



Operator's Manual

MANLINK-6 REV B 16/10/2020 1600,1900 Super Series Linkage Sprayers



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YOUR SPRAYER DETAILS

Record the details of your sprayer here for future reference when discussing service with your Silvan dealer, ordering parts or making a warranty claim.

SERIAL NUMBER _____

MODEL _____

DATE OF DELIVERY _____

SELLING DEALER _____

ADDRESS _____

TELEPHONE NO. _____

INSTALLED BY _____

New Product Warranty

Silvan Australia Pty. Ltd. builds equipment to a high level of specification using components from quality suppliers. The following information is provided to assist you with any repairs required within the warranty period. All warranty repairs on Silvan products are carried out by Silvan dealers. If any warranty repairs are required on Silvan products, it is recommended that the product be returned to the place of purchase. It is good practice to keep a record of equipment maintenance both during and after the warranty period. The warranty policy below explains the extent and limitations of your Warranty coverage on Silvan Products.

This warranty is the only warranty applicable to Silvan new products ('Products') and, to the maximum extent permitted by law, is expressly in lieu of any other conditions or warranties expressed or implied in relation to the Products.

Subject only to legislative obligations to the contrary, Silvan shall not be liable for incidental or consequential damage resulting from ownership or use of a Product. Silvan does not authorize any person to create for it any other obligation or liability in connection with these products.

Silvan warrants its authorised Dealer, who in turn warrants the original purchaser (owner) of each new Silvan product that it will repair or replace the product, or, pay the cost of repair or replacement, as determined by Silvan without charge for labour or any defective or malfunctioning parts in accordance with the warranty limitations and adjustment schedule below.

The warranty period begins on the date the product is delivered to the first retail purchaser for a period of 12 months.

This Warranty Covers: Only conditions resulting directly from defects in workmanship or material under normal use and service.

Warranty Exclusions: The Warranty does not cover:

- Conditions resulting from misuse, use of incompatible chemicals, exceeding machine specifications including overloading, impact damage, negligence, accidental damage or failure to perform recommended maintenance services.
- Any product which has been repaired by other than an authorised Silvan service outlet in a way which, in the sole and absolute judgement of Silvan, adversely affect its performance or reliability.
- The replacement of maintenance items such as diaphragms, batteries, V belts and ground engaging components, etc.
- Loss of time, inconvenience, loss of use of the product, liability to third parties or any other consequential damages.
- Incidental costs associated with a warranty repair including any travel costs, out of hour's labour charges, cleaning costs, transportation costs, freight costs or any communication costs.
- The repair of a defective product qualifying under this warranty will be performed by any authorised Silvan service outlet within a reasonable time following the delivery of the product, at the cost of the owner, to the service outlet's place of business. The product will be repaired or replaced, using new parts supplied by Silvan. Silvan, at its absolute discretion, may choose to pay the cost of replacement or repair of the product.

The owner is responsible for the performance of regular maintenance services as specified in the Owner/Operator Manual applicable to the product. Failure to carry out regular maintenance may invalidate warranty.

Safety Information



Before operating the sprayer read the following safety instructions.

Failure to comply with these warnings may result in serious injury or death.

- This sprayer is designed and manufactured solely for the purpose of applying agricultural chemicals to crops. Under no circumstances should it be used for any other purpose.
 - Before using the sprayer, carefully read and ensure you understand the contents of this manual and any other manual supplied with the sprayer.
 - Before operating the sprayer, read all the safety warnings, which are carried on various parts of the machine. Refer to the next page for a location diagram and the wording of these warnings.
 - Never allow an inadequately trained person to attach or operate the sprayer.
 - Do not operate the sprayer whilst wearing loose clothing, unrestrained long hair, jewellery or anything which could become entangled in rotating components or limit your vision.
 - Wear ear protection when operating the sprayer on a tractor which is not fitted with a sound proofed cabin.
 - Ensure the linkage capacity of the tractor is suitable for the loaded mass of the sprayer. Refer to the tractor operator's manual for safe working loads and relevant tractor safety instructions.
 - Only operate the sprayer on a tractor fitted with a roll-over protective structure (ROPS), or a cab incorporating a ROPS, complying with AS1636 or equivalent.
 - Exercise extreme care when operating in hilly or uneven terrain to ensure adequate stability. Refer also to the tractor manufacturer's operating and safety instructions.
 - Do not operate the pump at speeds greater than 540 PTO rpm and less than 400rpm.
 - Do not operate the sprayer without all of the tractor and sprayer safety shields in place.
- Carefully check that PTO and driveline shields are correctly installed.
- Stop the tractor, disengage the PTO, apply the parking brake and switch off the tractor engine before approaching the sprayer and performing any work on it.
 - Disconnect the PTO shaft at the tractor and ensure the sprayer is properly supported before performing any maintenance work.
 - **Before use of any chemicals** refer to the chemical manufacturer's label and safety instructions for safe handling procedures and correct method of use. Always use the recommended personal protective clothing and equipment. Dispose of empty chemical containers in accordance with the instructions supplied by the chemical manufacturer.
 - Always wear gloves when removing and cleaning filters.
 - Ensure that all operators and associated personnel are familiar with the legal regulations and codes of practice that apply to the safe use and storage of spray chemicals.
 - Ensure chemicals are kept away from the fresh water tank. **Never drink water from the fresh water tank.**
 - Ensure all bystanders are at a safe distance from the machine. Do not allow any person to ride on the sprayer or tractor whilst it is in motion.
 - Do not use flammable liquids or gases in the sprayer.

Safety Information



The locations of the safety decals fitted to Silvan linkage sprayers are shown in the diagrams below. The wording of the decals is shown on the following page. It is important that all operators read and follow the information on all safety decals before operating the sprayer. Failure to comply with these warnings could result in serious injury or death. Safety decals should be kept clean and legible at all times. If any decals are missing or unreadable they should be replaced by ordering new decals from your Silvan dealer using the part numbers shown.



Safety Information

Wording of Safety Warnings

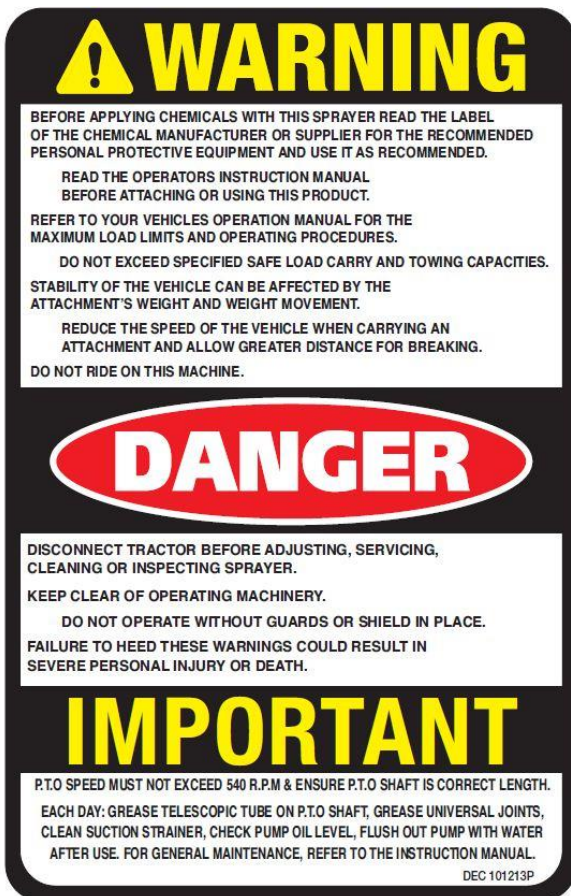
The wording of the safety decals shown on the previous page is given below.
Before operating the sprayer read all safety decals.
Failure to comply with these warnings could result in injury or death.



Part Number US4



Part Number DEC 232



Part Number DEC101213P

Specifications

Pumps

Positive displacement oil-backed diaphragm pump of varying capacity depending on sprayer specification. Output at 540 PTO rpm and maximum operating pressure as shown below.

Pump Model	Output l/min	Pressure Bar	psi	No. of Diaphragms
BP 125/20	117	20	290	3
BPS 200/20	199	20	290	4

Note: Maximum operating speed 540 rpm.

Minimum operating speed 400 rpm.

This pump has been designed and constructed solely to pump agricultural liquid chemicals, normally used for pest and weed control.

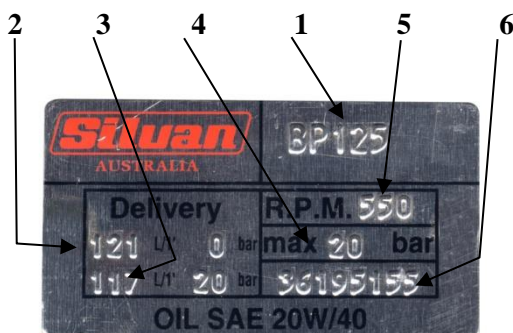
It must not be used to pump:

- Liquids with a density and viscosity greater than water.
- Chemical products if the compatibility with the materials of the pump is not known.
- Sea water or other salty concentrations.
- Water with a temperature above 40°C and less than 5°C.
- Any type of varnish.
- Solvents and thinners for any type of varnish.
- Any type of fuel or lubricant.
- Liquids containing granules or floating solid parts.
- Chlorine.
- For special liquids please contact Silvan service department.

Pump Identification

The following data is found on the pump name plate:

1. Pump Type
2. Maximum Delivery (at 0 Bar)
3. Delivery at Maximum Pressure
4. Maximum Pressure Permitted in Pump
5. Maximum RPM
6. Manufacturer's Serial No



Tank

1600 and 1900 litre Polytuff impact resistant polyethylene construction, external sightline with floating ball. Non-spill offset screw down lid with breather. 10 litre hand wash tank with screw on lid and on/off tap. 150 litre flush tank with screw on lid and external sightline. 50mm Camlock bottom fill facility. Bypass agitation from pump.

Frame

Galvanised steel with Category 2 and 3 hitch points. Vertical boom channels at the rear position the boom at optimum spray height.

Controls

Three section electric valve controls with metered bypass returns. Manual pressure regulator and electric pressure regulating valve to fine tune pressure setting. Master on/off valve. Manual tap to supply Silmix chemical hopper. Pressure gauge in switch box.

Chemical Induction

30L Silmix chemical hopper mounted to side of frame.

Filtration

Suction filter with stop valve 50 mesh screen (Blue). Nozzle filters on boom (if fitted) 50 mesh screens. Other screen mesh sizes available.

Driveshaft

Quality PTO driveshaft with safety covers and quick release pins.

Dimensions (No boom fitted)

	L (mm)	W (mm)	H (mm)	Kg (Dry)
K16NH-125	1480	2300	2300	650
K19NH-125E	1480	2300	2570	665

Factory Options

- Heavy Duty Devil Booms with hydraulic fold. Widths of 10m,12m,14m and 15m
- Hydraulic lift with airbag suspension for Devil booms
- Parallelogram with airbag suspension (no hydraulic lift) for Devil booms
- Paddock Marker foam marker 57L tank
- Automatic rate controller with GPS speed sensor
- Additional boom section valves and controls

Operation

Attaching to the Tractor

The Silvan 1600 and 1900 litre linkage sprayers are equipped to fit tractors with either Category 2 or 3 linkages. The lower linkage pin position is Category 2 and the higher pin position is Category 3. The lower holes in the top connection plates are Category 2 and the upper holes are Category 3.

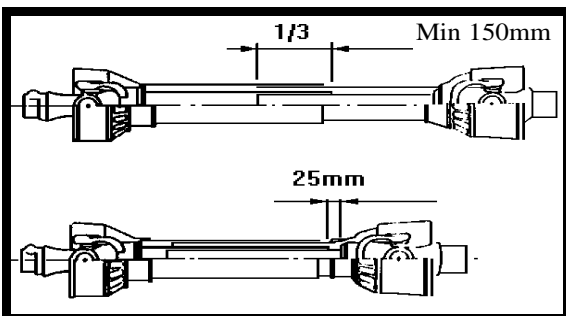
Remove the PTO shaft from the sprayer by depressing the locking pin. Lower the tractor linkage and attach it to the sprayer's lower hitch pins of the appropriate category, then connect the top link using the tractor's top link pin. Secure the linkage arms and top link pin with the tractor's lynch pins. Raise the tractor linkage to the desired spraying height and level the sprayer by adjusting the length of the top link and by using the lower arm leveling mechanism.

Clean and grease the splines on the tractor and sprayer pump PTO shafts and install the PTO shaft making sure that the spring loaded locking pins engage in the interference grooves of both stub shafts. Ensure that the PTO shaft guard chains, if fitted, are attached to the sprayer and tractor.

PTO Shaft Length

Note: Upon delivery of a new PTO driven sprayer, it is the selling dealer's responsibility to install and set the PTO driveshaft to the correct length, as part of the installation service. The following information is provided for reference.

Set the linkage height so that the ends of the two shafts are at their closest distance. Install the PTO shaft making sure that there is at least 25mm of telescopic travel remaining between the male and female sections. Raise and lower the sprayer to check that the telescopic tubes of the PTO overlap by approximately 1/3rd of their length, and not less than 150mm, in all operating positions.



If the PTO shaft must be shortened, cut equal amounts from both male and female shafts and safety covers. Carefully remove all burrs then clean and lubricate before reassembling.

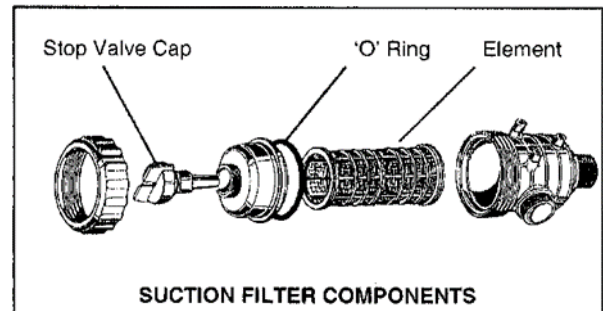
Starting the sprayer

When starting the sprayer for the first time conduct a trial run with water to become familiar with the operation of the controls and to check that all systems are functioning correctly without any problems.

The tank can be filled either through the top lid or via the 50mm Camlock fitting located under the frame step. It is preferable to use the camlock as the filling operation can be done more safely from the ground and there is less frothing of the tank contents when filled from underneath.

Filter

The suction filter is fitted with a stop valve which closes automatically when the valve cap is screwed off. This allows the filter cover to be unscrewed and the element to be removed for cleaning while there is fluid in the tank.



When the sprayer is operating, the valve must be fully screwed in to open the stop valve and allow fluid to pass through the filter. Directional arrows are moulded into the valve cap to show the opening and closing operation. Always wear appropriate safety equipment when handling the filter and element.

Pump

1. Check the oil level while the pump is standing still and sitting horizontally. The oil must reach the level indicated on the sight glass. Top up with SAE20W/40 oil if necessary. Refer to the pump instruction manual for further details.
2. Check the air pressure in the surge chamber at the end of the pump. The air pressure behind the chamber's diaphragm smoothes out the pulsations in fluid flow and should be set in accordance with the spraying pressure being used - refer chart on next page. Adjust the pressure at the valve fitting on the chamber using a compressed air hose fitted with a tire valve connection and a reliable pressure gauge.

Operation

Spraying pressure (Bar)	2 - 5	5 - 10	10 - 20	20 - 50
pressure (psi)	29 - 73	73 - 145	145 - 290	290
Surge air pressure (Bar)	2	2 - 5	5 - 7	7
pressure (psi)	29	29 - 73	73 - 102	102

Electric Valve Controls

The electric valve control system enables spraying to be stopped and started, the pressure adjusted and the output to be directed to any or all boom sections from the tractor cabin whilst on the move. The control box can be permanently installed in the tractor cabin with a multi pin plug allowing the wiring to the sprayer to be easily connected or disconnected.

The electric valves consist of a master valve to switch from bypass to pressure, separate valves for left, centre and right boom sections which incorporate regulating bypass compensators and an electric pressure adjusting valve to fine tune the spraying pressure. The compensating ports fitted to the section valves, when adjusted correctly, will keep the system pressure at the same level when individual sections are turned on and off. A manual tap directs fluid to the chemical induction hopper.

Connect the electrical cables provided directly to the battery.

Positive = **Red** Negative = Black

If the cable needs to be extended it is important to use wire of the same diameter. These cables supply power to the electric valves.

Run the controller wiring loom back to the sprayer through a convenient outlet in the tractor cabin, ensuring that it does not rub on any sharp edge. Connect the tractor loom to the sprayer loom at the quick release multi pin plug and ensure that all wiring is clear of the PTO shaft and tractor wheels.

If an automatic rate controller is used refer to appropriate installation and operation manuals.

Pressure Adjustment

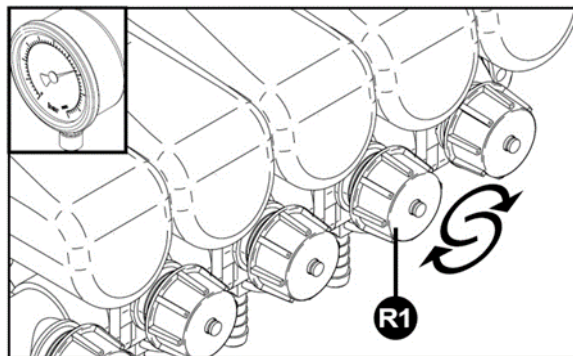
To set initial pressure turn power on to switch box. With the PTO off hold up the toggle switch to close the Electric Pressure Regulating Valve (valve is fully closed when motor stops). Wind the Manual Pressure Regulator anticlockwise until fully open. Start the PTO pump. With the section switches turned Off and the Master switch turned On maximum pressure can be set by turning the Manual Pressure Regulating Valve clockwise (usually 10 bar is sufficient). A clockwise rotation increases pressure and an anticlockwise rotation reduces pressure. The desired spraying pressure

can then be obtained by holding down the toggle switch on the control box which will open the Electric Pressure Regulating Valve and decrease the system pressure and vice versa.

To adjust the compensation ports:

Start the sprayer and set the spray pressure with the master On and all sections On.

Then turn off the first section and adjust the compensation knob R1 until the pressure is exactly the same as it was with all sections on. Turn the section back on and off to check the pressure remains constant.



Turn all sections on again and repeat for the remaining sections.

The sprayer is then adjusted correctly.

Before engaging the PTO switch the Master valve to the "Off" position. This places the pump into by-pass mode and closes the outlet valves to the spray nozzles on either side of the sprayer.

Flush Tank

The flush tank is filled through the screw cap on the rear corner of the tank.



To flush the system

1. Disengage the PTO
2. Turn the Ball Valve located under the lower step from **Main Tank** to **Flush Tank** (see picture next page)

Operation

- Turn on PTO and section valves to flush pump, plumbing, valves and boom spray lines.



Tank Drain

The main tank drain valve is located behind the lower step and the three way suction valve. To drain remove the cap on the Knife valve and push in the handle. (see picture below)

Dispose of unused chemical mix, rinse water and containers as recommended by the chemical manufacturer or government authority.



Chemical Induction Hopper



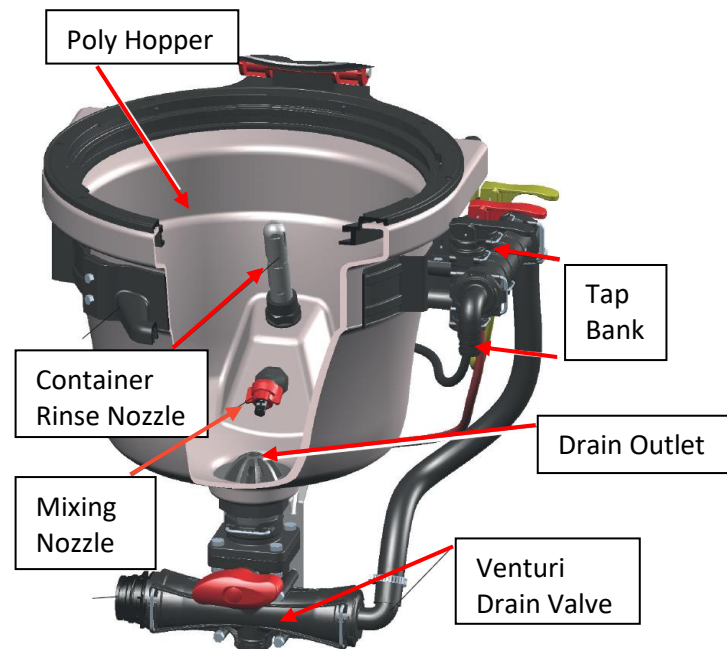
Before adding chemicals read and follow the chemical manufacturer's instructions and wear the recommended personal protective clothing.

The chemical induction hopper is located next to the frame step on the left side of the sprayer and has a capacity of 30 litres. Chemicals can be added to the tank safely and conveniently by use of the chemical inductor.

Take care to avoid the spillage of chemicals or mixed solution. Wear gloves, eye protection and the recommended protective clothing whilst filling with chemicals. Wash your hands after filling if they have come into contact with concentrate or mixed solution.

Store unused chemicals and dispose of empty chemical containers as recommended by the chemical manufacturer or relevant authority.

To use the chemical inductor put 500 litres of water in the tank and have the pump operating at approximately 400 PTO rpm. Turn the Master switch On and the Section switches Off. This pressurises the system to operate the induction hopper. Adjust the system pressure with the toggle switch to approximately 8 Bar. Turn on the manual tap on the valve bank to direct fluid to the chemical hopper. The fluid will circulate past the tap assembly and through the venturi fitting in the base of the hopper until the taps are activated to induct the chemical.



Unlatch the hopper and swing it out to enable access to the lid.

The three coloured taps control functions in the hopper.

BLACK Container Rinse Nozzle
RED Chemical Mixing Nozzle
YELLOW Hopper Rinse Nozzles

The venturi Drain Valve is open when the handle is horizontal (as in picture above)

Granular chemicals can be added directly to the hopper with the lid open and the Yellow tap open (up) and the Drain Valve open until all the granules have been transferred to the main tank.

For pre-measured chemicals close both the lid and the Drain Valve (handle vertical). Open the yellow tap to put approximately five litres of fluid into the hopper. Close the yellow tap. Open the lid and add

Operation

the required amount of chemical. CLOSE THE LID UNTIL IT LOCKS. Open the yellow tap again to add another five or so litres of water to the hopper. Close the yellow tap and open the Drain Valve to transfer the chemical into the sprayer tank.

Chemical Container Flush

Place empty chemical containers over the rinse nozzle. Insert the nozzle as far into the neck of the container as possible to avoid liquid spraying the operator (Fig 6a). Ensure the Drain Valve is open. Open the Black tap to activate the rinse nozzle. Containers should be rinsed 2-3 times for 15 seconds each time. The residue will be transferred to the main sprayer tank.



The Red tap activates the mixing nozzle in the hopper to aid chemical mixing and agitation of the hopper contents. It can be used in conjunction with the yellow tap to thoroughly mix the added chemicals and water.

Chemical Hopper Flush

To flush the chemical hopper after all chemicals have been added to the main tank and any containers rinsed CLOSE THE LID then open all three coloured taps and the Main Valve. This will flush the inside of the hopper. Flush for 30 seconds then close the three coloured taps. After all the rinse fluid has drained from the hopper close the Main Valve and close the manual tap on the sprayer valve bank. Switch off the Master switch on the control box. Swing the hopper back under the frame and close the latch.



To resume spraying switch on the Master valve and section valves and adjust the pressure with the toggle switch to desired spraying pressure.

Hand Wash Tank

The hand wash tank has a capacity of 10 litres and is mounted on the left side of the tank at the top of the steps and incorporates a handle to assist climbing up to the top of the tank. The hand wash tank is filled by removing the screw on lid and filling with a hose. The outlet tap is positioned under the tank close to the chemical hopper, Camlock tank filler and suction filter.

DO NOT USE THE HAND WASH TANK CONTENTS FOR DRINKING.



Optional Devil Booms

Devil Boom

The hydraulic fold Devil boom features independent left and right hydraulic folding arms for either one-side or two side operation. The outer arm fold utilises a push rod that is connected to the inner fold hydraulic ram. The outer arm has a spring-loaded break-back mechanism. There is an optional hydraulic lift kit and optional hydraulic lift with airbag suspension available with the Devil booms.

Folding and Unfolding the Boom



Always ensure the boom is folded or unfolded in a safe area where it will not foul on any other objects. Look up before folding or unfolding to check for obstructions especially overhead power lines. Ensure all bystanders are clear before moving boom.

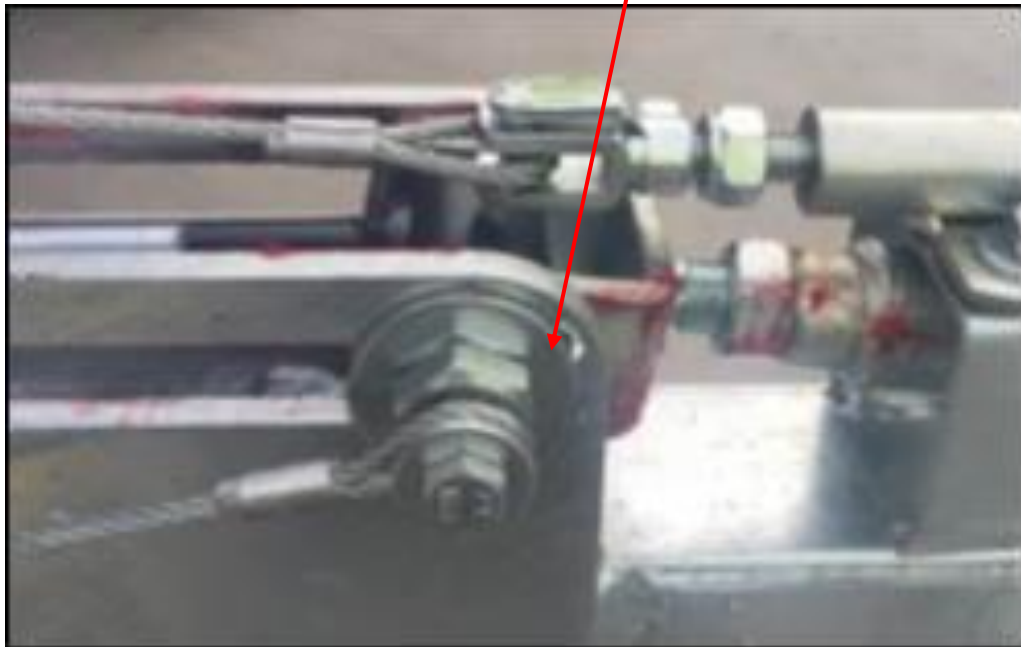
Unfolding: The boom will slide free from the saddles when unfolded. Use the tractor hydraulic lever to slowly unfold one arm at a time until the hydraulic cylinder is fully extended.

Folding: Fold the boom slowly, one arm at a time with the tractor hydraulics until the arm rests on the support saddle.

Boom Setup

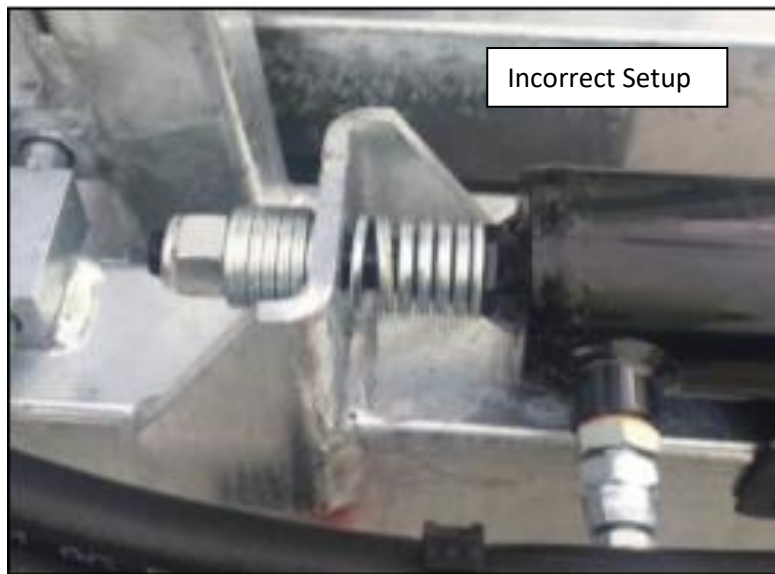
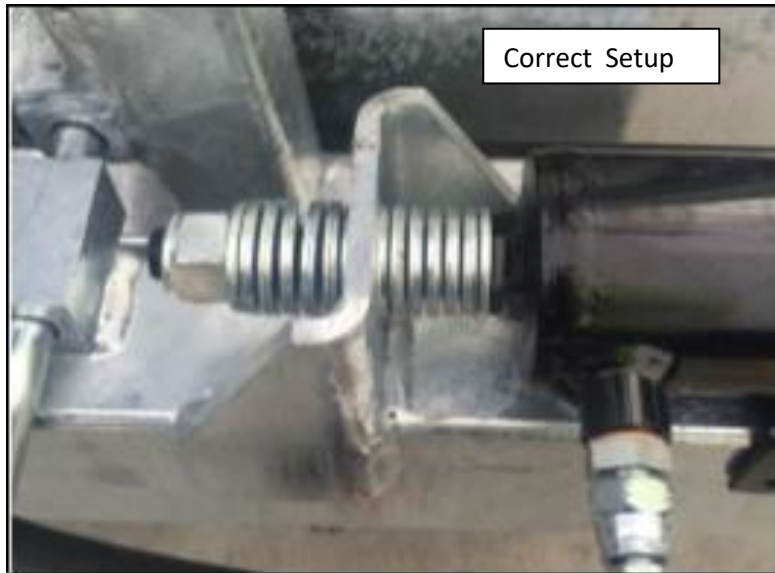
1. Unfold each arm using the tractor remotes.
2. When the hydraulic ram is fully extended, the bolt through the end of the ram must go the whole way to the end of the slot (below). Even a small gap will result in a whipping outer section.

Hydraulic Ram
Extension Slot



Optional Devil Booms

3. When the ram is at the end of the slot, the spring washers on the boom side of the bracket (right side below) must be fully compressed.



Boom Sprayer Calibration

Nozzle Selection

Refer to the chemical manufacturer's information on the product label to determine the recommended amount of chemical and water which will be the application rate in litres per hectare (l/ha) for your situation. Pay particular attention to any directions on the label that specify a droplet size from the nozzles to apply that chemical e.g. **“Do not apply with spray droplets smaller than VERY COARSE spray droplets according to the ASAE S572 definition for standard nozzles”** and any other label requirements.

Ground Speed

Determine the speed in kilometres per hour (km/hr) at which you intend to spray, taking into consideration the ground conditions of the area to be sprayed.

The ground speed read out on modern tractors should be sufficiently accurate for spraying but if in doubt check it by the following method.

Measure and mark a distance of 100 metres. Fill the sprayer with water and engage the PTO to simulate normal spraying conditions. Approach the starting mark at the required spraying speed and accurately measure the time in seconds to reach the finishing mark. The ground speed can be calculated as follows.

$$\text{Speed (km/hr)} = \frac{360}{\text{Time in seconds for 100 m}}$$

Using the appropriate chart for your boom, select the most suitable nozzle to use at the normal recommended pressure of 3.0 Bar. The leading digits in the nozzle number indicate whether it is an 80° or 110° fan angle and the last two digits refer to the size of the opening. Nozzles are colour coded for easy identification in terms of their capacity (l/min) at different pressures. Charts for specific nozzles will also have droplet size classifications as well as output figures.

All Silvan booms are fitted with AIXR air induction nozzles as standard which have a pressure range from 1.0 to 6.0 Bar. The chart on the next page applies to these nozzles.

Using the Calibration Charts

For example, a rate of 96 l/ha can be achieved at a ground speed of 10 km/hr using 3.0 Bar pressure with an AIXR11002 yellow nozzle - refer to the nozzle selection chart on the next page.

If the exact application rate does not appear in the chart it can be achieved by slightly adjusting the speed or pressure. For example, if a rate of 100 l/ha is required rather than 96 l/ha, it can be achieved with the same yellow nozzles by reducing the speed to 9.5 km/hr or increasing pressure to approximately 3.2 Bar.

Alternatively, the same rate of 100 l/ha could also be achieved with a larger nozzle and faster operating speed. By referring to the nozzle chart on the next page it can be seen that an AIXR11003 blue nozzle will give this rate at a little under 14 km/hr and 3.0 Bar (the rate shown on the chart at 14 km/hr is 103 l/ha).

It can thus be seen that a variety of choices exist for most application rates and the final selection of nozzle, speed and pressure will depend upon the factors which best suit your conditions and any chemical label requirements.

Always perform a calibration check to confirm your nozzle selection, as described on page 15.

Boom Sprayer Calibration



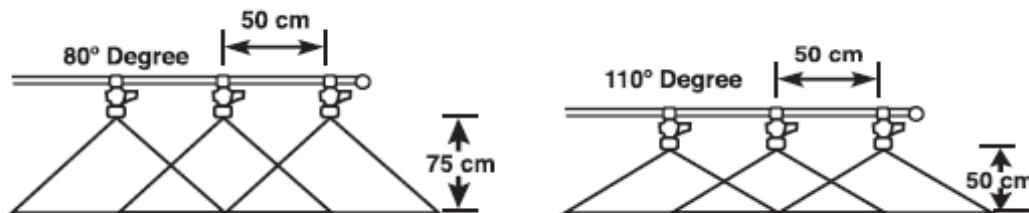
SPRAYER CALIBRATION CHART

1 BAR = 14.5 PSI

NOZZLE SPACING = 50cm

ISO STANDARD NOZZLE OUTPUT CHART FOR 80°/110° NOZZLES

ISO COLOUR CODE	LIQUID PRESSURE (BAR)	FLOW RATE L/MIN.	APPLICATION RATE: LITRES PER HECTARE.													
			6	8	10	12	14	16	18	20	22	24	26	28	30	
			km/h	km/h	km/h	km/h	km/h	km/h	km/h	km/h	km/h	km/h	km/h	km/h	km/h	km/h
FAN TIP ORANGE 80-01 110-01 100 MESH	2.0	0.33	65	49	39	33	28	24	22	20	18	16	15	14	13	
	2.5	0.37	73	55	44	37	31	27	24	22	20	18	17	16	15	
	3.0	0.40	80	60	48	40	34	30	27	24	22	20	18	17	16	
	3.5	0.43	86	65	52	43	37	32	29	26	23	22	20	18	17	
FAN TIP GREEN 80-015 110-015 100 MESH	4.0	0.46	92	69	55	46	39	35	31	28	25	23	21	20	18	
	2.0	0.49	98	74	59	49	42	37	33	29	27	25	23	21	20	
	2.5	0.55	110	82	66	55	47	41	37	33	30	27	25	23	22	
	3.0	0.60	120	90	72	60	51	45	40	36	33	30	28	26	24	
FAN TIP YELLOW 80-02 110-02 50 MESH	3.5	0.65	130	97	78	65	56	49	43	39	35	32	30	28	26	
	4.0	0.69	139	104	83	69	59	52	46	42	38	35	32	30	28	
	2.0	0.65	131	98	78	65	56	49	44	39	36	33	30	28	26	
	2.5	0.73	146	110	88	73	63	55	49	44	40	37	34	31	29	
FAN TIP BLUE 80-03 110-03 50 MESH	3.0	0.80	160	120	96	80	69	60	53	48	44	40	37	34	32	
	3.5	0.86	173	130	104	86	74	65	58	52	47	43	40	37	35	
	4.0	0.92	185	139	111	92	79	69	62	55	50	46	43	40	37	
	2.0	0.98	196	147	118	98	84	74	65	59	53	49	45	42	39	
FAN TIP RED 80-04 110-04 50 MESH	2.5	1.10	219	164	131	110	94	82	73	66	60	55	51	47	44	
	3.0	1.20	240	180	144	120	103	90	80	72	65	60	55	51	48	
	3.5	1.30	259	194	156	130	111	97	86	78	71	65	60	56	52	
	4.0	1.39	277	208	166	139	119	104	92	83	76	69	64	59	55	
FAN TIP BROWN 80-05 110-05 50 MESH	2.0	1.31	261	196	157	131	112	98	87	78	71	65	60	56	52	
	2.5	1.46	292	219	175	146	125	110	97	88	80	73	67	63	58	
	3.0	1.60	320	240	192	160	137	120	107	96	87	80	74	69	64	
	3.5	1.73	346	259	207	173	148	130	115	104	94	86	80	74	69	
FAN TIP GREY 80-06 110-06 50 MESH	4.0	1.85	369	277	222	185	158	139	123	111	101	92	85	79	74	
	2.0	1.63	326	245	196	163	140	122	109	98	89	82	75	70	65	
	2.5	1.82	364	273	218	182	156	137	121	109	99	91	84	78	73	
	3.0	2.00	400	300	240	200	171	150	133	120	109	100	92	86	80	
FAN TIP WHITE 80-08 110-08 50 MESH	3.5	2.16	432	324	259	216	185	162	144	130	118	108	100	93	86	
	4.0	2.31	462	346	277	231	198	173	154	139	126	115	107	99	92	
	2.0	1.96	392	294	235	196	168	147	131	118	107	98	90	84	78	
	2.5	2.19	438	329	263	219	188	164	146	131	120	110	101	94	88	
FAN TIP WHITE 80-08 110-08 50 MESH	3.0	2.40	480	360	288	240	206	180	160	144	131	120	111	103	96	
	3.5	2.59	518	389	311	259	222	194	173	156	141	130	120	111	104	
	4.0	2.77	554	416	333	277	238	208	185	166	151	139	128	119	111	
	2.0	2.61	522	392	313	261	224	196	174	157	142	131	120	112	104	
FAN TIP WHITE 80-08 110-08 50 MESH	2.5	2.92	584	438	350	292	250	219	195	175	159	146	135	125	117	
	3.0	3.20	640	480	384	320	274	240	213	192	175	160	148	137	128	
	3.5	3.46	692	519	415	346	297	260	231	208	189	173	160	148	138	
	4.0	3.70	740	555	444	370	317	278	247	222	202	185	171	159	148	



**CAUTION: ALWAYS MANUALLY CALIBRATE THE SPRAYER TO VERIFY APPLICATION RATE
ALWAYS REFER TO CHEMICAL LABEL FOR DROPLET SIZE REGULATIONS**

Boom Sprayer Calibration

Spray Pattern and Nozzle Uniformity

The overlap pattern of the boom, the spray pattern of individual nozzles and the uniformity of nozzle output can be tested in the following manner. Always keep one new nozzle aside from each set to use as comparator for this test.

1. Install the comparator nozzle, fill the sprayer tank with clean water and operate the boom at spraying pressure whilst stationary.
2. Examine the spray pattern from each nozzle against a dark background. Replace any that show streaks or signs of blockage.
3. Compare individual nozzle outputs by placing a container such as the Silvan calibrated measuring jug under each nozzle and run the sprayer for one minute. The water level in the container should be the same for each nozzle. Replace any nozzle giving more than 10% greater output than the comparator. Once several nozzles are worn to this extent it is good practice to replace the entire set.
4. Set the boom at the appropriate height for the nozzle angle, ie. 60 cm for 80° and 50 cm for 110°. Run the sprayer and check that the patterns from adjacent nozzles overlap by approximately 50%.
5. Remove and store the comparator nozzle.

Verifying the Calibration

After conducting the above tests to ensure pattern and output uniformity are correct, repeat the procedure at 3.0 Bar to compare the actual nozzle output with that shown on the nozzle selection charts. This may be done either as a test on an individual nozzle or the full boom.

a) Nozzle Test

Measure the fluid in litres, collected from one nozzle during one minute. The amount should agree with the flow rate shown in the Nozzle Selection Chart on the previous page, for the particular type and size fitted.

If the volume collected is too low the operating pressure may be increased and the test repeated, alternatively if the volume is too high the pressure can be lowered.

b) Boom Test

1. Partly fill the sprayer tank with water and mark the level or refer to the sight gauge.
2. Run the sprayer at 3.0 Bar for several minutes with all boom sections operating and measure the time carefully.
3. Refill the sprayer tank to the mark using a measuring jug and record the amount added.

4. The average output for one nozzle in l/min can be calculated as follows. It should agree with the flow rate shown at 3.0 Bar in the nozzle selection chart, for the particular nozzle type and size fitted.
5. If the nozzle output is lower than shown in the

$$\text{Nozzle output} = \frac{\text{Litres used}}{\text{No. nozzles} \times \text{No. minutes}}$$

chart the pressure may be increased and the test repeated or, if more than shown, the pressure may be reduced.

Nozzle Care and Maintenance

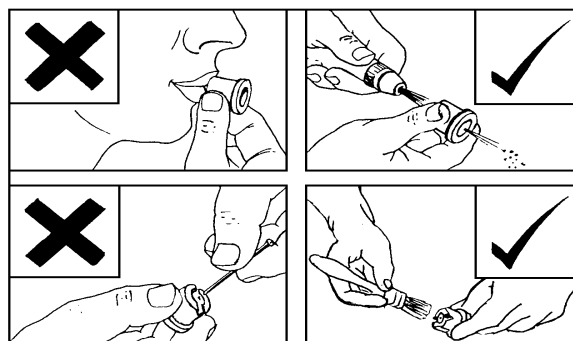
Nozzles are one of the most critical components in the spraying system and yet are often the most neglected. Worn or damaged nozzles result in over application of expensive chemicals, crop damage and environmental contamination.

They should be examined and checked regularly by the method shown above. Replace nozzles which are not within 10% of the datum.

Always keep a quantity of spare nozzles with the sprayer for immediate replacement in the field when necessary.

Never attempt to clear a nozzle by blowing through by mouth and never remove stubborn deposits with a pin, wire or sharp instrument.

Blocked nozzles should be soaked in clean, warm water with a mild detergent added and carefully cleaned only with a soft brush or airline.



Lubrication and Maintenance

Daily Maintenance

Before carrying out any maintenance

Turn off the tractor and disconnect the tractor PTO. Ensure the sprayer is adequately supported before performing any operation on the sprayer.

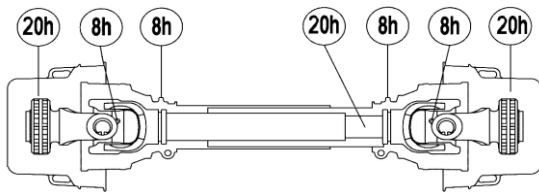
General

During the first few days of operation, before starting each day check that all hardware is tight and inspect the unit for leaks while running and tighten all hose clamps.

PTO Shaft

For safety reasons, it is **very important** to inspect the condition of the PTO guard and chains (if fitted) daily and to maintain as necessary.

Grease the PTO shaft and guard with multi-purpose grease at the time intervals shown below. This is the amount of lubrication recommended for normal operation. More frequent inspection and lubrication may be needed under very dusty conditions.



Pump

Oil Level and Condition

When the pump is stationary, the oil level must correspond to the indicator found on the oil reservoir on the side of the pump. The oil level may vary when the diaphragm pump is working: As the pump is started, the oil level will initially drop and then return to functioning level when the liquid begins to pump. The condition of the oil should be frequently checked as it affects the operation of the pump and the condition and life of the diaphragms. If the oil becomes white (water present in oil), it may be a symptom of failure of one or more diaphragms. It is necessary to **stop work** and inspect the condition of the diaphragms. If they are broken, it is necessary to replace the complete set.

Continued use with water in the oil will cause serious damage to internal parts of the pump.

See your Silvan dealer to replace diaphragms and pump service.

Filters

Always clean the suction filter before each tank refill (especially if powder based products are used) and at the end of the day. Close the stop valve by pushing the cap in and turning it in the direction indicated on the cap nut, then unscrew the filter cover to remove the filter element - refer to diagram in Operation section. The best method for cleaning the filter screen is with a soft bristle brush. Check for any tears or holes and replace if damaged. Ensure the 'O' ring is in good condition when refitting.

Re-assemble in reverse order.

Tank and Spray Lines

At the end of each day run clean water through the pump and lines to purge them of chemicals. Rinse out the tank to remove powdered material.

Never leave chemicals in the tank that may settle to the bottom, harden and break into lumps as this may block the suction filter.

Weekly Maintenance

PTO Shaft (Every 20 Hours)

Remove the shaft from the tractor and sprayer, slide the PTO shaft apart, clean the telescopic tubes and female ends with kerosene and apply multi-purpose grease to the sliding surfaces, then reassemble. This is most important in dusty conditions.

Diaphragm Pump

Check the inflation of the pressure accumulator (see the Operations section of this manual) especially if there are vibrations on the delivery hose and/or the pressure gauge. Check that the pump mount bolts on the machine frame are tight and if necessary re-tighten especially when there is vibration during use.

Annual Maintenance

Diaphragm Pump

Drain the oil from the pump annually or at 300 hours of use. Replace with SAE 20W-40 oil. Remove the pump heads and check diaphragms, valve seats and springs for wear or damage and replace as necessary. There are pump service kits available from your Silvan dealer.

Hardware

At the end of each season, generally inspect the sprayer for any signs of damage and check that all bolts are securely tightened.



Never use a pressure washer to clean around pump seals or any electrical components.

Trouble Shooting

Pump does not prime

- No liquid in tank or not covering suction inlet.
- Suction filter blocked.
- Suction filter stop valve closed.
- Suction filter bowl loose or missing O-ring.
- Suction line loose allowing pump to suck air.
- Master valve not in by-pass position i.e. Off
- Pump valve springs broken or valves worn.

Pump does not reach correct pressure

- Pump not operating at full 540 rpm.
- Suction filter blocked.
- Suction filter stop valve partly closed
- Pressure regulator not correctly adjusted
- Pressure regulator valve and seats worn.
- Pressure gauge faulty
- Pump diaphragms ruptured (pump oil grey or milky).
- Worn nozzles or capacity of nozzles greater than capacity of the pump.
- Worn pump inlet / outlet valves

Pump and hoses vibrating.

- Pump surge chamber pressure incorrectly adjusted or surge diaphragm ruptured.
- Air entering the suction line through loose or damaged fittings.
- Pump valves or valve springs worn or damaged.
- Worn nozzles or capacity of nozzles greater than capacity of the pump.
- Air trapped in filter or suction lines.

Water in oil (oil is a whitish grey colour)

- Broken diaphragms.

Pressure regulator valve vibrates

- Worn adjustment plate seat in regulator.

Notes



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