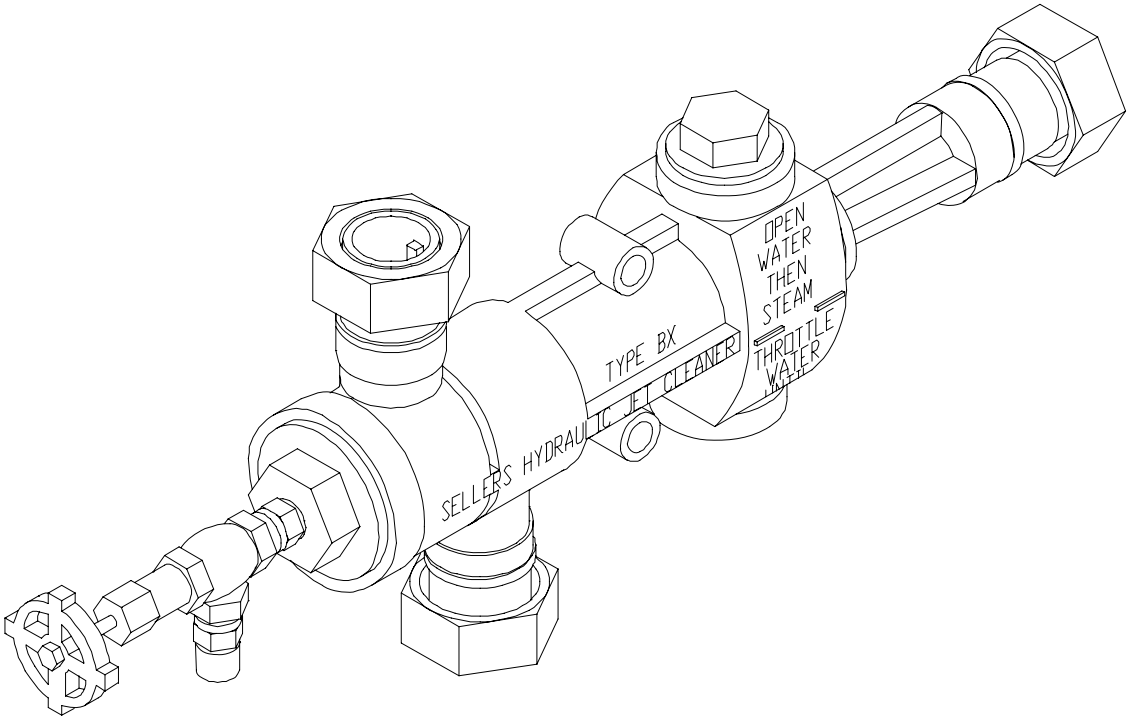
Sellers®
Cleaning Systems

OPERATION AND MAINTENANCE MANUAL

B & BX SERIES INJECTORS



IMPORTANT! ***Read all instructions in this manual before operating pump.***

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OPERATING GUIDE FOR SELLERS HYDRAULIC JET CLEANERS MODELS B AND BX

INSTALLATION
All references to the Model B also apply to the Model BX. They are all of the same type, operate the same, and require the same operating steam pressure.

All Jet Cleaners MUST be installed by securing the units in position by using the mounting holes in the outer body casting. Jets must not be installed using only water/steam pipe fittings as water hammer could cause vibration and or damage at connections.

The Jet Cleaner should be installed exactly as shown on the front cover of this bulletin. Position it high enough to clear the top of the detergent drum. Locate the steam and water valves as close as possible to the unit for ease of operation. Do not use valves that are smaller than the union connections of the Jet without factory approval. Also, certain plumbing codes require backflow prevention devices.

NOTE: If at all possible, do not use flexible hose on steam or water lines feeding the Jet. Connections should be piped as indicated in this bulletin. If greater mobility is required, use longer delivery hose. It is more efficient and more economical.
Sellers delivery hose is a 3/4" specially constructed high-pressure hot water hose. Standard lengths available are 50, 75 or 100 feet. Never use the injector or hose and lance assembly with live steam only.

STEAM AND WATER SUPPLY

These two supplies are related. The colder the water temperature is, the higher the steam pressure may be. Reference to the graph supplied will show the relationship.

STEAM SUPPLY

The nominal minimum steam pressure used to supply these Jets is 60 PSIG. Approximately one pound of steam by volume is required for each gallon of the Jet's discharge. It is important that this pressure and volume be available at the Jet when it is in operation. The chart below recommends the pipe sizes to be used with the various models. The sizes are determined by the length of run from the boiler or large main. Blow out all new lines before connecting the Jet to eliminate fouling it with debris.

Pipe Thread Sizes for Connections

JET	CAPACITY	DETERGENT	STEAM INLET	WATER INLET	DISCHARGE	OVERFLOW
B	250-1250	½" F	1¼" M	1¼" M	¾" F	1" F
BX	2000-4000	½" F	1½" M	1½" M	1½" M	2" F

F-Female Thread, M-Male Thread

WATER SUPPLY

To test the adequacy of your water supply, fully open the water valve, then fully open the steam valve. If the Jet continues to spill at the overflow, when the steam valve is wide open with full pressure, the Jet is getting sufficient water.
If the overflow stops as the steam valve is opened, the water supply is inadequate. To remedy this condition, increase the size of the water supply line or install a booster pump. The water supply must not pulsate.

OVERFLOW PIPING

Jet Cleaners are furnished with standard female NPT threads for connection of overflow piping. The overflow pipe and elbow should extend to the floor. Point the elbow away from the operating position. If the overflow is to be piped to a closed drain, install as shown on the cover. Overflow must remain open to atmosphere in order to balance.

OPERATING INSTRUCTIONS

To Start Jet:
1.) open water valve fully
2.) open steam valve fully
3.) close water valve until overflow stops
4.) after a few seconds, open water valve to position just before overflow reoccurs.

(It is recommended that the Auto-Shutoff lance and appropriate orifice disks matching the GPH capacity of the Jet be acquired and used with all B Series Injectors. This will enable you to balance and operate the Jet correctly for external cleaning. To balance the Jet correctly you should follow the instructions above, while holding open the valve handle (auto-shutoff valve) of the lance. You will also note that if you release the valve all the water and steam will immediately dump out the overflow of the Jet. This is the built-in safety feature of our system.)

To Add Detergent:
1.) open detergent valve as desired
2.) adjust water valve to stop overflow

To Turn Off Detergent:
1.) close detergent valve
2.) open water valve for maximum flow without overflow

To Turn Off Jet:
1) Close steam valve
2) Close water valve.

DETERGENTS OR SOLVENTS

Sellers Jet Cleaners can aspirate cold liquid detergents or solvents to aid their cleaning action. The units are equipped to mix such solutions in proportions controllable from 0 to 10% of the rated discharge volume. The percentage is adjusted by the Detergent Control Valve, piece # 1278.

Any good commercial detergent may be used provided it contains ingredients that will prevent the precipitation of water solids that can clog the tubes and nozzle orifices. The detergent can be mixed in a concentrated form in the detergent container and metered into the Jet as necessary. If the detergent mixing process heats the solution, allow it to cool before using.

The use of raw chemicals such as Trisodium Phosphate or Caustic Soda can precipitate residues which cake on the venturi tubes and cause operating problems.

NOTE: Excess solution temperatures or heat soaking into the detergent valve can cause a vapor lock. In that event, it is necessary to cool either the solution or the valve with cold water until the desired flow is obtained.

Do not attempt to start the Jet with the detergent valve open. Follow the normal start up procedure and then open the detergent valve. Since the detergent solution displaces some of the cold water supply, it may be necessary to readjust the water valve to stop the overflow.

Always shut off the detergent valve first so as to flush the Jet, then the steam and water. If rinsing is to continue after the detergent flow has been stopped, increase the water flow to the Jet.

DELIVERY PRESSURES AND TEMPERATURES

Typical Jet delivery characteristics are shown in the graphs supplied with this manual. These are based on standard stock venturi tube Jets operating against the appropriate nozzle area for the particular Jet. Optional tube combinations can be provided for special delivery requirements.

By changing the nozzle, any hose pressure from 0 to 2 times the supply steam pressure can be obtained. With the nozzle removed, or (in the case of a burst hose) the hose pressure is zero, thus, the unit fails safe.

TROUBLE SHOOTING AND SERVICING

The primary symptom of a malfunctioning Sellers Jet is found when the unit overflows during operation and the overflow cannot be stopped by throttling the water valve to obtain balance.

The appearance of the overflow changes from that of relatively cool running water to a swirling cone shaped mass of hot water that contains some steam.

INSPECT AS FOLLOWS:

1. Shut off steam and water supplies. Close detergent valve.
2. Remove hose nozzle or nozzles and check for foreign matter that might be obstructing holes.
3. Without replacing the nozzle, start the Jet in the normal manner. Although no pressure will be developed, if the overflow stops, the problem has been located. Replace the nozzle and return unit to service.
4. If Step 3 was not successful, disconnect the hose at the Jet by removing the Union Nut (# 1284). If the installation site permits water spraying straight out of the Jet, again start it in the normal manner. If the overflow can be stopped, the hose is defective and should be replaced.
5. If Step 4 was not successful, remove pieces 1271, 1272, 1273, and 1274. Look for foreign matter lodged in any of the throats. Any buildup of water or solids or chemical deposits must be removed. amage to the feather edges on 1273 or 1274, or roughness inside of 1271 and 1272 will require that they be replaced.

REMOVAL OF TUBES AND INSPECTION

REMOVAL:

All threads used on the Jet Cleaner are right hand. No gaskets are used or required.
Remove the hose by undoing Union Nut (# 1284). Use a wrench to remove the Delivery Tube (# 1271) and the Combining Tube (# 1272).

Disconnect the Detergent Suction Pipe or Hose. The Detergent Control Valve (#1278) may be removed or left in place at this time. Remove the Detergent Tube (#1274). Be careful not to damage the feather edge at its tip.

Use the Steam Nozzle Wrench (# 1319) to remove the Steam Nozzle (#1273). Screw the brass guide into the body opening carefully to prevent damage to the internal threads of the body. The guide need only be finger tight. Insert suitable piece of 1/2" round bar stock through hole in stem. Locate cross bar of stem in slot of Steam Nozzle. Hit bar stock with hammer to loosen nozzle while holding bar in slot. Once loose, the Steam Nozzle can be easily removed. Be careful not to damage the feather edge.
Remove Overflow Cap (# 1276) and Overflow Valve (# 1277).

INSPECTION:

Pieces # 1271 and # 1272 should have mirror smooth internal surfaces. Look for deposits of water solids or chemicals. See section on venturi tube cleaning. Roughness caused by corrosion or erosion require that the tubes be replaced.

Inspect piece # 1273 for cracking or breakage at the feather edge. Any such damage, nicks or bending require that the nozzle be replaced.

Inspect piece # 1274 for the same type of damage as on piece # 1273. Additionally, look for evidence of corrosion in the tube section and in the brass base. The tube must be tight in its base. The tube is not separately replaceable.

Examine the Overflow Valve (# 1277) and its internal body seat. Check to see that the Valve Stem can move freely in the Overflow Cap. Valve is held closed by vacuum, dirt or scale on valve and/ or seat must be removed. Wipe mating surfaces clean. Reseat by placing fine grinding compound on valve face and touch up seat. Rotate valve with screwdriver in stem slot.

VENTURI TUBE CLEANING

Internal deposits can be removed by immersing the parts in a 10% solution of inhibited Phosphoric Acid or other safe brass descaler. Rinse thoroughly and re-examine per the preceding instruction.
NOTE: If frequent tube cleaning is necessary, a more rapid method is to run about a quart of inhibited Phosphoric Acid through the Jet, while it is in operation, about once a week. Flush the unit with clear water afterwards.

REPLACEMENT PARTS

New, interchangeable parts are available for all Jet Cleaners. When ordering parts, be sure to supply the model designation (B or BX, which is cast into the side of the body, # 1270). Also, the discharge rate of the unit in gallons per hour. This discharge rate is metal stamped on each of the four venturi tubes. Reference to the piece numbers only will prevent us from filling your order. You will avoid delay by providing the needed information initially. A serial number is stamped on all injectors on the top ledge of the units left of the mounting hole. This will enable the factory to verify the model capacity of the jet to be serviced.

EFFECTIVE CLEANING

In **SELLERS INJECTORS®**, cleaning is derived from three basic elements- heat, mechanical action, and chemical action. The mechanical action comes from the impact energy delivered to the surface. This is a combination of the volume (weight) of solution discharged and high velocity generated.

IMPACT = MASS x VELOCITY

The hydraulic scrubbing is very effective for removal of bulky, heavy lumps of soil from a surface, and getting through to the surface. On the other hand, thin films and residues, especially of an oily or greasy nature, require chemical action for complete removal. High pressure hot water alone will not remove them. It is emphasized that all three basic cleaning actions are available from the INJECTORS. There will be cases where one will be more important than another.

Generally, for most hand-held operations, the Model B1000 is recommended. This does the best job for general cleaning in the least amount of time. Experience has shown this to be true. A B1000 will clean a surface in sufficiently less time than a B600 and the total water used by the B1000 will be no more than used by the smaller jets.

The high volume of the B1000 produces a good deal of splash effect or “bounce-back.” This is an advantage in cleaning inaccessible areas, but it is a disadvantage in trying to clean certain equipment where you have to stand close to see what you are doing, or to maneuver the nozzle, or in cleaning a shape that throws the stream back at you. A typical example is cleaning chill tanks (the bath tube-like units on wheels used in poultry plants). This is an instance where a Model B250 or B450 with the 35° fan nozzle will allow cleaning close in and thoroughly, without getting splashed and wet.

Operational Safety Data Sheet

Hazard Communication (per OSHA Title 29, CFR 1910.1200)

Right-to-Know Information

The handling or pressurized systems: I.E. injectors, steam and water, requires the attention of technical and safety personnel, proper implementation and application of all applicable codes. Management is responsible for development of proper operating and emergency procedures routine and preventative maintenance programs for every facility where work involves pressurized systems. After a rational and functional assessment of the job demands, tools, environment and exposures, development of strict guidelines should include as to how, where, and by whom pressurized systems can be used. Adequate training of all personnel and periodical testing of knowledge and procedures should be practiced, including the use of proper protective clothing or equipment. Once all necessary administrative controls have been established to regulate the design, procurement, and use of pressurized systems, the user should see that all necessary maintenance, inspections and tests are conducted on schedule.

During installation, all components should be secured to a firm foundation. Static weight, dynamic and concentration loads, as well as thermal expansion should be considered. The floor and foundation must be able to support the combined weight of the system, associated equipment, contents and operating personnel. Remote operation, or special construction should be provided for any pressure system for emergency shutdown in order to reduce personnel exposure. The component installation should provide for interruptions, surge, or fluctuations in supply sources. System de-pressurizing or venting should be controlled and directed according to established procedures. Locate and orient any relief or venting devices so the direction of discharge is not hazardous to personnel. Shield necessity will depend upon the relief magnitude and device. All system components should be visibly and properly labeled and identified to reduce chances of error.

DETERGENT PURPOSE AND CAPACITY

To completely remove the final thin film of soil from a surface, chemical action is necessary. To get the chemical reaction, the proper detergent must be mixed with the hot water jet stream in sufficient concentration to perform. The chemical must be mixed at ambient or cooler temperatures, NEVER inject hot chemicals in the jet at any point. In using SELLERS INJECTORS for cleaning, plan on using enough detergent per hour to get proper concentration at the nozzle. A good rule of thumb: 1 lb (powder material) or 1 pint (liquid) of detergent per 100 gallons of water discharged per hour. For example: a B1000 jet should use 10 lbs of powdered compound per hour for average cleaning.

CAUTION: If chemicals, hazardous materials, operations, and equipment are used in conjunction with this cleaning equipment, it is the responsibility of the user to establish appropriate associated safety and health practices. Prior to application, the user must consult and determine the applicability of regulatory (federal, state, local and facility) safety and environmental agency limitations.

DELIVERY TEMPERATURES (at Normal Balanced Operation)

1. **B & BX INJECTOR Models**
   The steam-to-water ratio on these INJECTORS are similar at corresponding steam pressures. As a result, similar delivery temperatures and pressures can be found regardless of the unit size.

2. **Input Water Temperatures**
   Remember, water supply temperatures do fluctuate, seasonally and by locality. Since we are dealing with temperature rise, should input water be hotter than 60° F (15.6° C), the final operating temperature will be higher by the same degree. Conversely, as temperatures drop below 60° F (15.6° C), discharge solution temperature will likewise, be lower. However, if water temperature is above 80° F (26.7° C), the unit may have problems forming a jet.

LOWER OUTPUT TEMPERATURE OPERATION

At times, there is a need or desire to operate the INJECTORS to secure lower temperatures than normal. This might be in the case of washing brewery or dairy tanks. For instance, where tanks are constructed with “cold walls” (refrigerated) and cannot be severely heated; or dairy equipment that needs to be cooled down quickly after cleaning; or cool areas where fog from condensation is undesirable (meat and poultry plants); or in cleaning certain soils where high temperatures would be detrimental; or on tanks with heat sensitive linings. These lower temperatures can be obtained without difficulty and in several ways:

1. **Adjustment of steam valve:**
   This is perhaps the most common way, but it is not recommended, since it is under the control of the operator’s judgement. Throttling the steam valve reduces the volume and pressure to the Jet and does lower the temperature, but it also reduce the solution pressure. For instance, at a steam pressure of 100 PSI (6.9 BAR) the resulting maximum solution pressure is about 225 PSI (15.5 BAR) with a temperature of about 180° F (82.2° C). If the steam pressure is throttled down to 60 PSI (4.1 BAR) the solution temperature will be about 160° F or a temperature drop of less than 15%. But the resulting maximum solution pressure will be about 140 PSI (9.7 BAR) or a pressure drop of about 40%.

2. **Adjustment of water valve.**
   Temperatures can be reduced further, by throwing the unit out of balance. This is done by opening the water valve so overflow and spilling occurs. This is wasteful, inefficient, and not good operation. Conversely, decreasing the water supply below the balance point (verge of overflow) will result in higher temperatures and lower hose pressures.

3. **Modification of an INJECTOR.**
   a. A simple conversion will produce a much lower temperatures. It consists of using a smaller than standard steam nozzle with standard combining and delivery tubes. This change has a permanent effect of reducing steam volume.
   b. The most stable permanent method for obtaining low temperature is to increase the diameter of the delivery tube throat. This modification used along with an increased hose nozzle orifice size will give low temperatures at a lower hose pressure, with reliability. We suggest that you consult the factory, however, before attempting such a modification.

APPLICATION CHECK LIST

When installing a hydraulic INJECTOR, whether it be a B or BX, some basic information is needed to select the proper size. Following this check list will help you evaluate the situation.

1. Steam pressure available, preferably operating pressure, at point of use.
   This will give the corresponding pressure to the selected unit.

Steam Available at Unit	**Recommended Unit**
60 + PSI (4.1 + BAR)	Models B and BX

2. **Size of boiler in B.H.P. or pounds of steam per hour:**
   Determine if the boiler has adequate steam capacity. Knowing a jet cleaner uses approximately a gallon of water per lbs (weight) of steam at 100 PSI (6.9 BAR) steam pressure, then at rated capacity the unit requires its rating in lbs of steam per hour. Therefore, a B1000 Jet requires 1000 lbs (weight) of steam per hour and a B600 Jet requires 600 lbs of steam per hour and a BX3000 Jet requires 3000 lbs per hour and so on. Note the tremendous steam capacity required for operation of the BX injectors. A boiler horsepower by one definition is the heat required to evaporate 34.5 lbs (15.6 kgs) of water per hour and at 212° F (100° C). So, a 30 Hp steam generator will produce 1035 lbs (469.4 kgs) of steam an hour, which is just barely enough to operate a B1000 Jet. That is why we recommend nothing less than a 40 Hp boiler for 1000 gallon units and a 30 Hp for 600 GPH units. The excess capacity will allow for other simultaneous steam loads in the plant that are usually present.

3. **Steam supply pipe size and distance from boiler to jet installation:**
   Although boiler capacity and pressure may be adequate, the pipes transporting the steam may be too small to operate the INJECTOR properly. When considering distance, also observe the number of fittings in the pipe run. Listed below are the recommended steam pipe line sizes for each INJECTOR.

JET CLEANER MODEL	**STEAM SUPPLY PIPE SIZE FROM BOILER OR MAIN**		
	0 - 50 Ft. Run	**50 - 100 Ft. Run**	**100 + Ft. Run**
B	1¼"	1½"	2"
BX	1½"	2"	2½"

If the plant has a 1" steam drop line use a B600 instead of a B1000. None of the Jet Cleaners will operate properly with a 3/4" steam line.

4. **Water supply pressure, temperature range, and pipe size:**
   Low pressure water (less than 30 PSI (2.1 BAR)) needs larger diameter pipelines to ensure adequate water supply to the unit. High pressure water may cause balancing problems because of the narrower range of valve adjustment. If water temperature is above 80° F (26.7° C), the unit may have problems forming a jet. Listed below are the recommended water pipe line sizes for each INJECTOR.

JET CLEANER MODEL	**WATER SUPPLY PIPE SIZE AT NORMAL PRESSURE**
B	1¼"
BX	1½"

Where water pressure is less than 30 PSI (2.1 BAR) a 1 1/2" water line is needed for a B1000. Likewise a 2" for a BX.

5. **Proper drainage:**
   To keep the tank empty during a cleaning cycle the solution going into the tank must be drained. Solution accumulating at the bottom of the tank will cushion the impact of the cleaning solution stream.

PRINCIPLE OF OPERATION

The hydraulic INJECTOR is a powerful cleaning tool capable of delivering a stream of liquid at high pressure and temperature. Detergent solution can be automatically aspirated and mixed into the high pressure stream. The Jet Cleaner can be used for high pressure pre-cleaning, cleaning, and rinsing. The INJECTOR creates this high pressure and temperature by combining steam and water in a unique manner, using a set of venturi tubes. The cover sheet of the operating bulletin 88G-001 shows how the jet is connected to the steam, detergent, and water lines. Note also how the overflow pipe is installed. In the following pages is a cross sectional drawing of the Jet itself. The assembly has four major components: the detergent tube (1274); the steam nozzle (1273); the combining tube (1272); and the delivery tube (1271).

Detergent Tube: Aspirates a metered amount of detergent into the combining tube injecting the detergent into the hot water jet stream. To resist corrosion the long protruding tip is of stainless steel.

Steam Nozzle: Directs and accelerates steam flow from the steam chamber into the combining tube.

Combining Tube: In the chamber the steam, water, (and detergent if requested) are mixed to form the hot water jet. The overflow holes and slots in the tube release excess steam and water into the overflow chamber when balancing the unit

Delivery Tube: Delivers the balanced high pressure jet into the hose.

In operation the steam enters the steam chamber and is directed by the steam nozzle into the combining tube. This steam meets the cold water (the colder the better) flowing from the cold water chamber into the combining tube. The cold water instantly condenses the hot steam creating a high vacuum; the cold water absorbs the heat and velocity from the steam; and the result is a high speed stream of hot water advancing down the throat of the delivery tube. Fluid energy is converted in a venturi. When passing through a contracting taper the fluid increases in velocity and decreases in pressure when passing through an expanding taper the fluid slows down and the pressure goes up. Thus, the high speed jet formed by combining the hot steam and cold water increases in velocity in the combining tube until it reaches the orifice of the venturi in the delivery tube. In expending the taper of the delivery tube the hot jet losses speed but gains pressure as it enter the hose.

The nozzle is a very important part of the system, its orifice size is critical. If the orifice is to small allowing insufficient flow, the hot water will back through the holes in the combining tube and exit out the overflow pipe. This is regarded as an unbalanced condition and wastes water. If the nozzle orifice is too large then water pressure is lowered with correspondingly less impact on the area to be cleaned. This is why Jets and nozzles must be properly sized for the jobs.

The installation of the overflow piping is also very important and warrants a short discussion. The drainage piping arrangement should be vented to atmosphere so no back pressure is directed into the unit, yet the arrangement must provide safety and protection for the user. Never cap or valve the overflow pipe, as the full passage opening of the drain is required. Visibility of the drainage must be maintained for the balancing procedures. If a closed loop drainage system is required, use an in-line sight flow indicator.

All this is not the only part of the system design. There is an important safety consideration, such as a cut or burst hose that will provide the system with the same effect as that of a large orifice nozzle. The pressure will immediately drop and although the water will still be hot it will not be discharging through the hose at high pressure, thus no hose whipping effect results. The only moving part in the system is the overflow valve (1277). When the fluid jet is in balance the valve is held closed by the vacuum created in the combining tube by the venturi action. Unbalance always results from either more water or more steam than the unit can use. Any excess flows through the holes in the combining tube into the overflow chamber,

lifts the overflow valve, and escapes through the overflow pipe. Incidentally, these holes are large enough to accept the entire flow even when the hose nozzle is completely shut off. Thus, water or steam cannot backup into either line regardless of the difference in pressure between the two. However, local regulations may require an approved siphon breaker or back flow preventer in the water line.

MODEL B® HYDRAULIC INJECTORS®

This is the basic design of the INJECTORS line. With input steam pressures of 60 to 150 PSI (4.1 to 10.3 BAR), and with properly sized nozzles, these units will deliver a jet of hot fluid at pressures at least twice that of the input steam pressure. The B Jet is available in the following nominal output capacities with an input steam pressure of 70 PSI (4.8):

250 GPH, 450 GPH, 600 GPH, 1000 GPH, and 1250 GPH

And are designated respectively as:

B250, B450, B600, B1000, and B1250

The B Jet body castings are all the same. Changing from one capacity to another is simply a matter of substituting the steam nozzle (1273), the combining tube (1272), the delivery tube (1271), and of course, the lance nozzle orifice. The solvent tube may also need to be changed. Although the “B” Jets are primarily used on hand held lance applications, they may also be used to power small tank cleaning heads (such as the Drum Major, or 2" Troll Ball). As with the nozzle, proper sizing of delivery hose and connections is critical to efficient operation of the Jet. Delivery hose should be 3/4" ID (never 1/2"). Never use pipe nipples as connectors, the internal diameters of such nipples are small enough to restrict the fluid flow and may cause jet balancing difficulties.

MODEL BX® HYDRAULIC INJECTORS®

Like the B Jet, the capabilities are varied by changing the steam nozzle, combining the tube and delivery tube.

But in the case of the BX series, there is only one solvent tube for all three sizes of Jets. The BX models are ideal as feed devices for tank cleaning machines or multiple point cleaning units or nozzles. BX models are available in 2,000, 3,000 and 4,000 GPH capacity ranges.

They may not, however, be used with hose and lances.

PARTS LIST FOR MODEL B® INJECTORS® (75-11-X)

PART NO.	REFERENCE NO.					DESCRIPTION
	B250 75-11-M	B450 75-11-F	B600 75-11-H	B1000 75-11-C	B1250 75-11-W	B INJECTOR ASSY.
1270	75-607					B Body, Injector
*1271	75-389	75-390	75-114	75-115	75-116	Tube, Delivery
*1272	75-772	75-391	75-118	75-491	75-491	Tube, Combing
*1273	75-563	75-392	75-122	75-123	75-124	Nozzle, Steam
*1274	75-126	75-126	75-126	75-127	75-127	Tube, Solvent Assy
1275	75-135					Union, Pipe 3/4"
1276	75-136					Cap, Overflow
*1277	75-137					Valve, Overflow
*1278	75-920					Valve, Sol Ctl
1283	12-103					Union, Pipe 1½"
1284	75-143					Nut, Hex Coupling
1290	75-916					Valve, Needle
1291	75-917					Valve, Check
*1292	2-31052-216					O-ring
	75-11-MSPLW	75-11-FSPLW	75-11-HSPLW	75-11-CSPLW	75-11-WSPLW	Kit, Spare Parts, less wrench

ACCESSORY LIST FOR THE B® INJECTORS®

PART NO.	REFERENCE NO.					DESCRIPTION
	B250 75-11-M	B450 75-11-F	B600 75-11-H	B1000 75-11-C	B1250 75-11-W	B INJECTOR Assy
2193	75-1536	75-866	75-555	75-355	75-556	Disc. 35"
2194	75-1519	75-394	75-554	75-357	75-368	Disc. 5 Hole
2234	---	75-978	75-957	75-940	75-899	Nozzle, Long FNPT
2396	---	75-628 75-354				Body, 15" Nozzle Cap, 15" Nozzle
2446	74-345	74-347	74-348	74-354	74-385	Nozzle, Long MNPT
*1319	75F-1159 75F-1160 75F-1180 75F-1161 75-1504 75-1096 75-1097 75-1098					Lance, Deadman w/o Tip Lance, Deadman w/Tip Lance, Compact Deadman Lance, Gunjet (3/4") Hose, 3/4" ID x 25 Ft Hose, 3/4" ID x 50 Ft Hose, 3/4" ID x 75 Ft Hose, 3/4" ID x 100 Ft

*Recommended spare parts

PARTS LIST FOR MODEL BX® INJECTORS® (75-7-X)

PART NO.	REFERENCE NO.			DESCRIPTION
	BX2000 75-7-J	BX3000 75-7-K	BX4000 75-7-L	BX INJECTOR Assy
1270	---	75-780	---	BX Body, Injector
*1271	75-788	75-785	75-781	Tube, Delivery
*1272	75-789	75-786	75-782	Tube, Combining
*1273	75-790	75-787	75-783	Nozzle, Steam
*1274		75-784		Tube, Solvent Assy
1275		10-327		Hose/Pipe Union
1276		75-798		Cap, Overflow
*1277		75-797		Valve, Overflow
*1278		75-920		Valve, Assy, Solvent Control
1283		10-327		Union, Pipe 1½"
1284		76-124		Nut, Hex Coupling
1290		75-916		Valve, Needle
1291		75-917		Valve, Check
*1292		2-31052-225		O-ring

SIZING AN INJECTOR TO A CLEANING UNIT

There is nothing magic or mysterious about sizing a Jet to a cleaning unit. A BX3000 will not drive a DRUM-MAJOR (or “2” TROLL BALL) because the amount of water produced by the Jet is more than can be forced through the nozzles in the unit: THE JET WILL NOT BALANCE.
A BX2000 will not drive a Tank Man because the amount of water produced by the Jet is not enough to drive the unit: THE UNIT WILL NOT ROTATE.

CHOOSING THE CLEANING UNIT

The type of unit required is largely determined by the diameter of the tank to be cleaned, and resistance of the contamination removal. Generally speaking, recommend the largest unit the customer can accommodate. To choose the best cleaning head for the job you will need to know:

A. Whether the cleaning is primarily dependent on the impact or on chemical reaction of the solvent.
B. The size of the tank to be cleaned.
C. The volume of cleaning solution available to the unit (GPM or M^3/Hr).
D. The pressure of cleaning solution available at the unit (PSI or BAR).

CHOOSING THE INJECTOR

Having decided on a cleaning unit and solution pressure the next step is to size the Jet to deliver the required solution. This depends on:

A. Steam pressure available (PSI or BAR).
B. Quantity of steam available (lbs/hr or kgs/hr).
C. Line losses between the Jet and the Unit.

It is important to understand something about the relationship between the solution capacity and the solution pressure. As given in the chart for any given input steam pressure the solution pressure is the maximum obtainable if the nozzle being fed by the Jet is the smallest possible without the Jet going out of balance. The capacity of the Jet for any given input steam pressure remains CONSTANT regardless of the nozzle size as long as the Jet remains in balance. If the nozzle is larger than the smallest possible the solution pressure will drop, but the amount of solution going through the nozzle remains the same. Thus, if you choose a cleaning unit of greater capacity than the Jet the operating pressure of the unit will drop: “THE UNIT WILL NOT ROTATE.” If you choose a cleaning unit of lesser capacity than the Jet: THE JET MAY NOT BALANCE.

PIPE LINE LOSSES

Since there is always a pipe or hose connecting the Jet to the cleaning unit, there will be some pressure loss as the solution flows from the Jet to the unit. Generally, the smaller the pipe or hose diameters; the longer the distance; and the greater the number of fitting: the greater the pressure loss. These must be accounted for when sizing the Jet.

CHART FOR GENERAL GUIDANCE IN CHOOSING A JET

Input Steam Pressure (PSI) Maximum Solution Pressure (PSI)	50 120	75 170	100 220	125 280	150 340	Jet Type	Steam Usage (lbs/hr)
Injector Capacity (GPM)	15 21 30 50 70	20 29 35 60 80	24 33 45 70 90	27 37 50 75 100	29 40 55 80 110	B1000 B1250 BX2000 3000 4000	700 - 1500 800 - 2000 1000 - 3000 1700 - 4500 2500 - 6000