

# **COMMANDER**

## **Operator's Manual**

67020004 - AU - 01/02

# COMMANDER

COMMANDER Operator's Manual

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All operators of the equipment dealt with by this publication must read this entire publication prior to operating any of the equipment. The safety section must be thoroughly read and understood.

**Failure to do so may result in injury or death.**

After changing chemicals or crops it is essential that the entire spraying system be flushed. This includes disconnecting hoses from the self cleaning filter and pressure relief valve and cleaning any residue and sediment found in the hoses, valve and filter.

**Failure to do so may lead to potential crop damage.**



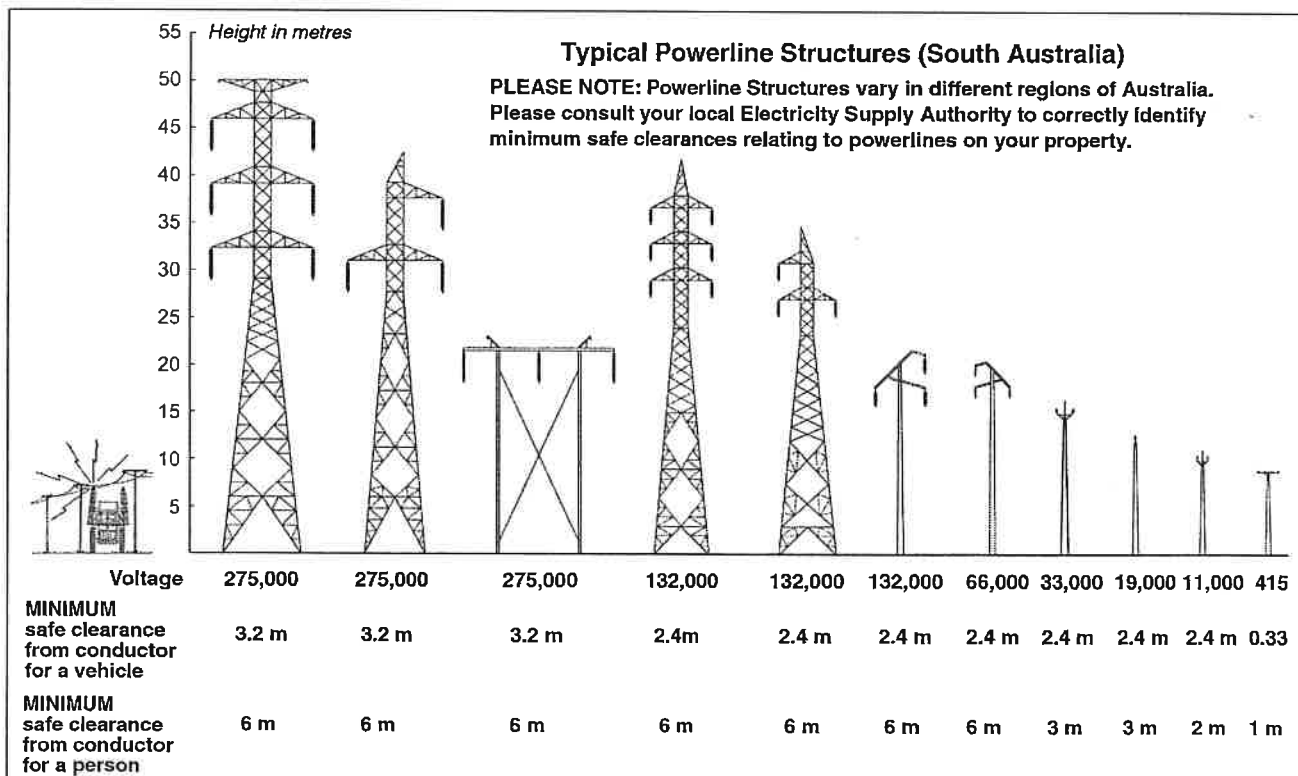
## WARNING!

Operating large agricultural vehicles near powerlines, even without actually touching them, can have serious consequences!

It is your responsibility to ensure that minimum safe clearances are strictly observed.

In particular when using spraying equipment it is necessary to be aware of the presence of powerlines when transporting the unit, spraying your crop, raising / tilting / lowering the boom, and when the operator is working above the vehicle.

Keep in mind that during hot weather there is potential for sagging of the lines, which will affect clearance distance.



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## Introduction

Congratulations on purchasing a HARDI COMMANDER sprayer. The reliability and efficiency of this sprayer depends upon your care. The first step is to take the time to carefully read this operator's manual. It contains essential information on efficient and safe operation of the HARDI COMMANDER sprayer. Additionally, all sprayer options are covered in this manual. The *EAGLE BOOM Operator's Manual* for your COMMANDER sprayer is also supplied with your sprayer documentation.

Thankyou for choosing HARDI and welcome to the increasing family of HARDI spraying equipment owners.

### Sprayer use

The HARDI COMMANDER sprayer is for the application of plant protection and liquid fertiliser chemicals. The sprayer must only be used for this purpose. It is not allowable to use the sprayer for other purposes. If no local law demands that the operator must be certified to use spray equipment, it is strongly recommended to be trained in the safe handling of plant protection chemicals and plant protection, to avoid unnecessary risk for persons and the environment.

### Identification plates

An identification plate is fitted on the frame and indicates:

Producer Name, Model, Serial Number, Date and Dealer Name (In some states the Dealer Name may not be on the plate).

Please record applicable details below:

Producers Name: .....

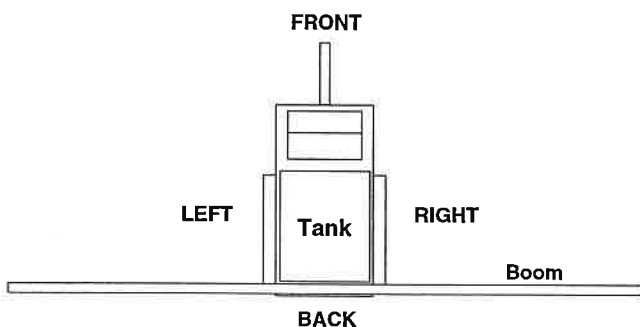
Model: .....

Serial Number: .....

Date: .....

Dealer Name: .....

### Sprayer Layout



## Safety

This is the safety alert symbol:

When you see the symbol in this manual or on the spraying equipment, be alert because it means **WARNING** your safety is involved.

Note the following recommended precautions and safe operating practices:

- Read and understand this operator's manual before using the equipment. It is equally important that other operators of this equipment read and understand this manual.
- You must read chemical labels and follow the instructions they contain prior to using them. Chemical labels are registered by the National Registration Authority. However each state governs the purpose for which a chemical may be used, this varies from state to state.
- Local law may demand that the operator be certified to use spraying equipment. Adhere to the law.
- Pressure test with clean water prior to using chemicals.
- Wear protective clothing.
- Rinse and wash equipment after use and before servicing.
- Depressurise equipment after use and before servicing.
- Never service or repair the equipment whilst it is operating.
- Disconnect electrical power before servicing.
- Always replace all safety devices or shields immediately after servicing.
- If an arc welder is used on the equipment or anything connected to the equipment, disconnect the power leads before welding. Remove all inflammable or explosive material from the area.
- Do not eat, drink or smoke whilst spraying or working with contaminated equipment.
- Wash and change clothes after spraying.
- Wash tools if they have become contaminated.
- In case of poisoning, immediately seek medical advice. Remember to identify chemicals used.
- Keep children away from the equipment.
- Do not go under any part of the equipment unless it is secured. The boom is secure when placed in the transport brackets.
- Do not use the sprayer step unless the sprayer is connected to the tractor or the sprayer is correctly placed on a hard, flat surface.
- If any portion of this operator's manual remains unclear after reading it, contact your HARDI dealer for further explanation before using the equipment.



## Description

### Frame

The frame is all steel construction. It has a strong chemical and weather resistant powder coat.

### Drawbar

The drawbar can be adjusted for different tow heights. An alternative Gooseneck attachment is available also.

### Suspension / Wheels

Tandem spring suspension is load-rated to tank size, rocker allows wheel movement as tank empties.

An alternative large tractor lug tyre is available.

### Tank

UV-resistant Polyethylene tank, in a purposeful design with limited sharp corners for easy agitation, emptying and cleaning.

### Pump

Dry sump diaphragm pump with grease lubrication. The pump model may be a 3 or 6 diaphragm model depending on the chosen option. Both pumps are available in both 540 and 1000 rpm versions. The 3 diaphragm pump is fitted with suction and pressure pulsators. The 6 diaphragm pump does not require pulsators. Both pumps have easily accessible valves and diaphragms.

### MANIFOLD system

All functions of the spray circuits are operated via the conveniently located MANIFOLD valves featuring colour coded plates and symbols for easy operation.

### EC operating unit

The EC operating unit is constructed of modules and consists of the main on/off valve, pressure gauge, pressure regulation with HARDIMATIC, and distribution valves with pressure equalisation adjustment. HARDIMATIC ensures a constant volume of the liquid per hectare (l/ha) at varying forward speed within the same gear when the number of PTO revolutions are between 300 - 600 rpm. The operating unit is fully electrically controlled via a remote control box or if fitted, via the HARDI PILOT controller.

### Filters

A filling filter is fitted to ensure the sprayer will have minimal nozzle blockages. A suction filter is standard.

With the self-cleaning filter the impurities that exist in the spray liquid will bypass the filter and be re-circulated back to the tank via the return flow. When the tank is empty, the impurities are then flushed out through the drain - before refilling.

Nozzle filters are standard also and In-line pressure filters can be optionally fitted.

### Booms

The COMMANDER boom options are as follows:

- 1 EAGLE 18-20 Hydraulic Lift, Hydraulic Fold and optional Hydraulic Tilt.
- 2 EAGLE 24-28 Hydraulic Lift, Hydraulic Fold and optional Hydraulic Tilt.

The booms feature trapeze suspension and an integrated spring suspension system with shock absorber dampening.

Please refer to the *EAGLE BOOM Operator's Manual*.

### HARDI foam markers (if fitted)

Hardi double-sided foam marker systems are 12 volt operated. They use air pressure in the front 100 litre tank to force the foam/water mix to the selected boom end, where with additional air the mix foams up, and is then dropped via the dropper.

Please see your Foam Marker Booklet for further details.

### Flush tank

A 285 litre tank is fitted for the purpose of flushing the boom, controls, filters and to pre-flush the main tank, depending on the chosen position of the MANIFOLD system valve handles.

### Flush nozzle

The flush nozzle as fitted inside the main tank is used to pre-flush the tank to aid in cleaning the tank. This is operated by the appropriate MANIFOLD system valve handle.

### Hand wash tank

A separate 15 litre tank is fitted to ensure clean water is available for hand washing or rinsing.

### Filtered fill system

The filtered fill system allows filling of the main, foam and rinse tanks from a fire fighter or overhead fill tank.

### QUICKMIX filler (If fitted)

A 60 litre mixing and transfer hopper, minimises lifting and safely transfers all chemical liquids, powders and granules to the sprayer tank.

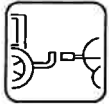
### Chemical suction probe (If fitted)

A camlock attached suction probe sucks liquid into the sprayer from a chemical container. This system also has the ability to flush the empty container.

### HARDI PILOT controller (If fitted)

The HARDI PILOT controller computer allows fully automatic control of spraying. The control panel and LCD display screen mount in the tractor cab via the single HARDI-LINK cable.

Please refer to the *HARDI PILOT 3880 DPE* booklet.



## Connection

Connect the sprayer with the tractor and adjust the tow height with the drawbar so that the trailer frame is level.

Use spacers to pack the hitch and thus prevent excessive vertical shock movement.

**WARNING!** The drawbar bolts must be re-tightened every 10 hours until the torque is stabilised at 365 Nm, then every 50 hours.

**WARNING!** The drawbar ball is designed for a 38 mm pin, which should be secured in the tractor drawbar to ensure the sprayer cannot be accidentally disconnected - use bushes to reduce slack.

**WARNING!** Your tractor will have decreased braking efficiency with the sprayer connected, particularly when the tank is full.

## Support leg

Remove and/or turn upside down to the storage position the drawbar support leg.

**WARNING!** The support leg is not designed to support the trailer for extended periods if the sprayer is full of water.

## Tyres

Equal pressure in all tyres is essential. Pressure should be kept as low as practical, i.e. baggy when tank is full. For recommended pressures see *Tyre pressures* (Page 27).

**NOTE!** Units fitted with computers must always maintain the same tyre pressure as when calibrated.

## Transmission shaft installation

Initial installation of the transmission shaft may require shortening of the shaft.

- 1 Attach the sprayer to the tractor and set the sprayer at a height allowing the shortest length of the transmission shaft with the tractor set at a turning angle.
- 2 Stop the engine and remove the ignition key.
- 3 If the transmission shaft must be shortened, pull the shaft apart. Fit the separated shaft parts to the tractor and sprayer pump and measure how much it is necessary to shorten the shaft. Mark the protection guards.

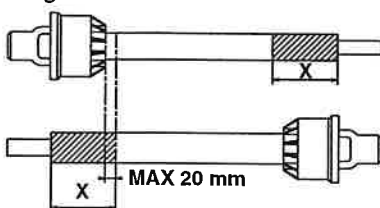


Fig 1

**NOTE!** The shaft must always have a minimum overlap of  $\frac{1}{3}$  of the length.

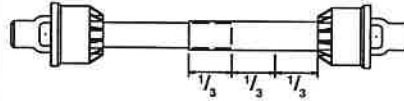


Fig 2

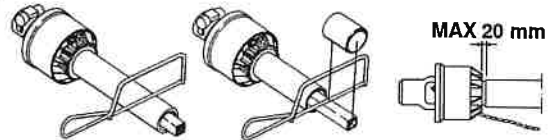


Fig 3

- 4 Shorten the two separated parts equally. Use a saw and file the profiles afterwards to remove burrs.
- 5 Grease the profiles, and assemble the male and female parts again.
- 6 Grease the tractor and sprayer pump PTO shafts.
- 7 Fit the transmission shaft to the tractor and sprayer pump PTO shafts:  
Push the yoke pin and slide the yoke onto the PTO shaft. Make sure that the lock engages by pushing and pulling forwards and backwards or if applicable by tightening the allen key. Fit the chains to prevent the protection guards from rotating with the shaft.

**NOTE!** Please fit the female part marked with a tractor symbol towards the tractor.

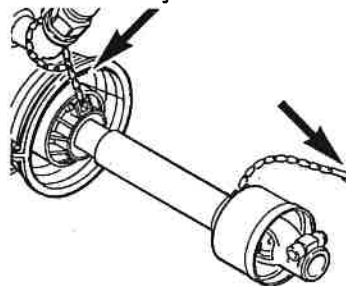


Fig 4

**NOTE!** To ensure long life of the transmission shaft try to avoid working angles greater than 35°.

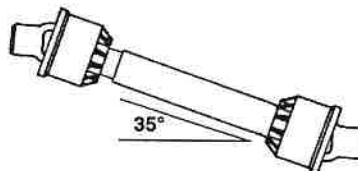


Fig 5

## Connecting hydraulics

Please refer to the *EAGLE BOOM Operator's Manual* regarding connecting hydraulics as well as boom operation, adjustment and maintenance.

## Connecting electric controls

For both the foam marker and EC operating unit, 12 volt sockets will be required with the following fuse ratings.

Control Box	Polarity / Wire color	Fuse (A)
	(+) (-)	
EC	Brown Blue	8
FM	White Black	16

The foam marker requires 12 V direct to the compressor box via the supplied cable. This cable should be connected via a 16 A fuse direct to the battery.

Ensure cables are not able to be caught in the PTO or damaged by tight turns.

**NOTE!** If the boom fitted to your sprayer has the hydraulic tilt function, please refer to the *EAGLE BOOM Operator's Manual* regarding connecting boom electric controls.

## Disconnecting sprayer

Always clean the sprayer inside and outside before disconnecting and parking it.

Before disconnecting from the tractor, make sure the support leg is properly fitted.

**WARNING!** To prevent the sprayer from tipping over, do not disconnect the sprayer from the tractor with the boom unfolded, unless the boom is supported.

Place stop wedges in front of and behind the wheels.

Remember to disconnect all hoses and cables from the tractor.

**WARNING!** If the sprayer is parked unattended, avoid unauthorised persons, children and animals having access to the sprayer.

## Before operating sprayer

Although the sprayer has had a strong and protective surface treatment applied to steel parts, bolts, etc. in the factories, it is recommended to apply a film of anti-corrosion oil (e.g. CASTROL RUSTILLO or SHELL ENSIS fluid) onto all metal parts in order to avoid chemicals discolouring the protective coating.

If this is done before the sprayer is put into operation for the first time, then it will always be easy to clean the sprayer and keep the coatings shiny for many years.

This treatment should be carried out every time the protective film is washed off.

## Roadworthiness

When driving on public roads and any other areas where traffic laws apply, please ensure that the required signs and lights are fitted and working.

**WARNING!** Maximum speed is the lesser of: 20 km/h less than the posted speed limit; and 30 km/h; and The tyre manufacturers maximum speed.



## Operation

### Function diagram

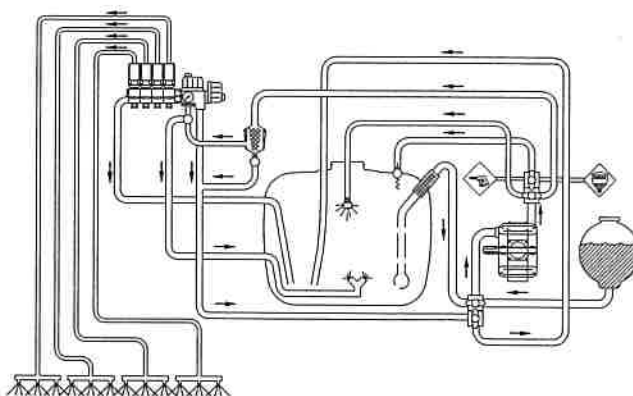


Fig 6

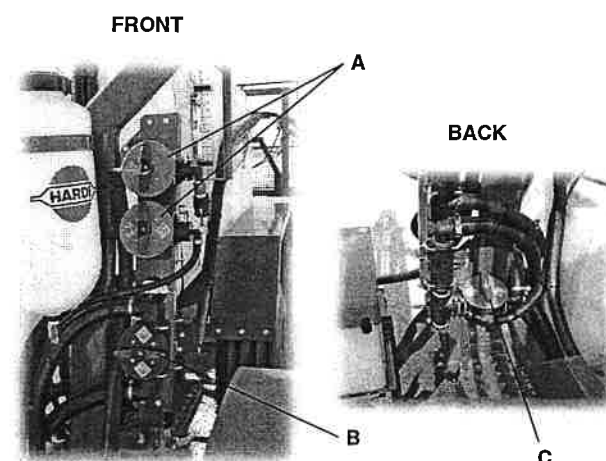
## MANIFOLD system

### Description

The MANIFOLD system is located behind the pump, on the left hand side of the sprayer (right hand side if a gooseneck sprayer). The system permits easy operation of a standard sprayer and facilitates the addition of up to two options on the pressure side.

The green pressure valves and the black suction valves have 4 positions. Two positions are for options. The other two are marked 'O' indicating the valve is closed.

The blue return valve only has two positions. The arrows on the handles indicate which positions are selected.



A = Green Pressure Valves  
B = Black Suction Valve  
C = Blue Return Valve

Fig 7

## Symbols

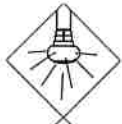
The pressure, suction and return valves are distinguished by coloured identification discs on the valves. Symbols are located on the discs for easy identification and operation.



### Green Discs = Pressure Valves



To Self Cleaning Filter / Operating Unit



To Tank Flush Nozzle



To QUIKMIX Filler



To Hose Reel / Spray Gun



### Black Disc = Suction Valve



From Main Tank



From Flush Tank



### Blue Disc = Return Valve



Return to Agitation



Return to Pump

Fig 8

## Green pressure valves

To select the equipment, the handle is turned so the arrow and thereby liquid is directed to the desired equipment instead of 'To Self Cleaning Filter / Operating Unit'. When spraying is to resume, turn the handle towards 'To Self Cleaning Filter / Operating Unit'.



To Self Cleaning Filter / Operating Unit

If two valves are fitted, the arrow must point towards the optional equipment you select, while the remaining handles are turned to 'O'.

When spraying is to resume, select 'To Self Cleaning Filter / Operating Unit', while the other handles are turned to 'O'.



To Self Cleaning Filter / Operating Unit

## Black suction valve

Turn the handle so the arrow points towards the selected tank, i.e. 'From Main Tank' or 'From Flush Tank'.



From Main Tank



From Flush Tank

## Blue return valve

Normally the liquid is directed to the tank return. When the tank is nearly empty, the handle is turned so the liquid is directed to the suction side of the pump 'Return to Pump', instead of the tank return 'Return to Agitation'.



Return to Pump



Return to Agitation

## Electric operated MANIFOLD valves (If fitted)

One or more MANIFOLD valves can be electrically operated via a control box in the tractor cab. These can only be operated manually if the power to the valve motor is disconnected.

## Filling of water

**WARNING!** Do not overfill any tank as this will cause chemical spillage out of the tank.

**IMPORTANT!** It is recommended to use water as clean as possible for spraying purposes.

Water can be filled into the tanks in the following ways:

- 1 Filled through tank lids (All tanks).
- 2 Filled by external pump (e.g. Fire fighter) through the filtered fill system (All tanks).

The main tank should normally be filled with 25% of the required spraying water, before adding the chemicals.

**IMPORTANT!** Always read the instructions on the chemical container.

## Filling through tank lid

Flip open the main tank lid and fill with water through the strainer to prevent rust or other particles entering the tank.

Screw open the foam marker and flush tank lids and fill with water.

An overhead tank can be used in order to obtain high filling capacity.

**WARNING!** Do not let the filling hose etc., enter any tank. Keep it outside the tank, pointing towards the filling hole. If the hose is placed at the bottom of the tank, and the water pump at the water supply plant stops, chemicals could be siphoned back and contaminate the water supply lines.



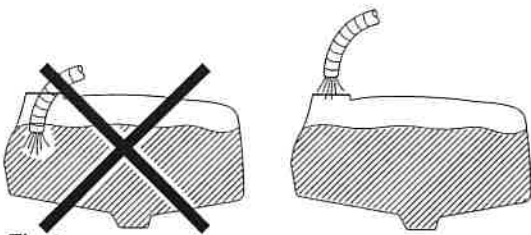


Fig 9

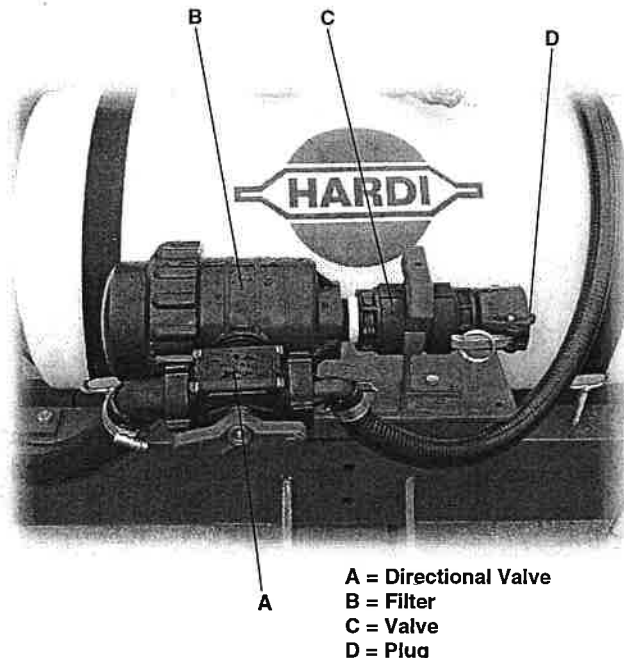
### Filtered fill system

This system allows the operator to connect (via a 1½" camlock) a hose from, for example, a fire fighter or overhead fill tank, and fill either the main tank or by turning the top mounted valve and repositioning the hose, the foam marker tank or flush tank - via a large 80 mesh filter.

The filter is fitted with a valve between pump and filter to ensure no draining and to shut off supply before overfilling.

**⚠ WARNING!** Do not fill tanks so rapidly that air cannot escape - tanks may rupture.

**⚠ WARNING!** This filter is able to withstand 260 l/m flow rate with up to 5 bar (72 psi) pressure. Please check pump capacity as damage may occur to screen inside or to housing.



A = Directional Valve  
B = Filter  
C = Valve  
D = Plug

Fig 10

### To fill main tank

- 1 Remove the camlock plug (D Fig 10) from the front of the fill filter valve.
- 2 Connect the filling hose from the filling source.
- 3 Turn the handle so that the directional valve (A Fig 10) on the filter, points to the large hose which flows into the main tank (Fig 11).

- 4 Fill the tank by opening the valve (C Fig 10).

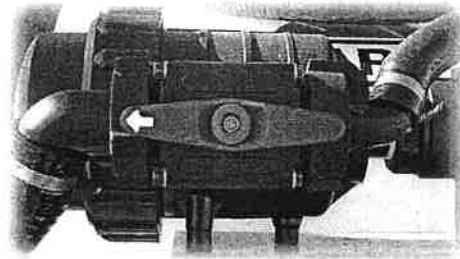


Fig 11

### To fill flush tank

- 1 Remove the camlock plug (D Fig 10) from the front of the fill filter valve.
- 2 Connect the filling hose from the filling source.
- 3 Ensure the small hose from the directional valve to the flush tank is connected (Fig 12).
- 4 Turn the handle so the directional tap on the top of the filter points to the front of the small hose (Fig 13).
- 5 Fill the tank by opening the valve (C Fig 10).



Fig 12

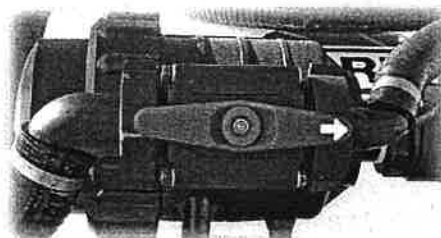


Fig 13

### To fill foam marker tank

- 1 Remove the camlock plug (D Fig 10) from the front of the fill filter valve.
- 2 Connect the filling hose from the filling source.
- 3 Loosen the cap from the foam marker tank to relieve pressure.
- 4 Ensure the small hose from the directional valve to the foam marker tank is connected - Remove the camlock plug from the foam marker tank and fit the hose that was attached to the flush tank (Fig 14).
- 5 Turn the handle so the directional tap on the top of

the filter points to the front of the small hose (Fig 15).

- 6 Fill the tank by opening the valve (C Fig 10) - Remember to allow approximately 4-6 litres of foam concentrate.

Remember to close the cap and fit the camlock plug to the foam tank for the system to work.



Fig 14

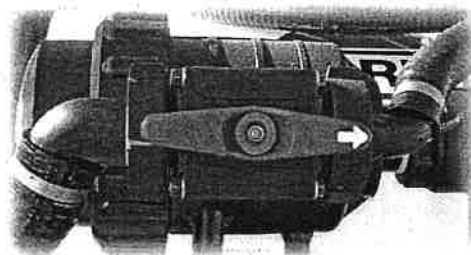


Fig 15

## Combination fill

It is possible to have a combination fill so that both the main tank and one other tank (i.e. flush or foam marker) may be filled simultaneously. For this feature the valve position is selected at midway (Fig 16).

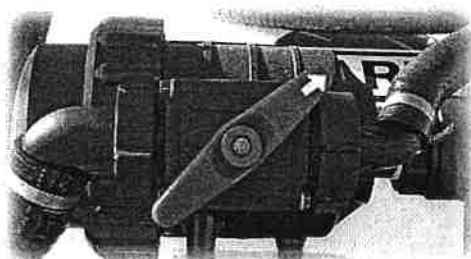


Fig 16

- ⚠ WARNING!** Always exercise caution when filling any tank with a high performance pump. Do not overfill tanks as damage and chemical spillage may occur.

## Filling clean water tank

The clean water tank has a capacity of 15 litres. The

water from this tank is for hand washing, cleaning blocked nozzles, etc. Only fill this tank with clean water.

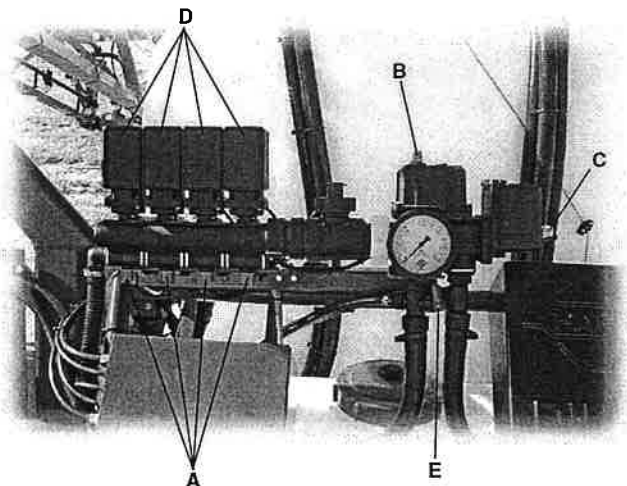


Fig 17

- ⚠ WARNING!** Although the clean water tank is only filled with clean water, it must not be used for drinking.

## EC operating unit

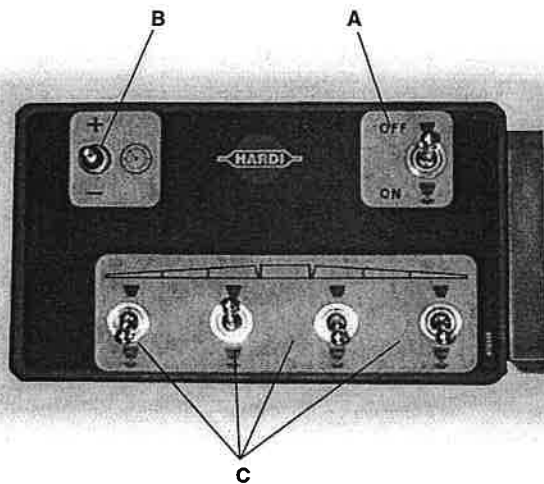
### Operating unit



- A = Adjustment Screws for pressure equalisation
- B = Main On/Off Valve
- C = Pressure Control Valve
- D = Distribution Valves
- E = Pressure Agitation Valve

Fig 18

## Remote control box



A = Main On/Off Valve Switch  
B = Pressure Control Valve Switch  
C = Distribution Valves Switches

Fig 19

### Controls adjustment

Before spraying, the EC operating unit is adjusted using clean water (without chemicals).

- 1 Choose the correct nozzle for the spray job. Make sure that all nozzles are the same type and capacity. Please see the *Spray Technique* book.
- 2 Toggle the main on/off valve switch (A Fig 19) to the on position.
- 3 Activate all distribution valves by toggling the distribution valve switches (C Fig 19) to the open positions.
- 4 Activate the pressure control valve switch (B Fig 19) towards '-' until the pressure control valve handle (C Fig 18) stops rotating (minimum pressure).
- 5 Put the tractor in neutral and adjust the PTO revolutions to the intended travelling speed. Remember the number of revolutions of the PTO must be kept between 300 - 600 rpm.
- 6 Activate the pressure control valve switch (B Fig 19) towards '+' until the required pressure is shown on the pressure gauge.

### Pressure equalisation adjustment

- 1 Close the first section of the distribution valve by toggling the relevant distribution valve switch (C Fig 19) to the close position.
- 2 Turn the relevant valve adjusting screw (A Fig 18) until the pressure gauge shows the same pressure again.
- 3 Adjust the other sections of the distribution valve in the same way.

**NOTE!** Hereafter adjustment of pressure equalisation will only be needed when you change to nozzles with other capacities or the nozzle output increases as the nozzles wear.

### Operation while spraying

In order to close the entire boom, toggle the main on/off valve switch (A Fig 19) to the off position. This returns the pump output to the tank through the return system. The non-drip diaphragm valves ensure instantaneous closing of all the nozzles.

In order to close one or more sections of the boom, toggle the relevant distribution valve switch (C Fig 19) to the close position.

The pressure equalisation ensures that the pressure does not rise in the sections which are to remain open.

**NOTE!** When the sprayer is put aside, the control box and the multi plug must be protected against moisture and dirt. A plastic bag may be used to protect the multi plug.

**NOTE!** The outputs stated in the nozzle charts are always based on the pressure measured at the nozzle, which will differ slightly from the gauge.

### Filters

Filters should always be used, and their function checked regularly. The mesh size of the filter should always be smaller than the flow average of the nozzles used. Therefore, pay attention to the correct combination of filters and mesh size. The recommended suction filter is 50 mesh - this allows good flow to the pump with little restriction. The standard self cleaning filter is 100 mesh. Refer to the chart below for correct filter recommendations.

Flat Spray Nozzle Size	Suction Filter	Self Cleaning Filter	In-Line Filter	Nozzle Filter
08-10-12-14	50	100	100	100
16-18	50	80	80	80 (50)
20 and more	30	80 (50)	50	50

Suction filter screens do wear from dirt and chemical particles. If nozzle filters continually block with chemical particles, then use the next size coarse nozzle filter.

## Self cleaning filter

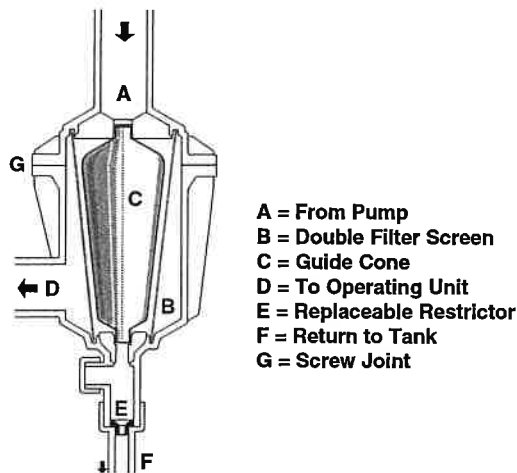


Fig 20

**IMPORTANT!** Note direction of restrictor in Fig 20.

### Correct restrictor choice

It is important to have a large flow through the filter. This is achieved by choosing the restrictor size in relation to the liquid consumption of the spray boom and pump output.

Four restrictors are supplied.

To choose a restrictor refer to *Flow in Specifications* (Page 27).

Or use the green one (largest orifice) first.

Disconnect the hose (Fig 21) at the self cleaning filter, place the restrictor in the hose and reconnect.

If the required working pressure cannot be obtained, the restrictor is too large. Choose a smaller one; starting with black, then white and finally red.

### Cleaning

When cleaning the filter, remove all hoses and check there are no residues.

Standard filter size is 100 mesh. Sizes of 50 and 80 mesh are available and can be changed by opening the filter top (replace the strainer). Check the O-rings before reassembling the filter and replace them if damaged.

Also refer to *Self cleaning filter* (Page 19).

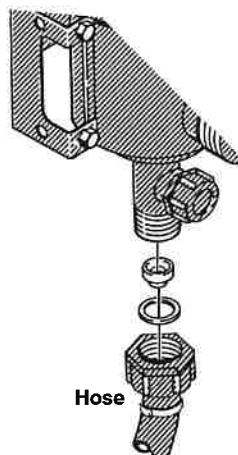


Fig 21

## Filling of chemicals

Chemicals can be filled into the main tank in three ways:

- 1 Through the tank lid.
- 2 By means of the QUIKMIX filler chemical hopper and transfer device (If fitted).
- 3 By means of the chemical suction probe (If fitted).

**WARNING!** Be careful not to slip or splash chemicals when carrying chemicals up to the tank lid.

**WARNING!** Always use the personal protection stated on the chemical container and as a minimum - gloves, face/eye protection and coveralls.

## QUIKMIX filler (If fitted)

### Valve bank and bottom valve

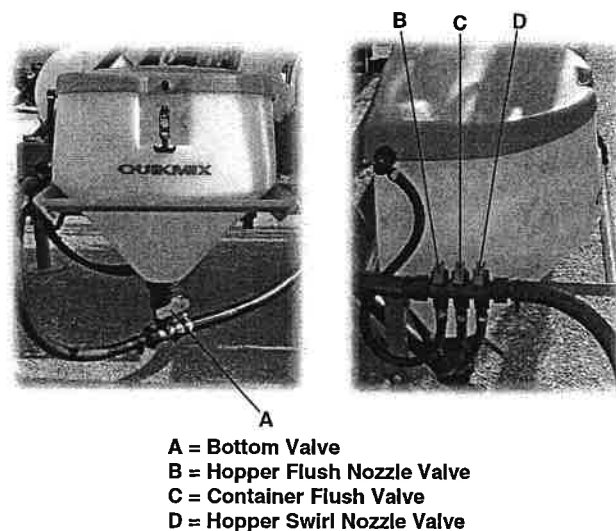


Fig 22

Chemicals are filled by means of the QUIKMIX filler as follows:

## Liquid chemicals

- 1 Fill the main tank at least 25% with water (unless anything else is stated on the chemical container label). See *Filling of water* (Page 8).



Fig 23

- 2 Turn the MANIFOLD system's black suction valve handle towards 'From Main Tank' and turn the blue Return valve handle towards 'Return to Agitation'.



- 3 Turn the green pressure valve towards 'To QUIKMIX Filler'. Close remaining valves by turning to 'O'. Check that the bottom valve of the filler (A Fig 24 & A Fig 22) is closed.



- 4 Engage and set the PTO at 540 rpm.
- 5 Open the filler lid.
- 6 Measure the correct quantity of chemical and fill it into the hopper.

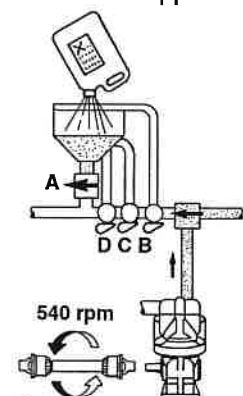


Fig 24

**NOTE!** The scale in the hopper can only be used if the sprayer is parked on level ground. It is recommended to use a measuring jug for best accuracy.

- 7 Open the bottom valve of the filler (A Fig 25 & A Fig 22) and the chemical is transferred to the main tank.
- 8 If the chemical container is empty it can be flushed with the container flushing device. Place the container over the multi-hole nozzle and press after opening the container flush valve (C Fig 25 & C Fig 22).

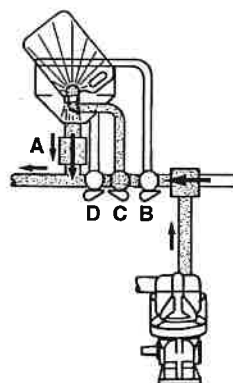


Fig 25

**IMPORTANT!** The rinsing device uses spray liquid for rinsing containers of concentrated chemicals. Always rinse the chemical containers with clean water several times until they are clean, before disposal.

- 9 Engage the hopper flushing device by opening the hopper flush valve (B Fig 26 & B Fig 22).
- 10 Close the valve again when the hopper is flushed.

**IMPORTANT!** The lid should be closed when flushing the hopper.

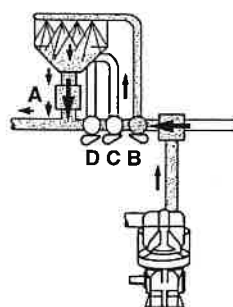


Fig 26

**IMPORTANT!** The hopper flushing device is using spray liquid for rinsing the hopper of concentrated chemical. Therefore the filler must always be cleaned together with the rest of the sprayer when the spray job is done.

- 11 Close the bottom valve of the filler and the filler lid again.
- 12 Turn the green pressure valve handle towards 'To Self Cleaning Filter / Operating Unit' and close remaining valves by turning to 'O'. Keep the PTO engaged so the spray liquid is continuously agitated until it has been sprayed onto the crop.



## Powder chemicals

- 1 Fill the main tank at least 50% with water (unless stated otherwise on the chemical container label). See *Filling of water* (Page 8).



Fig 27

- Turn the black suction valve handle towards 'From Main Tank' and turn the blue return valve handle towards 'Return to Agitation'.



- Turn the green pressure valve handle towards 'To QUIKMIX Filler'. Close the remaining valves by turning to 'O'.



- Engage and set the PTO at 540 rpm.
- Open the bottom valve of the filler (A Fig 28 & A Fig 22). Open the filler lid.
- Engage the hopper flushing device and hopper swirl device by opening their respective valves (B Fig 28 & B Fig 22) and (D Fig 28 & D Fig 22).
- Measure the correct quantity of chemical and sprinkle it into the hopper as fast as the flushing device can flush it down.
- Close all the flush and swirl valves (B, C & D Fig 28 & B, C & D Fig 22) once the hopper is flushed.

**IMPORTANT!** The hopper flushing device uses spray liquid for flushing the hopper of concentrated chemical. The filler must always be cleaned together with the rest of the sprayer when spraying is done.

- Close the bottom valve of the filler (A Fig 28 & A Fig 22) and the filler lid again.

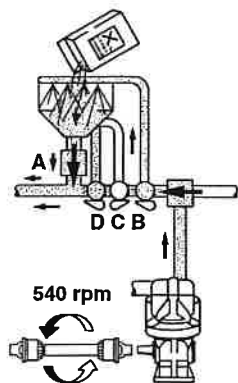


Fig 28

- Turn the green pressure valve handle towards 'To Self Cleaning Filter / Operating Unit' to mix the spray liquid. Keep the PTO engaged so the spray liquid is continuously agitated until it has been sprayed onto the crop.



## Chemical suction probe (If fitted)

This system is designed to transfer liquid chemicals direct from container to tank, with the possibility of flushing the container when empty.

The probe is attached via two different size camlocks on the MANIFOLD. Both camlocks on the machine have dust covers which must be refitted after use. The probe is not factory calibrated (due to variation of pumps) and should be stored in a clean environment.

## Operating suction probe

- Attach the probe via the two camlocks. Ensure the EC operating unit is off and the main tank contains about 25% of the required spraying water.
- Turn on probe suction by turning on the additional probe valve at the bottom of the MANIFOLD.
- Suck up the required amount of chemical.
- Turn the black suction valve handle towards 'From Main Tank'.



## To flush container

With the probe still attached and the pump running:

- Turn the additional green pressure valve handle towards the probe camlock.
- Rinse the container.
- Turn the additional green pressure valve handle towards 'O'.
- Suck out the remaining liquid as before.

**CAUTION!** This probe is used with undiluted chemicals. Always refer to chemical manufacturers label for safety instructions.

**CAUTION!** The suction probe uses spray liquid for rinsing containers of concentrated chemical. Always rinse the chemical containers with clean water before disposal.

**IMPORTANT!** Always run clean water through the pump and system after using the probe.

## Safety precautions

Always be careful when working with crop protection chemicals.

## Personal protection

Dependant on which type of chemical is used, the following protective clothing / equipment should be used:

- Gloves
- Waterproof boots
- Headgear
- Respirator
- Safety goggles
- Chemical resistant coverall

This equipment should be worn to avoid contact with the chemicals.

Badly contaminated clothing must not be worn in the cab of the tractor.

Protective clothing / equipment should be used when preparing the spray liquid, during the spraying work and when cleaning the sprayer. Also follow the recommendations on the chemical label.

It is always advisable to have clean water available, especially when filling the sprayer with the chemical.

Always clean the sprayer carefully and immediately after use.

Do not mix non compatible chemicals in the tank.

Always clean the sprayer before changing to another chemical.

### HARDI Foam Markers - General Guide

Ensure the system is clean. Add clean water to the tank first, then foam concentrate according to concentrate instructions.

For good quality foam note the following:

- Mix contents after adding foam
- Use clean water, preferably rain water
- Do not use dam water or bore (hard) water
- Do not use water containing salt or minerals
- Drain residues if more than a week old
- Flush the system to prevent it gumming up
- Use water with a temperature above 13° C
- Store concentrate in a frost free area

Cold operating conditions decrease foam quality, leading to blowouts where the foam spurts out of the generator.

### Operation

- 1 Add water (see *Filling of water* (Page 8)) and concentrate to the tank and close the lid.
- 2 Check that the compressor on/off switch is at the central position (A Fig 29). Connect power supply.
- 3 Flick the switch to the left or right side (B or C Fig 29) depending on where foam is required. This starts the compressor and production of foam.
- 4 Some foam marker systems may have an additional Blob interval control switch fitted as shown in Fig 29. Blob interval can then also be adjusted by holding the interval switch (D Fig 29) to the left for fewer blobs or to the right for more blobs.

### Remote control box

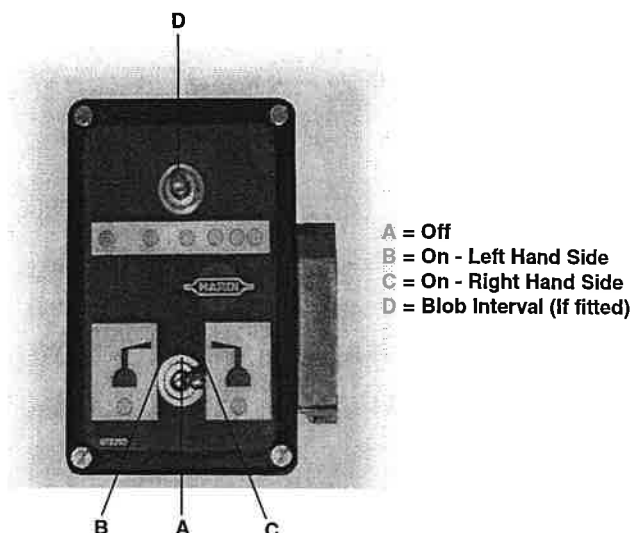


Fig 29

### Maintenance

**WARNING!** The foam marker tank is under pressure. To allow air to escape before adding foam or water, or when working on the system, undo the lid slowly.

The system must be kept clean to ensure foam is of good quality. Drain and flush when:

- Quality of foam produced is poor
- Preparing for off-season storage
- Residues are more than a week old
- Impurities are seen in the tanks

### System drain and flush

- 1 Open the drain tap below the tank.
- 2 Flush the tank with clean water.
- 3 Check the filter is clean.
- 4 Close the drain tap.
- 5 Add 7 litres of clean (preferably hot) water.
- 6 Start the compressor and pump liquid through the system.
- 7 Repeat points 5 and 6 if necessary.

**CAUTION!** Do not clean the compressor box with a high pressure cleaner.

**CAUTION!** Relieve the tank pressure after using the sprayer / foam marker.

### HARDI PILOT controller (If fitted)

The EC remote control box and foam marker remote control box are not used on HARDI PILOT controller fitted sprayers, because the HARDI PILOT control panel and LCD display incorporate the EC operating unit remote control and foam marker remote control.

Please refer to the *HARDI PILOT 3880 DPE* booklet for EC operating unit remote control and foam marker remote control operation as well as all other functions of the HARDI PILOT controller.

## Hose reel / Spray gun (If fitted)

On the MANIFOLD system, turn the green pressure valve handle towards 'To Hose Reel / Spray Gun', then use the trigger on the spray gun to activate the gun.



## Boom

Please refer to the *EAGLE BOOM Operator's Manual* regarding entire operation of the boom.

**WARNING!** Operate the boom only after reading the operator's manual.

**DANGER!** When folding and unfolding the boom, be sure that no person or objects are in the operating area of the boom, and that the boom cannot touch overhead electrical wires.

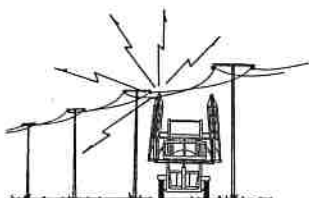


Fig 30

## Spray technique

See the *Spray Technique* booklet.

**NOTE!** A calibrated sprayer is a safe sprayer.

## Flush tank and flush nozzle

The incorporated 285 litre flush tank can be used for diluting and flushing.

### Diluting

Infield diluting of remaining spray liquid residues in the spraying circuit, for spraying the liquid into the field before cleaning the sprayer.

- 1 Empty the sprayer as much as possible. Turn the blue return valve handle towards 'Return to Pump' and spray until air comes out of all the nozzles.



- 2 Remove the tank filter basket.
- 3 Turn the black suction valve handle towards 'From Flush Tank'.



- 4 Turn the green pressure valve handle towards 'To Tank Flush Nozzle'.



- 5 Engage and set the pump at approximately 300 rpm.
- 6 When rinsing water, corresponding to approximately 10 times the spray liquid residue (see *Technical residue*) has been used, turn black suction valve handle towards 'From Main Tank' and operate all valves, so all hoses and components are flushed.



- 7 Turn the green pressure valve handle towards 'Self Cleaning Filter / Operating Unit' and spray the liquid into the field you have just sprayed.



- 8 Repeat points 3 - 7 until the flush tank is empty.

## Flushing

To flush the pump, operating unit, spray lines, etc., in case of a stop in spraying before the main tank is empty (e.g. beginning to rain, etc.):

- 1 Turn the black suction valve handle towards 'From Flush Tank'.



- 2 Turn the blue return valve handle towards 'Return to Pump'.



- 3 Engage the pump and spray water from the flush tank into the field until all tubes / nozzles are flushed with clean water.
- 4 Disengage the pump again.

**WARNING!** The flush nozzle cannot always guarantee a 100% cleaning of the tank. Always clean manually with a brush afterwards, especially if crops sensitive to the chemical just sprayed are going to be sprayed afterwards.

## Technical residue

Inevitably a quantity of spray liquid will remain in the system (which cannot be sprayed on the crop) as the pump takes in air when the tank is about to empty.

This **technical residue** is defined as the remaining liquid quantity in the system as the first clear pressure drop on the pressure gauge is read.



	RESIDUE (litres)	
	With Blue Return Valve	Without Blue Return Valve
Dilutable Residue*	3	15
Total Residue**	27	41

\* Residue in the main tank, possible to dilute with water from the flush tank

\*\* Total residue in the tank and spraying circuit on standard sprayer  
Variations due to different ground inclinations, etc.

The dilutable residue must be diluted 10 times with clean water and sprayed onto the crop just sprayed, before cleaning the sprayer - see *Cleaning*.

## Draining tanks

### Main tank drain valve

Pull the string at the left hand side of the tank to open the drain valve. The valve is spring-loaded but can be kept open by pulling the string out and upwards in the V-shaped slit.

To release and close the drain valve again, pull the string downwards and the valve will close automatically.

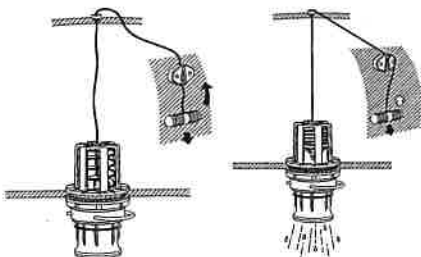


Fig 31

If draining a residue (e.g. liquid fertiliser) into a container, a 2 1/2" snap coupler with hose can rapidly be connected to the drain valve, and the liquid let safely out.

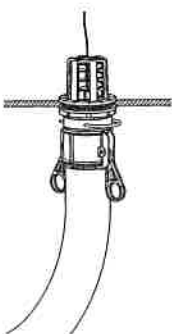


Fig 32

### Flush tank

To avoid algae developing in the flush tank always drain the flush tank when the sprayer is not in use for a long period.

### Foam marker tank

Do not store with pressure in the foam marker tank - loosen the cap.

If the sprayer is to stand a few days it is recommended to drain the foam marker tank, as once mixed, foam solution deteriorates rapidly.



## Maintenance

In order to derive full benefit from the sprayer for many years, the following program should be followed.

**IMPORTANT!** Read carefully through the individual paragraphs regarding maintenance jobs before starting. If any portion remains unclear or facilities unavailable, then for your safety please leave the job to your HARDI dealer's workshop.

**NOTE!** For boom maintenance, refer to your *EAGLE BOOM Operator's Manual*.

To effectively maintain the sprayer you must:

- 1 Perform **Cleaning** of the entire sprayer after spraying is completed - Refer to *Cleaning*. Specific cleaning of filters also forms part of the service and maintenance intervals - Refer *Service and maintenance charts* (Page 20).
- 2 **Lubricate** the sprayer according to the service and maintenance interval reached - Refer to *Lubrication* in the *Service and maintenance charts* (Page 20).
- 3 Perform **Service and maintenance** jobs according to the service and maintenance interval reached - Refer *Service and maintenance charts* (Page 20).
- 4 Perform **Occasional maintenance** jobs as needed after inspections - *Occasional maintenance* (P 20).
- 5 Immediately fit **Replacement parts** for parts that are worn or broken - Refer to *Replacement Parts* (P 28).

## Cleaning Guidelines

Read carefully chemical, detergents and deactivating agents labels. Take note of any particular instructions regarding recommended protective clothing, deactivating agents, etc, and any cleaning procedures given.

Be familiar with local legislation regarding disposal of chemical washings, mandatory decontamination methods, etc. Contact the appropriate body, e.g. Dept of Ag.

Chemical washings can usually be sprayed out on a soakway. This is an area of ground that is not used for cropping. Seepage or runoff of residues into streams, water courses, ditches, wells, springs, etc., must be avoided. Washings from the cleaning area must not enter sewers. Drainage must lead to an approved soakway.

**Note!** Well calibrated sprayers will ensure the minimal amount of remaining spray liquid.

It is good practice to clean the sprayer immediately after use, thereby rendering the sprayer safe and ready for the next chemical application. This also prolongs the life of the components.

If it is necessary to have spray liquid in the tank for short periods, e.g. overnight, or until the weather becomes suitable for spraying again, unauthorised persons and animals must not have access to the sprayer.

If the product applied is corrosive, it is recommended to coat all metal parts of the sprayer, before and after use with a suitable rust inhibitor.

**REMEMBER!** Clean sprayers are safe, ready for use and will not be damaged by chemicals.

**NOTE!** If the sprayer is cleaned with a high pressure cleaner or fertiliser has been used, lubrication of the entire sprayer is recommended - including the boom (Refer to your boom operator's manual).

## Cleaning Procedure

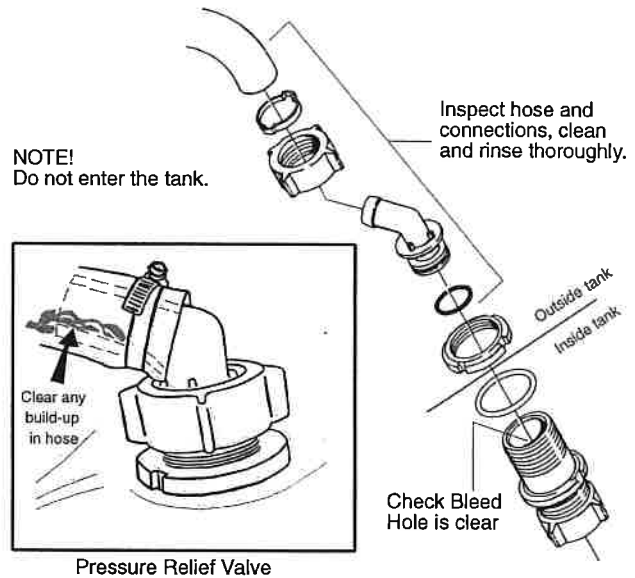
**NOTE!** Water in the Flush Tank, used to clean the sprayer, must be clean and free of contamination. Back-flow due to poor seals in hose connections, leaking valves and O-rings, spills, incorrect plumbing setup or fittings, or poor filling technique may all cause contamination.

Good maintenance and spray operation technique will prevent accidental recontamination of the system during the cleaning process. If Flush Tank contamination has occurred, fill with water containing the appropriate chemical decontamination agent. Emptying and refilling Flush Tank several times with clean rinse water will be needed before proceeding with general cleaning of the system.

- 1 Dilute the remaining spray liquid in the tank with at least 10 parts of water. Spray the liquid out into the field just sprayed - *Flush tank and flush nozzle (P16)*.

**NOTE!** It is advisable to increase forward speed (double if possible) and reduce pressure to as low as 1.5 bar for S4110 nozzles

- 2 Select and use appropriate protective clothing, deactivating agent and detergent for cleaning.
- 3 Flush and clean the sprayer and tractor externally. Use detergent if necessary.
- 4 Remove nozzles, tank filters, nozzle filters and suction filters and clean with appropriate solution (Refer to *10 Hours / Daily Service* chart - P 26) Be careful not to damage the mesh. Refit suction filter top. Refit filters when sprayer is completely clean.
- 5 Inspect pressure relief valve (mounted on tank - see diag above right), and ensure it is thoroughly clean, rinsed and free of any residues. Ensure that the bleed hole is clear of debris and the pressure relief valve is bypassing fluid back into the main tank during normal spray operations.
- 6 Inspect delivery hose to relief valve, clear away any build-up and ensure the hose and connections are thoroughly cleaned and rinsed.
- 7 Remove, clean, drain and flush all hoses.
- 8 Clean chemical filler hopper. Clean, flush and drain delivery hose from filler to main tank.
- 9 Carefully clean lid area, particularly the basket and underside of lid.



- 10 With pump running, thoroughly flush inside the main tank (remember tank roof and lid area). If rinse nozzles are not fitted use pressure cleaner etc to clean internal tank surface with appropriate cleaning solution. Flush and operate all components and any equipment that has been in contact with chemicals. Before opening the distribution valves and spraying the liquid out please identify a suitable method of disposing of any contaminated tank rinsing solution.
  - 11 After spraying the liquid out, stop the pump and fill at least 75% of the main tank with clean water. Note that some chemicals require tank to be completely filled. Always observe chemical labels. Add detergent and/or deactivating agent, e.g. Washing Soda or Triple Ammonia as directed on the chemical label.
- NOTE! Cleaning procedures given on chemical labels must be followed. Some chemicals require rinsing with very large amounts of clean water in order to ensure residual chemical is at a safe level.**
- 12 Start the pump and operate all controls, enabling the liquid to come in contact with all the components. Leave distribution valves until last. Some detergents and deactivating agents work best if left in the tank for a short period. Check the label.
  - 13 Remove end plugs from boom tubes while pump is not running, flush with clear H<sub>2</sub>O and replace plugs.
  - 14 Drain the tank and let the pump run dry. Flush the inside of the tank, again letting the pump run dry.
  - 15 Stop the pump. If the chemicals used have a tendency to block nozzles and filters, remove and clean them now. Check also for sediment on the pressure side of the self cleaning filter safety valve.
  - 11 Refit all filters and nozzles and repeat steps 10-14, using clean water, before storing the sprayer. If from previous experiences, it is noted that the solvents in the chemicals are particularly aggressive, store the sprayer with the tank lid open.

## Filters

Clean filters ensure:

- Sprayer components such as valves, diaphragms and operating unit are not hindered or damaged during operation.
- Nozzle blockages do not occur whilst spraying.
- Long life of the pump. A blocked suction filter will result in pump cavitation.

The main filter protecting sprayer components is the suction filter at the top of the tank. Check it regularly.

### Nozzle filters

Check and clean.



Fig 33

### Suction filter

To service the suction filter:

- 1 Pull the steel clip (A Fig 34) out.
- 2 Lift the suction hose fitting (B Fig 34) from housing.
- 3 The filter guide and filter (C Fig 34) can now be removed.

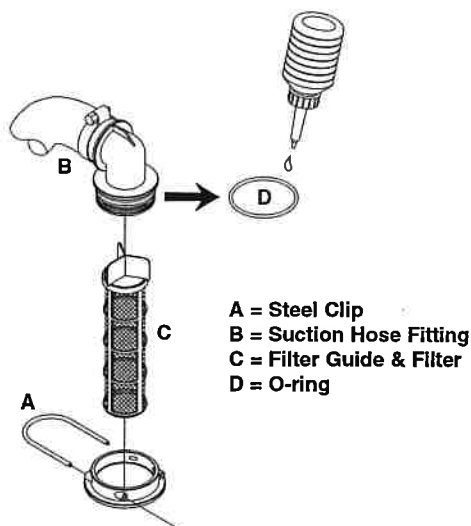


Fig 34

To reassemble:

- 1 Press the guide onto the filter end.
- 2 Place the filter into the housing with guide facing up.
- 3 Ensure the O-ring (D Fig 34) on the hose fitting is in good condition and lubricated.
- 4 Refit the suction hose fitting (B Fig 34) and steel clip (A Fig 34).

### Self cleaning filter

- 1 Unscrew the filter nut (A Fig 35) and open the filter.
- 2 Check the filter gauze (B Fig 35), clean if necessary and check there are no residues on any part of the filter/hoses.
- 3 Lubricate the O-ring (C Fig 35).
- 4 Re-assemble the filter.

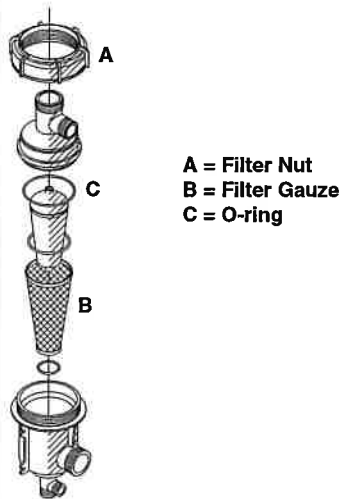


Fig 35

### In-Line filters (If fitted)

If the sprayer is equipped with In-line filters, unscrew the filter bowls to inspect and clean a filter. Lubricate O-rings.

Alternative filters are available. Refer to *Filters* (Page 11) and *Filters* (Page 27) in the *Specifications* section.

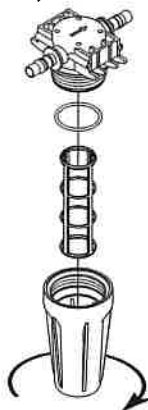


Fig 36

## Service and maintenance charts

Service and maintenance intervals for COMMANDER.

### 10 Hours or Daily (Whichever occurs first)

#### 1 Suction filter

Clean.

#### 2 Self cleaning filter

Check and clean gauze if necessary.

#### 3 In-Line filter

Clean.

#### 4 Nozzle filters

Clean.

#### 5 Spraying circuit

Fill with clean water, operate all functions and check for leaks, use higher spray pressure than normal. Check nozzle spray patterns visually using clean water.

#### 6 Lubrication

Lubricate all of the PTO shaft.

### 50 Hours or Weekly (Whichever occurs first)

Do all previous +

#### 7 Wheel bolts and nuts

Re-tighten (Refer *Torque settings* (Page 27)).

#### 8 Drawbar bolts

Re-tighten (Refer *Torque settings* (Page 27)).

#### 9 Tyres

Check pressure (Refer *Tyre pressures* (Page 27)).

#### 10 Transmission shaft

Check the function and condition of the transmission shafts protection guards. Replace possible damaged parts immediately.

#### 11 Lubrication

Lubricate the entire sprayer:

Pump - Grease bearings

Support leg - Oil base pivot & Grease handle

Drawbar - Grease any moving sections

Suspension - Grease rockers

Boom - Refer to the *EAGLE BOOM Operator's Manual*

### 200 Hours or Monthly (Whichever occurs first)

Do all previous +

#### 12 Wheel bearings

Check and adjust if necessary.

#### 13 Hoses and tubes

Check all hoses and tubes for possible damage and proper attachment. Renew damaged hoses or tubes.

### 1000 Hours or Yearly (Whichever occurs first)

Do all previous +

#### 14 Wheel bearings

Dismantle, check, grease and adjust.

#### 15 Transmission shaft

Renew protection guard.

## Occasional maintenance

### 363 pump

**NOTE!** It is recommended that if one or more diaphragms and/or valves need replacing they all should be replaced.

#### Changing valves

- 1 Remove the valve covers (A Fig 37). Before changing the valves (B Fig 37 & B1 Fig 37) note their orientation so they are replaced correctly.
- 2 The two white flap valves (B1 Fig 37) must be placed in the valve openings as shown. It is recommended to use new O-rings (C Fig 37) when changing or checking the valves.

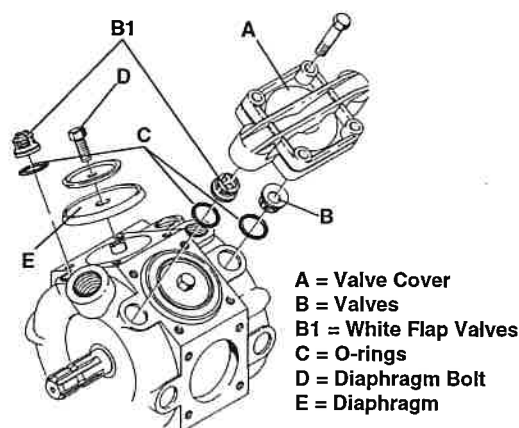


Fig 37

#### Changing diaphragms

- 1 With the valve covers removed as explained above, remove the diaphragm bolts (D Fig 37).
- 2 The diaphragms (E Fig 37) may now be changed.
- 3 If fluids have reached the crankcase, re-grease the pump thoroughly. Also check the drain hole at the bottom of the pump is not blocked.
- 4 Reassemble with torque settings as shown in *Torque setting* (Page 27).

### 1302 pump

**NOTE!** It is recommended that if one or more diaphragms and/or valves need replacing they all should be replaced.

#### Changing valves

- 1 Remove valve covers (A Fig 38). Before changing the valves (B Fig 38) note their orientation so they are replaced correctly. It is recommended to use new O-rings (C Fig 38) when changing or checking the valves.

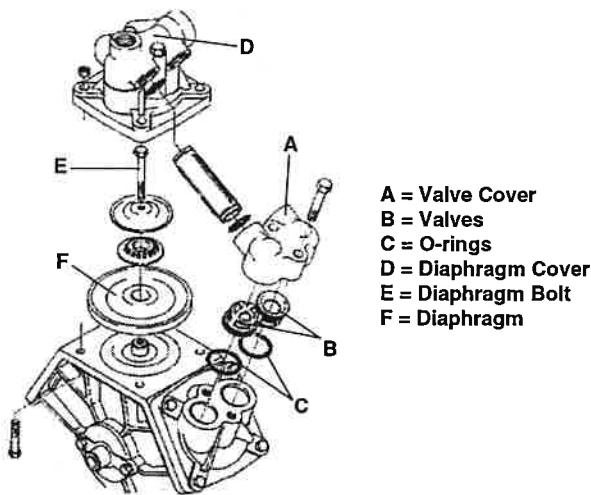


Fig 38

### Changing diaphragms

- 1 Remove the diaphragm covers (D Fig 38).
- 2 Remove the diaphragm bolts (E Fig 38).
- 3 The diaphragms (F Fig 38) may now be changed.
- 4 If fluids have reached the crankcase, re-grease the pump thoroughly. Also check the drain hole at the bottom of the pump is not blocked.
- 5 Reassemble with torque settings as shown in *Torque settings* (Page 27).

### EC operating unit ball seat

If the main on/off valve does not seal properly (dripping nozzles when main on/off valve is closed), the ball and seat should be checked.

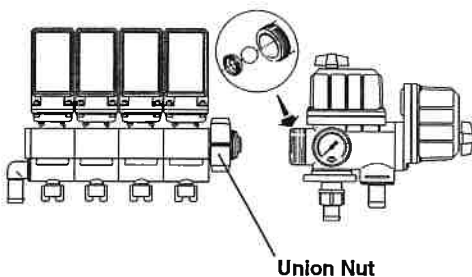


Fig 39

- 1 Remove the two bolts fixing the main on/off pressure valve unit to the bracket.
- 2 Unscrew the union nut (Fig 39) and pull the valve away from the distribution valves.
- 3 Check the ball for sharp edges and scratches, and check the ball seat for cracks and wear - replace if necessary.

### EC operating unit valve cone

Periodically check the distribution valves for proper sealing. Do this by running the sprayer with clean water and opening the on/off valve and all distribution valves.

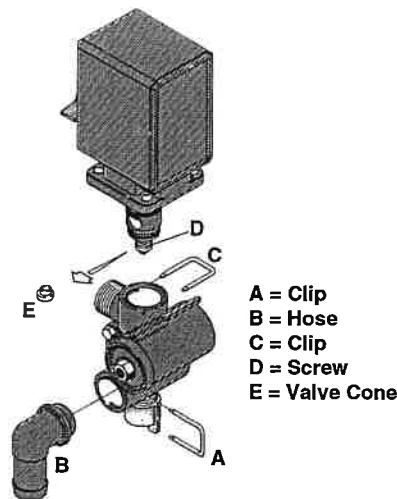


Fig 40

- 1 Cautiously remove the pressure equalization device clip (A Fig 40) and pull out the hose (B Fig 40). When the housing is drained, there should be no liquid flow through the pressure equalization device. If there is any leakage, the valve cone (E Fig 40) must be changed.
- 2 Remove the clip (C Fig 40) and lift the motor housing off the valve housing.
- 3 Then unscrew the screw (D Fig 40) and replace the valve cone (E Fig 40).
- 4 Reassemble in opposite sequence.

### Tubes and fittings

Poor seals are usually caused by:

- Missing O-rings or gaskets
- Damaged or incorrectly seated O-rings
- Dry or deformed O-rings or gaskets
- Foreign bodies

Therefore, in case of leaks:

**Do not over-tighten.** Disassemble, check condition and position of the O-ring or gasket, clean, lubricate and reassemble. The O-ring is lubricated **all the way round** before fitting on to the nozzle tube. Use non-mineral lubricant.

For **radial** connections (Fig 41), only hand tighten them.

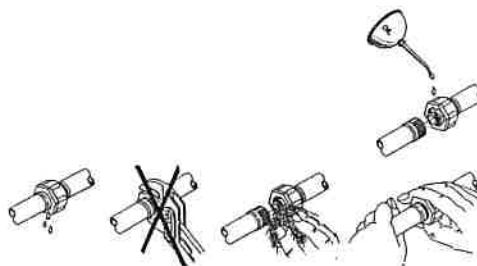


Fig 41

For **axial** connections (Fig 42), a little mechanical leverage may be used.

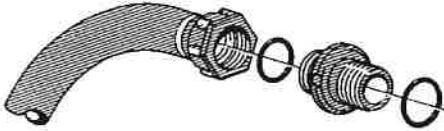


Fig 42

## Level indicator

The level indicator should be checked regularly. When the tank is empty, the floater should rest on the stop pin on the rod, and the O-ring at the indicator should be positioned at the top position line (A Fig 43).

If any deviation is found, pull out the plug (B Fig 43), loosen the screws (C Fig 43) and adjust the length of the cord.

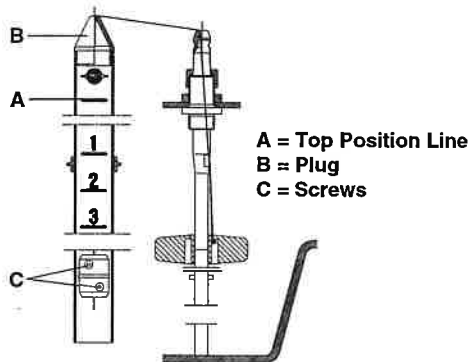


Fig 43

## Drain valve seal

If the main tank drain valve leaks, the seal and seat can be changed the following way:

**NOTE!** Do not enter the inside of the tank - the parts can be changed from underneath the tank.

**⚠ WARNING!** Use an eye/face protection mask when dismantling the tank drain valve.

- 1 Make sure the tank is empty and clean.
- 2 The valve must be closed and the string loose.
- 3 Pull out the clip (A Fig 44) and pull down the connecting piece (B Fig 44). The entire valve assembly can now be pulled out.
- 4 Check the cord and valve flap assembly (C Fig 44) for wear, replace the seal (D Fig 44) and reassemble.
- 5 Assemble the valve assembly again using a new valve seat (E Fig 44). Lubricate the O-rings (F Fig 44) before assembly.
- 6 Fit the clip (A Fig 44) again.

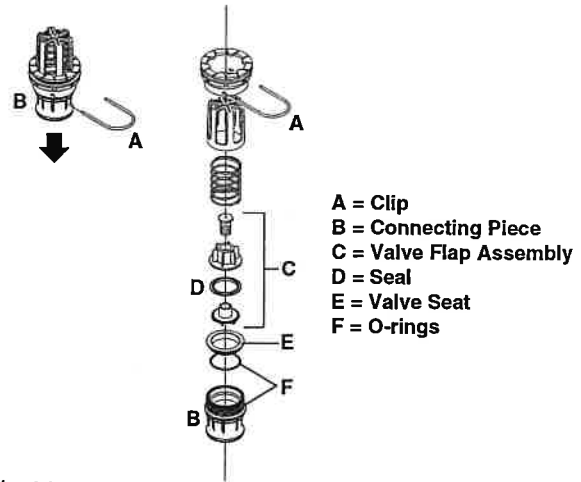


Fig 44


**NOTE!** Check function of valve with clean water before filling chemicals into the tank.

## Tyres

Should it be necessary to replace tyres, follow the following rules when doing so. If uncertain about any aspect, have a specialist do the job:

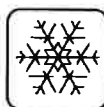
- Always clean and inspect the rim before mounting.
- Always check that the rim diameter corresponds exactly to the rim diameter moulded on the tyre.
- When fitting new tubed tyres always fit new tubes. Always use tubes of recommended size and of good condition.
- Inspect inside the tyre for dirt or foreign bodies and remove them if installing a tube.
- Do not use tubes in tubeless tyres.
- Tyres with irreparable damages must never be used.
- Always inspect inside the tyre for cuts, penetrating objects or other damage. Damages must be repaired before installing a tube.
- Before mounting always lubricate both tyre beads and rim flange with an approved lubricating agent or equivalent anti-corrosion lubricant. Never use petroleum based greases and oils because they may result in damage to the tyre. Using the appropriate lubricant the tyre will never slip on the rim.
- Always use specialised tools as recommended by the tyre supplier for mounting the tyres.
- Make sure that the tyre is centred and the beads are perfectly seated on the rim. Otherwise danger of bead wire tear can occur.
- Inflate the tyre to 100 - 130 kPa (14.5 - 19 psi) then check whether both beads are seated perfectly on the rim. If any of the beads do not seat correctly, deflate the assembly & re-centre the beads before starting inflation of the tyre. If the beads are seated correctly on the rim, inflate the tyre to a maximum of 250 kPa (36 psi) until they seat perfectly on the rim.
- Never exceed the maximum mounting pressure moulded on the tyre.

- After mounting tyres adjust inflation pressure to operation pressure recommended by the tyre manufacturer. *Tyre pressures* (Page 27) can be used as a guide.

 **WARNING!** Non observance of mounting instructions will result in the bad seating of the tyre on the rim and could cause the tyre to burst, leading to serious injury or death.

**CAUTION!** Never mount or use damaged tyres or rims!

**CAUTION!** Use of a damaged, ruptured, distorted, welded or brazed rim is not acceptable.



## Storage

When the spraying season is over, you should devote some extra time to the sprayer.

If chemical residues are left in the sprayer for long periods, it can reduce the life of sprayer components.

### Preparation before off season storage

To preserve the sprayer and protect the components, carry out the following off season storage program.

- 1 Clean the sprayer completely - inside and outside as described in *Cleaning* (Page 17). Make sure that all valves, hoses and auxiliary equipment have been cleaned with detergent and flushed with clean water, so no chemical residues are left in the sprayer.
- 2 Renew damaged seals and repair leaks.
- 3 Empty the sprayer completely and let the pump work for a few minutes. Operate all valves and handles to drain as much water off the spraying circuit as possible. Let the pump run until air is coming out of all nozzles. Remember to drain the flushing tank. Ensure the foam marker is rinsed and drained.
- 4 If the sprayer is not stored in a frost free place, pour in a mixture of Ethylene Glycol based anti-freeze and water at the ratio for the desired temperature protection. Volume of mixture should be about 1% of tank volume. Run the sprayer and circulate the anti-freeze in the pump, controls and boom lines.
- 5 Lubricate all lubricating points regardless of intervals stated.
- 6 When the sprayer is dry remove rust from possible scratches or damages in the powdercoat and touch up with paint.
- 7 Remove the Glycerine filled gauges and store them in a frost free vertical position.
- 8 Apply a thin layer of anti-corrosion oil to all metal parts, hoses and tyres. Suggested products for protecting your equipment are SHELL ENSIS or one of the CASTROL RUSTILLO range, eg DW9011M1. There are many factors that affect the selection of protective oils, such as temperature and humidity, and exposure to salt, UV and chemicals. Your local distributor of oil products will be able to advise on the best specific formula for your local conditions.
- 9 Fold the boom to transport position and relieve pressure from all hydraulic functions.
- 10 All electric plugs and sockets are to be stored in a dry plastic bag to protect them against damp, dirt and corrosion.
- 11 Remove any control boxes and optional HARDI PILOT control box and display (if fitted) from the tractor. Store them inside where it is dry and clean.
- 12 Wipe the hydraulic snap-couplers clean and fit the dust caps.
- 13 Apply grease onto all hydraulic ram piston rods that are not fully retracted in the barrel, to protect against corrosion.

- 14 Chock up the wheels, to prevent moisture damage and deformation of the tyres. Tyre blacking can be applied to the tyre walls to preserve the rubber.
- 15 To protect against dust the sprayer can be covered by a tarpaulin. Ensure ventilation to prevent condensation.

### Preparation after off season storage

After a storage period the sprayer should be prepared for the next season the following way:

- 1 Remove the cover.
- 2 Remove the support from the wheel axle and adjust the tyre pressure.
- 3 Wipe off the grease on the hydraulic ram piston rods.
- 4 Fit the pressure gauges again (seal with teflon tape).
- 5 Connect the sprayer to the tractor including hydraulics and electrics.
- 6 Check all hydraulic and electric functions.
- 7 Empty the remaining anti-freeze from the tank (If used).
- 8 Rinse the entire liquid circuit of the sprayer with clean water.
- 9 Fill with clean water and check all functions.



### Troubleshooting

In cases where breakdowns have occurred, the same factors always seem responsible:

- Minor leaks on the suction side of the pump will reduce the pump capacity or stop the suction completely.
- A clogged suction filter will hinder or prevent suction so that the pump does not operate satisfactorily.
- Clogged up pressure filters will result in increasing pressure at the pressure gauge but lower pressure at the nozzles.
- Foreign bodies stuck in the pump valves result in these valves not closing tightly against the valve seat. This reduces pump efficiency.
- Poorly reassembled pumps, especially diaphragm covers, will allow the pump to suck air, resulting in reduced or no capacity.
- Hydraulic components that are contaminated with dirt result in rapid wear to the hydraulic system.

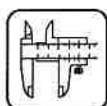
Therefore **always** check:

- 1 Suction, pressure and nozzle filters are clean.
- 2 Hoses for leaks and cracks, paying particular attention to the suction hoses.
- 3 Gaskets and O-rings are present and in good condition.
- 4 Pressure gauge is in good working order (Correct spray dosage depends on it).
- 5 EC operating unit functions properly. Use clean water to check.
- 6 Hydraulic components are maintained, clean and free from leaks (Refer to the *EAGLE BOOM Operator's Manual*).



Problem	Probable cause	Control / Solution
<b>Liquid system</b> No spray from boom when turned on	Air leak on suction line	Check if suction filter O-ring is sealing Check suction tube and fittings Check tightness of pump diaphragm and valve covers
	Air in system	Fill suction hose with water for initial prime
	Suction / pressure filters clogged	Clean filters Check yellow suction pipe is not obstructed or placed too near the tank bottom
Lack of pressure	Incorrect assembly	Restrictor nozzle in self cleaning filter not fitted or incorrectly aligned Pressure relief valve spring loose Too little distance between yellow suction pipe and tank bottom
	Pump valves blocked or worn	Check for obstructions and wear
Pressure dropping	Defect pressure gauge	Check for dirt at inlet of gauge
	Filters clogged	Clean all filters. Fill with cleaner water If using powders, make sure agitation is on
	Nozzles worn	Check flow rate and replace nozzles if it exceeds 10%
	Tank is air tight	Check vent is clear
	Sucking air towards end of tank load	Lower pump rpm
Pressure increasing	Pressure filters beginning to clog	Clean all filters
Formation of foam in main tank	Air is being sucked into system	Check tightness/gaskets/O-rings of all fittings on suction side
	Excessive liquid agitation	Reduce pump rpm Check safety valve for self cleaning filter is tight Ensure returns inside tank are present Use foam damping additive
Liquid leaks from bottom of pump	Damaged diaphragm	Replace. See <i>Changing valves</i> and <i>Changing diaphragms</i> (Page 20)

Problem	Probable cause	Control / Solution
<b>EC operating unit</b>		
Operating unit not functioning	Blown fuse(s)	Check mechanical function of microswitches Use cleaning/lubricating agent if switches do not operate freely
		Check motor (450 - 500 mA MAX) Change motor if over
	Wrong polarity	Brown = positive (+) Blue = Negative (-)
	Valves not closing properly	Check valve seals for obstructions Check microswitch plate position Loosen screws holding plate a ½ turn
	No power	Wrong polarity Check that Brown is (+), Blue is (-) Check printed circuit board for dry solder joints or loose connections Check fuse holder is tight around fuse
<b>Foam marker</b>		
Compressor will not start	Poor power supply	Check battery (must be 12 V) and wiring Use the HARDI electric distribution box
	Blown fuse	Change external fuse
	Defective relay	Open compressor box and check relay for corrosion
No liquid to foam generator	Blown fuse	Open compressor box and check fuse located on printed circuit board
	Solenoid valve not opening	Check wiring at printed circuit board for corrosion or loose connections
	Filter blocked	Dismantle and clean
Foam quality inconsistent	Recommendations not followed	See <i>HARDI Elite II foam marker</i> (Page 15)
Blob interval inconsistent	Adjustment valve gummed up	Flush system
Foam liquid in air lines	Non-return valve in line gummed up	Dismantle and clean



## Specifications

1 Nm = 0.738 lbf-ft

1 bar = 100 kPa = 14.5 psi

### Torque settings

#### BOLT TORQUE (Nm)

##### Wheel studs

18 mm 466

20 mm 490

##### Axle U-bolts

5/8" UNF 189

##### Drawbar bolts

M20 370

##### 1302 pump

Valve cover bolts 60

Diaphragm cover bolts 70

Diaphragm bolt 60

##### 363 pump

Valve cover bolts 70

Diaphragm bolt 60

##### General bolts

M12 77

M16 190

### Tyre pressures

#### TYRE MAX PRESSURE (kPa)

Road

Work

23.1 x 30 200 150

18.4 x 34 200 150

18.4 x 30 200 150

18.4 x 28 200 150

14.9 x 24 250 150

11.2 x 24 300 200

11.0 x 16 300 200

15R x 22.5 300 200

### Filters

#### MESH COLOR GAUZE SIZE (mm)

30 Green 0.58

50 Blue 0.30

80 Red 0.18

100 Yellow 0.15

### Temperature

Operating temperature range

2° - 40° C (36° - 104° F)

### Pressure

Operating pressure for pressure relief valve

12 bar

MAX Pressure on the pressure manifold

20 bar

MAX Pressure on the suction manifold

7 bar

### Dimensions

Always measure actual sprayer dimensions.

Width, Height and Length are dependant on the boom, tyres and drawbar fitted - they are subject to variation.

### Flow

#### EC

Bypass flow under the EC pressure adjusting motor (Pressure motor adjusted for full pressure):

0-1 l/m

#### Self Cleaning Filter

Bypass flow for each restrictor (Pressure @ 3 bar):

Green - 37 l/m

Black - 26 l/m

White - 18 l/m

Red - 13 l/m

#### Agitators

Flow for agitators @ 3 bar:

2.5 mm - 16 l/m

3.0 mm - 25 l/m

(This is a combined flow from both agitators)

### Materials and recycling

**Tank** HDPE

**Hoses** PVC

**Valves** Mainly glass-filled PA

**Fittings** PA

When the equipment has completed its working life, it must be thoroughly cleaned. The tank, hose and synthetic fittings can be incinerated at an authorised disposal plant. The metallic parts can be scrapped. Always follow local legislation regarding disposal.



## Replacement Parts

This section is to be used to help identify the replacement part numbers of many common parts on the COMMANDER sprayer - it is not as comprehensive as the *Spare Parts* manual at your HARDI dealer.

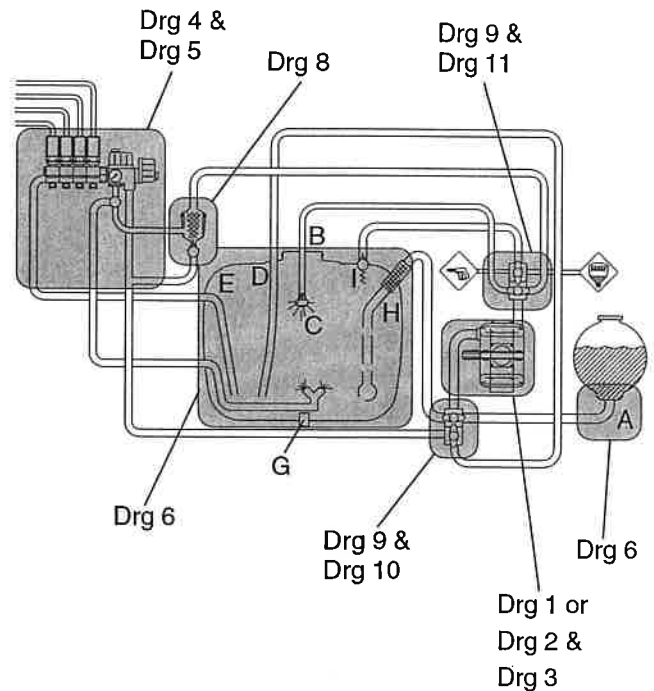
So if a part is not covered in this section, or is difficult to determine, you will need to contact your HARDI dealer.

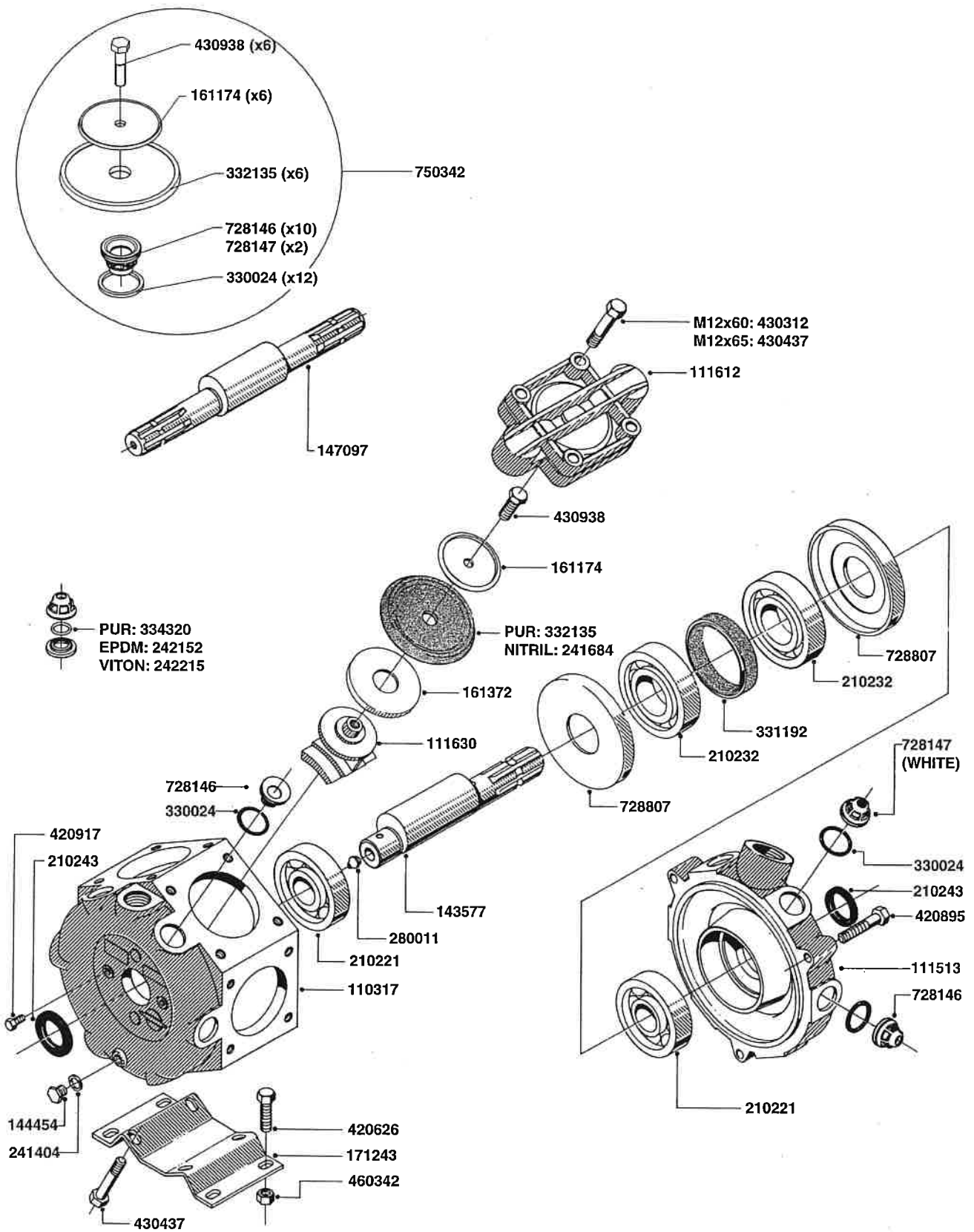
Every part illustrated in this section has a number or is shown as part of a group of parts in a numbered kit.

This number is the HARDI parts number for the part or kit of parts.

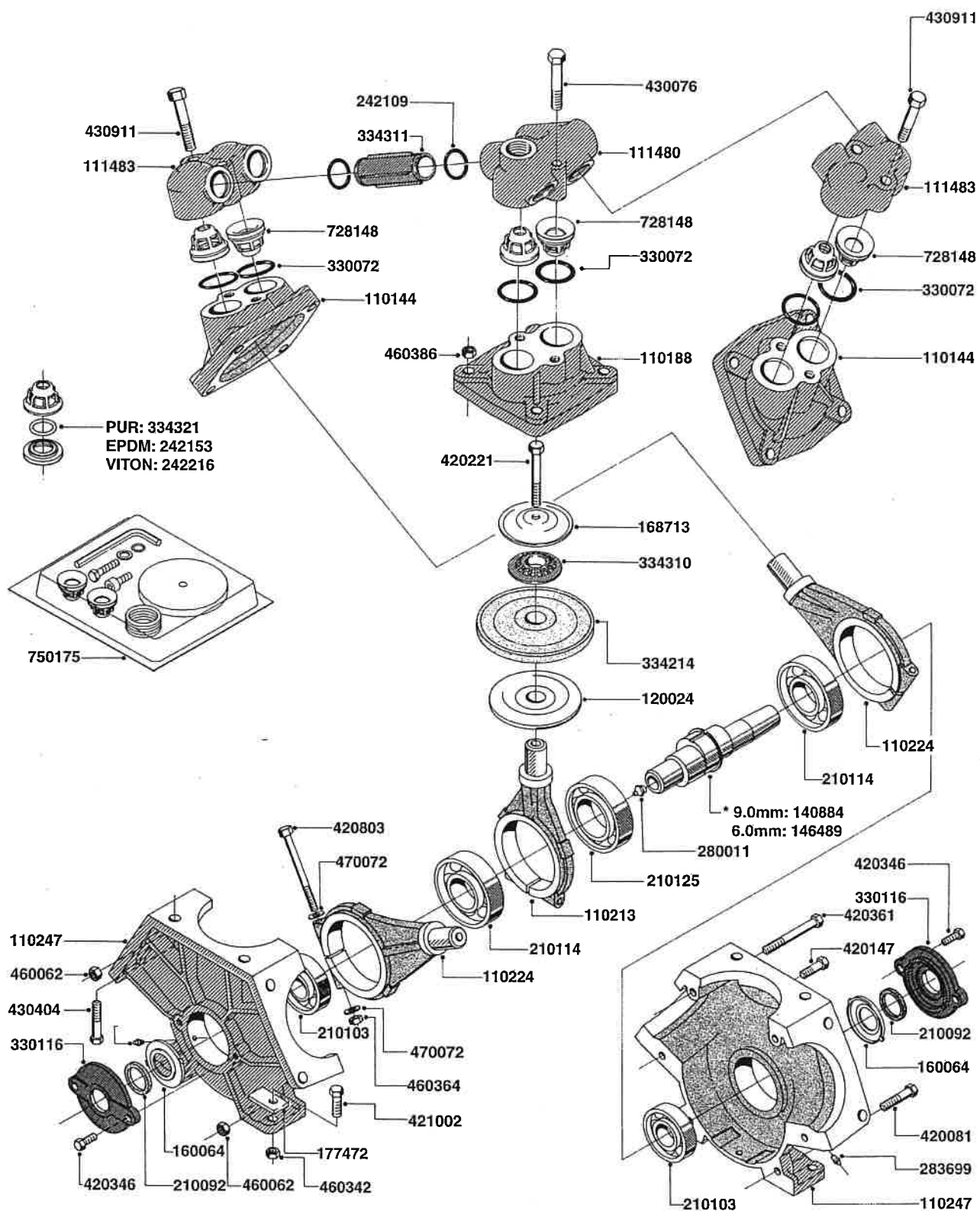
Note that drawing numbers used in this section do not represent any HARDI parts drawing numbers - they are simply used for cross-referencing within this manual.

Title	Drawing	Page
363 Pump	Drg 1	29
1302 Pump	Drg 2	30
Pump Fittings and Dampers	Drg 3	31
EC Operating Unit	Drg 4	32
EC Distribution Valve and Control Box	Drg 5	33
Tank Fittings	Drg 6	34
Filtered Fill Filter	Drg 7	35
Self Cleaning Filter	Drg 8	36
Pressure Manifold	Drg 9	37
Suction Manifold	Drg 10	38
Pressure Manifold - Green Valves	Drg 11	39
Valves	Drg 12	40
Clean Water Tank	Drg 13	41
Elite II Foam Marker (Optional)	Drg 14	42
Chassis	Drg 15	43
Wheel Hub	Drg 16	44
Suspension	Drg 17	45
363 1000 rpm Pump	Drg 18	46



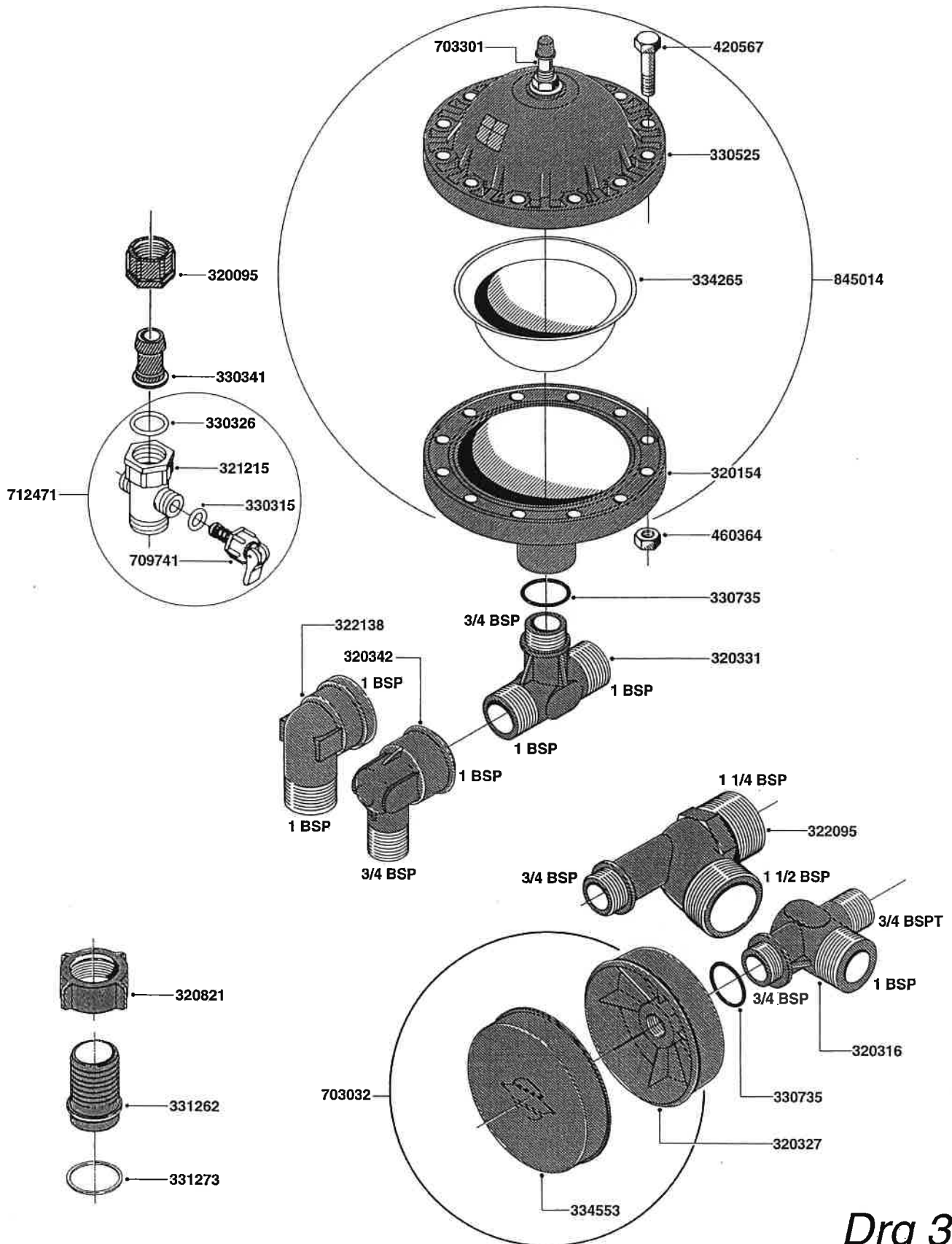


*Drg 1*  
363 Pump

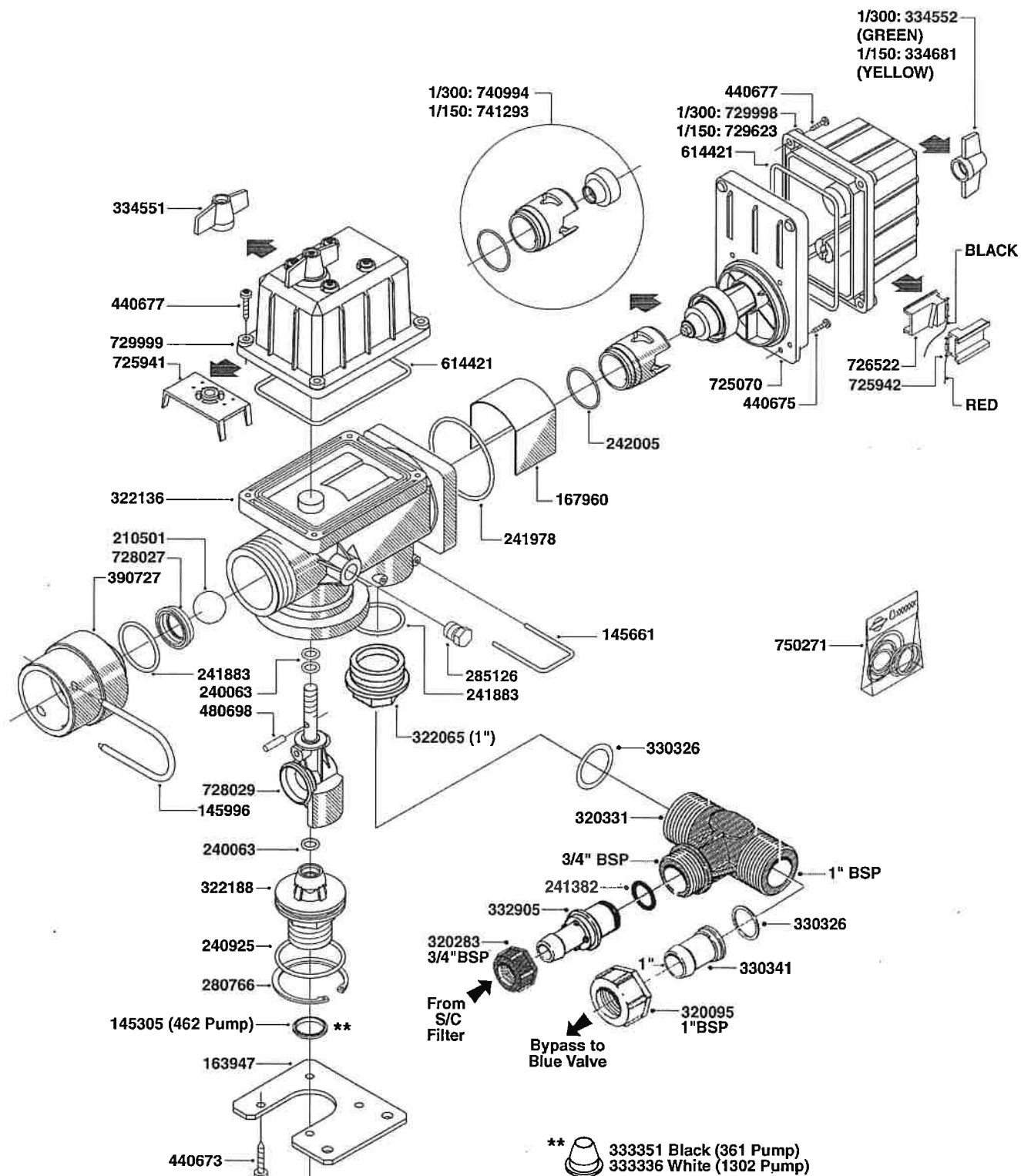


\* 9.0mm - 540 rpm  
6.0 mm - 1000 rpm

**Drq 2**  
**1302 Pump**

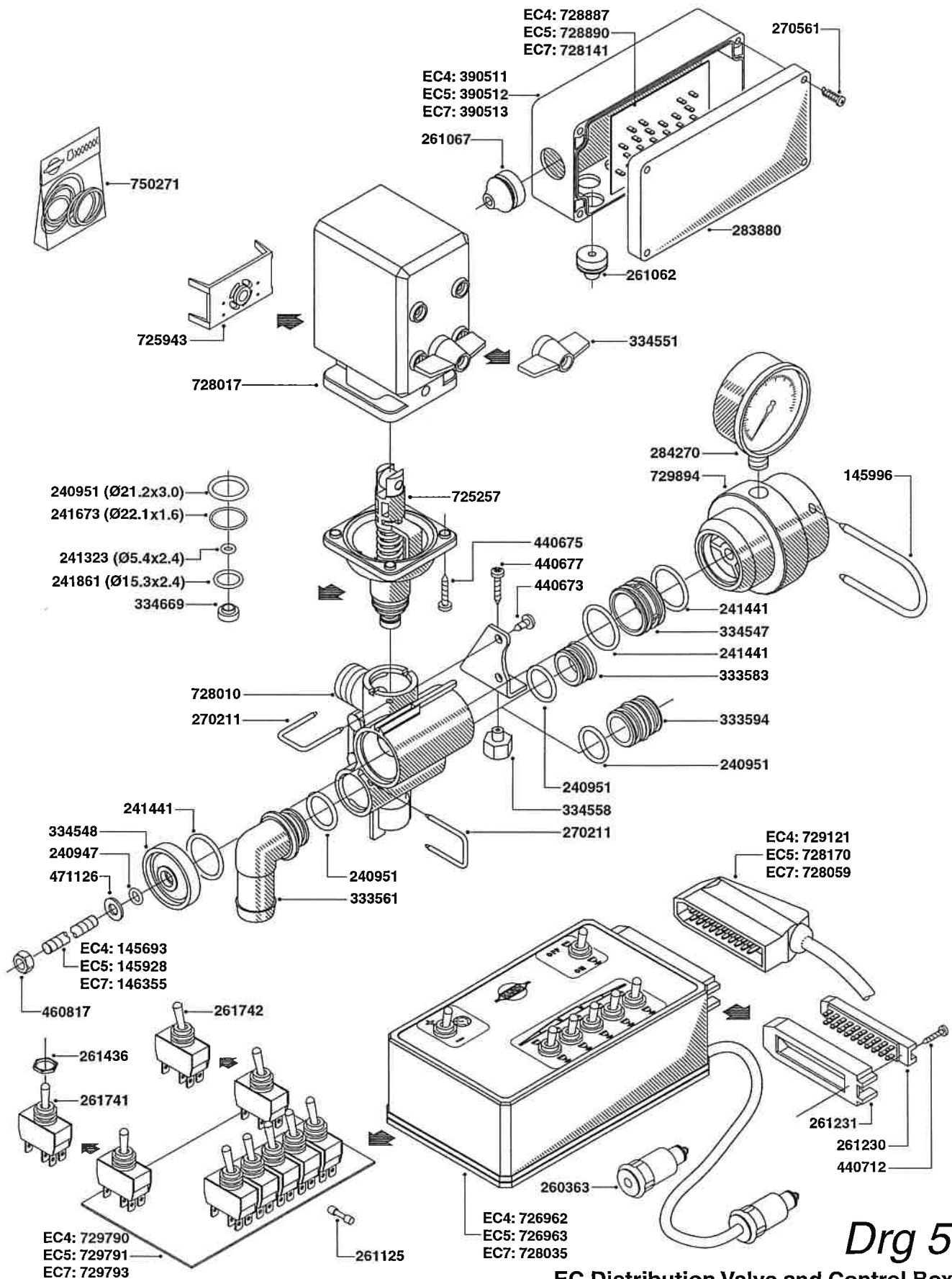


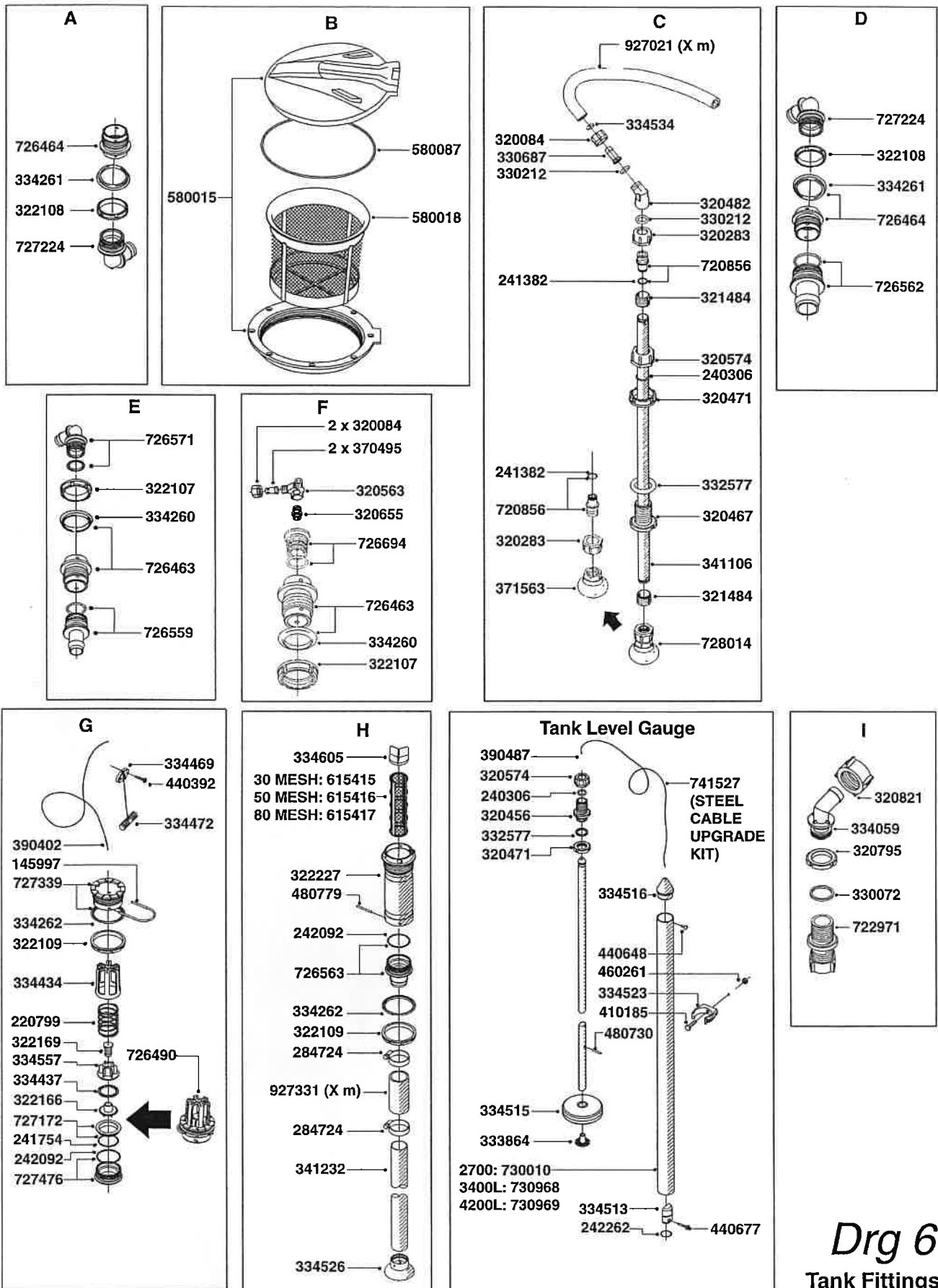
**Drp 3**  
**Pump Fittings and Dampers**



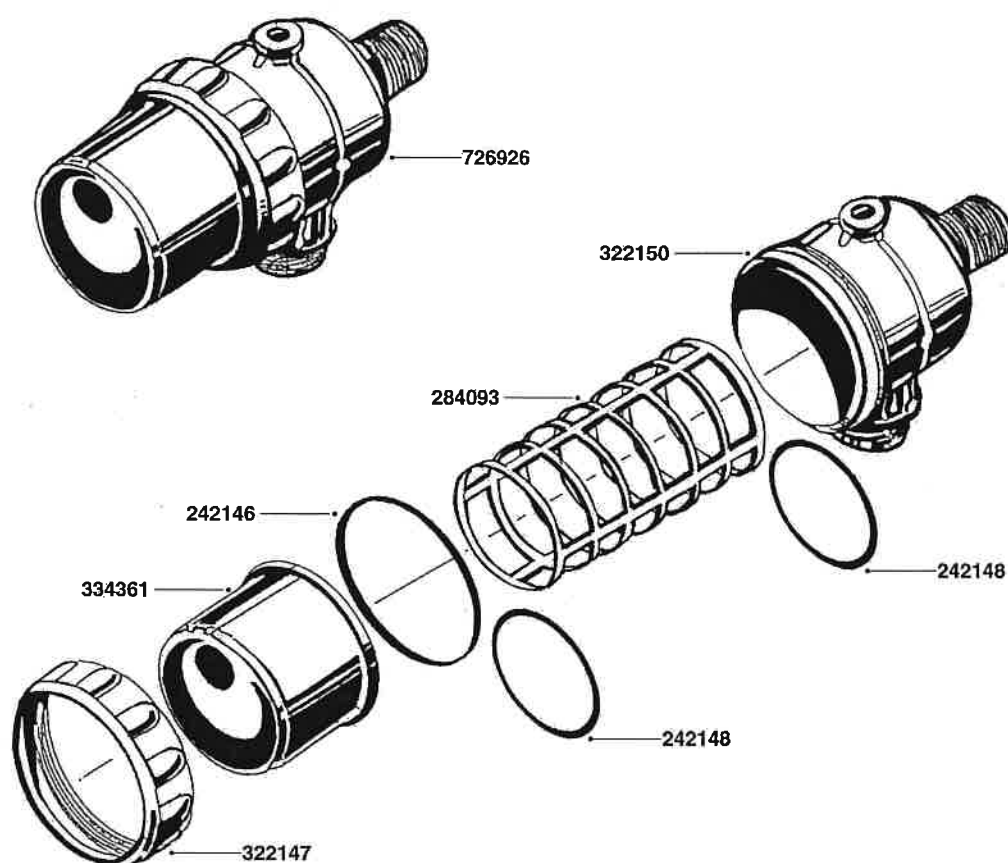
**Drp 4**  
EC Operating Unit



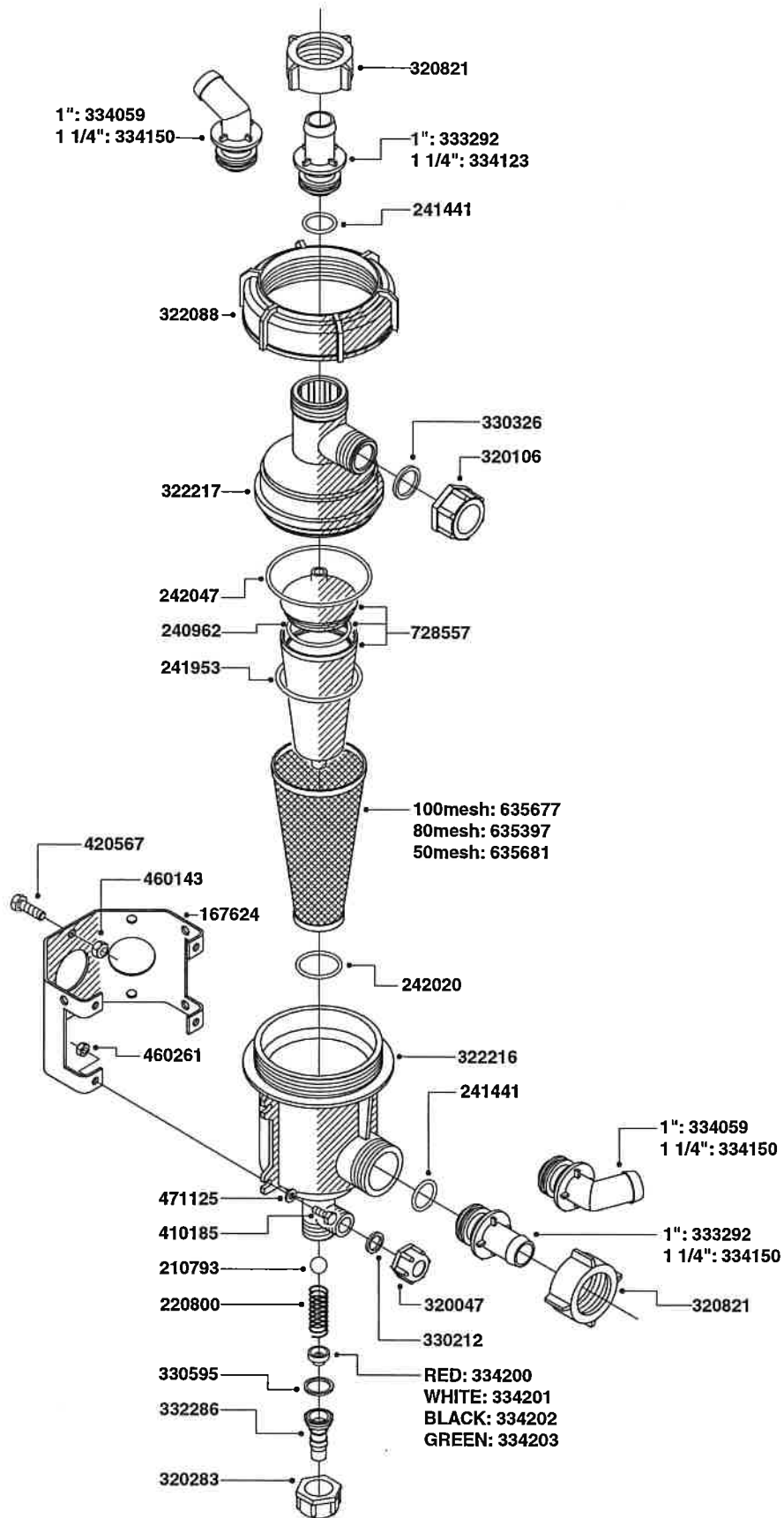




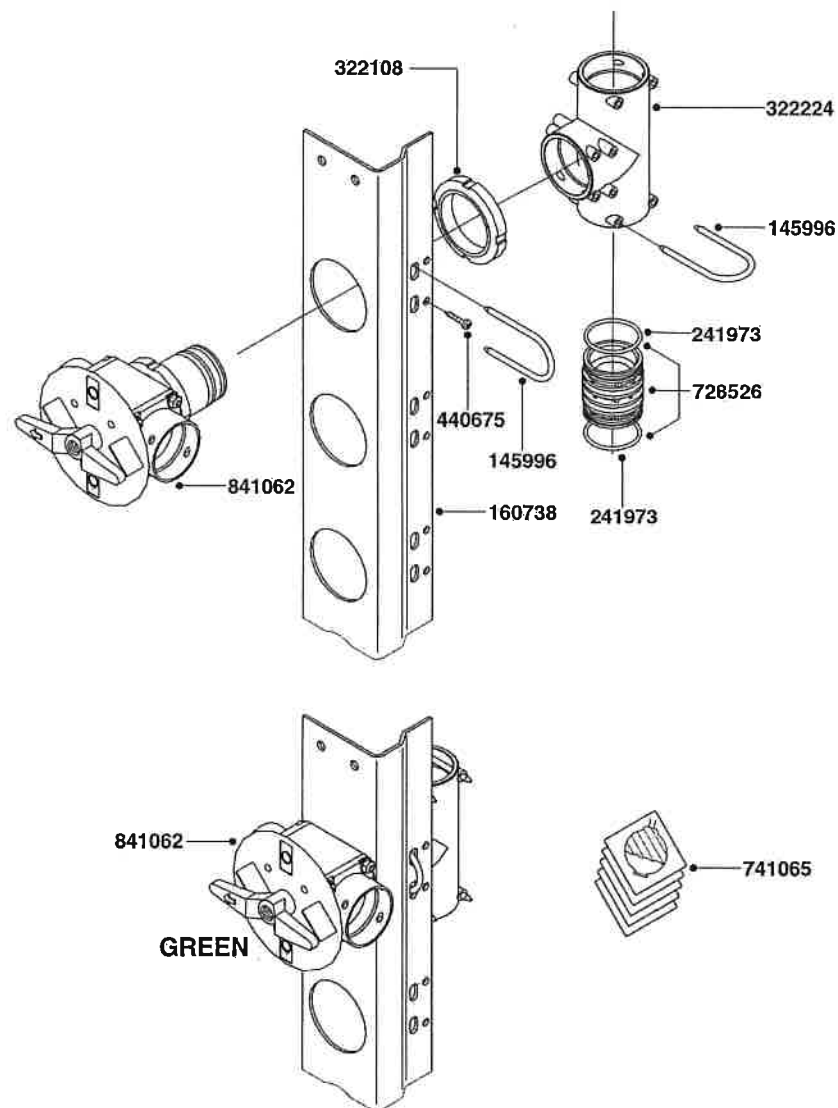
**Drp 6**  
Tank Fittings



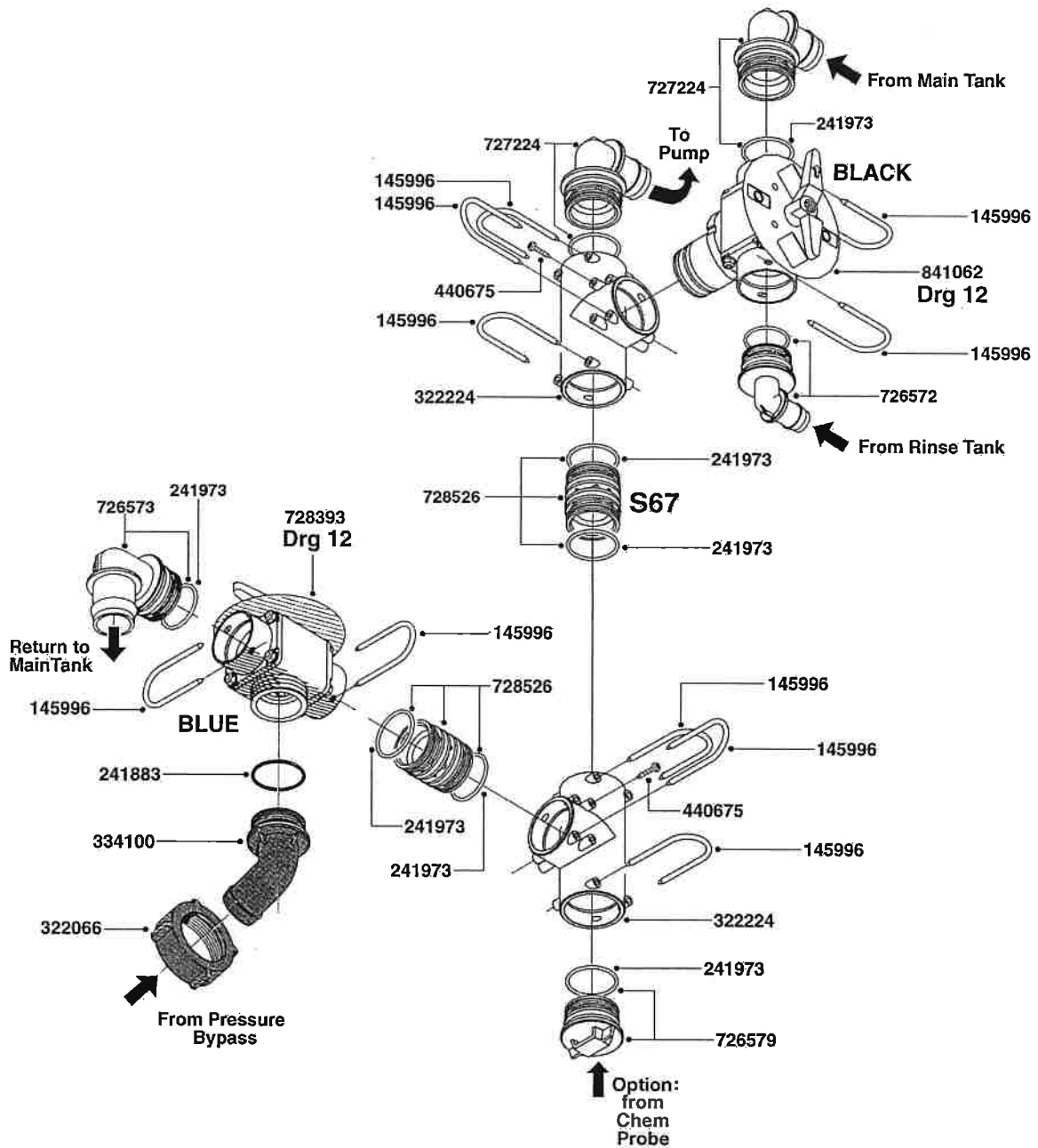
*Drg 7*  
**Filtered Fill Filter**



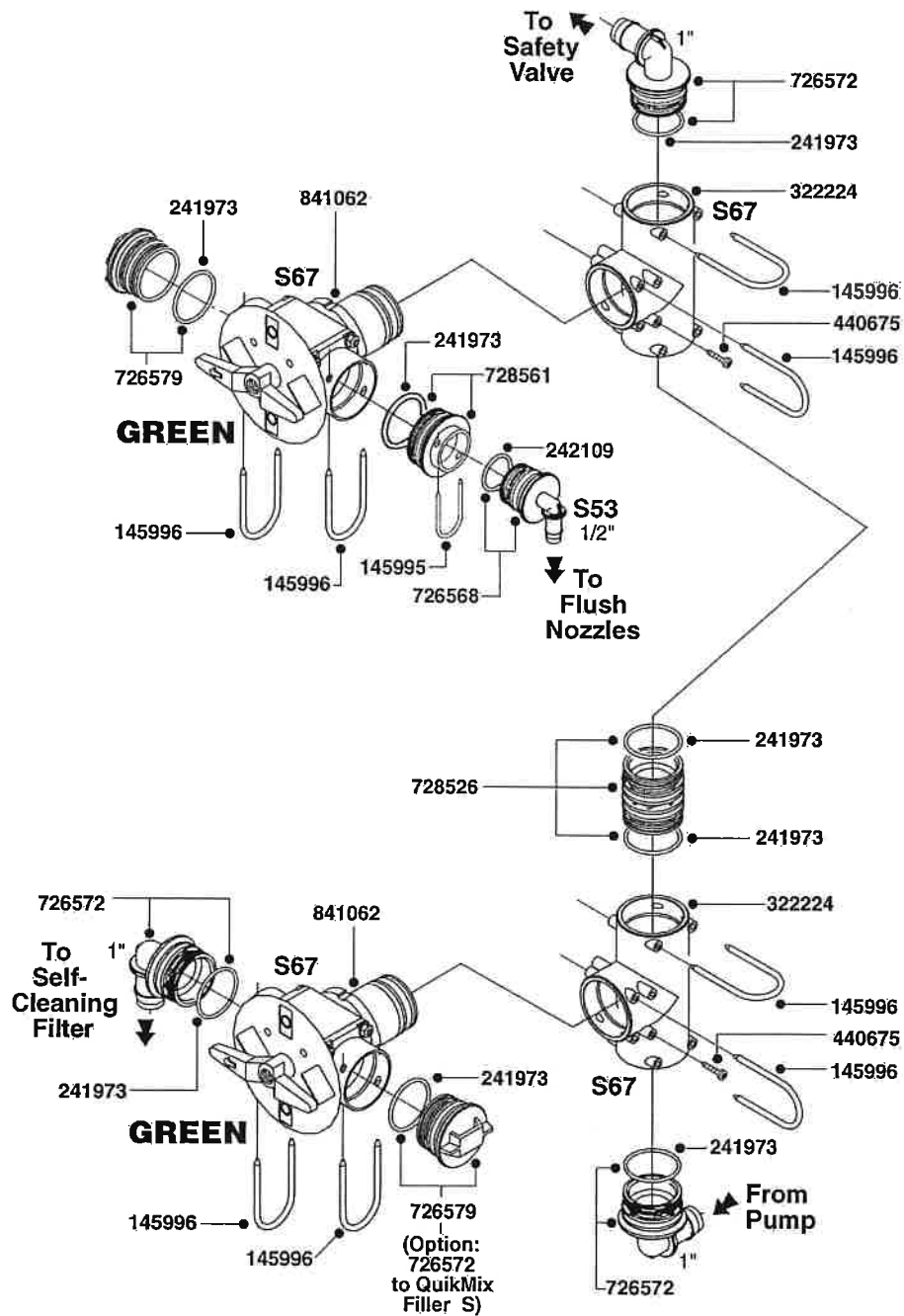
**Drp 8**  
Self Cleaning Filter



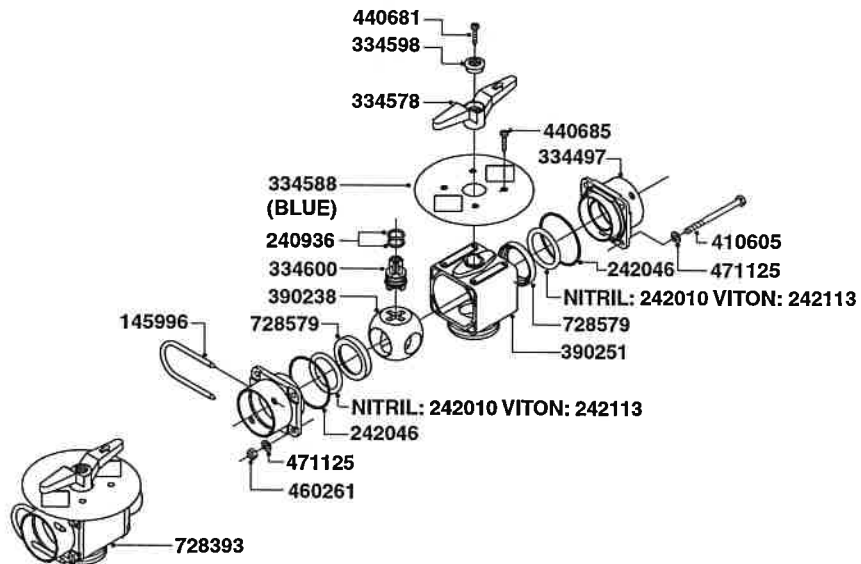
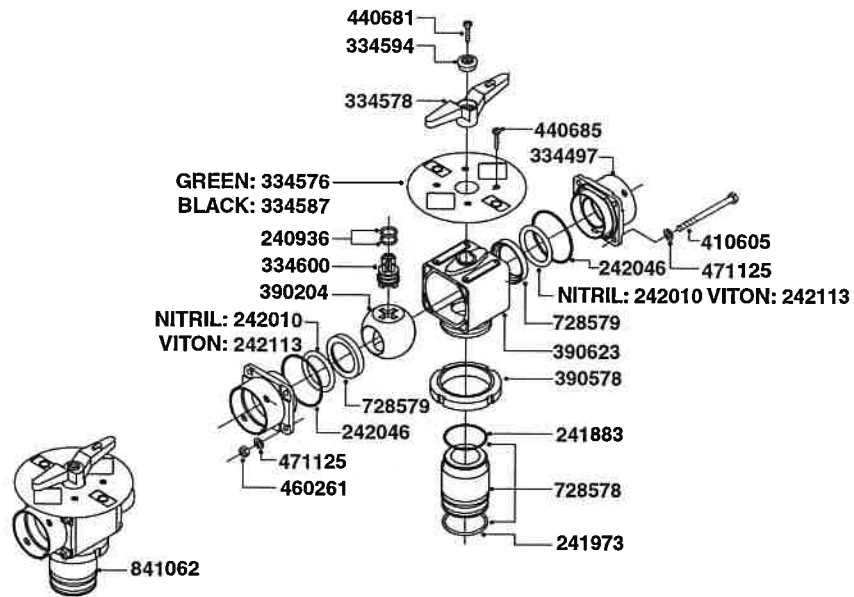
***Drg 9***  
**Pressure Manifold**



***Drg 10***  
**Suction Manifold**

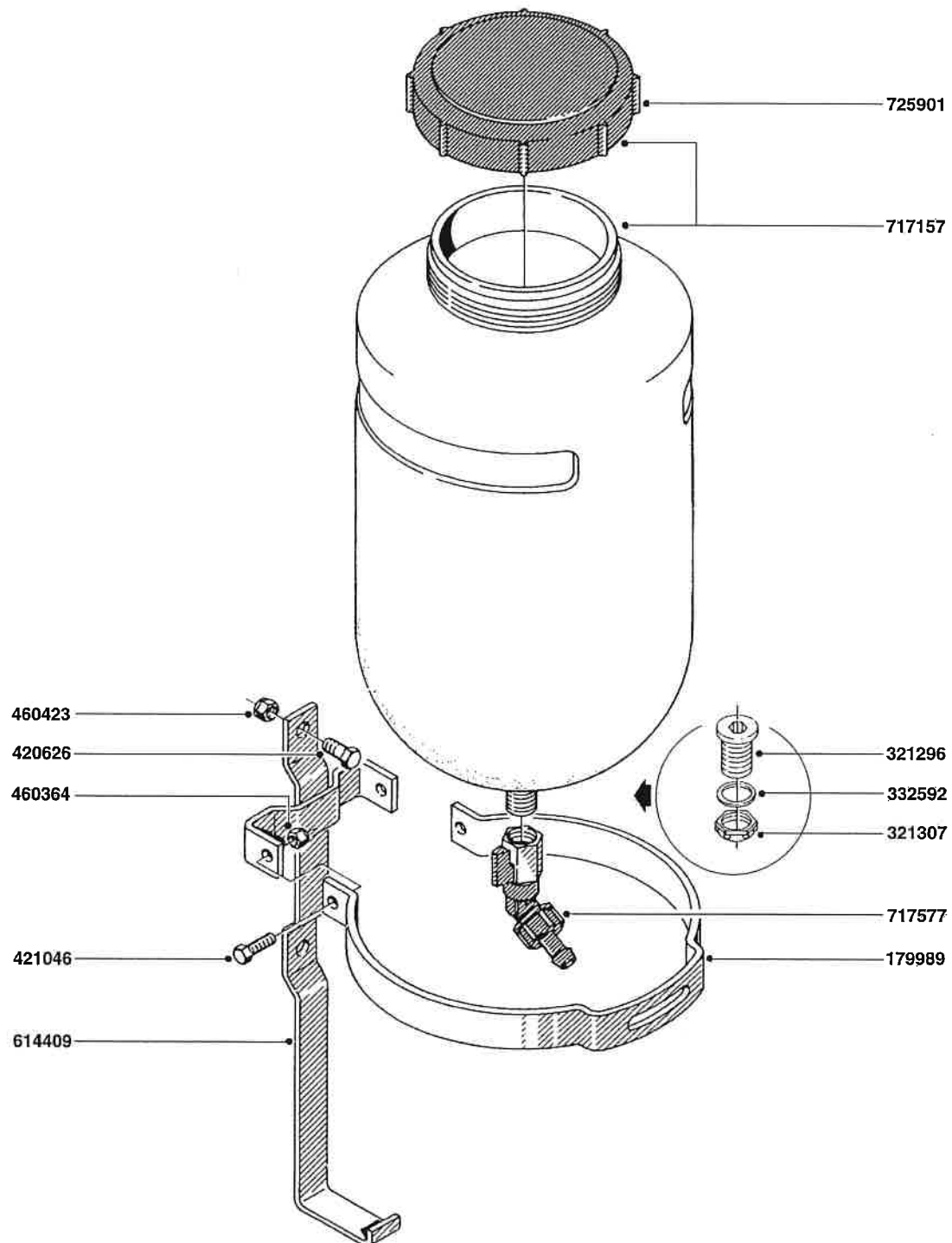


**Drg 11**  
**Pressure Manifold - Green Valves**



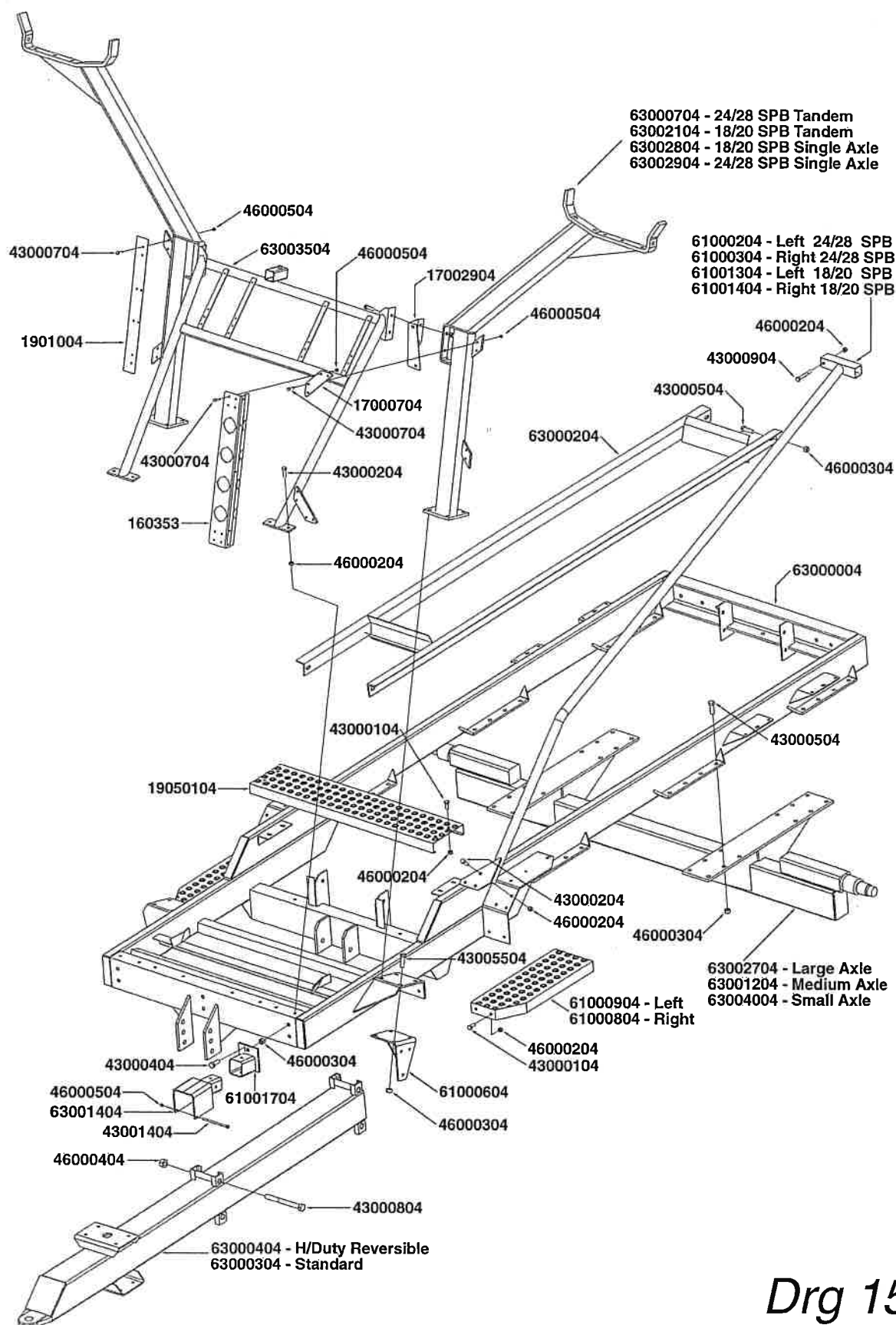
**Drg 12**  
Valves



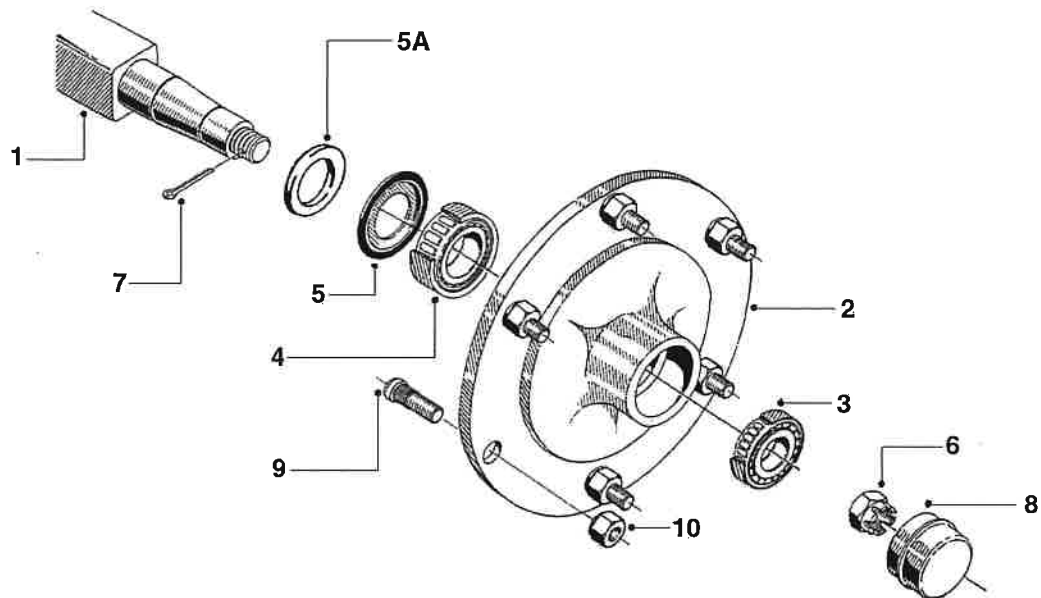


***Drg 13***  
Clean Water Tank



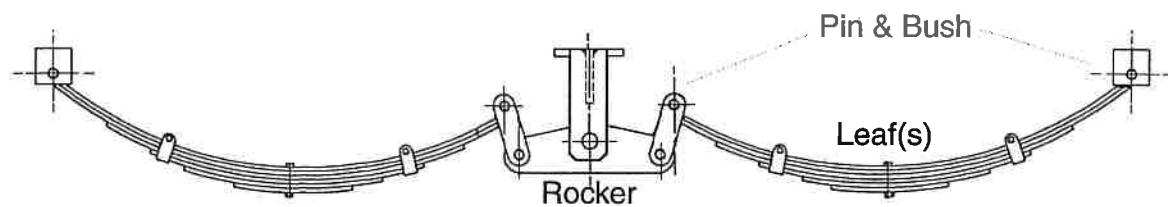


**Drg 15**  
 Chassis



ITEM	PART DESCRIPTION	PART NUMBER			
		50 mm 2700 litre Tandem Wheels	60 mm 3400/4200 litre Tandem Wheels	70mm 2700 litre Single Wheels	80mm 3400/4200 litre Single Wheels
1	Stub	5916360-2	5916371-2	5916375-2	59163380-2
2	Hub	5916360-7	5916371-7	5916375-7	59163380-7
3	Outer Bearing	5916360-5	5916371-5	5916375-5	59163380-5
4	Inner Bearing	5916360-9	5916371-9	5916375-9	59163380-9
5	Seal	5916360-4	5916371-4	5916375-4	59163380-4
5A	Seal Ring	5916360-13	5916371-13	5916375-13	59163380-13
6	Axle Nut	5916360-11	5916371-11	5916375-11	59163380-11
7	Split Pin	5916360-3	5916371-3	5916375-3	59163380-3
8	Grease Cap	5916360-12	5916371-12	5916375-12	59163380-12
9	Wheel Stud	5916360-6	5916371-6	5916375-6	59163380-6
10	Wheel Nut	5916360-8	5916371-8	5916375-8	59163380-8

**Drg 16**  
Wheel Hub



**COMMANDER**  
**2700 litre**  
**Trailer & Gooseneck**

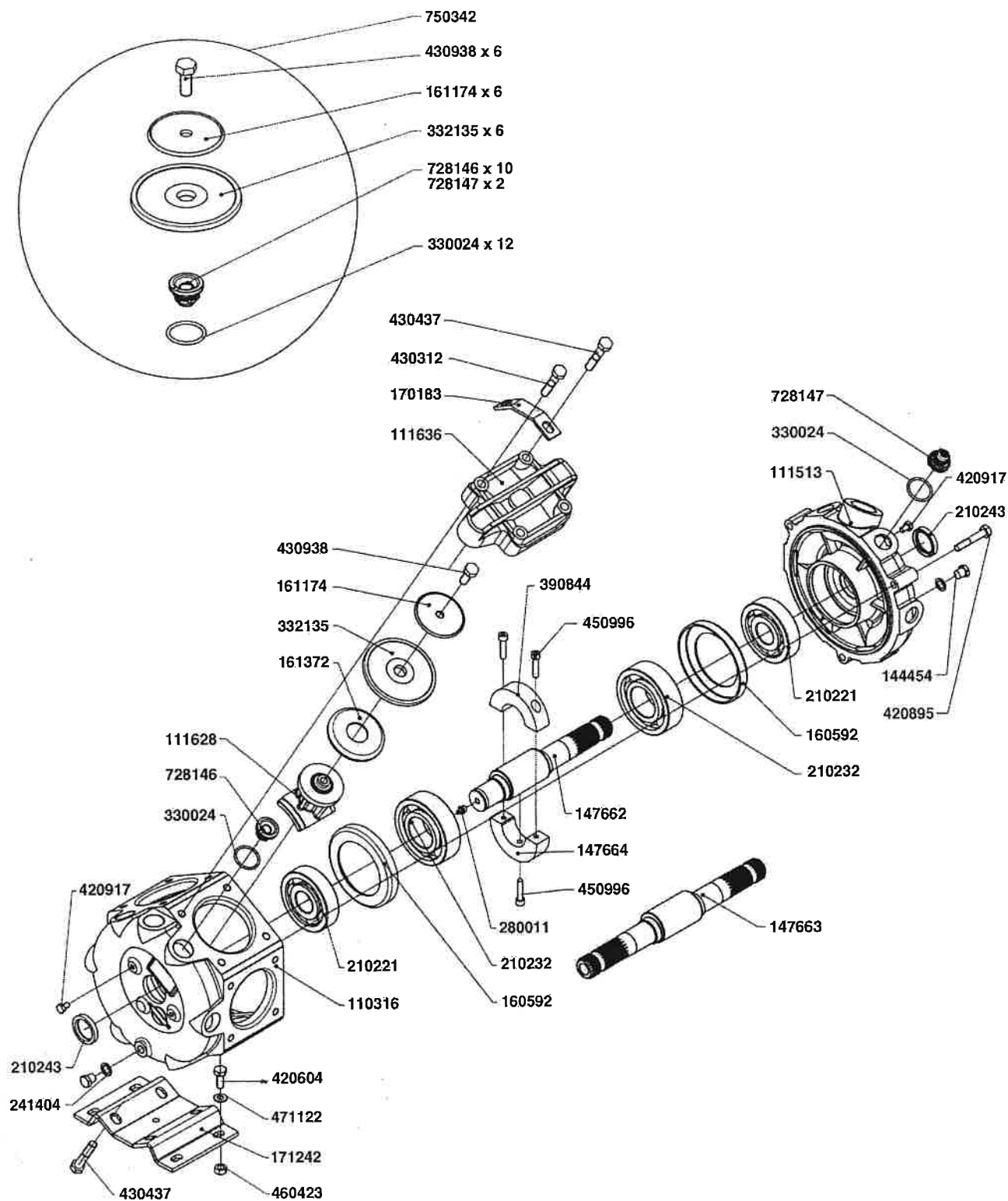
PART NUMBERS		DESCRIPTION
H1002	5916710	7 Leaf 65 x 8 Tandem Rocker Assembly
	5916710-20	Pin / Bush Kit
	5916710-21	Pin / Bush / Rocker Kit

**COMMANDER**  
**4200 litre**  
**Trailer**

PART NUMBERS		DESCRIPTION
H1006	5916725	9 Leaf 65 x 8 Tandem Rocker Assembly
	5916710-20	Pin / Bush Kit
	5916710-21	Pin / Bush / Rocker Kit

**COMMANDER**  
**4200 litre**  
**Trailer with 14.9 x 24 Gripsters**

PART NUMBERS		DESCRIPTION
H1400	5916730	7 leaf 65 x 8 Tandem Rocker Assembly
	5916710-20	Pin / Bush Kit
	5916710-21	Pin / Bush / Rocker Kit



**Drp 18**  
363 1000 rpm



## Notes

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