



## **Operator's Manual**

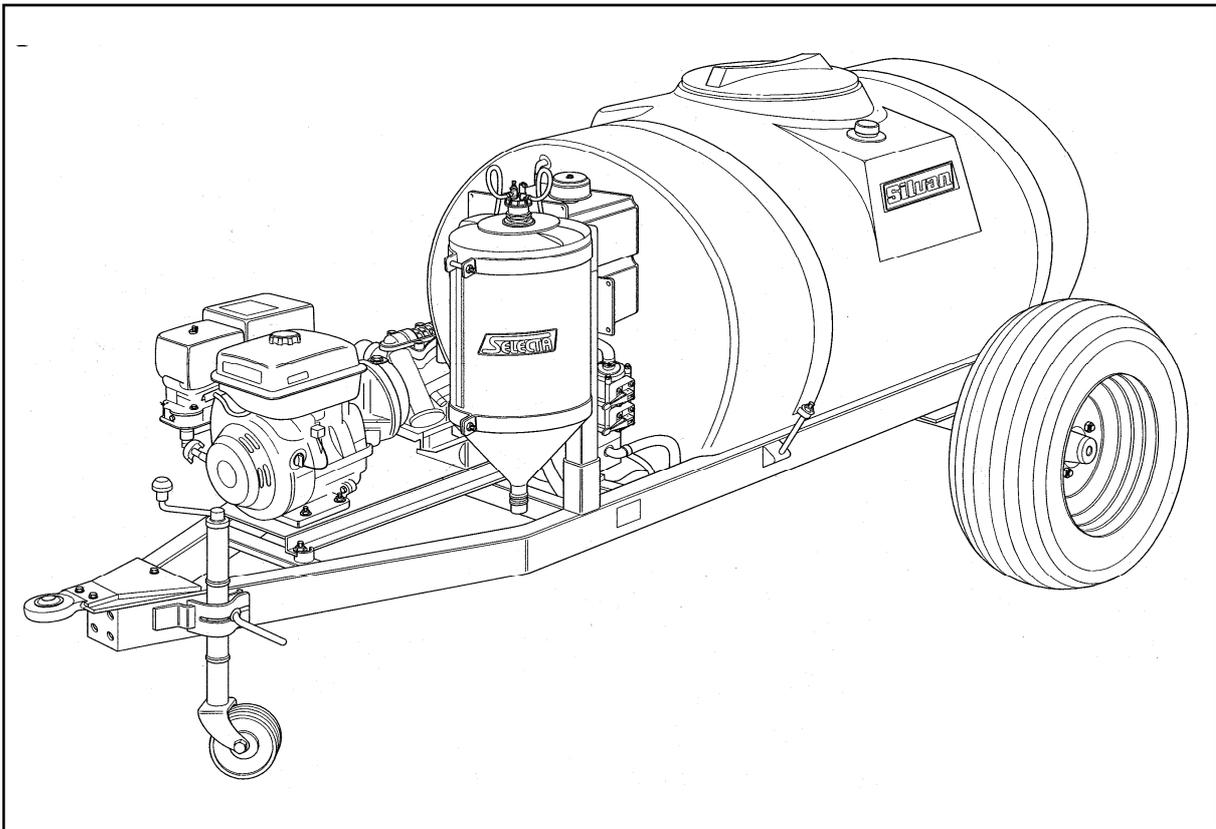
MANBA02 REV E 28/1/10

**Broadacre & Turf Sprayer**

**1000 Litre**

**2000 Litre**

**PTO or Engine Driven**



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**NEW ZEALAND**

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## New Product Warranty

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# *The Silvan Warranty*

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, operating outside duty cycle 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, in 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



## About Your Warranty

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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 following information on warranty coverage explains the extent and limitations of your Warranty coverage on Silvan Products.

### YOUR SPRAYER DETAILS

Record the serial number of your sprayer and other important information here for future reference when discussing service with your Silvan dealer, ordering parts or making a warranty claim.

SERIAL NUMBER \_\_\_\_\_

DATE OF DELIVERY \_\_\_\_\_

OPTIONAL EQUIPMENT \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SELLING DEALER \_\_\_\_\_

ADDRESS \_\_\_\_\_

TELEPHONE \_\_\_\_\_

INSTALLED BY \_\_\_\_\_

## Safety Information

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Before operating the sprayer read the following safety instructions.  
Failure to comply with these warnings may result in serious injury or death.

Whilst the sprayer has been designed and manufactured to incorporate all necessary safety features it is essential that any person who operates or works on the machine is aware of the safety precautions that should be exercised.

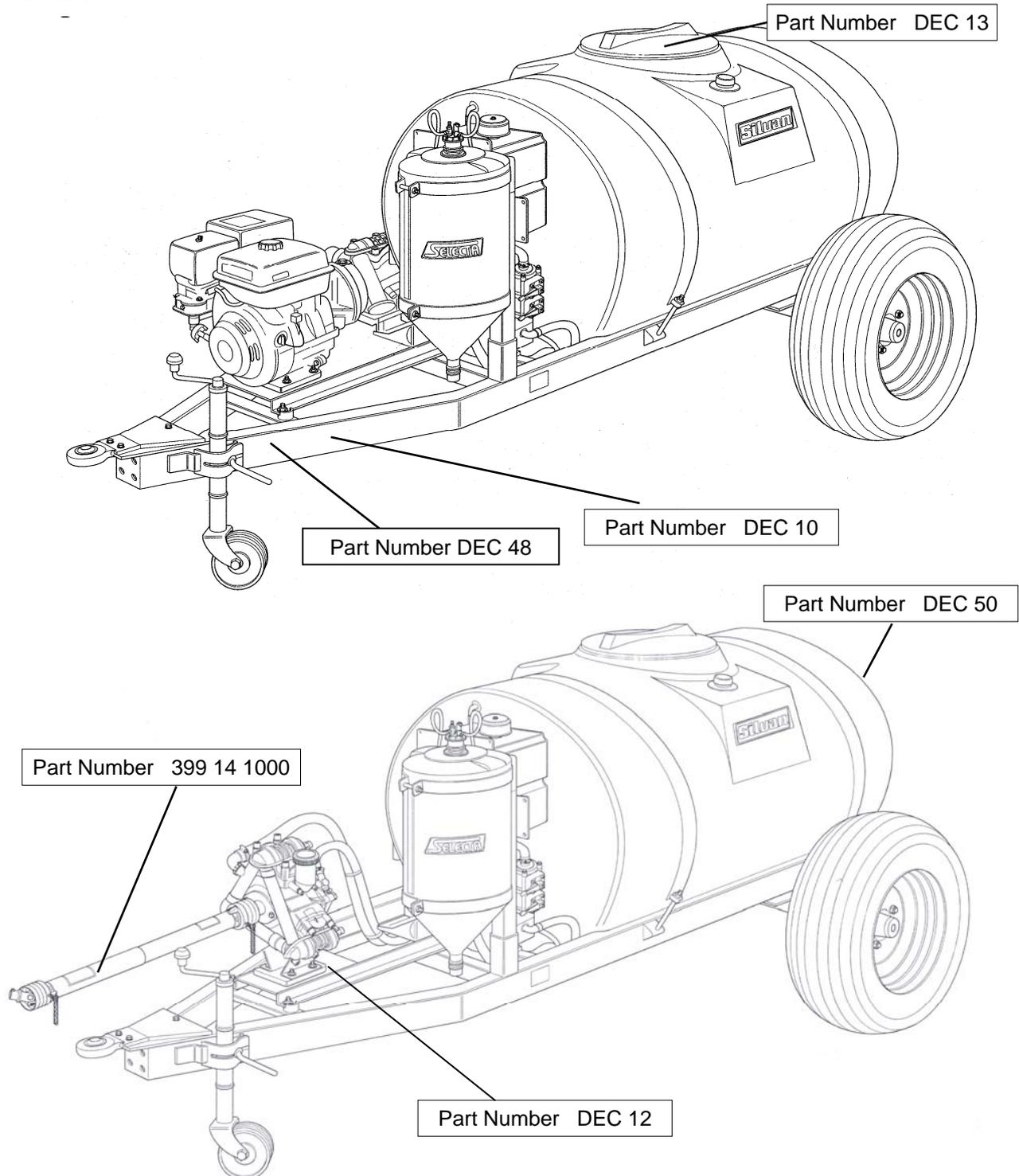
- ▲ This sprayer is designed and manufactured solely for the purpose of applying agricultural chemicals to crops. Under no circumstances should it be used for any other purpose.
- ▲ Before using the sprayer carefully read and ensure you understand the contents of this manual and any other manual supplied 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 two pages 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 operating capacity of the tractor matches the capacity of the sprayer. Refer to the tractor operator's manual for safe working loads and relevant tractor safety instructions.
- ▲ Exercise extreme care when operating in hilly or uneven terrain to ensure proper stability. Refer also to the tractor manufacturer's operating and safety instructions.
- ▲ Do not operate the sprayer without all the tractor and sprayer safety shields in place. Carefully check that PTO and driveline shields are correctly installed.
- ▲ Do not operate the sprayer at speeds greater than 540 PTO rpm.
- ▲ Stop the tractor PTO, apply the parking brake and switch off the tractor engine before approaching the sprayer or performing any work on it.
- ▲ Disconnect the PTO shaft at the tractor and ensure the sprayer is properly supported and restrained before performing any maintenance work.
- ▲ Stop the optional Honda engine, if fitted, before refuelling, performing maintenance or making adjustments to the sprayer.
- ▲ Do not support the sprayer by the jockey wheel if the tank is full or partly filled with liquid.
- ▲ **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.
- ▲ 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.
- ▲ **Do not enter the tank under any circumstances.** If service is required contact Silvan for correct maintenance procedures.

## Safety Information

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### Locations of Safety Warnings

The following "Safety Warning" decals are fitted to the sprayer. It is important that all operators read and follow the information given on these decals. They 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 under the part numbers shown. Refer to the opposite page for the details of the wording on these safety decals.



## Safety Information

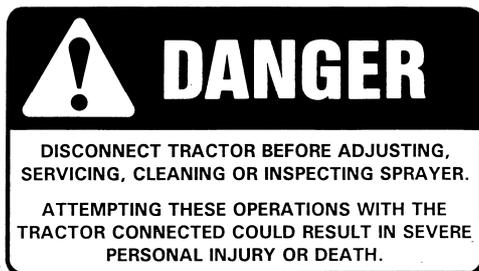
### Wording of Safety Warning Decals



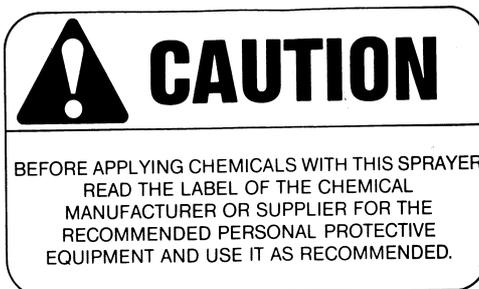
The wording of the safety decals shown on the opposite page is given below. If a decal has no wording the meaning of the symbol is stated under the diagram. Before operating the sprayer read all safety warning decals. Failure to comply with these warnings could result in serious injury or death.



Part Number DEC 12



Part Number DEC 10



Part Number DEC 13



Part Number DEC 50

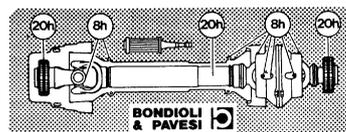


Part Number DEC 48



399141000

MADE IN ITALY



Part Number 399 14 1000



## Specifications

### General

The Silvan Sprayer is a high performance sprayer designed for the application of chemicals to crops and turf.

### Tank

Polytuff impact resistant polyethylene.  
Capacity 1000 or 2000 litres.  
455 mm screw down lid with basket strainer.  
Calibrated liquid level.  
Continuous agitation from by-pass flow line in bottom of tank.

### Pump

BP 125/20 positive displacement, three cylinder oil backed diaphragm type.  
102 l/min capacity at 540 rpm.  
20 bar (290 psi) maximum operating pressure.

### Drive

Bondioli 540 rpm PTO shaft with safety shields or optional,  
Honda 9 HP four-stroke engine with 540 rpm reduction gear unit and 2.5 litre fuel tank.

### Controls

#### At Pump

Screw type pressure regulator.  
Glycerine filled pressure gauge 0-40 Bar.  
Manual by-pass to tank valve.

#### In Cabin

Optional 12 volt electric control unit with master on/off switch, three on/off switches for solenoid valves controlling boom sections, a pressure adjustment rocker switch and glycerine filled pressure gauge 0-7 Bar (0-100 psi).

### Foam Marker

Optional 30L or 100 litre polyethylene tank.  
12 volt diaphragm type air pump.  
Cabin mounted on/off electric switch.  
Electric change, left and right foam droppers.

### Chemical Inductor

Optional Suction probe liquid chemical inductor operating through suction filter.

### Spray Boom

Optional Silvan Fieldmaster 10 or 12 metre width.  
All steel galvanised construction with a boom section shaped to protect nozzles from damage.  
Three spraying sections with double fold outer arms for convenient transporting.

Optional Height adjustable, sprung and shock absorber damped boom suspension.  
Stainless steel spray lines.  
Interchangeable nozzles at 50 cm spacing increments.

non-drip bayonet holders with integral strainer .  
Standard 110° fan angle nozzle No. XR11002.

### Filtration

Four stage with removable elements.  
Standard mesh shown. Alternatives available.  
Tank lid strainer - 18 mesh.  
Suction line filter - 50 mesh (blue).  
Boom section filters - 100 mesh (red).  
Nozzle strainers - 50 mesh.

### Chassis, Wheels and Suspension

Heavy duty galvanised steel construction.  
Optional Wheel Equipment.  
Four height adjustable ball type hitch.  
Adjustable height jockey wheel.

### Dimensions and Weights

With boom, PTO drive and standard equipment fitted. Dimensions in (mm), overall length **L**, transport width with boom folded **W**, transport height **H**. Mass **M** in (kg) with tanks empty.  
To calculate gross weight add 1 kg per litre of water fill.

	<b>L</b>	<b>W</b>	<b>H</b>	<b>M</b>
1000 litre tank				
Without boom	3400	1870	1825	275
2000 litre tank				
Without Boom	3500	2600	2100	400

## Installation

### Hitching to the Tractor

Attach the sprayer hitch to the tractor drawbar using the tractor hitch pin. Adjust the height of the tractor drawbar and/or the sprayer hitch to level the sprayer.

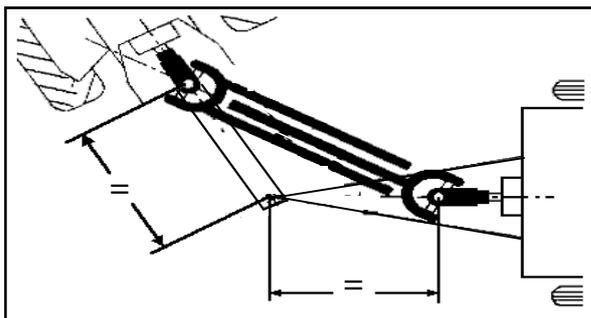
The sprayer hitch can be adjusted to four heights by undoing the two attaching bolts and re-installing it in one of four positions. The hitch can be installed above or below the sprayer drawbar with the tongue facing up or down. Ensure that the hitch attaching bolts are securely tightened.

### PTO Drive Shaft

*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.*

The hitch point between the tractor and sprayer should be approximately midway between the two universal joints on the PTO shaft and the height difference between the joints should not be greater than about 10 cm. This should ensure that the angles of the universal joints are approximately equal during turns and do not exceed the allowable limit. The length of the tractor drawbar may need to be adjusted to achieve correct PTO alignment. If the joint angles exceed  $35^{\circ}$  during turns it may be necessary to fit a PTO shaft with constant velocity joints (see your Silvan dealer).

The tractor and sprayer splined shafts should be



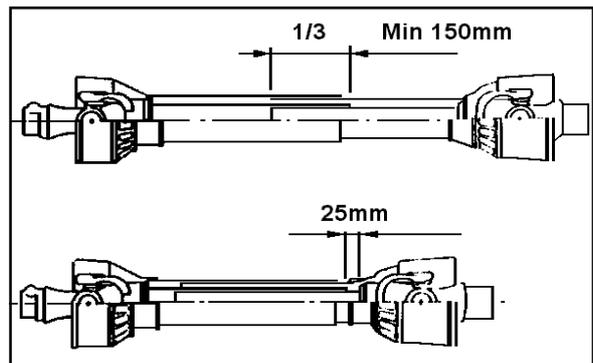
cleaned and greased before fitting the PTO shaft. Ensure that the locking pin in each end of the PTO shaft engages fully in the groove of the tractor and sprayer splined shafts.

Check that the length of the PTO shaft complies with the following minimum requirements when installed.

The telescoping tubes of the shaft must overlap by at least  $1/3$  of their length, but not less than

150 mm, in all possible operating positions and there must be approximately 25 mm telescopic movement remaining at the minimum length.

If the PTO must be shortened trim equal amounts from both male and female telescoping



shafts and safety covers. Carefully remove all burrs then clean and re-lubricate before reassembling.

### Cabin Electric Control Panel

Install the electric control box in the cabin of the tractor using the bracket and hardware provided. Ensure that it is clearly visible and within easy reach of the driver. All switches should be in the "Off" position whilst installing.

Connect the electrical cable provided directly to the battery. The connections are:

Positive = Red or Brown

Negative = Black or Blue

If the cable needs to be extended it is important to use wire of the same diameter.

Run the control loom and pressure tube back to the sprayer through a convenient outlet in the tractor cabin ensuring that they do not rub on any sharp edges. Connect the tractor loom to the sprayer loom at the quick release electrical coupling and connect the pressure tube with the threaded coupler. Ensure that all wiring is clear of the PTO shaft and tractor wheels.

### Foam Marker Cabin Control

Refer to the Foam Marker Operator's Manual for the correct method of installing the foam marker cabin control unit supplied with your sprayer.

## Operation

### Starting the Sprayer

When starting the sprayer for the first time conduct a trial run using water to familiarise with the operation of the controls and to check that all systems are functioning correctly without any leakage. Fill the tank through the top opening for the start up run.

To allow liquid to flow from the tank, open any ball valve on the suction filter by turning the handle to align with the direction of flow from the tank suction line.

Before engaging the PTO or starting the Honda engine the by-pass lever on the three way control unit should be rotated to the "by-pass" position and any outlet valves should be closed. The master switch of the tractor control unit should be in the "off" position if electric controls are fitted.

Engage the PTO slowly or start the engine and allow the sprayer to run in by-pass mode. Once the sprayer is running satisfactorily increase the tractor speed to 540 PTO rpm or open the Honda engine to full throttle.

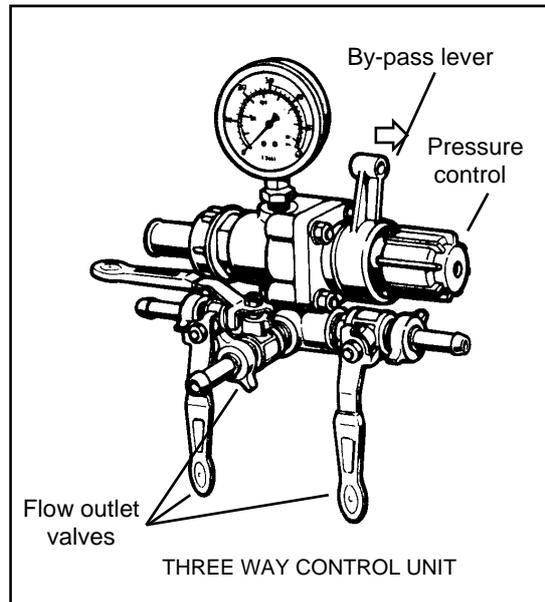
The by-pass lever can then be moved to the "off" position and the pressure can be adjusted by turning the red control knob and observing the reading on the gauge. The pump is designed to operate up to a maximum pressure of 20 bar or 290 psi but to avoid damaging any electric solenoid valves in the spraying circuit the maximum operating pressure for boom spraying should not be set above 7 bar or 100 psi.

Rotate the two outlet valves that are connected to the spray booms to the "on" position to direct pressurised fluid to the solenoid valve block. Spraying operation can now be controlled from the tractor cabin unit if fitted.

Note that, under most spraying conditions, the PTO or engine speed can be reduced to suit the particular application rate being used. This will save fuel and unnecessary wear on tractor and sprayer components.

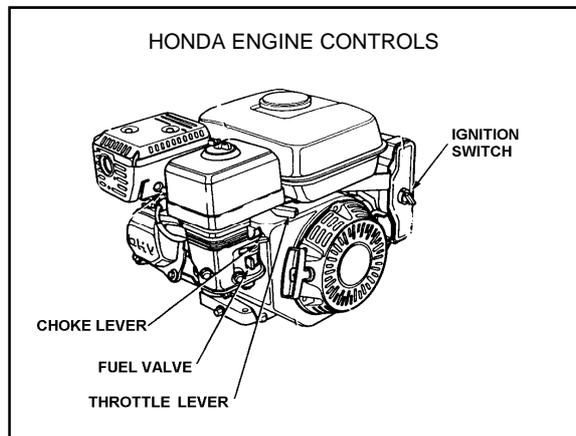
### Cabin Control Unit

A range of electric controls can be fitted to the sprayer. Refer to the operation manual supplied with your particular optional electric controls.



### Operating the Honda Engine

Before starting the engine for the first time read the safety and operating instructions contained in the Honda Owner's Manual supplied with the *PaddockMASTER*.



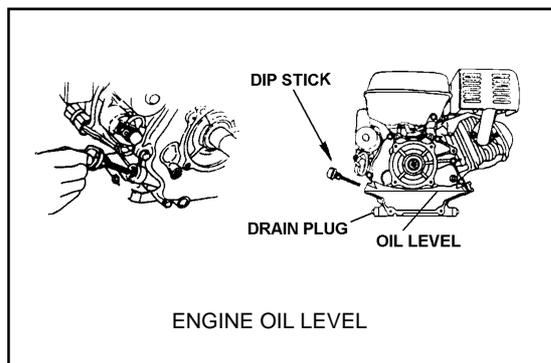
### Pre-Operation Checks

Unscrew the oil filler cap, wipe the dipstick clean and check the oil level. The oil should be at the mark half way up the dipstick when it is inserted but not screwed home. If necessary add a high detergent, premium quality SAE 10W-30 engine oil. Replace the filler cap.

The engine oil also lubricates the reduction gears.

Fill the fuel tank with standard grade, unleaded petrol. The capacity is 2.5 litres.

## Operation



### Starting the Engine

Turn the ignition switch on. Slide the fuel valve to the "on" position and close the choke lever. Do not use the choke if the engine is warm or the air temperature is high. Open the throttle slightly by moving the lever towards the fast running position.

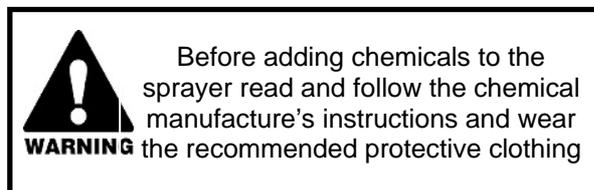
Pull the starter grip gently until resistance is felt, then pull it briskly and the engine should start. Return the starter grip gently, do not allow it to snap back or the starter may be damaged. If the engine does not start repeat the process.

Open the choke fully when the engine is warm and running smoothly.

### Stopping the Engine

To stop the engine under normal circumstances, return the throttle lever to the idle position, close the fuel valve and turn the ignition switch off. In an emergency the engine can be quickly stopped by simply turning the ignition switch off.

### Adding Chemicals



Fill the tank with approximately 400 litres of water before adding any chemicals. To pump the chemicals to the tank and facilitate thorough mixing, the pump control must be set to the "bypass" position whilst the chemicals are being added.

### Foam Marker

Refer to the Foam Marker Operator's Manual for the installation and operating procedures relevant to the type of marker fitted to your sprayer.

### Draining the Tank

The ball valve which operates the tank drain is located under the left front step, ahead of the wheels. Before draining the tank ensure that any chemical residue will not be discharged into a prohibited area or an environmentally sensitive location. If necessary drain chemical residue into containers for disposal.

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

### The Spraying Boom

The sprayer can be fitted with a three section *Fieldmaster* boom of either 10 m or 12 m width with folding outer sections.

### Adjusting the Boom Height

The setting of the correct boom height is most important to achieve a uniform spraying pattern. It needs to be at a height above the target which will achieve 50% overlap with the spray from adjacent nozzles.

To adjust boom height remove the crank handle from its holder and fit it to the winch shaft at the right hand side of the boom support. Lift the locking pawl from the ratchet and wind the winch shaft to achieve the required boom height. Reset the locking pawl to hold the boom in position and return the crank handle to its holder.

Check that the boom is horizontal. If levelling is required this can be achieved by adjusting the length of the lifting cables. Lower the boom to its minimum height and then fully unwind the lifting cables. Remove the U-clamp from the cable on the side to be raised, adjust the cable length and retighten the clamp. Repeat the procedure if necessary.

The boom lift requires little maintenance but care should be taken to ensure that the arms of the parallelogram linkage are not allowed to become loose, allowing sideways movement of the boom. The locking nuts on the linkage should be



## ***Operation***

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kept sufficiently tight to eliminate side clearance without the linkage binding.

The tension of the support cables may also need adjustment at the eye bolts to ensure the weight of the boom is carried evenly.

The maintenance of a steady boom height over uneven or undulating ground can be greatly assisted by fitting the skimmers shown in the manual.

## Calibrating the Sprayer

### General Information

#### When to Spray

Results will be best when wind speed is low, temperature low and relative humidity high. An ideal time is at sun up when these conditions are most likely to apply.

#### Droplet Size

Although more research is needed to define which is the optimum droplet size collected by particular targets, certain generalisations can be made. The trend with herbicides has been to apply large droplets (250 microns) to reduce the risk of drift but smaller droplets are often the most effective as shown by the following table.

DROPLET SIZE	COMMENTS
Large (above 300 microns)	Poor coverage and penetration. Stripping or uneven deposit. Minimal drift
Medium (150 - 300 microns)	Coverage, deposit and penetration fair. Some drift.
Small (below 150 microns)	Good coverage and penetration. Uniform application. Drift increased.

Silvan has a range of standard flat fan nozzles designed for a normal operating pressure of 3.0 bar. For larger droplets there is also a range of low pressure flat fan nozzles designed for a normal operating pressure of 1.0 bar.

In general the following factors can be varied to change droplet size.

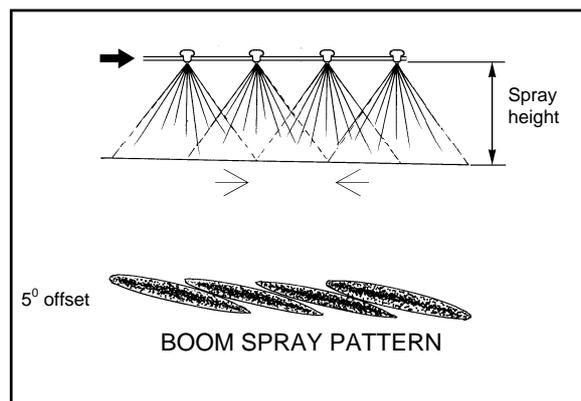
- Reducing pressure increases droplet size.
- Reducing the nozzle fan angle (from 110° to 80°) increases droplet size.
- For an equivalent pressure and fan angle a larger size jet produces larger droplets.

#### Nozzle Height and Spacing

To achieve a uniform spray pattern without gaps the output from adjacent nozzles should overlap by 50% at the point of contact with the surface being sprayed.

The *Padboom* nozzles are spaced at 50 cm intervals and the nozzle caps are offset 5° to the axis of the spray line to avoid interference between adjacent spray fans. They can be supplied in either 110° or 80° fan angle.

The correct spray boom height to achieve 50% overlap is 40 cm for 110° nozzles and 50 cm for 80° but a variation in the order of 5 to 8 cm can be accommodated without noticeable effect. The height referred to is the distance above the target which may be either the vegetation or the ground surface depending upon the operation..



#### Application Rate

The application rate depends on the following factors.

- Speed of travel - increasing speed reduces application rate and vice versa.
- Operating pressure - increasing pressure increases the application rate and reducing pressure decreases the rate.
- Nozzle size - increasing the nozzle size increases the application rate.

#### Ground Speed

The ground speed read out on modern tractors will normally be sufficiently accurate for spraying purposes but if in doubt it should be checked 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.

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



## Calibrating the Sprayer

### Nozzle Selection

Refer to the chemical manufacturer's information to determine the recommended application rate in litres per hectare (l/ha) for your particular situation. Then determine the speed in kilometres per hour (km/hr) at which you intend to spray, taking into consideration the particular ground conditions.

Using the chart below select the most appropriate 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. Nozzles are colour coded for easy identification.

For example a rate of 95 l/ha can be achieved at a ground speed of 10 km/hr using 3.0 bar pressure with either an XR8002 or XR11002 nozzle.

Of course the spray boom will have to be set to a different height depending on whether an 80° or 110° nozzle is chosen.

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/min is required rather than 95 l/min, it can be achieved with the same nozzles by reducing the speed to 9.5 km/hr or increasing pressure to approximately 3.2 bar.

Alternatively the required rate could also be achieved with an XR8003 or an XR11003 blue nozzle at 14 km/hr and 3.0 bar pressure (the rate shown is 101 l/ha.). It can thus be seen that a variety of choices exist for most application rates and the final selection will depend upon the circumstances which best suit your conditions.

SPRAY NOZZLE SELECTION CHART													
FAN TIP COLOUR & NUMBER	FILTER	LIQUID PRESSURE (Bar)	FLOW RATE (L/min)	APPLICATION RATE: LITRES PER HECTARE									
				6	8	10	12	14	16	18	20	22	24
ORANGE XR8001 XR11001	100 MESH	1.0	0.23	46	35	28	23	20	17	15	14	13	12
		1.5	0.28	56	42	34	28	24	21	19	17	15	14
		2.0	0.32	64	48	38	32	27	24	21	19	17	16
		3.0	0.39	78	59	47	39	33	29	26	23	21	20
		4.0	0.46	92	69	55	46	39	35	31	28	25	23
GREEN XR80015 XR110015	100 MESH	1.0	0.34	68	51	41	34	29	26	23	20	19	17
		1.5	0.42	84	63	50	42	36	32	28	25	23	21
		2.0	0.48	96	72	58	48	41	36	32	29	26	24
		3.0	0.59	118	89	71	59	51	44	39	35	32	30
		4.0	0.68	136	102	82	68	58	51	45	41	37	34
YELLOW XR8002 XR11002	50 MESH	1.0	0.46	92	69	55	46	39	35	31	28	25	23
		1.5	0.56	112	84	67	56	48	42	37	34	31	28
		2.0	0.64	128	96	77	64	55	48	43	38	35	32
		3.0	0.79	158	119	95	79	68	59	53	47	43	40
		4.0	0.91	182	137	109	91	78	68	61	55	50	46
BLUE XR8003 XR11003	50 MESH	1.0	0.68	136	102	82	68	58	51	45	41	37	34
		1.5	0.84	168	126	101	84	72	63	56	50	46	42
		2.0	0.97	194	146	116	97	83	73	65	58	53	49
		3.0	1.18	236	177	142	118	101	89	79	71	64	59
		4.0	1.37	274	206	164	137	117	103	91	82	75	69
RED XR8004 XR11004	50 MESH	1.0	0.91	182	137	109	91	78	68	61	55	50	46
		1.5	1.12	224	168	134	112	96	84	75	67	61	56
		2.0	1.29	258	194	155	129	111	97	86	77	70	65
		3.0	1.58	316	237	190	158	135	119	105	95	86	79
		4.0	1.82	364	273	218	182	156	137	121	109	99	91
BROWN XR8005 XR11005	50 MESH	1.0	1.14	228	171	137	114	98	86	76	68	62	57
		1.5	1.40	280	210	168	140	120	105	93	84	76	70
		2.0	1.61	322	242	193	161	138	121	107	97	88	81
		3.0	1.97	394	296	236	197	169	148	131	118	107	99
		4.0	2.28	456	342	274	228	195	171	152	137	124	114
GREY XR8006 XR11006	50 MESH	1.0	1.37	274	206	164	137	117	103	91	82	75	69
		1.5	1.67	334	251	200	167	143	125	111	100	91	84
		2.0	1.93	386	290	232	193	165	145	129	116	105	97
		3.0	2.37	474	356	284	237	203	178	158	142	129	119
		4.0	2.74	548	411	329	274	235	206	183	164	149	137

## Calibrating the Sprayer

### Testing the Spray Pattern

The overlap pattern of the boom and the spray pattern of individual nozzles can be tested in the following manner.

1. Fill the sprayer tank with clean water and operate the boom at spraying pressure with the machine stationary.
2. Examine the spray pattern from each nozzle against a dark background. Discard and replace any nozzles that show streaks or signs of blockage.
3. Compare the nozzles by placing a container of equal size (such as the Silvan calibrated measuring jug) under each nozzle and run the sprayer for one minute. The water level in each jar should be the same. Any nozzles showing too much or too little output should be replaced until all are within plus or minus 10% of the datum.
4. Set the boom height at the appropriate height above the ground for the spray nozzle angle, ie. 40 cm for 80° nozzles and 50 cm for 110° nozzles. Run the sprayer and check that the spray patterns from adjacent nozzles just meet as shown in the diagram on the previous page.

### Verifying the Calibration

#### a) Nozzle Test

After conducting the above tests to ensure the spray pattern is correct and the output from all nozzles is uniform, repeat the procedure at 3.0 bar and measure the amount of fluid collected in the container during one minute. The amount should agree with the flow rate shown in the Nozzle Selection Table on page 17, for the particular nozzles 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 for a several minutes with all booms 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 litres

per minute can be calculated as follows.

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

The output calculated should agree with the flow rate shown in the Nozzle Selection Chart on page 17, for the particular nozzles fitted.

5. If the nozzle output is lower than shown in the table 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 to the method shown above. Replace nozzles which are not within 10% of the datum.

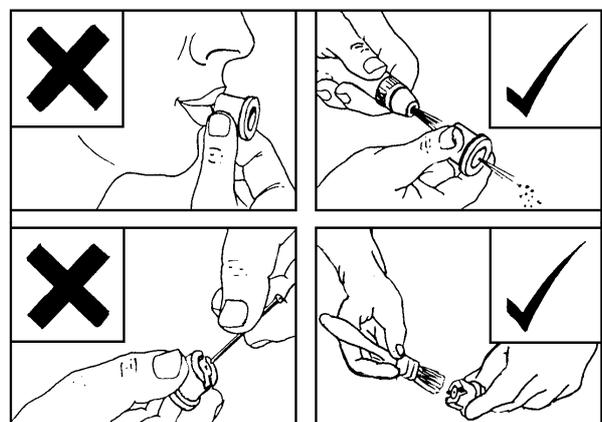
Always keep a new nozzle available as a basis for comparison.

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.

It is recommended that nozzles are renewed once a year or at the first signs of deterioration, whichever occurs first.





## Optional Equipment

The following information concerns the optional equipment which is normally factory fitted at the time of manufacture but in some cases can be installed during the life of the sprayer. Contact your Silvan dealer for further information about installation during service life.

### Silmix Chemical Inductor

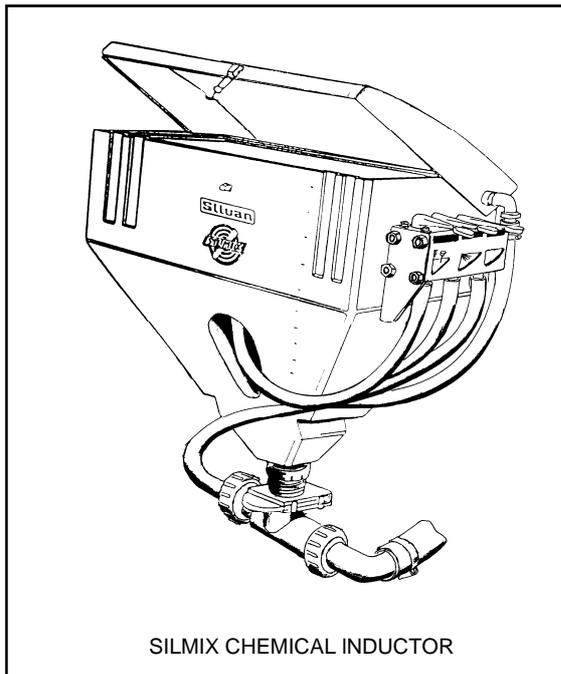
The Silmix is ideal for thoroughly mixing and safely transferring either powdered, granulated or liquid chemicals to the sprayer tank.

It operates through an adjustable 50 mm venturi inductor which is connected to a pressure hose from the sprayer's pump. Chemicals are transferred from the Silmix hopper to the bottom of the sprayer tank and are thoroughly mixed during the transfer process.

The 60 litre impact resistant polyethylene hopper has a hinged lid with a rubber tie down and incorporates a mesh grate to prevent blockages from large particles.

The Deluxe model includes a multi-purpose rinsers for washing down powdered chemicals that may remain in the hopper after transfer, or for cleaning chemical drums. A valve block is mounted on the hopper for control of this additional feature.

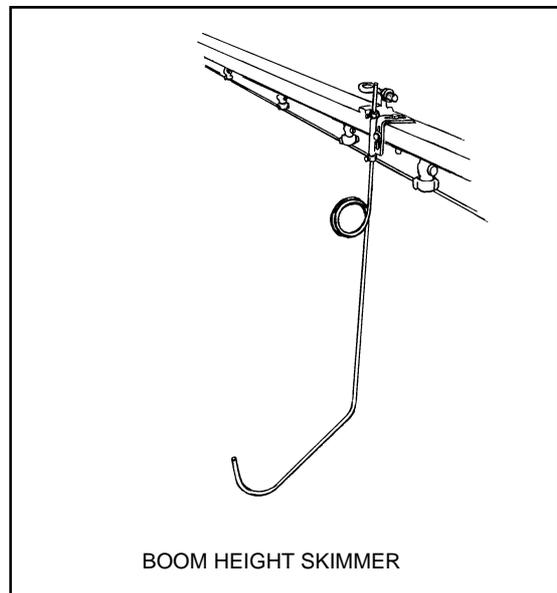
Installation instructions and operating details are contained in the Silmix Operator's Manual which is provided with the unit.



### Boom Height Skimmer

The skimmer can be easily fitted to the boom to help maintain a uniform spraying height over uneven terrain.

The skimmer is fitted by attaching its mounting bracket to the boom section with two bolts. Drill the outer arm section of the boom at the required location. Install the skimmer in the bracket and adjust so that it is in light contact with the ground at the required spraying height. Ensure the two clamping screws are tightened firmly. Skimmers should normally be fitted in pairs at the same location on each side of the boom.



## Lubrication and Maintenance

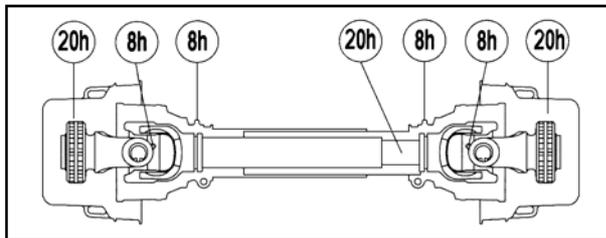
### Daily Maintenance

#### General

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

#### PTO Shaft

Grease the PTO shaft 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.



#### Honda Engine

Check the oil level in the engine and reduction gear unit daily. Use a high detergent, premium quality SAE 10W-30 engine oil. For further details refer Pre-Operation Checks on page 12.

Remove the air cleaner cover daily, check the elements and if necessary clean or replace.

Clean the foam element by washing in a solution of household detergent and warm water, then rinse thoroughly, or wash in nonflammable or high flash point solvent. Allow to dry thoroughly then soak in clean engine oil and squeeze out the excess. The engine will smoke at start-up if too much oil is left in the element.

Clean the paper element by tapping it lightly several times on a hard surface to remove any excess dirt, or blow compressed air through from the inside. Never brush the dirt off as this will damage the fibres. Replace if excessively dirty.

#### Pump

Check the oil level in the viewer daily and if necessary top up with SAE 20-40 multigrade engine oil.

#### Filters

Clean all filters daily or as stated below. More frequent cleaning may be found necessary depending upon circumstances.

Check and if necessary clean the basket strainer under the tank lid before each top fill.

Check and if necessary clean the bottom fill filter before each bottom fill.

Always clean the suction filter after each tank-full is emptied.

The best method for cleaning filters is to wash them with a soft bristle brush. Check for any tears or holes and replace if damaged.

#### 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 Hrs)

Slide the PTO shaft apart, clean the telescopic tubes with kerosene and apply multi-purpose grease to the sliding surfaces, then reassemble. This is most important in dusty conditions.

##### Honda Engine Oil Changes

Drain and refill the engine and reduction gear oil after the first 20 hours of operation and then after every 100 hours.

The drain plug is in side of the base of the engine.

#### Annual Maintenance

##### Honda Engine

Drain and refill the engine and reduction gear oil.

Replace the paper element in the air cleaner. Clean the foam element, check for damage and replace if necessary.

Remove the spark plug and clean with a wire brush. Replace if the insulator is chipped or cracked or if there is excessive erosion on the electrode surfaces. Reset the electrode gap to 0.70 - 0.80 mm (0.028 - 0.031 inch). Do not overtighten the spark plug when reinstalling; apply 1/8 - 1/4 turn after it seats.

With the fuel tap off, remove the bowl under the carburettor and clean out any sediment. Check for leaks after reinstalling and replace the O-ring if necessary.

After servicing, run the engine until warm then check that it idles correctly. If necessary adjust the throttle stop screw to achieve an idle speed of 1,400 rpm +/- 150 rpm.



## Lubrication and Maintenance

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### Pump

Drain the oil from the diaphragm pump annually, or at the end of each spraying season, and refill with SAE 20-40 multi-grade engine oil.

Remove the pump heads, carefully inspect the diaphragms and replace if necessary. Also check the inlet and outlet valves, seats and springs for wear, damage or chemical corrosion and replace as necessary.

Check the air pressure in the surge chamber at the end of the pump which smooths out the pulsations in fluid flow. The air pressure behind the chamber's diaphragm should be set in accordance with the spraying pressure being used, as shown in the chart below. 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.

SPRAYING PRESSURE (Bar)	2 - 5	5 - 10	10 - 20
SURGE AIR PRESSURE (Bar)	2	2 - 5	5 - 7

### Wheel Hubs

Remove the wheel hubs and check that the bearings are in good condition and adequately greased. Repack with multi-purpose grease as required.

Adjust the wheel bearings by tightening the axle nut, then backing it off by approximately 1/6 turn before installing the cotter pin.

Check that the hubs are free to rotate without any signs of end-play.

### Hardware

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

In particular check the tightness of the hitch bolts, wheel bolts, axle attaching U-bolts and the tank hold down straps. Do not overtighten the tank strap bolts as this may distort the tank.

## Notes

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