cabin in such a way that it cannot cause harm to the operator under any circumstance. If the sprayer is disconnected from the towing vehicle but the cable looms connecting the Raven console (or any console for that matter) to the sprayer is not disconnected, make sure the console will not harm the operator if it becomes a projectile.

Disconnect the console before jump starting, charging the battery or welding on equipment.

Do not mount the console such that it will be exposed to sunlight as this will cause damage to the console LCD displays.

Remove the console when not in use for an extended period of time (especially at the end of the spraying season).

NOTE: The Orange and Orange/White wires coming out of the loom are for a remote switch operation and are usually left disconnected.

When the two wires are connected together via a remote switch, this remote switch will act as a secondary Master switch.

CALCULATION OF SPEED CAL FOR DRIVE-SHAFT SPEED SENSOR (ALSO TO CHECK WHEEL-DRIVE SPEED CAL) AND RADAR

STEP 1: Measure accurately 100 metres on a flat surface, preferably on ground typical of the ground to be sprayed. Do not rely on vehicle speedo for measuring distance accurately

STEP 2: Fill Tank half full with water

STEP 3: Calibrate Raven console

NOTE: Make sure "**SP 1**" is programmed in for wheel-drive or drive-shaft speed sensor.
Make sure "**SP 2**" is programmed in for radar speed sensor.

STEP 4: Enter Speed Cal value of "155" or the Speed Cal value that is to be verified in key labelled [**SPEED CAL**]

STEP 5: Place Master switch and Boom 1 switch to "On"

STEP 6: At start of 100 metres, enter "0" in key labelled [**DISTANCE**]

STEP 7: Drive 100 metres

STEP 8: Read distance by depressing key labelled [**DISTANCE**]

STEP 9: Alter Speed Cal value accordingly if there is a sufficiently large discrepancy between the measured distance and the theoretical distance (ie greater than 5 metres);

eg. If distance reads 120 metres

New Speed Cal value = 155 x 100 ÷ 120 = 129

STEP 10: Enter in new Speed Cal value and repeat procedure (Step 5 to Step 8)

Continue to re-iterate the Speed Cal value until the desired distance accuracy is achieved

STEP 11: Write down the appropriate Speed Cal value so it will not be forgotten

TO USE THE FLOWMETER TO CALIBRATE THE TANK

STEP 1: Enter in the Meter Cal value as given on the white Calibration sticker on the flowmeter

STEP 2: Enter all the other calibration information needed to enable the console to work

STEP 3: Fill the tank to the top mark exactly (ie 2500 or 3000 etc.). Make sure the tank is level

STEP 4: Make sure the Total Volume reads "0"
Press [**TOTAL VOLUME**] then [**ENTER**]
Enter "0" then [**ENTER**]

STEP 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)

STEP 6: When the tank is empty press [**TOTAL VOLUME**] to read what the Raven flowmeter says the tank holds

STEP 7: If there is a large discrepancy (ie the difference between theoretical tank volume and flowmeter volume is greater than 100 litres), alter the Meter Cal value accordingly;

eg. If volume reads 3100 litres instead of 3000 litres and the original Meter Cal value is 185

New Meter Cal value = 185 x 3100 ÷ 3000 = 191

STEP 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

STEP 9: Write down the appropriate Meter Cal value so it will not be forgotten

STEP 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 (ie 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.

PROCEDURE TO SPRAY MANUALLY IF RAVEN COMPONENT FAILURE OCCURS

When there is a failure with one of the Raven components (ie either the console, speed sensor, flowmeter or control valve), the following temporary procedures should be adhered to in order to empty the tank if it is essential to continue spraying. Repair or replace the defective component as soon as possible.

CONSOLE FAILURE

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

1. Disconnect console from console cable;

2. Disconnect console cable from power source (ie battery);

3. Remove the plunger and spring from the solenoids (hence they will always be open);

4. To start and stop spraying through the nozzles, put the PTO in and out of gear to start and stop the pump (**hence there will be no agitation when the nozzles are not spraying**);

5. 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 (ie alter the adjusting stem).

6. 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. Repair or replace the console as soon as possible.

SPEED SENSOR FAILURE

If the speed sensor fails, the following procedures should be adhered to:

a) If a relatively constant ground speed is indicated on the console, then the problem is with the sensor, magnets, or cable, but not the console:

1. Enter a self-test speed the same as to what the ground speed can be maintained at.

The console should then give an application rate for that simulated ground speed.

b) If a relatively constant ground speed can not be maintained, or the console unable to perform a self-test, then:

1. Adjust the spraying pressure by switching the flow control into manual and using the Inc-Dec switch to adjust to the desired pressure as shown by the pressure gauge on the sprayer;

2. Drive the sprayer at the 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 operated so as to empty the tank. Repair or replace the speed sensor as soon as possible.

CONTROL VALVE FAILURE

If the control valve does not respond to the console to alter the amount of flow going back to the tank, then:

1. Close the Bypass Line ball valve in front of the control valve;

2. Adjust the ball valve in front of the electric control valve until the desired spraying pressure is shown by the pressure gauge on the sprayer. If the desired spraying pressure is not able to be achieved with the ball valve, adjust the pressure relief valve setting to achieve the desired pressure;

3. 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 operated to empty the tank. Repair or replace the control valve as soon as possible.

FLOWMETER FAILURE

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

1. Adjust the spraying pressure by putting the flow control switch into manual and using the Inc-Dec switch to adjust to the desired pressure as shown by the pressure gauge on the sprayer;

2. 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 operated to empty the tank. Repair or replace the flowmeter as soon as possible.

NOZZLES

GoldAcres use and recommend Spraying Systems nozzles. Other quality brands such as Albuz®, Lurmark and Sprays International are also suitable for use in GoldAcres sprayers.

As a standard, GoldAcres are fitting Spraying Systems XR 11002 nozzles. This nozzle is suited to a range of applications, however it is important that the operator is aware of his intended application. To determine the correct nozzle for a given application, firstly consult with the chemical label to determine the application volume required and optimum droplet sizes, then study a nozzle chart and match nozzle size to application volume at a given speed. Refer to Spraying Systems (Teejet) catalogue.

Note: All pressures mentioned refer to the pressure at the nozzle tip not at the sprayer pressure gauge. A drop in pressure can result between the gauge and the nozzle tip depending on the boom size.

XR TeeJet

According to the manufacturer, excellent spray distribution is obtained over a wide range of pressures (100 kPa to 400 kPa).

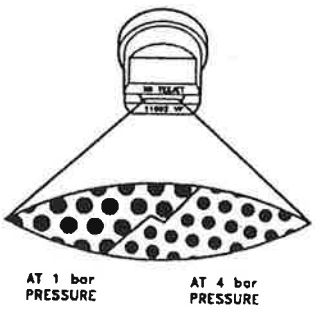
BEST- To apply pre-emergent herbicides, use at medium pressures (150 kPa to 200 kPa). This will produce medium size droplets for good surface coverage in applications such as minimum tillage.

BEST- To apply post-emergent systemic herbicides use lower pressures (100 kPa to 150 kPa) to help control droplet drift.

GOOD- To apply post-emergent contact herbicides, use higher pressures (200 kPa to 400 kPa) to produce smaller droplets for better coverage. Droplet drift of such herbicides is a hazard, to use lower pressures if adjacent crops are susceptible. **Read the chemical label.**

GOOD- To apply pre-plant incorporated herbicides use lower spraying pressures (100 kPa to 150 kPa) to produce larger spray droplets and reduce droplet drift.

- **Helps to control droplet drift at lower pressures, better coverage, but more droplets are drift prone at higher pressures.**



NOZZLE RATE CHART

Tip No. (Colour) (Strainer Size)	Liquid Pressure kPa	Capacity 1 Nozzle lit./min.	Litres Per Hectare - 50 cm Spacing							
			6 km/h	8 km/h	10 km/h	12 km/h	14 km/h	16 km/h	18 km/h	20 km/h
XR11001 TT11001 (ORANGE) (100 Mesh) TURBO ONLY	150	0.28	56	42	33	28	24	21	18.6	17
	200	0.32	64	48	39	32	28	24	21	19
	250	0.36	72	54	43	36	31	27	24	22
	300	0.39	79	59	47	39	34	30	26	24
	350	0.43	85	64	51	43	37	32	28	26
	400	0.46	91	68	55	46	39	34	30	27
	500	0.50	100	75	60	50	43	38	33	30
	600	0.55	110	83	66	55	47	41	37	33
XR110015 TT110015 (GREEN) (100 Mesh) TURBO ONLY	150	0.42	84	63	50	42	36	31	28	25
	200	0.48	97	72	58	48	41	36	32	29
	250	0.54	108	81	65	54	46	40	36	32
	300	0.59	118	89	71	59	51	44	39	35
	350	0.64	128	96	77	64	55	48	43	38
	400	0.68	137	102	82	68	59	51	46	41
	500	0.76	152	114	91	76	65	57	51	46
	600	0.83	166	125	100	83	71	62	55	50
XR11002 TT11002 (YELLOW) (50 Mesh) TURBO ONLY	150	0.56	112	84	67	56	48	42	37	34
	200	0.65	129	97	77	64	55	48	43	39
	250	0.72	144	108	86	72	62	54	48	43
	300	0.79	158	118	95	79	68	59	53	47
	350	0.85	171	128	102	85	73	64	57	51
	400	0.91	182	137	109	91	78	68	61	55
	500	1.02	204	153	122	102	87	77	68	61
	600	1.12	224	168	134	112	96	84	75	67
XR11003 TT11003 (BLUE) (50 Mesh) TURBO ONLY	150	0.84	167	126	100	84	72	63	56	50
	200	0.97	193	145	116	97	83	72	64	58
	250	1.08	220	162	130	108	93	81	72	65
	300	1.18	240	178	142	118	101	89	79	71
	350	1.28	260	192	153	128	110	96	85	77
	400	1.37	270	204	164	137	117	103	91	82
	500	1.52	304	228	182	152	130	114	101	91
	600	1.67	334	251	200	167	143	125	111	100

Tip No. (Colour) (Strainer Size)	Liquid Pressure kPa	Capacity 1 Nozzle lit./min.	Litres Per Hectare - 50 cm Spacing							
			6 km/h	8 km/h	10 km/h	12 km/h	14 km/h	16 km/h	18 km/h	20 km/h
XR11004 TT11004 (RED) (50 Mesh)	150	1.12	220	167	134	112	96	84	74	67
	200	1.29	260	193	155	129	111	97	86	77
	250	1.44	290	220	173	144	124	108	96	86
	300	1.58	320	240	189	158	135	118	105	95
	350	1.71	340	260	200	171	146	126	114	102
	400	1.82	360	270	220	182	156	137	122	109
TURBO ONLY	500	2.04	408	306	245	203	175	153	136	122
	600	2.23	446	335	268	223	191	167	149	134
XR11005 TT11005 (BROWN) (50 Mesh)	150	1.4	280	210	167	140	120	105	93	84
	200	1.61	320	240	193	161	138	121	107	97
	250	1.8	360	270	220	180	154	135	120	108
	300	1.97	390	300	240	197	169	148	132	118
	350	2.13	430	320	260	210	183	160	142	128
	400	2.28	460	340	270	230	195	171	152	137
TURBO ONLY	500	2.54	508	381	305	254	218	191	169	152
	600	2.79	558	419	335	279	239	209	186	167

It is important to regularly inspect the nozzles for wear. This will result in an uneven spray pattern and a change in the droplet size, thus affecting the spraying performance.

The best way to clean or unblock a nozzle is with water and a suitable brush or compressed air:

- Rinse the nozzle thoroughly with water
- Unscrew cap (be careful not to lose strainer or seal)
- Use brush or air to remove any foreign matter in the nozzle orifice

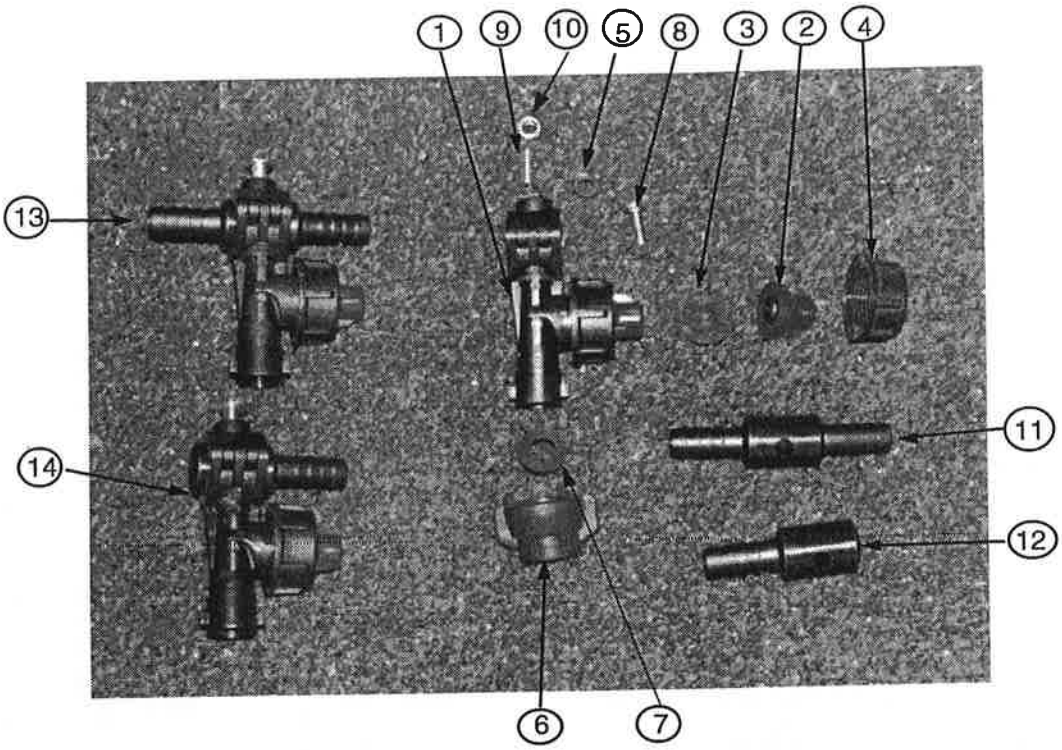
NEVER ATTEMPT TO CLEAN NOZZLES BY BLOWING WITH MOUTH

NOZZLE HEIGHT

The boom nozzle spacing is usually 50 cm, and for this spacing, the optimum height the boom should be from the object to be sprayed, for nozzles with a 110° fan angle, is 50 cm. There will be an adequate spray coverage if the nozzles are higher than this but there can be an increase in drift.

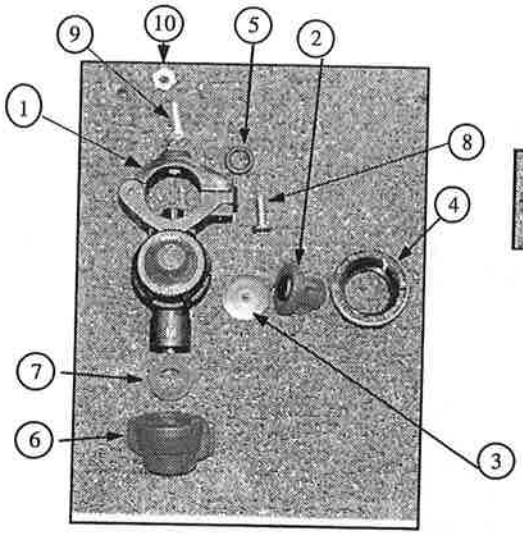
The spray pattern is affected by gravity, pressure, chemical composition and droplet size. Hence the pattern does not extend to the full theoretical coverage.

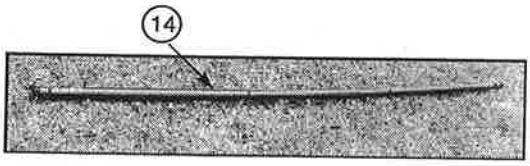
ARAG DRY BOOM NOZZLE BODY

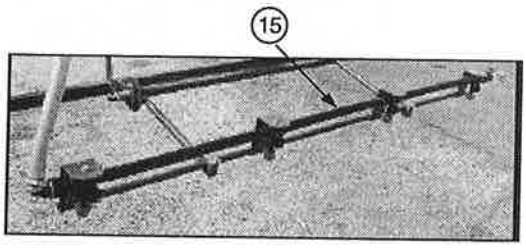


ITEM	DESCRIPTION	PART NUMBER
1	Quick Coupling Uni-Jet (1/2")	402735
2	Non-Drip Check Valve	005860.030
3	Non-Drip Check Valve Diaphragm	005860.036
4	Fly Nut (3/4")	200030
5	O-Ring for Jet Hole	400020.030
6	Cap	402900
7	Seal	402200.040
8	Self-Threading Screw	V2B2SF
9	15 x 6 Bolt	M15X6
10	6mm Nyloc Nut	NN6
11	T - Nozzle Manifold (In-line)	427213
12	L - Nozzle Manifold (End)	426213
13	T - Nozzle Body (less cap & seal)	402735A-T
14	L - Nozzle Body (less cap & seal)	402735A-L

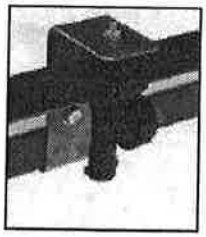
ARAG WET BOOM NOZZLE BODY

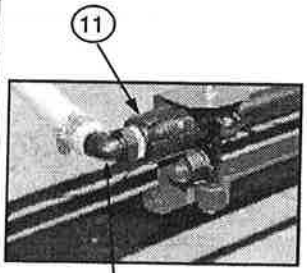


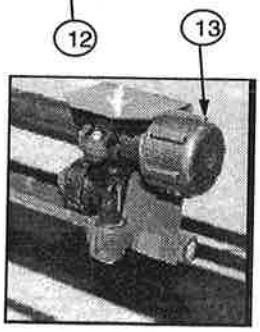




ITEM	DESCRIPTION	PART NUMBER
1	Quick Coupling Uni-Jet (3/4")	402755
2	Non-Drip Check Valve	005860.030
3	Non-Drip Check Valve Diaphragm	005860.036
4	Fly Nut (3/4")	200030
5	O-Ring for Jet Hole	400020.030
6	Cap	402900
7	Seal	402200.040
8	Self-Threading Screw	V2B2SF
9	15 x 6 Bolt	M15X6
10	6mm Nyloc Nut	NN6
11	3/4" Pipe Socket	CPLG075
12	3/4" Thread Hose Barb Elbow 3/4" Thread Hose Barb	EL34 A34
13	3/4" Pipe Cap	CAP075
14	4-Nozzle Manifold (Bare & Drilled) 5-Nozzle Manifold (Bare & Drilled) 6-Nozzle Manifold (Bare & Drilled) 7-Nozzle Manifold (Bare & Drilled)	MANN4-D MANN5-D MANN6-D MANN7-D
15	4-Nozzle Manifold Complete (less tips & Strainers) 5-Nozzle Manifold Complete (less tips & Strainers) 6-Nozzle Manifold Complete (less tips & Strainers) 7-Nozzle Manifold Complete (less tips & Strainers)	4-NOZWB 5-NOZWB 6-NOZWB 7-NOZWB

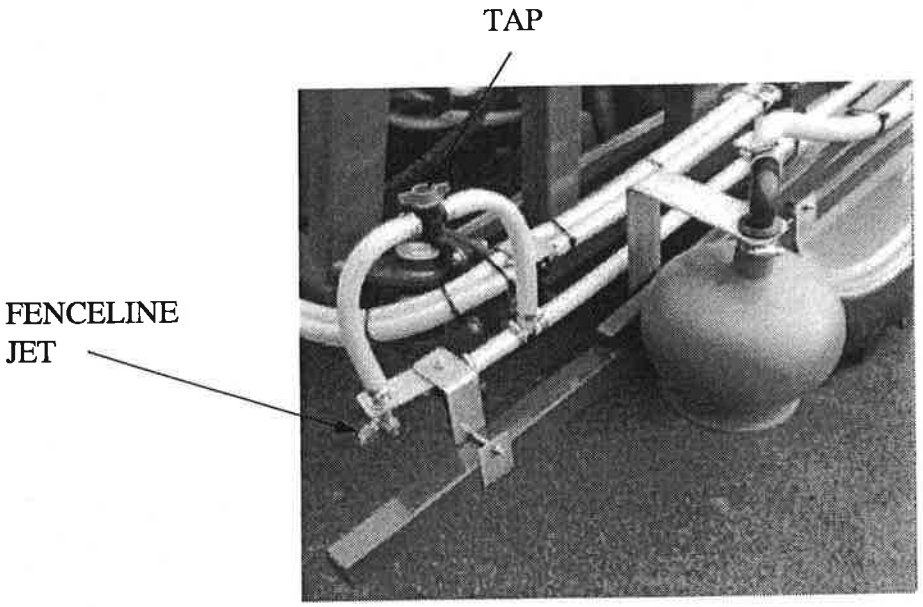






FENCELINE JET

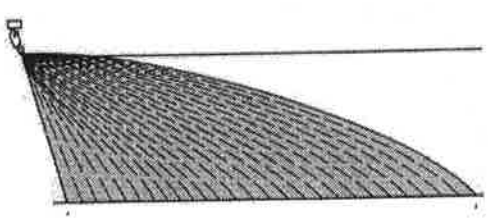
The fenceline jet is designed to enable the operator to spray right up to the boundary fence without having the boom really close to the fence. The angle of the off-centre jet can be altered to suit particular applications but it should enable the boom to be inside the fence by about 1 metre and still 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 must 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).



OFF-CENTRE FLAT SPRAY TIPS

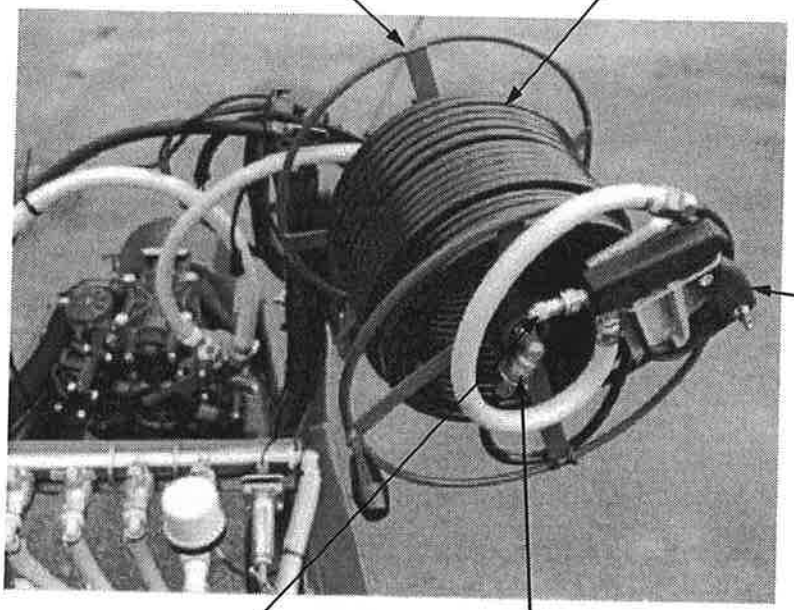
TIP	PRESSURE (kPa)	CAPACITY (l/min)	TIP	PRESSURE (kPa)	CAPACITY (l/min)
OC-02	200 300 400	0.65 0.79 0.91	OC-08	200 300 400	2.58 3.16 3.65
OC-03	200 300 400	0.97 1.18 1.37	OC-12	200 300 400	3.87 4.74 5.47
OC-04	200 300 400	1.29 1.58 1.82	OC-16	200 300 400	5.16 6.32 7.29
OC-06	200 300 400	1.93 2.37 2.74			

NOTE: The off-centre spray tips are only available in brass and hence have a relatively low wearing capacity (especially when compared to ceramic tips). Thus it would be advisable to periodically check the nozzle capacity to ensure that nozzle wear is not affecting the application rate.



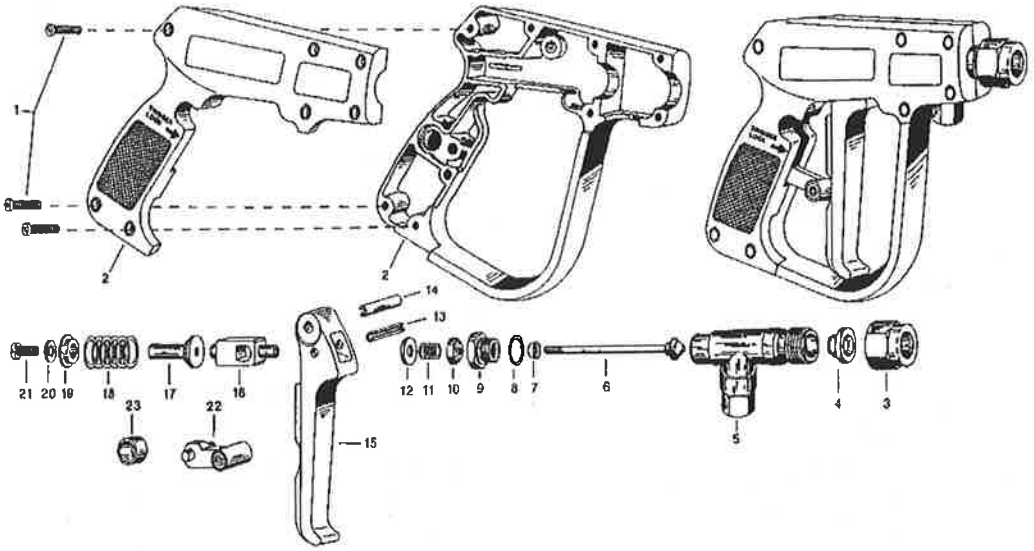
HOSE REEL

The hose reel (either 20m, 50m or 100m) has a brass swivel with a double o-ring seal, suitable for high pressure operation. Regularly check to see if there is any leakage from this fitting.



AA30L GUNJET

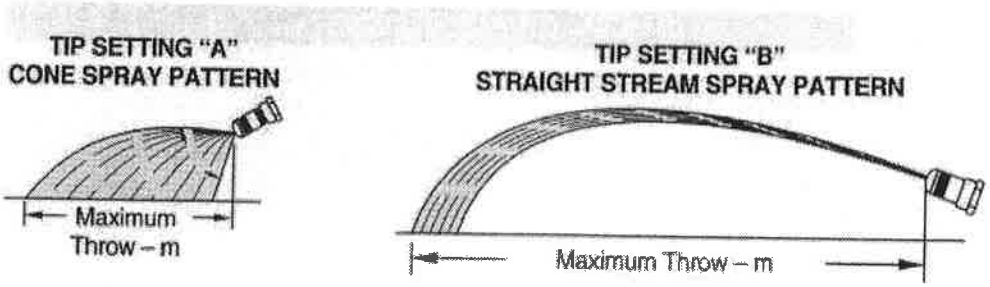
The gunjet trigger needs to be locked via the trigger lock when not in use to prevent the gunjet from spraying inadvertently.



ITEM	PART NO.	DESCRIPTION
1	CP17103-IZP	Zinc-Plated Steel Screw
2	CP19684-1-NYB	Right and Left Hand Nylon Housing Set
3	CP7890-INP	Nickel-Plated Steel Cap
4	CP7490-BRTF	Brass and Teflon Valve Seat Assy.
5	CP22136	Brass Inlet Body
6	CP22137-BR302S	Brass and Stainless Steel Stem Assy.
7	CP14255-1-AL	Buna Packing Cup
8	CP19812-AL	Aluminium Gasket
9	CP19811	Brass Packing Screw
10	CP7484-INP	Nickel-Plated Steel Stem Nut
11	CP7489-SS	Stainless Steel Trigger Stop Spring
12	CP7622-IZP	Zinc-Plated Steel Washer
13	CP17720-420SS	Stainless Steel Roll Pin
14	CP19820-420SS	Stainless Steel Roll Pin
15	CP17703-FRP	Fibreglass Reinforced Polyester Trigger
16	CP19810	Brass Trigger Guide
17	CP19815	Brass Spring Guide
18	CP22138-302SS	Stainless Steel Spring
19	CP19816	Brass Spring Retainer
20	CP19819-SS	Stainless Steel Washer
21	CP19818-IZP	Zinc-Plated Steel Screw
22	CP19806-FRP	Fibreglass Reinforced Polyester Trigger Lock
23	CP19805-CE	Celcon Lock Spring Ring

ADJUSTABLE CONEJET NOZZLE

The adjustable brass ConeJet nozzle rotates through a half turn to provide spray selection from wide angle, finely atomized cone spray to a straight stream spray. Tip settings "A" and "B" represent two extreme points of rotation in tip adjustment.



Adjustable ConeJet Tip No.	Perform-ance	Liquid Pressure (kPa)							
		150		200		300		400	
		A	B	A	B	A	B	A	B
5500 - X18	Capacity (l/min)	0.79	2.6	0.98	3.2	1.1	3.7	1.4	4.5
	Spray Angle (deg)	71	-	75	-	77	-	78	-
	Max. Throw (m)	1.2	11.5	1.2	12.5	1.2	12.8	1.2	12.8
5500 - X22	Capacity (l/min)	0.95	3	1.2	3.7	1.5	4.7	1.8	5.5
	Spray Angle (deg)	71	-	75	-	78	-	79	-
	Max. Throw (m)	1.2	11.9	1.4	12.5	1.5	12.8	1.5	12.8
5500 - X26	Capacity (l/min)	1.1	3.6	1.4	4.5	1.7	5.5	2.1	6.7
	Spray Angle (deg)	72	-	76	-	78	-	79	-
	Max. Throw (m)	1.4	12.2	1.5	12.8	1.5	13.1	1.7	13.1

TROUBLESHOOTING

RAVEN – UNABLE TO CONTROL RATE EFFECTIVELY

- Press all the calibration buttons on the console and check the calibration numbers with the required correct values. Write down these calibration numbers in the console.

RATE INACCURATE, UNSTABLE OR ZERO

a) When spraying, press speed and see if speed is unstable or zero;
b) When spraying, press volume and see if volume is erratic or not changing;
c) When spraying, place flow control switch into manual and use the Inc/Dec switch to see if the rate (and pressure) can be adjusted.

- Determine which Raven component is faulty (ie either console, speed sensor, flowmeter or control valve).

- It is then best to empty the tank by employing the relevant procedure to spray manually when there is a Raven component failure. See the section "PROCEDURE TO SPRAY MANUALLY IF RAVEN COMPONENT FAILURE OCCURS" in the Raven section.

- Once the sprayer is empty of chemical, partially fill the tank with fresh water (no chemical) so that test can be performed in order to correct the problem.

CHECK SPEED SENSOR DISPLAY

If speed sensor display is inaccurate, unstable or zero:

1. Check Speed Cal No.;

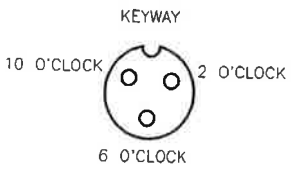
2. Clean and check all pins and sockets on speed sensor cable connectors;

3. Make sure magnets are on wheel (red followed by black) and that the magnets pass by the centre of the sensor and have between 6 to 20mm clearance;

4. Perform the following procedure to test speed sensor cables at the back of the console and at the cable breakaway (at front of sprayer). This test will determine if one of the cable sections is faulty or if the speed sensor itself is at fault.

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

Procedure to test speed sensor cables



a) 2 o'clock socket is power
b) 6 o'clock socket is signal
c) 10 o'clock socket is ground

Voltage Readings

a) 10 o'clock to 6 o'clock (+5 VDC)
b) 10 o'clock to 2 o'clock (+5 VDC)

a) Change Speed Cal Number to 1000 in [SPEED CAL] key

b) Press [DISTANCE] key

c) With a jumper wire (or paper clip or screwdriver), short between 6 o'clock and 10 o'clock sockets with a "short – no short" motion. Each time contact is made, the [DISTANCE] total should increment up 1 or more counts

d) If 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

e) Perform above voltage checks

f) Change Speed Cal Number back to previous number.

CHECK FLOWMETER DISPLAY

If volume display is inaccurate, unstable or zero (or not changing):

1. Check Meter Cal No.;

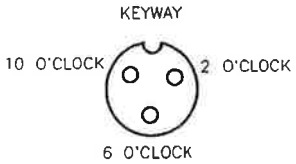
2. Clean and check all pins and sockets on flowmeter sensor cable connectors;

3. Make sure the flowmeter is pointing in the correct direction for flow;

4. Perform the following procedure to test flowmeter sensor cables at the cable breakaway (at front of sprayer) and at the flowmeter. This test will determine if one of the cable sections is faulty or if the flowmeter itself is at fault.

5. If the flowmeter appears to not be working, take the flowmeter apart. Then remove the turbine and turbine hub and clean. Replace the turbine and hub and check to make sure the turbine spins freely. If there is still no signal from the flowmeter, the flowmeter may need to be replaced.

Procedure to test flowmeter cables



a) 2 o'clock socket is ground
b) 6 o'clock socket is signal
c) 10 o'clock socket is power

Voltage Readings

a) 2 o'clock to 6 o'clock (+5 VDC)
b) 2 o'clock to 10 o'clock (+5 VDC)

a) Change Meter Cal Number to 1 in [METER CAL] key
b) Press [TOTAL VOLUME] key and place boom switches ON
c) With a jumper wire (or paper clip or screwdriver), short between 2 o'clock and 6 o'clock sockets with a "short – no short" motion. Each time contact is made, the [TOTAL VOLUME] total should increment up 1 or more counts
d) 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
e) Perform above voltage checks
f) Change Meter Cal Number back to previous number.

CHECK CONTROL VALVE

If the application rate (or pressure) cannot be altered:

1. Perform a self-test and put the flow control switch into manual and use the Inc/Dec switch to see if the rate can be adjusted (if the rate cannot be altered, control valve is not altering the amount of flow back to the tank);

2. Check the green and yellow wiring to the control valve and the connectors;

3. **Make sure the yellow wire is swapped over to the green wire and the green wire is swapped over to the yellow wire near the control valve;**

4. Check that there is 12 volts reaching the control valve (check at the console side of the breakaway connector and where the wires are swapped over). To do this, have the flow control switch in manual and the Inc/Dec going up and down. See if the motor is going and that the butterfly is going around. The hose and hose barb elbow fitting will have to be removed in order to do this.

CHECK CONSOLE

If there is a problem with the console, the following power check procedure should be performed. Otherwise the console may need servicing by the appropriate GoldAcres representative.

To check the power to the console:

1. Check that the red wire is connected to the positive and the white wire to the negative terminal of a 12 volt DC supply;

2. Make sure the battery connections are clean;

3. Check to ensure the fuse at the back of the console is not blown;

4. With a multi-meter, check the voltage potential across pins 1 and 16 on the 16-pin plug going into the console (should be at least 12 volts).

PRESSURE AND RATE

PRESSURE AND RATE TOO LOW

1. **Check pressure side for excessive bypass:**

a) Verify console calibration settings;
b) Look in tank to see if there is much bypass coming back into the tank from either the pressure relief valve (front of tank) or control valve (rear of tank);
c) Close ball valve in front of control valve and see if pressure on gauge rises (if it does then there is something wrong with the control valve);
d) Check the pressure relief valve setting;
e) Restrict the hose coming off the relief valve going back to the tank (ie with multi grips) and see if pressure on gauge rises;
f) Measure the flow per minute out of the nozzles and check with nozzle chart pressure for the corresponding flow.

2. **Check suction side for restriction:**

a) Clean suction filter strainer;
b) Check suction line and tank sump for blockages;
c) Check suction line for air leaks (ie tighten nuts, hose clamps).

3. **Check Pump:**

a) Check pump speed;
b) Check oil for colour change to see if diaphragms are damaged. Diaphragms will need to be replaced if oil is milky;
c) Check valves in pump.

PRESSURE AND RATE TOO HIGH

1. Verify console calibration settings;
2. Check restriction in bypass line (make sure the ball valve in front of the control valve is open);
3. Check pump speed is not too fast.

PRESSURE ON GAUGE HIGHER THAN THE NOZZLE CHART PRESSURE

1. Check and clean all pressure and nozzle filters
2. There is always a pressure loss when flow goes through hose and components (such as filters, solenoids, etc). The pressure at the nozzle tip is what the nozzle chart pressure is referring to. The pressure on the gauge is the pressure at the nozzle tip plus the pressure that is lost between the pressure gauge and the nozzle. The pressure at the nozzle tip can be measured by measuring in one minute the amount of flow coming out of the nozzle and then comparing that with what is on the nozzle chart for that particular nozzle.

INSUFFICIENT OR POOR QUALITY FOAM – ONE SIDE ONLY

If there is a problem producing foam on one side, the quickest way to determine what the nature of the problem is to compare the side that is not working satisfactorily with the side that is working satisfactorily.

1. Compare the flow coming out both the air and liquid lines for both sides to determine whether the solenoids are working properly;

2. Swap the foam generators over to see if the poor foam is dependent on the foam generator or not.

INSUFFICIENT OR POOR QUALITY FOAM – BOTH SIDES

If there is a problem producing foam on both sides, then the problem most likely will be in the components common to both, ie the tank mix, compressor etc.

1. Replace the tank mixture with clean, soft water and concentrate at the correct rate (1 to 50, or 2 litres of GoldAcres concentrate to 100 litres of water);

2. Check compressor flapper valves.

DIRECT INJECTION

If the Direct Injection Exacta Foam marker is not performing to near this rate or the foam is of a poor quality, check the following possible causes in addition to those causes for the Exacta Foam:

1. Tank contents contaminated (either concentrate in the fresh water or fresh water in the concentrate tank) – flush and replace contents and check one-way valves.

STANDARD FOAM MARKER

STANDARD PERFORMANCE TEST

Should fill 20 litres in approximately 2 ½ minutes (fill bucket up with foam) @ rate of 1 to 100. Need to add 10 litres of clean, soft water and 100 ml of **GoldAcres concentrate.**

INSUFFICIENT OR POOR QUALITY FOAM

If the Standard Foam marker is not performing to near this rate or the foam is of a poor quality, check the following possible causes:

1. Incorrect concentrate rate – drain and add new mix at correct rate (use clean, soft water and GoldAcres concentrate);

2. Dirty or hard water used – drain and add new mix at correct rate (use clean, soft water and GoldAcres concentrate);

3. Stale foam concentrate – drain and add new mix at correct rate (use clean, soft water and GoldAcres concentrate);

4. One-way valve at bottom of foam tank blocked – clean one-way valve;

5. Insufficient power to compressor/diverter unit – check power supply (should be minimum 12 volts) to solenoids and all connections;

6. Compressor failing to produce sufficient air – check and/or replace compressor flapper valves and clean compressor filter;

7. Air or water hose blocked – check all hoses for kinks and blockages.

CHEMICAL PROBE

STANDARD PERFORMANCE TEST

With a 121 litre/min pump running at approx. 600 kPa, the chemical probe will transfer **water** at a minimum rate of approximately 30 litre/min.

If the chemical probe is not performing satisfactorily, check:

1. The pressure (as displayed on the sprayer pressure gauge) should be close to 600 kPa;

2. Air leaks (make sure fittings are screwed tightly and hoses are in good condition and cam lever fittings have gaskets in place).

TRANS-CAL

STANDARD PERFORMANCE TEST

With a 121 litre/min pump running at approx. 600 kPa, the Trans-Cal will transfer **water** (ie from chemical container into Trans-Cal or from Trans-Cal tank into main spray tank) at a minimum rate of approximately 30 litre/min.

If the Trans-Cal is not performing satisfactorily, check:

1. The pressure (as displayed on the sprayer pressure gauge) should be close to 600 kPa;

2. Air leaks (make sure fittings are screwed tightly and hoses are in good condition (envirodrum) to the Trans-Cal or from the Trans-Cal to the main spray tank. This will help to pinpoint the possible source of the problem.

INDUCTION HOPPER

STANDARD PERFORMANCE TEST

With a 121 litre/min pump running at approximately 550 kPa, the induction hopper should transfer **water** at a minimum rate of 50 litres/min.

If the induction hopper is not performing satisfactorily, check:

1. The pressure (as displayed on the sprayer pressure gauge) should be close to 550 kPa;

2. Air leaks (make sure fittings are screwed tightly and hoses are in good condition and cam lever fittings have gaskets in place).

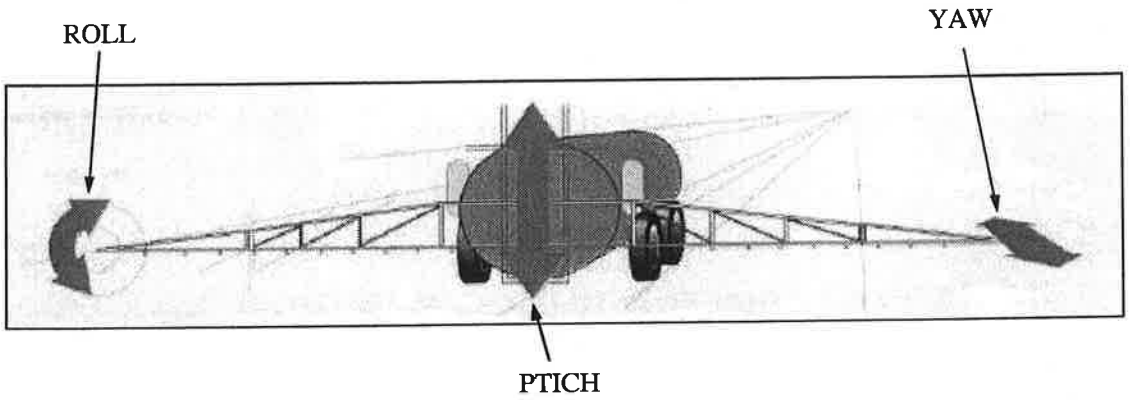
DELTA BOOM

The Delta Boom incorporates an unique patented boom suspension which provides suspension in three directions:

PITCH: Compression coil spring(s) and shock absorbers dampens the vertical boom movement encountered over rough ground conditions.

ROLL: Shock absorbers help to 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.



DELTA
SUSPENSION

SAFETY WARNINGS

SLOW DOWN WHEN TURNING TO PREVENT EXCESSIVE STRAIN ON BOOM (ESPECIALLY ON BOOMS 24m OR LARGER)

NEVER STAND WITHIN RADIUS OF BOOM WINGS

Personal injury can result if any part of the sprayer hits a person during operation of the sprayer.

ALWAYS ENSURE THERE IS ADEQUATE ROOM TO OPEN BOOM

Serious damage can be done to the sprayer if the boom hits or becomes entangled with any foreign objects.

ALWAYS ENSURE BOOM IS SECURELY SUPPORTED WHEN TRANSPORTING

Serious damage may occur if boom opens out whilst transporting.

DO NOT TRAVEL WITH BOOM IN FOLDED POSITION UNTIL BOOM IS LOWERED ONTO RESTS

ENSURE BOOM IS NOT LOWERED ONTO TYRES WHEN IN THE FOLDED (TRANSPORT) POSITION

BOOM MUST BE RAISED CLEAR OF RESTS WHEN UNFOLDING OR SERIOUS BOOM DAMAGE MAY RESULT

MAKE SURE ALL RELEVANT TOWING REGULATIONS ARE ADHERED TO WHEN TOWING SPRAYER

NEVER WORK UNDER HYDRAULICALLY RAISED BOOM

MAKE SURE SPRAYER COMPLIES WITH ALL RELEVANT ROAD REGULATIONS

SUITABLE CARE SHOULD BE TAKEN WHEN DRIVING WITH SPRAYER ATTACHED TO THE VEHICLE. CONSIDERATION SHOULD BE GIVEN TO BOTH THE CARRYING AND/OR TOWING CAPACITY OF THE VEHICLE AND THE TERRAIN GRADIENTS WHEN DETERMINING THE SPEED AT WHICH THE VEHICLE CAN BE SAFELY DRIVEN

ENSURE ALL BOLTS ARE TIGHTENED AND SECURED BEFORE TRANSPORTING AND OPERATING

INSPECT SPRAYER THOROUGHLY FOR DAMAGE AND WEAR BEFORE TRANSPORTING AND OPERATING

LUBRICATE SPRAYER AS PER RECOMMENDED REQUIREMENTS BEFORE OPERATING

NEVER ATTEMPT TO CLEAN NOZZLES BY BLOWING WITH MOUTH

READ THE CHEMICAL LABEL - HEED THE CHEMICAL LABEL

HANDLE ALL CHEMICALS WITH CARE

WEAR ALL NECESSARY PROTECTIVE CLOTHING WHEN EXPOSED TO CHEMICALS

FLUSH CHEMICALS FROM EQUIPMENT IMMEDIATELY AFTER USE

A SUPPLY OF FRESH WATER SHOULD BE WITH SPRAYER AT ALL TIMES

DO NOT OPERATE SPRAYER UNDER THE INFLUENCE OF ANY DRUGS OR TIREDNESS

HYDRAULIC BOOM LIFT

The Hydraulic Lift on a Delta Boom enables the boom to be raised and lowered so as to maintain an adequate boom height above the ground.

The hydraulic lift enables the boom to be raised when folding and then lowered onto the rests.

The Boom Lift ball valve provides the means to shut off the hydraulic oil flow between the tractor and hydraulic lift cylinder:

- When attaching the hydraulic coupling to the boom lift hydraulic line, shut the Boom Lift ball valve so that the boom will not alter its position;

- When disconnecting the Boom Lift hydraulic line from the tractor, shut the Boom Lift ball valve first, then work the tractor hydraulic control lever backwards and forwards to relieve the pressure in the hydraulic line caused by the weight of the boom if the boom is not lowered down to its lowest position, and then disconnect the coupling. This should enable the line to be able to be connected again without having to act against any hydraulic pressure.

TO LOWER BOOM ONTO RESTS

On booms 24 metres and greater, the boom rests are adjustable. At the manufacturing plant the boom rests are set in there lowest position to minimize transport height. Raising the boom rests will provide greater clearance between the boom and wheels.

To lower the Delta Boom onto its rests:

1) Make sure the Boom Lift hydraulic line is properly connected to the tractor hydraulic system via the hydraulic couplings;

2) Make sure the boom is raised sufficiently high so that when it is folded it will be well clear above the boom support rests and sprayer tyres;

3) Make sure the boom is correctly folded (so as to fit onto the rests);

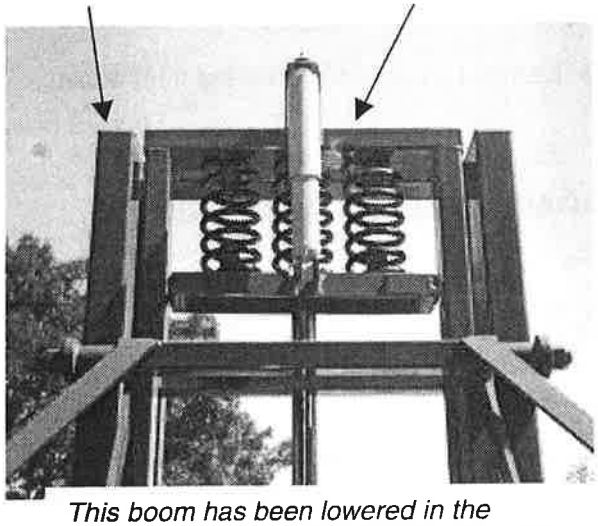
4) Lower the boom until the boom just touches the rests;

5) Then continue to lower the boom a further 100 mm (4") so as to put sufficient weight on the rests. **The rests need to be positioned high enough to allow the boom to lower 100mm without the boom resting on the tyres. When lowered the mast should not fall below the height of the boom tower (see picture below).**

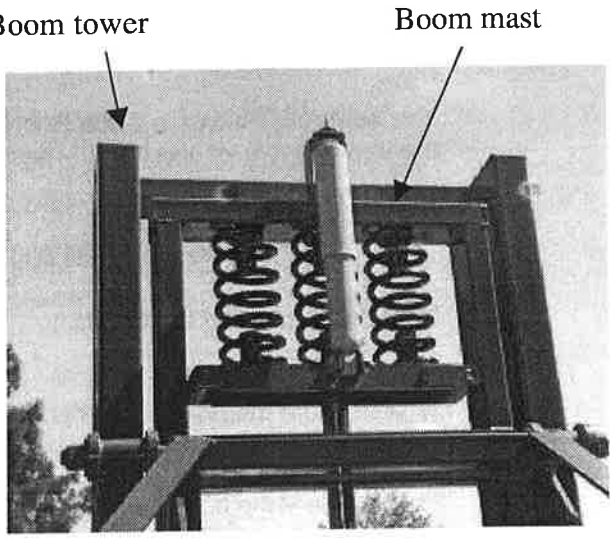
The hydraulic cylinder used for the hydraulic lift is a single-acting cylinder. Hydraulic pressure is used to raise the boom and the weight of the boom is used to lower the boom. Do not modify the cylinder so that it is double-acting because this can cause damage to the boom if lowered with too much force. The top hydraulic cylinder port has an air breather fitting so that a vacuum is not created when the piston inside the cylinder moves.

NEVER WORK UNDER HYDRAULICALLY RAISED BOOM

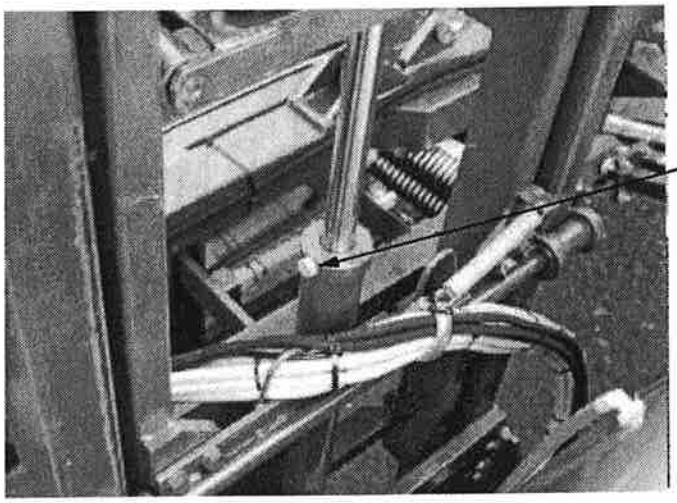
ENSURE THE BOOM IS NEVER LOWERED ONTO THE TYRES OF THE SPRAYER, WEATHER IN TRANSPORT OF STORAGE.



This boom has been lowered in the correct position. Notice that the top of the mast and top of the tower are level.



This boom has been lowered too far, and may cause damage to the boom and tyres on the sprayer when folded into the transport position.



HYDRAULIC BOOM FOLD

The Hydraulic Fold on a Delta Boom enables the boom to be opened and closed from within the tractor cabin via the tractor hydraulic system.

NEVER STAND WITHIN RADIUS OF BOOM WINGS

To hydraulically fold the boom:

1) Make sure the Boom Fold hydraulic lines are properly connected to the tractor hydraulic system via the hydraulic couplings;

2) Make sure the boom is raised sufficiently high so that when it is folded it will be well clear above the boom support rests;

3) Use the tractor hydraulic control lever to fold the boom completely in (ie move the control lever backwards or forwards, depending on how the hydraulic lines are connected);

4) Lower the boom until the boom just touches the rests;

5) Then continue to lower the boom a further 100 mm (4") so as to put sufficient weight on the rests. **The rests need to be positioned high enough to allow the boom to lower 100mm without the boom resting on the tyres. When lowered the mast should not fall below the height of the boom tower (see picture on previous page)**

As a guide for booms greater than 24metres, the top of the mast should not be lowered below the top of the tower. Sever tyre and boom damage may result if the boom is lowered beyond this point.

DO NOT TRAVEL WITH BOOM IN FOLDED POSITION UNTIL BOOM IS LOWERED ONTO RESTS

HYDRAULIC BOOM UNFOLD

NEVER STAND WITHIN RADIUS OF BOOM WINGS

To hydraulically unfold the boom into the working position:

1) Make sure the Boom Fold hydraulic lines are properly connected to the tractor hydraulic system via the hydraulic couplings;

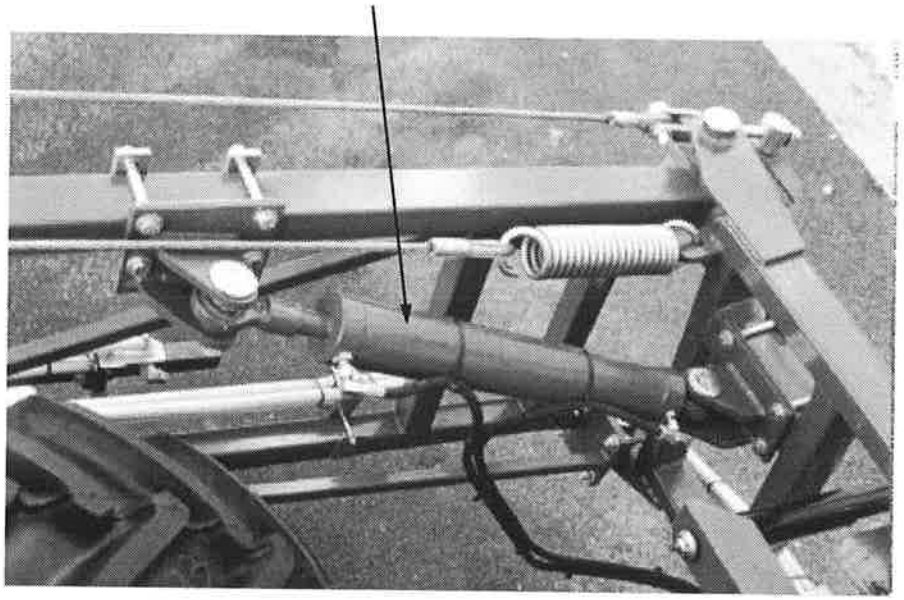
2) Raise the boom sufficiently high so that when it is unfolded it will be well clear above the boom support rests;

3) Use the tractor hydraulic control lever to unfold the boom so that the boom is aligned with the centre section (ie move the control lever backwards or forwards, depending on how the hydraulic lines are connected);

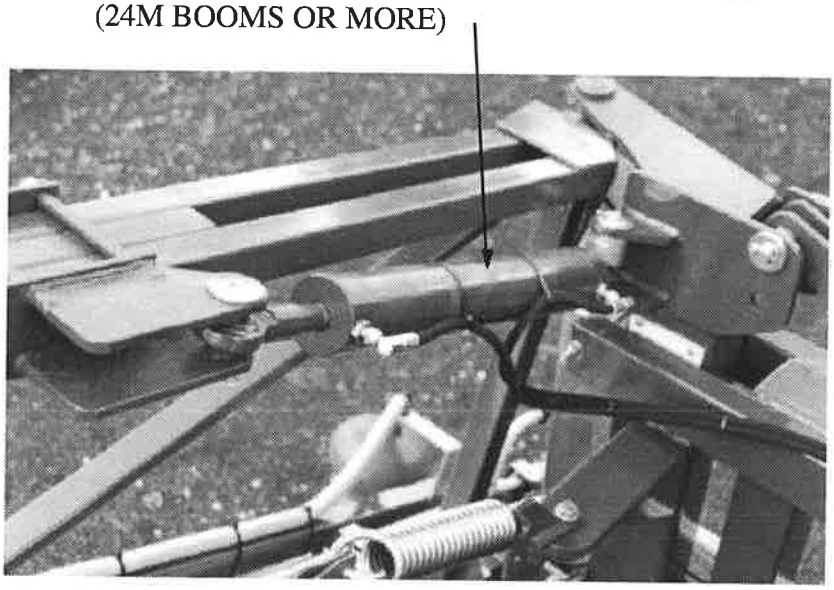
4) Lower the boom to the desired height above the spraying surface;

BOOM MUST BE RAISED CLEAR OF RESTS WHEN UNFOLDING OR SERIOUS BOOM DAMAGE MAY RESULT

DELTA BOOM HYDRAULIC FOLD CYLINDER
(20M BOOM OR LESS)



DELTA BOOM HYDRAULIC FOLD CYLINDER
(24M BOOMS OR MORE)



HYDRAULIC BOOM UNFOLD

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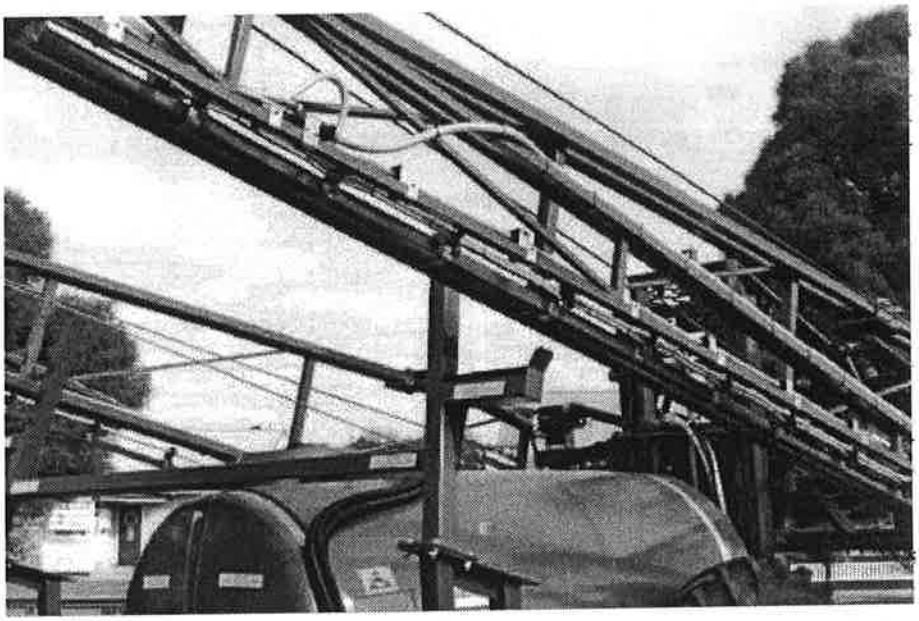
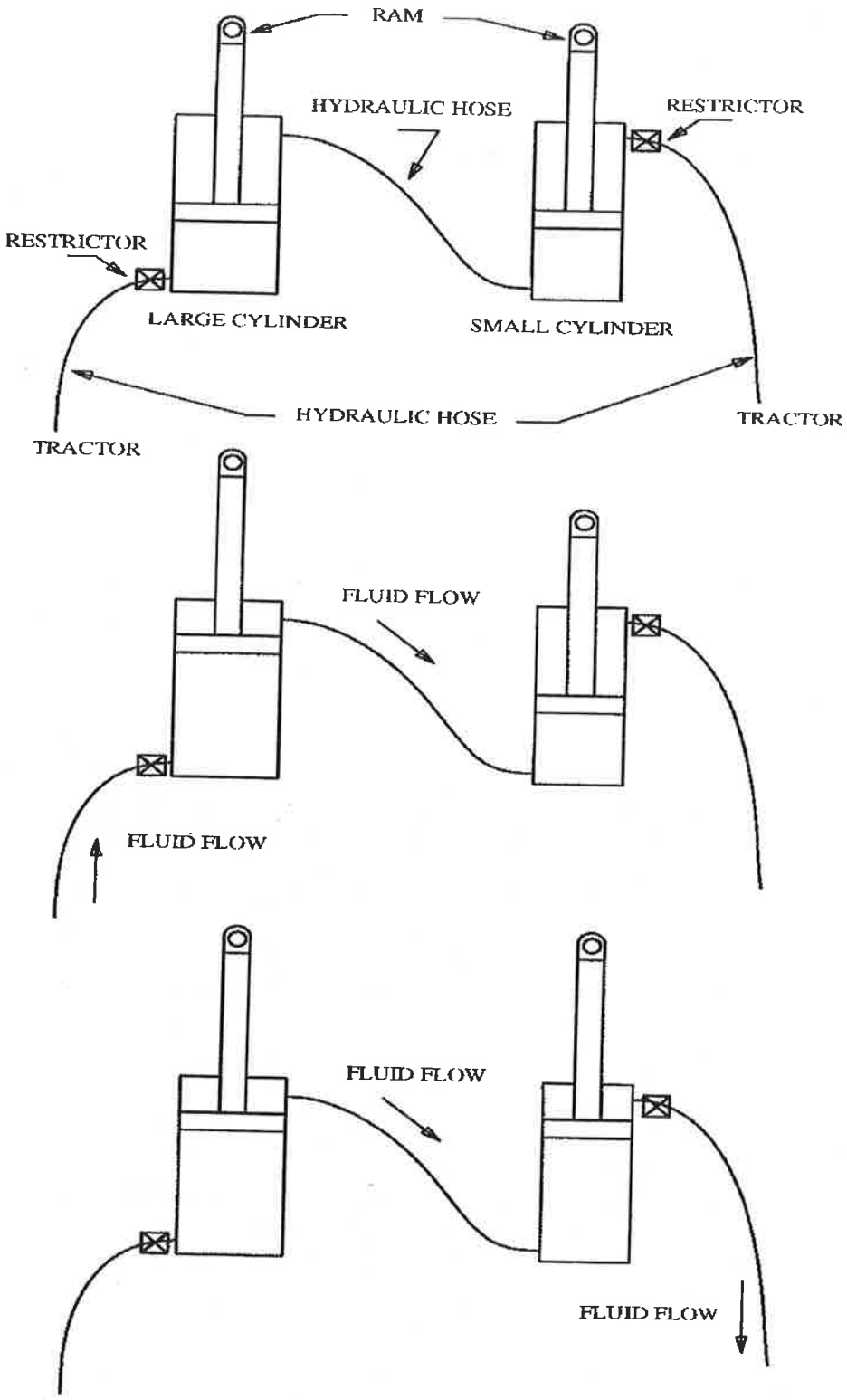
BOOM MUST BE RAISED CLEAR OF RESTS WHEN UNFOLDING OR SERIOUS BOOM DAMAGE MAY RESULT




RAM
HYDRAULIC HOSE
RESTRICTOR
RESTRICTOR
LARGE CYLINDER
SMALL CYLINDER
HYDRAULIC HOSE
TRACTOR
TRACTOR
FLUID FLOW
FLUID FLOW
FLUID FLOW
FLUID FLOW

HYDRAULIC TILT

The Delta Boom can incorporate an 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.

An extra hydraulic cylinder is required for each side to have the tilt option. This cylinder has a 100mm (4") extension/contraction.

The boom pivots on the tilt pivot and thus the tip of the boom is raised (or lowered) in the vertical plane when the tilt cylinder ram is contracted.

The amount the tip of the boom is raised (or lowered) depends on the size of the boom and the tilt cylinder ram contraction.

The tip of the boom will be raised when the hydraulic tilt cylinder is anchored in the tilt top hole and the tilt cylinder ram contracted.

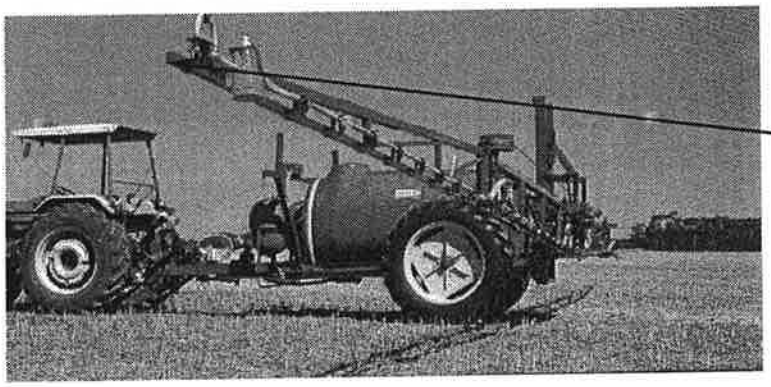
The tip of the boom will be lowered when the hydraulic tilt cylinder is anchored in the tilt bottom hole and the tilt cylinder ram contracted.

If the hydraulic tilt is not fitted on the 24m Delta booms or larger, a fixed link is placed in substitute for the tilt hydraulic cylinder.

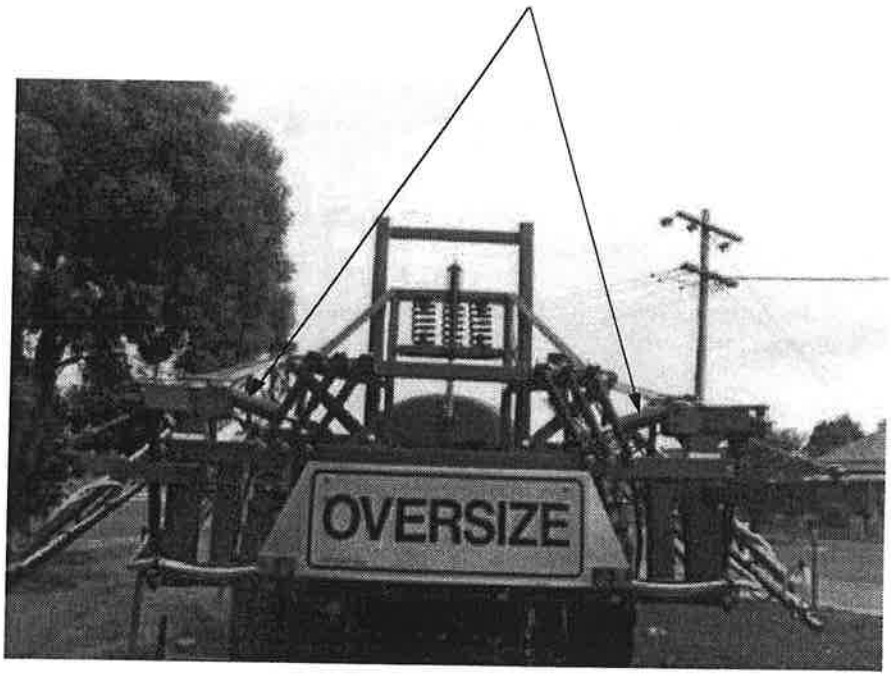
⚠ THE TILT MECHANISM IS TO ONLY BE EMPLOYED WHEN THE BOOM IS FULLY UNFOLDED IN THE WORKING POSITION

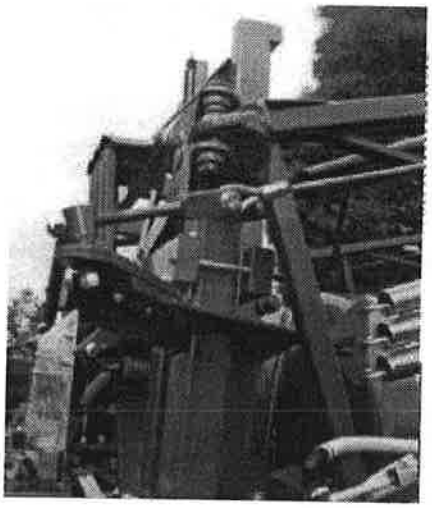
⚠ DO NOT USE THE TILT MECHANISM WHEN THE BOOM IS FOLDED AND SEATED ON THE BOOM SUPPORT RESTS

⚠ BE AWARE OF OVERHEAD OBSTRUCTIONS (IE POWERLINES) WHEN USING TILT CYLINDERS



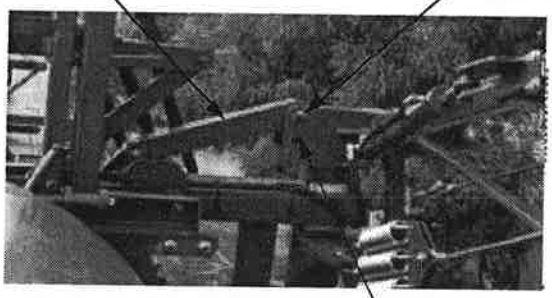
HYDRAULIC TILT CYLINDERS





SUBSTITUTE FIXED LINK

TILT TOP HOLE

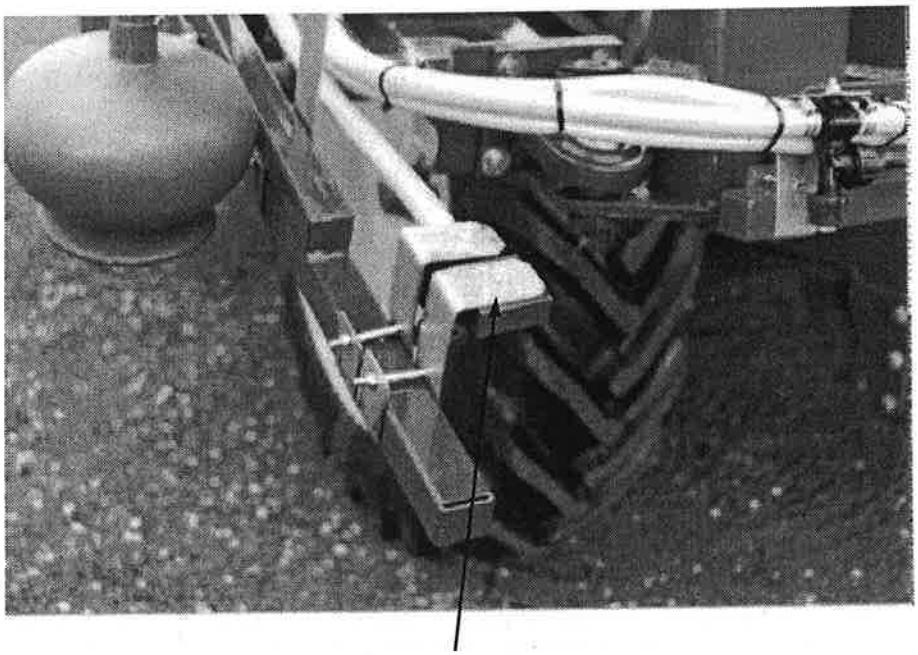


TILT BOTTOM HOLE

BOOM BALANCE

The Delta boom is designed so that it balances level with respect to the sprayer. If one side is heavier than the other, the boom will tend to hang lower on the heavy side. Hence both sides need to be balanced for the boom ends to be of the same height. To achieve this a boom counterweight is included on the boom and placed strategically so that it compensates and balances the boom (usually placed on the opposite boom side to the fenceline jet to compensate for its weight).

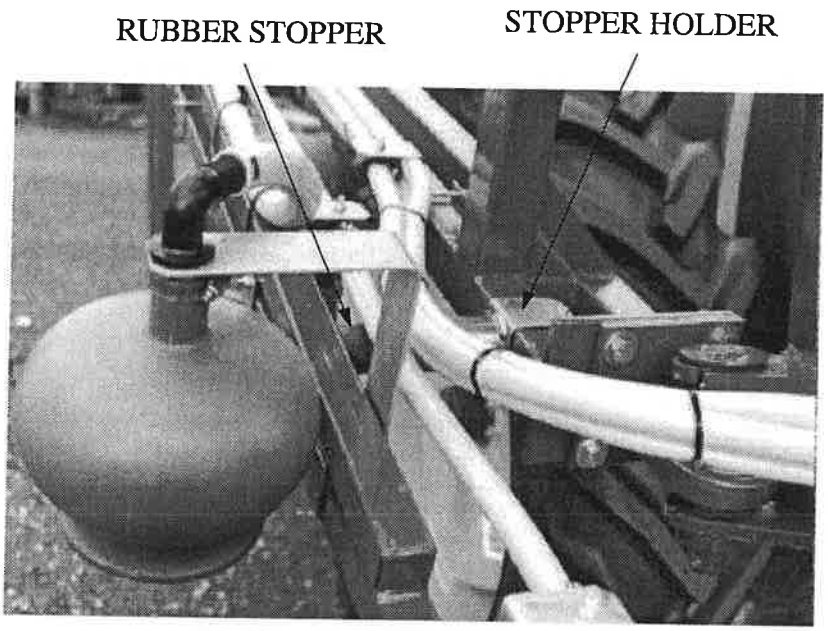
If the boom is not balanced (such that the height of the boom ends is different), the counterweight can be moved or more weight added to the counterweight until the boom is balanced. More weight can be added to the counterweight by unbolting the bolt that holds the weight to the adjustable bracket, increasing the weight and then replacing the bolt (or a longer one may be required) so that the weight is securely fastened to its bracket. Adding more weight to the counterweight will cause the side of the boom with the counterweight to hang lower (and the other side to rise higher). The counterweight is mounted on an adjustable bracket which can be unbolted and then bolted to a different part of the boom wing. If the counterweight is moved along the boom wing towards the centre of the boom, it will cause the boom side with the counterweight to rise higher (and the other side to hang lower).



BOOM COUNTERWEIGHT

STOPPER HOLDER

The stopper holder houses the rubber stopper that prevents the outer boom wing from hitting the inner boom wing. Otherwise damage to both the boom and the nozzles will occur. Always make sure that the stopper holder is positioned such that the outer wing will always hit the rubber stopper and not the inner wing. The outer wing may tend to hang lower after awhile and the stopper holder may need to be moved in order to compensate for this. The stopper holder can be unbolted and then bolted to a different part of the inner boom wing.



BOOM CABLE

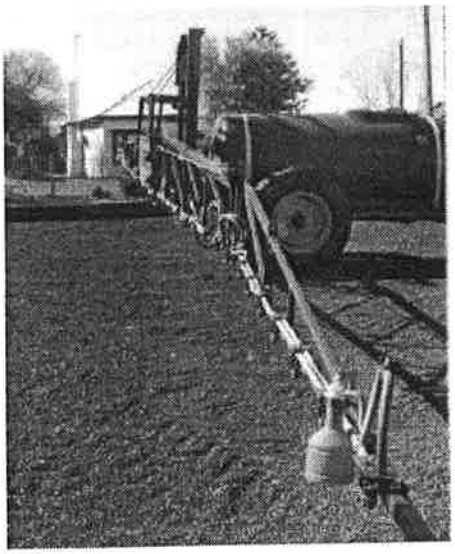
The boom cable needs to have the correct tension and be positioned correctly for the boom to have the correct alignment. The boom needs to aligned when in the working position (ie all boom sections in the one line which is perpendicular to the directional motion of the sprayer) and fold up tightly in the transport position.

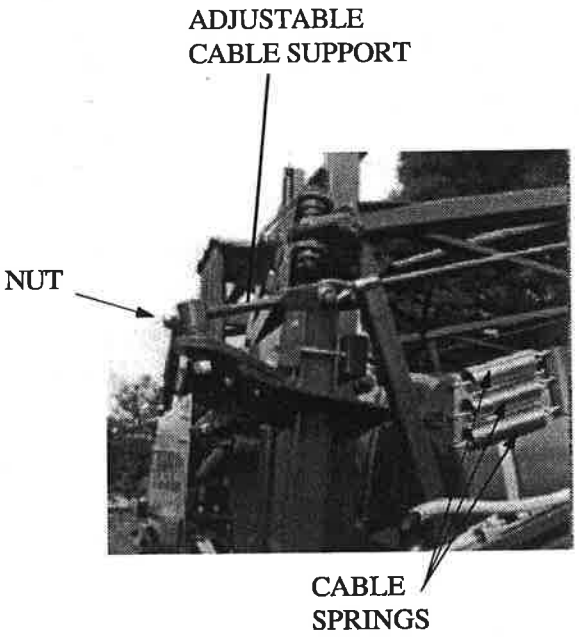
The tension of the cable affects the rigidity of the boom (ie how much the outer wing moves around when the boom is folded and unfolded). To alter this tension so that the outer wing does not move excessively, loosen the U-bolts in the cable drum and then alter the position of the nut accordingly on the adjustable cable support. Tighten the U-bolts back in the same position as before. Loosening the U-bolts ensures the alignment of the boom will not be affected.

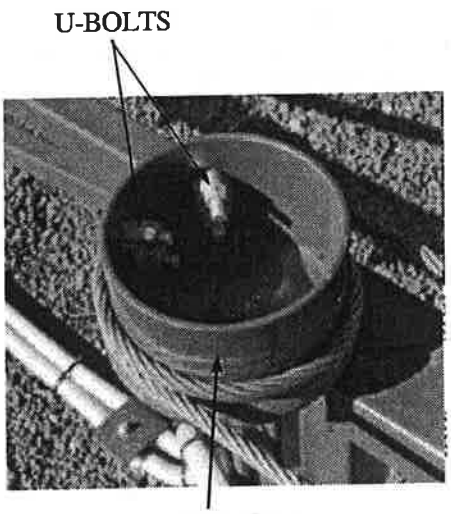
The alignment of the boom segments can be altered by altering the position of the nut on the adjustable cable support without releasing the U-bolts on the cable drum. This is best done with the boom is unfolded into the working position and the nut adjusted until the two boom segments line up. The diameter of the cable drum will then ensure the boom will fold tightly into the working position. This procedure should be performed for both sides of the boom.

CORRECT ALIGNMENT

INCORRECT ALIGNMENT







BOOM TECHNICAL INFORMATION

There are some fluid mechanic characteristics which need to be considered when dealing with booms. The boom, depending on its size, will incur pressure losses between the control manifold and the nozzles, which may, under certain circumstances, become significant.

Experimentation has shown that for turbulent flow:

- pressure loss varies directly as the length of pipe;
- pressure loss varies almost as the square of the velocity;
- pressure loss varies almost inversely as the diameter;
- pressure loss depends upon the surface roughness of the interior pipe wall;
- pressure loss depends upon the fluid properties of density and viscosity;
- pressure loss is independent of pressure.

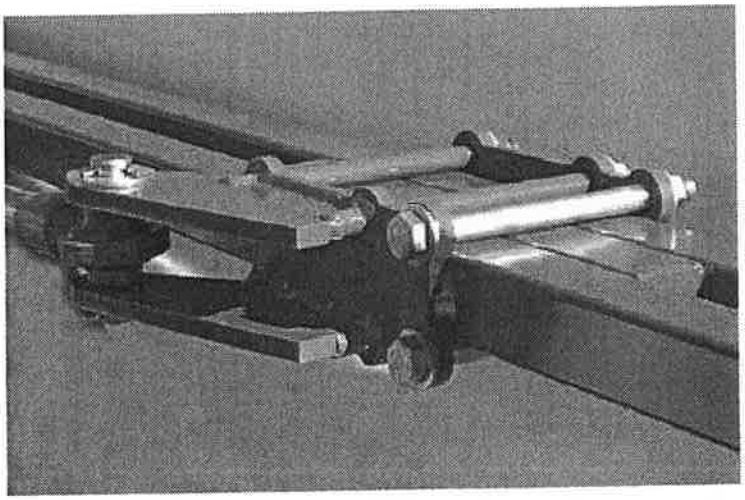
Therefore, there will be a pressure difference between the control manifold and the nozzles due to the length of hose required to travel between the two. The losses become more significant as fluid velocity increases (ie flow rate increases). Thus changing nozzles, which alters the flow rate, will affect the amount of pressure loss incurred. Changing to nozzles with a larger orifice diameter will increase the delivery flow rate and also increase the pressure loss.

GoldAcres have determined that for the 24 metre Delta boom with 11002 XR TeeJet nozzles there appeared to be approximately an 80 kPa pressure loss between where the sprayer pressure gauge reading (pressure taken at the manual pressure relief valve) and the furthermost nozzle.

DELTA BOOM HYDRAULIC FOLD RAM INSTALLATION
(12 Mt – 20 Mt inclusive)

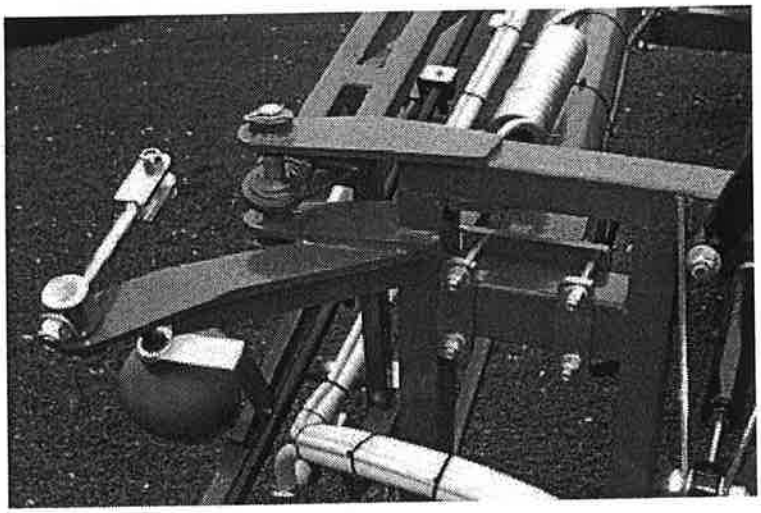
Install the boom arms onto the center section and align in the working position.

Attach the outer ram bracket onto the top rails of the inner boom arm at the point where the third section of RHS is welded between the two rails. Leave the bolts loose at this stage. Ensure the bracket is mounted on the front side of the boom and pointing towards the boom center section.



Outer Ram Bracket

Install the barrel end of the ram to the centre section using adjustable bracket. Bracket should be approximately 6mm from outer vertical post.



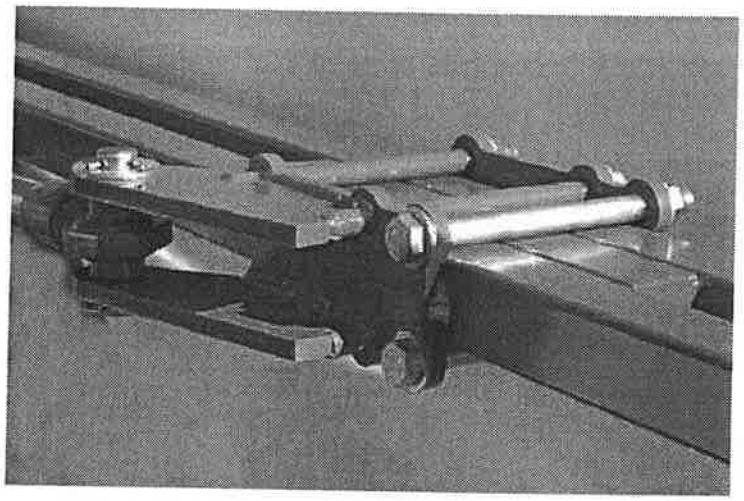
Barrel end mounted on adjustable bracket

Check alignment with boom in folded position. If the inner boom comes in too far, move bracket in and vice versa.

DELTA BOOM HYDRAULIC FOLD RAM INSTALLATION (24M+)

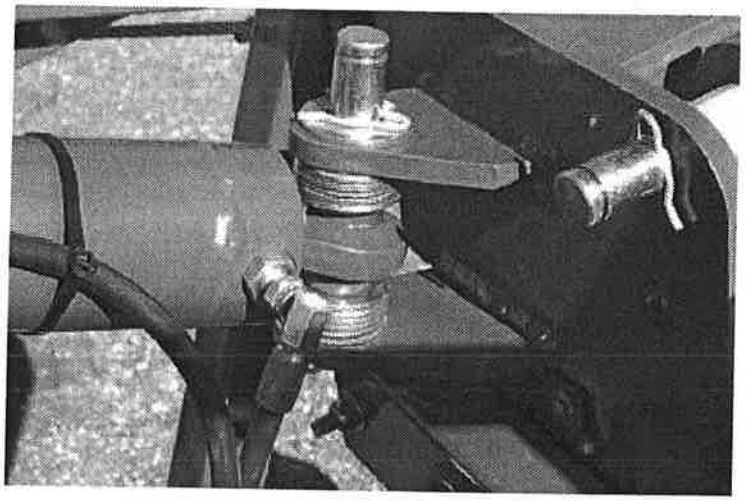
Install the boom arms onto the center section and align in the working position.

Attach the outer ram bracket onto the top rails of the inner boom arm at the point where the third section of RHS is welded between the two rails. Leave the bolts loose at this stage. Ensure the bracket is mounted on the front side of the boom and pointing towards the boom center section.



Outer Ram Bracket

Install the barrel end of the ram onto the center section. Fit equal number of washers top and bottom of ram rose end.



Barrel end mounted with washers top and bottom

Adjust the outer ram brackets until the inner boom arms are aligned correctly in the working position. Tighten bolts. Fold boom to transport position.

Check alignment. If the inner boom comes in too far transfer washers from bottom to top of ram rose end and vice versa.

BOOM CABLE INSTALLATION INSTRUCTIONS.

These instructions refer to all Delta booms but please **note**, all recent 24m+ Delta Booms have two break-a-way sections and in this context these instruction refer only to the inner of the two break-a-ways.

Position boom in the unfolded position with the outer boom arm orientated slightly forward as per diagram one.

Connect break-a-way spring(s), spring brackets and one end of the cable to the front side of the boom.

Starting from the front of the drum wind the cable down 1 ½ turns back under itself and exit on the rear of the drum at the bottom of the winding.

Install the cable clamps onto the drum and pull the cable through by hand to take up as much slack as possible before tightening.

Install the cable eyebolt adjuster onto the rear of the boom.

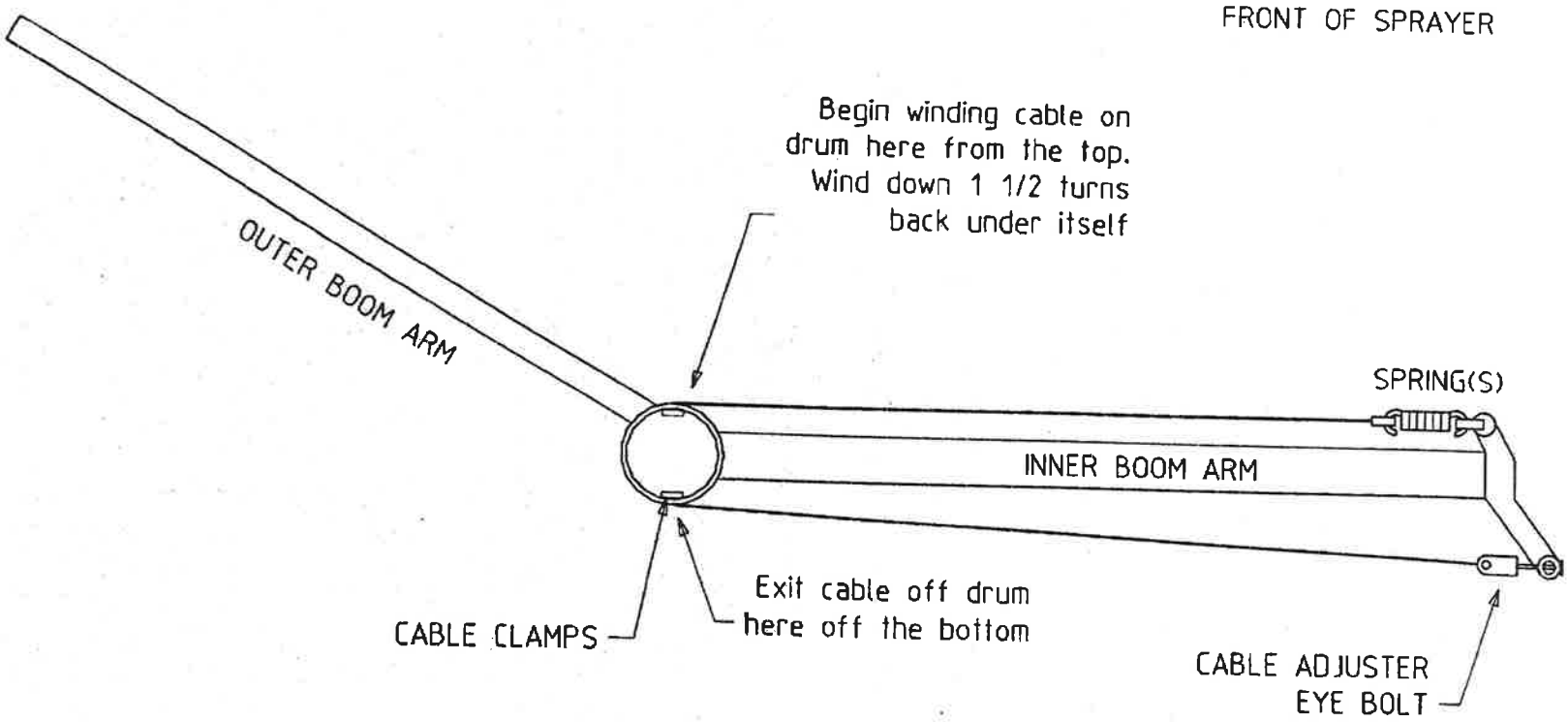
Pull back on the outer boom arm assembly by hand to extend the break-a-way springs enabling the remaining end of the cable to be connected to the eyebolt adjuster. This is using the outer boom drum as a tensioning lever.

Once the cable has been connected to the eyebolt adjuster, carefully release the outer boom arm assembly ensuring that it does not spring forward dangerously.

Adjust the eyebolt until the outer boom arm assembly has pulled back in line with the inner boom arm.

As a starting point, the break-a-way springs require one-millimeter clearance between the coils. If this clearance has not been obtained when initially aligning the outer boom arm, loosen the cable clamps on the drum, position the outer boom arm slightly forward again spinning the cable on the drum as you do so, retighten the cable clamps, then adjust the eyebolt again until the outer boom arm is realigned. Repeat if necessary until the correct clearance is achieved.

More or less tension can be placed on the break-a-way action of the outer boom arm by increasing or decreasing this gap in the break-a-way spring(s). This can be done by using the above adjustment method keeping in mind that you will need to position the outer boom arm slightly rearwards rather than forwards if decreased tension is required.



Boom cable installation instructions

Figure 1

OUTER BOOM ARM ADJUSTMENT PLATE. (24m + delta booms)

The eyebolt cable adjuster aligns the outer boom arm in the working position, the adjustment plate (Figure 2) is designed to adjust the outer boom arm in the **folded position**.

If installing these plates ensure they are position on the correct side and the correct way up.

When installed correctly 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. (See Photo)

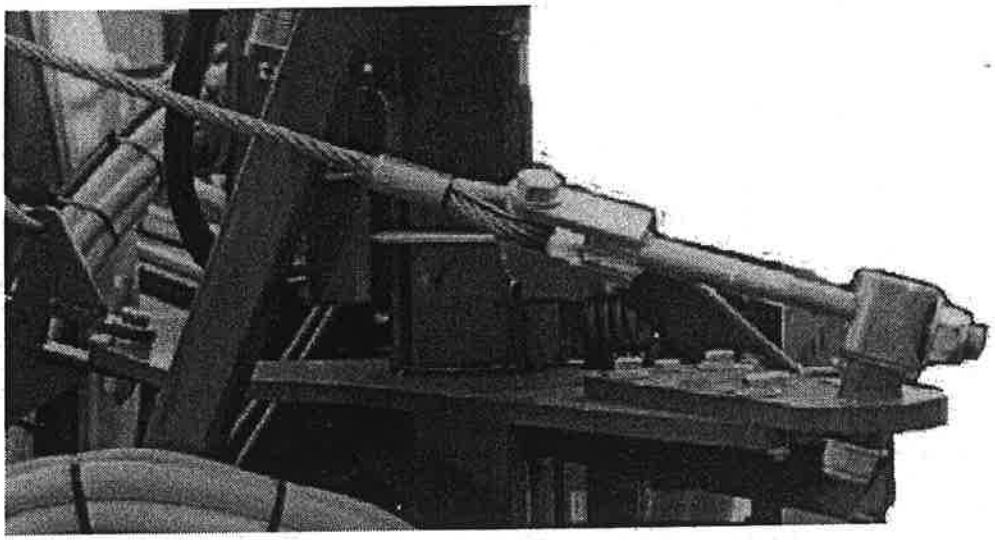
If installing these plates for the first time position the 4 bolts in the middle of the adjustment slots and temporarily tighten. Install the boom cable as per instructions ensuring the outer boom arm is correctly aligned when in the working position.

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 to much tension on the cable **(see note below)** then the adjustment plate needs to be moved inwards.

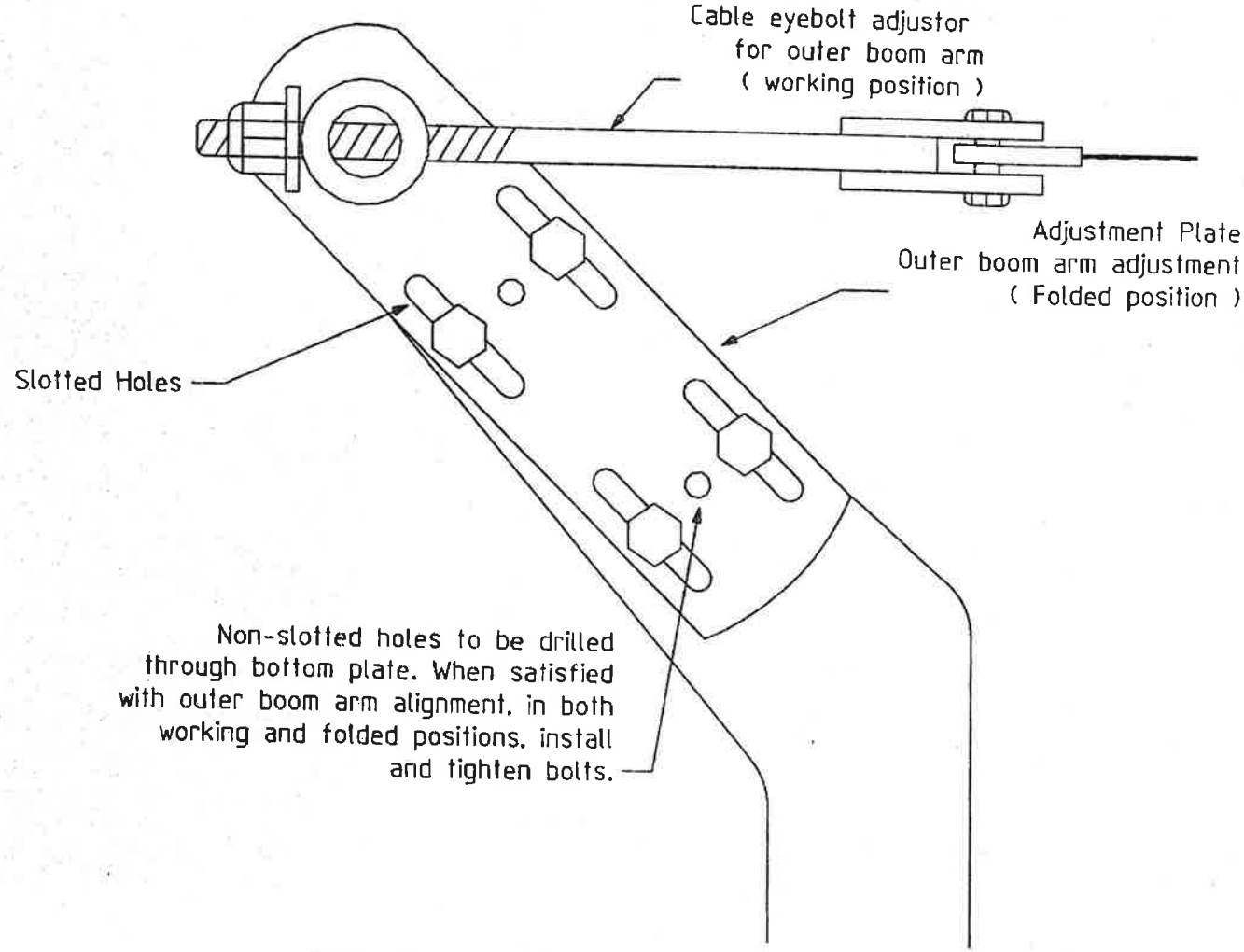
To adjust the plate the boom has to be in the working position. Have someone pull back on the outer boom arm to release the tension on the cable whilst you make adjustments to the plate. When adjustment is completed ensure the outer boom arm is released carefully so it does not spring forward dangerously.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

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

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



Eye Bolt Cable Adjuster with boom in folded position

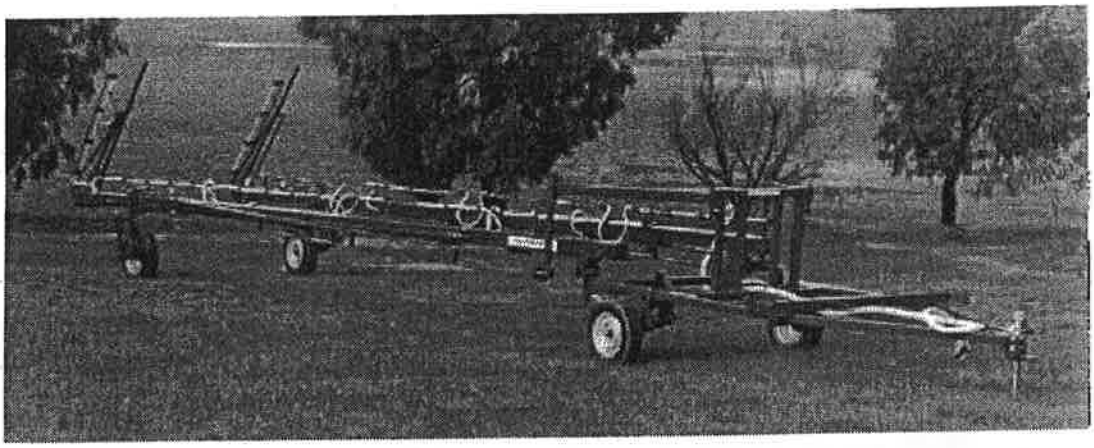


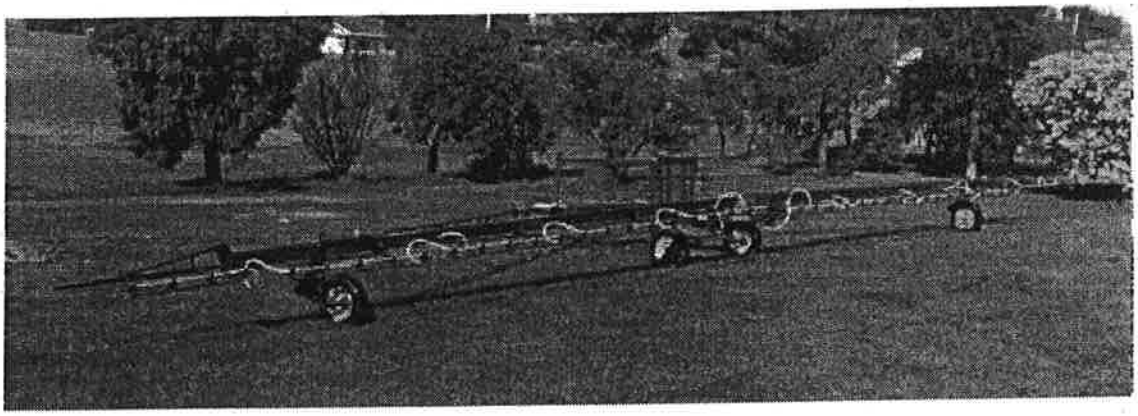
Outer arm adjustment plate

Figure 2

GROUND GLIDER TRAILING BOOM

The GoldAcres Trailing Boom provides a reliable and effective method of spraying. The nozzles are kept at a relative constant height above the ground due to the wheels at the end of the boom. The combination of both coil spring and shock absorber suspension provides excellent nozzle stability when operating and road handling when transporting.





SAFETY WARNINGS

NEVER STAND WITHIN RADIUS OF BOOM WINGS

Personal injury can result if any part of the sprayer hits a person during operation of the sprayer.

ALWAYS ENSURE THERE IS ADEQUATE ROOM TO OPEN BOOM

Serious damage can be done to the sprayer if the boom hits or becomes entangled with any foreign objects.

ALWAYS ENSURE BOOM IS SECURELY SUPPORTED WHEN TRANSPORTING

Serious damage may occur if boom opens out whilst transporting.

MAKE SURE ALL RELEVANT TOWING REGULATIONS ARE ADHERED TO WHEN TOWING SPRAYER

MAKE SURE SPRAYER COMPLIES WITH ALL RELEVANT ROAD REGULATIONS

SUITABLE CARE SHOULD BE TAKEN WHEN DRIVING WITH SPRAYER ATTACHED TO THE VEHICLE. CONSIDERATION SHOULD BE GIVEN TO BOTH THE CARRYING AND/OR TOWING CAPACITY OF THE VEHICLE AND THE TERRAIN GRADIENTS WHEN DETERMINING THE SPEED AT WHICH THE VEHICLE CAN BE SAFELY DRIVEN

MAXIMUM TRAVELLING SPEED IS 40 KM/H (OR LESS DEPENDING ON STATE ROAD REGULATIONS)

CHECK WHEEL NUTS REGULARLY

ENSURE ALL BOLTS ARE TIGHTENED AND SECURED BEFORE TRANSPORTING AND OPERATING

INSPECT SPRAYER THOROUGHLY FOR DAMAGE AND WEAR BEFORE TRANSPORTING AND OPERATING

LUBRICATE SPRAYER AS PER RECOMMENDED REQUIREMENTS BEFORE OPERATING

MAKE SURE SPRAYER IS PROPERLY SUPPORTED WHEN CHANGING TYRE

NEVER ATTEMPT TO CLEAN NOZZLES BY BLOWING WITH MOUTH

READ THE CHEMICAL LABEL - HEED THE CHEMICAL LABEL

HANDLE ALL CHEMICALS WITH CARE

WEAR ALL NECESSARY PROTECTIVE CLOTHING WHEN EXPOSED TO CHEMICALS

FLUSH CHEMICALS FROM EQUIPMENT IMMEDIATELY AFTER USE

A SUPPLY OF FRESH WATER SHOULD BE WITH SPRAYER AT ALL TIMES

DO NOT OPERATE SPRAYER UNDER THE INFLUENCE OF ANY DRUGS OR TIREDNESS

NOZZLE ADJUSTMENT

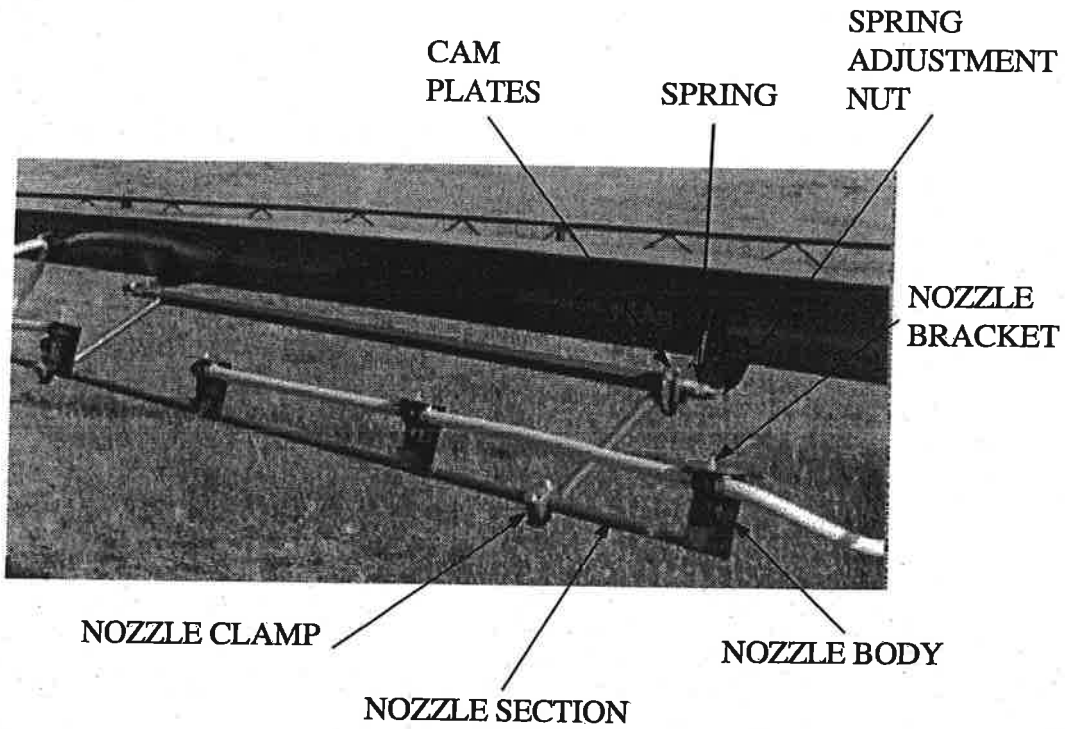
The trailing boom provides flexibility in the positioning of the nozzles with regard to either height from the ground or angle to the ground. The nozzles are divided into groups of either four, five or six depending on the size of the boom.

To alter the height of the nozzles, rotate the nozzle section up or down until desired orientation is achieved and the spring tension acting against the cam plates will hold the nozzle section in position. The spring tension can be increased if the cam plates become loose by tightening the spring adjustment nut.

WEAR ALL NECESSARY PROTECTIVE CLOTHING WHEN ADJUSTING NOZZLES DUE TO POSSIBLE EXPOSURE TO CHEMICALS

There will be residual pressure in the spray lines between the solenoids and the non-drip check valves in the nozzles bodies, unless the spray lines on the trailing boom are disconnected from the tanker spray lines. This pressure may cause flow to come through the nozzles if the non-drip check valves are sufficiently shaken when adjusting the nozzles. Do not have nozzles pointing towards the face of the operator at any time.

To alter the nozzle angle relative to the ground, twist the section supported by the nylon clamps until the desired orientation is achieved. Tighten the nylon clamps on each nozzle section so that the nozzles will not rotate whilst spraying but can be altered if need be. If the trailing boom is new, the clamps may initially need to be loosened considerably in order to rotate the nozzles as paint may have adhered to the clamps.

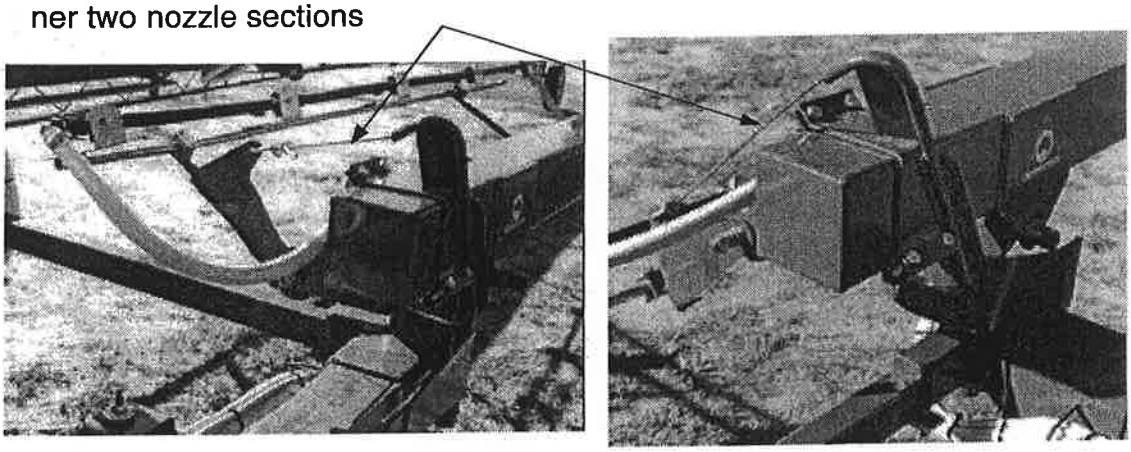


AUTOMATIC NOZZLE LIFTERS

The inner two nozzle sections need to be lifted when folding the boom so that they do not come into contact with the A-frame. The cable is strategically routed so that when the boom closes up, the cable pulls on the two nozzle sections and lifts them up clear of the A-frame.

Periodically check to make sure the automatic nozzle lifters are working satisfactorily.

The cable automatically raises the inner two nozzle sections



BOOM HEIGHT

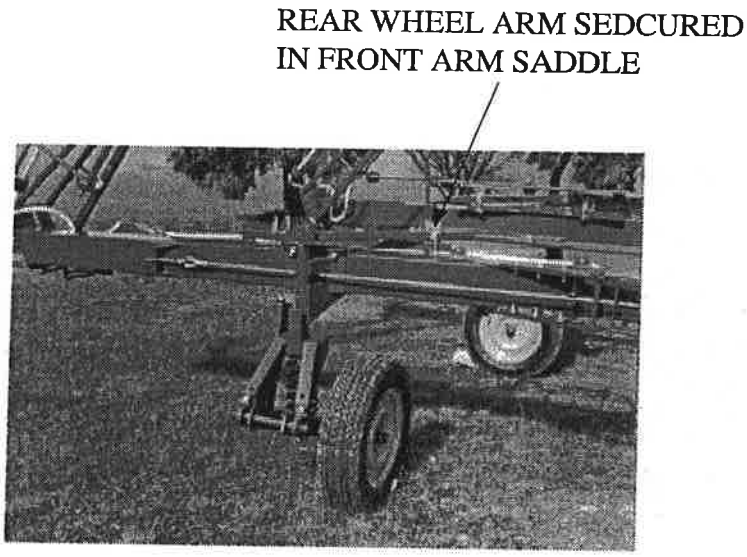
The boom nozzle spacing is usually 50 cm, and for this spacing, the optimum height the boom should be from the object to be sprayed, for nozzles with a 110° fan angle, is 50 cm. There will be an adequate spray coverage if the nozzles are higher than this but there can be an increase in drift.

The spray pattern is affected by gravity, pressure, chemical composition and droplet size. Hence the pattern does not extend to the full theoretical coverage.

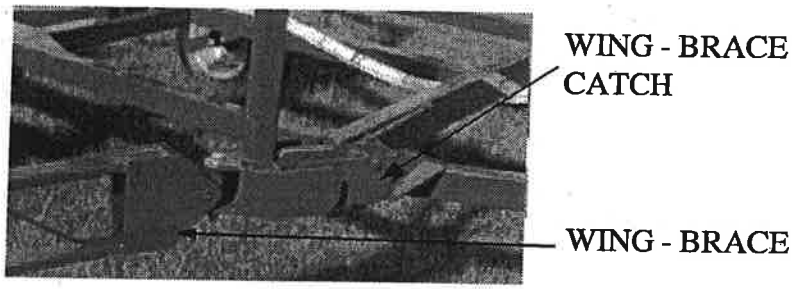
UNFOLDING TO WORK POSITION

To unfold the trailing boom into the working (spraying) position:

1) Align the rear wheels perpendicular to the boom wings by moving and securing both rear wheel arms into the front arm saddles;



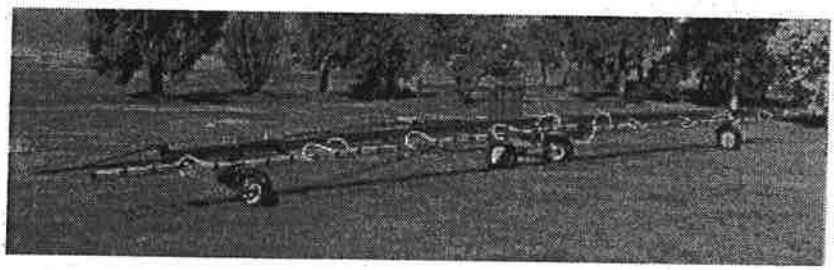
2) Close the wing-brace catches (handle turned towards A-frame) so that the wing brace can fasten onto A-frame;



3) Manually push the boom wings around until the wing-braces fasten onto the wing-brace catches;

4) Turn the end breakaway sections down;

5) Alter orientation of nozzles to suit particular spraying requirements.

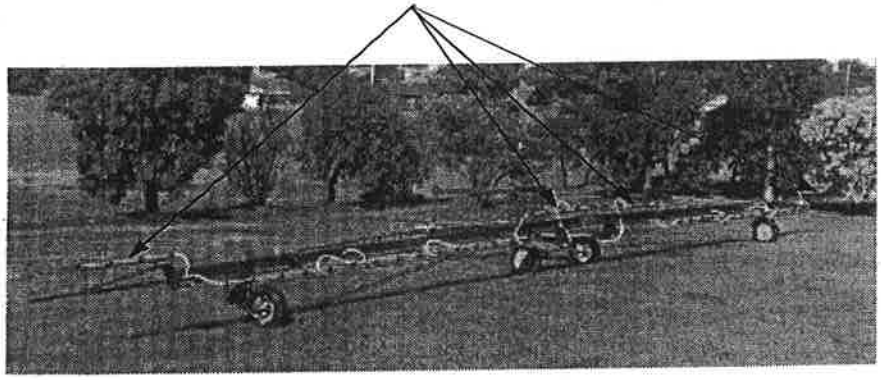


FOLDING TO TRANSPORT POSITION

To fold the trailing boom so that it can be transported:

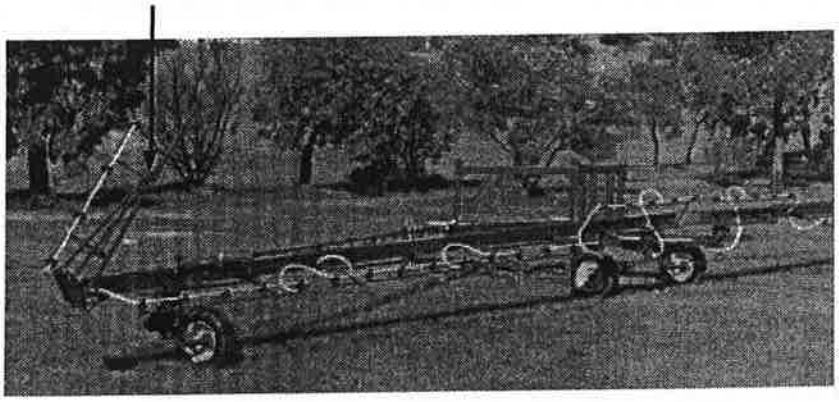
1) Raise the two inside nozzle sections (the nozzle sections closest to the trailing boom A-frame) and the nozzle sections on the breakaways vertically up;

NOZZLE SECTIONS RAISED UP



2) To shorten the length of the boom, fold the end breakaway sections up;

BREAKAWAY SECTIONS TURNED UP



UNCOUPLING FROM SPRAYER TANKER

When uncoupling the trailing boom from the spray tanker:

Disconnect the trailing boom safety chain from the spray tanker;

Remove the trailing boom hitch point from the spray tanker tow pin;

Disconnect any electrical wiring between the spray tanker and the trailing boom;

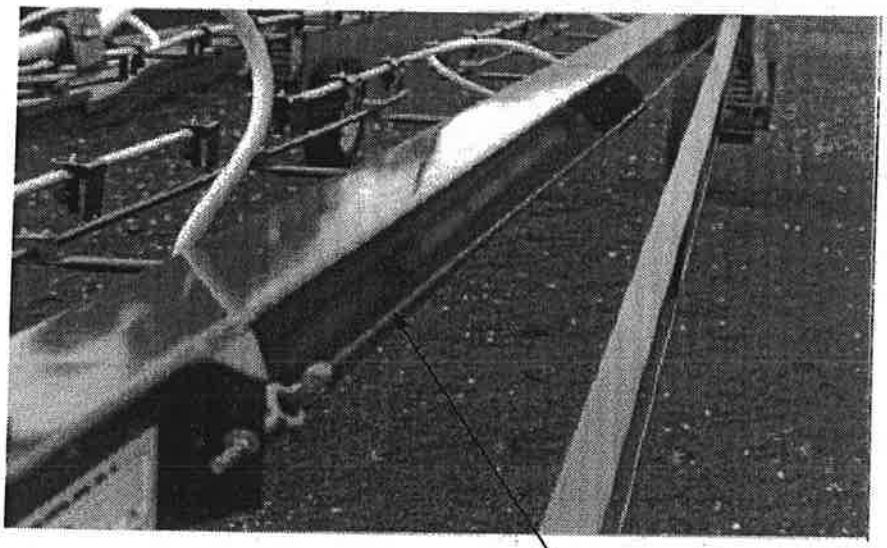
Disconnect the spray lines (and any foam marker air lines) between the spray tanker and the trailing boom. Be aware of the residual pressure in the lines (pressure between the solenoids and the non-drip check valves in the nozzle bodies) when disconnecting these spray lines;

Can use jack to support trailing boom A-frame.

WEAR ALL NECESSARY PROTECTIVE CLOTHING WHEN ADJUSTING NOZZLES DUE TO POSSIBLE EXPOSURE TO CHEMICALS

CABLE TENSION

There needs to be tension on the cable in order for the boom to not flex too much. The cable should have sufficient tension such that the cable is taught and the boom has a slight bend. Regularly check this cable tension. To adjust the tension on the cable, adjust the position of the nuts on the ends of the eye-bolts that the cable is attached to.



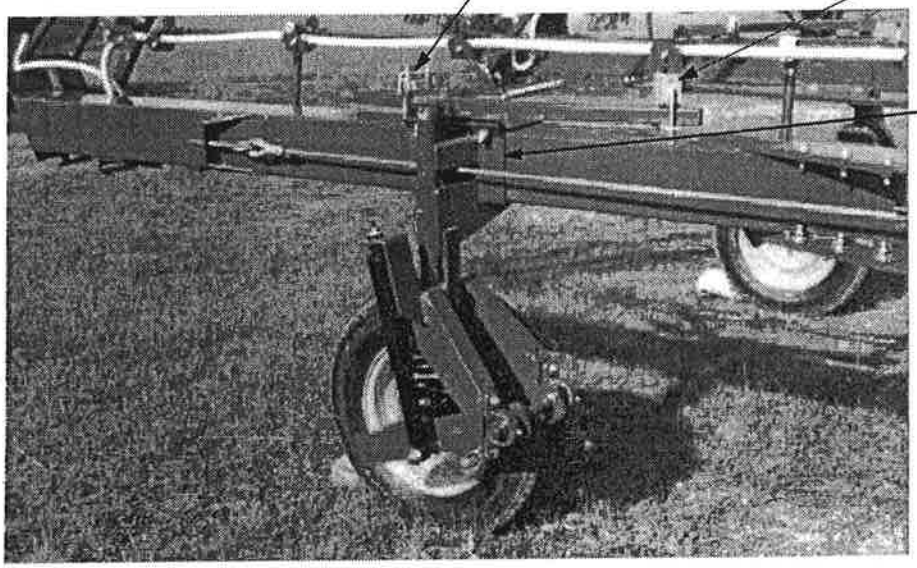
BOOM CABLE

REAR WHEEL ALIGNMENT

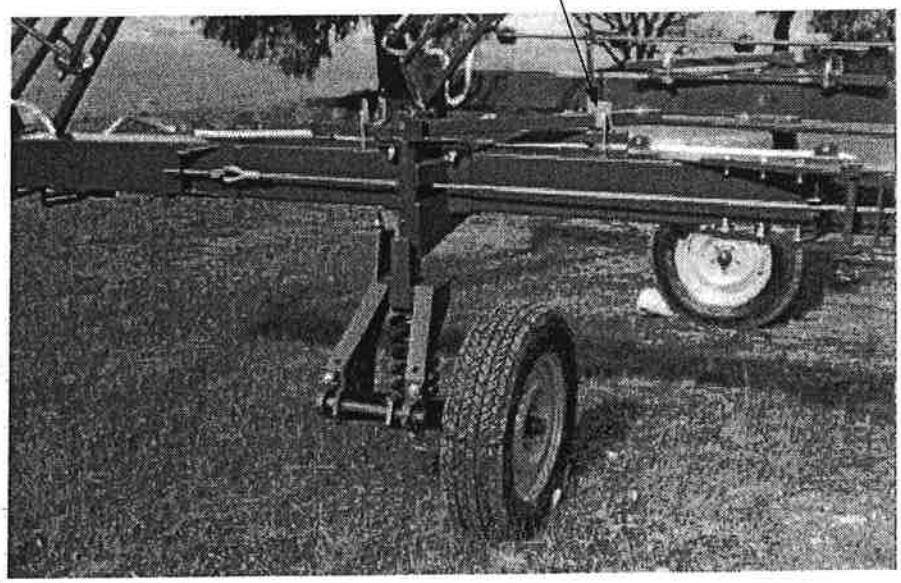
It is essential that the rear wheels are aligned correctly when in either the folded or unfolded position. If the wheels are slightly out, the wheel clamps will tend to shift up and down the boom wing.

Moving the rear wheel arm alters the orientation of the wheel and the arm is clamped into either the position for spraying or transporting. If the positioning of these arm saddles is incorrect, the wheels will not be aligned correctly. If the boom wings are not positioning correctly in either the folded or unfolded positions, shift the position of the respective arm saddles until the wheel is correctly aligned.

REAR WHEEL ARM CLAMPED INTO THE TRANSPORT POSITION



REAR WHEEL ARM CLAMPED INTO THE WORKING POSITION



TECHNICAL INFORMATION

There are some fluid mechanic characteristics which need to be considered when dealing with trailing booms. The trailing boom, with its relatively large size and long distance from the spray tanker, will incur pressure losses which may, under certain circumstances, become significant.

Experimentation has shown that for turbulent flow:

- pressure loss varies directly as the length of pipe;
- pressure loss varies almost as the square of the velocity;
- pressure loss varies almost inversely as the diameter;
- pressure loss depends upon the surface roughness of the interior pipe wall;
- pressure loss depends upon the fluid properties of density and viscosity;
- pressure loss is independent of pressure.

Therefore, for the trailing booms there will be a pressure difference between the control manifold and the nozzles due to the length of hose required to travel from one to the other and due to the flow having to pass through componentry. The losses become more significant as fluid velocity increases (ie flow rate increases). Thus changing nozzles, which alters the flow rate, will affect the amount of pressure loss incurred. Changing to nozzles with a larger orifice diameter will increase the delivery flow rate and also increase the system pressure loss.

GoldAcres have determined that for the 24 metre trailing boom with 1/2" feed lines, for 11015 XR TeeJet nozzles there appeared to be a 45 kPa pressure loss between where the feed lines connect to the tanker and the nozzles, for 11002 XR TeeJet nozzles a 55 kPa pressure loss, and for 11003 XR TeeJet nozzles a 100 kPa pressure loss. For the same boom with 3/4" feed lines, there appeared to be a 30 kPa pressure loss for 11002 XR TeeJet nozzles, and a 50 kPa pressure loss for 11003 XR TeeJet nozzles.

For the 28 metre trailing boom with 3/4" feed lines, there appeared to be a 40 kPa pressure loss between where the feed lines connect to the tanker and the nozzles for 11002 XR TeeJet nozzles, and a 60 kPa pressure loss for 11003 XR TeeJet nozzles.

There appeared to be little difference in pressure along each boom section and between the boom sections.

FIXED AND TWIN-LINK BOOMS

SAFETY WARNINGS

NEVER STAND WITHIN RADIUS OF BOOM WINGS

Personal injury can result if any part of the sprayer hits a person during operation of the sprayer.

ALWAYS ENSURE THERE IS ADEQUATE ROOM TO OPEN BOOM

Serious damage can be done to the sprayer if the boom hits or becomes entangled with any foreign objects.

ALWAYS ENSURE BOOM IS SECURELY SUPPORTED WHEN TRANSPORTING

Serious damage may occur if boom opens out whilst transporting.

MAKE SURE ALL RELEVANT TOWING REGULATIONS ARE ADHERED TO WHEN TOWING SPRAYER

MAKE SURE SPRAYER COMPLIES WITH ALL RELEVANT ROAD REGULATIONS

SUITABLE CARE SHOULD BE TAKEN WHEN DRIVING WITH SPRAYER ATTACHED TO THE VEHICLE. CONSIDERATION SHOULD BE GIVEN TO BOTH THE CARRYING AND/OR TOWING CAPACITY OF THE VEHICLE AND THE TERRAIN GRADIENTS WHEN DETERMINING THE SPEED AT WHICH THE VEHICLE CAN BE SAFELY DRIVEN

MAXIMUM TRAVELLING SPEED IS 40 KM/H (OR LESS DEPENDING ON STATE ROAD REGULATIONS)

CHECK WHEEL NUTS REGULARLY

ENSURE ALL BOLTS ARE TIGHTENED AND SECURED BEFORE TRANSPORTING AND OPERATING

INSPECT SPRAYER THOROUGHLY FOR DAMAGE AND WEAR BEFORE TRANSPORTING AND OPERATING

LUBRICATE SPRAYER AS PER RECOMMENDED REQUIREMENTS BEFORE OPERATING

NEVER ATTEMPT TO CLEAN NOZZLES BY BLOWING WITH MOUTH

READ THE CHEMICAL LABEL - HEED THE CHEMICAL LABEL

HANDLE ALL CHEMICALS WITH CARE

WEAR ALL NECESSARY PROTECTIVE CLOTHING WHEN EXPOSED TO CHEMICALS

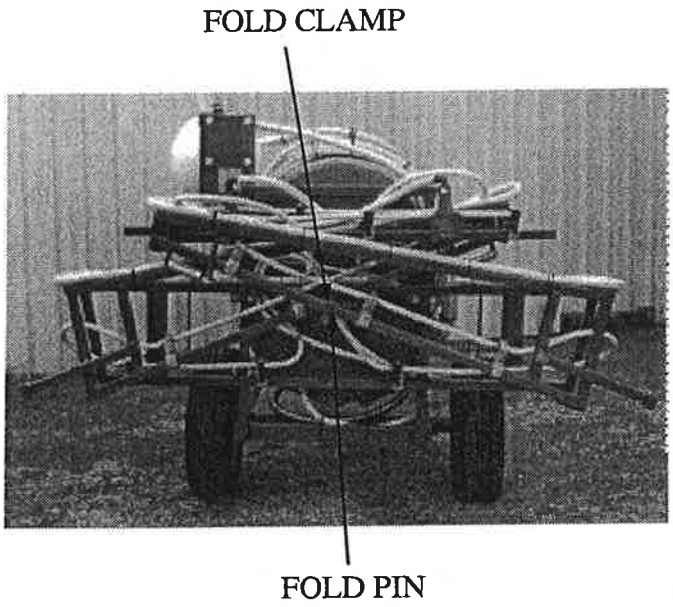
FLUSH CHEMICALS FROM EQUIPMENT IMMEDIATELY AFTER USE

A SUPPLY OF FRESH WATER SHOULD BE WITH SPRAYER AT ALL TIMES

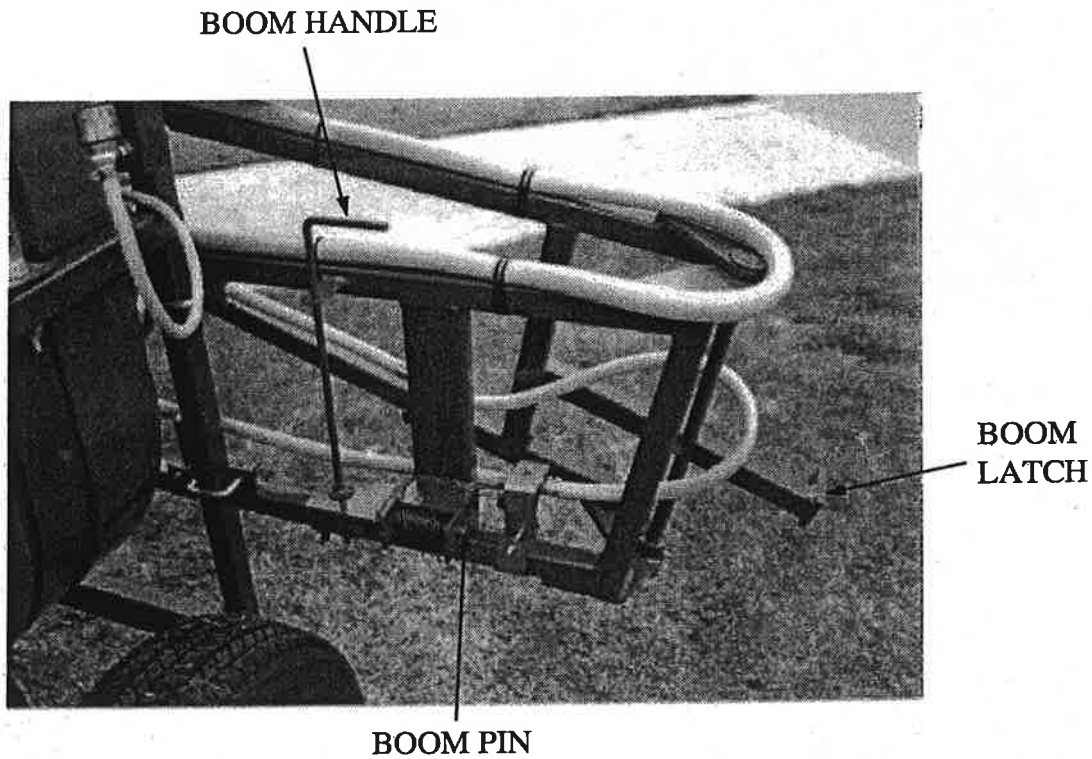
DO NOT OPERATE SPRAYER UNDER THE INFLUENCE OF ANY DRUGS OR TIREDNESS

BOOM UNFOLD

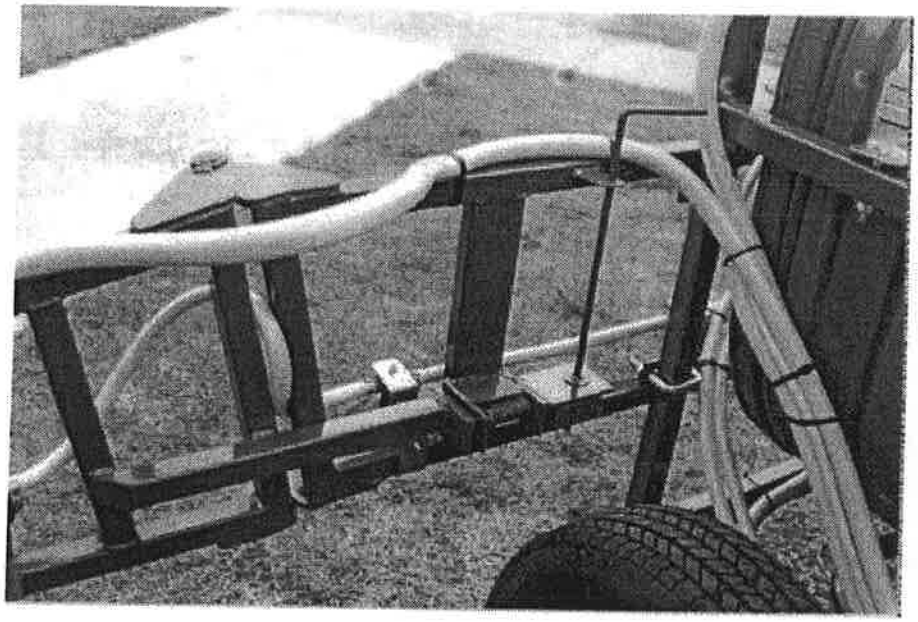
STEP 1: Release the fold pins. Open the inner wings out from the fold clamp and then replace the fold pins (with clips) back into position so they are not misplaced;



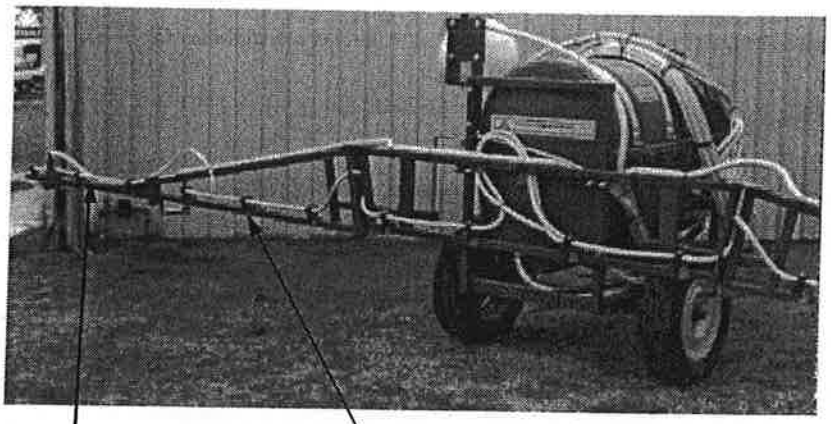
STEP 2: Turn the boom handles so that the boom pin protrudes out as far as possible;



STEP 3: Unfold the inner wings. The boom should lock into position as the boom latch fastens onto the boom pins;



STEP 4: Open the outer wings (open against the spring action). Be careful when unfolding that injury to the operator or boom damage does not result.

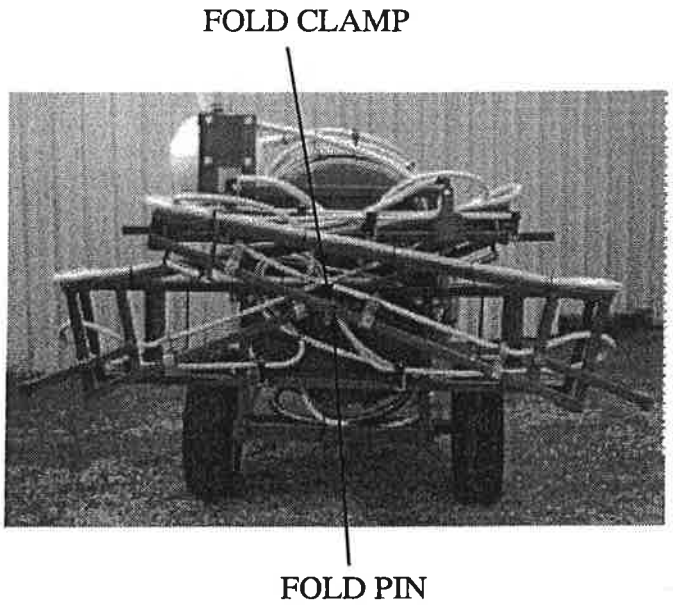


OUTER BOOM WING

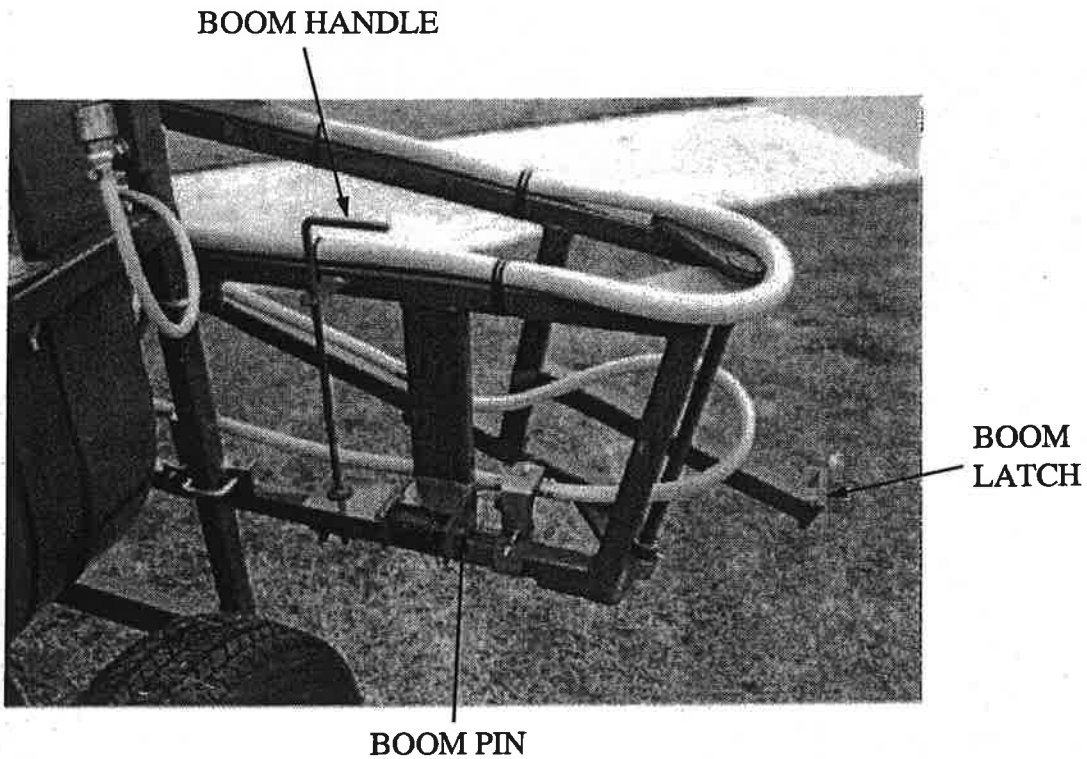
INNER BOOM WING

BOOM UNFOLD

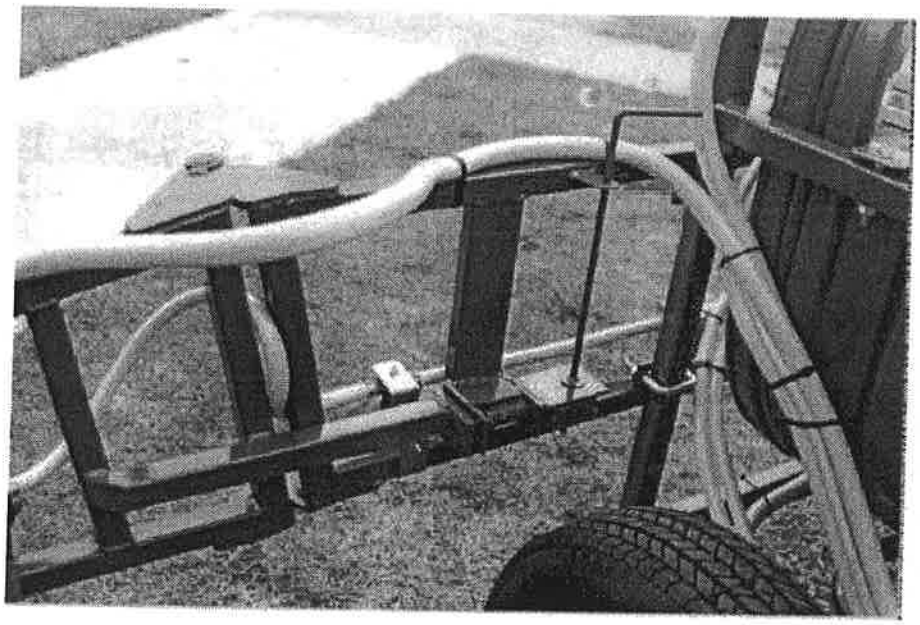
STEP 1: Release the fold pins. Open the inner wings out from the fold clamp and then replace the fold pins (with clips) back into position so they are not misplaced;



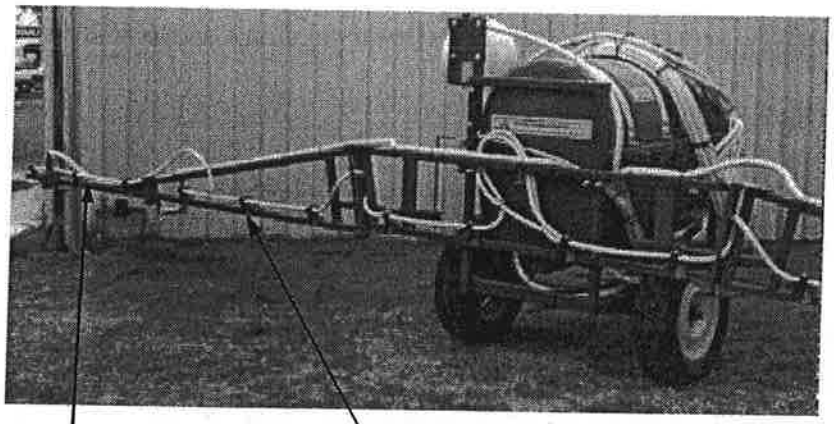
STEP 2: Turn the boom handles so that the boom pin protrudes out as far as possible;



STEP 3: Unfold the inner wings. The boom should lock into position as the boom latch fastens onto the boom pins;



STEP 4: Open the outer wings (open against the spring action). Be careful when unfolding that injury to the operator or boom damage does not result.



OUTER BOOM WING

INNER BOOM WING

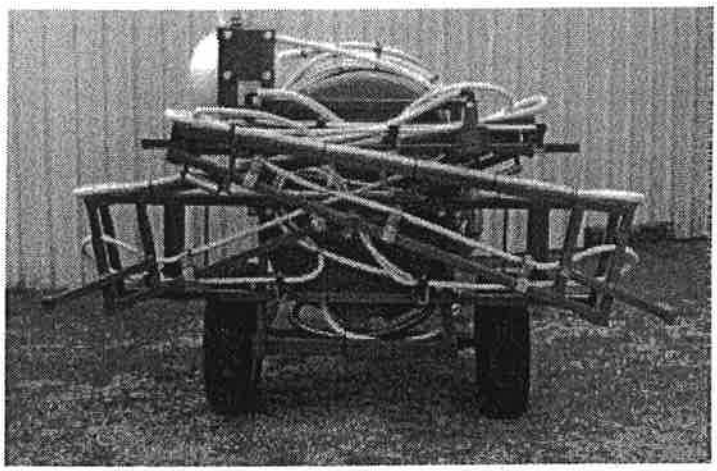
BOOM FOLD

STEP 1: Fold in outer wings;

STEP 2: Turn boom handles to release boom pin from latch;

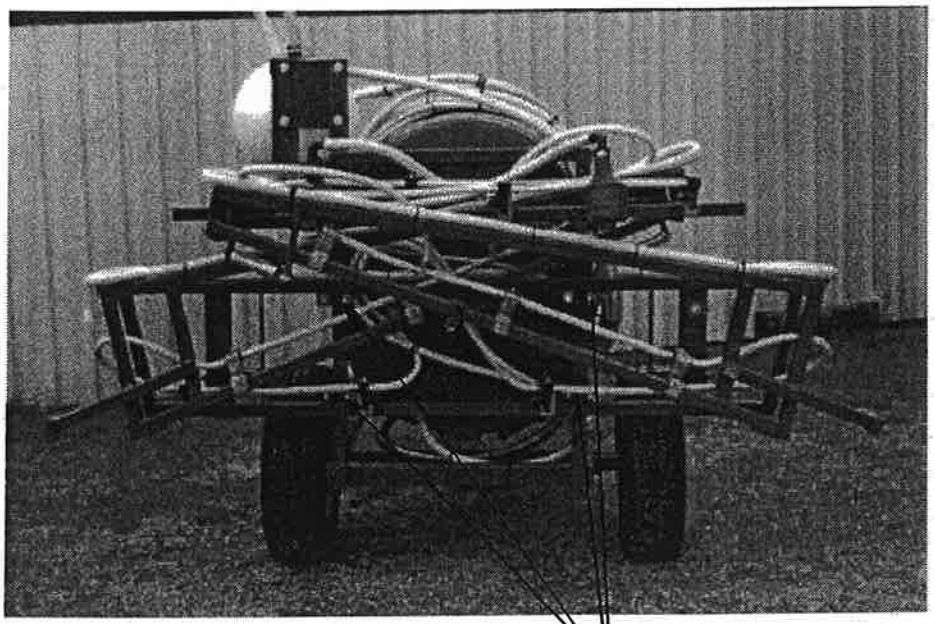
STEP 3: Fold inner wings;

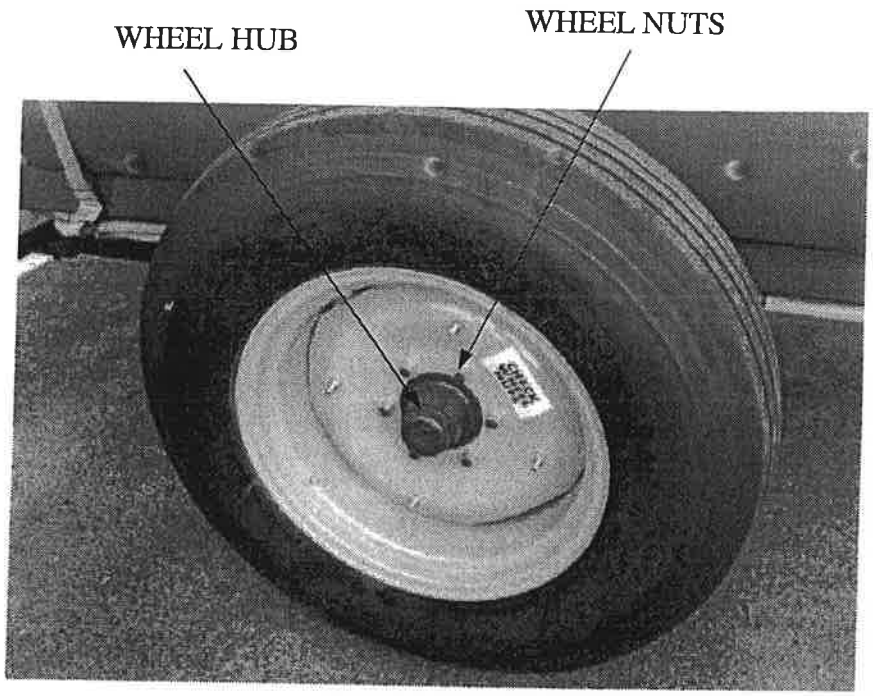
STEP 4: Lock boom into position by removing the fold pins, placing the boom in the fold clamps and then replacing the fold pins back into position.



BOOM HEIGHT ADJUSTMENT

To adjust the height of the boom, unscrew the nuts on the U - bolts clamping the boom to the frame. Raise or lower the boom to the desired height and then tighten the nuts on the U - bolts.

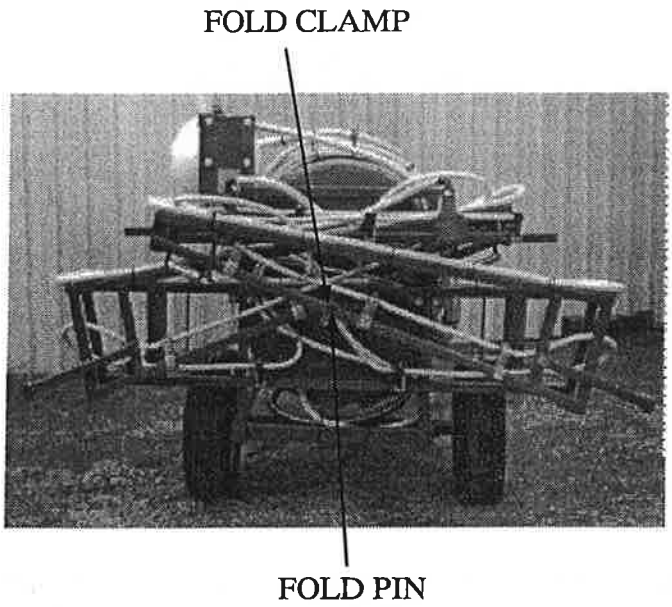



WHEEL HUB
WHEEL NUTS

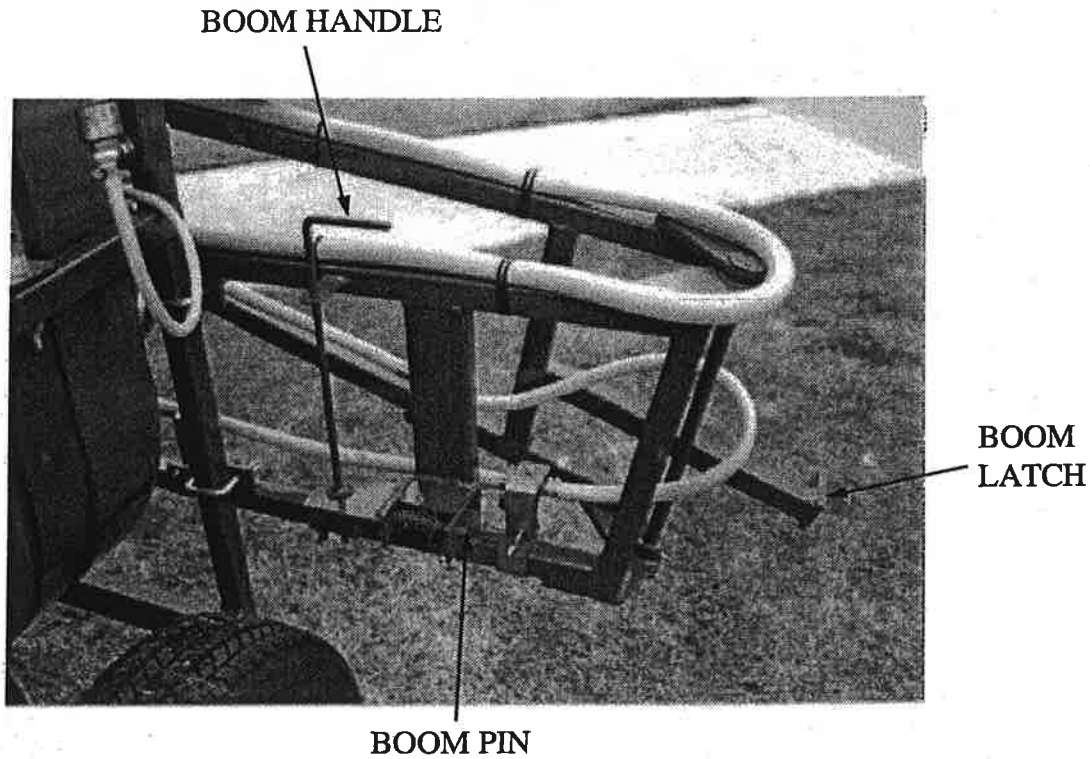

PLACE JACK UNDER SPRAYER AXLE BETWEEN AXLE BOLTS WHEN REMOVING WHEEL
AXLE BOLTS

BOOM UNFOLD

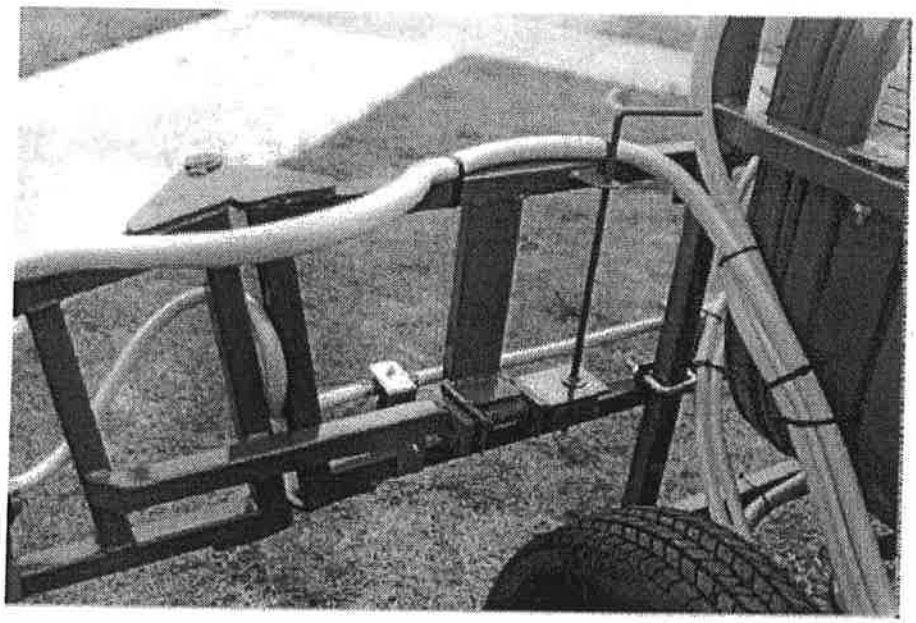
STEP 1: Release the fold pins. Open the inner wings out from the fold clamp and then replace the fold pins (with clips) back into position so they are not misplaced;



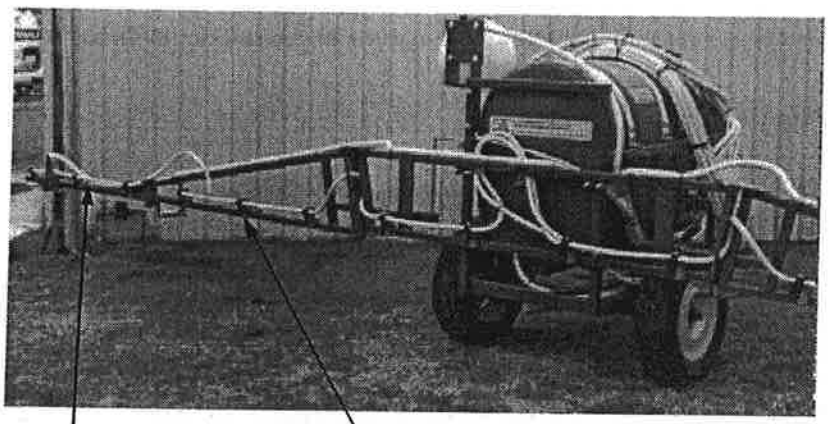
STEP 2: Turn the boom handles so that the boom pin protrudes out as far as possible;



STEP 3: Unfold the inner wings. The boom should lock into position as the boom latch fastens onto the boom pins;

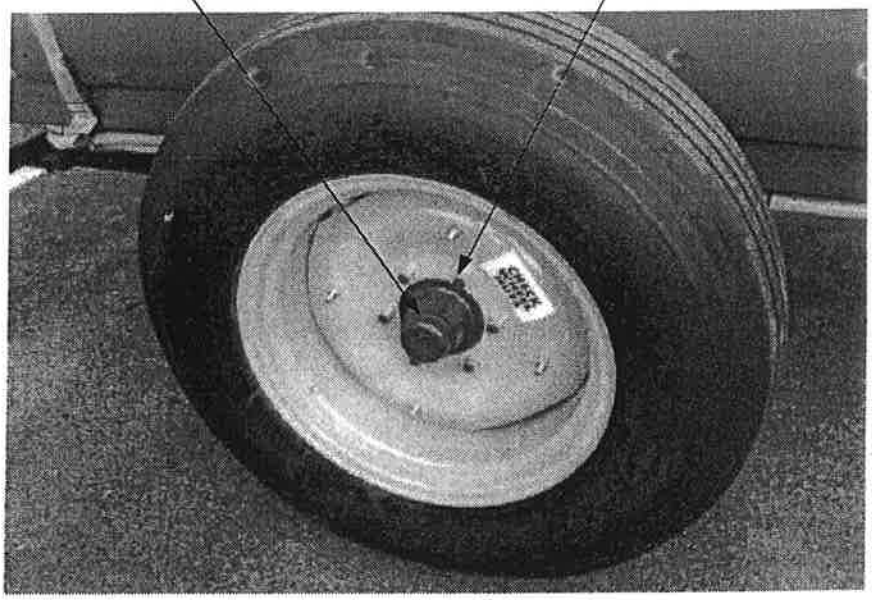


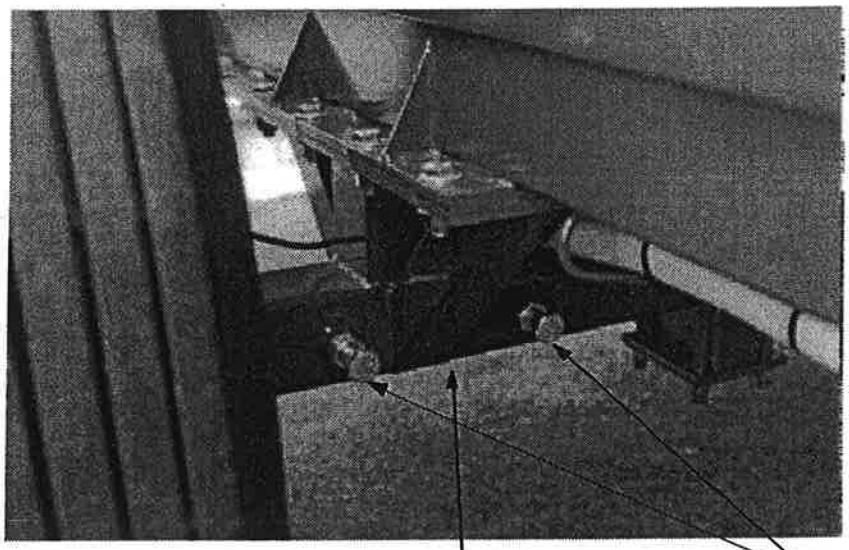
STEP 4: Open the outer wings (open against the spring action). Be careful when unfolding that injury to the operator or boom damage does not result.



OUTER BOOM WING

INNER BOOM WING


WHEEL HUB
WHEEL NUTS


PLACE JACK UNDER SPRAYER AXLE BETWEEN AXLE BOLTS WHEN REMOVING WHEEL
AXLE BOLTS

SPRAY TANKER WHEELS

PROCEDURE TO REMOVE WHEEL FROM SPRAY TANKER

MAKE SURE SPRAYER IS PROPERLY SUPPORTED WHEN CHANGING TYRE

NEVER CHANGE TYRE ON A SLOPE OR SOFT UNEVEN GROUND

NEVER GET UNDER THE SPRAYER WHEN IT IS SUPPORTED ONLY BY THE JACK

ALWAYS USE A JACK OF SUFFICIENT LIFTING CAPACITY

DO NOT SUPPORT SPRAYER WITH JACK UNLESS TANK IS EMPTY

To remove a wheel on the spray tanker, the following guidelines must be adhered to:

1) The sprayer must be hitched to the appropriate towing vehicle;

2) The engine of the towing vehicle must be turned off and the park brake applied ;

3) Chock the wheel(s) that is/are no to be removed with an appropriate obstacle to prevent the sprayer from moving.

4) 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)**;

5) Place a jack on level firm, 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;

6) Use the jack to raise the sprayer axle such that the wheel is off the ground;

7) Place an auxiliary jack block under the sprayer so that if the jack fails the sprayer will not fall;

8) Remove all wheel nuts;

9) Remove wheel from sprayer. Be careful that wheel does not fall on any person causing bodily harm;

10) Ensure that the sprayer is stable when being left for an extended period of time.

TRAILER AXLES

The most common use for these axles is on the GoldAcres trailing booms.

PART NO.	DESCRIPTION	TO SUIT:
HS1	HT Holden Hub-Stub Assembly	
H1	HT Holden Hub 5-Stud Drilled & Studded	HT Holden
HS4716	Mini Hub-Stub Assembly	ATV Trailer Frames
H4716	Mini Hub 4-Stud Drilled & Studded	Mini
A3912LM	Stub Axle 39mm Round 12"	HT Holden & Mini
LM67048	Outer Bearing Cup	HT Holden & Mini
LM67010	Outer Bearing Cone	HT Holden & Mini
LM11949	Inner Bearing Cup	HT Holden & Mini
LM11910	Inner Bearing Cone	HT Holden & Mini
GS609	Grease Seal	HT Holden & Mini
GC1	Grease Cap	HT Holden & Mini
AN34	Axle Nut 3/4"	HT Holden & Mini
WN716	Wheel Nut 7/16"	HT Holden & Mini
WS716	Wheel Stud 7/16"	HT Holden & Mini
AW1	Axle Washer	HT Holden & Mini
SP1	Axle Split Pin	HT Holden & Mini
BLM	Bearing Cup & Cone Set 11910/49 &	HT Holden & Mini
BALM	Bearing Assembly Complete	HT Holden & Mini

TOWING IMPLEMENTS BEHIND SPRAYER

GoldAcres does not recommend towing any implement behind the sprayer except the GoldAcres trailing boom behind the spray tanker. An implement behind the sprayer may result in the load carrying capacity of the wheels on the sprayer being exceeded. Also an implement, such as harrows, can exert a considerable side thrust on the sprayer (especially when turning whilst harrows are lowered in the working position).

DO NOT TOW ANY IMPLEMENT BEHIND SPRAYER (EXCEPT TRAILING BOOM BEHIND SPRAY TANKER)

WHEELS

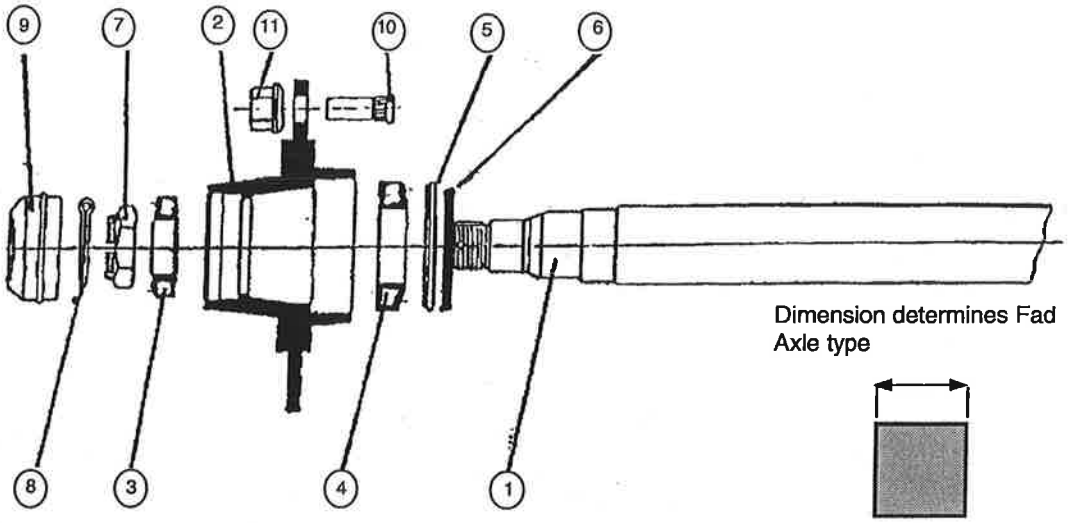
CHECK WHEEL NUTS REGULARLY

The wheel nuts need to be regularly checked and tightened if necessary (check every 8 to 12 hours of operation). The wheel nuts should be checked more frequently when the sprayer is enw (ie every 2 to 4 hours).

The wheel nuts should be tightened alternately and evenly to a torque rating of 350 Nm.

FAD AXLES

The FAD axles are used on most GoldAcres spray tankers.



Dimension determines Fad Axle type

POSITION NUMBER	DESCRIPTION	PART NUMBER					
		FAD80H	FAD80L	FAD70H	FAD70L	FAD60	FAD50
CARRYING CAPACITY (KG)		4250	3600	3250	3000	2350	1500
1	Stub	STUB80SQ	STUB80SQ	STUB70SQ	STUB70SQ	STUB60SQ	STUB50SQ
2	Hub	HUB80	HUB80	HUB70	HUB70	HUB60	HUB50
3	Outer Bearing	32211	30210	32210	30210	30211	30206
4	Inner Bearing	32215	30214	32213	30213	30208	30203
5	Seal	S90-130-12	S85-125-12	S80-120-12	S80-120-12	S70-100-10	S53-85-10
6	Seal Ring	SR77-90-13	SR72-85-13	SR	SR	SR57-70-13	SR46-53-13
7	Axle Nut	FSP24	FSP24	FSP24	FSP24	FSP22	FSP21
8	Split Pin	S1506	S1506	S1506	S1506	S1506	S1506
9	Grease Cap	FSPC090	FSPC090	FSPC090	FSPC090	FSPDC80	FSPDC
10	Wheel Stud	FSP44	FSP44	FSP44	FSP44	FSP44	FSP43
11	Wheel Nut	FSP34	FSP34	FSP34	FSP34	FSP34	FSP33

The following table has tyre load limit capacities at various cold inflation pressures for a maximum loaded speed of 20 km/h and no restriction on haul length:

NOTE: If the speed is increased or the tyre pressure reduced, the load capacity will be reduced.

TYRE SIZE	PLY RATING	MAXIMUM LOAD CAPACITY kg (MAXIMUM PRESSURE kPa)
9.00 x 13	6 8	875 (175) 950 (200) 1030 (225) 875 (175) 950 (200) 1030 (225) 1090 (250) 1180 (275) 1250 (300)
11 x 15	4 8	1120 (240) 1330 (250)
11.5 x 15.3	12	2145 (410)
9.00 x 20	8 10	1120 (175) 1215 (200) 1320 (225) 1400 (250) 1500 (275) 1120 (175) 1215 (200) 1320 (225) 1400 (250) 1500 (275) 1600 (300) 1700 (325)
12.00 x 24	6 8 10	1550 (175) 1650 (200) 1550 (175) 1650 (200) 1800 (225) 1550 (175) 1650 (200) 1800 (225) 1950 (250) 2060 (275) 2180 (300)
12.4 x 38	6 8	1910 (160) 2030 (180) 2180 (200) 1910 (160) 2030 (180) 2180 (200) 2320 (220) 2390 (240) 2450 (260)
14.9 x 38	6 8 10	2730 (160) 2730 (160) 2930 (180) 3110 (200) 3300 (220) 2730 (160) 2930 (180) 3110 (200) 3300 (220) 3470 (340) 3630 (260) 3800 (280)
16.9 x 38	6 8 10	2980 (140) 2980 (140) 3200 (160) 3460 (180) 3680 (200) 2980 (140) 3200 (160) 3460 (180) 3680 (200) 3880 (220) 4080 (240)
18.4 x 38	6 8	3630 (140) 4214 (180)
9.5 x 44 (Radial)	****	2580 (430)
11.2 x 44 (Radial)	****	3070 (430)

TYRES, AXLES AND WHEELS

TYRE PRESSURES AND LOAD CARRYING CAPACITIES

MAXIMUM SPEED WITH TANK LOADED IS 20 KM/H

MAXIMUM SPEED WITH TANK EMPTY IS 40 KM/H

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

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

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

TO DETERMINE THE CORRECT TYRE PRESSURE

To determine the correct tyre pressure for the sprayer, determine the maximum weight of the sprayer when loaded (do not forget to add the weight of the fresh water tank and the foam marker tank 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). Then determine what tyre size and ply is on the sprayer. Then determine what appropriate tyre pressure will provide the load capacity required by the respective tyre as indicated in the following table.

Tare weight of sprayer:

Maximum loaded weight of sprayer (Note: 1 litre = 1 kilogram):

Tyre size:

Tyre ply:

Recommended tyre pressure:

POLYETHYLENE TANKS

CARE AND CHARACTERISTICS

Polyethylene tanks have a very high chemical resistance and are thus ideal for use as chemical storage tanks. The tanks are made by rotating a specified amount of polyethylene in a mould over heat until a continuous layer of required thickness is formed within the mould. This production technique produces smooth rounded edges within the tank and this facilitates easier cleaning of all chemical residue. All tanks should be cleaned after every application and the correct decontaminating agent should always be used.

An ultra-violet blocking agent is used in the GoldAcres polyethylene tanks to provide a strong degree of resistance against all ultra-violet rays.

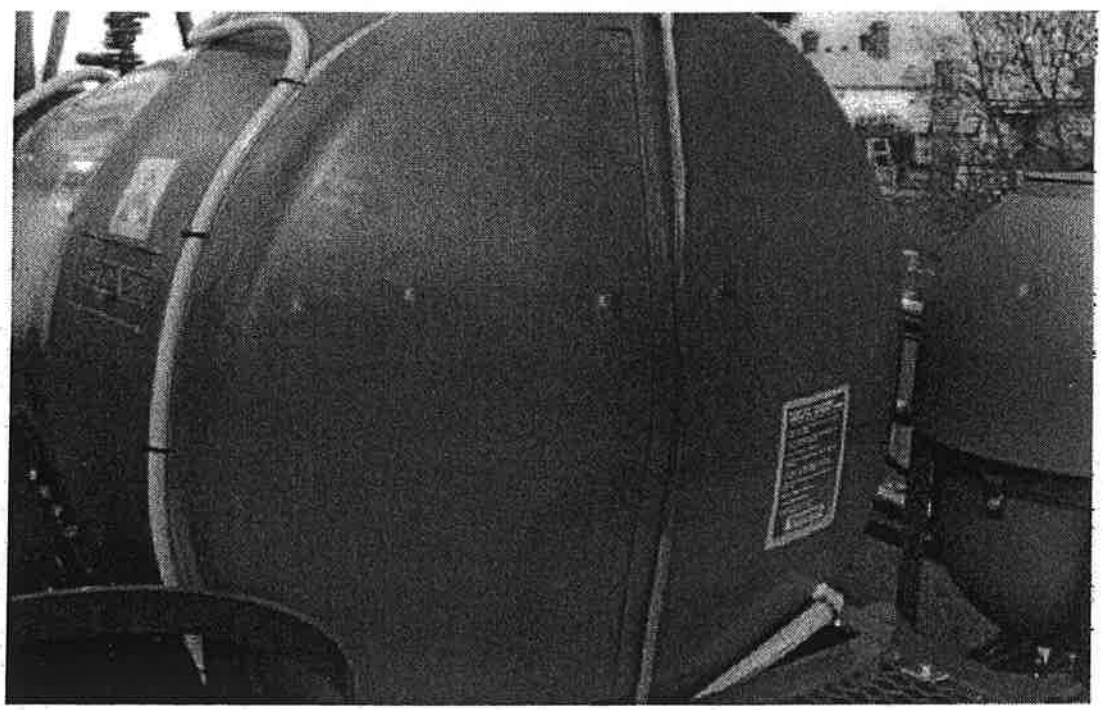
There is a high level of quality in the production process and the material provides a high resistance to impact damage.

By its nature, polyethylene is a flexible material and loses structural strength with increases in temperature. **For this reason it is important to store the tanks out of direct sunlight, particularly in extremely hot conditions.**

Due to the production technique, there can be variance in the overall dimensions of the tank, resulting in variations in tank capacity. **For this reason, level calibration markings should be used as a guide only.**

For an accurate calibration of individual tanks, one effective method is to transfer a known quantity of water from one tank to the other. Successive additions will thus provide the required volume graduations. Also a Raven Flowmeter can be used to calibrate the tank.

It is good practice to keep the outside of the tank clean. Apart from looking unsightly, chemical residue on the tank can also be dangerous, especially if children are in the habit of playing on the tank.



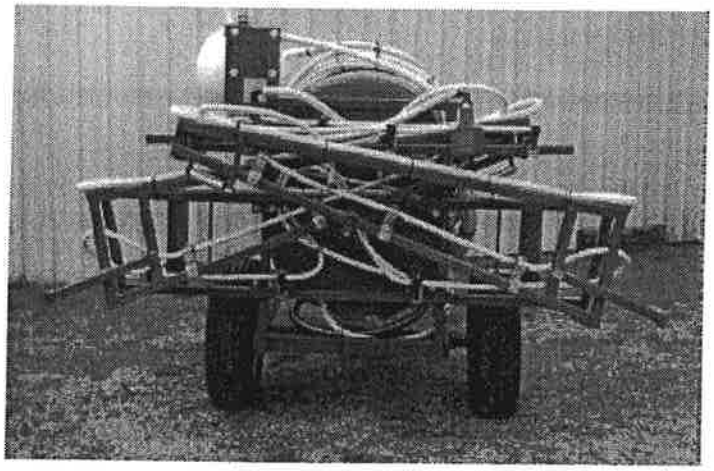
BOOM FOLD

STEP 1: Fold in outer wings;

STEP 2: Turn boom handles to release boom pin from latch;

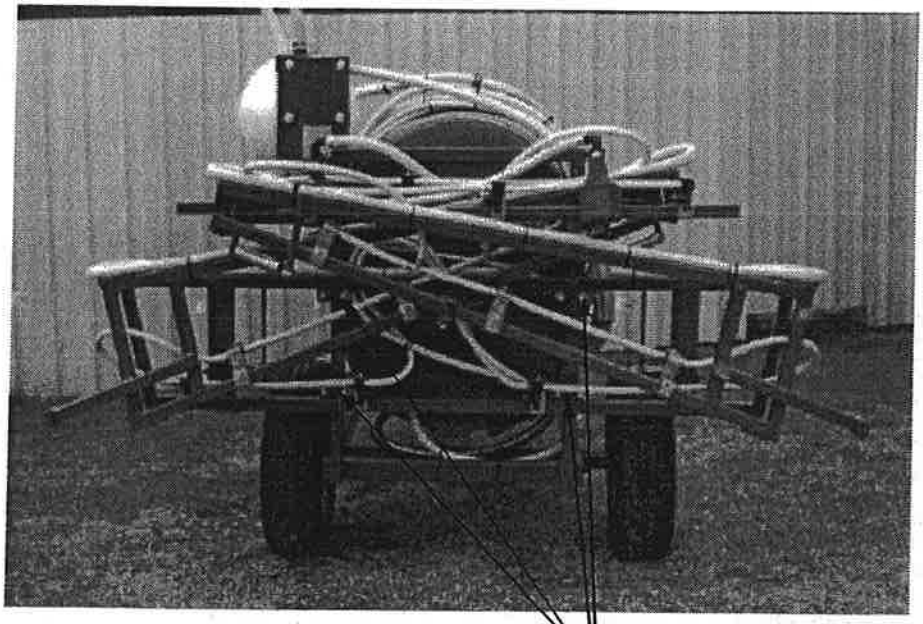
STEP 3: Fold inner wings;

STEP 4: Lock boom into position by removing the fold pins, placing the boom in the fold clamps and then replacing the fold pins back into position.



BOOM HEIGHT ADJUSTMENT

To adjust the height of the boom, unscrew the nuts on the U - bolts clamping the boom to the frame. Raise or lower the boom to the desired height and then tighten the nuts on the U - bolts.



U-BOLT NUTS

PROCEDURE TO FIT WHEEL ONTO SPRAY TANKER

To put the wheel back onto the spray tanker, the following guidelines must be adhered to:

1) Make sure the sprayer is stable when supported with the jack and the jack block in place and hitched to the appropriate towing vehicle;

2) Make sure the wheel is in a satisfactory condition to use and that the tyre is inflated to the correct tyre pressure;

3) Clean the surface between the wheel and the hub;

4) Carefully lift repaired/new wheel up so that the holes in the rim centre go over the wheel studs on the wheel hub;

5) Carefully put the wheel nuts on and tighten them finger tight;

6) With a wheel nut wrench tighten wheel nuts alternately and evenly to a torque rating of 350 Nm;

7) Remove the jack block under the sprayer;

8) Carefully lower the sprayer slowly with the jack until the tyre touches the ground;

9) Retighten the wheel nuts to the required torque rating;

10) 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;

11) Remove obstructions that were placed to the front and rear of the opposite wheel (to prevent it from moving);

12) Check tyre pressure before moving sprayer;

13) Retighten wheel nuts to the required torque rating one hour after fitting the tyre, before filling main spray tank and after the first tank load.

FLAT TYRE

If a tyre on the spray tanker becomes flat or underinflated:

1) Stop the towing vehicle immediately;

2) Safely move the sprayer off the road away from any traffic;

3) Turn on the vehicle hazard lights and the sprayer hazard lights (if tail lights are fitted);

4) Park on a level firm surface;

5) Apply the vehicle park brake and suitably block the sprayer wheels to prevent them from moving;

6) Remove the wheel with the flat tyre from the sprayer via the procedure outlined under "Procedure to remove wheel from spray tanker ";

7) Repair or replace tube and/or tyre, refit the repaired tube and/or tyre to the wheel and reinflate to required pressure;

8) Fit the wheel back to the sprayer via the procedure outlined under "Procedure to fit wheel onto spray tanker".

TRAILING BOOM WHEELS

PROCEDURE TO REMOVE WHEEL FROM TRAILING BOOM

MAKE SURE SPRAYER IS PROPERLY SUPPORTED WHEN CHANGING TYRE

NEVER CHANGE TYRE ON A SLOPE OR SOFT UNEVEN GROUND

NEVER GET UNDER THE SPRAYER WHEN IT IS SUPPORTED ONLY BY THE JACK

ALWAYS USE A JACK OF SUFFICIENT LIFTING CAPACITY

To remove a wheel on the trailing boom, the following guidelines must be adhered to:

1) Any tanks on the trailing boom must be completely empty (ie foam marker tanks);

2) If hitched to a towing vehicle, the engine of the towing vehicle must be turned off and the park brake applied;

3) Place obstructions to both the front and rear of all other tyre(s) apart from the wheel that is to be removed (ie to prevent the wheel(s) that are to remain on the ground from moving);

4) 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**);

5) Place a suitable jack on level firm, stable foundation near the wheel to be moved. If removing a wheel from the trailing boom a-frame, place the jack under the a-frame chassis just in front of the wheel to be removed. If removing a wheel from one of the boom wings, place the jack under the bottom of the rear wheel sub-frame near the compression spring (behind 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;

6) Use the jack to raise the chassis (either a-frame or boom) such that the wheel is off the ground;

7) Place an auxiliary jack block under the relevant chassis so that if the jack fails the trailing boom will not fall;

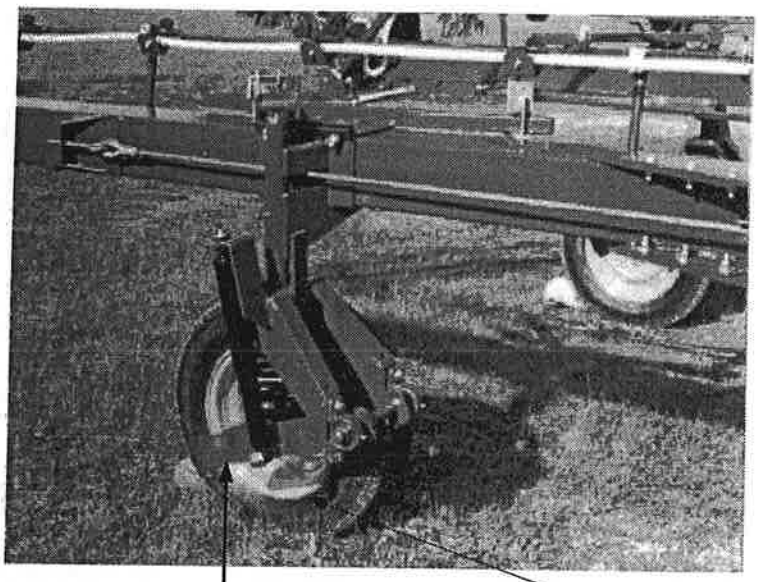
8) Remove all wheel nuts;

9) Remove wheel from trailing boom. Be careful that wheel does not fall on any person causing bodily harm;

10) Ensure that the trailing boom is stable when being left for an extended period of time.

A-FRAME WHEEL TO BE REMOVED

PLACE JACK UNDER HERE TO REMOVE A-FRAME WHEEL



PLACE JACK UNDER HERE TO REMOVE WHEEL FROM BOOM

WHEEL TO BE REMOVED FROM BOOM WING

PROCEDURE TO FIT WHEEL ONTO TRAILING BOOM

To put the wheel back onto the trailing boom, the following guidelines must be adhered to:

1) Make sure the trailing boom is stable when supported with the jack and the jack block in place;

2) Make sure the wheel is in a satisfactory condition to use and that the tyre is inflated to the correct tyre pressure;

3) Clean the surface between the wheel and the hub;

4) Carefully lift repaired/new wheel up so that the holes in the rim centre go over the wheel studs on the wheel hub;

5) Carefully put the wheel nuts on and tighten them finger tight;

6) With a wheel nut wrench tighten wheel nuts alternately and evenly to a torque rating of 350 Nm;

7) Remove the jack block under the chassis;

8) Carefully lower the chassis slowly with the jack until the tyre touches the ground;

9) Retighten the wheel nuts to the required torque rating;

10) 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 trailing boom.

11) Remove obstructions that were placed to the front and rear of the opposite wheel (to prevent it from moving);

12) Check tyre pressure before moving sprayer;

13) Retighten wheel nuts to the required torque rating one hour after fitting the tyre.

FLAT TYRE

If a tyre on the trailing boom becomes flat or underinflated:

1) Stop the towing vehicle immediately;

2) Safely move the trailing boom off the road away from any traffic;

3) Turn on the vehicle hazard lights;

4) Park on a level firm surface;

5) Apply the vehicle park brake and suitably block the trailing boom wheels to prevent them from moving;

6) Remove the wheel with the flat tyre from the sprayer via the procedure outlined under "Procedure to remove wheel from trailing boom";

7) Repair or replace tube and/or tyre, refit the repaired tube and/or tyre to the wheel and reinflate to required pressure;

8) Fit the wheel back to the sprayer via the procedure outlined under "Procedure to fit wheel onto trailing boom".

CALIBRATION

Any sprayer should be calibrated regularly to ensure minimal error in the application rate. A nozzle selection chart indicates what application rates are to be expected but variations due to nozzle wear, ground speed error and pressure irregularities can result in large application rate errors.

TO SELECT CORRECT NOZZLE SIZE

The following procedure can be used to determine the correct nozzle for a particular application:

- Determine the required application rate of spray mixture — **R** (litres / hectare)
- Measure the length of the boom — **W** (metres)
- Select an appropriate ground speed — **S** (kilometres / hour)

The total nozzle output **L** (litres / minute) is given by:

- **L** = (**S** x **W** x **R**) ÷ 600

To determine the nozzle output for each nozzle **V** (litres / minute):

- Count the number of nozzles being used — **N** (No. of Nozzles)
- **V** = **L** ÷ **N**

The required nozzle size can be selected by matching the required nozzle capacity to the respective nozzle chart and determining which nozzle size is appropriate and the corresponding delivery pressure.

EXAMPLE: A farmer wants to know which nozzle size to use for his particular spraying application. The farmer wants to spray at a rate of 80 litres per hectare with a 12 metre boom (24 nozzles) at around 300 kPa and travel at a ground speed of 12 kilometres per hour. The farmer wants to use XR TeeJet nozzles.

- **R** = 80
- **W** = 12
- **S** = 12
- **N** = 24
- **L** = (**S** x **W** x **R**) ÷ 600 = (12 x 12 x 80) ÷ 600 = 19.2 litres / minute
- **V** = **L** ÷ **N** = 19.2 ÷ 24 = 0.80 litres / minute

The farmer decides to use 11002 XR TeeJet nozzles.

TO SELECT APPROPRIATE GROUND SPEED

- **S** = (600 x **L**) ÷ (**W** x **R**)

Always check to make sure the nozzles are all of the same type and that nozzle spray patterns are uniform. Significant nozzle wear may affect the nozzle output.

EXAMPLE: A farmer wants to know what ground speed should be used if he wants to spray at the correct rate. The farmer wants to spray at a rate of 80 litres per hectare with a 12 metre boom (24 nozzles) using 11002 XR TeeJet nozzles at an operating pressure near 300 kPa.

- **R** = 80
- **W** = 12
- **N** = 24
- **V** = 0.79
- **L** = **V** x **N** = 0.79 x 24 = 19.0 litres / minute
- **S** = (600 x **L**) ÷ (**W** x **R**) = (600 x 19) ÷ (12 x 80) = 11.9 kilometres / hour

Thus the farmer needs to travel at around 12 kilometres per hour to achieve the desired spray application.

Ground speed readings may not be accurate, especially at low speeds, as they do not take into account tyre wear, wheel slip or the fitting of non-standard equipment.

To measure the ground speed :

- Measure 100 m on a drivable surface
- Determine the speed setting which corresponds to the required speed
- Measure the time taken to travel this 100 m at this speed setting **T** (seconds)
- Make sure the intended travelling speed has been obtained before the start of the 100 m

The actual ground speed **S** (kilometres / hour) can now be calculated:

- **S** = 360 ÷ **T**

The required time taken **T** (seconds) to achieve a certain ground speed **S** (kilometres / hour) is given by:

- **T** = 360 ÷ **V**

Alternatively, a GoldAcres Digital Speedo can accurately indicate the actual ground speed.

TO DETERMINE THE SPRAY APPLICATION RATE

- **R** = (600 x **L**) ÷ (**W** x **S**)

EXAMPLE: A farmer wants to know the rate at which he is spraying at. He is travelling at a ground speed of 12 kilometres per hour, has a 12 metre boom (24 nozzles) using 11002 XR TeeJet nozzles and operating at a pressure of 300 kPa.

S = 12

W = 12

V = 0.79

N = 24

L = **V** x **N** = 0.79 x 24 = 19.0 litres / minute

R = (600 x **L**) ÷ (**W** x **S**) = (600 x 19) ÷ (12 x 12) = 79 litres / hectare

Thus for the particular spraying conditions, the farmer is applying 79 litres per hectare.

CONVERSION TABLE

QUANTITY	CONVERSIONS
Length	1 Metre = 1.09 Yards 1 Yard = 0.91 Metres 1 Metre = 3.28 Feet 1 Foot = 0.305 Metres 1 Millimetre = 0.0394 Inches 1 Inch = 25.4 Millimetres 1 Kilometre = 0.621 Miles 1 Mile = 1.609 Kilometres
Area	1 Hectare = 10 000 Sq. Metres 1 Sq. Metre = 0.0001 Hectares 1 Hectare = 2.47 Acres 1 Acre = 0.405 Hectares 1 Sq. Centimetre = 0.155 Sq. Inches 1 Sq. Inch = 6.452 Sq. Centimetres 1 Sq. Metre = 0.093 Sq. Feet 1 Sq. Foot = 10.76 Sq. Metres
Volume	1 Litre = 0.22 Imp. Gallons 1 Imp. Gallon = 4.55 Litres 1 Litre = 0.264 US Gallons 1 US Gallon = 3.785 Litres 1 Litre = 1.76 Imp. Pints 1 Imp. Pint = 0.568 Litres
Mass	1 Kilogram = 2.204 Pounds 1 Pound = 0.454 Kilograms 1 Gram = 0.0353 Ounces 1 Ounce = 28.35 Grams
Velocity	1 Kilometre per Hour = 0.621 Miles per Hour 1 Mile per Hour = 1.609 Kilometres per Hour
Pressure	1 Kilopascal = 0.1450 Pounds per Sq. Inch 1 Pound per Sq. Inch = 6.895 Kilopascals 1 Kilopascal = 0.01 Bar 1 Bar = 100 Kilopascals 1 Kilopascal = 0.102 Metres of Water 1 Metre of Water = 9.81 Kilopascals 1 Kilopascal = 0.0075 Metres of Mercury 1 Metre of Mercury = 133.3 Kilopascals 1 Kilopascal = 0.00987 Std. Atmospheres 1 Std. Atmosphere = 101.325 Kilopascals

CHEMICAL HANDLING

Always ensure there is a supply of clean water readily accessible when spraying in case a chemical accident occurs. If a fresh water tank is not fitted as original equipment, it is the operator's responsibility to do so. GoldAcres can provide a fresh water tank (flush tank) with any of its sprayers.

FIRST AID, POISONING AND CHEMICAL STORAGE

Prior to using any chemical, always read and heed the chemical label, and fully understand all the safety procedures.

CHEMICAL TRANSPORT

When transporting chemicals, make sure they are isolated from the driver and any passengers.

The containers should be securely stowed and lids should be firmly fitted to prevent leakage.

All safety equipment and food should be carried in a location where it can not be contaminated by the chemicals.

Care should be taken whilst driving to minimise chemical spills.

The vehicles need to display the appropriate signs as determined by the relevant authority.

CHEMICAL USE

READ THE LABEL - HEED THE LABEL

Carefully observe the safety directions when using any chemical.

Be sure to calculate the quantity required before decanting.

When exposed to chemicals, wear the protective clothing stated on the label.

Always wash hands after handling chemicals and never eat, drink or smoke while decanting or mixing.

Use accurate measuring devices, and use them solely for the purpose of measuring farm chemicals. Never use kitchen utensils.

The mixing site should be selected to minimise the risk of any spills entering the watercourses or damaging adjacent desirable vegetation. To facilitate accurate measuring, the site should be level and relatively free of other objects to prevent accidents. There should be a plentiful supply of clean water for mixing and washing, and the area should be well lit so that labels can be easily read.

CHEMICAL SPILLS

In the advent of a spillage, have bystanders moved.

Put on recommended protective clothing as per chemical label.

If possible, return uncontaminated chemical to the original container.

Restrict the movement of the spillage as quickly as possible.

Only hose down a spill, if the label suggests so. Many chemicals must not be hosed down as this will spread the chemical over a larger area.

If the spill is on concrete, adsorb with sand or soil.

If the spill is on soil, remove the top 5 cm of soil, and dispose of in the appropriate manner (contact the relevant Government Department of Agriculture, or Natural Resources, or you local council).

Place all contaminated materials in a clearly labelled container for later disposal.

Clean all protective clothes and equipment after use.

DECONTAMINATION AND CLEANING OF EQUIPMENT

Thorough decontamination of all equipment should be an integral part of the spraying procedure. This will prevent chemical residue from building up to a concentration where it can damage equipment and contaminate following spray mixtures.

All spray equipment should be cleaned after each spray application and at the start and end of each spray season.

The method for cleaning will depend on the mixture used, so refer to the label or contact your chemical supplier for specific cleaning instructions and decontaminating agents.

The following steps are a guide to the cleaning and decontamination of sprayers:

- Be sure to adequately clean and flush all chemical handling equipment:

  Chemical Induction Hopper: Flush the chemical induction hopper by adding clean water with a boom cleaning additive to the hopper. Open the hopper ball valve on the control manifold to activate the venturi in the bottom of the hopper. Once the fresh water has been cleared to the main tank, turn the chemical hopper ball valve on the control manifold off.

  To fully clean the hopper, the volume gauge on the inside needs removing as powders and residue can build up behind the strap. Wearing the appropriate protective clothing (ie rubber gloves) undo the wing nut holding the strap, remove the stainless steel numbered strap and clean. When content, replace and securely fasten the wing nut.

  Finally with the hopper in the lowered position, open the small ball valve underneath the hopper to drain any remaining residue in the line to the main spray tank, and dispose of this residue in the appropriate manner.

  Trans-Cal: Follow the steps laid out in the operators manual under the headings of "Rinsing the Trans-Cal tank" and "Rinsing the Trans-Cal lines" amongst the Trans-Cal chapter.

- To clean the main spray tank, firstly use or dispose of any remaining spray mixture;
- Partly fill the tank with clean water and operate the pump to flush all lines;
- Drain the tank and dispose of the remaining mixture appropriately;
- Remove and clean in water all strainers and nozzle caps;
- Refill the tank with clean water and add the **correct decontaminating agent**;

When using Sulfonylurea chemicals such as Glean®, Ally®, or Logran®, a boom cleaning agent containing chlorine must be used to neutralise any residue. For other chemicals, a good quality boom cleaner will perform the task. If there are any concerns or queries with boom cleaners please **read the chemical label for the correct decontaminating procedures.**

- Operate the pump to flush all lines (minimum 10 minutes operation);
- Fill the tank with clean water and operate the pump to flush all lines.
- Tank rinsing nozzles can be a great benefit in cleaning and decontaminating sprayers when fitted. However shadow areas can be created by these nozzles, and thus areas exist that are not cleaned via the rinsing nozzles. Therefore it is important to wash any suspect area with a fresh water supply.

CHEMICAL DISPOSAL

Minimizing chemical waste can be achieved by careful planning:

- Purchase only the amount of chemicals needed for the upcoming season;
- Accurately calibrate the sprayer to ensure correct chemical quantities are being applied;
- Mix only the quantity required for immediate use;
- Take care to avoid accidents during all stages of handling;
- Return any unopened containers to the supplier if they are not required next season.

Do not dispose of raw chemicals on a farm. Contact your chemical supplier or local council regarding the disposal of unwanted chemicals.

Excess spray mixtures should be disposed of carefully. Contact your local council of Department of Agriculture or Department of Natural Resources to ensure environmental damage will be minimised when disposing of excess spray mixture.

Rinse all used containers with clean water and add to the sprayer when filling. Contact your chemical supplier regarding the possibility of recycling the containers. If this is not possible, contact your local council to find out where the containers can be disposed of. Puncture all containers to prevent them being reused.

If there is any doubt, contact the relevant Government Department (Reference - Department of Agriculture and Rural Affairs).

PARTS ORDERING

When ordering spare parts, please quote;

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

When returning parts to GoldAcres or to a GoldAcres dealer for service or repair, **clean thoroughly all parts before sending them**. GoldAcres cannot expose technicians to the various pesticides that are in use.

Only products recommended by GoldAcres should be used on GoldAcres sprayers.

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.

READ THE WARRANTY TERMS AND CONDITIONS

The warranty is void if any damage occurs through misuse, neglect, accident, improper installation or as a result of service or modification by other than an approved GoldAcres person.

WARRANTY TERMS AND CONDITIONS

Goldacres Goods described are only available for purchase upon the warranty terms and conditions set out below.

Interpretation

1. In these warranty terms and conditions:
   (1) "**Goldacres**" means Goldacres Trading Pty. Ltd. A.C.N. 061 306 732 of 1-3 North Western Rd., St. Arnaud; 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 product and, if nay, services sold or provided;
   (4) nothing in these warranty 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 Trade Practices Act 1974) and which by law cannot be excluded, restricted or modified.

General

2. These warranty terms and conditions (which shall only be waived in writing signed by Goldacres) shall prevail over all terms and conditions of the purchaser to the extent of any inconsistency.

Warranty Terms

3. The warranty relating to the Goods and all other products sold and, if any, services sold or provided by Goldacres are contained in these warranty terms and conditions.

Specifications, etc: Catalogues, etc: Quantities

4. All specifications, (without limiting the generality of same – including: 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 or form grounds for any claim against Goldacres. 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 purchaser, Goldacre's price is made on estimates of quantities required. Should there be any adjustments in quantities above or below the quantities estimated by Goldacres 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 herein.

Performance, Capacities, chemicals, liquids, application methods, environmental effects

5. Any performance, volumes, and/or capacity figures given by Goldacres are estimates only. Goldacres shall be under no liability for damages for failure to attain 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 gives no warranty as to the suitability of any chemicals or other liquids for any application, nor the suitability of the Goods for any application, nor the application methods, nor the environmental effects which may result from the use of the Goods. Goldacres 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.

Limit of liability

6. (1) Goldacre's liability for Goods manufactured by it is limited to making good any defects by repairing the same or at Goldacre's option by replacement, within a period not exceeding twelve calendar months after the Goods have been dispatched provided that:

(a) the defects have arisen solely from faulty materials or workmanship;
(b) the Goods have not received maltreatment, inattention or interference;
(c) accessories of any kind used by the purchaser are manufactured or approved by Goldacres;
(d) the seals of any kind on the Goods remain unbroken;
(e) there has been no improper adjustment, calibration or operation;
(f) the use of accessories including consumables, hardware or software (not manufactured by Goldacres) has been approved in writing by Goldacres;
(g) no contamination or leakages have been caused or induced;
(h) any modification of the Goods have been authorised in writing by Goldacres;
(i) there has been no inadequate or incorrect use, storage, handling or application of the Goods;
(j) there has been no use or operation of the Goods outside of the physical, electrical or environmental specifications of the Goods;
(k) there has been no inadequate or incorrect site preparations;
(l) there has been no inadequate or improper maintenance of the Goods;
(m) it has not been caused by fair wear and tear; and
(n) 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
(o) 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 operation of the Goods; and

(p) 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 at the time of any warranty claim;

(q) the defective Goods or any damaged part of the Goods are promptly returned free of cost to Goldacres or a representative of Goldacres;

(2) if Goods or any part thereof are not manufactured by Goldacres 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;

(3) Goldacres shall not be liable for and purchaser releases Goldacres from any claims in respect of faulty or defective design of any Goods supplied unless such design has been wholly prepared by Goldacres and the responsibility for any claim has been specifically accepted by Goldacres in writing and in any event Goldacres liability hereunder shall be strictly limited to the replacement of defective parts in accordance with paragraph 6 (1) of these conditions;

(4) Except as provided herein, all express and implied warranties, guarantees and conditions under statute or general law as to 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 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 Goldacre's negligence or in any other way whatsoever.

6. Goldacre's liability for a breach of a condition or warranty implied by Div. 2 of Pt. V of the Trade Practices Act 1974 (other than s 69) is hereby limited 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 of acquiring equivalent Goods;
   (d) the payment of the cost 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.

7. Goldacre's liability under s 68A and s 74H of the Trade Practices Act 1975 is expressly limited to a liability to pay to the purchaser an amount equal to:

(1) the cost of replacing the Goods;

(2) the cost of obtaining the equivalent Goods; or

(3) the cost of having the Goods repaired, whichever is the lowest amount.

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