AMBIC®

TEAT SPRAYER

Technical Information and Spare Parts Catalogue

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in livestock health management

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Jetstream Teat Spray System

Product:	**Jetstream**
Part Number:	AJS/1000, AJS/1500, AJS/2000
Description:	A high power vacuum-operated teat spraying system. Quality teat sprayers that ensure fast and efficient teat disinfection whilst promoting better udder health and improved milk quality. The system offers a "state of the art" self-regulating pump, providing constant pressure for up to 3 guns operating simultaneously. Systems are expandable to meet the needs of even the largest dairy farms

ATS/402 Lever Gun and Adjustable Nozzle

ATS/502 Lever Gun and Solid Cone Nozzle

AJS/2402 Button Gun and Solid Cone Nozzle

Endurance Trials

During the final stages of development of Jetstream, 10 Power Units, running constantly @ 50 kPa (15"Hg) Units, were depressurised by an automatic cam-operated rig to simulate gun operation of powered units. Run time in excess of 12,500 hours.

10 Power Units, running constantly at 50 kPa (15"Hg) Vacuum supply, automatically switch off every 2 Minutes, to simulate start up and shut down of units each milking and to test the effectiveness of the dumping feature of the Relief Valve at shut down. Run time in excess of 12,500 hours.

Description of the System

Motive Power	Vacuum 40 kPa - 50 kPa (12"Hg – 15"Hg)
Pump	Double acting Diaphragm
Effective Ratio	6.5 : 1
Vacuum Switching	Directional Valve ATS/425
Maximum Developed Pressure	70psi (4.8 Bar) @ 50 kPa (15"Hg)
Relief Valve	Modular integrated vacuum and spring activated, self-regulating valve
Standard Operating Pressure	50 psi (3.4 Bar) @ 44 kPa (13"Hg)
Vacuum Connections	Easy-fit rubber elbow fitted to plain 10mm diameter hole drilled in pipeline
Component Fixing Method	Snap-in clips
Power Unit Wall Fitting	Jetstream screw/keyhole fixing, or existing ATS wall bracket
Power Unit Cover	Quick release toggle latches
Maximum No. of guns per Power Unit	50
Maximum No. of guns operated simultaneously	3
Maximum Length of Pressure Line	25 m (80 ft)
Typical Power Unit vacuum consumption	50 l/min (1.8cfm) atmospheric air at 50kPa
Typical Chemical Consumption per cow treatment	8 – 14 ml/s per Gun

Chemical Suitability

Whereas Jetstream is suitable for the majority of Approved sprayable teat disinfectants, the use of sprays containing Sodium Hypochlorite, Chlorine Dioxide or Peracetic Acid is specifically excluded – since their use will cause premature failure of Jetstream components.

Special Viton Jetstream kits are available for use with Chlorine Dioxide.

Peracetic Acid Jetstream kits are also available on request; however, the use of Sodium Hypochlorite solution with any Jetstream is NOT recommended and will invalidate warranty.

Jetstream Vacuum Operated Teat Sprayer

This modern, vacuum operated teat spray system is simple to install and maintain and is available in a range of colours for pre and post spray applications

Jetstream is a state of the art vacuum operated teat spray system, designed to provide the modern dairy farmer with the very best in fast and efficient mastitis control.

Jetstream is fully vacuum operated, requires no switches and automatically comes up to operating pressure within seconds of starting your milking machine.

Jetstream is manufactured from the highest quality chemical resistant materials for strength, durability and total reliability.

Unique – Jetstream employs the first high volume 'demand' diaphragm pump. This ensures stable pressure at the guns and an optimum spray pattern with up to 3 guns operating simultaneously.

Pressure adjustable Jetstream provides the first teat spray system to offer this facility, making it suitable for use with all proprietary brands of teat spray chemicals across a wide range of viscosities and is expandable up to a 50 gun system.

Jetstream is supplied as a complete unit. And is simple to install and maintain. A comprehensive range of spares is available.

Jetstream – Key Points

Efficacy	The best spray pattern for excellent teat coverage
Efficiency	Vacuum operated self regulating diaphragm pump maintains stable pressure for up to 3 guns operating simultaneously
Convenience	Fast, effective mastitis control at the squeeze of a trigger
Reliability	Jetstream only employs fully tested and proven components
Durability	Designed to operate with total reliability even in the harshest dairy environment, manufactured from high quality chemical resistant materials
Economy	Superior spray pattern provides for low chemical usage with high efficacy, low cost maintenance
Expandable	Designed to meet the needs of the largest dairy farm with up to 50 guns operating from a single power unit

Technical Features and Benefits

Based on the Ambic Classic system, Jetstream is a second generation "state of the art" automated teat spray system – being the first to employ a "self-regulating" diaphragm pump. The unique vacuum operated pump ensures that Jetstream will meet ever-expanding herd requirements well into the 21st century.

The Jetstream power unit was the result of a four-year development program with a rigorous test protocol for all components. Featuring a new concept of the variable demand diaphragm pump, it provides stable pressure at the guns by regulating the output. No other teat spray system can claim this feature.

The unit is suitable for use with all proprietary sprayable teat disinfectants of varying viscosity.

Easy to install, easy to service, the Jetstream layout features snap in, snap out components providing quick and simple maintenance.

High capacity for larger herds, the new power unit is designed to provide stable operating pressure for up to 50 guns with any 3 being in operation simultaneously.

The new pressure sensitive relief valve completes the link up of technically advanced features, which provide a system, which is: -

- Capable of producing and maintaining stable pressure for a superior spray pattern when several guns are operated simultaneously.
- Provides an ergonomic and technically superior gun for improved teat coverage.
- Easily adjustable for larger installations or varying viscosity disinfectants.
- Economical.
- Easy to install and maintain.
- Reliable.
- Expandable up to a 50-gun system.

Trouble Shooting a Jetstream Installation

FAULT	CAUSE	REMEDY
1. Unit does not spray	a. Vacuum Pump not switched on	a. Switch on Vacuum Pump
	b. Vacuum line not airtight	b. Check that Vacuum is reaching Power Unit by pulling Supply Pipe out and test with finger. Check Vacuum Pipe adaptor is correctly installed
	c. Constricted Vacuum Supply Pipe	c. Check for kinks and over-tightened Cable Ties
	d. Chemical Container is empty	d. Fill Container
	e. Intake Filter blocked	e. Clean Filter
	f. Pressure Line blocked	f. Clear blockage, check for kinks, constrictions and tight Cable Ties
	g. Spray Nozzle ATS/415 or AJS/2415 blocked	g. Disassemble, clean Nozzle
	h. Unsuitable chemical being used	h. Change to recognised Teat Disinfectant
	i. Pump AJS/2004 faulty	i. Check Pump and repair or replace
	j. Directional Valve ATS/425 faulty	j. Check Valve and clean, repair or replace
	k. Relief Valve AJS/2006 faulty	k. Check Valve and clean, repair or replace
2. Nozzle does not shut off cleanly or leaks	a. Air in pressure Line	a. Vent – holding gun nozzle uppermost and depressing trigger until liquid flow continuous and free of air.
	b. Control Valve ATS/405 or AJS2405 dirty or damaged	b. Clean and remove debris, or replace Control Valve
3. Chemical running out of Power Unit	a. Loose Connector Nut	a. Locate leak and tighten Nut
	b. Defective Pump or Relief Valve	b. Check Units and repair or replace
4. Unit pressurised when Vacuum switched off	Relief Valve faulty	Repair or replace
5. Chemical leaks into Vacuum line	Relief Valve or Pump faulty	Immediately disconnect Vacuum line & plug it. Repair or replace defective part(s).

Servicing – Kits

Jetstream installations are generally extremely reliable and require the minimum of servicing. However, in order to ensure good reliability and avoid breakdowns, we recommend that the following kits be used at the intervals specified. On robot milking installations, where the Jetstream is operating for 24 hours every day, service intervals should be shortened from those shown.

AJS/2024 - Jetstream Minor (Annual) service kit – this comprises parts to service the Directional Valve and also includes an intake filter (which protects the pump non-return valves from becoming obstructed by debris in use).

AJS/2025 - Jetstream Major (5-yearly) service kit– this includes the components of the AJS/2024 plus a complete replacement Diaphragm Pump unit and rubber parts for the Pressure Relief Valve.

Servicing Spray Guns & Trigger Valves

Spray guns generally require no regular maintenance apart from being kept clean – especially to avoid dirt build-up underneath the lever (which can cause malfunction of the valve).

Adjustment/Replacement of Nozzles

ATS/402 – Adjustment of nozzle – on this type of gun the nozzle may be adjusted to best suit the type and viscosity of spray being used. All new guns are tested immediately prior to despatch and their nozzles set to give an appropriate spray using water – hence, if using chemicals of similar viscosity to water, no further adjustment should be necessary.

To (re)set the nozzle, tighten the nozzle by turning clockwise (when viewed from the nozzle spray outlet) until resistance to turning is felt, then unscrew the nozzle (anti-clockwise) ¾-1 turn - see fig. 1 below left. If spray exits from the nozzle in a solid jet, then turn clockwise. If spray pattern is uneven (one-sided) turn anti-clockwise to improve spray spread, or remove and clean nozzle.

Fig. 1 – Adjusting Nozzle (Nozzle for ATS/402 Gun)

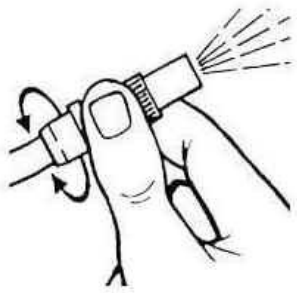
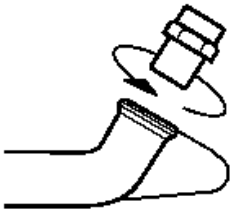


Fig. 2 – Changing Solid Cone Nozzle (Nozzle for ATS/502 & AJS/2402 Guns)

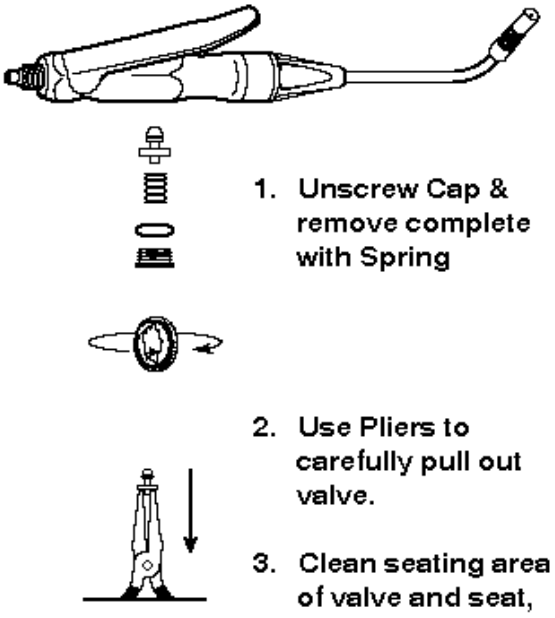


ATS/502 & AJS/2402 – Replacement of nozzle – the nozzle on this type of gun is NOT adjustable, but can be changed in the event of wear, permanent blockage, or damage to the internal swirl. Remove the nozzle from the gun lance by unscrewing anti-clockwise – see fig. 2 above right. Fit the new nozzle, having cleaned and dried the threaded area thoroughly, and use a smear of silicone bath sealant to ensure proper sealing – do NOT overtighten the nozzle.

On rare occasions, the solid cone nozzle will produce a single straight jet of spray; this is usually due to an internal blockage or misplacement of the internal swirl and the remedy often necessitates the. replacement of the nozzle (AJS/2415).

Leakage/dripping when not in use – this problem is usually caused either by debris in the trigger valve or by wear in that valve. Failure to properly purge air from the gun before spraying most often leads to slow shut-off after spraying but can also be responsible for dripping when the gun is hanging down from the coil. Dismantling and replacing the trigger valve is shown in fig. 3 opposite – use only a coin, wide-bladed screwdriver or Ambic Spanner to avoid damage to the screw slot.

Care should be exercised to ensure that the internal O-ring, against which the moving valve seats, is properly located and also that the O-ring seal on the valve is lubricated by a smear of silicone grease where it passes through the gun body.



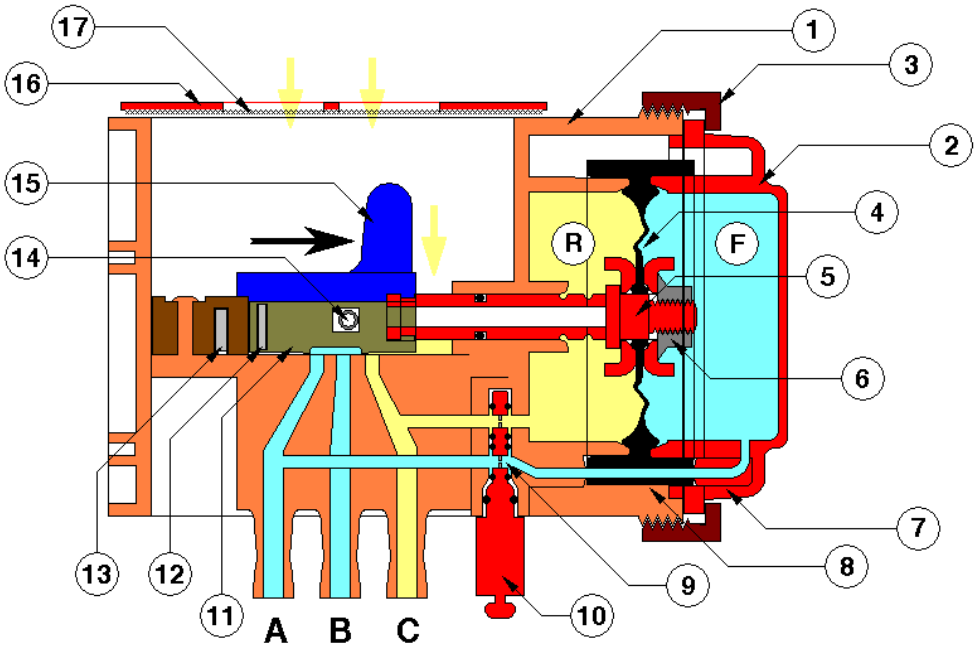
Servicing the Directional Valve (ATS/425)

Operation

The Valve serves as the main power source for the unit, in that it provides a pulsating signal, alternating between vacuum and air, to the diaphragm pump at a rate of 30-33 pulses per minute.

Its method of operation is illustrated in the diagrams Fig. 1 below and 2 overleaf.

Fig. 1



The unit comprises a Main Body (1) which houses two vacuum chambers (**F** & **R**) either side of a special diaphragm (4). The Front chamber (**F**) is formed between the Front Cover (2) and Diaphragm (4) whilst the Rear chamber (**R**) is formed between the Diaphragm (4) and Main Body (1). The Front Cover is held in place by the Large Black Nut (3).

The Diaphragm (4) is held in place on a central Spindle (5) by two washers and the Spindle Nut (6). The spindle passes through the body to connect to the Valve Drive Box (15) and is sealed by means of a single O-ring and silicone grease applied to the spindle – thereby ensuring that the chamber (**R**), created by the diaphragm is vacuum-tight when the spindle moves.

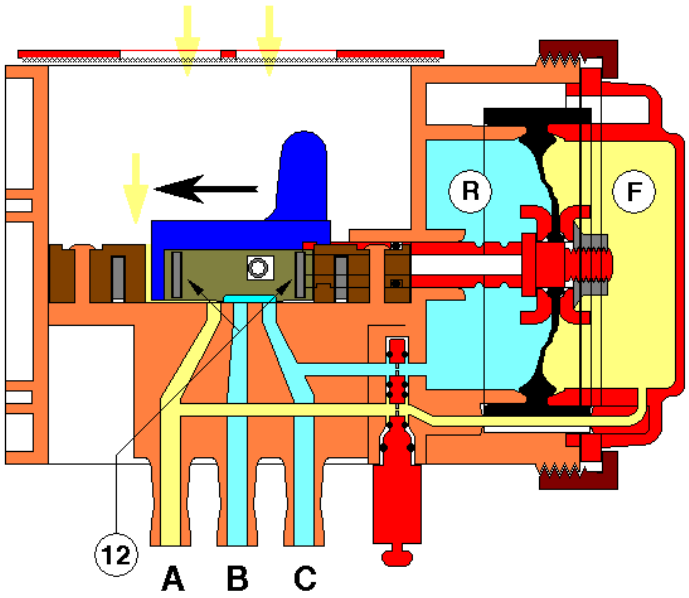
The Front chamber (**F**) is connected to port **A** by an offset moulding (7) in the Front Cover (2) which feeds air from/to the chamber through an offset moulding (8) on the Diaphragm (4) via a stainless steel flow restrictor (9). Air/vacuum from the Rear chamber (**R**) is connected to port C past a similar flow restrictor (of identical bore) also contained within the body of the (removable) Bleed Insert (10).

The Valve Slide (11) at rest is biased to one of two positions by two mechanical devices:

- the spring (14) effectively connects the Valve Slide (11) to the Valve Drive Box (15).
- the Magnet (13), contained within the magnet retainer block (fixed to the body), attracts one of the Magnet Plates (12) contained within the Slide Valve (11).

With the unit switched On, VACUUM is continually applied via the centre nipple (B). As shown at Fig. 1, the position of the Slide Valve (11) supplies Vacuum to port A and the Front diaphragm chamber (F). Air enters the body space above the Valve Slide assembly via the perforated Cover (17) and the fibre Air Filter (16) to leave port C at atmospheric pressure. Vacuum builds up slowly in chamber (F), due to the flow restrictor, but eventually it will move the diaphragm sufficiently to overcome both spring and magnetic forces to "flick" the Slide Valve over into the position shown in Fig. 2.

Fig. 2



NOTE: All items are shown diagrammatically in **Fig. 2** whilst, for clarity, certain items are omitted from the area of the Slide Valve and front Magnet/retainer in **Fig. 1**.

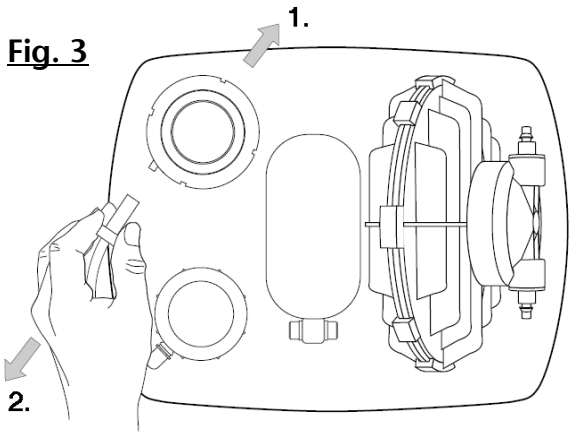
With the Slide Valve (11) in the position shown at Fig. 2, the Vacuum supply at port **B** is directed to port **C** and the Rear diaphragm chamber (**R**). Air enters the body space above the Valve Slide assembly via the perforated Cover (17) and the fibre Air Filter (16) now leaving port **A** at atmospheric pressure. Vacuum builds up slowly in chamber **R**, due to the flow restrictor, and eventually moves the diaphragm sufficiently to overcome both spring and magnetic forces to "flick" the Slide Valve back over into the position shown in Fig. 1 (overleaf).

Location & Maintenance

The Directional Valve is located at the top right of the Power Unit (see diagram Fig. 3 opposite).

This valve, if regularly cleaned and serviced, is extremely reliable. It is relatively easy both to check and to service in situ. To remove completely, unscrew transit screw from the rear of the case (if not already removed during initial installation), slide DV out of clips using a twisting action (1.) then grasp rubber tube manifold and pull to detach (2.).

Fig. 3



The DV is a key part of the unit; if the DV ceases to work then the teatsprayer will not work at all.
Regular servicing should be carried out as follows:-

FIBRE FILTER (17) - Replace every 1000 hours or sooner if heavily contaminated. Manually release Valve Filter Cover Clips by levering with fingers and carefully remove Valve Filter taking care not to drop dust into the working parts. Fit new Filter by reversing the process.

BLEED INSERT (10) - Pull red plastic Bleed Insert (10) vertically downwards out of main body, taking care not to dislodge the 4 'O' Rings. Wash off any dirt and inspect the two small restrictor holes near the end. Clean every 1000 hours or sooner if heavily contaminated, using thin wire attached to bleed

insert. Replace the Bleed Insert carefully, making sure that all small O-rings on both sides are correctly seated in place, then push home to seal.

DIAPHRAGM ASSEMBLY (4) Replace every 3000 hours. First remove Filter (see above). Remove Spring (14) and if it shows any sign of corrosion, replace it. Pull Drive Box (15) upwards to detach it from the spindle (5) using pliers on lug. Unscrew large Black Nut (3), gently prise off red cap, using a screwdriver in slot provided. Pull out Rubber Diaphragm by grasping outer rim. When re-fitting the new Diaphragm Assembly. Fit new Diaphragm Assembly by reversing the operation, taking care not to remove the grease on the shaft and ensuring that the semi circular Moulding (8) engages in the recess on the main body. When replacing the Drive Box push hard until a click is heard indicating proper engagement. Refit the Spring. Prior to fitting the Filter and Cover, push Drive Box from end to end. An audible click should be heard, indicating proper operation.

It is most common that the performance of the DV deteriorates gradually in use – often due solely to the ingress of dust/dirt – and this can give rise to a number of symptoms:-

a) Increasing difficulty in sucking up chemical and priming pump.
b) Reduced Spray output pressure / slow to reach/recover working pressure.
c) DV slide valve will only move automatically in one direction.
d) Excessive vacuum consumption/leakage.

The most likely cause of the above problems is dirt in the stainless steel flow restrictors and this can easily be remedied by cleaning as described above (see BLEED INSERT).

a) Increasing difficulty in sucking up chemical and priming pump
b) Reduced Spray output pressure / slow to reach/recover working pressure

Both these symptoms can be caused by the slowing down of the DV due either to dirty flow restrictor(s) or impending failure of the diaphragm.

The normal operating speed of the DV is 30-33 pulses per minute (60-66 "clicks" per minute) at this speed, the unit will achieve full working pressure (50 – 60 psi) within 30 seconds of applying full vacuum. At speeds significantly lower than 25ppm, slow chemical uptake and pressure build-up will result making spraying less effective and considerably prolonging pressure recovery after spraying.

If the unit has recently been re-assembled following service, check that the diaphragm is properly located in the body and that the end cap has been replaced in the correct position. Check particularly that the offset moulding (8) on the diaphragm is correctly located in the corresponding recess in both the body and the Front Cover (7). Ensure that the drive box is correctly clipped in place on the spindle and that the spindle shaft is not running dry of grease.

c) DV slide valve will only move automatically in one direction.
d) Excessive vacuum consumption/leakage.

Both these symptoms are most likely caused by a failure of the diaphragm (or, in rare cases, a dry running Spindle) – in the case of the first symptom (c), check that the Valve Drive Box (15) is correctly located with the Spindle and that the Spring is intact and correctly positioned; check also that the Slide Valve (11) is correctly located under the Magnet Holders and that these have not come loose from the body.

Check that the Bleed Insert (10) is correctly inserted, pushed fully home and check that none of the O-ring seals are distorted/damaged and thereby causing vacuum leakage.

Having carried out the checks already mentioned, then remove and carefully inspect the diaphragm for signs of perishing or small punctures and replace as appropriate.

Excessive Vacuum consumption, coupled with the DV being slow or inoperative, can be caused by a failure of the large (central) diaphragm in the Diaphragm Pump.

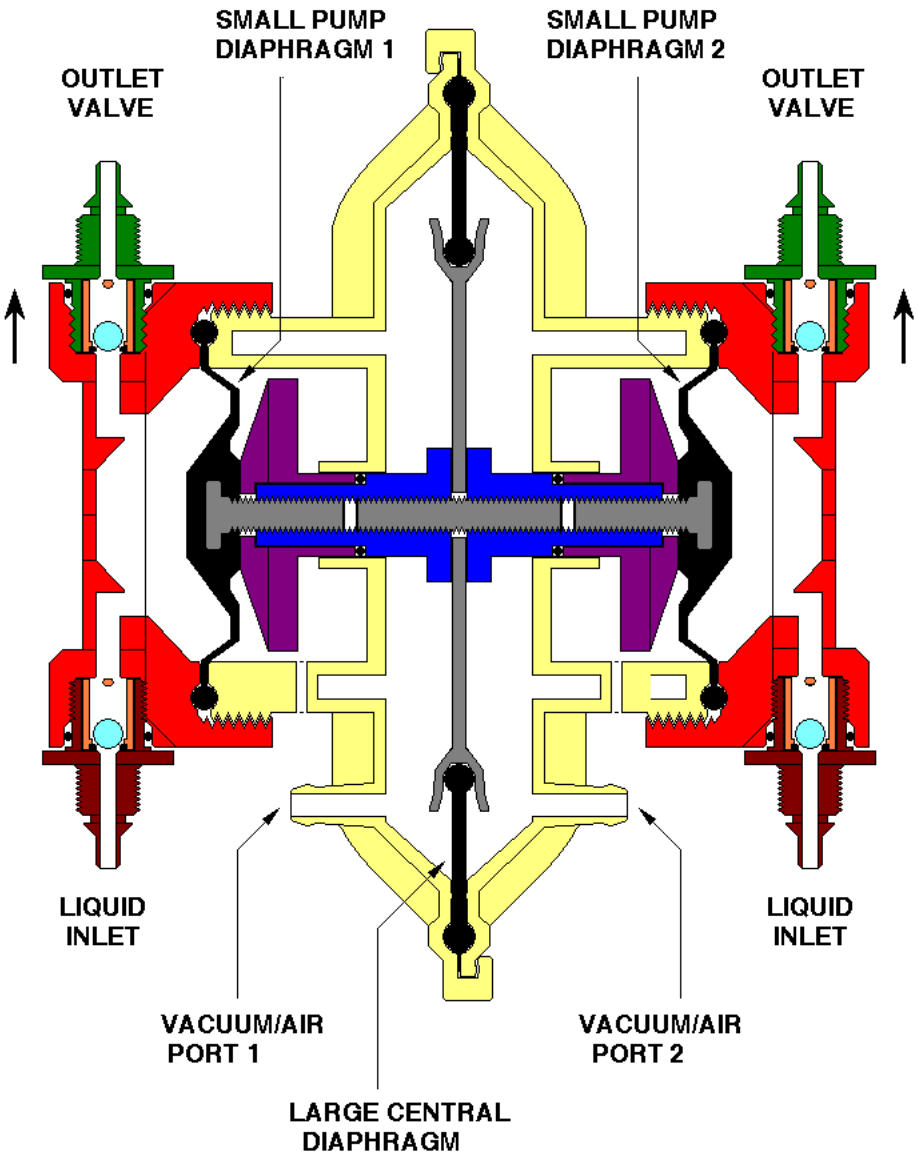
Servicing the Diaphragm Pump (AJS/2004)

Operation

The operation of the diaphragm pump relies on two small diaphragms (contained within the red housings on each side of the unit) to pump fluid alternately. These diaphragms are driven by a much larger diaphragm contained within the main body of the unit and powered by the alternate application of Vacuum and Air to either side of this large diaphragm by the Directional Valve.

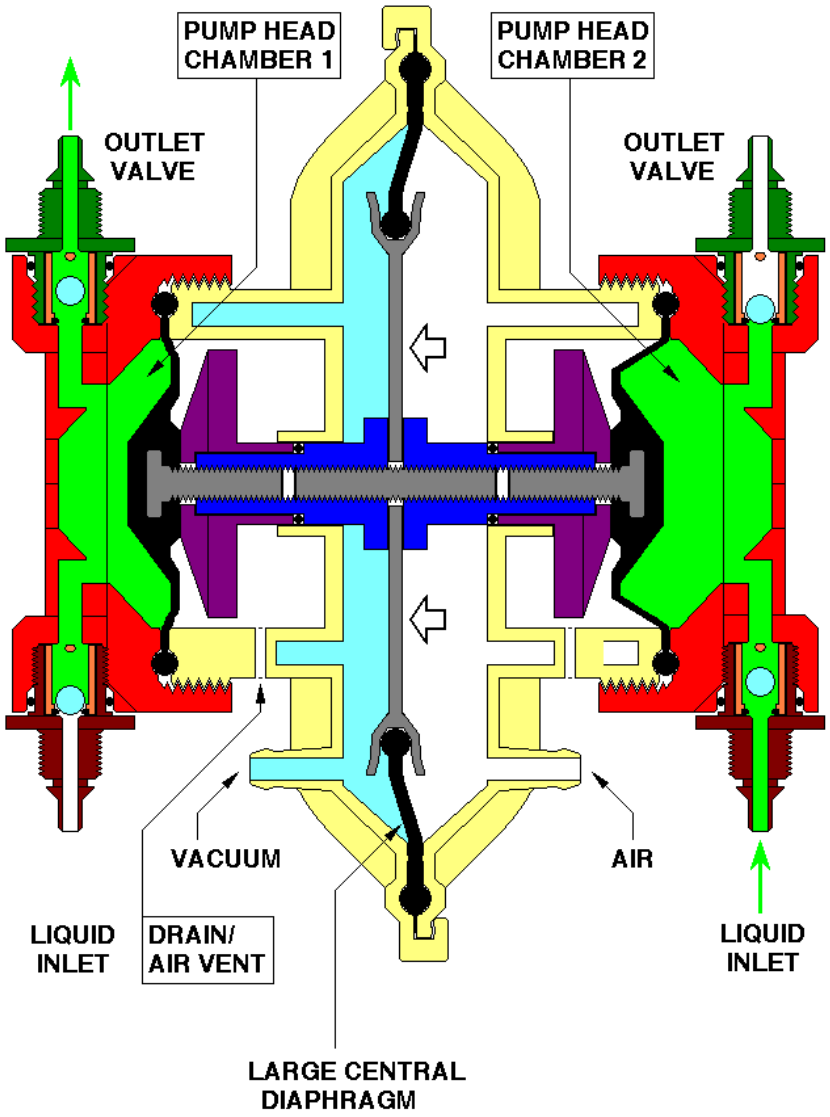
A diagram illustrating the main components of the diaphragm pump is given at FIG. 1 below:-

FIG. 1 AJS/CLASSIC DIAPHRAGM PUMP SECTIONAL DRAWING TO SHOW COMPONENTS & OPERATION



When Vacuum is applied to Port 1, air will also be applied to port 2 the pressure of which will cause the large diaphragm to move towards the left (see FIG. 2 below). Small Pump Diaphragm 2 is moved so that liquid is sucked into the Right–hand Pump Head Chamber 2 and any liquid already in the Left-hand Pump Head Chamber 1 is simultaneously discharged.

FIG. 2



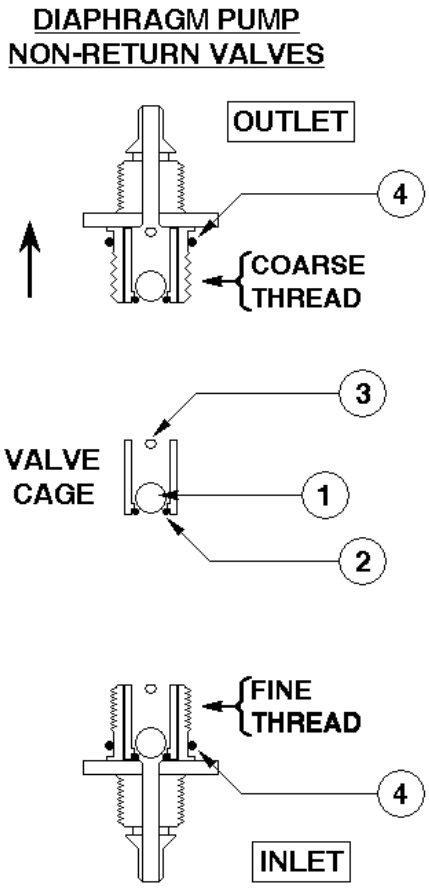
When the situation is reversed, with vacuum applied to Port 2, liquid collected in chamber 2 is discharged whilst chamber 1 is replenished.

In order for the pump to function correctly the chamber containing the Large Diaphragm is sealed from the liquid being pumped. The central diaphragm is essentially a "doughnut" shape - sandwiched tightly between two (welded) steel plates at the centre and the two plastic pump body halves (which are locked together tightly by bayonet type lugs).

The two Pump Head Chambers should not leak, but in order to function must have an air gap behind the diaphragms – this Drain/Air Vent also serves to allow liquid from a split Small Pump Diaphragm to show inside the Jetstream case.

Non-Return Valves control the Inlet to and Outlet from the Pump Head Chambers. These are of similar construction and, at first glance, look identical. However, there are obvious differences and these are illustrated in FIG. 3 overleaf.

FIG. 3



Both Non-Return Valves comprise an outer body with inner valve cage. Although the Valve Cages appear identical, they are NOT – having two vertical key-ways on the outside so that the Outlet cage cannot be inserted into the Inlet valve body.

The essential part of the Non-Return Valves comprises a Glass Ball (1) retained within a plastic cage by a "flip-over" bar (3) and seating onto a small O-ring (2).

The Non-Return Valves rely on gravity to seat correctly, so **will only function when pump is mounted vertically** and **the correct way up** (arrow on Pump Head pointing upwards).

Liquid sealing within the Pump Head Body is accomplished by a Large O-Ring (4) on the outside of the Body.

Identification of Non-Return Valves

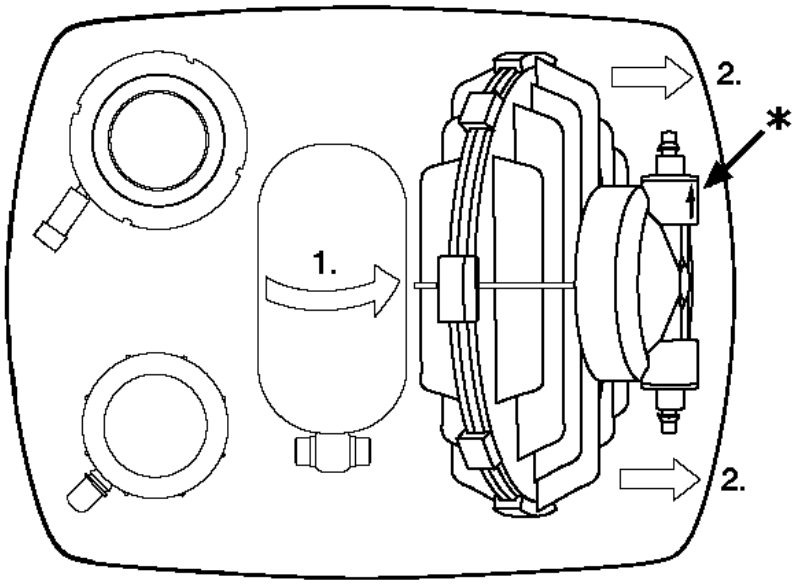
Outlet Non-Return Valve (ATS/446) has a Coarse thread and, when correctly assembled, the O-ring seat can clearly be seen.

Inlet Non-Return Valve (ATS/445) has a Fine thread (similar that on the tubing connection) and, when correctly assembled, no O-ring can be seen.

Although it is possible to dismantle non-return valves (and this is occasionally necessary in the event that debris gain entry to the pump, by way of a split/missing intake filter, and prevent the ball from seating), it is generally not recommended. Whilst it is usually possible to lift the "flip-over" bar of the Inlet valve and remove the ball to clear out debris lodged within the valve, it is practically impossible to remove the valve cage undamaged from the Outlet valve to carry out a similar operation.

Location & Removal

FIG. 4



The diaphragm pump is located on the Right-hand side of the Jetstream as illustrated in FIG. 4 opposite.

It is recommended that the pump is removed from the Jetstream unit before any maintenance is carried out.

BEFORE ATTEMPTING TO REMOVE, OR SERVICE, THE PUMP DISCONNECT VACUUM SUPPLY & ENSURE THAT THE PRESSURE BOTTLE IS EMPTY OF FLUID BY OPENING (OR DISCONNECTING) ALL GUNS TO FULLY DEPRESSURIZE SYSTEM.

During assembly at the factory the diaphragm pump is retained in the case by two cable ties. These should have been removed on installation of the unit.

To remove the pump, it is first necessary to unscrew the Pressure Bottle (action **1.** FIG. 4 above) in order to position the pump so that it can be pushed free from the clips in the rear of the case in the direction shown as action **2.** above. Once the pressure bottle has been removed, take care not to lose the O-ring seal (which often remains inside the threaded bottle housing).
The pump will now be free from the case but its movement will still be restricted by the tubing.

- Remove the two rubber elbows, which connect the pump to the Directional Valve, by pulling the elbows off the two ports.
- Slacken off completely all the nuts which retain the PVC tubing onto the liquid inlet and outlet nipples and use a hot air gun to soften the PVC tubing before pulling it off from each nipple.

BEWARE – DO NOT ATTEMPT TO REMOVE THE PVC TUBE UNTIL IT IS WELL SOFTENED – YOU WILL ALMOST CERTAINLY BREAK OFF THE NIPPLES FROM THE NON-RETURN VALVES.

Maintenance & Servicing

The diaphragm pump is not particularly easy to dismantle to service and, in many cases, it may be more economic to replace the complete pump (AJS/2004), rather than to spend time servicing the unit. For any pump more than 10 years old, it is almost certainly worthwhile replacing the complete pump.

The Large Central Diaphragm is extremely reliable and can easily withstand more than 10 years' daily use. Its failure could be wrongly diagnosed as a Directional Valve fault since it will almost certainly affect the correct operation of this component. Failure of the Large Diaphragm can be confirmed by removing the tube from one of the two Vacuum/Air Ports, temporarily blocking that tube (e.g. with a finger) and, with the unit running, listening to see if vacuum can be heard leaking from the open Vacuum/Air Port.

A failure of the pump to perform satisfactorily may give one or more of the following symptoms:-

a) **Liquid being difficult to draw up – liquid "oscillates" in inlet tube.**
b) **Liquid being difficult to draw up and/or pump being apparently intermittent in operation.**
c) **Liquid being pumped, but leaking into the case (from pump drain/vents)**
d) **Reduced Spray Output Pressure**
e) **Reduced Spray Output Volume**
f) **Pump not pumping at all (no visible liquid movement).**

a) Liquid being difficult to draw up may simply be due to the pump non-return valve(s) not seating properly due to lack of liquid. Especially on new pumps, the non-return valves rely on being wet to seat correctly. If liquid is seen oscillating in the intake tube, this implies that the pump is actually moving liquid but that a failure of one or more valves to seat means the liquid does not pass through the pump. There are a number of "tricks" to overcome this problem and ensure that the valves seat correctly as follows:-

- water is invariably easier to lift than the thicker teat sprays – so use water to prime pump.
- raise the container of liquid up so it is on a level (or even above) the teat spray.
- leave the guns / liquid output line open - so there is no back-pressure.
- If all else fails, prime the pump using the vacuum system by:
    - Disconnect the tube from the liquid output line
    - Connect the unit to vacuum and set it running
    - Take a separate tube from a source of vacuum and push it temporarily on to the output nipple of the unit until water can be seen to come from the pump

  Once water has passed through the pump, the pump should continue to pump.

Disconnect the vacuum from the unit, reconnect the liquid output line and, upon re-connecting the vacuum, the pump should start up and, with the guns/output line closed, the pressure bottle should fill up within 30 seconds to about 30 mm down from the top.

If all these "tricks" fail then it is likely that the cause is dirt or debris in one or more of the pump non-return valves. However, there is another possibility - outlined in **section b) below.**

Pump Non-Return Valves screw into the pump body with a normal thread and can be removed from the pump head using the special Ambic "C-spanner", having first removed the PVC tubing from each connection. Upon removal, the valve should be inspected to see that the glass ball is free to move within the ball cage and, if not, it is usually possible to dislodge any obstruction to the ball seat – take care not to damage the plastic close to the O-ring which forms the ball seat. It is suggested that the two Inlet valves are inspected and replaced before the Outlet valves are removed – this will avoid any confusion over distinguishing between the two valves. However it is easy to distinguish the valves on two counts:-

- Outlet valve has coarse thread (Inlet valve has Fine thread, similar to ¼"BSP)
- Outlet valve has small O-ring accessible once removed; Inlet valve has "flip-up" bar permitting easy access to and removal of the glass ball.

If no debris can be found obstructing the seat in any of the four valves removed for inspection then it may be necessary to replace all 4 valves **BUT check out section b) below first.**

b) Liquid being difficult to draw up and/or pump being apparently intermittent in operation. If all the "tricks" at **a)** above fail to reveal a problem, then failure to suck up liquid could be due to air leakage somewhere in the inlet pipe system.

- Check the tightness of all inlet tubing connections (including the connections at the rear of the case where the tubes connect onto the manifold).
- Check that the PVC tubing is properly fitted onto the barbs and has no splits or holes in it.
- If the PVC tubing is clear, then observe the tube near the T-piece where tubes serve the Pressure Relief Valve and the inlet to the pump for air bubbles. If air bubbles are seen, then try to detect their source and remedy the matter.

Ultimately, the seats on one or more Pump Non-return Valves may be faulty (it is often difficult to see whether the seats are damaged in some way – especially on the Inlet valve) so replacement of the 4 non-return valves (ATS/445 & ATS/446) may be necessary. Following replacement of the non-return valves (or even dissembly of the pump), it is advisable to ensure that the non-return valves are wetted by running water through the pump from inlet to outlet with the pump in an "inverted" position; this should avoid problems with liquid priming when the Jetstream unit is restarted after completion of pump servicing.

c) If a considerable amount of liquid is leaking from the pump then the most obvious (and likely) cause here is the failure of one of the Small Pump Diaphragms – this can also be responsible for the other faults, but it is very unlikely.

Replacement Small Pump diaphragms are available as spare parts (ATS/456) and can be replaced with not too much difficulty once the pump has been removed from the Jetstream unit. It is advisable, for a number of reasons, to remove one pump head at a time; however even if only one pump diaphragm is found to have failed REPLACE BOTH DIAPHRAGMS, as the failure of the second diaphragm will often follow shortly after the first one. BEFORE UNSCREWING THE PUMP HEAD, note the orientation of each pump head non-return valve port relative to the vacuum port on that side of the pump.

Unscrew the plastic pump head by gripping carefully with a suitable wrench whilst holding the pump body firmly in such a way that will not cause any damage to the body or its strengthening ribs. Unscrew the pump head completely to reveal the diaphragm.

Careful inspection of the diaphragm should show whether it is split or not, but it is often necessary to remove the diaphragm to reveal the split – this can be undertaken by lifting and gripping opposite edges of the diaphragm by hand and turning it anticlockwise to unscrew completely. Replacement of the diaphragm is essentially the reverse of removal, but it is advisable to lubricate the "rolled" edges of the diaphragm with a silicone fluid lubricant to ease assembly and when tightening down the pump head. Make sure that the head orientation is correct (as compared to its original setting) before refitting the non-return valves into their respective ports.

d) Reduced Spray Output Pressure is very often due to the inefficient operation of one or more non-return valves but can sometimes be indicative of stretched/worn pump diaphragms. It can also be caused by a failure of the Pressure Relief Valve – either its diaphragms or the module rubber pad – refer to the section on **Pressure Relief Valve service** for more information. A blockage (or rather partial blockage) of the pressure output line can also be responsible for reduced spray output pressure.

e) Reduced Spray Output Volume can have similar causes to those identified at **d)** above.

f) Pump not pumping at all (no visible liquid movement) can be due either to the pump, or a failure of the alternating vacuum air supply from the **Directional Valve**. Most likely pump problems have already been identified in the preceding sections; however, bear in mind that a blockage (or significant air ingress) anywhere in the pump liquid inlet system will almost certainly result in this symptom. The failure of the large (central) diaphragm would give this symptom, but would also affect the operation of the Directional Valve (as already described above).

Servicing the Relief Valve (AJS/2006)

Operation

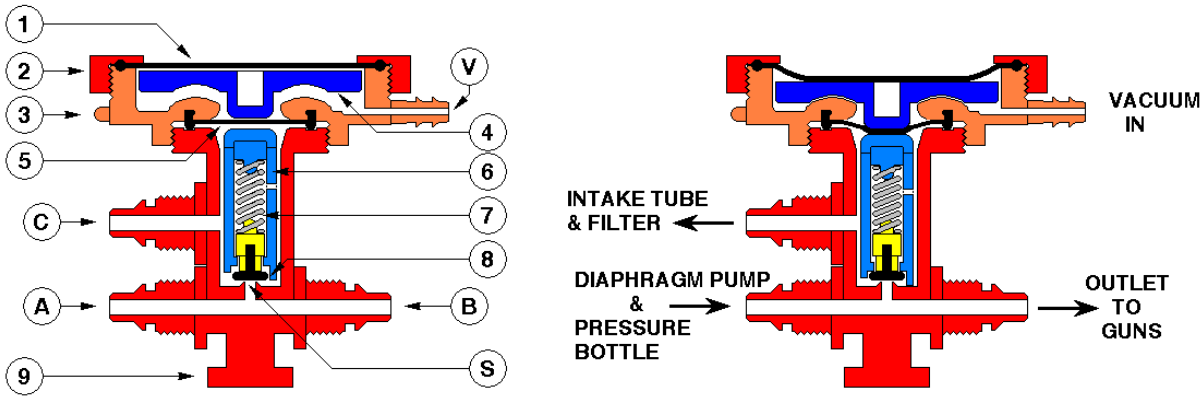
The Valve serves three purposes:–

- it "regulates", or rather limits, the spray output pressure from the teat sprayer (usually in the range 50-60psi, depending on module type fitted).
- It de-pressurizes the whole system once vacuum is removed from the unit.
- in depressurizing the system it dumps chemical back into the container, via the intake tube, and thereby serves to back-flush the intake filter.

Its method of operation is relatively simple and is illustrated in the diagrams below.

FIG. 1 - VACUUM OFF, PRESSURE RELIEVED MODULE CAN LIFT

FIG. 2 - VACUUM ON, DIAPHRAGMS FORCE MODULE DOWN PRESSURE FORCES MODULE PAD UP



The unit comprises a vacuum chamber created by two diaphragms (1 & 5) and the body top moulding (3); this chamber is screwed onto the main valve body (9) containing the Pressure Module (comprising parts 6, 7 & 8).

With **NO VACUUM** applied there is no downward pressure on the Pressure Module so liquid may flow freely via the ports **A**, **B** & **C**.

When **VACUUM IS APPLIED**, via the nipple **V**, the pressure acting on the large diaphragm (1) pushes it downwards in turn pushing down the plastic insert (4) against the small diaphragm (5) and the module (6, 7 & 8). The rubber pad (8) of the Module is thereby pushed hard against the seat (**S**) preventing fluid from flowing between the diaphragm pump and/or pressure bottle to the intake tube.

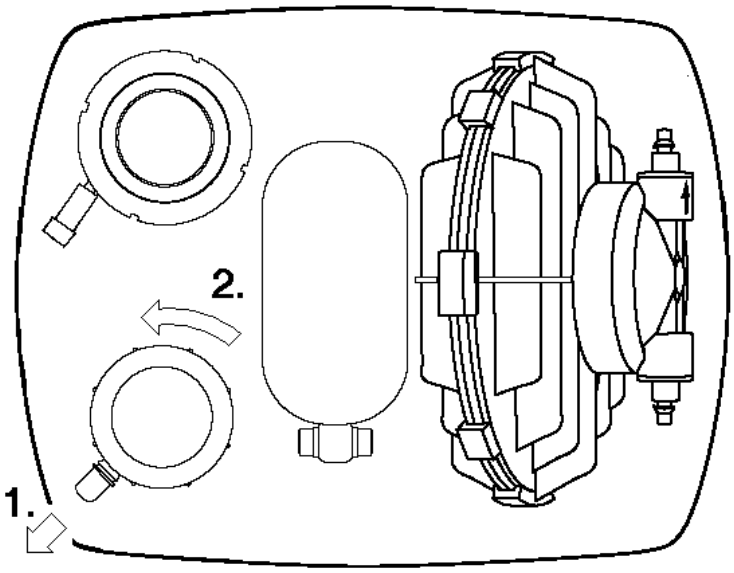
With all spray guns closed, pressure of fluid builds up in the pressure bottle and there will come a time when the pressure acting via the seat (**S**) on the rubber cap (8) overcomes the downwards pressure of the spring (7) and pushes up the pad, releasing fluid back into the intake pipe and thereby reducing the pressure until the spring re-seats the rubber pad sealing once more against the seat (**S**).

Location & Maintenance

The Valve is located at the bottom left of Power Unit (see diagram Fig. 3 overleaf).

Although it is rare for problems to develop with this valve, it is relatively easy both to check and to service in situ.

FIG. 3



A failure of the unit may give one or more of the following symptoms:-

a) **Reduced Spray output pressure**
b) **Failure to depressurize system /dump chemical when vacuum turned off.**
c) **Failure to suck up chemical from container**
d) **Leakage of chemical into vacuum system**
e) **Excessive vacuum consumption**

The most likely cause of the above problems is diaphragm failure; please note that numbered parts refer to the labels in diagram at FIG. 1. In some cases it is more efficient to replace the complete assembly.

BEFORE ATTEMPTING TO DISMANTLE THE VALVE, DISCONNECT VACUUM SUPPLY & ENSURE THAT THE PRESSURE BOTTLE IS EMPTY OF FLUID BY OPENING (OR DISCONNECTING) ALL GUNS TO FULLY DEPRESSURIZE SYSTEM.

For Problems (a-d) listed above, the cause is likely to rest in either the small diaphragm (5) or pressure module area. If the small diaphragm punctures, then chemical will gain access to the vacuum line. If the sealing pad of the Pressure Module (8) is faulty then the leakage may be sufficient to prevent the diaphragm pump from sucking up chemical altogether; alternatively the constant seepage of chemical back into the intake tube will effectively reduce the output pressure.

A **Service Kit (AJS/2019)** is available, which should be used in the event of problems.

To access the small Diaphragm and Pressure Module first pull off the rubber elbow vacuum connection pipe in the direction of arrow (action **1**. in FIG. 3). Unscrew the complete top (action **2**. in FIG. 3) inclusive of vacuum nipple, this will expose the Pressure Module left sitting in the body (9 in FIG. 1). The pressure Module may simply be lifted out of the body and replaced with a new one – before doing so, check that the valve seat (**S** in FIG. 1) is undamaged and unobstructed by debris.

If replacement of the Small Diaphragm is attempted, please ensure that the new Diaphragm is fitted the correct way up (see 5 in FIG. 1).

In the case of excessive vacuum consumption, it is likely that the large diaphragm is punctured. To replace the large Diaphragm (ATS/435), unscrew top large knurled nut (2 in Fig. 1 overleaf), this will expose Diaphragm for replacement. Retighten nut hand-tight only after fitting new diaphragm.

After service is complete, screw up the top moulding (3 in FIG. 1) only hand-tight and re-fit the rubber vacuum supply elbow.

OLD Classic Teat Sprayer – DUMP VALVE (now Obsolete)

Older models (pre-2000) of Classic Teatsprayers had a valve which looked externally similar to the Pressure Relief Valve used on all post-2000 teat sprayers.

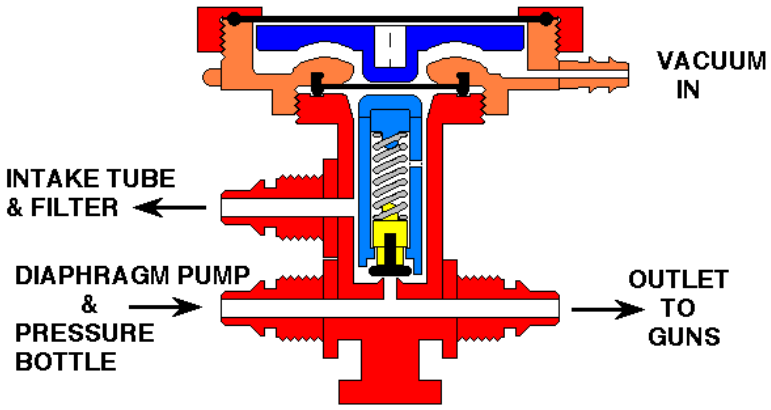
This Dump Valve was coloured BLUE and the diagram opposite illustrates the two valves – the older Dump valve shown below the later one.

The Dump Valve serves solely to dump pressurised liquid once vacuum is turned Off – it has no pressure control function.

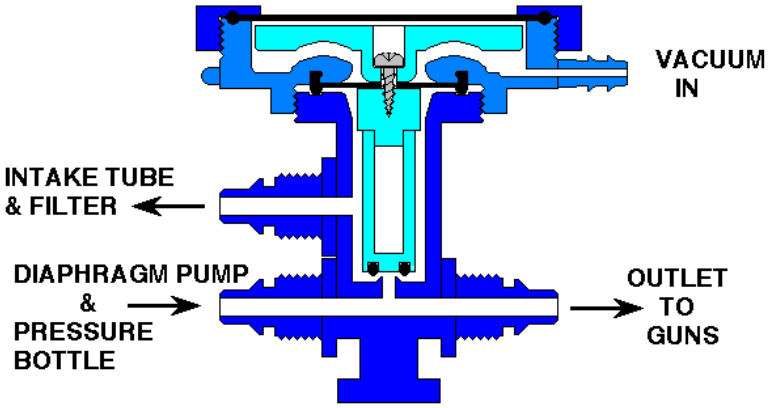
Although the large diaphragm from the new style Pressure Relief Valve can be fitted to the Dump Valve, other spare parts are NOT available and it is recommended that a failed Dump Valve be replaced by a Pressure Relief Valve.

Note On all Classic teat sprayers no rubber manifold/ elbow connectors are used, so access to service or remove any valves will necessitate the use of a means to warm and soften the PVC tubing prior to removal (a hot air gun may be used, taking care not to overheat the tubing or to "melt" the threads on the tube nipples).

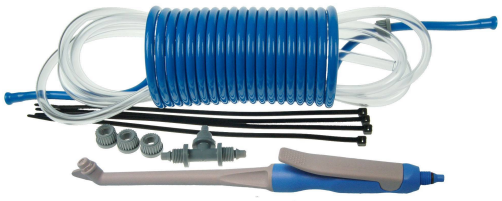
JETSTREAM PRESSURE RELIEF VALVE - OPERATION



CLASSIC pre-2000 OLD STYLE DUMP VALVE



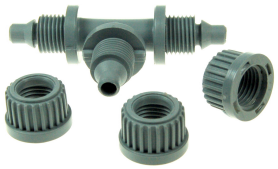
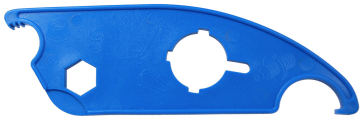
Spare Parts – Guns, Coils & Extension Kits

ATS/402 Lever Gun Adjustable Nozzle	ATS/414 Teat Spray Extension Kit with ATS/402 Gun
	
ATS/502 Lever Gun with Extended Plastic Lance and Solid Cone Nozzle	ATS/514 Teat Spray Extension Kit with ATS/502 Gun
	
AJS/2402 Button Gun with Plastic Lance and Solid Cone Nozzle	AJS/2414 Teat Spray Extension Kit with AJS/2402 Gun
	

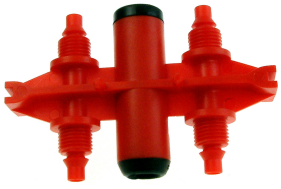
Spare Parts – Guns, Coils & Extension Kits (Continued)

ATS/449 Standard Stainless Steel Lance	ATS/404E Extended Stainless Steel Lance
	
AJS/2450 Standard Plastic Lance	ATS/504 Extended Plastic Lance with Solid Cone Nozzle
	
ATS/406 Retractable Coil	ATS/439 Classic Gun Lever
	
AJS/2405 Button Gun Control Valve	ATS/405 Control Valve
	
AJS/2415 Solid Cone Nozzle	ATS/415 Adjustable Nozzle
	

Spare Parts – Connectors & Sundry

ATS/407 'T' Connector	ATS/408 Straight Connectors x 2
	
ATS/409 Connector Nuts x 6	ATS/429 Blanking Plugs x 2
	
ATS/413 T. S. Vacuum Adaptor	ATS/438 Universal Connector
	
ATS/450 Pressure Reservoir Bottle Holder	AJS/2055 Teat Spray Spanner
	

Spare Parts – Tubing & Manifold

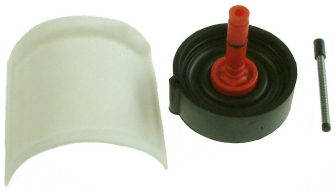
ATS/411 Teat Spray Cable Ties x 10	ATS/412 Intake Filter & Tubing
	
ATS/428 30m Flexible Tubing	ATS/410 6m Flexible Tubing
	
AJS/2008 Pipe Manifold Assembly	
	

Spare Parts – Diaphragm Pump & Relief Valve

AJS/2004 Diaphragm Pump	AJS/2006 Relief Valve
	

ATS/445 Pump Non Return Valve Inlet	ATS/446 Pump Non Return Valve Outlet	AJS/2016 Relief Module 50Psi Standard
		
ATS/456 Small Pump Diaphragm	ATS/435 Large Relief Valve Diaphragm	AJS/2019 Relief Valve Repair Kit
		

Spare Parts – Directional Valve

<table>
<tr><td colspan="3">ATS/425
Directional Valve</td></tr>
<tr><td colspan="3">  </td></tr>
<tr><td>ATS/443
DV Diaphragm Assembly</td><td>ATS/448
DV Service Kit</td><td>ATS/444
DV Filters x3</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>ATS/442
Directional Valve Spring</td><td>ATS/447
DV Bleed Insert</td><td>AJS/2012
Directional Valve Manifold</td></tr>
<tr><td>  </td><td> 
</td><td>  </td></tr>
</table>

Spare Parts – Jetstream Power Unit and Casing

AJS/2001
Jetstream Power Unit

AJS/2031
Jetstream Front Cover

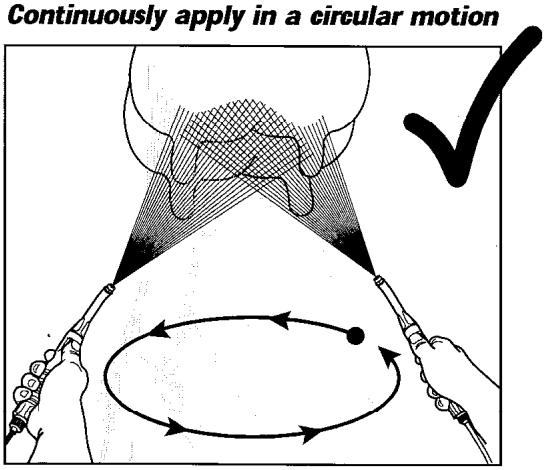
AJS/2041
Jetstream Back Cover

TEAT SPRAYING:
Guidance on best practice

- Post Milking teat disinfection is one of the cornerstones of Mastitis control.
- BUT IT MUST BE CARRIED OUT CORRECTLY AND THOROUGHLY! USING APPROVED TEAT SPRAY CHEMICALS.
- The following guidelines are intended to assist in the adoption of best practice when using automated teat spray systems as part of your mastitis programme.
- Remember! The effectiveness of your mastitis control programme will be severely diminished by failing to completely cover the entire surface of each teat, after milking. A drop of disinfectant on the end of the teat is not enough!
- To assist in the improvement of your teat disinfection regime, periodically check the effectiveness of your technique and ensure the spray system is properly maintained.
- The use of a 'solid cone' nozzle will optimise teat coverage, avoiding the hollow ring spray patterns, which can give rise to dry shadows on the sides of teats or miss them entirely.

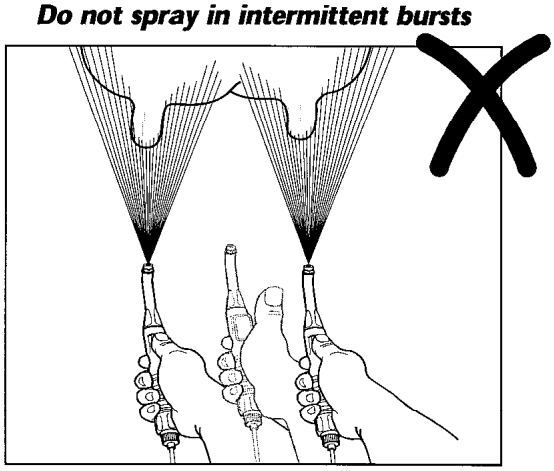
Effective Spraying Technique

Continuously apply in a circular motion



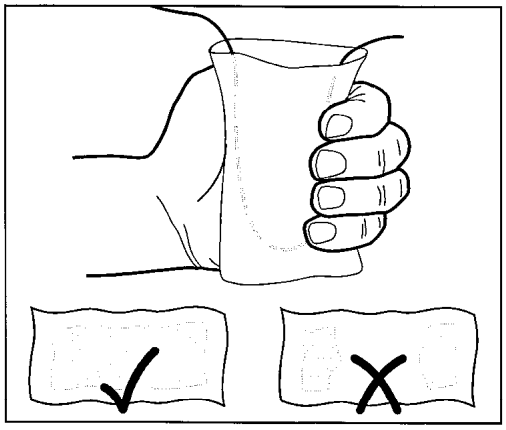
To ensure complete coverage of teats, adjust angle of spray as gun rotates underneath udder

Do not spray in intermittent bursts



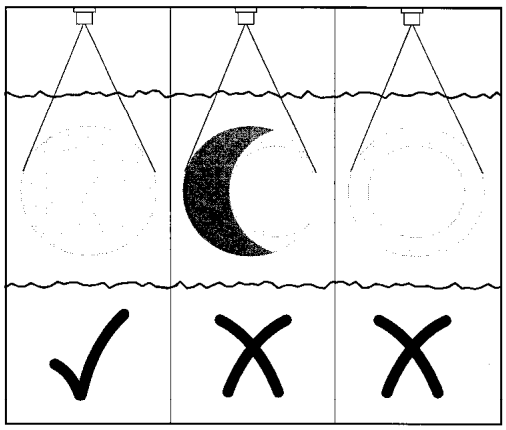
Teats will not be covered effectively, when sprayed using individual bursts

Check technique



To check the whole teat is covered with chemical, periodically apply a disposable towel for evidence of complete coverage

Check spray pattern



Spray direct onto paper and check for an even, regular spray pattern

Replace worn spray nozzles, when excessive wetting or dry patches occur

Avoid 'hollow ring' spray patterns, which increase the risk of 'dry shadows' and missing teats completely

AMBIC *leading best practice in livestock health management*

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