CROPLANDS

OPERATORS SAFETY MANUAL

WWW.CROPLANDS.COM.AU

STOP

BEFORE COMMENCING operation, **ENSURE** you read & understand this manual, its contents, and any additional information supplied.

GP-SAFE-A | Update 4

CROPLANDS IS CONTRIBUTING TO A SUSTAINABLE FUTURE

INTRODUCTION
GENERAL MANAGER'S WELCOME

Sean Mulvaney
General Manager

Dear Customer

Congratulations on the purchase of your new sprayer and thank you for supporting another true blue Australasian manufacturer.

For over 50 years Croplands have been delivering spraying solutions and ongoing support for a variety of applications whilst investing in long term partnerships with our suppliers, distributors, end users and local communities. These partnerships are absolutely key in our commitment to support our products into the future.

At Croplands, we are committed to sourcing the very best technology from around the globe and adapting these products to our specific requirements. When these products don't yet exist, we innovate through continuous investment in our own research and development.

Croplands is a wholly owned subsidiary of Nufarm Ltd, the largest supplier of crop protection products in Australasia. This brings a unique understanding and collaborative approach to new market developments, challenges and opportunities.

Please take the time to thoroughly read this manual before you operate your sprayer. This will provide direction to ensure safe usage and help optimise the performance of your investment. Your feedback is welcome and valued.

We trust you will be happy with your sprayer and the level of support - our goal is to be your preferred spraying solutions partner from this point onwards.

Yours Sincerely

Sean Mulvaney
General Manager

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SECTION 1
IMPORTANT INFORMATION

FOREWORD

Croplands Equipment is a subsidiary of Nufarm Australia Ltd and operates as Croplands Equipment Pty Ltd in Australia and Croplands Equipment Ltd in New Zealand. Croplands Equipment is a leading importer, manufacturer and supplier of spraying equipment.

At Croplands we strive to be a supplier of innovative application equipment for sustainable agriculture.

ABOUT THIS MANUAL

This manual provides safety information relating to operation of Croplands Spray equipment and other Croplands products related to the agricultural industry.
For specific information in relation to chemicals, their use and first aid consult the product label and then the retailer or manufacturer.

Please pass on this manual with the sprayer at the time of resale for usage by the new owner.

TERMINOLOGY

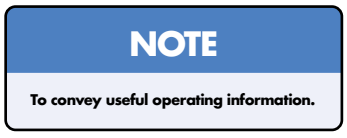
These terms and symbols are used throughout this manual and you will also find them on your equipment where relevant.

Being familiar with these decals will help you to easily identify risks and operate safely.

This Danger sign will be used in areas where the highest risk is present. Always read the information on these signs and ensure you are taking steps to prevent risk or injury.

This Warning Sign shows the potential for risk or injury and highlights the need for steps to be taken to protect ones safety.

This Caution sign shows the potential for an incident. An incident may include damage to the machine itself, or possible injury to the operator.



This Note sign is in place to convey useful information and will help you to identify the best possible way to operate the machine.

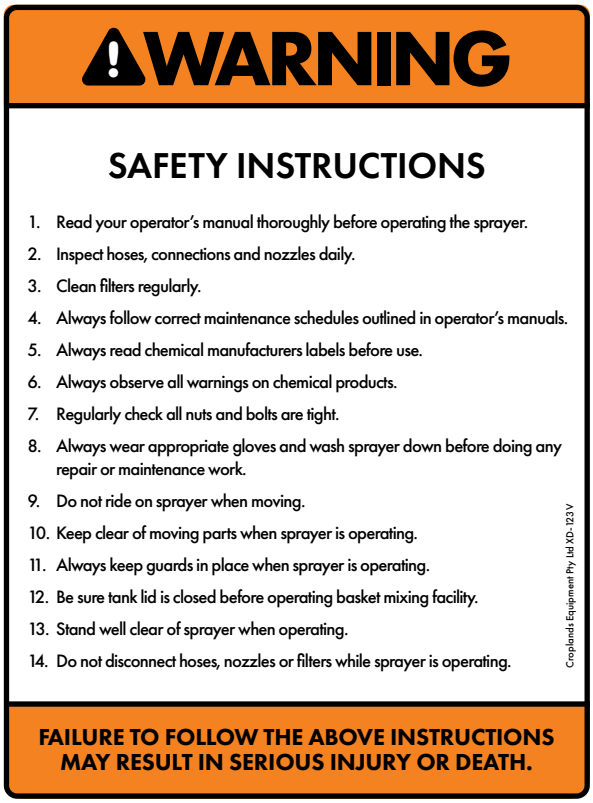
BEFORE OPERATING YOUR SPRAYER

Before operating any equipment for the first time it is important that you have taken the time to familiarise yourself with the manuals and documentation provided. Even if you know the machine well it is recommended that you read the manuals periodically to ensure that you do not become complacent in your operation. Before continuing, please ensure you have done the following:

1. Read the Operators Manual/s carefully.
2. Familiarise yourself with this Safety Manual and ensure you have a good understanding of the risks associated with spraying chemicals. We strongly recommend using a SprayWise manual to document your job and as an additional safety check.
3. Check that the weather conditions are compatible with the task that you are about to complete and that it is safe to work with chemical at this time.
4. Do you have sufficient fresh water easily available to wash yourself or equipment if you have a chemical spill?

Is this sprayer suitable for the job at hand?

Is the operator trained to operate the sprayer?



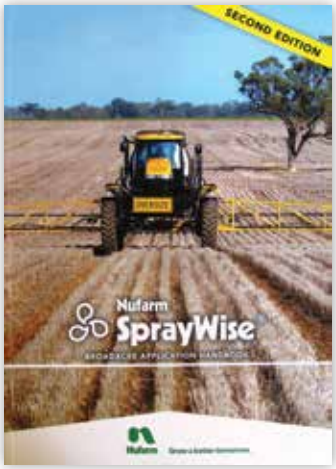
SECTION 1
IMPORTANT INFORMATION

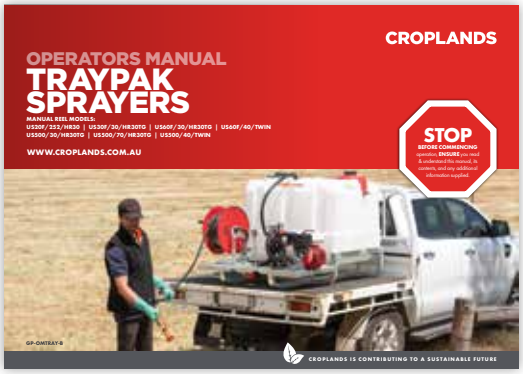
OPERATOR'S MANUAL/S

In addition to this Safety Manual, the operator should also make themselves familiar with all other manuals supplied with the sprayer. These might include...

- Sprayer Operators Manual
- Pump Operators Manual
- Controller Operators Manual
- PTO Shaft Instructions

In many cases there might be multiple manuals per sprayer, pump and controller.





SECTION 2
OPERATOR SAFETY

BASIC RISK ASSESSMENT

Spray Job / Chemical SDS	Also refer to page no(s)	Y	N
What chemicals are being used - check the spray job details	4, 7, 9		
Where are the SDS (Safety Data Sheets), First Aid and emergency action plans.	4, 7, 8, 9, 26		
Weather Conditions			
Is an inversion or alternatively, strong winds, likely to present a risk of drift?	10, 11		
Are humidity and Delta T in the appropriate operating range?	10		
Are weather conditions likely to change before the task is complete?	10		
Condition of the sprayer			
Have all pre start checks been undertaken?	4, 5, 12, 26		
Is the sprayer securely connected and in good working order?	Section 5, 26		
Operator and fit for work			
Is the operator fit for work?	7		
Has the operator been trained in the use of the machine?	7, 26		
Have all appropriate PPE items been made readily available?	7, 8, 9, 18		
Is the operator aware of the risks posed by the specific chemicals being used?	7 (SDS), 9		
Physical risks and the work environment			
Any danger posed by power lines?	14, 25, 27		
Is there any uneven terrain to be considered?	24		
Any likelihood of untrained bystanders or children in the area?	11		
Is there a First Aid station nearby?	7, 11, 26		
Where is the washdown zone?	9, 10, 11, 26		

SECTION 2
OPERATOR SAFETY

WORKPLACE HEALTH & SAFETY COMPLIANCE

Workplace health and safety in Australia is governed by the Model WHS Bill 2023 and Regulations 2024.

Safe Work Australia and state WHS authorities provide reliable guidance, especially for agricultural operations.

Employers must be aware of and comply with safety requirements before conducting any spraying activities.

www.safeworkaustralia.gov.au

TRAINING AND CERTIFICATION

Operational training for your unit can be given by your dealer or at the point of sale. If required, please ask for this training again.

Chemical certification through a local government body or the ChemCERT Training Group is highly recommended for all those working with Chemicals.

www.chemcert.com.au

FIT FOR WORK

Do not operate spraying equipment if you are:

- Intoxicated
- Negatively affected by drugs or medication
- Fatigued
- Untrained
- Physically unable to control the machine
- Stressed or mentally unfit for work

FIRST AID

Before spraying make sure you are aware of the First Aid requirements relative to the chemicals being used (consult the Chemical Safety Data Sheets), and know the location of an appropriate First Aid kit to suit.

There should be a First Aid action plan in place whenever handling / spraying of chemical.

SAFETY DATA SHEET (SDS)

All spray chemicals will come freely supplied, (or available for), Safety Data Sheets (once known as material safety data sheets (MSDS).

You can obtain SDS from the chemical manufacturer, supplier or importer who is responsible for providing them to customers.

A register of hazardous chemicals in the workplace (including spray chemicals), should be kept at the workplace and include the current SDS's.

It's important to read, understand and follow the information on each relevant SDS.

Each SDS is arranged into 16 sections;

Section 1	Identification
Section 2	Hazard(s) identification
Section 3	Composition and information on ingredients
Section 4	First-aid measures
Section 5	Fire-fighting measures
Section 6	Accidental release measures
Section 7	Handling and storage
Section 8	Exposure controls and personal protection
Section 10	Stability and reactivity
Section 11	Toxicological information
Section 12	Ecological information
Section 13	Disposal considerations
Section 14	Transport information
Section 15	Regulatory information
Section 16	Any other relevant information

Safe Work Australia's website is an excellent resource for a better understanding of Safety Data Sheets.

EMERGENCY RESPONSE PLAN

An emergency response plan should be prepared (WHS Reg. 43) and include, at least:

- site evacuation protocols
- First Aid and spill response
- contact procedures for emergency services.

SECTION 2
OPERATOR SAFETY

PERSONAL PROTECTIVE EQUIPMENT

Ensuring that you have the correct Personal Protective Equipment (PPE) is essential before working with agricultural chemicals and spraying equipment. Refer to SDS, Section 4.

The PPE that you will require is relevant to both the chemical and sprayer that you are about to work with.

Recommended PPE to be used whilst handling chemicals.

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Chemical handling

When measuring and mixing chemical, use Croplands' calibrated, easy-pour 1, 3 and 5 litre measuring jugs and the 25 litre chemical mixing bucket are practical, easy to clean, U.V. resistant and chemical resistant.

Clothing

Cover as much of the body as possible, especially the neck, chest and forearms. Use washable fabric overalls, disposable overalls or preferably waterproof clothing especially when coming in direct contact with chemicals.

Gloves and Boots

Never use leather or cloth materials as they absorb chemicals and provide a constant source of contamination. Gloves should be un-lined for this reason. Nitrile chemical handling gloves are recommended.

Footwear is an often forgotten cause of absorbing, spreading or contaminating vehicle cabs etc.

Using nitrile boots makes it easier to wash off any spills or overspray.

Head and face

Washable hats, goggles, spray helmets and face shields are important when handling concentrates. Purchase Goggles that feature sealed, anti-fog lenses for practical, comfortable eye protection. Croplands Kasco Spray Hood is fully approved for use with agrichemicals.

Respirators

Choose the correct type and have the correct cartridge fitted. Replace cartridges regularly and write the date on each cartridge. Ensure there is an adequate fit to the face. Croplands' respirators are recommended for most spraying applications.

Operator Safety

When handling chemicals, always use elbow-length gloves, long clothes and a respirator. If you and your clothing become contaminated with chemical, **STOP WORK**; remove clothing and wash affected areas thoroughly with soap and water. Put fresh clothing on before starting again.

STOP

BEFORE COMMENCING operation, **ENSURE** you read & understand this manual, its contents, and any additional information supplied.

SECTION 3
CHEMICAL SAFETY

WORKING WITH CHEMICAL

Chemical handling

Ensure you have familiarised yourself with all documentation, including labels, before opening and mixing chemicals in your sprayer. You should always understand the complexities of the chemical you are using, the safety measures and have an appropriate safety plan in place.

You should have all Chemical Labels, Safety Data Sheet (SDS) and technical guides available to you. These can often be found on the manufacturers' website if you do not have hard copies.

Agricultural chemicals can cause serious illness and even death if they are handled incorrectly or enter the body. Make sure your PPE is appropriate.

You have the risk of chemical entering the body in the following ways.

Orally
Drinking, splashing into mouth, eating/drinking with dirty hands

Inhalation
Inhaling chemical vapours and or spray droplets

Dermal Absorption
Through the skin. Risk increased if skin is broken.

Mixing the Product

Reduce or eliminate operator contact by using closed loading systems wherever possible.

Use the recommended PPE when handling all chemicals, both in concentrate or solution form. Open drums, containers and bags carefully. Be mindful not to splash or drop ingredients.

Always mix chemicals in a well-ventilated area to prevent the accumulation of hazardous fumes.

Do this on level ground with secure footing to reduce risk of slipping or falling whilst handling chemicals. Do not stir chemicals with your hands, allow fresh water to dilute and mix the chemicals for you.

Do not mix more spray solution than is needed.

Keeping the Operator clean

Triple rinse multi use gloves, or disposable gloves carefully. Remove all potentially contaminated PPE before entering the Tractor Cab (if applicable) to ensure no chemical enters the working environment with you. If chemical enters the body rinse with fresh water immediately and seek medical attention.

Some sprayers are equipped with a "toolbox" for the safe storage of PPE and maintenance tools.

SECTION 3
CHEMICAL SAFETY

Cleaning your Sprayer

Flush your sprayers' entire system, operating all taps in all directions with clean water. Remove and rinse all filters - be sure to relieve pressure from filters before you open them.

Rinse chemical intake systems, tank rinse options, all chemical transfer lines and nozzles.

Tank cleaning agents are available from most specialist "spray shops". For further instructions refer to your machine specific Operators Manual regarding cleaning and decontamination.

Disposal of unwanted Chemicals and Containers

- Rinse empty containers and pour residue into the spray tank.
- Dispose of containers in the correct manner and where provided, use chemical drum disposal programs.
- Change out of protective clothing and shower as soon as possible after working with chemicals.
- Wash hands and face thoroughly before eating, drinking or smoking.
- Provide clean water at filling site and on sprayer in case of emergency.
- Wash and clean respirators regularly. Replace respirator cartridges at recommended intervals.

General Maintenance on spraying equipment

Before working on or servicing any spray equipment ensure it has been cleaned thoroughly inside and out. If you are not sure and no one can verify when the machine was cleaned, clean it again before you start maintenance work.

SAFE APPLICATION

Spraying conditions

Safe application starts with being familiar with the safety requirements of the chemical being used.

Be sure to familiarise yourself with all the documentation attached to your chemical drum or shuttle before you start mixing, and then spraying.

Once operating, and in addition to operator safety it's important that the chemical sprayed hits the target and drift is minimised.

The following conditions are generally unsuitable for spraying,

- Rain
- Wind above 15km/h
- Excessive humidity
- Cold air and low pressure systems that increase the risk of inversion

Delta T has become a widely used measure for acceptable spraying conditions with regards to temperature and humidity.

Observe all weather conditions, Temperature, Humidity, Wind direction & Speed before you start spraying, and during the duration of the job. Take all steps necessary to minimise spray drift and the risk of inversion. If you have any doubt consult with a qualified advisor or agronomist.

For further information on suitable spraying conditions consult the Nufarm SprayWise handbooks for Broadacre or Horticulture.

SECTION 3
CHEMICAL SAFETY

WORKING ENVIRONMENT

Mixing/filling stations

Minimise hazards associated with slips, trips and falls. Secure footing is required to reduce the risk of spills and unintentional chemical contact.

All mixing stations should have clean running water available in case of chemical spills and be equipped with a basic First Aid kit.

Spraying by hand

Spraying by hand is a very high risk scenario as the operator is in very close proximity to chemical for an extended period of time.

When spraying by hand pay special attention to wind and weather conditions as they may result in chemical solution drifting onto the operator.

Take steps to minimise the following risks where possible

- Slips, Trips and Falls
- Entanglement in Spray hoses
- All weather conditions and especially wind speed and direction

What's wrong with the image above?

Refer to page 26 for the answer.

Open Cab Tractors

Spraying from an open cab tractor is a high risk scenario. Pay special attention to wind and weather conditions as they may result in chemical drifting onto the operator.

Wear suitable protective clothing. Plan the spray application (i.e travel towards the wind) to minimise the risk of drift contacting the operator

Closed Cab tractors/vehicles

Ensure the chemical cab filter is fitted to the vehicle / cab.

Ensure the cab filter is clean and replaced regularly (as per service manual).

- Be careful not to contaminate the cabin by bringing chemicals in on your clothes or footwear.

Bystanders and Children

Always be sure that bystanders and children are kept well clear of chemicals, areas recently applied with chemical or in the path of possible over spray (drift).

Working Together

When 2 or more operators are working on and around a sprayer (say at a fill station) it's important that the operators are aware of each other's activities.

This is especially important if inspection, maintenance or repairs are being undertaken on a "live" sprayer.

Before engaging controllers or pumps check that the area is clear of personnel.

SECTION 4
EQUIPMENT SAFETY AND MAINTENANCE

MAINTENANCE

A well-maintained sprayer is a safer sprayer. Always maintain the sprayer or spray apparatus to ensure it's in good working order for the next use.

Always consult the sprayer's manual re maintenance.

Keep the unit clean, both inside and out. This will both help to minimise wear and make it easier to identify any faults.

Repairs should only be undertaken by qualified personnel.

All work should be done with the sprayer parked on solid level ground, stop the engine, apply the brakes and chock the wheels. Discharge all stored energy (hydraulic, spray, air, or electrical) before commencing work.

TYRES

Regularly check tyre pressures. Pressures must be even from side to side.

From the factory sprayers are commonly delivered with 40 ~ 50 psi in each tyre.

All tyres will have maximum load and speed rating listed on the tyre sidewall - will vary from model to model.

Any replacement tyres must be fitted by a suitably qualified tyre fitter. Replacement tyres must meet or exceed original tyre specifications.

Do not exceed tyre speed limits.

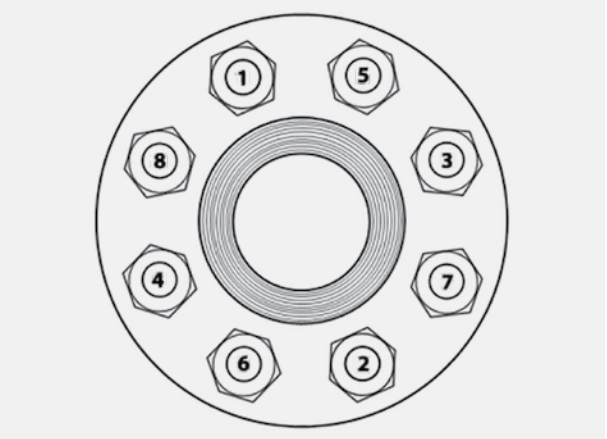
WHEELS

Wheel nuts need to be checked regularly.

Ongoing inspection & re-tensioning (using a torque wrench), should be done in accordance with the sprayer's Operators Manual. Inspection periods should be no less than every 50 hours.

Male and female treads are to be dry, however small amounts of anti-corrosive oil covering is permitted.

Always tighten in staged sequences as per good engineering practice. Below is an example of the tightening sequence for an eight stud wheel.



Metric Wheel Studs	
Stud Size	**Torque**
M12	73 ft.lbs (100 N.m)
M14	122 ft.lbs (166 N.m)
M16	173 ft.lbs (235 N.m)
M18 (Vine Pro)	253 ft.lbs (344 N.m)
M20	372 ft.lbs (504 N.m)
M 22 (Csk Nut)	442 ft.lbs (600 N.m)
M22 Cap/w Nut	425 ft.lbs (575 N.m)
M24 Csk/Nut	562 ft.lbs (762 N.m)
M24 Cap/ w Nut	540 ft.lbs (732 N.m)

Axle pivot and suspension points, plus wheel hubs require regular greasing. Refer to the Operators Manual.

SECTION 4
EQUIPMENT SAFETY AND MAINTENANCE

SAFETY SIGNS AND DECALS

All signs and decals for sprayer safety and operation must be maintained in good order and replaced if damaged or missing. Most Croplands labels have a part number printed on the decal to aid identification and replacement.

SAFETY GUARDS

All safety guards should be replaced if damaged to ensure that risks are controlled as intended.

Some examples of safety guarding includes fan blade guards, PTO guards and Hydraulic hose protection.

Fan air intake guards should be regularly checked and if necessary, cleaned of leaves and similar debris. ALWAYS disengage the fan(s) when cleaning the guards.

TANK MAINTENANCE

Always keep the outside of the tank clean. Do not enter a spray tank unless trained to do so.

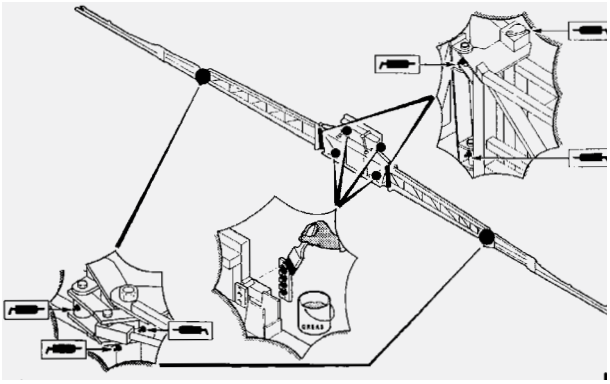
DIAPHRAGM PUMP MAINTENANCE

Refer to the Operator's Manual for pump maintenance procedures including;

- daily, before start-up
- daily, after use
- every 50 hours
- every 250 hours (or seasonal)
- for storage & pre-seasonal servicing.

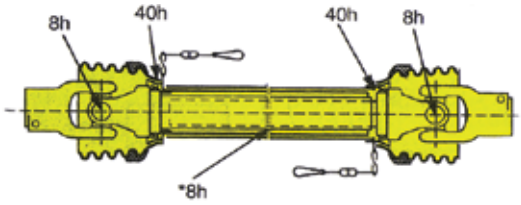
BOOM MAINTENANCE

All booms, lift devices, towers etc require regular greasing. Refer to the Operators Manual.



PTO MAINTENANCE

PTO shafts (where fitted) require regular greasing. Refer to the PTO manual for full details.



SPRAY-LINE MAINTENANCE

At the completion of any spray program, the spray system should be flushed with clean water to prevent corrosion and sediment build-up. Refer to the Operator's Manual.

Flush and clean all filters. Check for clogged or worn nozzles..

Flow meters should be cleaned on a regular basis.

Most panel-mounted pressure gauges have a drain function that should be activated on a regular basis.

SECTION 5
LOADING, TRANSPORT, TOWING & HANDLING

FOLD BOOMS BEFORE TRAVELLING

Always tie down any boom that is about to be road transported. Mostly, this will be done at the parking bracket position. Never operate the boom without being attached to a tractor.

LOADING AND UNLOADING

Loading or offloading a sprayer from a truck is an especially dangerous task. It is not a one-person job and must be performed by people qualified for the task at hand and with equipment with sufficient capacity for the job. Where possible, use a dedicated loading ramp.

When loading onto a truck, always (but not limited to) use the tie down points provided. Secure all components of the sprayer that could come loose during transport - especially the boom arms.

ROAD TRANSPORT

Always follow state laws for the requirement of load sizes, pilot vehicles, escorts and signage when traveling with oversized loads.

It's the responsibility of the operator to know the law. Even if a pilot vehicle is not legally required, if vision or maneuverability is limited it's strongly recommended that an escort accompanies the equipment for road transport.

SELF PROPELLED SPRAYERS

In most Countries, States and Territories, there are special vehicle licence conditions that govern the use and movement of Self-propelled machinery. The vehicle may also have speed restrictions based on tyre load ratings.

TRACTOR TOWING

Check with the manufacturer to ensure that your vehicle or tractor is legally capable of transporting your equipment down the road (also refer to next page).

When towing on public roads, always check with the relevant government authorities (these vary from area to area), re the regulations for towing the sprayer in your area.

Always ensure the load does not exceed the loads allowed for the towing vehicle (consult the vehicle manual).

Where possible (and maybe limited to) towing the sprayer when empty.

Be mindful of sizes, weights and braking capacity.

Always use safety chains where provided or required.

Be aware of significant load (on the drawbar) variations from full to empty.

Always hitch to the vehicle before operating the boom. Note that some sprayers might overbalance if empty and the boom is open/opened.

SECTION 5
LOADING, TRANSPORT, TOWING & HANDLING

TRACTOR TOW REQUIREMENTS

Tractor size/power required is dependent upon a combination of tractor weight, sprayer weight (with full tanks), boom size, farm conditions (soil and terrain) and road (or inter-farm) travel requirements.

As a general rule, under ideal conditions, the gross sprayer weight should not exceed 150% of the gross tractor weight and the tractor front axle weight should not be less than 20% of gross tractor weight ... (refer New Zealand Agricultural Vehicles Guide 2017).

There will also be a hydraulic oil pressure & flow requirement for operating booms, fans etc.

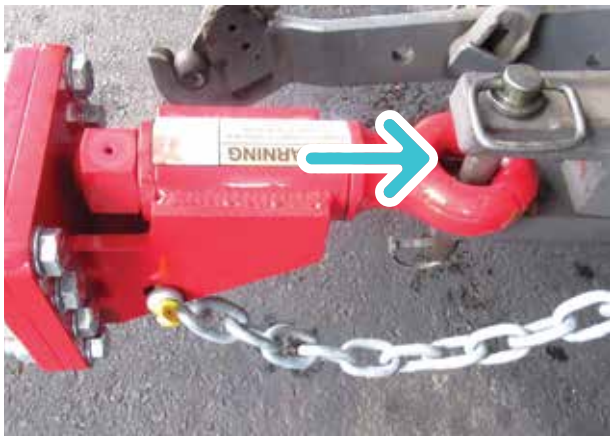
Determining the correct tractor should be done in consultation with the tractor dealer.

DRAWBAR PINS

The diameter of drawbar pins should be no less than 75% of the larger coupling hole.

For example, if the drawbar uses a bolt-on 50mm tow eye, the drawbar pin should not be less than 37.5mm diameter - use a 1.5" (38mm) coupling pin (or larger).

The **blue arrow** below is pointing to a drawbar pin that is too small.



SAFETY CHAINS

Each unit is shipped with safety chain + shackles. Ideally, the chains should cross over, left side of sprayer to right side of the tractor and vice versa, (not as shown above).

JACKING STAND

Once the sprayer is connected to the tractor ensure the jacking stands are removed or if applicable, as shown below, folded to the horizontal position before moving.

Also note the PTO cover chains have been installed but not the main safety chains.

WHEEL CHOCKS

Wheel chocks should be used at any stage the sprayer is not connected to the tractor.

WORKING ON OR UNDERNEATH MACHINES

When working on or underneath a sprayer, always take measures to make sure that the sprayer cannot move.

For trailed sprayers, always chock the wheels.

For linkage and other sprayers make sure they are secure and self-supporting.

Under no circumstances should you ever get underneath a suspended machine.

SECTION 6
SPRAYER SAFETY

LADDERS AND STEPS ON EQUIPMENT

Ladders present a number of risks to the operator and should be used appropriately. Not all ladders are configured the same, familiarise yourself with the handles, rails and operation (if applicable) of your ladder.

Be mindful to wear appropriate, enclosed foot wear that has good grip when operating a sprayer and working with chemical.

Access to the top of a spray tank is best effected by using a purpose built platform.

Take extreme caution when carrying chemical containers. **Do not climb with an open container.**

A step is provided on Croplands' larger linkage sprayers to allow safe access to the lid on top of the tank (shown above in the folded position).

THREE POINTS OF CONTACT

When accessing sprayers, always maintain three points of contact—two hands and one foot, or two feet and one hand—to reduce the risk of slips, trips, and falls.

Use designated steps, handholds, and platforms, and never climb on equipment while it's in operation or wet.

Steps provided to access a working platform on a trailed sprayer. These steps fold manually - Ensure steps are in the upright position before moving the sprayer.

SECTION 6
SPRAYER SAFETY

LIQUID SYSTEMS

Every sprayer has a liquid system with similar components including chemical intake, chemical pump and solution delivery. They are all slightly different but follow the same principals. Familiarise yourself with your sprayer and its unique features before operation/maintenance.

The liquid system

- Spray tank.
- Suction system, (may include filtration and valves).
- Mixing system - referred to as the chemical mixer. Note that not all sprayers have a chemical mixer fitted, and in some cases the mixer is completely separate from the sprayer.
- Pump and pressure lines (may include filtration and valves).
- Spray lines or delivery lines.
- Nozzle bodies and nozzles.

Spray tank

Croplands spray tanks are most commonly made from polyethylene, fibreglass or stainless steel. Check your tank with each fill to make sure it does not have any leaks. Common places to find leaks are on hoses and joiners, or on the bellyof your tank as it can be exposed to potential punctures.

Suction system

On most Croplands sprayers, there is a suction filter fitted. Some have an integrated shut-off valve, others have a ball valve to shut off the suction system.

The purpose of the suction filter is to strain the solution to avoid blockages further along the liquid system. Before accessing or cleaning the filter, or using any valves on in the suction system, turn the pump and/or engine off. This is especially important if working with another operator on the same sprayer.

Where pressure risks are present a manual pressure relief tap will be fitted. Relieving this pressure will significantly reduce the risk of coming into contact with chemical unnecessarily.

This will be covered in greater detail in your Operators Manual.

Mixing system

Refer to your Operators Manual on how to use your chemical mixing system.

Correct use of this system will be the safest way to mix chemical into solution. Be mindful of splashing whilst using this system and pouring chemicals from jugs or drums.

Pumps, pressure lines and valves

Pressurised systems may vary up to 50 bar (725 psi). Pressure can create a serious risk and it is important that the system is both well understood and well maintained.

To avoid risks, it is important the following steps are taken:

- read and understand the Operator's Manual
- do not undo fittings, cut hoses or carry out maintenance when the pump is running or when the system is under pressure
- do not exceed maximum pressures as stated in the Operators Manual.

Setting pressures - note the needle in the green

Spray lines, nozzle bodies and nozzles

Wear appropriate PPE when cleaning or changing nozzles and carrying out any maintenance on your equipment.

Ensure boom lines have no residual pressure before removing flushing caps or nozzles. Wear chemical resistant gloves.

SECTION 6
SPRAYER SAFETY

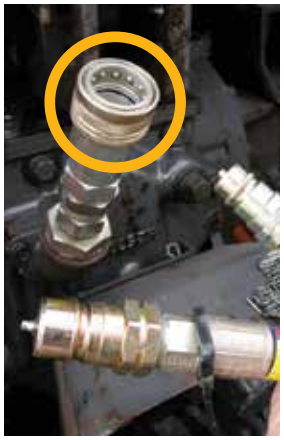
HYDRAULIC SYSTEMS

Hydraulic systems used on Croplands Equipment may include rams, motors, pumps, manifolds, accumulators and oil coolers. These systems use a variety of hydraulic hoses, fittings and couplings which are all specific to purpose and rated to take the pressure used in that system.

Hydraulic system components are sometimes operated at very high pressures and temperatures. For these reasons, it's very important that the operator be familiar with the functions and limitations of the system. Read and understand the Operator's Manual carefully before operating any hydraulic equipment.

Connection

Most Croplands hydraulic systems are colour-coded to aid in the correct identification of hydraulic hoses. See sprayer operating manuals for further details.



When connecting an implement to tractor, be careful to correctly connect pressure and return lines. This is especially true for quick connect fittings where it's possible to connect but not fully engage the coupling.

Always double-check the connection, especially the return line. Failure to properly connect the return line will result in "dead heading" the system and can lead to a pressurised failure.

When engaging a hydraulic system for the first time, it's always safer to engage at lower operating speeds (and hence pressures) and not increase to full operating pressure until it can be confirmed the equipment is operating correctly.

Inspection, Adjustment and Repair

Periodic inspection of the hydraulic system and especially the hoses is recommended and should include:

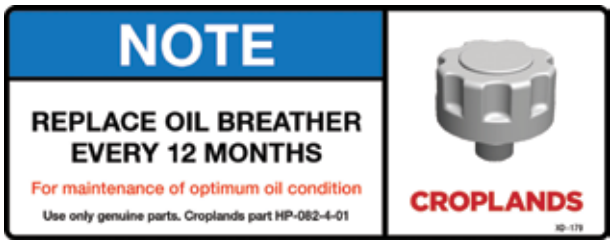
- The age of the hoses.
- Condition of the hose fittings.
- Rub marks and potential wear points from hose contact.
- Unexplained Hydraulic oil and Leaks.
- Excessive corrosion of fittings.

Working with hydraulics requires appropriate PPE.

If any faults are found, do not operate the machinery until the issues have been rectified.

Where feasible, all inspection and servicing tasks should be performed by individuals qualified in hydraulic system maintenance, testing, and commissioning.

Maintenance and routine checks should be conducted to ensure adequate hydraulic fluid levels and filter cleanliness are maintained in the system. Manufacturer's recommendations should be adhered to as excessive or inadequate fluid levels can cause system failure and present serious risk.



Failure of hydraulic systems is rare, but when they happen the results can be severe, due to the heat and pressures that are sometimes involved.

Injection Injury

Injection injuries occur when a jet of hydraulic fluid pierces the skin and enters the blood stream. This could occur if a hydraulic line were to be pierced or damaged.

It should be noted that **injection injuries are extremely dangerous and have the potential to result in the death** of those affected.

Burns

Hydraulic oil increases in temperature with pressure and use. Components, including gearboxes used to drive hydraulic power packs may be very hot to touch and could result in contact burns.

SECTION 6
SPRAYER SAFETY

Oil leaks may spray hot oil and cause burns to persons nearby.

Full coverage clothing minimises the risk of oil burns and is recommended when working with this type of equipment.

Hose Whip / Striking

Hose Whip injuries may occur when an unrestrained hose releases oil pressure quickly causing it to whip back and forth until the hydraulic oil and energy is fully released.

The most common point for failure in a hydraulic hose is at the fittings, where corrosion and stress-related damage is most likely to occur.

Hydraulic Functions Safety

- Do not touch any hydraulically operated components while they are in motion.
- Before servicing, ensure all hydraulic systems are fully isolated and residual pressure is safely released.
- Hydraulic systems may operate at pressures up to 3,000 psi and temperatures up to 85°C - posing a serious risk of injury if not handled correctly.
- This applies to all hydraulic pumps, rams and actuators across all equipment.

DANGER

Probability of death or serious injury if an accident occurs

PETROL ENGINES

Any equipment supplied with an external petrol engine will come with an Operator's Manual for that engine. Please read and understand the manual before operating the equipment.

Be aware of warning labels on your engine that will highlight operating risks.

The main risks associated with powered spray equipment are:

- burns from hot engines and exhausts
- fire when filling an engine with fuel or flammable material contacting the hot exhaust
- entanglement in drive components / moving parts
- carbon monoxide poisoning from operating an engine in an enclosed space.

To minimise these risks:

- do not touch hot exhaust and engine components
- do not refuel engines near naked flames or ignition sources. Be especially vigilant when refuelling the engine – always use a funnel for refuelling. Always clear away flammable materials (such as dry grass) that might come into contact with the engines exhaust
- do not wear loose clothing when operating this equipment. Keep hands well away from moving parts
- do not operate the engine in an enclosed area.

Be aware of the risk of fire due to the presence of petrol. Keep firefighting equipment nearby if necessary.

Always follow the engine manufacturers instructions.

SECTION 6
SPRAYER SAFETY

MOVING PARTS AND CRUSH POINTS

Connecting and disconnecting your sprayer

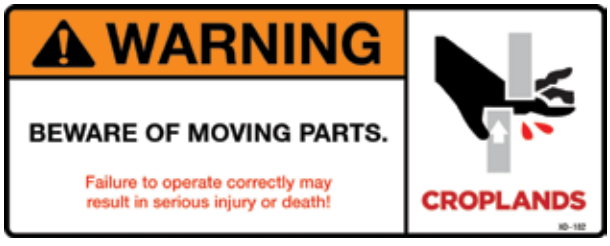
Drawbar engagement and disengagement from a tractor or vehicle should only be done on level ground with the implement chocked or secured into place.

Crush and or pinch risks are very high during this process. The sprayer must be attached properly as per the Operators Manual before the boom or any other hydraulic functions are activated. Sprayers are at risk of being unbalanced if hydraulics are activated whilst the unit is not secured to the tractor.

Manual and Mechanical movements

Many sprayers have either mechanical or hydraulic movement of the spray boom, mast or tower.

When operating a manual or mechanical feature it is important to only touch the designated handles and or safe points. Crushing of fingers or hands are at a higher risk during this operation.



Boom operation

The operations involved in unfolding, folding, adjusting the height or row width, and parking spray booms must be carried out with utmost care. It is especially critical to ensure that fellow workers and bystanders remain at a safe distance from all moving parts during these procedures.

Pictured above are areas of high risk to fingers. Often these are boom hinge points, which can be manually or hydraulically operated.

Warning labels will be present to identify specific risks to your machine. Be sure to look for and read these.

SECTION 6
SPRAYER SAFETY

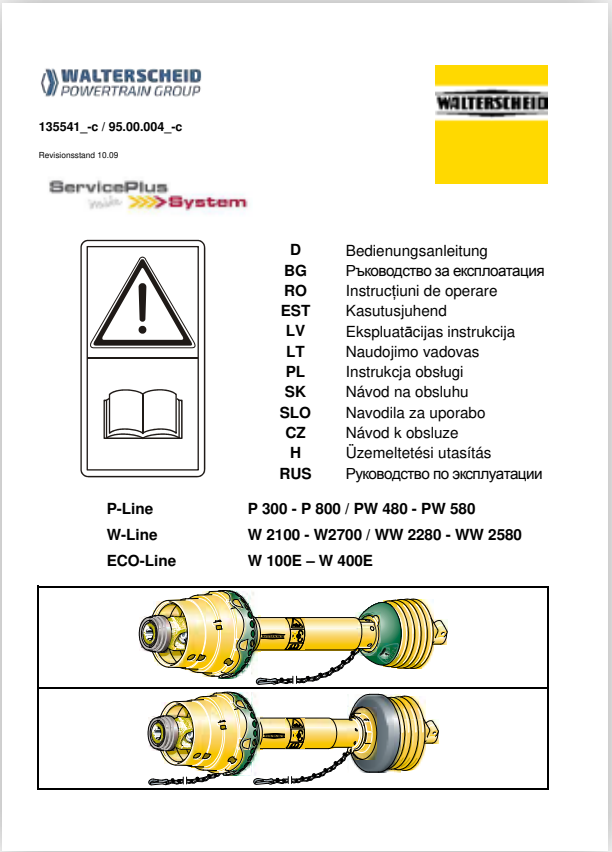
PTO SHAFTS

Power Take Off shafts (PTO shafts) are one of the most dangerous moving parts of agricultural sprayers. Used to transmit rotational power from a tractor to an implement, these shafts have resulted in many severe injuries and deaths in farming.

Loose clothing is a real danger when near any type of shaft – it is highly recommended that well-fitting clothing or overalls are worn when operating machinery.

Each PTO shaft supplied will also have a small manual from the shaft manufacturer explaining how to replace and maintain the safety guards. Please read and understand that documentation before operating the equipment. **If you cannot find the PTO manual**, please ask your dealer for another copy.

The supplied PTO shaft comes with yellow or black guarding that should not be removed or tampered with. These guards prevent access to rotating parts, it is essential that they do not rotate with the shaft.


WALTERSCHEID POWERTRAIN GROUP

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Revisionsstand 10.09

ServicePlus System

WALTERSCHEID

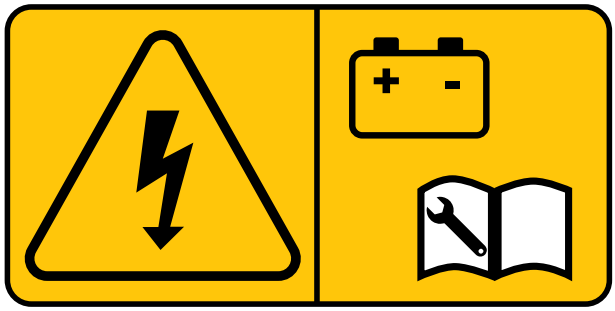
D	Bedienungsanleitung
BG	Ръководство за експлоатация
RO	Instrucțiuni de operare
EST	Kasutusjuhend
LV	Ekspluatācijas instrukcija
LT	Naudojimo vadovas
PL	Instrukcja obsługi
SK	Návod na obsluhu
SLO	Navodila za uporabo
CZ	Návod k obsluze
H	Üzemeltetési utasítás
RUS	Руководство по эксплуатации

P-Line	P 300 - P 800 / PW 480 - PW 580
W-Line	W 2100 - W2700 / WW 2280 - WW 2580
ECO-Line	W 100E – W 400E

PTO safety practices

- Keep all components of PTO systems shielded and guarded. Check regularly.
- Grease the sliding shafts on a frequent and regular basis (consult shaft manual).
- Be sure PTO driveline is securely locked onto the tractor PTO stub shaft.
- Disengage the PTO and shut off the tractor before dismounting to clean, repair, service, or adjust machinery.
- Always walk around tractors and machinery, NEVER stepping over a rotating shaft.
- Position the tractor's drawbar properly for each machine to help prevent driveline stress and damage.
- Avoid tight turns that may damage PTO shafts.
- Engage and disengage PTO at idle only
  - if operating below 350 rpm, excessive vibration can occur.
  - do not exceed maximum operating rpm (usually 540 rpm).
- Avoid loose clothing, jewellery and secure long hair when working around the PTO.

SECTION 6
SPRAYER SAFETY



ELECTRICAL COMPONENTS

- Only qualified persons should disassemble or service electric components.
- If an electrical device or accessory is supplied with a three-pronged, earthed plug, ensure it is used correctly with a compatible earthed power source.
- Electrical looms should be checked on a regular basis for fraying and any signs of wear, damage or defects.
- Do not use an electrical device in or near an area where it may fall or be pulled into water, other liquids or in the rain.
- **Do not touch an electrical device that has fallen into water.**
- In case of an electrical fire, shut off the power and use a suitable fire extinguisher. Never use water to put out an electrical fire. Water used on an electrical fire may result in fatal shock.

CAUTION

Always check electrical loom for fraying and any signs of wear, damage or defects. Refer all servicing of electrical equipment to qualified service agents.

Battery Safety Tips

- Lead acid batteries generate flammable and explosive gases. Keep sparks and flames away from batteries. Injury or death can occur.
- When disconnecting the battery, do not ground out the (red) positive side of the battery as electrocution or shock can occur.
- Wear safety goggles or a face shield when inspecting or cleaning Lead acid batteries.
- If acid enters an eye, immediately flood the eye with running water for at least 30 minutes. See a doctor as soon as possible.
- If acid contacts the skin, wash the affected area immediately with plenty of water.
- Smoking or naked flames should never be present in battery area.
- Be aware that poor connections to a battery may spark and be an ignition source for a fire.
- Ensure area where battery is mounted/kept, is well ventilated.

DANGER

Lead acid batteries generate flammable and explosive gasses.

Battery Jumper Lead Tips

From time to time it may be necessary to use Jumper leads. It's important to follow the correct procedure. Improper jumper cable connections can cause an explosion resulting in personal injury.

- Ensure the donor battery is the same voltage as the flat battery.
- If vehicles are involved, make sure the vehicles are in either Neutral or Park, with the handbrake on and / or wheels chocked. Ensure the vehicles are not touching.
- Take one clamp of the **red positive (+)** jumper lead alnd attach it to the positive terminal on the dead battery. Take the second (other end) red positive (+) clamp and secure it to the positive terminal on the good battery.
- Take one end of the **black negative (-)** jumper lead and attach it to the negative terminal on the good battery. Take the second (other end) black negative (-) clamp and connect it to a spot of clean, unpainted metal part of the dead vehicle (say engine block) / machinery but not near the battery.
- Never connect the black negative clamp to the negative terminal of the dead battery – as there is a risk of sparking which could lead to a fire or explosion.
- Disconnect the jumper leads in the reverse order of connection. Remove the black negative lead from the ground, then from the donor vehicle.

STATIC ELECTRICITY RISK

Dry conditions increase static buildup when handling flammable or low-conductivity fluids, especially in plastic containers. Grounding safely directs static charges into the earth.

SECTION 7
IN FIELD SAFETY

GUARDS

There are many other areas of equipment that use guards to protect the user from rotating parts.

Many of these are through connection from the PTO such as pump or compressor and are no less dangerous.

When servicing, repairing or replacing any parts, ensure the guards are refitted

COMPRESSED AIR

Inappropriate and unsafe use of compressed air can lead to serious personal injury such as ear or eye damage.

- Ensure compressors, air tanks, regulators and air-ride valves are regularly maintained and inspected by a competent person.
- Drain water condensate daily by opening the drain valve - typically when switching off the compressor at the end of the day/spray program.
- If using compressed air for cleaning, use low pressure (especially if there are other people are in the vicinity) and wear eye protection.

LIGHT OR RADAR SOURCES

Many sprayers feature radar or ultrasonic sensors for boom height. When working around the sprayer avoid activating the sensors which could cause an unexpected shift in boom position.

For Optical sprayers using UV light source sensors, do not look directly into the lens's light source. There is a potential for eye damage.

CARRYING EQUIPMENT

If you are loading or unloading, or just simply lifting equipment or chemical containers be sure to use a safe lifting technique as outlined below.

- Stand close to the object, feet shoulder-width apart
- Lift with the strength in your legs, not your back.
- Do not twist whilst holding an object. Move your feet if required.
- Ask for help when you need to lift a heavy load.
- Do not carry equipment that is too heavy for you as it increases the risk of dropping that equipment and causing a chemical spill.
- More than one person would be required to safely load or unload tray-mount sprayers manually.
- Spray units should be emptied of all liquid contents before lifting to avoid injury or accidents.

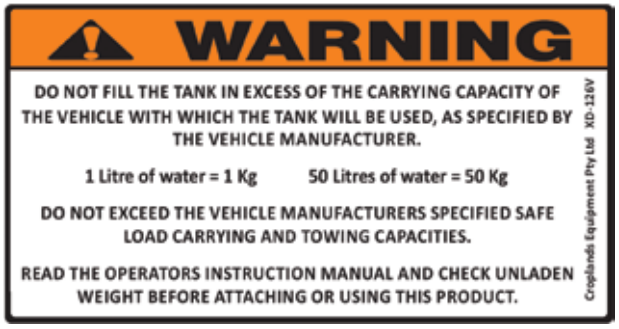
Back pack sprayers

When carrying a knapsack or back pack sprayer, be mindful of your posture and only fill sprayers to the point that you can lift and carry them comfortably.

SECTION 7
IN FIELD SAFETY

WEIGHT AND BALANCE

Never exceed the maximum towing weight, or drawbar weight for the tractor or vehicle being used. Users of the equipment must also be aware of the operational limits of the tractor or vehicle being used. Every Croplands Sprayer comes with a WARNING label to this affect.



SPRAYING ON SLOPING OR UNEVEN GROUND

Operating machinery on sloping or uneven ground creates risk of machine roll overs. There is also a risk of towed machines sliding and pulling the tow vehicle.

Always be aware of the ground conditions and grip levels for both personal footings and machines being operated.

When operating wheeled machines:

- slow down for slopes exceeding 10 degrees
- do not operate on slopes exceeding 15 degrees
- slow down when operating machines on irregular surfaces.

Pay special attention to ground surface conditions while operating as these may change through out the duration of the job.

Be especially careful when turning corners on sloping ground.

Due to the 3 dimensional nature of turning corners it's very easy to exceed operating limits without being aware of doing so.

WORKING WITH FANS

Many of Croplands sprayers use axial fans to provide moving air to transport crop protection chemicals and water into the tree, vegetable or vine crop. Typically, these fans are anything from 420mm to 1100mm in diameter and spin at RPM's from 1500 to 3000 RPM.

These fans can be extremely dangerous given the power they consume to produce large volumes of air for the task.

PTO driven fans are dangerous at any speed. Be especially vigilant around PTO shaft connections to "air blast" fan gearboxes.

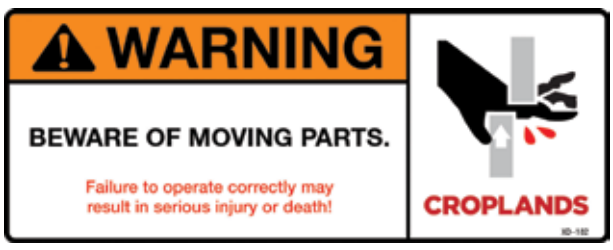
It is vital all supplied guards remain in place and are replaced if damaged or fatigued.

Be mindful that the air inlet side is often the more dangerous side as the suction created by these fans can quickly and unexpectedly pull in hands, hair or loose objects such as clothing or tools.

On the downwind side the most common danger is loose objects being propelled at high speed.

Be aware that serious injury or death can occur if the precautions and procedures below are not followed:

- keep body parts and loose objects away from rotating fans
- never try to adjust or clean the fan while it is engaged and operating
- never allow untrained personnel or children near an axial-fan sprayer while in operation
- always disengage and ideally disconnect the power supply (e.g. PTO or hydraulic) so the fan stops completely before repairing, cleaning or inspection of the fans.



SECTION 7
IN FIELD SAFETY

POWER LINES

Hazard identification

Operating spray equipment near power lines and equipment can have serious consequences. The operator is responsible to maintain a safe distance from powerline structures.

Keep in mind that equipment with a high potential to conduct electricity such as a wet spray boom does not need to touch a power line for it to arc down through the sprayer and tractor to reach the ground.

Minimum safe distance from power lines, for equipment or operators will vary from 1metre to 6 metres depending on the transmission voltage (say 240 to 220,000 volts). Keep in mind weather conditions such as high temperatures (sagging) or high winds (moving) can change the position of power lines.

See your local authority for further information. At the time of writing **https://www.safeworkaustralia.gov.au** has some very comprehensive information as do most state safety offices. Most Shires or Councils can assist with risk assessment and how to best manage the risk of power lines.

Wide Broadacre booms can be challenging to judge whilst spraying. Take extra care to avoid contact with power poles, as striking them with boom tips may damage the boom or the pole, and poses a serious risk of electrocution.

Potential Risks

- Proximity of plant and equipment or work (spraying) to overhead power lines and support structures such as power poles and towers;
- Environmental conditions, such as rain, wind or uneven terrain, which may bring an increased risk;
- Visibility of the overhead power lines and their supporting structures;

Control measures

Once the hazards associated with spraying near overhead power lines have been identified and assessed, control measures should be implemented to eliminate the risk.

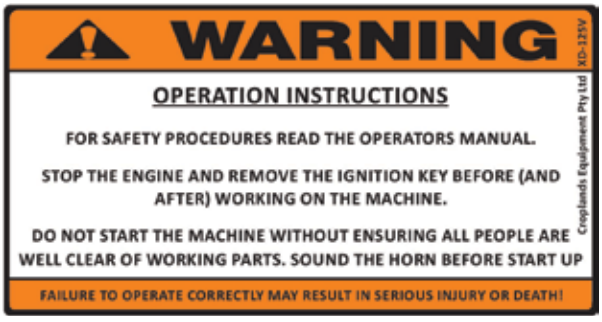
- Using a Spotter to decrease the risk of striking the power lines accidentally.
- Planning a different travel/spray route so that machinery does not need to be so close to the power lines.
- Where possible use barriers or fences so that no one can drive in the high risk areas identified.

A combination of control measures is recommended as best practice.

OPENING AND CLOSING BOOMS

Opening, closing and parking of hydraulically controlled booms requires close attention at all times.

- Always check for clear and available space before operating booms. Be especially vigilant of bystanders or power lines.
- Regularly check for loose or damaged structures or components. These can be snagged or fail during operation.
- Be sure the boom is properly parked before driving off. A loose boom arm can be very dangerous.
- Secure the boom with straps in the parking bracket during long-distance or rough-road transport. Before first use after delivery, ensure all restraints are removed.
- Be aware that in opening or closing a boom, it also changes the weight distribution of a sprayer, therefore ...
- Always connect the sprayer to the tractor or vehicle being used before opening and closing booms. Failure to do so may lead to a serious imbalance or rollover of the equipment.
- Never allow the boom to be operated by untrained personnel.



SECTION 7
IN FIELD SAFETY

GENERAL

One of the main contributors to farm incidents is equipment being activated while being cleaned, adjusted, or repaired.

- Be especially vigilant when 2 or more people are working around the same sprayer.
- Do not ride on sprayer when moving
- Stand well clear of sprayer when operating
- At the end of each spray session,
    - flush the liquid system
    - clean all liquid system filters
    - drain the tank
    - wash down the sprayer
    - dispose of used PPE in a responsible manner

Ensure the site for draining, flushing and cleaning the sprayer meets with environmental and statutory regulations.

From time to time, practice the Emergency Action Plan.

TANK OVERFLOW PRECAUTIONS

Never fill a tank beyond its rated capacity.

All spray tanks are designed with an additional 5% "freeboard" volume—a safety margin that accommodates foaming and prevents overflow during normal use.

Best practice: Fill carefully and monitor to avoid spills.

Q; What's wrong with the image on the front cover / page 11.

A; The operator is wearing the wrong footwear - The operator should be using long nitrile boots (refer to p.8).

MAINTENANCE CHECKLIST

Maintenance checks should be performed on a regular basis, such as, (but not limited to) the following;

- check for structural integrity
- check all safety guards are correctly in place
- check Jockey stand(s) (connection & greasing)
- check PTO is in good order (inc regular greasing)
- check all wheels & tyres (nut tension & tyre pressure)
- check all joints are greased and have a full range of movement (axles, booms, linkage points etc)
- check all electrical connections
- check all gearboxes and pumps
- check for any leaks (water, oil or air)
- check all spray nozzles are in good order
- check all filters
- replace any damaged or missing safety decals.

HAVE AN EMERGENCY ACTION PLAN

EMERGENCY ACTION PLAN

Never operate the sprayer without an action plan in place for when things go wrong ...

"Take 5" to evaluate the risks

Actions for most foreseeable machine issues such as breakages start with ...

"Drop the speed"

"Dump the pressure"

then evaluate further.

To stop spraying at any stage.

MASTER SPRAY OFF

SECTION 8
SELF PROPELLED & AUTONOMOUS

SELF PROPELLED SPRAYERS

In most Countries, States and Territories there are special vehicle licence conditions that govern the use and movement of Self-propelled machinery. These conditions will need to be researched by the owner and/or operator prior to driving or operating Self-propelled sprayers.

In some cases, depending on the width of the machine, a pilot or escort vehicle may be required. Any wide vehicle must display an OVERSIZE sign. Most Self-propelled vehicles to be driven on public roads will have requirements for lighting / flashing beacons etc.

For Self-propelled sprayers, there will be special requirements, especially regarding the risk of fire, not covered in this manual, such as;

- fuel handling and associated safety procedures
- hot exhausts and associated fire risks and safety procedures
- exhaust fumes, cab filters and safety procedures
- engine cooling system and safe handling.

Each Self-propelled sprayer will come with it's own complete manual, including a comprehensive safety section. The safety section will be specific to the brand and model of Self-propelled sprayer. The manual, and all the safety content, must be read and understood by the owner and the operator prior to commencing any spraying operation.

USE A SPOTTER

When operating a Self-propelled sprayer in confined areas, an area close to power lines or where other people or property might be in the vicinity, it's highly recommended that a "spotter" be used, with radio communications between the operator and the spotter at ground level.

Steps provided to access the cab and platform on a self-propelled sprayer. Use both hand rails and avoid carrying items while ascending and descending.

AUTONOMOUS SPRAYERS

The Prospr autonomous sprayer is equipped with numerous safety features including;

- remote (operator) e-stop
- on-board e-stops x 6
- safety bumper
- lights and sounder
- lidar x 3 obstacle detection / collision avoidance
- indicators and horn.

Autonomous sprayers (and other implements) are relatively new to agriculture. As a consequence the "standards" to govern the safe use of autonomous sprayers is constantly evolving.

It's highly recommended that operators of Autonomous sprayers refer to the...

"CODE OF PRACTICE Agricultural Mobile Field Machinery with Autonomous Functions in Australia".

This document was created by Grain Producers Australia (GPA), Tractor and Machinery Association (TMA) and the Society of Precision Agriculture Australia (SPAA) with input from various agricultural equipment manufacturers including **Croplands** and the Western Australian Department of Mines, Industry Regulation and Safety.

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Your nearest Croplands Dealer can be found in the dealer section on the Croplands website.