

Baron-Blakeslee

Operations and
Maintenance

Instruction Manual

M-Line
Series

CLEANING AND DEGREASING
SYSTEMS

Genesolv/Baron • Blakeslee



Revision 9/90

WARRANTIES

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IMPORTANT MESSAGE

INCLUDED AS PART OF THE OPERATING AND MAINTENANCE MANUAL FOR THE BARON BLAKESLEE CLEANING SYSTEM IS A RECOMMENDED SPARE PARTS LIST AND/OR A STANDARD ASSEMBLY TICKET FOR YOUR PARTICULAR MACHINE.

WE SUGGEST THAT YOUR MAINTENANCE PERSONNEL REVIEW THE INFORMATION AND THEN PLACE AN ORDER FOR THE REQUIRED SPARE PARTS. SEVERAL ITEMS, SUCH AS 'O' RINGS, SEALS, GASKETS, ETC., MUST BE PERIODICALLY REPLACED AS A RESULT OF NORMAL USE. IF YOUR MACHINE INCORPORATES A FILTERING SYSTEM, THE FILTER ELEMENT OR CARTRIDGE MUST BE REPLACED ON A REGULAR BASIS TO ATTAIN SATISFACTORY CLEANING RESULTS.

STOCKING THE RECOMMENDED SPARE PARTS WILL INSURE MINIMUM DOWN TIME IF A COMPONENT SHOULD FAIL OR DURING MAINTENANCE.

BARON BLAKESLEE APPRECIATES THE OPPORTUNITY TO BE OF SERVICE AND LOOKS FORWARD TO ASSISTING YOU IN SOLVING FUTURE CLEANING EQUIPMENT REQUIREMENTS.

THE ENCLOSED OPERATING AND INSTRUCTION MANUAL CONTAINS BARON-BLAKESLEE PROPRIETARY INFORMATION AND MAY NOT BE USED OR DISCLOSED BY OTHERS FOR ANY PURPOSES OR USED FOR MANUFACTURING PURPOSES WITHOUT PRIOR KNOWLEDGE AND WRITTEN PERMISSION FROM BARON-BLAKESLEE, 2001 NORTH JANICE AVENUE, MELROSE PARK, ILLINOIS 60160.

INSTRUCTION MANUAL

M-Line Cleaner / Degreaser
V-Vapor only; L-Liquid Immersion; S-ultraSonics
R-Refrigeration Cooling; W-Water Cooling

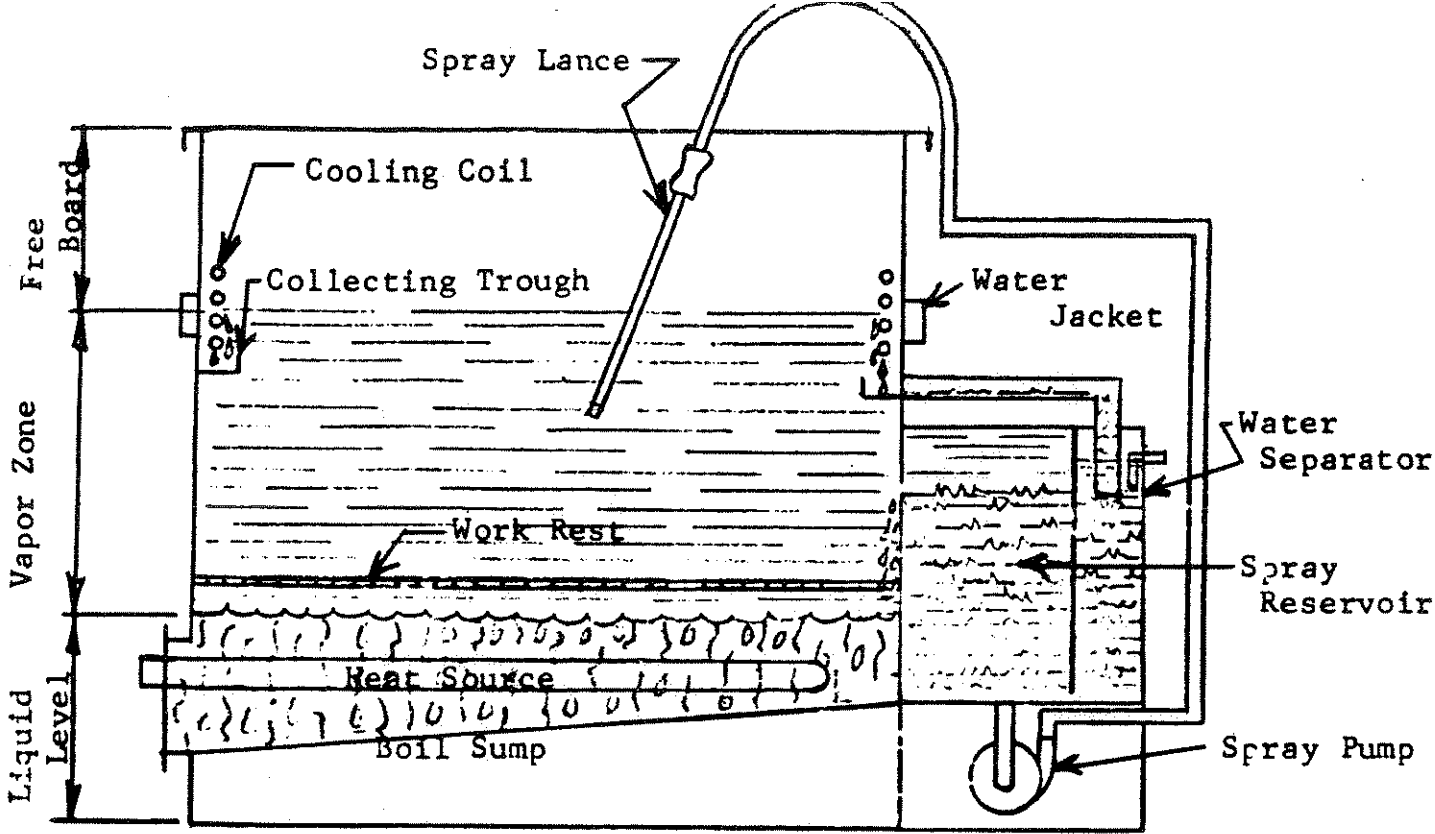
Model and Serial Number _____

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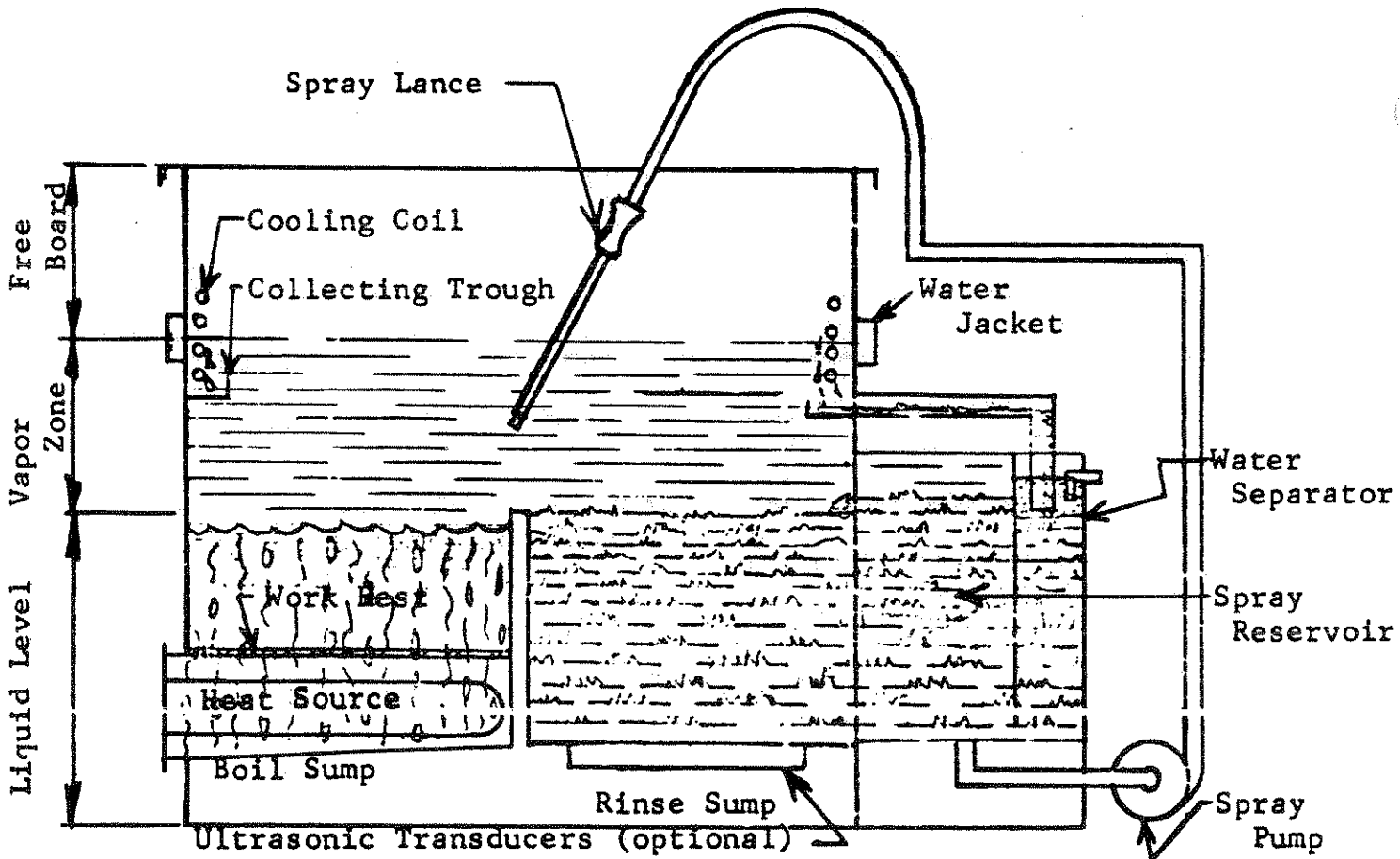
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IMPORTANT RULES FOR VAPOR DEGREASING

- (1) No drafts at entrance and exit of equipment. (Drafts = solvent loss.)
- (2) The equipment should be up to temperature (condensation of heated solvent at coldspot) before processing any work.
- (3) Speed of travel for work entering, leaving, or while in vapor zone is 12 feet per minute maximum. The main reasons are fewer solvent losses and cleaner parts.
- (4) If spray is required, only spray in vapor zone.
- (5) Part or parts should be arranged so that solvent drains off readily. If this is not done, parts can trap solvent and bring solvent vapors out of degreaser creating a possible health hazard and undesired solvent losses.
- (6) Never lift part or parts above vapor zone when transferring from one sump to another sump.
- (7) Never let liquid level get below top of heat source. Keep adequate supply of solvent on hand. The equipment should always be filled to proper operating levels.
- (8) Size and type of load to be processed can be critical to the degreaser. If vapor line lowers rapidly and requires extra time to recover, load is too great for machine and should be reduced to machines design limits.
- (9) Machine maintenance - A cleanout schedule should be established for the removal of contamination (sludge) from the boil sump(s) at regular intervals to eliminate undesired and unsafe conditions, and to maintain efficient cleaning operation.
- (10) Never locate a degreaser near open flames, baking ovens, or any arc welding operations.
- (11) Never place hands below vapor line! Use hooks or long handle baskets to place parts in solvent. Do not use absorbent materials such as cloth, wood, or rope, etc. to handle work in degreaser.



Vapor Spray Degreaser



Immersion Degreaser

Ultrasonic Transducers (optional)

Section 1, A Vapor Degreaser (Equipment using Solvent for Cleaning)

(1) What is it?

A solvent vapor degreaser is a tank with some means of boiling the solvent and some means of controlling the vapors in the upper section.

(2) What does it do?

If the solvent is properly selected, contamination will be removed from the part being cleaned by solvent action.

(3) How does it work?

The selected solvent is heated within the tank, which will generate a vapor. The vaporized solvent is maintained in the tank by means of a cold area which condenses the vapor back to a liquid. The liquid solvent is collected in a trough and directed to a water separator (to remove free water) and returned to the tank.

(4) How does it clean?

The articles to be cleaned are suspended in the air-free zone of solvent vapors, which condense on the cool parts to dissolve the contaminate and give a continuous rinse in clean solvent. As the condensed solvent drains from the part, it carries off the contaminate and returns to the boiling liquid. The vapor treatment is often augmented by mechanical action such as liquid immersion or spraying the work with liquid (distillate) solvent in the vapor zone. The work is held in the vapor zone for final rinsing and drying until the parts reach vapor temperature, at which time condensation stops. The articles should then be slowly withdrawn from the machine. The process is a safe, rapid, economical procedure for preparing dry, clean articles for subsequent finishing or fabricating steps, usually without further treatment. Ultrasonics may be applied to further enhance the cleaning capability of the degreaser. By adding ultrasonics to a liquid immersion sump, holes & crevices on a part that cannot normally be cleaned by solvent action alone, should be penetrated to make the part thoroughly clean.

1. Any degreaser pit two feet deep or more should be exhausted at a minimum rate of twice its air volume per minute. Ventilate at least 10 minutes before entering.
2. Allow solvent to cool before draining. Make sure that all solvent and vapor have been removed before entering or welding in/on a degreaser. DO NOT enter this machine unless all cleanout doors have been removed. All solvent must be expelled and the unit purged with air by using fan forced or compressed air from above. ENTER ONLY with a life line and NIOSH/MESA approved breathing apparatus, THEN ONLY when another man similarly equipped is watching you.
3. Do not smoke in vicinity of a degreaser.
4. IF SOLVENT GETS INTO EYE, hold eye open, flush with water for at least 15 minutes, call a physician. If solvent contacts skin, immediately flush with plenty of water.
5. IF SOLVENT SHOULD SOAK CLOTHING, remove such clothing at once and aerate thoroughly. Use soap and water to wash parts of the body that have been wet with solvent, and then apply lanolin-type cream. Remove contaminated shoes.
6. IF SOLVENT IS SWALLOWED, induce vomiting by sticking finger down throat or by giving soapy water or strong salty water to drink (1 TBS. per glass). Repeat until vomit is clean. NEVER induce vomiting or give anything by mouth an unconscious person or a person having convulsions.
7. IF A PERSON IS OVERCOME BY EXCESSIVE EXPOSURE, remove patient to fresh air. Call a doctor. If breathing stops, give artificial respiration. When patient starts to breath again, give oxygen. HIGH VAPOR CONCENTRATION CAN CAUSE UNCONSCIOUSNESS OR DEATH.

NOTE TO PHYSICIAN: Overexposure to many of the chlorinated solvents, especially if accompanied by anoxia, may temporarily increase cardiac irritability. Maintain adequate oxygenation until recovery. Avoid sympathomimetic amines; such as epinephrine, which may precipitate arrhythmias.

8. Stop distillation before heating element surfaces become exposed (liquid level never lower than the top of steam coils, gas immersion tubes, or electric heating elements).
 9. Never add solvent to hot oil-solvent mixtures. Sudden expansion can splash solvent out of the degreaser and possibly harm operator.
- * For Trichlorethylene see Manufacturing Chemists' Association Chemical Data Sheet SD-14.
For Perchloroethylene see Manufacturing Chemists' Association Chemical Data Sheet SD-24.
For Methylene Chloride see Manufacturing Chemists' Association Chemical Data Sheet SD-86.
For 1,1,1-Trichloroethane see Manufacturing Chemists' Association Chemical Data Sheet SD-90.

Manufacturing Chemists' Association
1825 Connecticut Avenue N.W.
Washington, D.C. 20009

PERSONAL PROTECTION*

Specific requirements deemed necessary for personal protection are listed:

INSTRUCTION: "All employees working in and around open-surface tank operations must be instructed as to the hazards of their respective jobs, and in the personal protection and first aid procedures applicable to these hazards."

FILLING: Whenever there is a danger of splashing, for example, when additions are made manually to the tanks, or when acids and chemicals are removed from the tanks, the employees so engaged shall be required to wear either tight fitting chemical goggles or an effective face shield.

EMERGENCIES: "When, during emergencies, workers must be in areas where concentrations of air contaminants are greater than the threshold limit of solvent or oxygen concentrations are less than 19.5 percent, they shall be required to wear respirators adequate to reduce their exposure to a level below these limits, or to provide adequate oxygen. Such respirators shall also be provided in marked, quickly accessible storage compartments built for the purpose, when there exists the possibility of an accidental release of hazardous concentrations of air contaminants. Respirators shall be approved by the U.S. Bureau of Mines, U.S. Department of the Interior (see 30 CFR Part 11) and shall be selected by a competent industrial hygienist or other technically qualified source. Respirators shall be used in accordance with Section 1910.134 (a), (b), and (c), and persons who may require them shall be trained in their use."

SPLASHING: "Near each tank containing a liquid which may burn, irritate, or otherwise be harmful to the skin if splashed upon the worker's body, there shall be a supply of clean cold water. The water pipe (carrying a pressure not exceeding 25 pounds) shall be provided with a quick opening valve and at least 48 inches of hose not smaller than three-fourths inch, so that no time may be lost in washing off liquids from the skin or clothing. Alternatively, deluge showers and eye flushes shall be provided in cases where harmful chemicals may be splashed on parts of the body."

* From the Occupational Safety and Health Act

OPERATION*

- Avoid excessive speed of work in and out of vapor
- Prevent liquid dragout by entrainment in parts
- Avoid contamination of solvent with water and other materials
- Keep proper heat balance

SPRAY CLEANING AND DEGREASING: In vapor degreasing, spraying takes place in an air-free atmosphere below the vapor blanket so that evaporative losses due to the mixing of solvent and air are negligible. However, care should be taken to always emerge parts dry.

COVERS: We recommend suitable covers for degreasers to reduce vapor emission when the degreasers are not operating and condenser coils are not functioning. For large machines, roll top covers or power operated covers are available to facilitate their use. In addition, freeboard chillers are very helpful in reducing solvent emissions. The principle used in this case is the creation of a heavy, cold air blanket over the solvent vapor by means of refrigeration devices.

WELDING IN VICINITY: "Degreasing or other cleaning operations involving chlorinated hydrocarbons shall be so located that no vapors from these operations will reach or be drawn into the atmosphere surrounding any welding operation. In addition, trichlorethylene and perchlorethylene should be kept out of atmospheres penetrated by the ultraviolet radiation of gas shielded welding operations."

* From Occupational Safety and Health Act

The BARON-BLAKESLEE Precision Cleaning equipment covered by the operating manual is specifically designed for use with fluorocarbon solvents such as "Blaco-Tron" TF, TCM, TE, and TE PLUS. Chlorinated solvents with higher boiling points, such as Blaco-Tri, may also be used in the subject machines. Machines with a "R" prefix, such as MSR, MVR, and MLR, are equipped with a refrigeration cooled solvent condensing coil and freeboard area, while the "W" prefix machines such as MSW, MVW, and MLW require a cold water supply and drain facilities for cooling. Those machines equipped with ultrasonics include an "S" in the prefix such as MSR and MSW. Models with a "V" in the prefix, such as MVR and MVW, are units designed for vapor immersion only, while the other models are designed for both liquid and vapor immersion.

- * The basic machine is a two sump unit with a clean condensate reservoir equipped with a solvent pump for final spray rinsing. One sump contains the heaters for solvent boiling while the second sump contains the clean solvent overflow from the spray reservoir and may be equipped with an ultrasonic transducer bottom. The condensed vapors are collected in a trough below the condensing coil and are directed into the gravity type water separator. The clean solvent is stored in the spray reservoir with the overflow directed into the clean solvent sump. Finally, the clean solvent sump overflows into the boiling sump to complete the closed recirculating system. Safety controls (High Temperature and Safety Vapor) are incorporated to turn the boiling sump OFF in the event of either low solvent level in the boiling sump or high vapor level in the freeboard area.

The refrigerated machines are supplied with a thermostatically controlled refrigeration system energized at all times when the electrical power is connected. The refrigeration unit operates periodically even when the boiling sump heat is turned OFF to provide a cold blanket of air in the freeboard area covering the solvent. The result is a savings in solvent, due to evaporation, of almost 50% as compared to typical tap water cooled machines.

A. Location

Among the considerations in selecting the cleaning system location are providing a work area free of dirt or contamination in the air and a means of filling and draining the tank when changing solvent solutions. Care must also be taken not to locate the system near blowers, drafts, fans, open windows, doors, open flames, baking ovens, or arc-welding operations. If the machine is water cooled, consideration must be given to the water inlet and outlet connections in addition to the necessary electrical requirements. The refrigeration cooled machines require only electrical connections for operation and are easily moved if equipped with casters.

When locating the refrigeration cooled machine, it is important that the particular location selected does not restrict the flow of cooling air to the refrigeration condensing unit. In addition, the refrigerated degreaser must not be operated in a small room without ventilation, since the condensing unit produces heat that would eventually heat up the room air used for cooling the condensing unit.

B. Electrical Connections

Check the nameplate located on the machine and electrical schematic diagram in the back of the manual for proper voltage, current, and frequency of the input power requirements. The Model MLR-120 and MSR-120 refrigerated machines are supplied with an electrical cable and mating receptacle. Check the electrical schematic for proper connections. A fused disconnect switch must be supplied for the main input power line, if required by local electrical code.

C. Water Connections (MLW, MVW, and MSW)

For maximum solvent conservation, the cooling water inlet temperature must be 60° Fahrenheit or less when using Fluorocarbon solvents in the cleaning system. When connecting the water piping to the machine install two valves in the inlet; one for daily ON/OFF of the water supply and one for an initial adjustment to control the water flow rate.

Do not install any valves or obstructions other than connecting pipe on the water outlet. The inlet water temperature and flow rate should be adjusted to maintain a solvent vapor level half way up the condensing coils when the boiling sump heat is turned ON.

D. Setting Safety Controls

The machines covered by this manual are protected by two built-in safety controls; the safety vapor control (S.V.C.) and high temperature control (H.T.C.). The safety vapor control turns OFF the heat in the event of high vapor level and must be set at 15° Fahrenheit below the boiling point of the solvent being used. The high temperature control turns OFF the heat in the event of low solvent level in the boiling sump and must be set about 25 degrees Fahrenheit above the boiling point of the solvent used. Both controls are manual reset type and must be reset after the fault is corrected and before the heat can be turned ON. When first turning ON the machine, check both controls by pushing the reset buttons in until the switch resets. Refer to data sheet #2391.7 on S.V.C. and H.T.C. for recalibration information.

Section 5

OPERATING

A. Filling and Turn-On Procedure

Before filling the cleaning system with solvent be sure that you have checked for possible leaks in the piping. Also check that all drain valves are closed and drain plugs are installed tight. Be sure that the cooling media is flowing thru the solvent condensing apparatus. Then fill both sumps with the selected solvent to a level even with the divider between the two sumps. Do not attempt to pour solvent into the spray reservoir. After the machine is turned ON and the spray reservoir fills with clean condensate, additional solvent will have to be added to the boiling sump. To charge and seal off the water separator tank after the spray reservoir is full of condensate, pour approximately four cups of clean water into the condensate trough and allow it to run into the water separator tank. Water will drip out of the water separator "water outlet" when fully charged with water. Note: Do not pour water into the water separator until solvent overflows from the spray reservoir into the rinse sump. Also, solvent such as Blaco-Tron TE or Blaco-Thane should not have water added as they are capable of absorbing water.

NOTE: DO NOT add water to a water separator when using 1,1,1 trichloroethane, or solvents containing acetone or alcohol. These include the following Genesolv solvents: DE, DI-15, DE-35, DFX, DMS, DES, 5535, 5433, 5240, DA-12, DTA, DTA+, DS-10. These solvents can absorb water and possibly become flammable or corrosive (go acid).

NOTE: DO NOT add water to a Desiccant Dryer system. This tank contains a dryer media which adsorbs water from the distillate solvent. Adding water to this tank defeats its purpose.

If the machine is a refrigerated cooled model, the refrigeration system will turn ON automatically as soon as the main power is applied. Until the heat switch is turned ON, the refrigeration system will cycle to maintain an air temperature of approximately 50 degrees Fahrenheit in the freeboard area above the solvent. After turning ON the heat, the solvent vapors will rise and the refrigeration system will run continuously to maintain a constant vapor height.

B. Cleaning Procedure

Never use hands for placing work in machine. Cleaning may begin as soon as the boiling sump starts boiling and the condensed vapors are dripping off the condensing coil. For ease of handling, large parts may be placed in the cleaning tank directly with long handle hooks or tongs, while small parts are best placed in a basket. (Stainless steel baskets are recommended.) If a basket is used, rack the parts for best drainage and minimum solvent entrapment. Best cleaning will result when the number of parts being cleaned at one time is kept at a minimum. Lower the contaminated work into the boiling sump slowly and allow to set for several minutes.

The exact time will depend on the kind and amount of contamination and is best determined by experiment. Next, transfer the work slowly into the clean solvent sump for a several minute rinse while moving the part around. Never bring work above vapor line when transferring. If the clean solvent tank is equipped with ultrasonics, additional surface cleaning will take place. The work can then be raised into the solvent vapor for a spray rinse, if desired, and final vapor rinse.

After completing the cleaning operation, the stainless steel cover should be moved into place to conserve solvent whether the boiling sump is ON or OFF.

C. Using Ultrasonics: See Baron Blakeslee's Ultrasonic Equipment Manual.

MAINTENANCE

Section 6

A. Refrigeration System

At weekly intervals, or sooner if operating conditions demand, the refrigeration condensing unit heat exchanger must be thoroughly cleaned with compressed air or a vacuum cleaner to remove all dirt, dust or other material that would reduce the heat transfer effectiveness. In the event the dirt and dust is not removed, the compressor discharge pressure will become too high with a resultant overheating of the compressor motor. Safety controls in the form of a high pressure and thermal overload switch are incorporated in the machine to protect itself. A sight glass is included in the high pressure refrigeration liquid line to check the refrigeration system operation. Under normal operating conditions, the sight glass will be clear without the presence of bubbles. In the event the sight glass contains bubbles, or no liquid refrigerant, the refrigeration system is operating incorrectly due to either a dirty condensor, defective expansion valve, or low refrigerant level as a result of a leak. Under such conditions the system should not be operated until the faults are corrected. A copy of the condensing unit manual is furnished for reference.

B. Safety Vapor Control

At least once a month check operation of safety vapor thermostat. This can be done on refrigerated units by bringing unit up to heat (vapor condensing on cooling coils). Open disconnect switch. Wait until vapors are at top of cooling coils, close disconnect switch-refrigeration will start immediately, heating elements should not be energized, due to the S.V.C. turning off the heating system. After vapors drop below cooling coils (none or very little vapor condensing on cooling coils) turn heat switch off. Re-set safety vapor control and turn heat switch to "ON" position. Heating elements should be energized. For water cooled units, simply turn off cooling water. Observe vapors until (a) heating elements are turn off, (b) vapor rises above cooling coils. Do not allow vapors to rise to top of machine tank and into work area. Turn cooling water "ON" and heat switch "OFF". Re-set safety vapor control, and turn machine heat "ON".

Malfunctioning of safety vapor control can be caused by miscalibration, improper setting, or defective control. (See "Insutructions on Recalibration of Safety Thermostats" at back of manual).

C. Cleaning Tank

The degreaser tank requires very little maintenance other than an occasional draining and cleaning. The boiling sump can be cleaned by turning ON the heat and draining the clean condensate from the reservoir tank as it is produced. As soon as the boiling sump level is down to the heaters, the heat switch must be turned OFF. Then the dirt and sludge may be removed through the boiling sump drain valve (small units) or thru cleanout door opening (large units) before refilling with clean solvent. (See page 4 on Safety.)

Mild non-scratching abrasives in powder form (Bon-Ami or other household cleaners) and soap can be used to clean the stainless steel tank. Steel brushes and sponges should not be used to clean stainless steel as they may leave particles embedded in the stainless steel surface which would lead to rusting.

D. Ultrasonics (if supplied)

Maintenance and servicing is covered by the attached ultrasonic generator manual.

E. Solvent Maintenance

Most solvent can be recycled indefinitely with proper care in distillation and water removal. The solvent should be periodically checked for proper PH or acid acceptance, due to type of stabilizers, the contamination introduced into the solvent and water in system (condensation or by parts). For chlorinated solvents BARON-BLAKESLEE offers an acid acceptance test kit (part no. 12-001). Fluorinated solvents are very stable and normally do not require periodic tests.

A degreaser removes oil, chips and most organic soils. Where do these soils accumulate? In most degreasers the boiling sump collects the majority of contamination. Solvent flow is normally from condensing coils, to gravity water separator, to spray reservoir, to rinse sump, to boil sump. The solvent counter-flows the travel of work to provide the purest solvent for rinsing (either by spray or immersion).

CAUTION: contaminated solvents can be flammable due to nature of contamination.

The degree of solvent contamination, governs the degree of part cleanliness. Briefly, a "CLEAN DEGREASER" produces "CLEAN PARTS." Oil contamination increases boiling temperature of solvent. When the normal boiling temperature is exceeded by 7°F., machine should be cleaned out.

Aluminum or magnesium fines or trimmings can cause accelerated solvent break down. When cleaning parts of these materials a closer watch on solvent acidity is required.

Discard solvent with high acidity and completely clean and flush equipment with a solution of water and soda ash (2 oz. per gallon). Caution: NEVER USE CAUSTIC SODA. Flush and rinse with water, dry and refill with fresh solvent.

Periodic inspection is required on some machines equipped with silica gel dryers. When water droplets are observed on top of liquid in dryer shell, replace silica gel.

INSTRUCTIONS FOR CLEANING DEGREASERS AFTER SOLVENT DECOMPOSITION

INTRODUCTION

The introduction of modern stabilization systems for degreasing solvents has reduced the incidence of acid degreasers to the point where significant decomposition is rare. Occasionally, however, acidity may develop because a necessary maintenance schedule is not followed; acidic soils are introduced; white metals contact heating surfaces, etc.

Rapid, violent chemical reactions are possible when considerable quantities of aluminum or magnesium fines are present in an acid degreaser and great precaution is necessary to prevent damage to the equipment and plant if trouble develops.

Steel, copper and zinc alloys do not present the same violent reaction possibilities as aluminum and magnesium in an acid degreaser, but all due caution should be exercised.

Two types of reaction products are formed in an acid degreaser:

1. Irritating, corrosive and toxic fumes; sharp, pungent odors emanate from the machine.
2. Black, gummy residues composed of carbon, polymers, metal-organic compounds and, when aluminum is present, aluminum chloride.

The fumes are corrosive to metals, not only in the degreaser, but also in the surrounding plant area. The black, gummy residues are also very corrosive and, in addition, when a reactive metal is present it will catalyze further breakdown of the solvent. The decomposition of solvent may generate sufficient heat to ignite oils or other soils in the degreaser.

To check the condition of the solvent, shake equal volumes of distilled solvent and neutral distilled water. Check the water layer for pH. Generally a pH below 6.0 is a result of decomposition of the solvent. Acid acceptance kits are available for Trichloroethylene and 1,1,1 Trichloroethane.

Baron-Blakeslee or your solvent supplier should be consulted if you suspect an acid condition and the following procedure should be adopted to prevent serious damage to the machine and disruption of the process.

STEPWISE CLEANING OF AN ACID DEGREASER

1. Turn off the heat to the degreaser.
2. Do not shut off the water to the condenser coils.
3. Send all personnel away from the immediate area except those required to clean the machine.
4. Wait until the temperature of the solvent drops to a minimum of 30 - 50°F below boiling point of solvent. In some cases, it may be necessary to cool the degreaser by external means. Should this be necessary, spray cold water on the outside of the degreaser until the temperature of the solvent drops at least 30 - 50°F. below boiling point of solvent.
5. Use a 3/4" or 1" hose attached to the main water supply to flood the degreaser. Cover all solvent to a depth of 2 to 4 inches. (NOTE: Adding a small amount of water may aggravate the condition.) Adding 1/2 cup of soda ash for each gallon of water used will help neutralize the acidic decomposition products and will facilitate cleaning the machine.
6. Drain water separator on degreaser and/or still and pour solvent portion back into degreaser.
7. Turn heat on and proceed to distill out into steel drums. Check distillate for pH frequently. If pH is 6 or higher this reclaimed solvent can be mixed immediately with an equal or greater quantity of new solvent for reuse. Distill down as far as possible without danger of exposing heating surfaces.
8. Turn heat off and pump bottoms into still or into drums.
9. Pump all residual solvent from the degreaser and water separator into steel drums to which have been added about one pound of soda ash and some water. (NOTE: Do not insert the bungs in the drums. Carbon dioxide is formed by the reaction between soda ash and acid solvent. If the drums are sealed, internal pressure built up from the evolution of carbon dioxide will split the drums.) Make sure enough water is present in the degreaser to prevent solid residues from being exposed to the air when the solvent is pumped out of the machine. (The water floats on top of the solvent.) Do not use caustic soda.
10. After the solvent has been removed, cover heater surfaces with water. Add 1/2 cup of soda ash per gallon of water and bring to a boil. After cooling, pump or drain water out of the system.

11. Remove the cleanout doors and scrape out any residues (from outside) of the tank. Transfer all solids from the machine into metal drums containing water. All of these wastes should be disposed of in accordance with all applicable Federal, State and local Hazardous Waste Regulations. Handle the drums with care. Turn off the heat and hand spray soda ash solution on cooling coils, troughs, walls, and allow water separator to fill up (via the troughs).

WARNING:

- a. Before cleaning tank interior, drain contents and open cleanout doors. Ventilate and clear all vapor from pockets in tank or pits.
 - b. Do not enter degreaser until unit has been shut off, all solvent drained from unit and cleanout doors removed. Person entering degreaser shall be equipped with halter and lifeline together with NIOSH/MESA pressurized air mask. Man on outside shall be similarly equipped and be able to communicate with person in tank.
 - c. All degreaser personnel must be trained and completely familiar with instructions before operating and performing maintenance work on equipment. An authorized supervisor must be present at all times.
 - d. Death can result from carelessness.
12. Replace all cleanout door plates.
 13. Refill all sumps of machine with 6 to 8 inches of water. Add about 1/2 cup of soda ash for each gallon of water used. Turn on the heat to the machine. When solution comes to boil, pump solution from each sump thru a flexible hose, spray the condenser coils, troughs, conveyors, and inside walls of machine. Be sure to fill the water separator (via the troughs). Also pump soda ash solution thru spray wand, spray piping, etc., depending on how machine is equipped.
 14. Turn off heat. Cool and drain. Remember to drain water separator.
 15. Remove cleanout doors to scrape out any remaining residues. (An undetected deposit of unneutralized residue as small as a pea can cause the degreaser to go acidic again after it has been put back in service because of the catalytic nature of the residue.)
 16. Wipe dry all interior surfaces of the degreaser body, conveyor and components.

17. Inspect and replace damaged thermostats, corroded condenser coils, etc.
18. Replace all damaged cleanout door gaskets with new ones.
19. Recharge the degreaser with clean solvent and bring up to operating levels with new solvent.

The degreaser is now ready for service. It is suggested that the degreaser run idly for 1 to 2 hours to expel excess water from the system.

FURTHER COMMENTS

1. Baron-Blakeslee or your solvent supplier will assist you in determining the cause of trouble and prescribe steps to remove this cause.
2. If solvent decomposition is experienced, your cleanout and maintenance program should be thoroughly reviewed.
3. Consult your solvent supplier to determine whether the acidic solvent is salvageable.

PRELIMINARY TESTS OF FLUORINATED HYDROCARBONS

pH using 0.04% Brom Thymol Blue Indicator

1. Collect sample of distillate solvent either from trough or from discharge of a clean water separator.
2. Shake vigorously in a test tube with an equal volume of freshly boiled distilled water.
3. Allow to separate into two layers and add 3-4 drops of Indicator.
4. Blue color mean pH is 7.6 (alkaline) or above. Green color means pH is about 7.0 (neutral). Yellow color pH is 6.0 (acid) or below.
5. If the pH is above 6.0 (green to blue) indications are that there is no decomposition product in the distillate.
6. If the pH is below 6.0 (yellow) decomposition products may be present, this should be confirmed by test for chlorides.

NOTE: pH tests on sludges or other than distillate solvent have no significance. It is necessary to distill such samples and test the mid-fractions.

BARON BLAKESLEE DECREASER AND SOLVENT RECOVERY STILL
STEAM PRESSURE AND COOLING WATER REQUIREMENTS

Standard design on most equipment is represented by listings below. For special equipment refer to general assembly print for any deviation.

SOLVENT USED

Trichlorethylene
1,1,1 Trichloroethane
Perchloroethylene

STEAM PRESSURE REQUIRED

10 P.S.I. = 0.7 Kgs. per Sq. Cm.
6 P.S.I. = 0.42 Kgs. per Sq. Cm.
50 P.S.I. = 3.50 Kgs. per Sq. Cm.

P.S.I. = pounds per square inch. Kgs. per Sq. Cm. = Kilograms per square centimeter. Slightly lower pressures can be used for initial start-up of equipment because all solvent in system is clean.

COOLING WATER TEMPERATURES

SOLVENT	INLET TEMPERATURE		OUTLET TEMPERATURE		TEMPERATURE RISE	
	F ^o	C ^o	F ^o	C ^o	F ^o	C ^o
Trichlorethylene	75 ^o	24 ^o	125 ^o	52 ^o	50 ^o	28 ^o
1,1,1 Trichloroethane	75 ^o	24 ^o	115 ^o	46 ^o	40 ^o	22 ^o
Perchloroethylene	75 ^o	24 ^o	125 ^o	52 ^o	50 ^o	28 ^o
*Methylene Chloride	60 ^o	16 ^o	70 ^o	21 ^o	10 ^o	5 ^o
*Fluorocarbons (Blaco-tron)	60 ^o	16 ^o	70 ^o	21 ^o	10 ^o	5 ^o

*Normally requires chilled water.

Closed loop system such as water tower, requires 1.6 times as much as listed quantity of water.

Trichlorethylene	85 ^o	30 ^o	115 ^o	46 ^o	30 ^o	16 ^o
1,1,1 Trichloroethane	85 ^o	30 ^o	105 ^o	41 ^o	20 ^o	11 ^o
Perchloroethylene	90 ^o	32 ^o	130 ^o	55 ^o	40 ^o	23 ^o

F = Fahrenheit

C = Celsius

Higher inlet temperatures are permissible, however, quantity of water and temperature rise will vary. With heat "ON" vapor level must be maintained without work being processed.

Baron-Blakeslee Technical Bulletin

Equipment Model: M-Line Degreasers

Bulletin Number: 3

Subject: Tuseal Pump (Teflon Seal)

Date: November, 1989

General Description

Baron-Blakeslee Tuseal Pump
Part number 030-250 and 030-255

Models of the M-Line degreasers may use this pump for various functions. Refer to the General Assembly print on your machine for possible applications, as described below.

A Tuseal pump provides solvent transfer from a Degreaser unit to a Solvent Recovery Still. The pump in the Degreaser transfers contaminated solvent from its vapor sump to the Still. The Still then distills this solvent. The distilled solvent then pumps or gravity flows to the cleanest tank of the Degreaser.

Tuseal Pumps are an option for the spray pump. This pump provides a higher pressure or volume of solvent than the

standard magnetic drive pump. We use this pump mostly with fixed spray headers.

Tuseal Pumps are an option for the recirculation system. They pump a greater volume of solvent through the heater/cooler and/or filtration system.

The Baron-Blakeslee Tuseal pumps are designed specifically for the application of pumping volatile solvents (readily vaporizable at a relatively low temperature) which are heated near their boiling point and include suspended contaminants. These pumps (030-250 and 030-255) use a Teflon seal, which is most resistant to these solvents. All wetted metal parts are of type 304 stainless steel. The standard motor uses C flange permanently lubricated ball bearings. See a separate bulletin (page 27 in M-Line Manual) on other Tuseal Pumps (030-007 and 030-100).

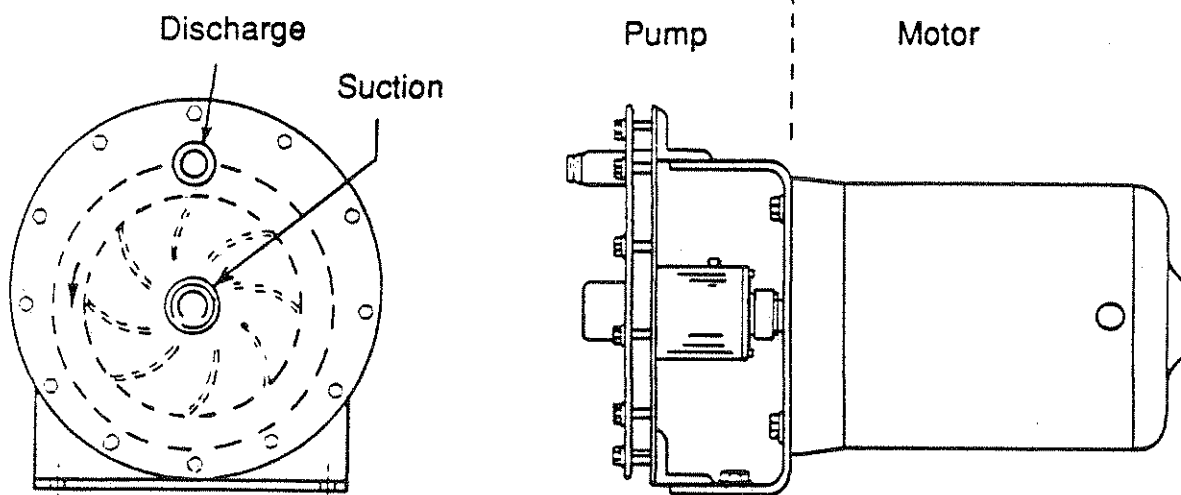


Figure 1 Tuseal Pump

Maintenance

This pump assembly requires very little maintenance. A wet or dark spot on the floor under the pump may indicate a leaking seal. Use the following procedure for field replacement of the Teflon seal assembly. The numbers next to components refer to those shown in figures 2 and 3.

WARNING

DISCONNECT ALL POSSIBLE SOURCES OF ELECTRICAL POWER TO THE PUMP MOTOR BEFORE PROCEEDING.

NOTE: This procedure can vary slightly with different applications for the pump. Refer to prints on your equipment for application, valve location and electrical connections.

1. Close the valves on the pumps suction and discharge sides, or drain solvent from the sump to a level below the pump.
2. With main electrical power off, disconnect the motor leads. Assure the wires are numbered or re-number them for proper reconnection.
3. Position a pan under the suction (inlet) union of the pump. Loosen and disconnect the union from the pump. Allow the trapped solvent to drain into the pan. Empty the pan in the vapor sump of the cleaner or Still.
4. Disconnect the union on the discharge side of the pump. Some applications connect a tube from a fitting on the seal housing (2) and the discharge side of the system. This keeps the seal wetted and thereby cooled. If equipped, disconnect this tube fitting.
5. Remove the pump support bracket (1) mounting bolts. Remove the pump and motor from the machine as an assembly. Drain any trapped solvent from the pump into a pan or vapor sump.
6. Loosen the set screws in the set collar (7). Remove the 4 bolts securing the motor to the support bracket, and the motor.
7. Remove the 12 bolts and cover plate (8). Remove the set collar from the impeller (3) shaft. Remove the impeller.
8. Remove the two socket head screws and the seal housing cover (5). Discard the "O" ring (6) and the ceramic seat with Teflon backing (stationary part of item 4).
9. Loosen the 3 set screws and remove the rotating seal (rotating part of item 4) from the impeller shaft.
10. Clean all pump parts. Lubricate the seal housing cover (5) with a light, clean mineral oil.
11. Remove the stationary seat (white) with cardboard facing, from the packaging. Align a notch in the ceramic of the stationary seat with the roll pin in the cover (5). This pin assures that the stationary seat will not rotate. Press the Teflon (red marked side) into the seal housing cover (leave cardboard on seal face). Use special care to press the stationary seat in place so that it is square, flat and tight against the seal housing cover. Remove the cardboard facing and apply a coat of oil on the face of the seat.
12. Clean the impeller and shaft (3). If the impeller shaft is scored, polish it in the area for the seal. Apply a coat of clean oil on the shaft.
13. Place the impeller face down. Remove the plastic packing and cardboard from the rotating part of the seal assembly. Do not remove the tape from the seal or the spring retaining clips.
14. Push the rotating seal part evenly onto the impeller shaft, spring retaining clip end toward the impeller. If your pump includes a seal spacer, press it against the back of the impeller plate and press the seal against the spacer. If your pump does not

Tuseal Pump (Teflon Seal)

- include the spacer, position the front edge (spring clip end) of the rotating seal part next to the groove in the shaft, and/or use calipers to position it for 29/32 inch (.906") between the back of the impeller plate and the spring clip end of the seal part. Tighten the 3 set screws in the rotating seal part. Remove the tape and spring clips from the rotating seal part. Coat the carbon face with clean oil.
15. Coat the new "O" ring (6) with clean oil. Assemble the "O" ring onto the seal housing cover. Reassemble the seal housing cover onto the seal housing and tighten its two mounting screws.
16. Assemble the motor on the support bracket. Properly position the motor for alignment of electrical connections. Position the motor flush with the mounting bracket. Assemble and tighten the 4 mounting bolts. Assemble the set collar over the motor shaft.
17. Insert the impeller shaft with the rotating seal part, into the impeller/seal housing. Insert the impeller assembly until the machined step on the shaft extends beyond the seal housing cover (over the motor shaft) and the larger diameter of the shaft is flush with the cover.

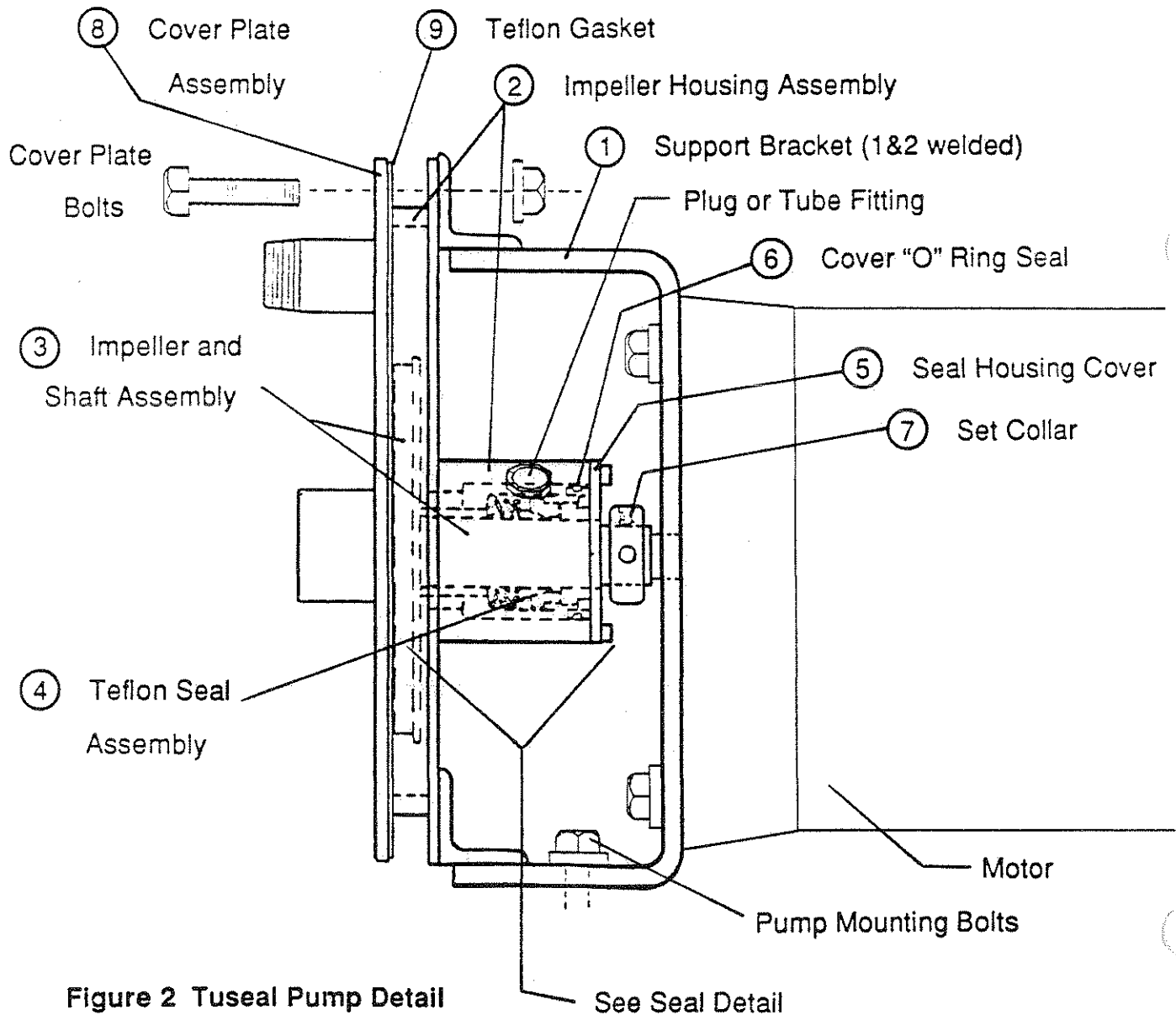


Figure 2 Tuseal Pump Detail

Tuseal Pump (Teflon Seal)

18. Position the set collar on the impeller shaft. Align the collar so the two set screws position, bridge the slot in the impeller shaft. Assure that the collar does not rub on the seal housing cover. Tighten the set screws to clamp the impeller shaft to the motor shaft. Check for free rotation of the impeller. If it does not turn, rubs or binds (scraping sounds), loosen the set collar and slightly move the impeller away from the motor. Verify free rotation. Retighten the set collar screws.
19. Assemble the new gasket (9) to align with the cover plate (8). Assemble the cover plate and gasket to the impeller housing (2) and bracket (1) assembly with the 12 mounting bolts. Center the gasket (check the entire perimeter). Tighten all bolts evenly in a cross pattern.
20. Re-check for free rotation of the impeller (turn at the set collar). Loosen the set collar and slightly move the impeller, if necessary. Verify free rotation. Retighten the set collar screws.
21. Reassemble the pump assembly into the machine. Reconnect piping and wiring. Open the suction and discharge valves and inspect for leaks. Verify proper rotation of the pump.

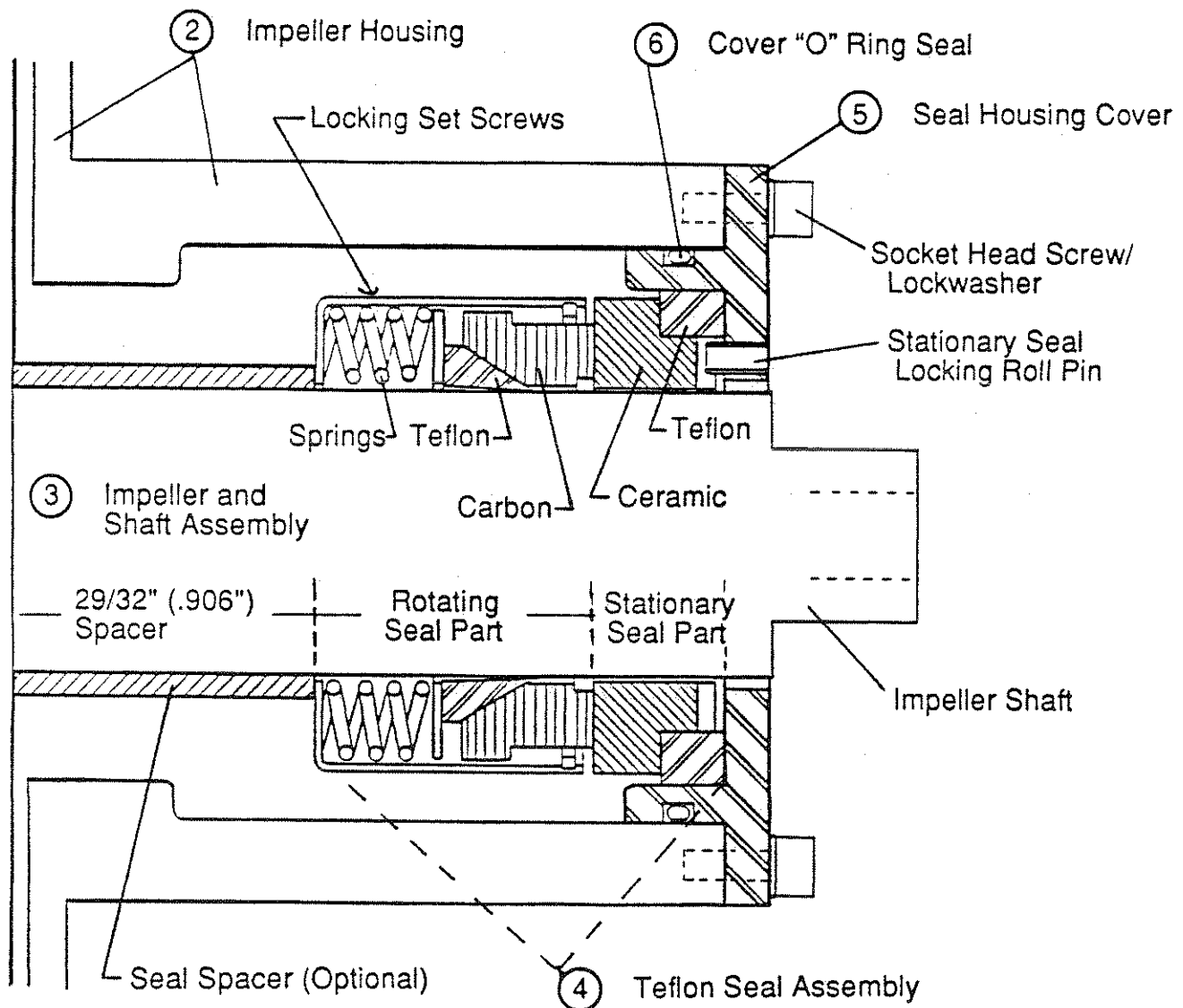


Figure 3 Teflon Seal Detail

Parts List

- Pump- A - All wetted parts are of type 304 stainless steel, Teflon seal and gaskets, 1" FPT suction, 1/2" MPT discharge;
 B - Same as Pump A, except 1.25" FPT suction, 1" MPT discharge.

NOTE: Item numbers refer to those listed in Figures 2 and 3.

<u>Item#</u>	<u>Part#</u>	<u>Description</u>	<u>Quantity</u>
<u>A</u>	<u>030-250</u>	<u>Tuseal Pump 1 x 1/2</u>	
1	-	Support Bracket (1&2 welded)	1
2	-	Impeller Housing Assembly (1&2 welded)	1
3	-	Impeller and Shaft Assembly	1
*4	032-145	Teflon Seal Assembly	1
	-	Seal Spacer (Optional)	1
5	-	Seal Housing Cover	1
	LP	#8-32 x 3/8" Socket Head Screw	2
	LP	#8 Lockwasher	2
	LP	Seal Locking Roll Pin, 3/32"D x 3/16"L	1
*6	032-144	Teflon encapsulated "O" Ring (cover seal)	1
7	059-381	Set Collar (with 2 socket head set screws)	1
8	032-099	Cover Plate Assembly (with pipe fittings)	1
	LP	5/16 - 18 x 1 1/4" Hex Head Cap Screw	12
	LP	5/16 Hex Nut (Keps)	12
*9	059-027	Teflon housing gasket	1
<u>B</u>	<u>030-255</u>	<u>Tuseal Pump 1.25 x 1</u>	
8	032-124	Cover Plate Assembly (with pipe fittings)	1

All other parts with numbers are interchangeable with Pump (A).

LP = Local Purchase (common hardware items)
* = Recommended spares

Parts Ordering

We recommend that you maintain spare parts inventory to reduce production down time. If this time is critical, order the complete pump assembly. Also order parts to rebuild the pump. When ordering, please provide the model and serial number of your equipment.

Write, fax or call your Customer Service Representative at:

Allied/Baron-Blakeslee
Customer Service Department
2001 North Janice Avenue
Melrose Park, Illinois 60160

Fax: (708) 450-3884
Phone: (800) 548-4422, or (708) 450-3909

Baron-Blakeslee Technical Bulletin

Equipment Model: General

Bulletin Number: 2

Subject: Magnetic Drive Solvent Pump

Date: October, 1989

General Description

This pump assembly usually mounts on the unit by threading directly into a fitting on the tank wall (male pipe threads on both the suction and discharge fittings). It is used in rinse filtration and in distillate spray systems.

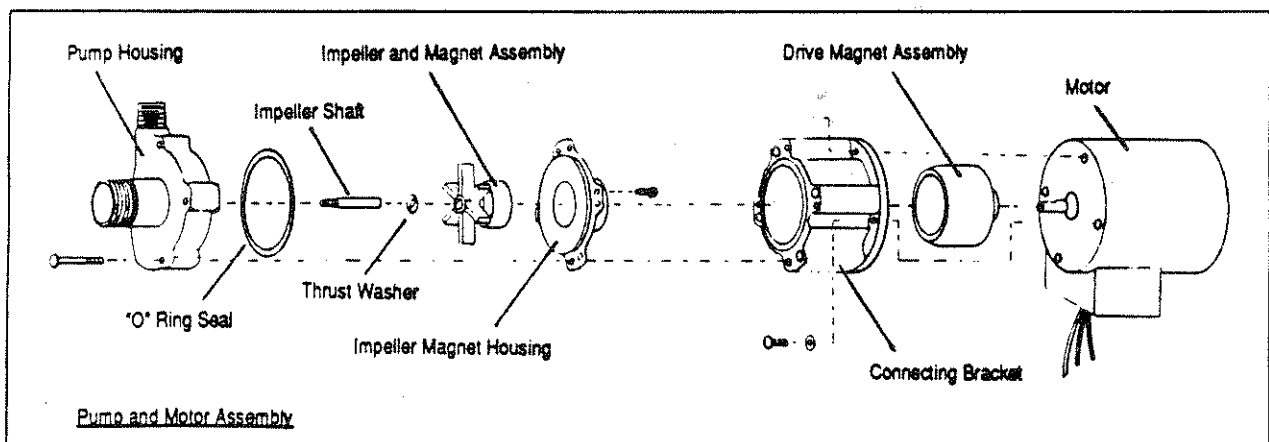
A magnetic drive pump allows for a more reliable seal against solvent leaks. The motor shaft does not connect directly to the impeller and therefore, does not require a seal. The impeller assembly contains a magnet which "floats" in a cup housing. A cup shaped magnet connects to the motor shaft. This magnet fits over the impeller housing. As the motor and magnet rotate, it magnetically turns the impeller. This arrangement normally creates a positive drive from the motor to the impeller. However, if the impeller binds or stalls, it does not cause a bind and overheating of the motor. Note that if the solvent temperature exceeds 200°F (Perchloroethylene), the magnets lose their function. The impeller temporarily stalls until the magnets cool. Use a different pump or cool the solvent prior to the pump.

To Remove/Replace the Pump Assembly

1. Drain/ assure solvent level in sump is below the pump fitting.
2. Disconnect power to the unit,
3. Disconnect wiring at the motor junction box and piping from the pump,
4. Unscrew the motor and pump assembly from the sump wall fitting,
5. Reassemble the new pump in reverse of removal - use new Teflon tape or Teflon based pipe thread compound on the fittings.

Preventive Maintenance

The only routine maintenance required on this assembly is lubrication of the motor, and observing the assembly for solvent leaks and proper output. Each six (6) months, add several drops of S.A.E. 20 wt. oil in the motor lubrication tube. If a leak is noticed, replace the "O" ring seal. If



output volume/ pressure is decreasing, clean the pump assembly. Contaminations in the solvent, particularly metal fines, can collect around the magnet and cause the impeller to bind.

Pump Cleaning/ Repair

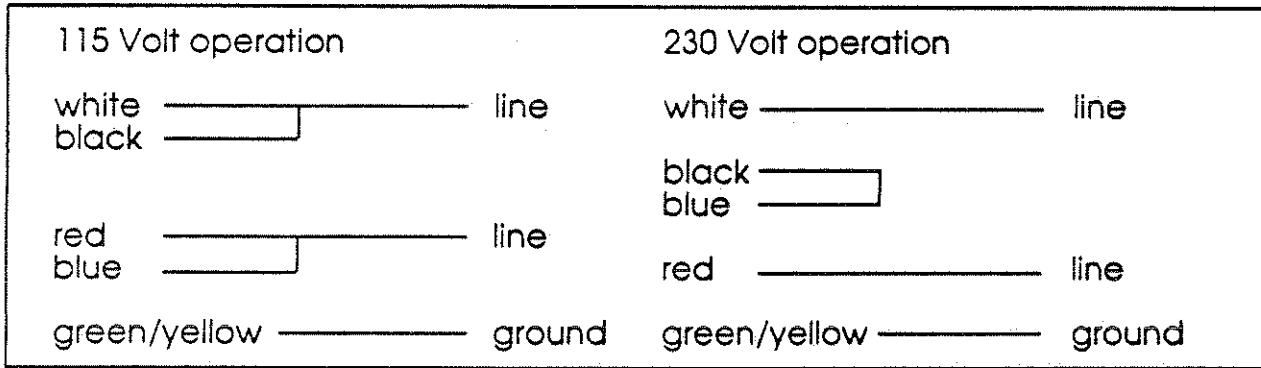
1. Remove the pump assembly from the unit,
2. Remove the four (4) screws securing the pump housing to the connecting bracket (see illustration),

3. Remove the four (4) screws securing the impeller magnet housing to the pump housing (4 hex nuts on the S-S model),
4. Remove the impeller/magnet from the housing and clean all parts,
5. Install a new "O" ring and reassemble in reverse order of disassembly. Tighten the screws evenly and in a cross pattern.

NOTE:

You may prefer to leave the pump housing attached to the sump fitting, and remove the rest of the assembly from the housing.

Motor Wiring Connections :



Parts Ordering

We recommend that you maintain spare parts inventory to reduce production down time. If this time is critical, order the complete pump assembly. Also order parts to rebuild the pump. When ordering, please provide the model and serial number of your equipment.

Write, fax or call your Customer Service Representative at:

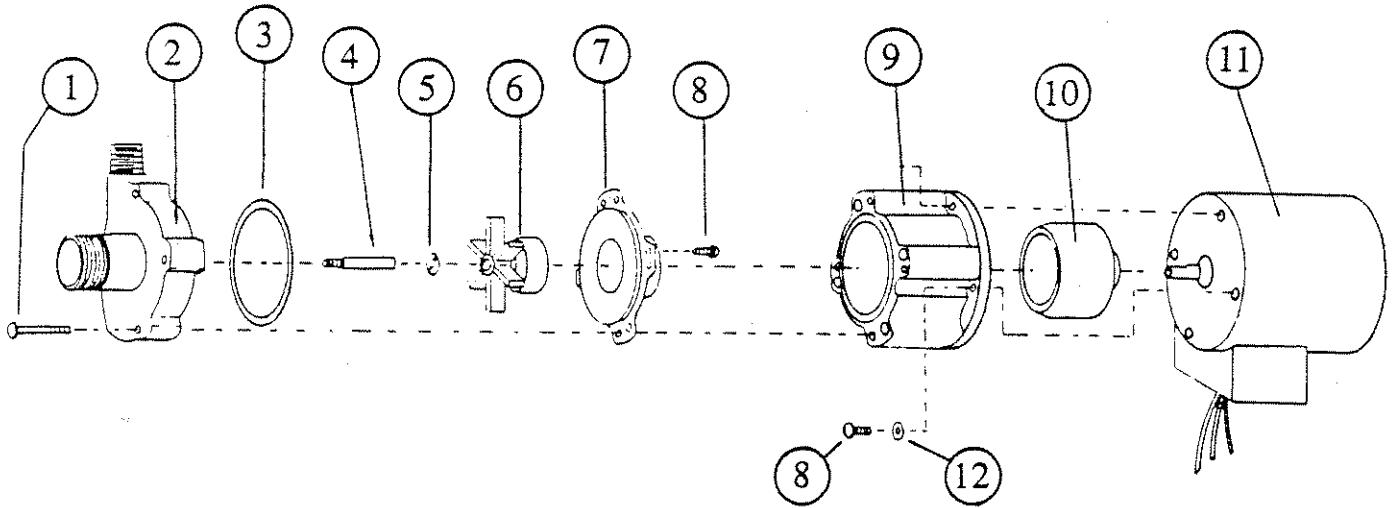
Allied/Baron-Blakeslee
 Customer Service Department
 2001 North Janice Avenue
 Melrose Park, Illinois 60160

Fax: (708) 450-3884
 Phone: (800) 548-4422, or (708) 450-3909

Magnetic Drive Solvent Pump

Specifications:

- Motor- 115/230 Volts, Single Phase, 50/60 Hertz, 1.4/.70 Amp., 3050 R.P.M., 1/25 H.P., Continuous Duty.
- Pump- A - Bronze Housing, Ryton Impeller, Viton Seal, Center Inlet, 3/4" MPT Suction, 1/2" MPT Outlet;
 B - Same as Pump A, except all wetted parts are of Type 304 Stainless Steel and "O" Ring Seal is Teflon.



Parts List

<u>Item#</u>	<u>Parts</u>	<u>Description</u>	<u>Quantity</u>
A	<u>030-027</u>	<u>Bronze Pump and Motor Assembly</u>	
1	LP	#8 X 1 1/4" Long Round Head Screw	4
2	032-270	Pump Housing	1
*3	032-143	"O" Ring Seal - Viton (2.5 inch O.D.)	1
	033-055	"O" Ring Seal - Teflon Encapsulated	1
4	032-273	Impeller Shaft	1
5	032-274	Thrust Washer	1
*6	032-272	Impeller and Magnet Assembly	1
7	032-275	Impeller Magnet Housing	1
8	LP	#8 X 3/8" Long Round Head Screw	
9	032-276	Connecting Bracket	1
10	032-277	Drive Magnet Assembly	1
11	NA	Motor	1
12	LP	#8 Flat Washer	4
B	<u>030A042</u>	<u>S-S Pump / Motor Assembly (Teflon Seal)</u>	
1	LP	#8 X 1 1/16" Long S-S Round Head Screw	4
2	032-271	S-S Pump Housing	1
8	LP	#8 S-S Hex Nut (for Remain Screws in HSG.)	4
3-7 and 9-12		Parts are interchangeable with the Bronze Pump (A).	
		NOTE: LP = Local Purchase (common hardware items)	
		* = Recommended spares	

INSTRUCTION BULLETIN

HOW TO START UP AND CLEAN BARON BLAKESLEE SINGLE COLUMN CARTRIDGE FILTERS

WHEN TO SERVICE:

As the filter cartridge removes contamination, the pressure drop across the unit will slowly rise. You can determine this by mounting a pressure gauge upstream from the filter or by mounting a gauge in the vent opening with a T, so that the filter can still be vented.

Experience with your particular application will determine the pressure rise indicative of a dirty filter. Without pressure gauges, too low a flow rate will indicate when new cartridges are required.

HOW TO SERVICE:

When filter cartridges need replacement:

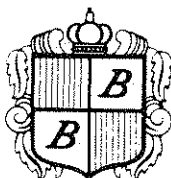
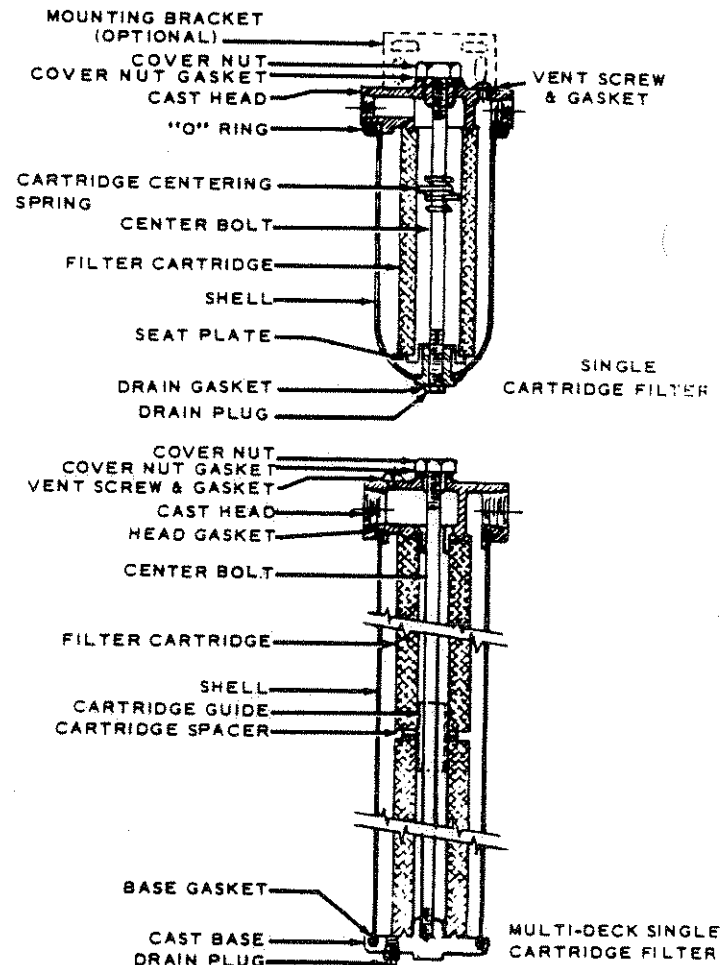
- 1 - Close inlet and outlet valves to unit.
- 2 - Open bottom drain plug and loosen vent screw to drain unit.
- 3 - Unscrew cover nut while supporting bottom assembly with hand.
- 4 - Remove and discard used cartridge.
- 5 - Clean all parts.
- 6 - Inspect, clean, and replace, if necessary, head and base gaskets or "O" ring as required by the particular filter unit being serviced.
- 7 - In two and three cartridge units, insert cartridge connector in one cartridge, then place second cartridge over other end — being careful that spacer is between the cartridges. (Should tension between cartridge and connector weaken, spread connector with fingers.)
- 8 - Place new filter cartridge over boss in shell.
- 9 - Raise entire shell assembly to filter head until the cartridge guide engages in the cartridge center core.
- 10 - Rescrew cover nut and tighten until metal to metal contact is made on "O" ring unit; 15 ft.-lbs. of torque on flat gasket unit. Do not exceed this limit in either case.

HOW TO OPERATE:

- 1 - Open inlet valve to filter slowly, checking for gasket leak.

CAUTION: These units incorporate either "O" ring seals or flat gaskets. If leakage occurs, open the unit; clean and inspect the "O" ring or flat gasket. Replace if stretched or otherwise damaged. On "O" ring units, the cover should be bolted until metal to metal contact is made. Further tightening will stretch the bolt without improving the seal. Filter cartridges will compress about 1/4" - 3/8".

- 2 - Loosen vent screw to bleed trapped air.
- 3 - Tighten when liquid appears around vent opening.



Baron Blakeslee

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**INSTRUCTIONS FOR LIQUID TEMPERATURE SENSOR
(LIQUID TEMPERATURE CONTROL)**

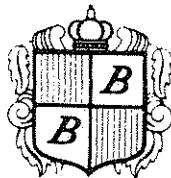
Baron-Blakeslee has added a thermostat to the boil sump of some degreasers or stills, to sense the temperature of the liquid in the boil sump. This thermostat is called a Liquid Temperature Sensor (LTS) (sometimes called a Liquid Temperature Control (LTC)). The LTS or LTC is a manual reset thermostat and must be reset before machine heat can be restarted.

Due to solvent alcohol blends it is possible to gain alcohol in the boil sump of a degreaser or in a solvent recovery still. As the alcohol builds up, the boiling point of the solvent gets higher and if not monitored can result in a solvent vapor that is flammable.

The LTS should be set at 1300F for Fluorocarbon-Alcohol blends. When the LTS shuts off machine heat the boil sump should be cooled and drained. Then dispose of this solvent in a proper manner. The degreaser should be filled to proper level with fresh solvent and the LTS reset and machine heat turned back on.

For chlorinated solvent with alcohol the LTS should be set 100F above normal boiling point of solvent.

Thermostats should be checked and calibrated frequently. For calibration of thermostats see Form 2391.7.



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VAPOR-UP CONTROL

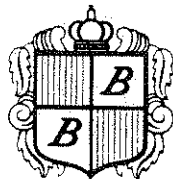
Standard Baron-Blakeslee degreaser operation requires that the sprays never be operated above the vapor blanket in the degreaser. Doing so will result in excessive solvent emissions, which are costly and create unpleasant working conditions.

To prevent this condition Baron-Blakeslee offers the vapor-up control, also known as the spray safety switch. The primary component of the control is a thermostat with probe. The probe is installed in the degreaser just below the normal vapor level. When properly adjusted the control will prevent operation of the spray pump until the unit is fully up to heat and the vapor level is established. On conveyorized units the control will also prevent operation of the conveyor.

During normal operation, if heat is lost or if the unit is overloaded with work, the vapor line will drop causing the vapor-up control to disable the spray pump and conveyor.

When vapor line has been re-established the control will automatically reset, allowing sprays and conveyor to function.

To set the control, set the temperature adjustment above the boiling point of the solvent being used in the degreaser. Wait until solvent is condensing on the cooling coils. Slowly move the temperature adjustment lower until the vapor up light is illuminated. This will set the thermostat at the vapor temperature.



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Baron-Blakeslee Technical Bulletin

Equipment Model: General

Bulletin Number: 1

Subject: Zytron Temperature Control

Date: October, 1989

General Description

Baron-Blakeslee uses different models of the Zytron Thermostat control for different functions. The next section describes each functional use for the thermostat. In general, a thermostat circuit monitors or controls the temperature in one area of the machine. It reads a thermocouple sensor input to determine that temperature. It then opens and closes the circuit between output terminals as the sensed temperature goes above or below the operator adjustable set point temperature. We use this thermostat output to turn heating or cooling circuits on and/or off.

Baron-Blakeslee changed to the solid state Zytron thermostat in mid-1986. There are distinct advantages of the Zytron over the previously used electro-mechanical type thermostat.

- Solid State Operation
- Faster Response Time
- Probe Is Replaceable As Separate Unit
- No Field Calibration Required

All models of the Zytron Thermostat, used in the Baron-Blakeslee equipment, are factory calibrated for a 0-300°F, operator adjustable, set point range. They require a Type "J" Thermocouple sensor for input. They provide output connections from a SPDT Relay. This allows using them for a High or Low Limit control or an On and Off control.

Each control has a red LED labeled Power (see Figure 1). It is on when power is applied to the unit. It has a yellow/green LED labeled Load. It is on when the output relay is energized. It also has adjusting pots labeled Span and Offset (OFST.). These are factory adjusted

and should not require recalibration.

The control has a sensitive input amplifier stage. It provides amplification and automatic ambient compensation of the thermocouple sensor input voltage. It compares this amplified input voltage to a reference voltage. By adjusting the temperature set point pot, you set this reference voltage level.

When the temperature at the thermocouple sensor is below the set point temperature, the amplified input voltage is less than the set point reference voltage. The comparator circuit keeps the output relay energized. When the sensor temperature goes above the set point temperature, the amplified thermocouple voltage exceeds the set point reference voltage. The comparator circuit de-energizes the output relay.

We use the High Limit control for areas of safety, such as for SVC and HTC (see next section). In normal operation, the thermostat output relay remains energized. Its closed "NO" contacts create a series circuit for the heaters. If the temperature at the sensed area increases above the set point, the output relay contacts open the circuit and turn off the heaters. Even after the temperature returns to a normal value, the relay will not re-energize until you press the manual Reset switch.

We use the On-Off control on refrigeration cooling units. During night time operation, this control causes the refrigeration compressor to turn on and off to maintain a consistent temperature at the cooling coils. The output relay automatically resets as the sensed temperature goes above and below the set point temperature. When the temperature reaches the set point, the compressor

turns on. When the temperature decreases below the set point by a differential amount, the compressor turns off. This on/off differential is adjustable between 3-7°F by the Hyst/BW (hysteresis) pot on the side of this controller.

Function and Adjustment

NOTE: Your equipment will not use all of the optional controls described in this section. Refer to your General Assembly and/or Wiring prints to determine which ones do apply. The listed temperature settings are typical. They can vary with different applications.

1. Proper adjustment and function of the safety vapor control (SVC) is extremely important. The vapor line (where top of vapor blanket meets air) is usually half way up the solvent condensing (cooling) coils. See the General Assembly print for your equipment. The safety vapor control turns off the heat if the solvent vapors rise above the condensing coils. The SVC trips if the cooling coils do not maintain a temperature cold enough to condense the solvent vapors. This control helps prevent the hazards associated with solvent vapors escaping into the atmosphere.

The proper temperature setting for the SVC is about 15°F below the normal boiling temperature of the chosen solvent. Refer to solvent specification sheet for the boiling point of solvent used in your system. Use the following test procedure to determine the specific temperature setting required to allow proper operation.

Periodically (monthly) verify the operation of the safety vapor control. Turn the cooling off until: (a) the SVC turns off machine heat, or (b) the vapors rise above the condensing coils. Do not allow vapor to reach the top of the tank. Re-adjust the safety vapor control if heat does not shut off as vapors reach the top of the condensing coils. Set the

control for a lower temperature. Repeat checking the SVC operation until you obtain the proper setting. You should not operate the equipment with a faulty safety vapor control.

2. The cleaner is equipped with a high temperature control (HTC). The proper temperature setting is 20°F above the solvent boiling temperature. The H.T.C. will turn off the heat if the solvent level drops below the top of the heater elements. This helps prevent burning out the elements if you let the solvent level get too low in the tank. Check this level daily.
3. The optional Vapor Up (VU) thermostat turns on an indicator light when the solvent vapors are up to proper level on the cooling coils. This indicates the equipment is ready to operate. It also inhibits the spray pump(s) when the vapor line is below normal operating level. Proper temperature setting is 3-5°F below the solvent boil temperature. This control indicates vapor up when the heat of rising vapors reach the cooling coils and the VU sensor. A long heat up time can indicate contaminated solvent or a defective heating element.
4. The optional liquid temperature control (LTC) senses the temperature of the solvent in the boil sump. Contamination or alcohol build up in the boil sump will cause the boiling point temperature to increase. The LTC will shut off the heat if the boiling point raises to an undesirable degree. When using an alcohol blend solvent, the alcohol level could increase to a flammable point. The same condition applies when parts carry in alcohol or other flammable liquids into the cleaner. This control should turn off the heat before the solvent blend becomes flammable. It is set at approximately 7°F above the boiling point of the solvent. When the LTC trips, you should drain the boil sump and recharged with fresh solvent. Dis-

pose of contaminated solvent in the proper manner.

5. The optional water temperature thermostat (WTH) may be included in models with water cooled condensing coils. This control shuts off the heat input if the cooling water is above adjusted temperature. See prints with degreaser/cleaner for specifications. Verify the water valve is open, the "Y" strainer is not clogged, and the water pressure and temperature are within specifications. Insufficient cooling will cause a trip of the safety vapor control circuit also.
6. The refrigeration thermostat (RT) is used on units with refrigeration cooled coils. It functions to control the operation of the compressor. It automatically resets as temperature at the probe (connected to the cooling coil) changes. During night time operation of the refrigeration system, this control causes the compressor to turn on when the coil temperature increases to the set point temperature. The compressor runs until the coil cools down to the differential point below the set point. During machine operation, the heat load of the solvent vapors on the coils (and sensor) prevents the temperature from reaching the shut off point. The compressor should continue running as long as vapor is up in the machine.

Testing/Troubleshooting (See Figure 1)

While recalibration is not normally required, it may be necessary to replace the unit at some time. Here are some brief tests that you can perform to determine if the defective part is the thermostat or the probe.

Normal operation for the safety thermostats will have the green "load" indicator lamp on. When the control trips because of an unsafe condition, the "load" indicator will go off.

If the "load" indicator stays on all the time, even when the thermostat dial is turned to low end of the scale, replace the thermostat.

The more likely condition is that the "load" indicator will be off and can not be reset. The following procedure should assist in troubleshooting and identifying the problem.

1. Short the Reset switch (terminals 12 and 13). If the indicator lamp comes on, replace the switch. If the lamp stays off, go to next step.

NOTE: In normal operation, you must press and hold the Reset switch a few seconds before the thermostat will reset.

2. Remove probe leads from the thermostat and short the terminals with a 14 gauge jumper (paper clip). If the "load" light comes on, replace the probe. If the lamp stays off, replace the thermostat.

Erratic operation can be caused by a failing thermostat or a misplaced or dirty probe. The probes are tip sensitive, which means that only 1/8"-1/4" of the probe tip is a sensing surface. For contact probes, like those used on the H.T.C. or RT, the tip must be in close contact with the component being sensed (heating element or cooling coil). Contamination or sludge around the tip can cause a loss of sensitivity.

To check operation of the thermostat, remove the probe leads and short between the terminals with a paper clip as previously described. Turn the dial down until the thermostat trips ("load" light goes out). The indicated temperature should be close to the ambient temperature in the control panel. Turn the dial back up, reset the thermostat and repeat the step. If this step can be repeated several times with no more variation than 1°F indicated, the thermostat is probably good and the probe should be replaced. On rare occasion, the wire connecting the probe and thermostat may require replacement. Use type "J" thermocouple wire. Replace full length. Do Not Splice.

Thermostat Troubleshooting Chart

PROBLEM	* POSSIBLE CAUSE	* CORRECTION
Red "POWER" indicator not lit	* Power interruption	* Determine cause of interruption and correct
Green "LOAD" indicator not lit	* Safety has tripped * Probe lead disconnected * Probe defective * Thermostat defective	* Reset safety * Check/clean/re-make connection at probe or thermostat * Replace * Replace
Safety will not reset	* Defective thermostat * Reset switch defective * Probe defective	* Replace * Replace * Replace
Erratic operation	* Thermostat defective * Probe out of position (H.T.C.)	* Replace * Probe tip must be clean and in contact with what is being sensed

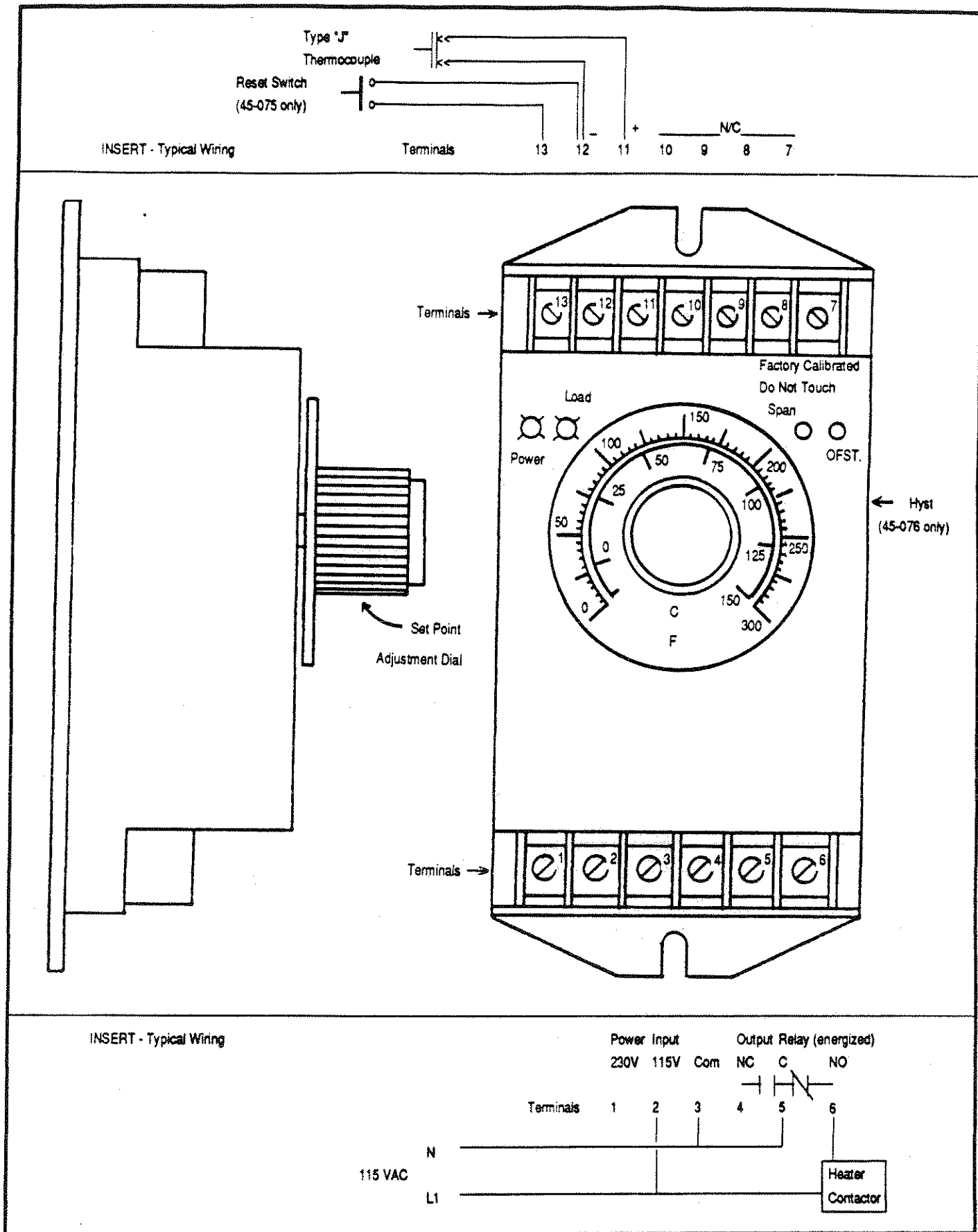


Figure 1 Thermostat Layout

Part Number Listing

Refer to text for description of parts. The functions listed in (parenthesis) are typical. They can vary with application. Refer to prints on your equipment.

Thermostats

- 45-075 Manual Reset, no hysteresis (SVC, HTC, LTS/C, WTH)
- 45-086 Automatic Reset, slight hysteresis (VU)
- 45-076 Automatic Reset, adjustable hysteresis (RT)

Thermocouples (Type 'J')

- 45-077 6" Long with Polarized Male Connector
- 45-078 36" Long with Polarized Male Connector

Miscellaneous Hardware

- 5417396 Type 'J' Thermocouple Wire (Per Foot, Do Not Splice)
- 45-081 Type 'J' Thermocouple Connector (Polarized Female)
- 45-084 Compression Fitting, Stainless Steel, 1/8" NPT
- 45-080 Momentary Switch (Reset) with Black button

We recommend that you maintain at least one of each type thermostat and thermocouple used in your equipment. When ordering spare parts, please include the model and serial number of the equipment. Write, fax, or phone your Customer Service Representative at the following:

Allied/Baron-Blakeslee
Customer Service Department
2001 North Janice Avenue
Melrose Park, Illinois 60160

FAX : (708) 450-3884

Phone: (800) 548-4422
or: (708) 450-3909

BARON BLAKESLEE WATER REGULATING VALVE INSTALLATION AND MAINTENANCE

GENERAL DESCRIPTION: This valve is installed to minimize water consumption by regulating flow of water through machine's cooling system. Constant water temperature is automatically maintained at water outlet of machine by valve's temperature sensing bulb. Valve opens on temperature rise, closes on temperature drop.

Range spring and sliding parts are not submerged in water where they would be subject to sedimentation and corrosion. Only three parts, made of corrosion-resistant material, contact the water...valve disc retainer, valve seat and extension sleeve.

ADJUSTMENT: Valve may need adjustment in order to achieve water outlet temperature recommended in machine's operating instructions. Adjustment can be made with standard wrenches or screwdrivers. To raise temperature at which valve will open, turn adjusting screw to left (counter clockwise); to lower temperature, turn adjusting screw to right (clockwise). Closing temperature is non-adjustable; it will fall 3-5°F. below opening temperature.

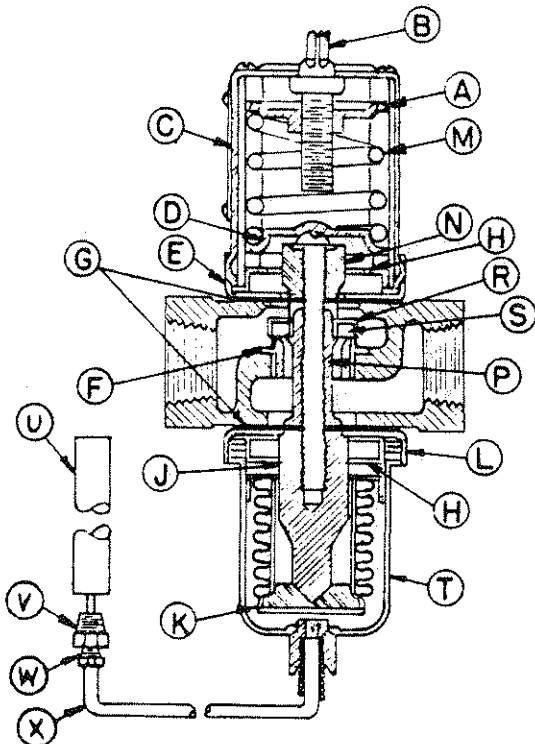
MAINTENANCE: For optimum performance of valve, periodic flushing is recommended to remove sedimentation buildup.

To flush valve, insert a screwdriver under each side of lower spring guide. Pry both guide and spring away from body to open valve. This does not affect valve adjustment.

SERVICE: After long periods of operation, valve seat and disc may become worn, pitted or "wire drawn", allowing leakage through valve in closed position. Internal parts can be ordered from valve manufacturer; new valve can be ordered from Baron Blakeslee.

INSTALLATION: For initial installation or after service, mount valve in vertical position with temperature element down. **IMPORTANT:** Flush water lines to remove filings, chips and other foreign matter before connecting to valve. Make water line connections so flow through valve is in direction of arrow on body casting. Place temperature sensing bulb in water line as shown in Figure 5, Form No. 2312.14. Make sure that any internal obstruction will not make metal to metal contact with bulb. Tighten connector and seal. **AVOID SHARP BENDS OR KINKS IN CAPILLARY TUBE.**

<u>SYMBOL</u>	<u>DESCRIPTION</u>
A	Upper spring guide
B	Adjusting screw and cam
C	Spring housing
D	Lower spring guide
E	Upper diaphragm pressure plate
F	Valve seat
G	Diaphragm (4 required)
H	Diaphragm guide plate (2 required)
J	Bellows push rod
K	Bellows reinforcing plate
L	Lower diaphragm pressure plate
M	Range spring
N	Guide post
P	Extension sleeve
R	Valve disc retainer
S	Valve disc
T	Temperature element
U	Temperature sensing bulb
V	Connector
W	Seal
X	Capillary tube



Equipment Model: M-Line Degreasers

Models Affected: All LE Versions, except MLR/MSR-120LE, MVR-215LE

Subject: Dryer/Spray Reservoir

Bulletin Number: 2

Date: November, 1989

General Description

A dryer system removes water from the solvent distillate. The solvent vapors condense on the cooling coils and drip into a trough (see Figure 1). This solvent distillate gravity feeds through the trough and into a pipe that goes through the tank wall. The distillate then runs into the dryer tank. This tank contains a molecular sieve (desiccant dryer media). This media adsorbs any water present in the distillate.

The distillate solvent collects in the dryer tank until it overflows through the stand pipe in the spray reservoir tank. When you use the spray, solvent pumps from this reservoir to the spray wand. As you spray parts below the vapor line, solvent returns into the degreaser tank. If sufficient solvent builds up in the spray reservoir, it overflows through a pipe into the degreaser tank. The solvent boils to a vapor and the process starts over again. This is a sealed, closed loop system. Its designed to prevent solvent losses.

As solvent passes through the dryer tank, the desiccant media adsorbs suspended water molecules. The media will adsorb a limited amount of water. You need to replace the media before it losses its capacity to adsorb water.

The first result of excessive water in the solvent is water vapor in the solvent vapor. Solvent vapor is normally colorless. When present, water causes the vapor to have a white, foggy appearance. This water vapor will deposit on the part, leaving water

marks and some contamination. Without proper maintenance, solvents can become corrosive (go acid) when they contain concentrations of water. Alcohol blend solvents can become flammable with a concentration of water present.

Dryer Media Maintenance

As soon as experience on the system allows, develop a schedule to replace the desiccant dryer media, before water vapor appears.

1. The desiccant media is a molecular sieve, type 3A. It is the potassium form of the Type A crystal structure, an alkali metal aluminosilicate. Type 3A will adsorb molecules with critical diameters up to 3 angstroms. This small pore size prevents coadsorption of other molecules, while adsorbing water.
2. You place the molecular sieve in a cloth bag with a draw string. Place the bag of media into the dryer basket. Lower the basket inside the dryer tank. The bag should be below the solvent liquid line and the solvent outlet. After you can see water in the vapor, you will see water droplets floating on the surface of the solvent in the dryer tank. This is further indication that the media needs be changed.
3. To replace the media, turn off the heat, then drain the solvent from the dryer. Return the solvent to the vapor sump. Unclamp the sealed lid from the dryer tank.

Slowly remove the basket and bag of media, allowing any trapped solvent to drain. Wipe out the inside of the tank with a dry cloth. Install a new bag of media. Close the drain valve before turning the heat on.

4. You may regenerate the molecular sieve for reuse, if proper equipment is available. Spread out in a pan. Allow the solvent to evapo-

rate in a vented area. Place in a vented oven at 475°F, for about three hours. Optimum drying time can be determined by observing the decrease in humidity in the vent exhaust (if the specialized equipment is available). The sieve may be regenerated several times before pore contamination will decrease its efficiency to adsorb water.

Part Number Listing

125-025 Molecular Sieve, size 3A pellets, 50 pound container

033A070 Nylon Bag with draw string, 18.5" long x 18.5" wide x 6.75" deep

033A071 Nylon Bag with draw string, 18.5" deep x 9.813" wide

When ordering spare parts, please include the model and serial number of the equipment. Write, fax, or phone your Customer Service Representative at the following:

Allied/Baron-Blakeslee
Customer Service Department
2001 North Janice Avenue
Melrose Park, Illinois 60160

Fax: (708) 450-3884

Phone: (800) 548-4422 or (708) 450-3909

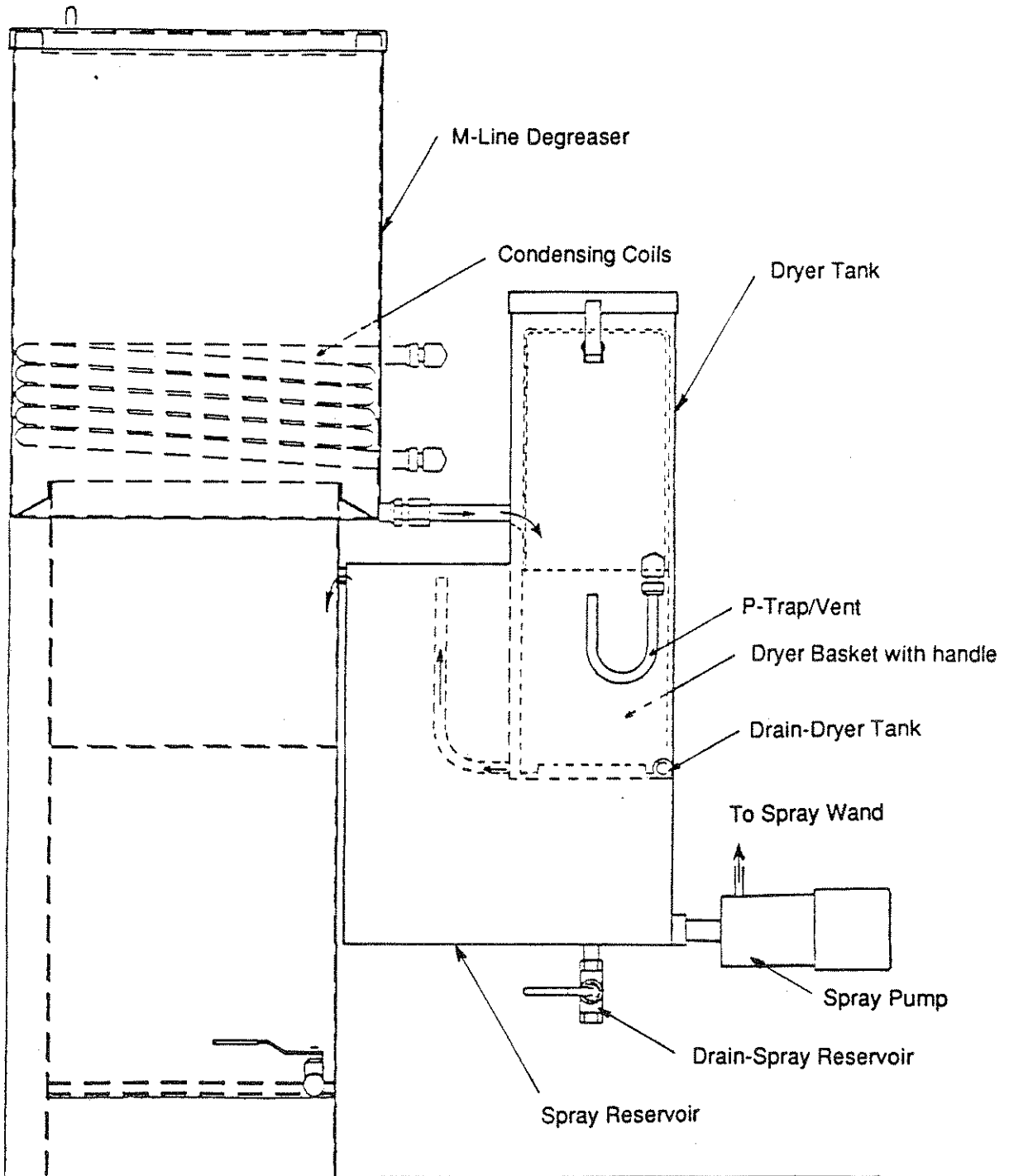


Figure 1

Dryer Tank/Spray Reservoir Layout

COMBINATION WATER SEPARATOR - DRYER INSTRUCTIONS

Models Affected: MLR/MSR-120LE, MVR-215LE

Degreasing solvents, being heavier than water, settle out in the lower portion of the Gravity Section from where they flow into the Dryer Section thru openings near the bottom. Dryer Section fills to overflow level with dewatered solvent. This section may contain a cotton bag of Molecular Sieve drying agent. (Linde Molecular Sieve Type 3A).

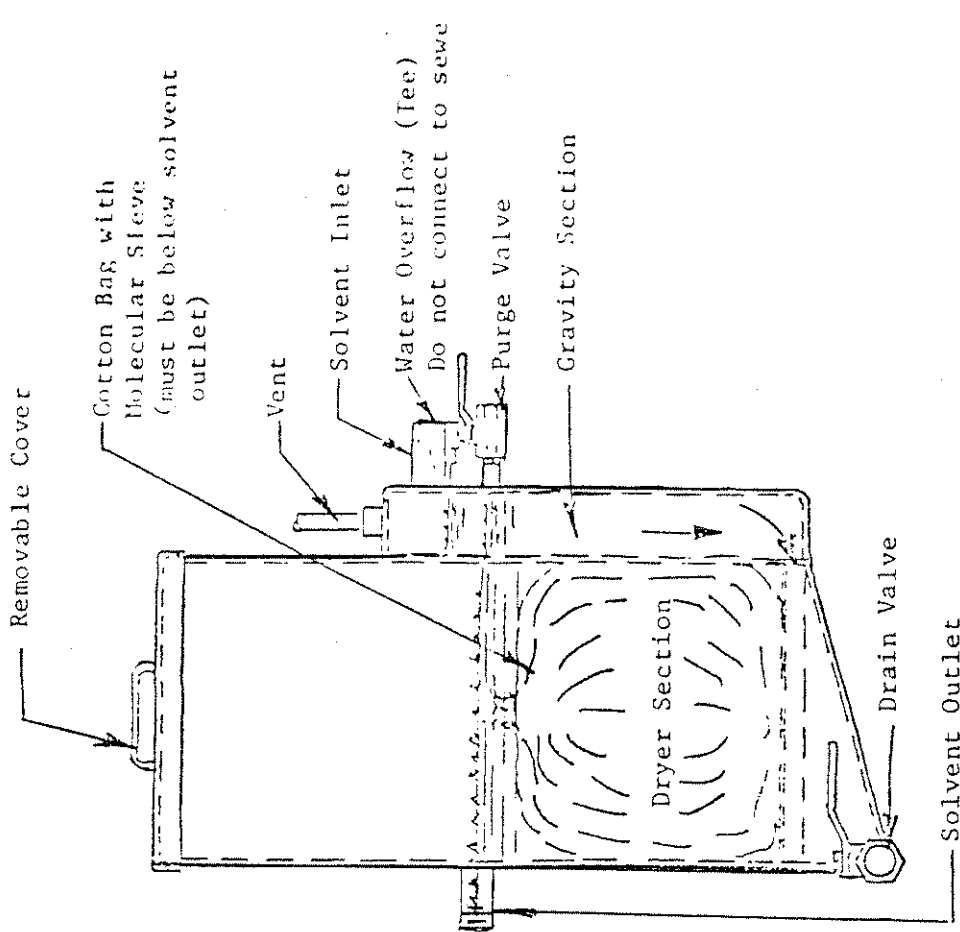
Top of the bag should always be below liquid level so droplets of water floating on the surface can be observed as they indicate time for replacement of the drying agent with new or with freshly dehydrated material. (Media Kit must be ordered if Molecular Sieve is to be used.)

To replace, turn heat off, drain separator-dryer and transfer to vapor sump. Wipe out chamber with dry cloth and put in new bag of media in Dryer. Close valve before turning heat on.

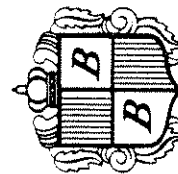
Bulk water on solvent in Gravity Section will run out of water overflow if allowed to accumulate. However, we recommend removing water at least once a day by opening purge valve part way while degreaser is up to heat. Bleed off water before it has time to accumulate and cause water solubles to come out or develop a corrosive acidity. Also, water solubles allowed to accumulate too long may render the water layer flammable (particularly true with TE, 1P, and TA).

Although designed for use with fluorinated solvents, this Combination Separator-Dryer can often be used to advantage with the chlorinateds.

Note: To dry Molecular Sieve, spread out in a pan to allow solvent and additives (alcohol, etc.) to evaporate before placing in an oven to drive off water. Dry at 475°F for three hours. Dry in a vented oven. Be sure no flammables present before placing in oven.



Combination Water Separator/Dryer



Baron-Blakeslee

2001 North Jenice Avenue, Melrose Park, Illinois 60160 (312) 450-3900
Plants in Chicago • Los Angeles • San Francisco • Milwaukee

OFFICES IN ALL PRINCIPAL CITIES



Standard Practice for CONFINED AREA ENTRY¹

This standard is issued under the fixed designation D 4276; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers recognized procedures necessary to protect the health and safety of workers required to enter confined spaces. These procedures are particularly applicable to entry into the confined areas associated with the use of halogenated organic solvents.

1.2 Confined areas addressed in this practice include, but are not limited to: vapor degreasers, cold cleaning tanks, storage vessels, tank cars and trucks, van trailers, ships or barges, pits or sumps, and unventilated rooms.

1.3 This practice does not necessarily address entry into all confined spaces nor does it address the decision strategy involved in requiring such entry.

1.4 Although this practice describes specific safety steps to be taken for entry into confined spaces, it is not intended to preclude the use of any additional measures that may be deemed necessary for a particular situation.

1.5 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Significance and Use

2.1 Vapor inhalation is the primary hazard encountered in the use of chlorinated solvents. The greatest potential for over exposure to these solvent vapors occurs where the employee is exposed to the high concentrations of vapor that may be found in enclosed areas. The seriousness

of this hazard is often underestimated by those performing this type of work.

2.2 This practice is designed for use by employers in developing their own specific standards for vessel or enclosed area entry.

3. Summary of Practice

3.1 Confined area entry refers to the entering of any tank, vessel, sump, pit, duct, tank car, tank truck, van trailer, or enclosed space in which there has been, or may have been chemicals, chemical vapors, or a lack of ventilation.

4. Procedure

4.1 All personnel working in confined areas should be properly trained in safe entry and rescue procedures. They should have a working knowledge and understanding of the hazards that may exist.

4.2 *Entry Permit*—Entry into confined spaces should be by written entry permit, issued by the responsible supervisor or other qualified person. The purpose of the entry permit is to ensure that a checklist of precautions has been reviewed prior to entry. This permit is an authorization, and approval in writing certifying that all existing hazards have been evaluated and necessary protective measures have been taken to insure the safety of the worker. The permit should be valid for a limited time only, (usually an 8 or 10 h shift) and issuance of a new permit required in the event of any job interruption or any indication of changes in job conditions. Issuance of the

¹ This practice is under the jurisdiction of ASTM Committee D-26 on Halogenated Organic Solvents and is the direct responsibility of Subcommittee D26.05 on Industrial Hygiene.

Current edition approved April 4, 1984. Published May 1984.



entry permit should address all of the following considerations.

4.3 Vessel Preparation:

4.3.1 *Isolation*—All process lines exiting or entering the confined space should be disconnected, capped off, and blinded. Closing of valves alone is *not* adequate protection.

4.3.2 *Lockout*—Pumps, connected to the enclosed area, or any other mechanical or electrical equipment (particularly conveyors) are to be locked out by locking the main electrical switch in the "OFF" position.

4.3.3 *Cleaning*—The space should be cleared, flushed, or purged of hazardous materials to the extent practical. This should be followed, where practical, by cleaning with water, steam, or other suitable materials.

4.3.4 *Ventilation*—A system for positive ventilation should be provided, prior to and during the entire entry period, through the use of fans, portavents, air movers, or by adequate natural drafts.

4.4 *Atmospheric Testing*—The enclosed space must be tested for the following prior to and during any entry:

4.4.1 *Oxygen Content*—The oxygen content must be between 19.5 and 22.0 % in all levels of the tank.

4.4.2 *Flammability*—The atmosphere must be nonexplosive (less than 10 % of the lower flammable limit).

4.4.3 *Toxicity*—The atmosphere should be tested to ensure the absence of toxic concentrations of vapors.

4.5 *Personal Protective Equipment*—Personal protective equipment is not an adequate substitute for safe working conditions, adequate ventilation, or safe working practices.

4.5.1 Personal protective equipment can include, but is not limited to: approved respirator, hard hat, safety glasses or safety goggles, gloves, and long sleeved shirts.

4.6 *Area Safety Equipment*—Any person entering the enclosed area must be fitted with a safety harness and lifeline. The lifeline should be secured outside the entrance.

4.6.1 Where entry into the vessel must be made through a top opening, a hoisting device or other effective means must be provided to lift employee out of the space.

4.6.2 Ladders must be in place for entrances

and exits where the drop or climb involves a depth of more than 3 ft.

4.6.3 Self-contained breathing apparatus or supplied air respirators should be available at the vessel entrance. These devices must be worn if testing finds the toxicity level to be above the OSHA limits.

4.7 *Observer*—A second person should be available at the area entrance and in sight of the person inside at all times. He should be equipped with proper safety equipment and adequate communications equipment for summoning additional help if necessary (for example, two-way radio, whistle, etc.). Under no conditions should this observer enter the enclosed area unless others are standing by. If the observer is required to leave his post, the person inside the enclosed space must come out.

4.8 *Tools*—Approved low-voltage electrical equipment must be used where the atmosphere in the confined area may contain flammable vapors or where the atmosphere could contain solvent vapors within their flammable limits. All electrical circuits should be equipped with a ground-fault interruptor.

4.9 *Labeling*—Entrances to confined space should be posted, identifying the area as a confined space and that a permit is required for entry. During the work, when there is more than one entrance to the confined area, signs indicating that workers are inside, posted at each entrance, are advisable.

5. Testing Procedures

5.1 The tests required prior to entry into a confined area make use of specialized equipment.

5.1.1 *Oxygen Content*²—Use a portable instrument that analyzes directly for oxygen irrespective of the solvent vapors present in the air.

5.1.2 *Flammability*—Measurement of the flammability of the atmosphere may be done using a combustible gas indicator.³

5.1.3 *Toxicity*—If the prior contents of the vessel are known, the remaining concentrations of those materials may be determined as follows:

² Model OX230 Audible Alarm Oxygen Monitor, National Mine Service Co., Oakdale, Pa., or equivalent.

³ Explosimeters (registered trademark), Mine Safety Appliances, or equivalent.



for methylene chloride, trichloroethylene, 1,1,1-trichloroethane, and perchloroethylene, use gas-detector tubes found in the NIOSH certified-equipment list.⁴ A calibrated halide meter⁵ may be used as an alternative. For trichlorotrifluoroethane, use either a portable flame-ionization gas

chromatograph⁶ or a portable IR analyzer.⁷

⁴ Available from the National Institute for Occupational Safety and Health, 5600 Fisher Lane, Rockville, MD 20857. Publication Number 80-144 and Supplement Publication No. 82-106.

⁵ GasTech Inc. or equivalent.

⁶ OVA-108 or 128, Foxboro, or equivalent.

⁷ MIRAN 101, Foxboro, or equivalent.

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This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, 1916 Race St., Philadelphia, Pa. 19103.

SAMPLE PERMIT Tank or Confined Area Entry Permit

NOTE—This permit is valid only between the hours noted. Any change of supervisor, workman, or working conditions will void this permit.

NO.

Permit is required for entering any tank or enclosed space for any purpose;

Good This Date Only | Time: a.m. to a.m. p.m. to p.m.

Location: _____

Equipment: _____

Purpose: _____

I certify that all necessary precautions have been taken to make this tank safe for entering and carrying on prescribed work during specified time:

Production Supervisor _____

Maintenance Supervisor _____

Atmosphere Tester _____

I have been properly instructed for safe entry into this tank and understand my responsibilities:

Standby Observer _____

Person(s) authorized to enter tank:

1. _____

2. _____

3. _____

Authorizations:

Permit Noted—Supervisor _____

Permit Granted—Superintendent _____

Note—Before this permit can be signed the following sample items must be checked for preparation:

- 1. Tank cleaned, washed, and purged: [] Yes [] Not Necessary
2. Wash water tested for neutrality: [] Yes [] Not Necessary
3. All fuses or safety jacks pulled, breakers and switches locked out and tagged:: [] Yes [] Not Necessary
4. All lines broken or blinded, or both: [] Yes [] Not Necessary
5. Atmosphere tested for flammable concentration: [] Yes [] Not Necessary Time: _____ by _____
6. Test for toxic atmosphere: ppm of: _____ [] Yes [] Not Necessary Time: _____ by _____
7. Test for oxygen content: [] Yes [] Not Necessary Reading: _____ %
8. Surrounding area checked for flammability and toxic gases: [] Yes [] Not Necessary Time: _____ by _____
9. Observer assigned and properly instructed: [] Yes
10. Employees in the immediate area alerted to help if needed: [] Yes [] Not Necessary
11. Fresh air supply provided: [] Yes [] Not Necessary
12. Rescue harness provided and worn: [] Yes
13. Tie line attached: [] Yes
14. Rescue equipment on the job: extra rope, harness, hoisting device, breathing equipment, and alarm: [] Yes [] Not Necessary
15. Self-contained breathing equipment to be worn: [] Yes [] Not Necessary
16. Protective clothing required and worn: [] Yes [] Not Necessary
17. Additional precautionary remarks:

Remarks: _____

REFRIGERATION TROUBLE SHOOTING
(USE ONLY QUALIFIED REFRIGERATION REPAIR SERVICE)

No. 2312.54

PROBLEM	PROBABLE CAUSE	SYMPTOMS	REMEDY
Compressor will not start or try to run	Power failure due to blown fuse, open circuit breaker or open disconnect switch or service switch	Electrical circuit test shows no power on line side of start relay	Replace fuse, check load on fuse. Determine why circuit breaker or disconnect switch open. If no reason, close breaker or switch.
	Defective start relay	Test for burned out or open holding coil and broken contacts	Repair or replace
	Open control circuit	Start relay coil not energized	Check pressure switch (on 3 H.P. and up) reset switch. Check reason for either too low or too high pressure.
	Defective compressor	Compressor will not run	Replace defective compressor
	Low voltage	Electric circuit tester glows but not at full brilliance, wiggy moves but not up to proper voltage	Check with volt meter, if low check internal power source, loose connections etc. Call Power Company.
	Low oil pressure	Compressor will restart upon resetting oil pressure switch	Check oil level, add oil if necessary, Check pressure control and wiring.

REFRIGERATION TROUBLE SHOOTING
(USE ONLY QUALIFIED REFRIGERATION REPAIR SERVICE)

No. 2312.54

PROBLEM	PROBABLE CAUSE	SYMPTOMS	REMEDY
Condenser starts and stops with machine heat on	Dirty condensing coil	Condenser shuts off on overload	Clean condensing coil (vacuum, do not brush dirt in).
	Condenser fan defective	High head pressure shuts off on overload or pressure switch (if furnished)	Replace defective fan
	Defective run or start capacitor	Humming on start-up. Frequent start-stops.	Replace defective capacitor
	Defective start relay		Replace defective start relay
	Low oil pressure	Compressor will restart upon resetting oil pressure switch (if furnished)	Check oil level, add oil if necessary, check control and wiring, replace control if necessary
Cooling coils frosting (Normal for chlorinated solvents and low ambient conditions with fluorinated solvents)	R.T. thermostat set too low	Frosting and ice on cooling coils	Reset R.T. thermostat to 45°F. Recalibrate if necessary.
Insufficient cooling with heat "ON"	Dirty condensing coils or obstructed air flow over condensor	Unit heat shuts off on safety vapor thermostat	Clean condensing coil Clear air flow over condensor
	System low on refrigerant	Bubbles in system sight glass	Repair leak and charge system

REFRIGERATION TROUBLE SHOOTING
(USE ONLY QUALIFIED REFRIGERATION REPAIR SERVICE)

No. 2312.54

PROBLEM	PROBABLE CAUSE	SYMPTOMS	REMEDY
Insufficient cooling	Restricted line strainer, dryer or expansion valve	Temperature change in line after restriction (frosting).* Unit heat shuts off on safety vapor thermostat	Replace restricted part or adjust expansion valve (if adjustable) to proper super heat setting 80°/120F.
	High ambient temperature room temperature too high to remove enough heat from condensing coil	Same as above	Do not operate equipment until ambient temperature drops
Compressor noisy when starting	Check hold down bolts	Noise from condensor	Spring mounted compressors, loosen hold down bolts. Check 1/2 H.P. condensing unit base bolts, if too long shorten.
	Liquid returning to compressor	Noisy on start-up	Check R.T. thermostat bulb location, if not on bottom of bottom coil and tight, relocate and tighten.

* NOTE: Frosting at suction accumulator is normal.

DEGREASER TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Strong Solvent Odor Around Degreaser (also see high vapor concentration below).	Cover open. Drafts over open top degreasers cause vapor to be disturbed.	Keep machine cover closed except when putting parts into, taking parts out of or hand spraying in degreaser. Remove fans, air make-up units, etc. from degreaser area where they can cause air currents over open top degreasers.
Air Make-Up Unit and Gas Fired Space Heater Corrosion	Drafts over degreaser pulling out solvent vapors, solvent vapors decomposing and corroding units. Exhaust system not operating.	It may be necessary to put up partitions to block air currents over open top degreasers. Space heaters require special flue gas venting. Exhaust system should be interlocked with degreaser heat. No exhaust, no heat.
High Vapor Concentration Around Machine High Solvent Usage (also see solvent odor above).	Exhaust duct blocked or damper not adjusted properly. Lip slot(s) closed or not adjusted properly. Work being processed too fast through machine.	Remove duct blockage, readjust damper for proper air flow. Open lip slot(s) and adjust for even air flow along entire slot. Reduce speed - never exceed eleven (11) feet per minute vertical travel. Wait until parts (work) looks dry before removing from machine.
Parts (work) cupping (holding) solvent because of part configuration.	Parts (work) cupping (holding) solvent because of part configuration.	Proper part orientation for complete drainage. Tilt or rotate parts to promote draining.

DEGREASER TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
High Vapor Concentration Around Machine High Solvent Usage	Parts cupping solvent.	Tumble parts in vapor to spill out solvent before they are removed from degreaser. (Use rotating basket conveyORIZED machine or rotary plating basket that can withstand solvent). If none of above solve the problem, process may require drying tunnel or section with a carbon adsorption system. Check with Baron-Blakeslee, Inc. Sales Engineer or factory.
	Too high spray pressure or spraying at or above vapor line.	Reduce spray pressure. Do not spray at or just below vapor line. Spray as far below vapor line as possible.
	Too large or heavy loads. Vapor line drops with load and takes 5 minutes or more to recover (return to proper level). This pumps a vapor air mixture from machine when vapor line recovers.	See instructions or degreaser assembly print for vapor line location. Reduce weight or surface area per load to reduce heat requirement.

DEGREASER TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
High Vapor Concentration Around Machine. High Solvent Usage.	Solvent leakage or spills.	Use all safety precautions. Evacuate area if necessary. Be sure to notify proper agencies of any reportable release. Correct or repair leaks, clean up any pools of liquid solvent.
Parts Not Degreasing Properly	Solvent not up to proper temperature, vapor line too low.	Air out area. Check for safe working conditions before resuming production.
	Solvent too contaminated. High Boiling point, 90F or higher above fresh solvent boiling point. Very little solvent vapor being condensed on cooling coils. Very little condensed solvent coming from still.	Always tighten cleanout door gaskets from center out to edges. Use a teflon or teflon filled pipe compound when making up joints in solvent piping. Never use galvanized pipe for solvent.
		Do not use aluminum or any white metal for pumps, fittings or piping.
		Wait until solvent is condensing on cooling coils before processing work.
		Boil down boiling or vapor sump (see instructions or degreaser assembly print). Do not expose heating surfaces. Drain boil sump. If boil sump has solids, metal fines, etc. drain entire machine (if degreaser has more than one sump). Using all safety precautions clean out machine and refill with fresh degreasing grade solvent.

DEGREASER TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Parts Not Degreasing Properly	Improper cleaning cycle. Parts wet when removed from Degreaser. Too fast a cycle.	Increase immersion or time in vapor - spray and let dry before removing. Lengthen time and/or immersion in degreaser.
	Temperature of ultrasonic sump too high - solvent boiling (units with heater/cooler package).	Check with Baron-Blakeslee Sales Engineer for proper cleaning process for parts.
	No recirculation of heater/cooler package Too much particulate matter in ultrasonic sump.	Set heater/cooler thermostat lower - if thermostat non-functional - replace thermostat. See ultrasonic section of manual for proper cavitating temperature of solvent being used.
	Too much recirculation tends to upset proper ultrasonic operation.	Replace filter cartridge recirculation system.
	Adjustable power control turned down. No ultrasonic activity in sump.	Partially close valve on discharge side of recirculation pump.
	Ultrasonic sump not degassed. Ultrasonic sump must be degassed before proper cavitation for parts cleaning.	Turn up adjustable power control. Turn up slowly and check parts being processed.
Parts Not Degreasing Properly		Bring sump up to temperature. Turn on ultrasonic generators. Set half/full wave switch to full.
		Wait for high pitch sound and until ultrasonic sump surface is peaking with ultrasonic cavitation.

DEGREASER TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Ultrasonic Generator Not Working	See trouble shooting in ultrasonic section of manual.	
Spray Pump Not Pumping Solvent. No Solvent Coming Out Of Spray Wand	Spray reservoir empty.	Reduce amount of spraying. Spraying too much for solvent being condensed.
	Not enough solvent being condensed.	Check boiling point of solvent. Maybe too much contamination for proper vapor generation. Drain and replace with fresh solvent.
	Condensed solvent overflowing through back into boil sump.	Clean piping from trough to separator, clean separator and piping to spray reservoir.
	Spray filter/strainer clogged.	Replace cartridge filters/ clean strainers.
	Metal fines in spray pump (especially magnetic drive pump).	Remove metal fines, provide strainer before pump or replace pump with direct drive pump.
Spray Pump Will Not Start	Vapor up thermostat not sensing vapor. Vapor up light not illuminated.	Machine heat must be on and vapor at proper level to start spray pump.
	Vapor up thermostat out of adjustment.	Re-adjust vapor up thermostat. (Calibrate thermostat if necessary see instruction sheet Z391.7).
	Vapor up thermostat not functioning.	Replace vapor up thermostat.

DEGREASER TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Spray Pump Works Fine Until Solvent (1,1,1-Trichloroethane or Trichlorethylene) Is Hot When It Is Pumped.	Magnetic drive spray pump 030-027 and 030-028. Shaft pin on high side of tolerance and impeller I.D. on low side of tolerance.	Enlarge impeller I.D. slightly or reduce shaft pin O.D.
Spray Pump Leaking Solvent	Shaft seal bad. Front end plate loose. (Suction and discharge plate).	Replace shaft seal(s). Tighten end plate. For Pumpaks, see instructions 2391.2 for Tuseal pumps, see 2391.29.
Spray Pump On No Spray Or Uneven Spray	Spray nozzle(s) clogged or partially clogged.	Clean spray nozzle(s) if spray headers located in machine - observe all safety precautions - drain and air out machine if necessary.
Heat Shuts Off Because Of High Temperature Control Or Low Level Control	Liquid level too low in boil sump.	Add fresh degreasing grade solvent until proper level is reached in boil sump. See degreaser assembly print.
Heat Shuts Off Because Of Liquid Temperature Control	Too much alcohol in boil sump when using fluorinated solvent mixes like Blaco-Iron TMS+, TE, TA, etc. Maximum setting 130OF.	Drain boil sump and fill with fresh solvent through spray reservoir. Dispose of drained solvent properly.
Heat Shuts Off Because Of High Temperature Control	Too much oil in chlorinated solvent. 9 to 10OF above fresh solvent boiling point. Metal fines, lint, etc. collecting around thermostat capillary bulb.	Same as above. Drain sump clean material away from capillary bulb and all solids from sump. Observe <u>all</u> safety precautions when cleaning out boil sump.

DEGREASER TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Electric Heating Element Burnt Out	High contamination in boil sump or still. Too many solids, oil, etc.	Drain machine, pull clean out door clean or replace heating element(s). Observe all safety precautions.
Solvent Takes A Long Time To Heat Up. Little Condensing Of solvent on cooling coils.	Boiling point 90F or higher than fresh solvent.	Clean out sump. Observe all safety precautions when cleaning out machine.
Distillate Flow Sight Shows Very Little Flow	Acidic solvent too much aluminum or white metal fines in solvent. Too much water getting into solvent (inhibitors imiscible in water).	Refill with fresh degreasing grade solvent.
Parts, Especially Aluminum Parts, Discoloring. Toxic Fumes Sharp Pungent Odors. Corrosion on cooling coils, discolored tank interior, conveyor rusting.	Cooling water not on.	Stop production. Check pH of solvent (see instructions). Check acid acceptance of solvent. If solvent acidic see instructions for cleaning acid degreaser - observe all safety precautions. See Instructions 2391.16, pages 1,2,3, & 4.
Heat Shuts Off Because Of Safety Vapor Control or Water Flow Switch.	Temperature control valve not properly adjusted (do not use with cooling tower water).	Turn on cooling water. Re-set safety vapor control.
	Cooling water piping and/or coil blocked or limed up.	Readjust water temperature control valve. Check strainer to see if it is blocked. (See instruction sheet 2391.11).
		Clean cooling water piping and coil. Boiler service people can clean out water lines. Reset safety vapor control.

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DEGREASER TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Safety Vapor Control Shuts Off Heat	Cooling water temperature too high.	Check chiller if chilled water used for cooling. Clean air filters or repair for proper temperatures.
		Check cooling tower system if tower water used. Especially return piping for proper flow. Reset safety vapor control.
	Not proper temperature setting.	Calibrate per instruction sheet 2391.7 and readjust. It may be necessary to set a little higher to prevent nuisance shut downs.
Safety Vapor Control Shuts Off Heat	Safety vapor control not functioning.	Replace safety vapor control.
<u>*Check Proper Operation of Safety Vapor Control Weekly*</u>		
Machine Heat Stays On And Vapors Come Out Of Machine	Heat Solenoid Valve(s) Stuck open.	Evacuate personnel from area - observe all safety precautions. Turn off heat to degreaser manually.
	Heat contactor(s) stuck closed.	Turn off main line disconnect (unless degreaser does not have electric heat and exhaust is required for breathable atmosphere).
	Safety vapor control not functioning.	Check for proper setting and calibration (see instruction sheet 2391.7). Replace if necessary.

DEGREASER TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Machine Heat Or Control Circuit Will Not Energize.	Acidic degreaser. Main line disconnect off.	See instructions for cleaning acid degreaser in manual, sheets 2391.16 pages 1,2,3, & 4. Turn on main line disconnect.
	Fuse(s) blown.	Check fuse(s), find reason for fuse(s) blowing, repair, then replace fuse(s) with proper size (see electrical print).
	Control transformer not functioning.	Replace control transformer.
	Not functioning pilot light(s), push button(s), or switch(es).	Replace not functioning pilot light(s), push button(s), or switch(es).
Machine Heat Will Not Come On	Exhaust system not on. Low liquid level.	Turn on exhaust system. Add fresh degreasing grade solvent to spray reservoir or distillate tank until level in boil sump up to proper level.
Safety Vapor, High Temperature Or Liquid Temperature Control Tripped	Low cooling, dirty boil sump, contaminated or too high boil point of solvent.	Correct condition, reset control.

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DEGREASER TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Conveyor Drive Starts But Chains Or Belt Does Not Move.	Torque limiter slipping. Shear pin sheared.	Check for obstructions to conveyor movement, parts spilled into sumps, open cover on rotating fixtures or baskets. If necessary drain machine, observe all safety precautions. Clean out spilled parts, close covers, repair any damage. Replace shear pin - restart conveyor - or if necessary tighten torque limiter. Caution do not over tighten adjust in quarter turn increments and try drive.
Conveyor Drive Starts But Chains Or Belt Does Not Move	Cross rods not aligned.	Refill machine.
	Excessively rusted conveyor chain.	Check chain take ups - take up evenly and if necessary jump tooth on drive sprocket to align crossrods - replace shear pin or adjust torque limiter if required.
	Sprocket(s) worn or damaged.	Lubricate chain with Glydag-B or Oildag available from Acheson-Colloidal Graphite, Port Huron, MI 48060 or equal.
		Replace worn or damaged sprocket(s). Look for uneven loading, misalignment or improper adjustment. Check chain for ware.

DEGREASER TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Conveyor Drive Motor Trips Overloads	Torque limiter adjusted too tight.	Adjust torque limiter to drive conveyor with normal loads. Replace friction discs if necessary. Do not over tighten.
Ghost Vapor (foggy-white) In Degreaser or Still	Shear pin replaced with straight pin.	Replace with proper shear pin. Remove cause of overload. Reset drive motor overloads.
Ghost Vapor (foggy-white) In Degreaser or Still	Excess water in solvent.	Check water separator - be sure solvent is flowing through separator and water outlet on separator is free.
Thermometer Shows Temperature Of Solvent To be Below Normal Boiling Point and Solvent Is Boiling	Clogged piping. Water and solvent can form an azeotrope with lower boiling point.	Check for clogged pipes to or from water separator. Free pipelines for full flow.
If Steam Heated; Decrease Rate Of Boil Even Though Steam Pressure Is Up.	Cooling water coils leaking.	Repair or replace cooling coils.
If Steam Heated; Decrease Rate Of Boil Even Though Steam Pressure Is Up.	Leaking Steam Coils. <u>THIS CAN BE HAZARDOUS.</u>	Shut off boiler, evacuate boiler and degreaser areas.
If Steam Heated; Decrease Rate Of Boil Even Though Steam Pressure Is Up.	Leaking Steam Coils. <u>THIS CAN BE HAZARDOUS.</u>	Drain excess water from separator through water purge valve. See Sheet 2312.48 or 2312.36

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DEGREASER TROUBLE SHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Blow Down Of Boiler Has Solvent Odor.	Boiler water is treated. Sodium hydroxide is a form of water treatment. When sodium hydroxide, solvent, water and high temperatures exist, dichloracetylene gas can form.	SLOWLY drain boiler, while bringing in raw water, so that air will not enter boiler. Flush all steam piping, steam coils, and condensate lines with raw water from boiler.
	<u>Dichloracetylene gas will automatically ignite when mixed with air.</u>	Drain solvent, check for pH and acid acceptance. Dispose of solvent properly if solvent cannot be reclaimed.

WHEN WORKING ON OR NEAR DEGREASING EQUIPMENT, NEVER USE OPEN FLAMES OR ARCS (SUCH AS WELDING) WHEN SOLVENT IS PRESENT IN DEGREASER. ALWAYS DRAIN DEGREASER AND THOROUGHLY AIR OUT AREA BEFORE ATTEMPTING ANY WELDING AND OR WORK WITH TORCHES. SOME SOLVENT VAPOR AIR CONCENTRATIONS CAN BE IGNITED.

Maintenance Record

