Sonicor

SONICOR INSTRUMENT CORPORATION

INSTRUCTION MANUAL

ULTRASONIC VAPOR DEGREASER

CUDR-98SFFA23

SONICOR INSTRUMENT CORPORATION

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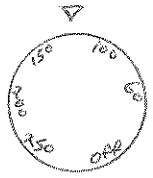
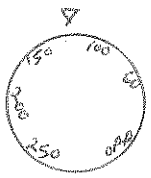
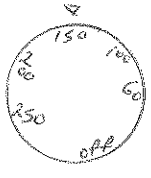
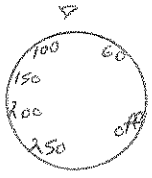
HIGH SOLVENT TEMPERATURE
VAPORS UP
REFRIGERATION
DO NOT CHANGE
THERMOSTAT CONTROLS

High Solvent Temp: (Set at 125°F) monitors the level of Contamination in the boiling chamber. The Heaters will shut off when temp reaches 125°F.

High Vapor Level: (Set at 110°F) monitors the vapor heights above the cooling coils. The Heaters will shut off when temp above coils reach 110

Vapors up: (Set at 150°F) will Disable the spray system unless vapors are dripping into the trough From the coils.

Thermostat Controls

High Solvent Temp	High Vapor Level	Vapors up	Refrigeration (Pre-Set temp) Do Not Change
			
Set at 125°F	set at 110°F	Set at 150°F	Set at 80°F

UNPACKING AND HANDLING

NORMAL PRECAUTION IN UNPACKING AND REASONABLE CARE IN HANDLING SHOULD BE EMPLOYED TO AVOID POSSIBLE DAMAGE TO THE SYSTEM. A VISUAL INSPECTION OF ALL INTERNAL AND EXTERNAL COMPONENTS AND SURFACES SHOULD BE CONDUCTED TO DETECT ANY DAMAGE WHICH MAY HAVE OCCURRED DURING SHIPMENT. RETAIN CONTAINER AND PACKING MATERIAL FOR SUBSEQUENT RE-SHIPPING.

NOTE: THE CARRIER IS RESPONSIBLE FOR DAMAGE TO THE UNIT DURING SHIPMENT. IF DAMAGE HAS OCCURRED NOTIFY THE CARRIER IMMEDIATELY TO ESTABLISH PROPER BASIS FOR CLAIM.

INTRODUCTION

IT IS RECOMMENDED THAT YOU READ THIS INSTRUCTION MANUAL CAREFULLY TO ACQUAINT YOURSELF WITH THIS SYSTEM BEFORE YOU ATTEMPT OPERATION.

IT IS CONSTRUCTED OF THE VERY FINEST MATERIALS AND THE WORKMANSHIP MEETS THE HIGHEST MANUFACTURING STANDARDS. IT HAS BEEN THOROUGHLY TESTED AND INSPECTED BEFORE LEAVING THE FACTORY AND WITH NORMAL USE WILL PROVIDE MANY YEARS OF SATISFACTORY SERVICE.

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1.0 DESCRIPTIONS

1.1 DESCRIPTION OF MANUAL

This manual is for Sonicor Refrigerated Ultrasonic Degreaser Model CUDR-98SFFA23. It contains Installation, Operation, and Maintenance Instructions with accompanying Specifications and Drawings.

1.2 DESCRIPTION OF EQUIPMENT

The CUDR-98SFFA23 is an integrated open cabinet system, multistaged solvent cleaning unit which features Vapor Degreasing and Ultrasonic cleaning.

The Unit consists of a Boil Chamber for Vapor Generating, an Ultrasonic Immersion Chamber for precision cleaning, and a vapor zone for vapor rinsing. A remote direct expansion refrigeration unit eliminates the need for a cooling water supply and problems of drainage.

The CUDR-97SFFA23 designed for maximum cleaning efficiency. The unit was engineered for cleaning applications using solvents which provide continuous distillation combined with cleaning, rinsing, and drying in a single unit.

The unit features dual filter housing, distillate spraying system, 0-30 minutes auto reset electronic timer for ultrasonic operation, a manually operated solenoid controlled drain from the ultrasonic to the boil chamber and a foot switch operation of the spray or fill of the ultrasonic chamber.

1.3 SPECIFICATION REF. DRWG NO D329-08

DIMENSION (INCHES)	
OVERALL (EXCLUDING REFRIGERATION)	60" X 36" X 41" HIGH
REFRIGERATION UNIT (SEPARATE)	36" X 40" X 36" HIGH
ULTRASONIC CHAMBER	16" X 20" X 4" DEEP
BOIL CHAMBER	16" X 20" X 15" DEEP
WORKING	16" X 20" X 10" DEEP
SOLVENT CAPACITY	
ULTRASONIC CHAMBER	6 GALLONS
BOIL CHAMBER	7 GALLONS (5" DEPTH)
WATER SEPARATOR	1 GALLON
RESERVOIR	12 GALLONS
ULTRASONIC POWER	1200 WATTS/40kHz
SPRAY/FILL-PUMP	STAINLESS STEEL
HEAT: BOIL CHAMBER	6KW THERMOSTATICALLY CONTROLLED
DISTILLATE RATE* (NO LOAD)	24 GALLONS PER HOUR
COVER - LIFT OFF	STAINLESS STEEL
REFRIGERATION UNIT	3 HP (REMOTE LOCATION)
ELECTRICAL REQUIREMENTS	230V, 60HZ, 3PH, 35 AMP
MAINTENANCE	FRONT AND LEFT SIDE OF UNIT

* BASED ON TRICHLOROTRIFLUOROETHANE (FREON TF OR GENESOLV D)

CONTROLS AND INDICATORS
- MAIN POWER SWITCH WITH INTERNAL INDICATOR
- HIGH VAPOR LEVEL WARNING INDICATOR.
- HIGH SOLVENT TEMPERATURE WARNING INDICATOR.
- BOIL CHAMBER LOW LEVEL WARNING INDICATOR.
- RUN INDICATOR LAMP
- START/RESET BUTTON
- ULTRASONIC TIMER 0-30 MINUTE AUTO RESET
  - START BUTTON
  - STOP BUTTON
  - DAIL INDICATOR
  - "ON" INDICATOR LAMP
- SPRAY/FILL MODE SWITCH WITH INDICATORS
- DRAIN SWITCH WITH INDICATOR
- FOOT SWITCH (OPERATES SPRAY OR ULTRASONIC CHAMBER FILL)

SAFETY CONTROLS
- HIGH VAPOR LEVEL THERMOSTAT
- HIGH SOLVENT THERMOSTAT (VAPOR AREA)
- LOW LEVEL SWITCH (BOIL CHAMBER)

1.4 THEORY OF OPERATION

A Sonicor Vapor Degreaser is designed to provide an efficient method for precision cleaning of metal parts, while at the same time distilling the solvent used in the degreaser to constantly replenish the pure solvent supply. To accomplish these ends, the Degreaser is designed with the following components that function together to create a liquid vapor liquid cycle.

1. Boil chamber to generate vapors.
2. Vapor zone for pre-immersion rinse, final rinse and hot vapor drying.
3. Condensing coil to condense hot vapors.
4. Remote refrigeration unitfor cooling the condensing coil.
5. Distillate trough to collect condensed solvent.
6. Water Separator for removing condensed moisture from the distillate.
7. Ultrasonic/Immersion chamber to collect pure solvent to provide liquid dip and/or ultrasonic cleaning.

The liquid vapor liquid cycle starts in the boil chamber. An immersion type heater brings the solvent in the chamber to its boiling point producing vapors. The vapors rise toward the mid section of the condensing coil area, creating a zone of vapors inside the unit.

The remote refrigeration unit cools the condensing coil causing the vapors to condense on the cold coil and drip into the collection trough below the coil. The condensed solvent along with any condensed atmosphere moisture flows along the trough and into the water separator where the water is removed.

Distillate solvent then flows Ultrasonic Immersion Chamber via the water separator and spray reservoir. The ultrasonic chamber solvent temperature is controlled by heating and cooling system. Solvent temperature is an important factor in the Ultrasonic Immersion Chamber; solvent too cold will not cavitate properly while solvent too warm will heat the immersed part too close to the vapor temperature. Ideally, a part lifted from the Ultrasonic Immersion should be cool enough to condense solvent vapors as it passes through the vapor zone in order to provide a good vapor rinse.

As the ultrasonic immersion chamber fills with solvent it overflows into the boil chamber and the cycle continues.

1.5 ULTRASONIC SYSTEM

1.5.1 GENERATOR

Sonicor Ultrasonic Generator features 1200 Watts,unique DO-O-FLEX tuning, full wave continuous 40KHz output; all solid state circuitry; EMI suppression and modular construction with easily accessible slide out replaceable modules. The generator takes line voltage and efficiently energizes the transducers at the desired power and frequency.

1.5.2 TRANSDUCERS
The Transducers are of sandwich type design, consisting of a nickel plated loading block, two piezoelectric crystals (Lead-zirconate-titanate) separated by an electrode, and an aluminum radiating block. The components are connected by a torqued steel bolt. The Generator energizes the transducers, the polarized crystals begin to expand and contract. This causes the transducers to convert electrical into mechanical energy at the design frequency which are transferred through the bottom of the Ultrasonic Chamber.

1.5.3 ULTRASONIC CHAMBER
The Ultrasonic Chamber is constructed of stainless steel for its strength and ability to minimize the etching (erosion) caused by cavitation.

Twenty four 40kHz transducers are permanently bonded to the buttom exterior surface of the ultrasonic chamber in a manner which efficiently transfers the mechanical energy into the solvent. This mechanical energy converts into ultrasonic energy in the presence of solvent (liquid). This energy transfer produces the basis for ultrasonic cleaning.

1.6 VAPOR RINSING (DEGREASING) SYSTEM

1.6.1 BOIL CHAMBER
The Boil Chamber contains a 6000 watt Immersible Heater which boils the solvent increasing its cleaning ability and producing vapors. The soiled workload is cleaned through a combination of direct suspension in the boiling solvent and placement in the Vapor Zone.

1.6.2 VAPOR ZONE
The Vapor Zone is the area above the Ultrasonic and Boil Chambers and to the mid point of the cooling coils. The boiling solvent from the boil chamber produces hot vapors which are suspended in this area. Condensation on cooler parts suspended in this zone creates the process known as Vapor Rinsing.

1.6.3 VAPOR RINSING (DEGREASING) CYCLE
Vapor Rinsing can best be explained by describing a typical rinsing operation. A soiled part is suspended in the vapor zone above the boil chamber. Since the dew point temperature of the part being cleaned is below that of the solvent vapor, condensation will occur on the part. The condensing vapor will run or drip off the soiled part carrying with it the soluble contaminants until the temperature of the part reaches the vapor temperature. The part is then immersed in the Ultrasonic Chamber, where particle contamination will be removed. The part is then resuspended in the vapor zone until it again reaches vapor temperature and can be removed dry and clean.

1.7 REFRIGERATION SYSTEM
The CUDR-98SFFA23 features a remote direct expansion Refrigeration unit. This is superior to Chilled Water Systems in that it allows the system to be mobile, requires no costly water supply or drainage facilities, and is far more effective in preventing vapor loss. The vapors up thermostat energizes the refrigeration unit which pumps coolant into the, vapor zone cooling coils and by means of solenoid activated valves, into the ultrasonic chamber cooling coils.

1.8 SPRAY SYSTEM
The Spray Reservoir is filled with cool solvent from the Water separator. Stepping on the foot switch activates the Spray Pump. This forces solvent out through the Spray wand.

WARNING:
1. Place the foot switch where it can not be accidentally stepped on.
2. All spraying must take place within the Vapor Zone.

Spray rinsing should take place after the parts are taken out of the Ultrasonic Tank and are suspended in the Vapor Zone. This will dislodge any particle not previously removed and lower the part temperature. The hot vapors begin condensing on the cool part restarting the Vapor Rinsing (Degreasing) process.

2.0 CONTROLS, INDICATORS AND ACCESSORIES

2.1 OPERATIONAL CONTROLS, INDICATORS AND ACCESSORIES

2.1.1 MAIN POWER ON/OFF CIRCUIT BREAKER INTERNAL W/INDICATOR LAMP
This switch when placed in the ON position will supply power to the control circuit. The Main Power Indicator Lamp will illuminate whenever the switch is in the ON position and power is supplied to the unit.

2.1.2 HIGH SOLVENT TEMPERATURE WARNING LAMP
This lamp will illuminate to indicate that the solvent in the boil chamber has become too contaminated, as indicated by the rise in its boiling point, and the heater will turned OFF. At this point the contaminated solvent in the boil chamber must be replaced before the system can be re-energized.

2.1.3 HIGH VAPOR WARNING LAMP
This lamp will illuminate to indicate that the vapor level has risen above the predetermined safe level and that the heaters will turned OFF to prevent vapor loss.

2.1.4 LOW SOLVENT LEVEL WARNING LAMP (BOIL CHAMBER)
This lamp will illuminate to indicate that there is insufficient solvent in the boil chamber and that the heaters will turned OFF. The addition of solvent to the boil chamber will enable the system to be reactivated.

2.1.5 START/RESET BUTTON
This reset button is used to Start/Reset the heater when the Main Power Breaker is in the ON position. The Reset Button is to reset the safety device if/whenever it triggers. The cause of the problem must be corrected before restarting the unit.

2.1.6 RUN INDICATOR LAMP
This lamp works inconjunction with the Warning Lamps and the Start/Reset button, when the button is pushed and the warning lamps turnes OFF, the Run lamp illuminates. If during the operation one of the safety divices triggers, the respective lamp will illuminate and the Run lamp will turn OFF.

2.1.7 ULTRASONIC CLEAN 0-30 MIN. TIMER INDICATOR LAMP
The will energize the Ultrasonic Generator, which activates the ultrasonic cleaning chamber with ultrasonic energy. The ultrasonic cleaning chamber should only be turned ON when in use, leaving it running when not in use will cause wear on the chamber surface and reduce its useful life span. The indicator lamp should illuminate when ultarsonics is in the ON position.

2.1.8 DRAIN - ULTRASONIC CHAMBER - SWITCH WITH OPEN & CLOSE INDICATOR LAMPS.
This switch operates a solenoid valve that opens the drain line, from the ultrassonic chamber to the boil chamber. To replemish the ultrasonic chamber see 2.1.9 - FILL/SPRAY - ULTRASONIC CHAMBER.

2.1.9 FILL/SPRAY - ULTRASONIC CHAMBER - SWITCH WITH FILL & SPRAY INDICATOR LAMPS.
This, center position OFF switch, works inconjunction with foot switch. To operate the Fill function, place the switch to the lower position (Fill) and step on the Foot switch. To operate the Spray function, place the switch to top position (Spray), position the spray wand towards the item(s) to be spray and step on the foot switch. The Spray or Fill indicator will illuminate when the switch is in the respective position.

2.2 THERMOSTATIC CONTROLS

2.2.1 THERMOSTAT SETTINGS

The System has been designed for use with chlorinates solvents such as 1,1,1 trichloroethane and trichloroethylene as well as fluorocarbon solvents such as trichlorotrifluoroethane and some of its blends.

The only time the thermostat needs to be changed, is when a different solvent is being used.

The operator may have to modify the setting slightly to bring the unit to optimum operating condition.

When any of the various fluorinated solvent blends are used, the high solvent temperature thermostat should be set 8-10 deg. F. above the boiling point of that particular solvent. The other three thermostats should remain the same as for pure trichlorotrifluoroethane.

50°C

2.2.2 HIGH VAPOR LEVEL THERMOSTAT

This thermostat monitors the vapor height at a pre-determined location in the Tank. If the vapor level rises above its pre-determined level (above the condensing coil), the circuit will open, and the High Vapor Level Warning Lamp will illuminate and the heaters will shut down. The unit should be turn ON only after the problem is corrected.

Recommended thermostat setting for:

111 Trichlorethane	130 degree F.	(49 degree C.)
Trichlorethylene	125 degree F.	(52 degree C.)
Freon TF/Genesolv D	107 degree F.	(42 degree C.)

Please note: Since the thermostats has a tolerance +/- 4 degree F. they may have to be adjusted according to individual unit.

70°C

2.2.3 HIGH SOLVENT TEMPERATURE THERMOSTAT

This thermostat monitors the level of contamination in the Boil Chamber, as indicated by a rise in the solvent boiling point. The circuit will open when the boiling point of the solvent reaches the pre-set temperature on the thermostat. The heaters will shut OFF, the High Solvent Temperature Warning Lamp will illuminate. After the contaminated solvent has been replaced, start the unit by pressing the Start/Reset Button.

Recommended thermostat setting for:

111 Trichlorethane	175 degree F.	(78 degree C.)
Trichlorethylene	195 degree F.	(90 degree C.)
Freon TF/Genesolv D	147 degree F.	(64 degree C.)

Please note: Since the thermostat has a tolerance of +/- 4 degree F. they may have to be adjusted according to individual unit.

55°C

2.2.4 VAPORS UP THERMOSTAT

This thermostat disables the Spray system unless vapors are condensing in the unit.

Recommended thermostat setting for:

111 Trichlorethane	110 Degree F. Min.	155 Degree F. Max.
Trichlorethylene	110 Degree F. Min.	175 Degree F. Max.
Freon TF/Genesolv D	100 Degree F. Min	110 Degree F. Max.

2.2.5 REFRIGERATION THERMOSTAT
The refrigeration thermostat which is located in the control box, turns the condensing unit ON and OFF automatically as required by the level of vapors in the boil chamber. Once the thermostat is set no further adjustments should be required unless the type of solvent is changed.

Recommended thermostat setting for:

111 Trichlorethane	110	Degree	F.	Min.	155	Degree	F. Max.
Trichlorethylene	110	Degree	F.	Min.	175	Degree	F. Max.
Freon TF/Genesolv D	100	Degree	F.	Min	110	Degree	F. Max.

2.2.6 WATER SEPARATOR - SPRAY RESERVOIR
The water separator is a gravity type design. Water and solvent vapors condense on the peripheral condensing coil and flow into the water separator via the collection trough located under the coils. Water, (which is lighter than the solvent) floats to the top and is removed through the Water Separator Water Outlet. The distilled solvent flow from the water separator into the spray reservoir. When the reservoir is fill, the solvent flows into the boil chamber.

2.2.7 WATER SEPARATOR WATER OUTLET
This outlet allows the water to drain from the water separator. DO NOT restrict the flow of the water in any way. Let the water flow freely into a container. No valve is to be connected to this drain.

2.2.8 BOIL CHAMBER LOW LEVEL CONTROL
This device is permanently attached to the lower front wall of the Boil chamber and its purpose is to prevent the heater and refrigeration system from coming on if there is insufficient solvent in the boil chamber. A low level condition in the boil chamber will be evidenced by the inability of the system to switch from the reset to the run mode when the start/reset button is pushed.

2.3 ACCESSORIES

2.3.1 COVER
The system come's equipped with a stainless steel cover that should be in place whenever the unit is not in use. When the unit is running the Cover should be in place as much as possible to prevent harmful moisture and disruptive air currents from interfering with the cleaning process.

3.0 INSTALLATION

3.1 PLACEMENT OF EQUIPMENT
The unit should be placed where the rear is accissible. An undisturbed air flow from the rear of the unit should always be maintained in order to keep the components at a safe operating temperature. Periodically check the air intake to insure that dust or dirt is not restricting the air flow on the condenser.

WARNING

Install the Degreaser in a well ventilated area, away from direct air currents that could upset the vapor zone and cause excess fumes. Solvent can decompose to form toxic and corrosive substances when exposed to high temperature. Avoid welding operations, open electrical heating elements and open flames.

3.2 ELECTRICAL REQUIREMENT

The unit must be connected to a fused disconnect power supply, capable of accommodating the electrical requirement as stated on the serial plate and in the specification sheet of this manual. The serial plate is next to the AC access hole located in rear of the control box

The unit must be connected according to the National Electrical Code and/or to the plant specifications.

4.0 SOLVENTS

4.1 PRECAUTIONS

It is essential that all persons who are responsible for operating or maintaining Vapor Degreasers and all others who may be exposed to the solvents used should be thoroughly trained in the proper handling of the solvents and the equipment in which they are used. Such persons should be aware of the hazards, the first aid prescribed in case of accident and the proper use of protective equipment to safeguard worker health and promote maximum safety. In addition these people should consult OSHA EPA, federal and state guidelines for disposal, safe use and environmental considerations when using solvents in their facility. Additional help may be obtained from the manufacturer of the chemical solvents used as well as your Sonicor Representative.

4.2 RECOMMENDED SOLVENT

The unit has been designed for use with chlorinated solvents such as 1,1,1 trichloroethane and trichloroethylene as well as fluorocarbon solvents such as trichlorotrifluorothane and its blends.

According to your specific cleaning needs choose the solvent which best softens the soil and maintains cavitation, rinsing and drying properties. All solvents are toxic to some degree.

WARNING

1. Prolonged exposure to solvent, either breathing or direct contact with body, can result in serious injury.
2. Always use solvents in well ventilated area.
3. Use protective gloves, goggles and clothing.
4. Heated solvent can cause burns.
5. Solvents remove natural oils from the skin producing irritations and rashes.
6. Deliberate inhalation of fumes can cause death.

5.0 OPERATING INSTRUCTION

5.1 OPERATIONAL PRECAUTION

A. DO NOT use any chemical solution that would attack 300 series Stainless Steel.
B. DO NOT use any toxic or flammable solvent. Ultrasonics tend to increase the evaporation rate, which may cause additional hazards.
C. Never operate the Ultrasonic Chamber without a minimum solvent depth of four inches (100mm).
D. DO NOT place heavy work directly on the bottom of the Ultrasonic Chamber.
E. Always make sure the protective rack covers the heating element.
F. Always experiment on a sample when cleaning a new part or before proceeding with batch cleaning.
G. Lubricate metal items after cleaning to prevent oxidation (when necessary).
H. Solvent above 140 F (60 C) and solvent vapors above 160 F (71 deg. C.) can cause burns. Use eye protection, gloves and protective clothing.
I. Deliberate inhalation of solvent to produce intoxication can be fatal.
J. DO NOT take solvent internally.
K. DO NOT bring solvent into contact with highly active metal such as sodium, potassium and barium.
L. Keep cover on when not in use.

5.2 INITIAL SOLVENT FILLING (WATER SEPARATOR-SPRAY RESERVOIR, BOIL CHAMBER, ULTRASONIC CHAMBER).

1. Close Boil and Ultrasonic Chamber drainage valves. Check and tighten drain plugs on all reservoirs.
2. To fill Water separator and Spray Reservoir, pour clean solvent into trough (dirt in trough can clog the spray nozzle) until the solvent begins to pour into the boil Chamber through the inlet on the rear wall.
3. Pour solvent into the Ultrasonic Chamber until it overflows into the Boil Chamber. The depth of solvent in the boiling chamber must be at minimum 2" above the work rest.

5.3 ULTRASONIC CLEANING PRINCIPLE

Ultrasonic cleaning is the rapid and complete removal of contaminants from object by immersing them in a solution, permeated with ultra high frequency sound waves (Ultrasonic Energy). These inaudible sound waves cause the solution to act as a scrub brush. This process uses high frequency electrical energy, which is fed to a convertor and changed to mechanical energy by a rugged lead-zirconate-titanate transducer. These transducers are intimately bonded to the bottom of the ultrasonic chamber. The transmission of the Ultrasonic energy in to the solution causes the formation of millions of microscopic bubbles

which collapse and release a great amount of energy to literally "blast" the contaminants free from the internal and external surfaces of parts being cleaned. This phenomenon is called "Cavitation" and is the most modern, safe, gentle and thorough way of cleaning devised for most metallic and nonmetallic parts.

5.4 VAPOR DEGREASING PRINCIPLE

Vapor degreasing can best be explained by describing a typical degreasing operation. A soiled part is suspended in the vapor zone above the boil chamber, since the Dew Point temperature of the part being cleaned is below that of the solvent vapor, condensation will occur on that part. The condensing vapor will run or drip off the soiled part carrying with it the soluble contaminants until the temperature of the part reaches the vapor temperature. The part is then immersed in the Ultrasonic Chamber, Where particle contamination will be removed. The part is then resuspended in the vapor zone until it again reaches vapor temperature and can be removed dry and clean.

5.5 CLEANING TIME

Cleaning time will depend on the amount, location and type of soil to be removed. While most surface soils can be remove instantaneously, heavy soil imbedded in the cracks, crevices pores and parts that are touching will increase cleaning time. The proper handling device (basket is extremely important in getting maximum efficiency.

5.6 OPERATING PROCEDURE

1. Check for proper electrical requirement.
2. Check for temperature setting for solvent being used.
3. Check solvent depth in Boil Chamber (2" min. above work rest)
4. Place Main Power Switch to the "ON" position
   Main Power Indicator will illuminate
5. Place Ultrasonic Clean Timer dial to 10 minutes and push Start Button. The Indicator will illuminate.
   At this point Ultrasonic Energy is being introduced to the solvent. Due to the physical properties of solvents, some will have effective Ultrasonic cavation sooner than others as the temperature rises. Effective Ultrasonic Cavitation is noted by the presence of rippling on the solvent surface and a buzzing sound which will vary throughout the operation. This Variation has no bearing on the cleaning efficiency and may change considerably in intensity when work is introduced in the solvent.
6. Wait for the vapor level to rise (apporx. 3" above the trough.)
7. Place contaminated parts into basket.
8. Lower basket into vapor zone over Boil Chamber.
   The solvent vapors will condense on the parts, then run or drip off carrying with it all soluble contamination. parts

that are unusually dirty can be cleaned more rapidly by immersing them into the Boil Chamber.

9. Place the basket into the Ultrasonic Chamber for precise clean.
   After the parts are cleaner, raise the basket into the vapor zone. Tip and shake the parts to release any trapped solvents.
   Keep the basket in the vapor zone until the condensation ceases.
   Slowly remove the basket from the vapor zone.

5.7 SHUT DOWN PROCEDURE

1. Turn Ultrasonics OFF.
2. Place the Main Power Switch to the OFF position.
3. Place the cover on the unit.
4. Do not remove power service from the degreaser.

6.0 MAINTENANCE

6.1 PERIODIC MAINTENANCE

Normal maintenance requires no special skills, If assistance is needed, contact the factory or the sales representative.

1. Periodically check the entire System for leaks.
   WARNING: Never tip degreaser on its side; doing so could damage the compressor.
   Use the proper protective devices when handling solvent.
2. Blow excessive dirt and dust from refrigeration unit and generator.
3. Draining the System (Solvent Regeneration)
   a. Drain Ultrasonic Tank - Flush with clean solvent - Wipe clean.
   b. Pour dirty solvent into Boil Chamber - The clean solvent will collect in the Ultrasonic Chamber.
   c. Collect clean solvent.
   d. Run Boil Chamber until the low solvent level shuts off the machine. Drain remaining sludge and dispose of according to environmental specifications.
   e. According to usage:
      Drain Water Separator and spray pump reservoir. Dirt in these tanks could clog the spray nozzle.
4. Clean and buff out cabinetry.

6.2 TROUBLE SHOOTING

6.2.1 TROUBLESHOOTING: SCHEMATIC

General wiring schematic diagram is included to aid maintenance personnel in identifying various components, and to locate connection points for troubleshooting.

6.2.2 TROUBLESHOOTING CHART

The following chart, is an aid in locating possible trouble in the console. Diagnose the symptom(s) -using the chart and the schematic - locate the assembly or subassembly that may be responsible for the failure.

SYMPTOMS	PROBABLE CAUSE
MAIN POWER INDICATOR LAMP FAILS TO ILLUMINATE WHEN SWITCH IS TURNED ON	1. UNPLUGGED LINE CORD 2. DEFECTIVE FUSE 3. DEFECTIVE LINE CORD 4. DEFECTIVE SWITCH 5. DEFECTIVE INDICATOR LAMP
LOW FLOW RATE FROM THE FILTER INLET	1. ADJUST FILTER SYSTEM THROTTLE VALVE 2. CHANGE FILTER ELEMENT
FUSE FAILS WHEN START/RESET BUTTON IS PUSHED	1. UNDERATED MAIN FUSE 2. INCORRECT VOLTAGE 3. SHORT IN WIRING (HEATERS OR CONDENSING UNIT). 4. DEFECTIVE TOGGLE SWITCH 5. CONDENSING UNIT STARTING UNDER A LOAD.
NO ULTRASONIC ACTIVITY IN TANK. INDICATOR ILLUMINATES FAN OPERATES.	1. DEFECTIVE MODULE(S) 2. DEFECTIVE RF CABLES 3. DEFECTIVE TRANSDUCERS
RUN INDICATOR LAMP TURNS OFF AND START/RESET INDICATOR LAMP ILLUMINATES.	1. LOW SOLVENT LEVEL IN BOIL CHAMBER. 2. INCORRECT HIGH VAPOR LEVEL THERMOSTAT SETTING (VAPOR LEVEL - SHOULD BE TO THE MIDDLE CONDENSING COIL). 3. INCORRECT HIGH SOLVENT TEMPERATURE THERMOSTAT SETTING. 4. UNDER CHARGED REFRIGERATED SYSTEM. 5. EXCESSIVELY CONTAMINATED SOLVENT
LOW VAPOR LEVEL/LONG VAPOR GENERATING TIME.	1. DEFECTIVE OR BURNED OUT HEATER(S)

CONDENSING COIL ICING	1. DEFECTIVE OR BURNED OUT HEATER(S). 2. IMPROPERLY CHARGED REFRIGERATION SYSTEM. 3. SHORTAGE OF REFRIGERANT IN THE SYSTEM 4. UNIT IS NOT UP TO ITS FULL (HEAT) LOAD CAPACITY. (COIL MAY FREEZE WHEN UNIT IS FIRST TURNED ON AND DEFROST AS THE VAPOR LEVEL RISE - THIS CONDITION IS NORMAL)
INSUFFICIENT COOLING - HIGH VAPORS	1. OVER/UNDER CHARGED REFRIGERATION SYSTEM. 2. LEAK IN REFRIG. SYSTEM. 3. DEFECTIVE COMPRESSOR.
CONDENSING COILS IS NOT GETTING COLD AFTER START/RESET BUTTON IS PUSHED (HEATER IS OPERATING)	1. CONDENSING UNIT LINE DISCONNECTED FROM SWITCH 2. DEFECTIVE WIRE (LOOSE OR BROKEN)
CONDENSING COIL IS NOT GETTING COLD WHEN CONDENSING UNIT IS OPERATING (HEATER IS OPERATING)	1. RESTRICTION IN REFRIGERATION SYSTEM 2. SHORTAGE OF REFRIGERANT (UNDER CHARGED)

6.3 REPLACING POWER MODULE(S)

If after a comprehensive trouble shooting of the system, you conclude a power module is defective, follow this procedure.

1. Remove Generator front panel (grilled section).
2. Unplug the AC input leads from the defective module (one (1) white and one (1) black).
3. Unplug the green neutral transducer lead (NTL) at the top of the module.
4. Unplug the RF output lead at the top of the module, directly under the NTL. The RF output lead can be either orange, red yellow, white blue or gray.
5. Unplug the green jumper at the bottom of the module.
6. Slide out module.
7. Install new module by carefully reversing the removal procedure.

6.4 STORAGE

1. Drain Ultrasonic chamber, Boil Chamber, Water Separator, Spray Reservoir
2. Clean out Chambers
3. Seal Unit

6.5 RETURN OF EQUIPMENT

Your system has been designed for reliable, trouble free performance. After prolonged use, a failure may occur. In this case, return the system to the factory, but first contact the service department. Follow these steps to insure prompt service:

1. Include date of purchase, model and serial number with request for service.
2. Provide adequate packing to insure against damage during shipping.
3. Send equipment with all transportation charges prepaid, and return method of shipping indicated.

REPLACEMENT PARTS LIST
GENERAL WIRING SCHEMATIC
DRAWING NO. C329-10

SYMBOL	DESCRIPTION	PART NO.
CT1	CONTROL TRANSFORMER - 75 VA	410239
SI	CIRCUIT BREAKER	820301
S2,S1	PUSHBUTTON SWITCH, SPST, N.O.	820054
S3	ROTARY SWITCH, SPDT	820101
S4	TOGGLE SWITCH, DP3T (CENTER OFF)	820034
L1-L9	NEON LAMP, 115V, RED	800101
R1,R5,R6	RELAY, TPDT, 115V COIL	822033
R2,R3,R4	RELAY, DPDT, 115V COIL	822031
TH1,TH2	THERMOSTAT	820214
TH3,TH4	THERMOSTAT	820214
F1,F2,F3	FUSE, 5 AMP, SLO-BLO	820526
P1	PUMP,230V, 3 PHASE	891086
V1	SOLENOID VALVE, 115V, N.C. 3/8" NPT	890504
V2	SOLENOID VALVE, 115V, N.C. 1" NPT	890509
H1,H2	HEATER, 230V, 3PH, 3KW	811387
T1	SOLID STATE TIMER MODULE, 0-30 MIN	821031
FS1,FS2	FLOAT SWITCH, CLOSE ON RISE	820081
FS3	FLOAT SWITCH, OPEN ON RISE	820081
C1	CONTACTOR, 40AMP, TPST, 115V COIL	822071
PS1	FOOTSWITCH	820044
S5	PUSHBUTTON SWITCH, SPST, N.C.	820055