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SONIFIER II

Cell Disruptor / Homogenizer

SONIFIER CONTACTS

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FAX: 203-796-2240
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[Driving directions to Branson's Headquarters](#)



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PRODUCTS AND SERVICES

ULTRASONIC CLEANING TECHNOLOGY

Branson Ultrasonics Corporation pioneered the use of ultrasonics for precision cleaning in the 1940s and continues to be a leader today. This section discusses the fundamental theory and application of ultrasonics for precision cleaning, the importance of frequency, and how to optimize system performance.

AQUEOUS CLEANING PRODUCTS

Branson produces a wide range of aqueous products, including our Benchmark modular cleaning line and our OMNI self-contained wash/rinse/dry systems.

SOLVENT CLEANING PRODUCTS

Branson proudly offers one of the most comprehensive lines of solvent cleaners in the business. From our B series degreasers to our EVD-80, we have something for every budget and application.

CHEMISTRIES AND MSDS SHEETS

Branson offers a complete line of cleaning chemistries for many applications and most are concentrated and offered in quarts, gallons, 5 gallon pails and 55 gallon drums. This section includes downloadable MSDS sheets.

SPECIAL PRODUCTS

Branson offers a broad range of inline ultrasonic cleaning and liquid processing cells for working with flowing liquids.

ULTRASONIC MOLD CLEANING

Branson offers a full line of ultrasonic mold cleaning consoles and tanks. Branson also offers custom sized systems to meet your needs.

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BRANSONIC

Tabletop Ultrasonic Cleaners

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Ultrasonic cleaning is faster, more consistent, and safer than any other method. Hand scrubbing, soaking, or steam don't even come close. The Bransonic table top cleaners now include the same high power, rugged transducers found on industrial systems sold to the automotive, electronics, and metalworking industries. These Langevin-type metal/ceramic devices use engineered ceramics to assure both durability and superior power. Coupled with a new sweep frequency capability, you get the best possible cleaning every time, all the time.

- Rugged enough for industry
- Consistent enough to meet medical and laboratory standards
- Safe enough for delicate electronic parts and precious jewelry



No one knows ultrasonics better than Branson. Over fifty years ago we pioneered ultrasonic cleaning, and ultrasonics is still our primary business. Bransonic cleaners incorporate everything we've learned from our experience, our research, and especially our customers.

Click on a model below based on tank size or capacity to view the product page

Note: Included accessories are for the US market and may vary in other geographies

Model B-200 6.5" x 3.5" x 2.22" 1.5 pints	Model B-300 11.8" x 3.9" x 2.9" .5 gal.	Model B3 3.5 Dia. x 3" 1 pint	Model 1510 6" x 5.5" x 4" .5 gal.
Model 2510 9.5" x 5.5" x 4" .75 gal	Model 3510 11.5" x 6" x 6" 1.5 gal.	Model 5510 11.5" x 9.5" x 6" 2.5 gal.	Model 8510 19.5" x 11.5" x 6" 5.5 gal.



Model DHA-1000
14" x 16" x 10.5"
10 gal.



Model PC-620
19.5" x 5.7" x 6"
2.2 gal.



Model IC 1216
12" x 16" x 13"
10 gal.



Model IC 1620
16" x 20" x 16"
21 gal.

If you would like additional information please click [here](#).

Typical Applications

Scientific Labs

Lab Glassware, Test Tubes, Pipettes, Optical & Contact Lenses, Eyeglass Frames, Scientific Instruments, Components

Industry

Switches, Relays & Motors, Gears, Precision Bearings, Metal & Plastic Parts, Assemblies

Electronics

PC Boards, SMDs, Ceramic Substrates, Capacitors, Lapping Heads, Packaging Components, Quartz Crystals, High-resolution Glass Plates

Medical & Dental Labs

Cannulae, Syringe Parts, Surgical Instruments, Blood Oxygenators, Dental Instruments, Burs, Dentures, Caps, Plates

Jewelry

Watches, Clock Movements, Precious Metals & Gemstones, Intricate Settings, Chains, Charms, Coins

[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
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SONIFIER II

Cell Disruptor / Homogenizer

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SONIFIER® PRODUCTS

The Sonifier ultrasonic cell disruptors are versatile laboratory tools designed to apply high-frequency ultrasonic energy to biological and chemical processing to:

- Disrupt cellular structures
- Homogenize samples
- Emulsify materials
- Disperse or mix compounds
- Accelerate reactions

Sonifiers are able to process static samples from 1ml to greater than 500 ml or flowing material up to 40l/hr. Analog units are available in two power levels. Digitally-operated units are offered in three power levels and are suggested for applications requiring higher levels of process control or parameter measurement. Click on any photo below to go to that product's page.

Analog Units

Sonifier analog cell disruptors and homogenizers are available in 200 watt (Model S-250A) and 400 watt (Model S-450A) models. These capable units are widely-used in laboratories to facilitate a wide range of biological and chemical processes.





The Model 910BCA is a higher-power unit designed specifically for continuous processing of liquids. It is ideal for in-line emulsification, homogenization, dispersion, or mixing.

Digital Units



The Sonifier S-150D 100 watt digital unit is a full-featured, lower power unit designed to effectively process the smaller samples often associated with genome and other biological research.

The Sonifier S-250D 200 watt and S-450D 400 watt units offer all of the capability of the analog models, plus digital control for precise process control and parameter measurement. They are particularly suitable for larger or more difficult samples.



Click the icons for more information on how to order Sonifier products with a credit card.

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OEM SOLUTIONS

THE NEEDS OF AN OEM ACCOUNT ARE DIFFERENT

Branson recognizes the needs of OEM accounts are substantially different and go beyond the requirements of a traditional commercial account. OEM accounts are entrusting Branson with their reputation in terms of performance, reliability, and on-time delivery. That is why Branson has dedicated specific resources to serving this important segment of our business. You can count on Branson being there for you and your customers 100% of the time.

Over the years Branson has supplied many types of ultrasonic components to industry. This has resulted in a very broad range of "pre-engineered" components and an excellent understanding of many OEM applications. We can offer "what you need", not "what we have". Chances are we already have experience in your particular area of interest.

ULTRASONIC GENERATORS

Branson's ultrasonic generators offer a full range of features to meet any precision cleaning requirements. Used on a simple cleaning tank or in a fully integrated cleaning system, all will deliver precise cleaning quickly, consistently and cost effectively.



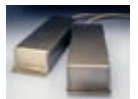
ULTRASONIC TANKS

Branson's ultrasonic tanks provide versatile ways to meet localized cleaning needs in a variety of industrial settings. The eight standard sizes range from 5 to 80 gallon capacities. This selection is supplemented by our fabricating capability for custom sizes.



IMMERSIBLE TRANSDUCER

Branson's hermetically sealed immersible ultrasonic transducers are available in two standard sizes and four mounting configurations. This allows for maximum versatility of transducer placement on tank walls or bottom to optimize cleaning. Available in custom sizes, frequency ranges from 20 kHz to 170 kHz.



TRANSDUCER BONDING SERVICES

Branson offers the capability of adding ultrasonics to your specialized tanks or process weldments. We can bond piezoelectric transducer elements to your custom cleaning tanks, extrusion dies, or other devices to improve performance and efficiency.



SPECIAL PRODUCTS

Branson offers a broad range of inline ultrasonic cleaning and liquid processing cells for working with flowing liquids.



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BRANSON PRECISION PROCESSING

Branson Ultrasonics Corporation is the industry leader in the design, development, manufacture, and marketing of precision cleaning equipment. It is the only company of its caliber worldwide.

HISTORY



Norman G. Branson (*left*) founded Branson Instruments in 1946 in Danbury, CT, to harness ultrasonic energy for industrial purposes. His first product was the Audigage - a nondestructive material thickness tester. The company expanded in 1953 by forming Branson Cleaning Equipment Company to develop ultrasonic cleaning technologies to meet growing industry needs. Early product was designed to work only with water based solutions. Rapid growth in electronics manufacturing in the late 1950s led to the development of solvent degreasing equipment to meet the special requirements of that emerging industry. Since that time,

Branson has been a leader in both of these critical cleaning technologies. In 1960, Branson opened their first manufacturing facility to meet overseas demand for cleaning products. Based in Holland, that plant is still in operation today and has now been joined by facilities in France, Slovakia, Malaysia, Hong Kong, China, and Mexico.

Acquired in 1968 by SmithKline & French for its work in medical imaging technology, Branson remained a part of that organization for over 15 years. Since 1984, Branson has been one of the more than 50 autonomous divisions of St. Louis-based [Emerson](#), a Fortune 100 company.

TECHNOLOGY

At the core of ultrasonics is the creation and channeling of high frequency sound waves for industrial purposes. When ultrasonic energy is applied to a liquid small cavities are produced by the varying pressure gradient. This "cavitation" is the source of all of the benefits of ultrasonic cleaning.

To ensure corporate growth, Branson emphasizes the development of new technologies both within and outside the realm of ultrasonics. This focus is evident in the large Research and Development department maintained throughout the world. Many patents have been awarded as a result of these efforts to lead the industry. For example, Branson pioneered in the quest for higher frequency cleaning for precision applications with the introduction of the 400 kHz MicroCoustic product in 1987. Other frequencies have been added (80, 120, and 170 kHz) since.

RESOURCES

While the enabling technology is important, it is the application of the technology that is critical to the user. Branson maintains a number of Application Laboratories around the world, each staffed with professional technicians. It is in these laboratories that the customers' needs are met. A worldwide electronic database of these applications is maintained. Free application evaluation services are available to develop both the process and equipment requirements and the success of both are guaranteed.

With more than 1,700 employees and 70 sales and service offices, the broadest product line, and the strongest technical position in the world, Branson is prepared to meet your needs.

FOR YOUR FILES...

You can download a PDF file of our corporate profile for your reference [here](#).

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Click on below picture to see What's New at Branson!



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Branson has been a world leader in the development of ultrasonic precision cleaning equipment for over 50 years. Since 1984, we have been one of the more than 50 autonomous divisions of St. Louis-based [Emerson](#), a Fortune 100 company. We employ the latest technology in [aqueous cleaning](#), semi-aqueous cleaning, and [vapor degreasing](#). [Our global presence](#) insures that you will be able to find the products and services you need, wherever you are! Our [membership in industry associations](#) insures access to our technology networks.

Branson offers magnetostrictive ultrasonics at 20 kHz, as well as a full spectrum of piezoelectric ultrasonics from 25 kHz - 400 kHz. Ultrasonic cleaning components which are suitable for use in aqueous cleaning or solvent degreasing applications. We maintain a professionally staffed [Applications Laboratory](#) to assist in selecting the process and equipment needed to meet your requirements.

Our [Sonifier](#) cell disrupter / homogenizer line has been consistently used as the benchmark in laboratory experiments and research studies for nearly 30 years. Technicians find it invaluable for degassing liquids, accelerating chemical reactions, preparing liposomes, and performing genome research.

[Aqueous products](#) range from our [Brasonic line](#) of tabletop cleaners to our sophisticated Benchmark cleaning consoles for the semiconductor and disk drive industries. Between are many choices in pre-configured units and modular cleaning lines to meet the most demanding production requirements. Typical applications include particulate removal, defluxing, and many others. Deionizers, coalescers, and other water treatment and waste water treatment support modules are available

Branson's line of [solvent cleaning equipment](#) incorporates vapor degreasers, liquid vapor degreasers and ultrasonic vapor degreasers. All Branson degreasing equipment complies with current EPA regulations, NESHAP regulations and SCAQMD guidelines. We were awarded [ISO 14001](#) Certification in August 1998. We are proud to undertake an ongoing [effort to improve and co-exist within the environment](#) and have earned several awards for our activities.

Today, there are all kinds of cleaning processes and equipment available - and Branson offers most. With our exclusive [Four Step Approach](#), you'll get a cost effective, environmentally responsible solution to even your most challenging precision cleaning problems. We guarantee it!

Branson Ultrasonics Corporation also provides a complete line of [plastic joining equipment](#), through our Applied Technologies Group.

Planning to visit us soon? You can obtain driving directions, as well as information on Danbury's current weather forecast by checking [here](#).



Branson is an Equal Opportunity Employer

Branson Ultrasonics Corporation, Precision Processing Division, 41 Eagle Road, Danbury, CT. 06813-1961
USA

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FREQUENTLY ASKED QUESTIONS ABOUT THE SONIFIER

- [At what frequency does a Sonifier operate?](#)
 - [When should I change the replacable tip on my horn?](#)
 - [Why must the amplitude \(power\) be set below 7 when I use a microtip?](#)
 - [What factors must I consider to effectively process my sample size?](#)
 - [What is a "booster" and when is it used?](#)
 - [Can I process toxins or bio-hazardous materials safely?](#)
 - [How can I process more than 4-500ml of material?](#)
 - [How do I process very small samples?](#)
-

At what frequency does a Sonifier operate?

Standard Sonifier products operate at a nominal frequency of 20 kHz or 20,000 cycles per second. The auto-tuning feature actually moves the frequency within a small range during operation to optimize performance.

When should I change the replaceable tip on my horn?

Replaceable tips are generally used in high-energy applications where tip wear is expected. As energy is transmitted from the horn tip, traces of metal are eroded. Over time, this results in light pitting. Tips can be polished with crocus paper or emery cloth until they are out of dimensional tolerance. When this happens, the horn will be difficult to tune, may squeal, and eventually crack. As tips are relatively inexpensive, it is recommended that they be changed after the second polishing.

Why must the amplitude (power) be set below 7 when I use a microtip?

Microtips are designed to be used in small containers and are therefore quite thin. This smaller dimensional cross-section makes them more susceptible to stress cracking at higher amplitudes.

What factors must I consider to effectively process my sample size?

The two primary factors for effective processing of a given sample size are horn diameter and delivered power. The two must work together for optimal performance. Too little power and a large horn will stall. Too much power and horn damage may result. Branson offers a range of horns with each of their Sonifiers that have been proven effective with that particular unit.

What is a "booster" and when is it used?

A "booster" is a device which is inserted between the converter and the horn. It mechanically increases the horn amplitude by some factor. They are typically used in difficult applications or flow-through applications where exposure time is very limited.

Can I process toxins or bio-hazardous materials safely?

Hazardous materials may be safely processed with a sealed atmosphere horn. This device isolates the process sample in a sealed chamber during the entire cycle. It is available with external cooling and is also used in cases where there is need for metric evaluation of reaction components.

How can I process more than 4-500ml of material?

For processing larger volumes or a continuous flow of material, Branson offers flow-through processing cells. These specialized chambers permit the continuous flow of material through a high-density ultrasonic field. Volumes as high as 40 liters per hour can be reached with a single unit. Look at our [Model 910BCA](#).

How do I process very small samples?

The greatest difficulty with processing small samples is providing good horn/sample contact. This can be improved by using a process container with a conical bottom. This increases liquid depth for easier horn tip immersion without increasing liquid volume. The bottom of an Eppendorf cell is often used for this purpose. A 3/32" or 1/8" microtip should be used and care should be exercised to not touch the side of the container with the horn.

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SONIFIER II

Cell Disruptor / Homogenizer

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SONIFIER II

Cell Disruptor / Homogenizer

SONIFIER ACCESSORIES

We offer several accessories to make your Sonifier more efficient and easy to use. To find out more about each accessory, download the PDF datasheet.



You'll need Adobe's free Acrobat Reader to view PDF files. Click the icon to download.

Disruptor Horns

These basic tools are designed to be used with both analog and digital units for a wide variety of general applications. They are available in standard sizes ranging from 3/8" to 1.0."



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(60.8Kb)

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Microtips

These smaller, high-intensity tips are ideal for processing smaller samples in Eppendorf vials or similar vessels. Available in stepped or tapered designs. Sizes range from 1/8" to 5/16"



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(51.3Kb)

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Cup Horns - Standard Intensity

For use with S-450 units only.

These specialized horns permit high intensity sound to be applied to multiple samples without direct horn contact. Units are available in 2.0" and 3.0" diameters.



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(46Kb)

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Cup Horns - High Intensity

For use with S-450 units only.

This 1.0" horn is similar to a standard cup horn but utilizes a parabolic reflector to amplify the sound intensity while producing maximum sound density within the sample.



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Flow-Through Horns

These horns offer the ability to pass a process liquid through an intense energy field within the horn itself. Dual ported horns permit the emulsification of two dissimilar liquids in controlled, continuous proportions.



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(48.4Kb)

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Continuous Flow Chamber

This temperature-controlled chamber permits continuous processing of a flowing liquid through a high-intensity ultrasonic field.



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(73.3Kb)

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Sealed Atmosphere Horns

These specialty horns have been developed to handle noxious or hazardous samples while isolating them from incidental contact or to contain reactants for metric evaluation.



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(54.7Kb)

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Sound Enclosures

These cabinets have been designed to effectively contain operating noise while providing easy access to process samples. Suitable for standard or inverted horn operation.

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PRODUCT BULLETINS FOR SONIFIER CELL DISRUPTION/HOMOGENIZING UNITS

Item #	Description
C119	Sonifier S-250A and S-450A analog-controlled processors
C118	Sonifier S-150D digital 100 watt processor
C103	Sonifier S-250D and S-450D digitally-controlled processors
900-13	Sonifier 910BCA continuous flow high power processor
C109	Disruptor horns
C110	Microtips
C105	Cup horns - standard intensity
C108	Cup horns - high intensity
C111	Flow-through horns
C107	Continuous - flow chambers
C106	Sealed atmosphere horns
C112	Sound enclosures

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If possible, please include any pertinent information, so that we can forward you the correct documentation relative to your Branson equipment.



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C118	Sonifier S-150D digital 100 watt processor
C103	Sonifier S-250D and S-450D digitally-controlled processors
900-13	Sonifier 910BCA continuous flow high power processor
C109	Disruptor horns
C110	Microtips
C105	Cup horns - standard intensity
C108	Cup horns - high intensity
C111	Flow-through horns
C107	Continuous - flow chambers
C106	Sealed atmosphere horns
C112	Sound enclosures

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BRANSON

41 Eagle Road Danbury, CT 06813-1961
(203) 796-0400

The Weather In Danbury

This is a real time report, so you'll always know what to pack or bring.

Danbury, CT
55 °F / 13 °C
Overcast
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Driving Directions from Area Airports

From Kennedy International: Follow signs to Van Wyck Expressway to 678, Whitestone Bridge. After you cross the Whitestone Bridge, continue on Hutchinson River Parkway, to I-684 North towards Brewster. Go East on I-84 towards Danbury and get off I-84 at Exit 8. Go right at the end of the exit ramp and make a right at the second traffic light on Eagle Road. Go 1/2 mile and Branson will be on your right, before a sharp right bend in the road.

From LaGuardia: Follow signs to Grand Central Parkway East to I-678, Whitestone Bridge. After you cross the Whitestone Bridge, continue on Hutchinson River Parkway, to 684 North towards Brewster. Go East on I-84 towards Danbury and get off I-84 at Exit 8. Go right at the end of the exit ramp and make a right at the second traffic light on Eagle Road. Go 1/2 mile and Branson will be on your right, before a sharp right bend in the road.

From Newark Airport: Follow signs to 95 North (New Jersey Turnpike) to George Washington Bridge to 87 North (Major Degan Expwy), to 287 towards White Plains, to I-684 North towards Brewster. Go East on I-84 towards Danbury and get off I-84 at Exit 8. Go right at the end of the exit ramp and make a right at the second traffic light on Eagle Road. Go 1/2 mile and Branson will be on your right, before a sharp right bend in the road.

From Bradley International Airport (Hartford): Follow signs to 84 West and go West on I-84 towards Waterbury/Danbury. Get off I-84 at Exit 8. Go straight at the traffic light at the end of the exit ramp and move left into the middle lane. After you cross over the highway, you will go straight and then make a right at the third traffic light onto Eagle Road. Go 1/2 mile and Branson will be on your right, before a sharp right bend in the road.

Area Hotels

We recommend the following area hotels when coming to visit us. Mention Branson if you are staying at any of the starred (*) hotels to obtain the corporate rate:

Holiday Inn *

80 Newtown Road
Danbury, CT. 06810
203-792-4000

Ramada Inn*

Exit 8, Interstate 84 (I84)
Danbury, CT. 06810
203-792-3800

Best Inns & Suites

78 Federal Road
Danbury, CT. 06810
203-743-6701

Quality Inn*

Route 6 - Newtown Road
Danbury, CT. 06810
203-748-6677

Best Western Berkshire Inn

11 Stony Hill Road
Bethel, CT. 06801
203-744-3200

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SONIFIER® PRODUCTS

The Sonifier ultrasonic cell disruptors are versatile laboratory tools designed to apply high-frequency ultrasonic energy to biological and chemical processing to:

- Disrupt cellular structures
- Homogenize samples
- Emulsify materials
- Disperse or mix compounds
- Accelerate reactions

Sonifiers are able to process static samples from 1 ml to greater than 500 ml or flowing material up to 40l/hr. Analog units are available in two power levels. Digitally-operated units are offered in three power levels and are suggested for applications requiring higher levels of process control or parameter measurement. Click on any photo below to go to that product's page.

Analog Units

Sonifier analog cell disruptors and homogenizers are available in 200 watt (Model S-250A) and 400 watt (Model S-450A) models. These capable units are widely-used in laboratories to facilitate a wide range of biological and chemical processes.





The Model 910BCA is a higher-power unit designed specifically for continuous processing of liquids. It is ideal for in-line emulsification, homogenization, dispersion, or mixing.

Digital Units



The Sonifier S-150D 100 watt digital unit is a full-featured, lower power unit designed to effectively process the smaller samples often associated with genome and other biological research.

The Sonifier S-250D 200 watt and S-450D 400 watt units offer all of the capability of the analog models, plus digital control for precise process control and parameter measurement. They are particularly suitable for larger or more difficult samples.





Click the icons for more information on how to order Sonifier products with a credit card.

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Technical Papers & Case Studies

This file library contains downloadable technical papers and presentations on precision cleaning topics. Click the icon to download the paper of your choice.



Ultrasonic Primer: The theory behind ultrasonic cleaning. (156KB)



In-tank Rotation: How do you clean tightly packed parts? (3.61MB)



The Art Of Rinsing: Washing is just one step towards getting it clean. (333KB)



Cleaning Wire & Rod: In-line aqueous systems can get the job done. (576KB)



The Ultrasonic Advantage: Benefits and logic behind using ultrasonic cleaning. (73.3KB)



Optimizing Your Ultrasonic Cleaner: Getting the best results from your benchtop cleaner. (134KB)



The Impact of Ultrasonic Cleaning on Particle Removal: The particulars of preparing parts for their end use. (1MB)



Cleaning News #1 / Mold Cleaning: Clean injection molds without damage and with aqueous chemistry (524KB)



Cleaning News #2 / Compact Disk Cleaning: Cleaning glass master disks; aqueous chemistry and solvent drying (576KB)



Cleaning News #3 / Plating: Cleaning in the plating line (660KB)



Cleaning News #4 / Choosing the Right Cleaning Chemistry (1.43MB)



Cleaning News #5 / Circuit Board Cleaning: Cleaning with solvent-alternative chemistries (1.30KB)



Cleaning News #6 / Aqueous Degreasing of Metal Parts (1.39KB)



Cleaning News #7 / Ultrasonic Cleaning of Aircraft Parts (1.31KB)



Cleaning News #8 / Precision Cleaning of Disk Drive Components (1.19KB)



Cleaning News #9 / Cleaning Ceramic Latex Molds (859KB)



Cleaning News #10 / Optical Lens Cleaning (911KB)



Cleaning News #11 / Vapor Degreasing Emissions (814KB)



Cleaning News #12 / Key Elements of Rinsing: a light version of Art of Rinsing (667KB)



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PRODUCT BULLETINS FOR AQUEOUS ULTRASONIC CLEANING EQUIPMENT

Item #	Description
MU 001	Magnapak Magnetostrictive Ultrasonics - High Power 20 kHz Cleaning. Four-page bulletin describes Magnapak line of equipment.
MU 004	Magnapak Magnetostrictive Ultrasonics - Cylsonic Ultrasonic Cleaning Equipment. Bulletin describes aqueous ultrasonic high-speed cleaning equipment for wires, rods, and cables.
MU 005	Magnapak Magnetostrictive Ultrasonics - Magnapak Tanks and Magnatrak Generator. Six-page bulletin describes T-Series transducerized tanks, FlexLine systems, Magnatrak generators, and Magnapak transducers.
MU 123	Magnapak Magnetostrictive Ultrasonics - Ultrasonic Transducers & Magnatrak Generator. Describes Immersible ultrasonic transducers and generators for production cleaning systems. Easily rearranged and reconfigured, these components provide flexibility for the user.
S-1015	OMNI 2000 Cleaning System, Model 1012. A compact, fully-configured aqueous cleaning, rinsing, and drying system, that minimizes floor space needs. Tank sizes are 10" x 12" x 10" deep.
S-1024A	OMNI 2000 Cleaning System, Model 1620. A compact, fully-configured aqueous cleaning, rinsing, and drying system, that minimizes floor space needs. Tank sizes are 16" x 20" x 16" deep. Has rust inhibiting option.
S-1014	FlexLine Cleaning and Rinsing Tanks. A cost-effective industrial product for aqueous ultrasonic cleaning and rinsing parts. Offers flexibility in tank arrangement. Available in two sizes.
S-1025	FlexLine Dryers. Bench-mountable recirculating hot air dryers. May be installed in a bench or contained separately as the final step in aqueous or semi-aqueous cleaning system.
S-1028	Benchmark Precision Cleaning Systems. Aqueous/semi-aqueous system, environmentally safe systems minimize impact on environment. Custom system from standard components, in any combination of cleaning, rinsing, drying modules.
S-1029	Benchmark Precision Rinse Modules. Three standard types of rinse tanks - modular rinse, 4-way overflow, and modular spray rinse.
S-1034	Benchmark High Performance Hot Air Dryer. A self-contained unit utilizing evaporation and recirculated hot air.
S-1035	Aquafier Water Purification System. An economical closed-loop treatment system that recycles rinsewater from various cleaning processes.
S-1032	Coalescing System. Self-contained systems to separate oil from water or other immiscible fluids by coalescing and gravity separation.
S-1043	S8300/CH Tanks. Information on Series 8300 Ultrasonic Power Supplies and C/CH Series Transducerized Cleaning Tanks.

S-1044	Series 8500 Advanced Ultrasonic Cleaning Power Supply Data Sheet. Full-featured units with selectable sweep frequency, line/load regulations, auto tuning, power modulation, and many other advanced features.
S-1045	S8300/Immersible Transducers. Information on Series 8300 Ultrasonic Power Supplies and Immersible Transducers for adding Ultrasonics to existing tanks.
S-1057	S8500 High Frequency Ultrasonic Generators offer a full range of features to meet all precision cleaning requirements.

PRODUCT BULLETINS FOR SOLVENT ULTRASONIC CLEANING EQUIPMENT

Item #	Description
S-1067	B Series Ultrasonic Vapor Degreasers. The B Series degreasers are fully-configured, environmentally sound, ultrasonic vapor degreaser with on-board primary and sub-zero cooling packages.
S-999A	Model BTC-200 Industrial Vapor Degreaser. Provides specifications and dimensions for bench-top industrial vapor degreaser.
S-1037A	LED Series, Low Emission Degreaser. A state-of-the-art solvent cleaning machine incorporating the latest in emission control technology.
S-1061	B-452R Ultrasonic Vapor Degreaser. An environmentally sound, cost-effective degreaser ideal for use with most solvents.

PRODUCT BULLETINS FOR HANDLING EQUIPMENT

Item #	Description
S-993	TDR-15 Data Sheet. Provides specifications and dimensions for TDR-15 that can process loads of 33 lbs. (15 kg).
S-994	TDR-50 Data Sheet. Provides specifications and dimensions for TDR-50 that can process loads of 110 lbs. (50 kg).
S-1040	Standard Cleaning Baskets. Provides specifications and dimensions on standard baskets with three mesh sizes.

TECHNICAL APPLICATION REPORTS

Item #	Description
CN-1	Cleaning News #1 - Marketing Brief: Plastic Injection Mold Cleaning.
S-997	Cleaning News #2 - Marketing Brief: Cleaning Compact Disc Masters.
S-998	Cleaning News #3 - Marketing Brief: Ultrasonic Cleaning in the Plating Line.

S-1001	Cleaning News #4 - Choosing the Right Cleaning Chemistry.
S-1003	Cleaning News #5 - Application Brief: Cleaning Printed Circuit Boards with Solvent-Alternative Chemistries.
S-1006	Cleaning News #6 - Application Brief: Aqueous Degreasing of Metal Parts.
S-1010	Cleaning News #7 - Marketing Brief: Ultrasonic Cleaning of Aircraft Components.
S-1013	Cleaning News #8 - Application Brief: Precision Cleaning of Disk Drive Components.
S-1017	Cleaning News #9 - Application Brief: Cleaning Ceramic Latex Molds.
S-1018	Cleaning News #10 - Application Brief: Optical Lens Cleaning.
S-1041	Cleaning News #11 - Technical Brief: Vapor Degreasing Emissions.
S-1042	Cleaning News #12 - Technical Brief: Key Elements of Rinsing.

Can't find what you need? It may be available! E-mail us at [Industrial Info](#) for more information.

If possible, please include any pertinent information,
so that we can forward you the correct documentation relative to your Branson equipment.



You'll need Adobe's free Acrobat Reader to view PDF files. Click the icon to download.

BRANSON'S APPLICATION LABORATORY Precision Cleaning Evaluations

Branson has maintained a professionally-staffed, on-site Application Laboratory for over 30 years. During this period, we have detailed **over 4000** specific cleaning applications. This information is available to you through our sales engineers. Chances are we have experience with cleaning just like yours!



Applications Assistance

We take your application and your business seriously. Our Application Laboratory will clean your parts, recommend a chemistry, a process, and a cleaning system and guarantee that it will work in your plant - ***in writing*** ! Only Branson can offer a full range of aqueous and solvent equipment - from tabletop size through large systems and custom units.

[ON-LINE APPLICATIONS ASSISTANCE](#)

[Gen 8500HF](#) | [Gen 8500](#) | [Gen 8300](#) | [Gen G1KA](#)
[Tanks](#) | [Tranducers](#) | [Aqueous Products](#) | [Solvent Products](#)
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BRANSON ULTRASONICS CORPORATION
Precision Processing Division

INDUSTRIAL WARRANTY STATEMENT

Equipment

When used in accordance with written instructions and under normal operating conditions, Branson manufactured products are guaranteed to be free from defects in material and workmanship for ONE YEAR. In addition, Branson Series 8000 Power Supplies are guaranteed for TWO YEARS. Transducer elements and their bond are guaranteed for the LIFETIME of the radiating surface when used in accordance with manufacturer's instructions. All guarantees are from the date of invoice.

This warranty *shall not* apply to the following:

- Cavitation erosion of tank or immersible transducer surfaces, which is process related and a normal occurrence in the operation of an ultrasonic cleaning system.
- Equipment subjected to misuse, improper installation, alteration, neglect, or accident.

Any equipment which proves defective during the stated period will be repaired or replaced at the sole discretion of Branson, F.O.B. Danbury, CT, or other repair depot as specified by Branson.

Process

Branson will guarantee any process developed in their applications laboratory for ninety days following the installation of recommended Branson equipment when the following stipulations are met:

- The customer must supply a sufficient quantity of parts with soils representative of the parts to be cleaned in production.
- A sample of those parts will be labeled and sealed.
- The balance of the customer-supplied parts will be cleaned using a process developed and recommended by Branson.

- **Cleanliness levels will be determined by a methodology agreed upon by Branson and its customer.**
- **A sample of the cleaned parts will be labeled and sealed as representative of the recommended process.**

Branson guarantees, in accordance with the above, that parts received into the Branson precision cleaning system with the same level and condition of soil as the laboratory and subjected to the recommended process will be cleaned to the same level as that demonstrated in the laboratory.

Should the equipment or process fail to meet the agreed upon level of cleanliness, Branson will be afforded a reasonable time to remedy the problem. Following that period, the customer will have the right to return the equipment in accordance with normal return policies.

Branson's liability, whether based on warranty, negligence, or other cause, shall not in any case exceed the cost of the equipment. In no case shall Branson be responsible for any consequential damages arising out of commercial loss.

This warranty is limited to the original purchaser and is not transferable. It is intended as a general overview of the product's specific warranty, which appears in its complete form in the product operating manual. No warranties expressed or implied have been made other than those stated herein. SELLER DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Contact Branson Representatives

Worldwide Headquarters

Branson Ultrasonics Corp.

41 Eagle Rd.

Danbury, CT 06813

PH: 203-796-2298

FAX: 203-796-0320

Email: info@bransoncleaning.com

[Driving Directions to Branson's Headquarters](#)



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This is a JAVA script function and requires a **version 4** browser from MS or Netscape

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OEM SUPPORT

Branson Ultrasonics Corporation

Jeff Hilgert

41 Eagle Road

Danbury, CT 06813

203-796-0461

jhilgert@bransonultrasonics.com

NORTH AMERICA

Includes Canada and Mexico

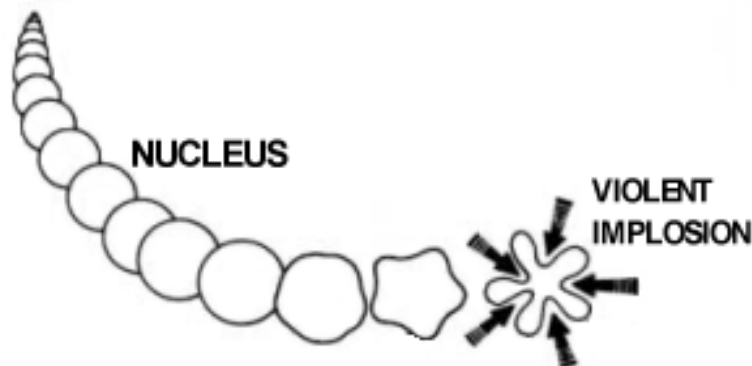
INTERNATIONAL

ULTRASONIC CLEANING PRIMER

THEORY OF ULTRASONICS

Ultrasonic cleaning depends upon cavitation, the rapid formation and violent collapse of minute bubbles or cavities in a cleaning liquid. This agitation by countless small and intense imploding bubbles creates a highly effective scrubbing of both exposed and hidden surfaces of parts immersed in the cleaning solution. As the frequency increases, the number of these cavities also increases but the energy released by each cavity decreases making higher frequencies ideal for small particle removal without substrate damage.

Growth and collapse (implosion) of a cavitation vacuum bubble



Cavitation is produced by introducing high frequency (ultrasonic), high intensity sound waves into a liquid. Consequently, the three essential components of any ultrasonic cleaning system are: a tank to contain the cleaning liquid, a transducer to convert electrical energy into mechanical energy, and an ultrasonic generator to produce a high frequency electrical signal.

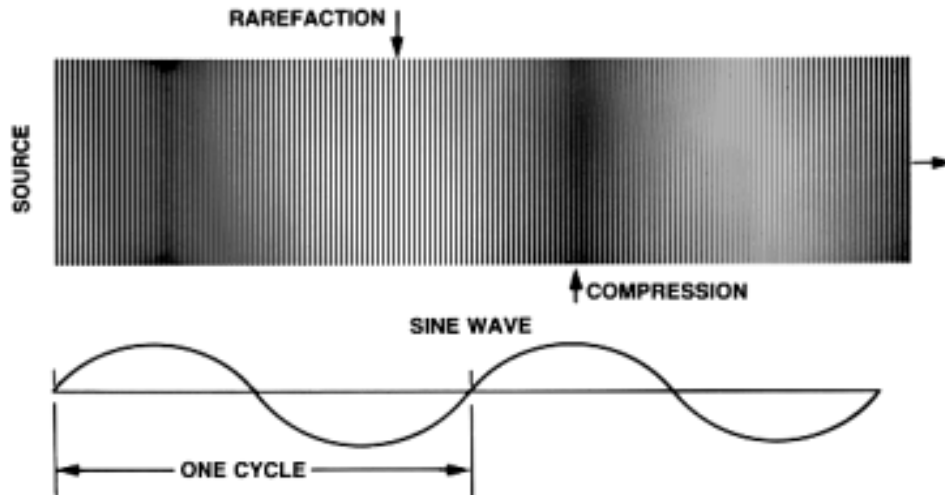
TRANSDUCERS AND GENERATORS

The heart of any ultrasonic cleaning system is the transducer. At the present time, the two types of transducers offered are magnetostrictive, made of nickel or its alloys, and electrostrictive, made of lead zirconate titanate or other ceramics. Electrostrictive materials change their physical dimensions when placed in an electrical field of varying voltage. This is known as the "piezoelectric effect." Magnetostrictive transducers are made of materials which change dimensions in a varying magnetic field.

Regardless of the type of transducer, the common, but primary factor, is the intensity of cavitation produced. Ultrasonic energy, like any sound wave, is a series of pressure

points, or rather a series of compressions and rarefactions (see figure below). If the sound energy is of sufficient intensity, the liquid will actually be pulled apart at the rarefaction stage and small bubbles or cavities will be formed. With the following compression stages, the bubbles collapse or implode throughout the liquid, creating an extremely effective force which is uniquely suited to cleaning. This is the process known as cavitation.

Compression and rarefaction cycles of a sound wave



From theoretical considerations, it has been estimated that a pressure of more than 10,000 psi and a temperature greater than 20,000° F can exist within the collapsing bubble, and shock waves radiate in all directions at the instant of collapse. The energy released from a single cavitation bubble is extremely small, but many millions of bubbles collapse every second. Cumulatively, the effect is very intense and produces on the surface of the workpiece the intense scrubbing action which is characteristic of all ultrasonic cleaning.

Cavitation occurs throughout the liquid if the energy intensity is sufficient, and it is for this reason that ultrasonics can effectively clean holes and small crevices. It also accelerates chemical reactions and the rate at which surface films are dissolved.

Cavitation only occurs when the local pressure in the liquid is reduced to a value less than its vapor pressure. The amplitude (power) of the ultrasonic waves generated by the transducer must be great enough to satisfy this condition. The minimum amount of power necessary to initiate cavitation is referred to as the threshold of cavitation. Different liquids will have different thresholds, but the thresholds must be exceeded to achieve ultrasonic cleaning. It is only the ultrasonic energy above the threshold that is contributing to the formation of cavitation bubbles and to ultrasonic cleaning.

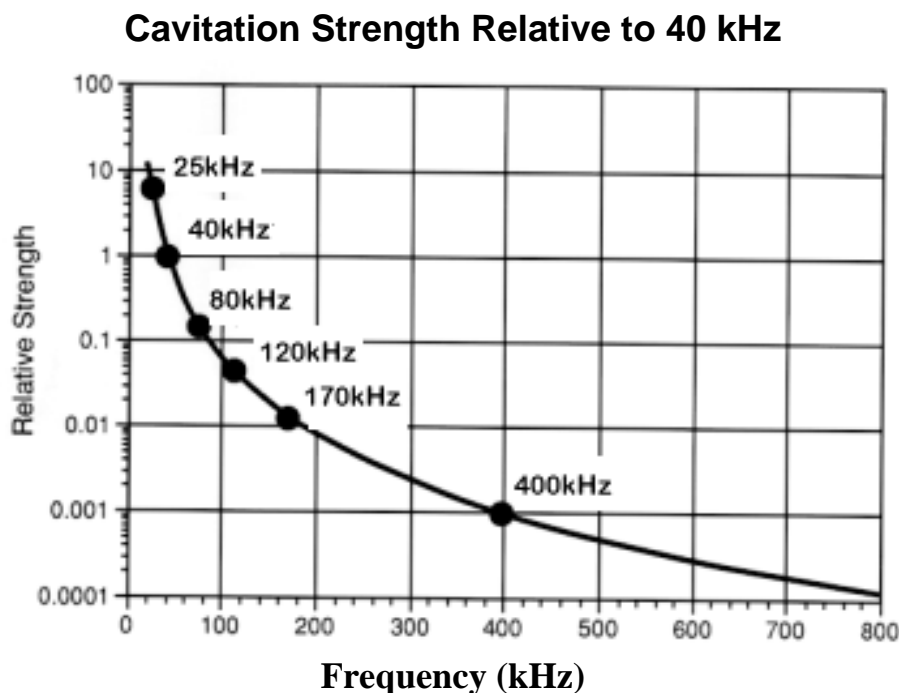
Increases in ultrasonic energy above the threshold level will result in increases in cleaning up to a certain point. There is a level beyond which the liquid will be incapable of accepting increases in power and, at this point, the cavitation near the transducer radiating face will be of such violence as to cause the liquid carrier to become elastic, thus either reducing or eliminating further transmission of energy into the liquid. This effect is

known as surface cavitation.

At the other end of the scale, there is a certain threshold below which cavitation will not occur. A minimum amount of power is required to cause cavitation. Once cavitation occurs, the power level can actually be reduced below this threshold and still maintain cavitation. The useful range with which we are concerned in ultrasonic cleaning is, thus, between the point at which surface cavitation occurs and the point to which energy may be reduced and still maintain cavitation. The sonic range over which cavitation can exist between threshold and maximum is usually separated by no more than a ratio of 2 or 3 to 1. For example, a tank having only a small amount of liquid over the transducer will be subject to surface cavitation at very low levels; a very deep tank or one that is heavily loaded with parts will take a much higher level of power to cause surface cavitation and will, in fact, require a much higher level of power to cause effective cleaning.

IMPORTANCE OF THE FREQUENCY

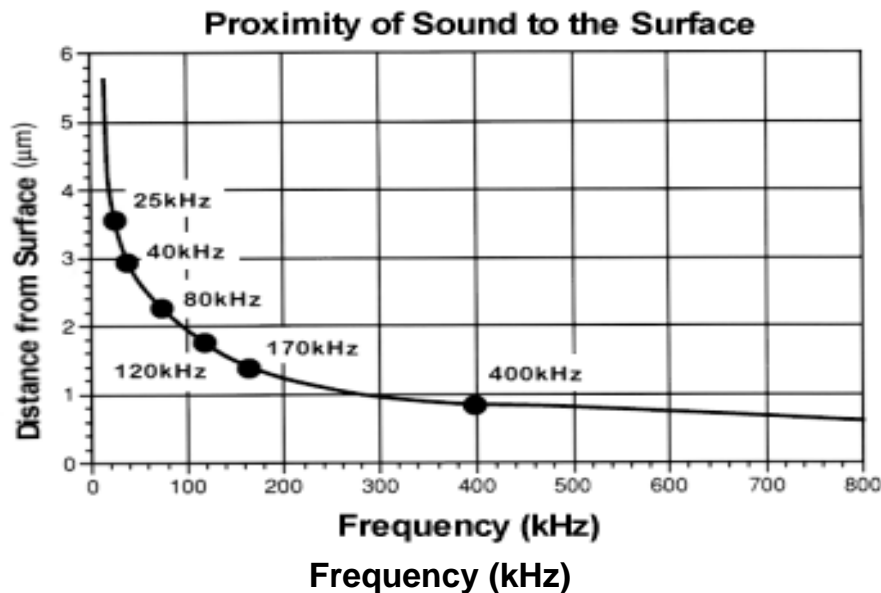
If the operating frequency is low (within the audible range) noise becomes a problem. As the equipment frequency drops below 20 kHz, operating noise not only becomes substantial but may exceed maximum safe limits as specified by the Occupational Safety and Health Act, or other regulatory measures. Lower frequencies from 20 kHz to 30 kHz are generally chosen for difficult applications where higher power levels are needed to remove soils and damage to the parts is not a problem. They are most often used for large or heavy parts or loads of smaller parts which form a dense mass. Branson offers 20 kHz magnetostrictive units and 25 kHz piezoelectric units.



Higher frequencies are more often used to clean smaller, more delicate parts or in circumstances where small particles must be removed. The higher frequencies are also used in applications where damage to the part itself may be a problem. Several factors

can contribute to improved performance at higher frequencies. The number of cavities increases linearly with an increase in frequency producing a more intense scrubbing action that is capable of reaching into smaller geometries. If power is held constant, the size and therefore the energy contained in each cavity, is reduced. This effectively minimizes the risk of substrate damage. Higher frequencies also have the advantage of reducing the viscous boundary layer (Bernoulli effect) allowing the ultrasonics to "see" smaller particles. This is like lowering the water level in a stream so smaller stones can be seen.

Proximity of Sound to the Surface



Branson offers a wide range of intermediate frequencies including 40 kHz, 80 kHz, 120 kHz and 170 kHz. For extremely small particles. Frequencies above 350 kHz are generally chosen. Branson currently offers a MicroCoustics system at 400 kHz for these precision applications.

WHY AN ULTRASONIC SYSTEM?

The recognized advantages of ultrasonic cleaning are:

- PRECISION** Because ultrasonic energy penetrates into crevices and cavities, any type of part or assembly can be cleaned. In many cases ultrasonic cleaning is the only way to meet specifications, as in the cleaning of precision parts or assemblies.
- SPEED** Ultrasonic cleaning is faster than any conventional cleaning method in the removal of soil and contamination from parts. Entire assemblies can be cleaned without disassembly. Often, its labor saving advantages make ultrasonics the most economical way of cleaning.

CONSISTENCY Unlike manual cleaning, ultrasonics offers unmatched cleaning consistency, whether pieces to be cleaned are large or small, simple or complex, handled singly, in batches, or in an automated line.

SELECTING A CLEANING PROCESS and CLEANING SOLUTIONS

Before a cleaning system is purchased, the parts to be cleaned should be submitted for an application analysis where:

1. The materials of construction, configuration, and quantity of the parts to be cleaned are identified.
2. The soils to be removed are identified and analyzed.
3. The cleaning approach to be used, either aqueous or solvent, is determined and trials undertaken.

Only then can an appropriate ultrasonic cleaning system, designed for the cleaning process and the cleaning solution, be provided.

CHOOSING A CHEMISTRY

While all of a liquid's physical properties will have an effect on ultrasonic cleaning, the effects of vapor pressure, surface tension, viscosity, and density are the most pronounced. Since temperature influences these properties, it also has influence on the effectiveness of cavitation.

Considering the effects of these four key physical properties on cavitation, studies have shown that high density, low viscosity, and middle range surface tension and vapor pressure are the ideal conditions for most intense cavitation. Due to temperature effects on these four physical properties, the most intense cavitation will be considerably below the liquid's boiling point, but not so low as to get into the adverse regions of too low vapor pressure or too high surface tension. Different liquids will have different temperatures at which cavitation intensity will be the greatest because of the difference in physical properties and their rate change in temperatures. Thus the cavitation intensity will be less either below or above this ideal temperature.

Any cleaning system should be designed for use with the cleaning solution. Aqueous systems usually consist of open tanks in which the parts to be cleaned are immersed. A complex system may consist of several tanks, incorporating recirculating pump and filter systems, rinse and drying stages, and other accessories.

Systems designed for use with solvents, often ultrasonic vapor degreasers, usually incorporate means for continuously reclaiming contaminated solvent. Ultrasonic vapor

degreasing is accomplished in an integrated multiple-compartment system consisting of boiling solvent sumps and ultrasonic rinse sumps. The combination of warm solvent vapors and ultrasonic agitation thoroughly removes oil, grease, wax and other solvent-soluble soils. The parts emerge from the cleaning process warm, clean and dry.

In selecting the cleaning solution, three factors should be considered:

1. **Effectiveness:** In choosing the most effective cleaning solution, experimentation may be necessary. Where ultrasonics is being applied to an existing application, it is probable that the solution presently being used can remain unchanged.
2. **Simplicity of use:** Liquids should be judged for safety, simplicity of use, and longevity.
3. **Cost:** The least expensive cleaning solution is not necessarily the least costly to use. Consideration must be given to its effectiveness, safety, and the number of parts processed with a given amount of solution. Naturally, the cleaning solution must be compatible with the materials to be cleaned as well as effective in removing the soils. Water is one of the most common cleaning liquids and, invariably, systems using aqueous-based solutions are simple to handle, have low operating costs, and are effective over a wide range of applications. There are some materials and soils, however, for which aqueous solutions are not particularly suitable and, to deal with these, there is a wide range of solvents available.

PARTS HANDLING

Another factor in ultrasonic cleaning concerns the loading of parts or the design of the basket or containers for holding the parts. The loading of parts in the ultrasonic cleaning tank should be such that neither the parts nor the basket are on the tank bottom. The sum of the parts' cross-sectional areas should not exceed 70% of the tank's cross-sectional area. Elastomers and non-rigid plastics will absorb ultrasonic energy and should be used cautiously for fixturing. Insulated parts may have to be specifically oriented. Incorrect basket design, or a basket having too high a mass, can greatly reduce the effectiveness of the best ultrasonic cleaning system. Any material more tightly woven than 50 mesh screen acts as a solid, while slightly larger openings scatter the ultrasonic waves. Openings larger than one-quarter inch tend to act as open material. Hooks, racks, and beakers can also be used to support parts.

[Back to Products & Services Selection](#)



INDUSTRIAL AQUEOUS PRODUCTS

ULTRASONIC GENERATORS [GO](#)

Branson's ultrasonic generators offer a full range of features to meet any precision cleaning requirements. Used on a simple cleaning tank or in a fully integrated cleaning system, all will deliver precise cleaning quickly, consistently and cost effectively.

ULTRASONIC TANKS [GO](#)

Branson's ultrasonic tanks provide versatile ways to meet localized cleaning needs in a variety of industrial settings. The eight standard sizes range from 5 to 80 gallon capacities. This selection is supplemented by our fabricating capability for custom sizes.

IMMERSIBLE TRANSDUCER [GO](#)

Branson's hermetically sealed immersible ultrasonic transducers are available in two standard sizes and four mounting configurations. This allows for maximum versatility of transducer placement on tank walls or bottom to optimize cleaning. Available in custom sizes, frequency ranges from 20 kHz to 170 kHz.

OMNI 2000 SERIES

[OMNI 2000 - 1012](#) [GO](#)

[OMNI 2000 - 1620](#) [GO](#)

The Branson OMNI Cleaning System is a fully-configured ultrasonic cleaning and rinsing system with a built-in dryers. All controls are mounted in a convenient control box and operate at 24 volts for safety.

FLEXLINE TANKS

[FLEXLINE - 1216](#) [GO](#)

[FLEXLINE - 2024](#) [GO](#)

The basic component of the Branson FlexLine Series is a standard 316 stainless steel tank with protective skirting. The base tank can be configured for a variety of applications.

BENCHMARK WASH/RINSE CONSOLES [GO](#)

The Branson Benchmark Series modular cleaning systems can incorporate virtually any combination of state-of-the-art ultrasonic generators, cleaning tanks, rinsing tanks, and drying modules.

BENCHMARK DRYERS [GO](#)

Branson Benchmark Series dryers are high performance high volume forced hot air dryers. They are unmatched in efficiency and are an integral part of our Benchmark series and they are required when accelerated drying is necessary to meet production volume.

PRODUCT HANDLING ROBOTS [GO](#)

The Branson TDR Series two-dimensional robots are micro-processor based automated parts handling systems. These systems are ruggedly constructed for use in either production or clean room environments.

COALESCING SYSTEM

The Branson Coalescer is one of a series of environmentally sound, cost effective waste and water treatment products. This compact, fully-configured industrial chemistry treatment system is designed to separate oily soils from cleaning solutions, thereby extending their useful life.

AQUAFIER WATER PURIFICATION

The Branson Aquafier is another of our environmentally sound, cost effective waste and water treatment products. This compact, fully-configured industrial water purification system incorporates all of the elements necessary to produce high quality rinse water at rates up to 5 gpm.

[Back to Products & Services Selection](#)

INDUSTRIAL SOLVENT PRODUCTS

[ABOUT SOLVENT CLEANING](#)

[BTC 200 ULTRASONIC VAPOR DEGREASER](#)

The BTC-200 is a compact ultrasonic vapor degreaser which incorporates many of the environmental, control, and safety features found on larger units. Its 8"x10" processing sumps are ideal for light production or process development.

[B SERIES ULTRASONIC VAPOR DEGREASER](#)

The B Series degreasers are fully-configured, environmentally sound, ultrasonic vapor degreaser with on-board primary and sub-zero cooling packages. There are four sizes available from 10"x12" to 20"x24" allowing you to choose the appropriate size to meet your process needs.

[LED LOW EMISSIONS DEGREASER](#)

The LED Series low emissions degreasers are available in three sizes. They incorporate a number of leading-edge technologies to improve productivity and performance. Key among these are the patented conductive dry (superheat), welded plumbing and unique bi-parting cover.

[PRODUCT HANDLING ROBOTS](#)

The Branson TDR Series two-dimensional robots are micro-processor based automated parts handling systems. These systems are ruggedly constructed for use in either production or clean room environments.

[About](#) | [BTC 200](#) | [B SERIES](#) | [LED](#) | [Robots](#)

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CONCENTRATED CLEANING CHEMISTRIES

Branson offers a complete line of cleaning chemistries for many applications and most are concentrated and offered in quarts, gallons, 5 gallon pails and 55 gallon drums. Following is a list of available chemistries and included with each cleaner description are links for downloading PDF (Acrobat) document files. One file is literature, detailing the compositions and action of the cleaner, the other is the **Material Safety Data Sheet (MSDS)**.



Scroll down the page for additional chemistry information.

The Effects of Solutions on Common Metals:

Solution	Steel	Brass	Aluminum	Magnesium	Zinc	Stainless Steel	Tin
OC Optical	none	none	none	none**	none	none	none**
JC Jewelry	none	none	none	none	none	none	none
BC Buffing Compound	none	slight stain	none	none	attacks	none	none
OR Oxide Remover	slight etch	none	slight attack	attacks	attacks	none	none
EC Electronics Cleaner	none	none	slight attack	none	none	none	none
GP General Purpose Liquid	none	none	slight attack	none	none	none	none

GP Powder	none	none	none	none	none	none	none
IS Industrial Strength	none	none	slight attack	none	none	none	none
MC-1 Metal Cleaner	none	none	none	none	none	none	none
MC-2 Metal Cleaner	none	none	slight attack	none	none	none	none
MC-3 Metal Cleaner	none	none	none	none	none	none	none
LRS Liquid Rust Stripper	none	none	attacks*	attacks	attacks	none	slight attack

* *WARNING: Free hydrogen may be released if solution comes in contact with reactive metals.*

** *No effect is solution temperature is less than 140 degrees Fahrenheit.*

Solution concentrations may vary. The amount used depends on the particular solution and the type of soil to be removed. Follow the instructions on the solution container.

Chemistry Information

OC - OPTICAL CLEANER

Alkaline, non-foaming, liquid detergent formula for the optical, glass and lens manufacturing industry. Removes general soils, fingerprints, cerium oxide, pitch, and blocking waxes from optical lenses. It is very effective in removing polishing compounds from glass and optical surfaces prior to deposition of coatings.

Part Number	Size	Per Case
100-955-722	Quart	12
100-955-726	Gallon	4
100-955-724	5 Gal. Pail	1
100-955-728	55 Gal. Drum	-

[\[OC LITERATURE.PDF\]](#) [\[OC MSDS.PDF\]](#)

JC - JEWELRY CLEANER

Biodegradable, phosphate-free alkaline cleaner for cleaning jewelry and precious metals. Removes general soils, particulates, fingerprints, oils, and oxides that accumulate with normal use. Gemstones and precious metals alike are quickly and safely restored to their original brilliance with this free-rinsing solution.

Part Number	Size	Per Case
000-955-214	Quart	12
000-955-216	Gallon	4

[\[JC LITERATURE.PDF\]](#) [\[JC MSDS.PDF\]](#)

BC - BUFFING COMPOUND

Biodegradable, phosphate-and caustic-free cleaner developed for removing buffing compound. - A blend of non-ionic surfactants, detergents, and emulsifiers, designed to remove the most difficult buffing compounds and polishing agents. Nonviscous liquid rapidly removes tripoli, rouge, lime, diamond tripoli, etc. from buffed components, and rinses freely and quickly.

Part Number	Size	Per Case
000-955-314	Quart	12
000-955-316	Gallon	4
000-955-307	5 Gal. Pail	1
000-955-318	55 Gal. Drum	-

[\[BC LITERATURE.PDF\]](#) [\[BC MSDS.PDF\]](#)

OR - OXIDE REMOVER

Blend of detergents and acidic chemistries which is both phosphate-free and biodegradable. Rapidly removes rust and oxides from all metals. It is used in cleaning and reconditioning materials and components requiring removal of oxides that result from storage or assembly operations.

Part Number	Size	Per Case
000-955-514	Quart	12
000-955-516	Gallon	4
000-955-518	55 Gal. Drum	-

[\[OR LITERATURE.PDF\]](#) [\[OR MSDS.PDF\]](#)

EC - ELECTRONICS CLEANER

Biodegradable, phosphate and caustic free alkaline cleaner formulated for electronic industrial use. Formulated to remove light oils, rosins, fluxes and other soils from surfaces normally encountered in the electronic, plating, and other related industries. Applications include: Cleaning during manufacturing assembly of infrared detectors, cleaning electrical contacts and leads, and cleaning ceramic insulators and component. Whether cleaning through -hole or surface mount printed circuit boards, Branson EC does the job effectively and economically.

Part Number	Size	Per Case
100-955-920	Quart	12
100-955-914	Gallon	4
100-955-916	5 Gal. Pail	1
100-955-918	55 Gal. Drum	-

[\[EC LITERATURE.PDF\]](#) [\[EC MSDS.PDF\]](#)

GP - GENERAL PURPOSE - LIQUID

Biodegradable caustic-free alkaline cleaner. Removes general soils, fingerprints, dust, packaging particulates, and light oils and greases from components in general manufacturing areas, instrument shops, telecommunications applications, and other light industrial manufacturing and fabricating facilities.

Part Number	Size	Per Case
000-955-014	Quart	12
000-955-016	Gallon	4
000-955-009	55 Gal. Drum	-

[\[GPL LITERATURE.PDF\]](#) [\[GPL MSDS.PDF\]](#)

GP POWDER - GENERAL PURPOSE POWDER

Branson GP Powder is a high performance heavy duty ultrasonic cleaning compound in convenient powder form. It is biodegradable and caustic-free. Branson GP Powder remover fingerprints, dust, packaging particulate, oils and light greases, and other soils typically found in industrial manufacturing and assembly facilities. It is safe on all metals including aluminum and magnesium if rinsed promptly as well as glass, plastic and other hard substrates.

Part Number	Size	Per Case
CPN-955-007	2 lb. Containers	3

[\[GPP LITERATURE.PDF\]](#) [\[GPP MSDS.PDF\]](#)

IS - INDUSTRIAL STRENGTH

Biodegradable phosphate and caustic-free alkaline cleaner for heavy industrial use. Removes grease, oils, and particulates automotive, aircraft, and similar mechanical components; oils and lubricants from machined parts and stampings in machine and metalworking shops. It is often used by chemical plants, petrochemical refineries, appliance factories, telecommunications equipment producers, printing plants, and other industrial manufacturing and fabricating facilities.

Part Number	Size	Per Case
000-955-114	Quart	12
000-955-116	Gallon	4
000-955-107	5 Gal. Pail	1
000-955-109	55 Gal. Drum	-

[\[IS LITERATURE.PDF\]](#) [\[IS MSDS.PDF\]](#)

MC-1 METAL CLEANER

Biodegradable, phosphate and caustic free alkaline cleaner formulated for heavy duty industrial use. Removes oils, greases and a wide variety of soils from aluminum and aluminum alloys as well as copper, brass, and steel substrates. Effective in removing stamping and cutting lubricants, and light polishing media. MC-1 displaces soils and floats them to the surface for easy removal with a skimmer.

Part Number	Size	Per Case
100-955-830	Quart	12
100-955-824	Gallon	4
100-955-826	5 Gal. Pail	1
100-955-828	55 Gal. Drum	-

[\[MC-1 LITERATURE.PDF\]](#) [\[MC-1 MSDS.PDF\]](#)

MC - 2 METAL CLEANER

Biodegradable, phosphate and caustic free alkaline cleaner formulated for general purpose and normal maintenance cleaning applications. Removes oils, greases and a wide variety of soils from steel alloys, titanium alloys, copper, copper alloys and stainless steel (not recommended for aluminum or aluminum alloys). Effective in removing stamping and cutting lubricants and light polishing media. MC-2 is an emulsifying cleaner which holds soils in suspension preventing redeposition on clean parts.

Part Number	Size	Per Case
100-955-840	Quart	12
100-955-834	Gallon	4
100-955-836	5 Gal. Pail	1
100-955-838	55 Gal. Drum	-

[\[MC-2 LITERATURE.PDF\]](#) [\[MC-2 MSDS.PDF\]](#)

MC - 3 METAL CLEANER

Biodegradable, phosphate and caustic free alkaline cleaner formulated for general purpose and normal maintenance cleaning applications. Removes oils, grease and a wide variety of soils from steel alloys, titanium alloys, copper, copper alloys and stainless steel.. MC-3 is specially-formulated for effective cleaning of active metals like aluminum and aluminum alloys without risk of damage.

Part Number	Size	Per Case
100-955-850	Quart	12
100-955-844	Gallon	4
100-955-846	5 Gal. Pail	1
100-955-848	55 Gal. Drum	-

[\[MC-3 LITERATURE.PDF\]](#) [\[MC-3 MSDS.PDF\]](#)

LRS - LIQUID RUST STRIPPER

Powdered Concentrate is a phosphate-free, highly-alkaline cleaner formulated for heavy-duty cleaning and rust removal. A special blend of free caustic alkaline salt and a special wetting agent ensures maximum cleaning performance in the most difficult tasks. Used for derusting and descaling of ferrous metals, paint stripping, degreasing, mold cleaning, and heavy-duty cleaning in the metals, petroleum, food, and transportation industries. Heavy greases, oils, and carbonaceous soils are readily removed from internal combustion engine parts and components. Light to medium scale can be removed from titanium.

Part Number	Size	Per Case
CPN-955-008	Quart	12
CPN-955-003	Gallon	4
CPN-955-002	5 Gal. Pail	1
CPN-955-004	55 Gal. Drum	-

[\[LRS LITERATURE.PDF\]](#) [\[LRS MSDS.PDF\]](#)

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SPECIAL PRODUCTS

CYLSONIC WIRE/STRIP CLEANING

Are you still cleaning wire by wiping it? Improve your current wire-cleaning process and overall productivity by investigating this system.

WF3-16 INLINE WIRE CLEANING

Chances are, this multi-purpose unit operates more efficiently than your current process. Remove soaps, oxides, and surface debris after drawing, annealing, and before coating.

PENTAGONAL INLINE LIQUID PROCESSOR

Do you process liquids in a continuous flow environment? This unit can help speed up degassing, disintegration, dispersion, mixing, emulsification, or extraction. Transducers on each side of the process tube ensure uniform ultrasonic activity.

pH1 & pH2 TRANSDUCERS

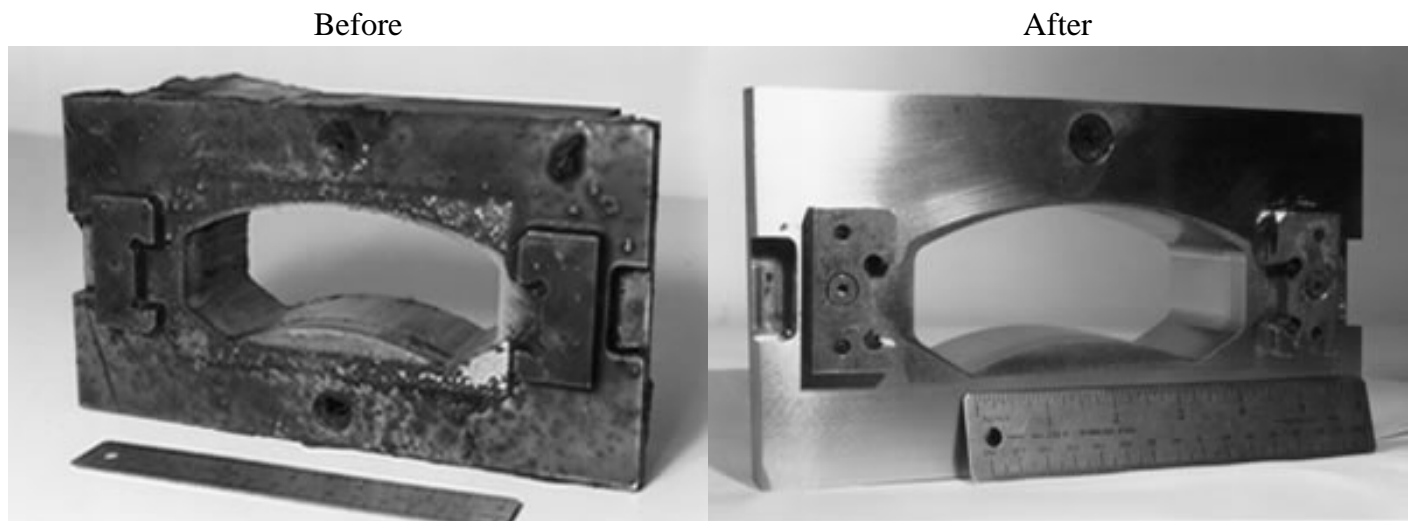
Need to strip debris from sensors and other compact products? The pH1 assures maximum energy at the radiating surface and is immersable, while the pH2 can remove smaller particles in harsh environments. Both units insure reliable results.

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ULTRASONIC MOLD CLEANING

The use of [ultrasonic cleaning](#) for routine injection mold maintenance has been effectively employed for many years. As a non-contact method, mold detail is not damaged during cleaning and critical tolerances can be maintained, extending mold life. The high cleanliness level achieved with ultrasonics results in better part release and longer runs. This improves productivity and reduces scrap. The penetrating nature of ultrasonic cleaning removes residual polymer, mold release and outgas residue extending the mold life. It can remove residue from the cooling channels and vent lines improving polymer flow. In most cases, molds can be cleaned without disassembly, which significantly reduces the man-hours required for the cleaning process.



EQUIPMENT AND PROCESS

Ultrasonic cleaning is an immersion process that requires three components. The first is the tank to hold the liquid, the second is the chemistry in the tank and the third is the ultrasonic power supply and transducers. Branson offers systems in a number of configurations depending on your needs. Sizes range from tabletop tank and generator systems that are effective at cleaning inserts, core pins and small molds, to fully integrated wash/rinse/dry systems for larger molds. Most mold cleaning applications utilize powerful 25 kHz ultrasonics but Branson offers 40 kHz for more delicate molds.

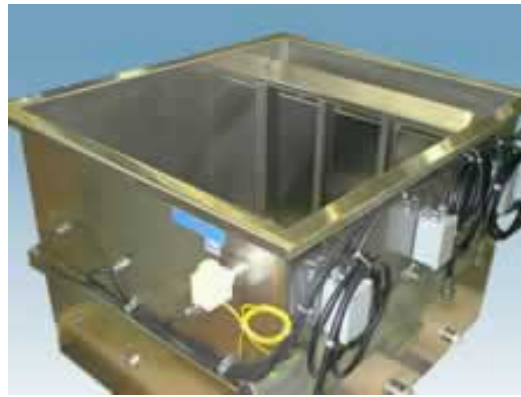
While the chemistry can vary based on the mold material and type of soil, most molds are cleaned in a buffered alkaline solution with a pH above 12. It is important that the cleaning agent contains a rust inhibitor to prevent flash rusting when the mold is removed from the cleaning solution. The mold is then rinsed by hand with cold water or immersed in a rinse tank. Drying is usually accomplished by blowing the mold off with compressed air and spraying it with a rust preventative. The typical wash time is less than 30 minutes and most molds do not need to be disassembled for processing.

Branson has demonstration equipment available for inhouse testing at your facility. Contact your local Branson salesperson or the Danbury, CT facility for information and to schedule a trial.

Typical Wash/Rinse System



Ultrasonics in Existing Tank



SYSTEM BENEFITS

- Reduced labor
- Longer mold life
- Reduced mold damage from cleaning
- Longer runs
- Reduced scrap
- Easy to maintain system

STANDARD FEATURES

- Powerful, reliable and efficient Branson ultrasonic transducers and power supplies
- Stainless steel construction for durability
- Thermostatically controlled heat for enhanced cleaning
- Side mounted ultrasonic transducers to provide even cleaning
- Optional pump and filter to extend chemical life
- Custom sizes available

[Omni 2000 - 1012](#) | [Omni 2000 - 1620](#) | [Flexline 1216](#) | [Flexline 2024](#)
[Benchmark Dryer](#) | [Robots](#) | [Coalescing](#) | [Aquafier](#)
[Back to Products & Services Selection](#)

ULTRASONIC GENERATORS

GENERATOR MODELS

SERIES 8500HF Full-featured generators at 80, 120, and 170 kHz 

SERIES 8500 Full-featured generators at 25 and 40 kHz 

SERIES 8300 25 and 40 kHz piezoelectric generators 

SERIES G1KA 1000W Magnapak magnetostrictive generators 

Generators (power supplies) create the high frequency energy that produces cavitation in the cleaning tank. Branson offers the broadest spectrum of equipment in the industry, including both magnetostrictive equipment and piezoelectric units with features like line/load regulation, true variable power control, sweep frequencies, power modulation and power monitoring.

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FREQUENTLY ASKED QUESTIONS

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- [What is "degassing", and why should it be done?](#)
- [How do I get the best ultrasonic cleaning?](#)
- [Can ultrasonic cleaning damage my parts?](#)
- [What are "direct" and "indirect" cleaning?](#)
- [Why is a special solution required for cleaning?](#)
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- [When should solutions be changed?](#)
- [Why must I keep solution at the tank's level indicator?](#)
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- [Why shouldn't I leave my cleaner on constantly?](#)
- [What current Bransonic replaces my older unit?](#)

What is "cavitation"?

"Cavitation" is the rapid formation and collapse of millions of tiny bubbles (or cavities) in a liquid. Cavitation is produced by the alternating high and low pressure waves generated by high frequency (ultrasonic) sound. During the low pressure phase, these bubbles grow from microscopic size until, during the high pressure phase, they are compressed and implode.

What is "degassing", and why should it be done?

"Degassing" is the initial removal of gases present in the solution. Useful cavitation occurs after gasses have been removed from the cleaning solution, leaving a vacuum in the formed bubble. When the high pressure wave hits the bubble wall, the bubble collapses; it is the energy released by this collapse that will assist a detergent in breaking the bonds between parts and their soils.

How do I get the best ultrasonic cleaning?

There are many considerations important to ultrasonic cleaning. Optimizing these variables will produce the best cleaning. The most important decisions to be made are choosing the proper cleaning solution, cleaning at the right temperature for the correct amount of time, and choosing the right size and type of ultrasonic cleaner.

Can ultrasonic cleaning damage my parts?

With certain cautions, ultrasonic cleaning is considered safe for most parts. While the effects of thousands of implosions per second is very powerful, the cleaning process is safe since the energy is localized at the microscopic level. The most important cautionary consideration is the choice of cleaning solution. Potentially adverse effects of the detergent on the material being cleaned will be enhanced by the ultrasonics. Ultrasonic cleaning is *not* recommended for the following gemstones: opal, pearl, emerald, tanzanite, malachite, turquoise, lapis and coral.

What is "direct" and "indirect" cleaning?

Direct cleaning occurs when the parts are cleaned in a cleaning solution which fills the cleaner, usually inside a perforated tray or mesh basket. The limitation of direct cleaning is that a solution must be chosen that will not damage the ultrasonic cleaner. Indirect cleaning involves placing the parts to be cleaned in an inner non-perforated tray or beaker that often contains a solution that the user may not want directly filling the ultrasonic tank. When choosing indirect cleaning, make sure that the water level inside the tank itself is maintained to the fill line (about 1" from the tank top) at all times.

Why is a special solution required for cleaning?

Soils adhere to the parts... if they didn't, the soil would just fall off the parts! The purpose of the solution is to break the bonds between parts and their soils. Water alone has no cleaning properties. The primary purpose of the ultrasonic activity (cavitation) is to assist the solution in doing its job. An ultrasonic cleaning solution contains various ingredients designed to optimize the ultrasonic cleaning process. For example, increased cavitation levels result from reduced fluid surface tension. An ultrasonic solution will contain a good wetting agent or surfactant.

What cleaning solution should I use?

Modern ultrasonic cleaning solutions are compounded from a variety of detergents, wetting agents and other reactive components. A large variety of excellent formulations are available, designed for specific applications. Proper selection is crucial for acceptable cleaning activity and to preclude undesirable reactivity with the part being cleaned. Your Branson representative can help you to identify either the optimal 'stock' cleaning formula, or likely candidates to test and evaluate.

What cleaning solution shouldn't I use?

Flammables or solutions with low flash points should never be used. The energy released by cavitation is converted to heat and kinetic energy, generating high temperature gradients in the solution, and can create hazardous conditions with flammable liquids. Acids, bleach and bleach by-products should generally be avoided, but may be used with indirect cleaning in a proper indirect cleaning container, such as a glass beaker, and appropriate care. Acid and bleach will damage stainless steel tanks, and/or create hazardous conditions.

When should solutions be changed?

Cleaning solutions should be replenished when a noticeable decrease in cleaning action occurs, or when the solution is visibly dirty or spent. A fresh batch of solution at each cleaning session is usually not required.

Why must I keep solution at the tank's level indicator?

The solution level should always be maintained at the level indicator in the tank, with trays or beakers installed. The ultrasonic cleaning system is a 'tuned' system. Improper solution levels will change the characteristics of the environment, can affect the system frequency, decrease effectiveness, and potentially damage the cleaner. Maintaining the proper solution level provides optimum circulation of solution around parts, and protects heaters and transducers from overheating or stress.

What is the length of cleaning time?

Cleaning time will vary, depending on such things as soil, solution, temperature and the degree of cleanliness desired. Highly visible removal of soils should start almost immediately after the ultrasonic cleaning action begins. Cleaning time adjustment is the easiest (and most often misapplied) factor used to compensate for process variables. Although new application cycle duration can be approximated by an experienced operator, it usually must be validated by actual use with the chosen solution and the actual soiled parts.

What is the purpose of the unit heater?

The primary purpose of the unit heater is to maintain a solution temperature between cleaning cycles. The tremendous energy released by cavitation will generate the heat for cleaning.

How do I know if the unit is cavitating properly?

Most poor cleaning usually results from improper control of one or more process variable(s); such as choosing the wrong detergent solution, insufficient heat, or not allowing enough time for the particular soil to be removed. If you suspect that your ultrasonic cleaner is not cavitating properly, there are two simple tests you can perform: the "glass slide" test and the "foil" test.

How do I perform the "glass slide" test?

Wet the frosted portion of a glass slide with tap water and draw an "X" with a No. 2 pencil from corner to corner of the frosted area. Making sure that the tank is filled to the fill line, immerse the frosted end of the slide into fresh cleaning solution. Turn on the ultrasonics. The lead "X" will begin to be removed almost immediately, and all lead should be removed within ten seconds.

How do I perform the "foil" test?

Cut three small pieces of aluminum foil about 4" x 8" each. Fold each piece over a rod that you will use to suspend the foil in the tank. A clothes hanger works well. Your cleaner should be filled with an ultrasonic cleaning solution, degassed, and brought up to normal operating temperature. Suspend the first "square" in the center of the tank and the other two a couple of inches from each end of the tank. Make sure that the tank is filled to the fill line, and turn on the ultrasonics for about ten minutes. Remove the foil and inspect: All three pieces of aluminum foil should be perforated and wrinkled to about the same degree.

Why must trays or beakers be used?

Items being cleaned should never be placed directly on the tank bottom. Transducers (which produce the ultrasound) are bonded to the bottom of the tank. Items resting directly on the tank bottom can damage the transducers and/or reduce cavitation. Additionally, a tray or beaker will position the item within the optimal cleaning zone of the tank. The tray or beaker will also hold the load together and allow for easy, no-touch removal, draining and transport of the items to the next step in the cleaning process.

What is the optimum cleaning temperature?

Heat usually enhances and speeds up the cleaning process, and most detergent solutions are designed to work best at an elevated temperature. The best way to find the optimum temperature, which will give you the fastest, cleanest and safest results, is to run tests. Usually, the best results are within the 50°C to 65°C range.

Is rinsing required after cleaning cycles?

Rinsing is recommended to remove any chemical residue, which could be harmful to the part. Parts can be rinsed right in your ultrasonic cleaner, using a clean water bath, or in a separate tub containing tap, distilled or deionized water.

Why shouldn't I leave my cleaner on constantly?

Low solution levels can seriously damage your cleaner. Running your unit continuously runs the strong risk of lowered levels as the solution evaporates, especially when heated. Getting into the habit of shutting off the ultrasonics when not in use, and monitoring the solution level when in use, will yield many years of trouble free service from your ultrasonic cleaner.

What current Bransonics replaces my older unit?

See our [Bransonic Cross Reference Chart](#).

[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
[DHA-1000](#) | [PC-620](#) | [B-200](#) | [B-300](#) | [B3](#)
[Model IC 1216](#) | [Model IC 1620](#) | [FAQs](#)

Product Literature and Drawing Downloads

Many of our customers have expressed an interest in obtaining literature and other documentation electronically. Click on the Item Number or Drawing # to download the PDF file you are interested in.

Item #	Description
CP-38A	Tabletop Cleaners - Bransonic® Bench-top Ultrasonic Cleaners, Accessories, and Cleaning Solutions - brochure pictures range of bench-top ultrasonic cleaning units, with heated or unheated tanks, digital or mechanical timer, one-half gallon to 5-gallon capacity, and available accessories. Lists applications and chemical characteristics of Branson ultrasonic cleaning solutions.
CP-39	Pipette Cleaner (PC620) - A benchtop cleaner with dimensions specifically suited to cleaning long, narrow components such as pipettes. Available heated or unheated.
CP-40	B-200 Ultrasonic Cleaner - Compact and stylish with plug-in anywhere convenience.
C-104	BC Series-Ultrasonic Cleaning Systems - Digital timers, convenient controls, complete with accessories.
B-117	Optimizing your Ultrasonic Cleaner
B-300	B-300 Tabletop Ultrasonic Cleaner - provides quick, consistent, high quality cleaning over a wide range of applications.
S-825	DHA1000 Ultrasonic Cleaning System - Offering a full line of features to meet most precision cleaning requirements.
SR-Series	Support Racks - for use with tabletop ultrasonic cleaners.
GS-B	General Solution Brochure - specific solution information is listed under "Chemistry" link.

Drawing#	Model with voltages
095	Series 1200 - 117/230/100 volt.
096	Series 2200 - 117/230/100 volt.

098	Series 3200 - Series 5200 - 117/230/100 volt.
181	Series 8200 - 117/230/100 volt.
164	Series 1210-5210 MT/MTH - 117/230/100 volt.
169	Series 1210-5510 DTH - 117/230/100 volt.
179	Series 8210 MT/MT - 117 volt.
178	Series 8210 MT/MTH - 230 volt.
182	Series 8210 DT/DT - 117 volt.
181	Series 8210 DT/DTH - 230 volt.



You'll need Adobe's free Acrobat Reader to view PDF files. Click the icon to download.

Can't wait and need a file *now*? It may be available! E-mail us at [InfoQuest](#) for more information.

If possible, please include your model number and other pertinent information, so that we can forward you the correct documentation relative to your Branson equipment.

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Product Manuals

Many of our customers have expressed an interest in obtaining manuals and other documentation electronically. The following are available in PDF format:



Mini manual for Branson® Models 1200, 2200, 3200, 5200, and 8200.

Covers the basics of running and caring for the unit.



Complete manual for Branson® Models 1510, 2510, 3510, 5510, 8510.

Please note that this manual is also pertinent to Models 1210, 2210, 3210, 5210, and 8210.



Manual for Branson® Model B200.

This is the quadfold manual that is shipped with the product.



Manual for Model BC Cleaner.

This is the manual that is shipped with the product.



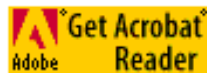
Manual for Model DHA Cleaner.

This is the manual that is shipped with the product.



Manual for Branson® Model PC620.

This is the manual that is shipped with the product.



You'll need Adobe's free Acrobat Reader to view PDF files. Click the icon to download.

**Can't wait and
need a file
now? It may
be available!
E-mail the
[Webmaster](#)
for more
information.**

**If possible,
please
include your
model
number and
other
pertinent
information,
so that we
can forward
you the
correct
documentation
relative to
your Branson
equipment.**

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Brasonic Cross Reference Chart

Series X200	Series X210	Series X510	Features
B-1200-1	-----	-----	Ultrasonics only
B-1200-2	B-1210-MT	B-1510-MT	Ultrasonics+mechanical timer
B-1200-3	B-1210-MTH	B-1510-MTH	Ultrasonics+mechanical timer+heat
B-1200-4	B-1210-DTH	B-1510-DTH	Ultrasonics+digital timer+digital heat
B-2200-1	-----	-----	Ultrasonics only
B-2200-2	B-2210-MT	B-2510-MT	Ultrasonics+mechanical timer
B-2200-3	B-2210-MTH	B-2510-MTH	Ultrasonics+mechanical timer+heat
B-2200-4	B-2210-DTH	B-2510-DTH	Ultrasonics+digital timer+digital heat
B-3200-1	-----	-----	Ultrasonics only
B-3200-2	B-3210-MT	B-3510-MT	Ultrasonics+mechanical timer
B-3200-3	B-3210-MTH	B-3510-MTH	Ultrasonics+mechanical timer+heat
B-3200-4	B-3210-DTH	B-3510-DTH	Ultrasonics+digital timer+digital heat
B-5200-1	-----	-----	Ultrasonics only
B-5200-2	B-5210-MT	B-5510-MT	Ultrasonics+mechanical timer
B-5200-3	B-5210-MTH	B-5510-MTH	Ultrasonics+mechanical timer+heat
B-5200-4	B-5210-DTH	B-5510-DTH	Ultrasonics+digital timer+digital heat
B-8200-1	-----	-----	Ultrasonics only
B-8200-2	B-8210-MT	B-8510-MT	Ultrasonics+mechanical timer
B-8200-3	B-8210-MTH	B-8510-MTH	Ultrasonics+mechanical timer+heat
B-8200-4	B-8210-DTH	B-8510-DTH	Ultrasonics+digital timer+digital heat

Notes:

Voltage designators: R = 117 volt; E = 230 volt; J = 100 volt
 X200 Series and X210 Series = Radial transducer elements
 X510 Series = Heavy duty industrial transducers

Brasonic Service Centers

With normal use, your Ultrasonic Cleaner should not require servicing. However, if it fails to operate satisfactorily, first try to diagnose the problem by following the suggestions in the Troubleshooting Guide.

! WARNING !

DO NOT DISASSEMBLE YOUR CLEANER OR YOU WILL VOID THE WARRANTY. HIGH VOLTAGE INSIDE THE CLEANER IS DANGEROUS.

If you find that your cleaner needs repair, carefully pack and return it to the Service Center recommended by your Branson Regional Office. If under warranty, remember to include proof of purchase.

Branson Regional Office Information

United States of America

Alpha Omega Electronics

2821 National Drive
Garland, TX 75041
Tel: 800-540-4967
Fax: 214-840-3668

Master Sonics

77 Whiting Street
Plainville, CT 06062
Tel: 800-737-2198
Fax: 860-410-1704

Paragon Electronics

6861 S.W. 196th Avenue Suite 404
Pembroke Pines, FL 33332
Tel: 954-434-8191
Fax: 954-434-8385

Canada

Crystal Electronics Inc.

140 Centre Street
Aurora L4G 1K1
Ontario, Canada
Tel: 905-841-5762

Fax: 905-841-9688

Asia Pacific

Branson Ultrasonics Asia Pacific
5/F Pioneer Industrial Building
213 Wai Yip Street
Kwun Tong, Kowloon, Hong Kong
Phone: 852-2-790-3393
Fax: 852-2-790-4998

Europe

Branson Ultrasonics S.A.
9 Chemin du Faubourg-de-Cruseilles
CH-1227, Carouge
Geneve, Switzerland
Phone: 41-22-304-8355
Fax: 41-22-304-8359

Japan/Korea

Branson Ultrasonics
Division of Emerson Japan Ltd
4-3-14 Okada, Atsugi-Shi
Kanagawa 243, Japan
Phone: 81-462-28-2881
Fax: 81-462-28-8992



BRANSONIC CONTACTS

Worldwide Headquarters
Branson Ultrasonics Corp.
41 Eagle Rd.
Danbury, CT 06813
PH: 800-732-9262
FAX: 203-796-2240
Email infoquest@bransonultrasonics.com
[Driving directions to Branson's Headquarters](#)



North America - South America and Canada

Branson Ultrasonics Corp.
41 Eagle Rd.
Danbury, CT 06810
PH: 800-732-9262
FAX: 203-796-2240
Email: info@bransoncleaning.com

Holland

Branson Ultrasonics B.V.
Vlierberg 26A
3755 BS Eemnes, The Netherlands
Contact: Mr. Wim v.d. Wal
PH: 011-31-35-60-98111
FAX: 011-31-35-60-98120
Email: w.vanderwal@branson.nl

Korea

Branson Korea Co. Ltd.
Room #7803 Dongil Techno Town,
#823, Kwan Yang-2dong, Dong Au-gu
An Yang-si, Kyung Ki-do, Korea
Contact: Mr. Sun-Ho Ryu
PH: 011-82-31-422-0631
FAX: 011-82-31-42-9572
Email: shryu@branson.co.kr

South Asia

Branson Ultrasonics Asia/Pacific
5/F Pioneer Industrial Building
213 Wai Yip Street
Kwun Tong, Kowloon, Hong Kong
PH: 852-2-790-3393
FAX: 852-2-341-2716
Email: sam.chiu@branson-hk.com

Japan

Branson Ultrasonics Corporation
4-3-14 Okada, Atsugi-Shi
Kanagawa, 243, Japan
PH: 81-462-28-2881
FAX: 81-462-28-8992
Email: hiro@branson.emerson.co.jp

BRANSONIC

Tabletop Ultrasonic Cleaners

B200 ULTRASONIC CLEANER

Branson's Model B200 cleaner is compact and stylish, with the convenience of plug-in-anywhere operation. This model has the ultrasonic cleaning ability to handle a wide variety of applications; it is specifically designed to clean jewelry and optical pieces quickly and effectively.

The Model B200 contains a stainless steel tank with a 15-ounce capacity. The tank is well sealed within an impact-resistant plastic housing. A cover and parts basket are included. This versatile unit features a 5 minute timer that shuts off automatically. All you need to do is add the appropriate solution for your application, followed by a thorough rinse.



The cleaner uses ultrasonic energy (40 kHz) in the form of sound waves to create millions of tiny microscopic bubbles in the solution that even works its way into holes and hidden cavities, loosening dirt on all surfaces that the solution touches. This action, called cavitation, occurs thousands of times per second to gently yet thoroughly scrub contamination off the article being cleaned. When you lift the item out of the cleaner, it's microscopically clean.

JEWELRY

The model B200 ultrasonic cleaner used with Branson's jewelry solution is all you need to clean your jewelry items such as gold, gemstones, platinum, rings, and watch bands.

Branson's Jewelry Cleaner Concentrate is a specialized biodegradable phosphate-free alkaline cleaner for jewelry and precious metals. A unique blend of nonionic surfactants, detergent bases, and wetting agents provides a safe cleaning medium for valuable jewelry. Gemstones and precious metals are quickly restored to their original brilliance with this free-rinsing solution.

OPTICS

The cleaner also is designed for optical cleaning of contact lenses, eye glasses, and optical components. Effective removal of cutting residue, polishing compounds, and handling soils such as fingerprints and dust, can be achieved with the use of Branson's Optical Solution followed by a thorough rinse.

OTHER CLEANING APPLICATIONS

- Instrument & clock parts
- Small geological samples
- Coins & hobby items
- Small electrical/electronic components
- Metal & plastic machine parts
- Recorders & drafting pens

Specifications

Overall Size	8.7" x 4.5" x 5"
Tank Size	6.5" x 3.5" x 2.2"
Weight	3 lbs

Order Information

B-200 (120V Model)	100-951-010
B-200 (230V Model)	100-951-011

Order On-line - [Click Here](#)

If you would like additional information please click here:



[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
[DHA-1000](#) | [PC-620](#) | [B-200](#) | [B-300](#) | [B3](#)
[Model IC 1216](#) | [Model IC 1620](#) | [FAQs](#)

BRANSONIC

Tabletop Ultrasonic Cleaners

B300 ULTRASONIC CLEANER

The B-300 tabletop ultrasonic cleaner will provide quick, consistent, high quality cleaning over a wide range of applications. Ultrasonics takes advantage of the multi-directional nature of sound to dislodge even the most difficult soils from cracks and crevices not reached by any other cleaning method. When used with water and your favorite cleaning or disinfecting solution, the B-300 will deliver clean, bright parts or instruments in just minutes. While used in many fields, this cleaner has been found to be especially useful for jewelry artisans, optical shops and veterinarians.



COMPLETE INTEGRATED UNIT

The B-300 includes a stainless steel cleaning tank using industrial-style ultrasonic transducer technology. The deep drawn tank has no corner welds or other dirt-catching surfaces, making it easy to keep clean. Ultrasonic power is provided by a rugged 40 kHz power supply. Both are housed in a wraparound, sealed metal enclosure for safety and reliability. Controls are front-mounted for easy access, and the unit includes an automatic 15 minute timer. All units come complete with a cover and perforated stainless steel parts basket so you can get right to work.

CLEANING APPLICATIONS

Ultrasonic cleaners are ideal for removing difficult soils or contamination in hard-to-reach places. Possible uses are limited only by the imagination. Jewelers use them to remove brazing fluxes, polishing compounds and watch lubricants. Optical shops use them during lens manufacture and for sample frame cleaning. Veterinarians find them useful for cleaning instruments before sterilization. Even personal care salons use them for cleaning and disinfecting instruments.

Branson also offers a line of application specific cleaning chemistries to make your work even easier. Ask your distributor or check our website at www.bransonic.com for information.

Specifications

Overall Size	13.2" x 5.3" x 5.9"
Tank Size	11.8" x 3.9" x 2.9"
Weight	4.6 lbs

Order Information

B-300 (115V Model)

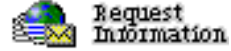
CPN-951-028

B-300 (230V Model)

CPN-951-026

Order On-line - [Click Here](#)

If you would like additional information please click here:



[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
[DHA-1000](#) | [PC-620](#) | [B-200](#) | [B-300](#) | [B3](#)
[Model IC 1216](#) | [Model IC 1620](#) | [FAQs](#)

BRANSONIC

Tabletop Ultrasonic Cleaners

B3 ULTRASONIC CLEANER

This low cost, UL-listed ultrasonic cleaner is especially useful for on-the-spot cleaning of small industrial, medical, laboratory, jewelry, or hobby items. It provides the speed and effectiveness of ultrasonic cleaning power with the convenience of plug-in-anywhere operation.

The Model B3 ultrasonic cleaner can be used with most of Branson's aqueous cleaning chemistries or with your favorite non-flammable cleaning solution. With an appropriate chemistry the B3 will remove general shop soils, light tarnishes and oxides, oils and light greases. It will remove these soils from both exposed surfaces and any cracks, crevices or internal areas that the cleaning solution can reach.



COMPLETE INTEGRATED UNIT

This compact ultrasonic unit has both the 1pint capacity cleaning tank and the ultrasonic generator circuitry enclosed in an attractive, impact resistant plastic housing. The unit uses all solid-state components with no fans or other moving parts for long, trouble-free service. The high-grade stainless steel tank has no welds or other dirt catching surfaces making it easy to maintain between uses. A plastic tank cover is provided to protect the cleaning solution when the unit is not in use.

COMMON APPLICATIONS

- Eyeglasses and optical components
- Coins and other collectibles
- Recorder and drafting pens
- Art brushes and palate knives
- Metal and plastic machine parts

Specifications

Overall Size	5 1/4" x 5 1/4" x 6 1/4"H
Tank Size	3 1/2" Diameter x 3" D
Weight	3 lbs
Frequency	55kHz

Order Information

Model B3 (115 V 50/60 Hz)

000-951-005

Model B5 (230 V 50/60 Hz)

000-951-103

Order On-line - [Click Here](#)

If you would like additional information please click here:



[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
[DHA-1000](#) | [PC-620](#) | [B-200](#) | [B-300](#) | [B3](#)
[Model IC 1216](#) | [Model IC 1620](#) | [FAQs](#)

BRANSONIC

Tabletop Ultrasonic Cleaners

Bransonic Features

- Digital Control Plus Heat & Timer
- Mechanical Timer Plus Heat
- Mechanical Timer
- Cover Included
- Two Year Warranty

**Specifications**

Overall Size	10" x 12" x 11.5"
Tank Size	6" x 5.5" x 4"
Weight	7 lbs
Frequency	40 kHz

Order Information**BELOW UNITS ARE SOLD WITH A COVER**

	120V Models	230/240V Models
Digital Control + Heat & Timer	B1510-DTH CPN-952-118	B1510E-DTH CPN-952-138
Mechanical Timer + Heat	B1510-MTH CPN-952-117	B1510E-MTH CPN-952-137
Mechanical Timer	B1510-MT CPN-952-116	B1510E-MT CPN-952-136

Order On-line - [Click Here](#)**Accessories**

Tank Cover	A12-1 100-032-320	600 ml Glassless Steel	A600-2 000-410-055
Solid Tray	A12-2 100-410-170	Support Rack	CPN-916-039
Perforated Tray	A12-3 100-410-160	Drain Tubing 1 Ft.	000-486-065
Beaker Cover (1-600 ml Beaker)	A12-4 CPN-246-010	Mesh Basket	100-916-333

600 ml Glass

A600-1
000-140-004

Brasonic Accessories



If you would like additional information please click here:



[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
[DHA-1000](#) | [PC-620](#) | [B-200](#) | [B-300](#) | [B3](#)
[Model IC 1216](#) | [Model IC 1620](#) | [FAQs](#)

BRANSONIC

Tabletop Ultrasonic Cleaners

Bransonic Features

- Digital Control Plus Heat & Timer
- Mechanical Timer Plus Heat
- Mechanical Timer
- Cover Included
- Two Year Warranty



Specifications

Overall Size	13.5" x 12" x 11.5"
Tank Size	9.5" x 5.5" x 4"
Weight	9 lbs
Frequency	40 kHz

Order Information

BELOW UNITS ARE SOLD WITH A COVER

	120V Models	230/240V Models
Digital Control + Heat & Timer	B2510-DTH CPN-952-218	B2510E-DTH CPN-952-238
Mechanical Timer + Heat	B2510-MTH CPN-952-217	B2510E-MTH CPN-952-237
Mechanical Timer	B2510-MT CPN-952-216	B2510E-MT CPN-952-236

Order On-line - [Click Here](#)

Accessories

Tank Cover	A22-1 100-032-321	600 ml Glass	A600-1 000-140-004
Solid Tray	A22-2 100-410-172	600 ml Stainless Steel	A600-2 000-410-055
Perforated Tray	A22-3 100-410-162	Support Rack	CPN-916-040

**Beaker Cover
(2-600 ml Beaker)**

A22-5
CPN-246-011

Drain Tubing 1 Ft.

000-486-065

**Beaker Cover
(2-250 ml Beaker)**

A22-6
CPN-246-015

Mesh Basket

100-916-334

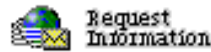
250 ml Glass

A250
000-140-001

Bransonic Accessories



If you would like additional information please click here:



[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
[DHA-1000](#) | [PC-620](#) | [B-200](#) | [B-300](#) | [B3](#)
[Model IC 1216](#) | [Model IC 1620](#) | [FAQs](#)

BRANSON

Tabletop Ultrasonic Cleaners

Bransonic Features

- Digital Control Plus Heat & Timer
- Mechanical Timer Plus Heat
- Mechanical Timer
- Cover Included
- Two Year Warranty



Specifications

Overall Size	16" x 12" x 14.5"
Tank Size	11.5" x 6" x 6"
Weight	12 lbs
Frequency	40 kHz

Order Information

BELOW UNITS ARE SOLD WITH A COVER

	120V Models	230/240V Models
Digital Control + Heat & Timer	B3510-DTH CPN-952-318	B3510E-DTH CPN-952-338
Mechanical Timer + Heat	B3510-MTH CPN-952-317	B3510E-MTH CPN-952-337
Mechanical Timer	B3510-MT CPN-952-316	B3510E-MT CPN-952-336

Order On-line - [Click Here](#)

Accessories

Tank Cover	A32-1 100-032-322	600 ml Glass	A600-1 000-140-004
Solid Tray	A32-2 100-410-174	600 ml Glass Stainless Steel	A600-2 000-410-055
Perforated Tray	A32-3 100-410-164	Support Rack	CPN-916-041

**Beaker Cover
(3-250 ml Beaker)**

A32-4
CPN-246-016

Drain Tubing 1 Ft.

000-486-065

**Beaker Cover
(2-600 ml Beaker)**

A32-5
CPN-246-012

Mesh Basket

100-916-335

250 ml Glass

A250
000-140-001

Bransonic Accessories



If you would like additional information please click here:



[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
[DHA-1000](#) | [PC-620](#) | [B-200](#) | [B-300](#) | [B3](#)
[Model IC 1216](#) | [Model IC 1620](#) | [FAQs](#)

BRANSONIC

Tabletop Ultrasonic Cleaners

Bransonic Features

- Digital Control Plus Heat & Timer
- Mechanical Timer Plus Heat
- Mechanical Timer
- Cover Included
- Two Year Warranty

**Specifications**

Overall Size	16" x 15.5" x 14.5"
Tank Size	11.5" x 9.5" x 6"
Weight	14 lbs
Frequency	40 kHz

Order Information**BELOW UNITS ARE SOLD WITH A COVER**

	120V Models	230/240V Models
Digital Control + Heat & Timer	B5510-DTH CPN-952-518	B5510E-DTH CPN-952-538
Mechanical Timer + Heat	B5510-MTH CPN-952-517	B5510E-MTH CPN-952-537
Mechanical Timer	B5510-MT CPN-952-516	B5510E-MT CPN-952-536

Order On-line - [Click Here](#)**Accessories**

Tank Cover	A52-1 100-032-323	600 ml Glass	A600-1 000-140-004
Solid Tray	A52-2 100-410-176	600 ml Stainless Steel	A600-2 000-410-055
Perforated Tray	A52-3 100-410-166	Support Rack	CPN-916-042

**Beaker Cover
(4-600 ml Beaker)**

A52-4
CPN-246-013

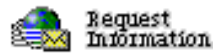
Drain Tubing 1 Ft.

000-486-065

Bransonic Accessories



If you would like additional information please click here:



[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
[DHA-1000](#) | [PC-620](#) | [B-200](#) | [B-300](#) | [B3](#)
[Model IC 1216](#) | [Model IC 1620](#) | [FAQs](#)

BRANSONIC

Tabletop Ultrasonic Cleaners

Bransonic Features

- Digital Control Plus Heat & Timer
- Mechanical Timer Plus Heat
- Mechanical Timer
- Cover Included
- Two Year Warranty

**Specifications**

Overall Size	24" x 18" x 14.5"
Tank Size	19.5" x 11.5" x 6"
Weight	26 lbs
Frequency	40 kHz

Order Information**BELOW UNITS ARE SOLD WITH A COVER**

	120V Models	230/240V Models
Digital Control + Heat & Timer	B8510-DTH CPN-952-818	B8510E-DTH CPN-952-838
Mechanical Timer + Heat	B8510-MTH CPN-952-817	B8510E-MTH CPN-952-837
Mechanical Timer	B8510-MT CPN-952-816	B8510E-MT CPN-952-836

Order On-line - [Click Here](#)**Accessories**

Tank Cover	A82-1 000-917-050	600 ml Glass	A600-1 000-140-004
Solid Tray	A82-2 100-410-178	600 ml Stainless Steel	A600-2 000-410-055

Perforated Tray

A82-3
100-410-168

Support Rack

CPN-916-043

**Beaker Cover
(6-600 ml Beaker)**

A82-4
CPN-246-014

Drain Tubing 1 Ft.

000-486-065

Bransonic Accessories



If you would like additional information please click here:



[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
[DHA-1000](#) | [PC-620](#) | [B-200](#) | [B-300](#) | [B3](#)
[Model IC 1216](#) | [Model IC 1620](#) | [FAQs](#)



DHA-1000 ULTRASONIC CLEANER

This low cost ultrasonic cleaner is designed especially for medium and heavy duty industrial applications. It is fully integrated, with ultrasonic generator and cleaning tank in a single enclosure. Solution capacity is 10 gallons - enough to handle large, bulky parts or for batch cleaning of small components. It's the only industrial size ultrasonic cleaner of its type available today.



MANY SOLUTIONS AND USE

The DHA-1000 unit is suitable for use with alkaline, mildly acidic, neutral or caustic aqueous solutions to clean electronic and electrical subassemblies, fabricated metal or plastic components; glass and other materials prior to inspection, assembly or further processing.

RUGGED STAINLESS STEEL TANK

Its deep-drawn tank of 304L stainless steel has no corner welds or other dirt-catching surfaces. The tank is insulated for low heat loss and low noise operation. Low-watt density heaters maintain the cleaning solution at the proper temperature for maximum cleaning effectiveness. High efficiency piezoelectric transducers are attached to the tank bottom. The tank also has a stainless steel drain.

DEPENDABLE SOLID STATE CIRCUITRY

All circuitry is solid state for long, trouble-free life. There are no fans or other moving parts to wear out. Separate heater and generator controls are provided, and the unit is equipped with a R.F.I. filter to meet FCC radio frequency interference standards. Because the Branson DHA-1000 cleaner is a completely self-contained integrated unit, installation requires only a power connection.

Specifications

Overall Size	17" x 19" x 19"
Tank Size	14" x 16" x 10.5"
Weight	70 lbs
Frequency	40 kHz

Order Information

DHA-1000 (120V Model)	000-914-506
DHA-1000 (230V Model)	000-914-606

Order On-line - [Click Here](#)

Accessories

Cover	100-246-802
Basket	CPN-916-032

If you would like additional information please click here:



[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
[DHA-1000](#) | [PC-620](#) | [B-200](#) | [B-300](#) | [B3](#)
[Model IC 1216](#) | [Model IC 1620](#) | [FAQs](#)

BRANSONIC

Tabletop Ultrasonic Cleaners

Typical Applications**Scientific Labs**

Lab glassware including test tubes, burettes and pipettes; lab sensors and instrumentation; lab fixtures and tools.

Industry

Switches, relays and other electromechanical components; precision bearings, small stampings and machined parts; optics and related components.

**Electronics**

Printed circuit boards, surface mount assemblies, flex-circuits, integrated circuits, quartz crystals, packaging components, electronic hardware.

Medical and biological labs

Cell separation, cell disruption, cleaning of cannulae and syringes, surgical instruments, blood oxygenators, dental instruments and burs.

Jewelry

Watches, clock movements, gemstones, findings, chains charms, coins and other collectibles, repair work.

Specifications

Overall Size	20.2" x 6.2" x 10.5"
Tank Size	19.5" x 5.7" x 6"
Weight	23 lbs
Frequency	40 kHz

Order Information

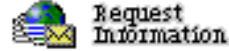
	Heated	Unheated
PC-620 40kHz (120V)	000-951-330	000-951-030

MORE INFORMATION

You can download a PDF file of the PC-620 datasheet by clicking [here](#).

Order On-line - [Click Here](#)

If you would like additional information please click here:



[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
[DHA-1000](#) | [PC-620](#) | [B-200](#) | [B-300](#) | [B3](#)
[Model IC 1216](#) | [Model IC 1620](#) | [FAQs](#)



IC-1216 INTEGRATED CLEANER

This integrated ultrasonic cleaning unit combines a stainless steel cleaning tank with industrial style transducers and a powerful ultrasonic generator to provide the strongest tabletop cleaning available. It provides the speed and effectiveness of ultrasonic cleaning power with the convenience of plug-in-anywhere operation. A work basket and cover are included in the base unit.



The Model IC-1216 ultrasonic cleaner can be used with most of Branson's aqueous cleaning chemistries or with your favorite non-flammable cleaning solution. With an appropriate chemistry the IC-1216 will remove general shop soils, tarnishes and oxides, oils and light greases. It will remove these soils from both exposed surfaces and any cracks, crevices or internal areas that the cleaning solution can reach.

FREQUENCY SELECTION

The IC-1216 Integrated Cleaner is available in two frequencies, 25kHz or 40kHz, to help match the unit to your application. Generally 25kHz is preferred for large massive parts or parts which are more densely packed. The higher 40kHz frequency is often used for smaller, more intricate parts or components with complex geometries. At either frequency the IC-1216 unit has a higher watt density than traditional tabletop ultrasonic cleaners. This make it ideal for heavier or more tenacious soils.

KEY FEATURES AND BENEFITS

- Industrial power in a small footprint
- Digitally controlled temperature to 60° C
- Digital process timer – 1-99 minutes
- High visibility digital display of time and temperature
- Fill and drain connections
- Meets CSA and UL requirements
- Full two (2) year warranty
- Ready to go – Cover and basket included

Specifications

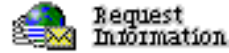
Model	Part Num.	Volts	Tank ID	Unit OD	Freq.	Weight
IC1216-25-12	CPN-908-011	208	12"x16"x13"D	21"x19"x17"H	25 kHz	80 lbs.

IC1216-25-12	CPN-908-013	230	12"x16"x13"D	21"x19"x17"H	25 kHz	80 lbs.
IC1216-40-12	CPN-908-012	208	12"x16"x13"D	21"x19"x17"H	40 kHz	80 lbs.
IC1216-40-12	CPN-908-014	230	12"x16"x13"D	21"x19"x17"H	40 kHz	80 lbs.

Order Information

Order On-line - [Click Here](#)

If you would like additional information please click here:



[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
[DHA-1000](#) | [PC-620](#) | [B-200](#) | [B-300](#) | [B3](#)
[Model IC 1216](#) | [Model IC 1620](#) | [FAQs](#)



IC-1620 INTEGRATED CLEANER

This integrated ultrasonic cleaning unit combines a stainless steel cleaning tank with industrial style transducers and a powerful ultrasonic generator to provide the strongest tabletop cleaning available. It provides the speed and effectiveness of ultrasonic cleaning power with the convenience of plug-in-anywhere operation. A work basket and cover are included in the base unit .



The Model IC-1620 ultrasonic cleaner can be used with most of Branson's aqueous cleaning chemistries or with your favorite non-flammable cleaning solution. With an appropriate chemistry the IC-1620 will remove general shop soils, tarnishes and oxides, oils and light greases. It will remove these soils from both exposed surfaces and any cracks, crevices or internal areas that the cleaning solution can reach.

FREQUENCY SELECTION

The IC-1620 Integrated Cleaner is available in two frequencies, 25kHz or 40kHz, to help match the unit to your application. Generally 25kHz is preferred for large massive parts or parts which are more densely packed. The higher 40kHz frequency is often used for smaller, more intricate parts or components with complex geometries. At either frequency the IC-1620 unit has a higher watt density than traditional tabletop ultrasonic cleaners. This make it ideal for heavier or more tenacious soils.

KEY FEATURES AND BENEFITS

- Industrial power in a small footprint
- Digitally controlled temperature to 60° C
- Digital process timer – 1-99 minutes
- High visibility digital display of time and temperature
- Fill and drain connections
- Meets CSA and UL requirements
- Full two (2) year warranty
- Ready to go – Cover and basket included

Specifications

Model	Part Num.	Volts	Tank ID	Unit OD	Freq.	Weight
IC1620-25-12	CPN-908-021	208	16"x20"x16"D	25"x23"x21"H	25 kHz	120 lbs.

IC1620-25-12	CPN-908-023	230	16"x20"x16"D	25"x23"x21"H	25 kHz	120 lbs.
IC1620-40-12	CPN-908-022	208	16"x20"x16"D	25"x23"x21"H	40 kHz	120 lbs.
IC1620-40-12	CPN-908-024	230	16"x20"x16"D	25"x23"x21"H	40 kHz	120 lbs.

Order Information

Order On-line - [Click Here](#)

If you would like additional information please click here:



[Model 1510](#) | [Model 2510](#) | [Model 3510](#) | [Model 5510](#) | [Model 8510](#)
[DHA-1000](#) | [PC-620](#) | [B-200](#) | [B-300](#) | [B3](#)
[Model IC 1216](#) | [Model IC 1620](#) | [FAQs](#)

ANALOG UNITS

Models S-250A & S-450A

DESCRIPTION

Branson Sonifier ultrasonic cell disruptor / homogenizers are versatile laboratory units suitable for a broad range of liquid processing applications such as:

- Biological cell disruption / homogenization
- Emulsification
- Reaction acceleration
- Dispersion
- Fine mixing
- Degasing

Each model consists of a power supply, a converter, and a mechanical probe or horn. The power supply/converter changes standard electrical power to high frequency mechanical energy, which is then applied to the horn, where it is further amplified for use (often with specialized accessories)



KEY FEATURES

Sonifier S-250A and S-450A analog ultrasonic processors include many features to make the technician's work easier.

- Two power levels
 - 200 Watt (S-250A)
 - 400 Watt (S-450A)
- Auto tuning for optimum performance under varying conditions
- Power output control to match power to the application
- Continuous or timed (0-15 minutes) operation to free technician for other activities
- Pulsed mode to minimize heat generation in thermally-sensitive samples
- Broad process range from 1ml to over 500 ml per sample
- Power output meter to monitor power and permit reproducibility
- Compact design limits required counter space
- Sloped front control panel for visibility and easy control access
- Includes a high-efficiency converter which requires no internal cooling
- Supplied with a standard 1/2" titanium horn that is suitable for many applications
- A wide range of dedicated accessories to meet special needs

SPECIFICATIONS

Model	Part Number	Input Power	Output Power	Dimensions	Weight
S-250A	101-063-196	117V, 60Hz	200 Watts	7-3/8"W X 16-3/4" D X 8-3/4"H	19lbs.
S-250A	101-063-197	220V,50/60Hz	200 Watts	7-3/8"W X 16-3/4" D X 8-3/4"H	19lbs.
S-450A	101-063-198	117V,60HZ	400 Watts	7-3/8"W X 16-3/4" D X 8-3/4"H	25lbs.
S-450A	101-063-199	220V,50/60Hz	400 Watts	7-3/8"W X 16-3/4" D X 8-3/4"H	25lbs.
S-450A EPA	101-063-346	117V, 60Hz	400 Watts	7-3/8"W X 16-3/4" D X 8-3/4"H	25lbs.

[Click here to request pricing](#)

ACCESSORIES

We have a series of accessories that are compatible with the analog Sonifiers:

- Disruptor horns
- Microtips
- Cup horns - standard intensity
- Cup horns - hgh intensity
- Flow-through horns
- Continuous flow chamber
- Sealed atmosphere horns
- Sound enclosures

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ANALOG UNITS

Model 910BCA

DESCRIPTION

Branson Sonifier ultrasonic cell disruptor / homogenizers are versatile laboratory units suitable for a broad range of liquid processing applications such as:

- Biological cell disruption / homogenization
- Emulsification
- Reaction acceleration
- Dispersion
- Fine mixing
- Degasing



The 910BCA basic package consists of a power supply and a converter. The power supply/converter changes standard electrical power to high frequency mechanical energy, which is then applied to the horn/process cell, where it is further amplified for use. Horns and process cells which are selected around the specific application are offered as standard accessories.

KEY FEATURES

Sonifier 910BCA analog ultrasonic processor includes many features to make the technician's work easier.

- Up to 1000 watt output at 20 kHz for those difficult applications
- Patented auto tuning feature for optimum performance under varying conditions
- Power output /amplitude control to match power to the application requirements
- Automatic amplitude compensation for constant horn amplitude over the power range
- Exclusive System Protection Monitor protects against excessive loading, loose boosters, etc.
- Processing rates up to 10 gph depending on power density / unit time required
- LED power output meter in 5% increments to permit monitoring
- All liquid contact materials are non-corrosive for long life
- Compact design limits required counter space
- Process cells suitable for use up to 200° C and 500psig
- Includes a high-efficiency air cooled converter for reliability
- A wide range of dedicated accessories to meet specific application needs

SPECIFICATIONS

Model	Part Number	Input Power	Output Power	Dimensions	Weight
910BCA	101-063-292	115V, 60Hz	1000 Watts	16-5/8"W x 19-3/8"D x 6-1/4" H	36lbs.

[Click here to request pricing](#)

ACCESSORIES

We have a series of accessories that are compatible with the analog Sonifiers:

- Titanium Process Horns - 1" or 1½"
- Mechanical Boosters to control amplitude range
- Process Cell for 1" Horn
- Process Cell for 1½" Cell

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SONIFIER II

Cell Disruptor / Homogenizer

ANALOG UNITS

Model 910BCA

DESCRIPTION

Branson Sonifier ultrasonic cell disruptor / homogenizers are versatile laboratory units suitable for a broad range of liquid processing applications such as:

- Biological cell disruption / homogenization
- Emulsification
- Reaction acceleration
- Dispersion
- Fine mixing
- Degasing



The 910BCA basic package consists of a power supply and a converter. The power supply/converter changes standard electrical power to high frequency mechanical energy, which is then applied to the horn/process cell, where it is further amplified for use. Horns and process cells which are selected around the specific application are offered as standard accessories.

KEY FEATURES

Sonifier 910BCA analog ultrasonic processor includes many features to make the technician's work easier.

- Up to 1000 watt output at 20 kHz for those difficult applications
- Patented auto tuning feature for optimum performance under varying conditions
- Power output /amplitude control to match power to the application requirements
- Automatic amplitude compensation for constant horn amplitude over the power range
- Exclusive System Protection Monitor protects against excessive loading, loose boosters, etc.
- Processing rates up to 10 gph depending on power density / unit time required
- LED power output meter in 5% increments to permit monitoring
- All liquid contact materials are non-corrosive for long life
- Compact design limits required counter space
- Process cells suitable for use up to 200° C and 500psig
- Includes a high-efficiency air cooled converter for reliability
- A wide range of dedicated accessories to meet specific application needs

SPECIFICATIONS

Model	Part Number	Input Power	Output Power	Dimensions	Weight
910BCA	101-063-292	115V, 60Hz	1000 Watts	16-5/8"W x 19-3/8"D x 6-1/4" H	36lbs.

[Click here to request pricing](#)

ACCESSORIES

We have a series of accessories that are compatible with the analog Sonifiers:

- Titanium Process Horns - 1" or 1½"
- Mechanical Boosters to control amplitude range
- Process Cell for 1" Horn
- Process Cell for 1½" Cell

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DIGITAL SONIFIER UNITS

Model S-150D

DESCRIPTION

Branson Sonifier ultrasonic cell disruptor / homogenizers are versatile laboratory units suitable for a broad range of liquid processing applications such as:

- Biological cell disruption / homogenization
- Emulsification
- Reaction acceleration
- Dispersion
- Fine mixing
- Degasing

Each model consists of a power supply, a converter, and a mechanical probe or horn. The power supply/converter changes standard electrical power to high frequency mechanical energy, which is then applied to the horn, where it is further amplified for use (often with specialized accessories)



KEY FEATURES

Sonifier S-150D digital ultrasonic processors include many features and operator benefits, as noted below:

- 100 Watts of power for effective processing of smaller samples
- Digital LCD display offers continuous indication of watts at the horn
- Thumb switch on converter for convenient pulsed operation to minimize heating
- Selector for continuous operation or pulse mode operation
- Compact design limits required counter space
- Includes high-efficiency converter and 1/8" probe as standard
- Converter and spare horn storage built into the unit for ease of access
- Sloped front panel for good visibility and easy control manipulation
- Plug-in timer module available for applications requiring longer exposure
- Additional horn designs available to meet special needs

SPECIFICATIONS

Model	Part Number	Input Power	Output Power	Dimensions	Weight

S-150D	101-063-634	115V, 60Hz	100 Watts	7-1/2"W X 13" D X 6-3/4"H	10lbs.
S-150D	101-063-635	220V, 50/60Hz	100 Watts	7-1/2"W X 13" D X 6-3/4"H	10lbs.

[Click here to request pricing](#)

ACCESSORIES

We have a series of accessories that are compatible with the digital Sonifiers:

- 3/32" microtip
- 3/16" microtip
- 1/4" microtip
- Plug-in timer

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SONIFIER II

Cell Disruptor / Homogenizer

DIGITAL SONIFIER UNITS Model S-150D

DESCRIPTION

Branson Sonifier ultrasonic cell disruptor / homogenizers are versatile laboratory units suitable for a broad range of liquid processing applications such as:

- Biological cell disruption / homogenization
- Emulsification
- Reaction acceleration
- Dispersion
- Fine mixing
- Degasing

Each model consists of a power supply, a converter, and a mechanical probe or horn. The power supply/converter changes standard electrical power to high frequency mechanical energy, which is then applied to the horn, where it is further amplified for use (often with specialized accessories)



KEY FEATURES

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- Selector for continuous operation or pulse mode operation
- Compact design limits required counter space
- Includes high-efficiency converter and 1/8" probe as standard
- Converter and spare horn storage built into the unit for ease of access
- Sloped front panel for good visibility and easy control manipulation
- Plug-in timer module available for applications requiring longer exposure
- Additional horn designs available to meet special needs

SPECIFICATIONS

Model	Part Number	Input Power	Output Power	Dimensions	Weight
S-150D	101-063-634	115V, 60Hz	100 Watts	7-1/2"W X 13" D X 6-3/4"H	10lbs.
S-150D	101-063-635	220V, 50/60Hz	100 Watts	7-1/2"W X 13" D X 6-3/4"H	10lbs.

[Click here to request pricing](#)

ACCESSORIES

We have a series of accessories that are compatible with the digital Sonifiers:

- 3/32" microtip
- 3/16" microtip
- 1/4" microtip
- Plug-in timer

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DIGITAL SONIFIER UNITS

Models S-250D & S-450D

DESCRIPTION

Branson Sonifier ultrasonic cell disruptor / homogenizers are versatile laboratory units suitable for a broad range of liquid processing applications such as:

- Biological cell disruption / homogenization
- Emulsification
- Reaction acceleration
- Dispersion
- Fine mixing
- Degasing

Each model consists of a power supply, a converter, and a mechanical probe or horn. The power supply/converter changes standard electrical power to high frequency mechanical energy, which is then applied to the horn, where it is further amplified for use (often with specialized accessories)



KEY FEATURES

Sonifier S-250D and S-450D digital ultrasonic processors include the same features as the analog units, but also offer these additional operator benefits:

- Two power levels
 - 200 Watt (S-250D)
 - 400 Watt (S-450D)
- Digital parameter setting with automatic parameter range validation
- Automatic end-point management using preset limits
- 80 character LCD display for process monitoring and alarm indication
- Printer interface with date stamp
- Broad process range from 1ml to over 500ml per sample
- RS-232 serial port for convenient computer interface
- Independent user I/O for remote start/stop control
- Internal self-diagnostic package to assure optimum performance
- Imbedded multi-language software for operator convenience
- Supplied with a standard 1/2" titanium horn that is suitable for many applications
- A wide range of dedicated accessories to meet special needs

SPECIFICATIONS

Model	Part Number	Input Power	Output Power	Dimensions	Weight
S-250D	101-063-588	117V, 60Hz	200 Watts	7-3/8"W X 16-3/4" D X 8-3/4"H	20lbs.
S-250D	101-063-589	220V, 50/60Hz	200 Watts	7-3/8"W X 16-3/4" D X 8-3/4"H	20lbs.
S-450D	101-063-593	117V, 60Hz	400 Watts	7-3/8"W X 16-3/4" D X 8-3/4"H	22lbs.
S-450D	101-063-591	220V, 50/60Hz	400 Watts	7-3/8"W X 16-3/4" D X 8-3/4"H	22lbs.
S-450D EPA	101-063-596	117V, 60Hz	400 Watts	7-3/8"W X 16-3/4" D X 8-3/4"H	22lbs.

Click to request pricing for:

[S-250D - 115V](#)

[S-250D - 220V](#)

[S-450D - 115V](#)

[S-450D - 220V](#)

ACCESSORIES

We have a series of accessories that are compatible with the digital Sonifiers:

- Disruptor horns
- Microtips
- Cup horns - high intensity
- Cup horns - standard intensity
- Flow-through horns
- Continuous flow chamber
- Sealed atmosphere horns
- Sound enclosures

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SONIFIER II

Cell Disruptor / Homogenizer

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LITERATURE DOWNLOAD REQUEST

Click on the Item Number to download the PDF file you are interested in. If the Item Number is not a link, a PDF file is not currently available on-line.

PRODUCT BULLETINS FOR AQUEOUS ULTRASONIC CLEANING EQUIPMENT	
Item #	Description
MU 001	Magnapak Magnetostrictive Ultrasonics - High Power 20 kHz Cleaning. Four-page bulletin describes Magnapak line of equipment.
MU 004	Magnapak Magnetostrictive Ultrasonics - Cylsonic Ultrasonic Cleaning Equipment. Bulletin describes aqueous ultrasonic high-speed cleaning equipment for wires, rods, and cables.
MU 005	Magnapak Magnetostrictive Ultrasonics - Magnapak Tanks and Magnatrak Generator. Six-page bulletin describes T-Series transducerized tanks, FlexLine systems, Magnatrak generators, and Magnapak transducers.
MU 123	Magnapak Magnetostrictive Ultrasonics - Ultrasonic Transducers & Magnatrak Generator. Describes Immersible ultrasonic transducers and generators for production cleaning systems. Easily rearranged and reconfigured, these components provide flexibility for the user.
S-1035	Aquafier Water Purification System. An economical closed-loop treatment system that recycles rinsewater from various cleaning processes.
S-1032	Coalescing System. Self-contained systems to separate oil from water or other immiscible fluids by coalescing and gravity separation.
S-1043	S8300/CH Tanks. Information on Series 8300 Ultrasonic Power Supplies and C/CH Series Transducerized Cleaning Tanks.
S-1044	Series 8500 Advanced Ultrasonic Cleaning Power Supply Data Sheet. Full-featured units with selectable sweep frequency, line/load regulations, auto tuning, power modulation, and many other advanced features.
S-1045	S8300/Immersible Transducers. Information on Series 8300 Ultrasonic Power Supplies and Immersible Transducers for adding Ultrasonics to existing tanks.
S-1057	S8500 High Frequency Ultrasonic Generators offer a full range of features to meet all precision cleaning requirements.

PRODUCT BULLETINS FOR SOLVENT ULTRASONIC CLEANING EQUIPMENT	
Item #	Description

S-1067	BSeries Ultrasonic Vapor Degreasers. The B Series degreasers are fully-configured, environmentally sound, ultrasonic vapor degreaser with on-board primary and sub-zero cooling packages.
S-999A	Model BTC-200 Industrial Vapor Degreaser. Provides specifications and dimensions for bench-top industrial vapor degreaser.
S-1037A	LED Series, Low Emission Degreaser. A state-of-the-art solvent cleaning machine incorporating the latest in emission control technology.
S-1061	B-452R Untrasonic Vapor Degreaser. An environmentally sound, cost-effective degreaser ideal for use with most solvents.

PRODUCT BULLETINS FOR HANDLING EQUIPMENT

Item #	Description
S-993	TDR-15 Data Sheet. Provides specifications and dimensions for TDR-15 that can process loads of 33 lbs. (15 kg).
S-994	TDR-50 Data Sheet. Provides specifications and dimensions for TDR-50 that can process loads of 110 lbs. (50 kg).
S-1040	Standard Cleaning Baskets. Provides specifications and dimensions on standard baskets with three mesh sizes.

TECHNICAL APPLICATION REPORTS

Item #	Description
CN-1	Cleaning News #1 - Marketing Brief: Plastic Injection Mold Cleaning.
S-997	Cleaning News #2 - Marketing Brief: Cleaning Compact Disc Masters.
S-998	Cleaning News #3 - Marketing Brief: Ultrasonic Cleaning in the Plating Line.
S-1001	Cleaning News #4 - Choosing the Right Cleaning Chemistry.>
S-1003	Cleaning News #5 - Application Brief: Cleaning Printed Circuit Boards with Solvent-Alternative Chemistries.
S-1006	Cleaning News #6 - Application Brief: Aqueous Degreasing of Metal Parts.
S-1010	Cleaning News #7 - Marketing Brief: Ultrasonic Cleaning of Aircraft Components.
S-1013	Cleaning News #8 - Application Brief: Precision Cleaning of Disk Drive Components.
S-1017	Cleaning News #9 - Application Brief: Cleaning Ceramic Latex Molds.
S-1018	Cleaning News #10 - Application Brief: Optical Lens Cleaning.
S-1041	Cleaning News #11 - Technical Brief: Vapor Degreasing Emissions.

[S-1042](#)

Cleaning News #12 - Technical Brief: Key Elements of Rinsing.

Can't find what you need? It may be available! E-mail us at [Industrial Info](#) for more information.

If possible, please include any pertinent information, so that we can forward you the correct documentation relative to your Branson equipment.



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FREQUENTLY ASKED QUESTIONS

- [What is "cavitation"?](#)
 - [What is "degassing", and why should it be done?](#)
 - [How do I get the best ultrasonic cleaning?](#)
 - [Can ultrasonic cleaning damage my parts?](#)
 - [Why is a special solution required for cleaning?](#)
 - [What cleaning solution should I use?](#)
 - [What cleaning solution shouldn't I use?](#)
 - [What is the length of cleaning time?](#)
 - [What is the optimum cleaning temperature?](#)
-

What is "cavitation"?

"Cavitation" is the rapid formation and collapse of millions of tiny bubbles (or cavities) in a liquid. Cavitation is produced by the alternating high and low pressure waves generated by high frequency (ultrasonic) sound. During the low pressure phase, these bubbles grow from microscopic size until, during the high pressure phase, they are compressed and implode.

What is "degassing", and why should it be done?

"Degassing" is the initial removal of gases present in the solution. Useful cavitation occurs after gasses have been removed from the cleaning solution, leaving a vacuum in the formed bubble. When the high pressure wave hits the bubble wall, the bubble collapses; it is the energy released by this collapse that will assist a detergent in breaking the bonds between parts and their soils.

How do I get the best ultrasonic cleaning?

There are many considerations important to ultrasonic cleaning. Optimizing these variables will produce the best cleaning. The most important decisions to be made are choosing the proper cleaning solution, cleaning at the right temperature for the correct amount of time, and choosing the right size and type of ultrasonic cleaner.

Can ultrasonic cleaning damage my parts?

With certain cautions, ultrasonic cleaning is considered safe for most parts. While the effects of thousands of implosions per second is very powerful, the cleaning process is safe since the energy is localized at the microscopic level. The most important cautionary consideration is the choice of cleaning solution. Potentially adverse effects of the detergent on the material being cleaned will be enhanced by the ultrasonics. Ultrasonic cleaning is *not* recommended for the following gemstones: opal, pearl, emerald, tanzanite, malachite, turquoise, lapis and coral.

Why is a special solution required for cleaning?

Soils adhere to the parts... if they didn't, the soil would just fall off the parts! The purpose of the solution is to break the bonds between parts and their soils. Water alone has no cleaning properties. The primary purpose of the ultrasonic activity (cavitation) is to assist the solution in doing its job. An ultrasonic cleaning solution contains various ingredients designed to optimize the ultrasonic cleaning process. For example, increased cavitation levels result from reduced fluid surface tension. An ultrasonic solution will contain a good wetting agent or surfactant.

What cleaning solution should I use?

Modern ultrasonic cleaning solutions are compounded from a variety of detergents, wetting agents and other reactive components. A large variety of excellent formulations are available, designed for specific applications. Proper selection is crucial for acceptable cleaning activity and to preclude undesirable reactivity with the part being cleaned. Your Branson representative can help you to identify either the optimal 'stock' cleaning formula, or likely candidates to test and evaluate.

What cleaning solution shouldn't I use?

Flammables or solutions with low flash points should never be used. The energy released by cavitation is converted to heat and kinetic energy, generating high temperature gradients in the solution, and can create hazardous conditions with flammable liquids. Acids, bleach and bleach by-products should generally be avoided, but may be used with indirect cleaning in a proper indirect cleaning container, such as a glass beaker, and appropriate care. Acid and bleach will damage stainless steel tanks, and/or create hazardous conditions.

What is the length of cleaning time?

Cleaning time will vary, depending on such things as soil, solution, temperature and the degree of cleanliness desired. Highly visible removal of soils should start almost immediately after the ultrasonic cleaning action begins. Cleaning time adjustment is the easiest (and most often misapplied) factor used to compensate for process variables. Although new application cycle duration can be approximated by an experienced operator, it usually must be validated by actual use with the chosen solution and the actual soiled parts.

What is the optimum cleaning temperature?

Heat usually enhances and speeds up the cleaning process, and most detergent solutions are designed to work best at an elevated temperature. The best way to find the optimum temperature, which will give you the fastest, cleanest and safest results, is to run tests. Usually, the best results are within the 50°C to 65°C range.

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ULTRASONIC CLEANING TANKS

Branson ultrasonic tanks provide versatile ways to meet localized cleaning needs in a variety of industrial settings. Type 316L bright annealed stainless steel construction permits use of a wide range of cleaning chemistries. Hard chrome is offered as an option in severe applications.



The eight standard sizes range from 5 to 80 gallon capacities. This selection is supplemented by our fabricating capability for custom sizes. All tanks can include optional thermostatically controlled heat to improve cleaning.

We are proud to offer 48 hour delivery on all of our CH Tanks.

CH TANK SPECIFICATIONS

	Model 1012-12	Model 1216-18	Model 1620-24	Model 2024-36
Working Dimensions:	10"W x 12"L x 10"D	12"W x 16"L x 12"D	16"W x 20"L x 16"D	20"W x 24"L x 20"D
Overall Dimensions*:	14"W x 16"L x 16"H	16"W x 20"L x 18"H	20"W x 24"L x 22"H	24"W x 28"L x 26"H
Heater Power:	1000 Watts	2000 Watts	3000 Watts	3000 Watts
Power Requirements:	120V/1p/8.5A	230V/1p/8.7A	230V/1p/13A	230V/1p/13A

* includes 7/8" horizontal flange on all four sides

LARGE TANK SPECIFICATIONS

	Model 2032	Model 5012	Model 2436	Model 2448
Working Dimensions:	20"W x 32"L x 20"D	12"W x 50"L x 18"D	24"W x 36"L x 20"D	20"W x 48"L x 20"D
Overall Dimensions:	24"W x 36"L x 24"H	18"W x 54"L x 20"H	32"W x 45"L x 28"H	32"W x 57"L x 28"H

Heater Power:	5000 Watts	4000 Watts	9000 Watts	12000 Watts
Power Requirements:	230V/1p/20A	230V/1p/16A	230V/3p/21A	230V/3p28A

TRANSDUCER ELEMENTS

Branson offers you the choice of either magnetostrictive or piezoelectric transducers on its tanks. Magnetostrictive 20 kHz transducers are generally used to clean massive parts while piezoelectric transducers are more appropriate for more intricate components or where smaller particles must be removed. All transducers and their bond to the tanks are guaranteed for the life of the system (excluding cavitation erosion).

ADDITIONAL FEATURES

- Recirculation pump and filtration packages.
- Stainless steel fill and drain connections.
- Optional stainless steel covers and a selection of baskets with varying mesh sizes.

POWER SUPPLY SELECTION

Each Branson cleaning tank must be served by a generator/generators operating at the same frequency and rated for the same number of transducer elements.

[Gen 8500HF](#) | [Gen 8500](#) | [Gen 8300](#) | [Gen G1KA](#) | [Tranducers](#)
[Aqueous Products](#) | [Back to Products & Services Selection](#)
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IMMERSIBLE ULTRASONIC TRANSDUCERS

Branson immersible transducers provide versatile ways to add ultrasonics to new or existing tankage in a variety of industrial settings. Type 316L bright annealed stainless steel construction permits use of a wide range of cleaning chemistries. Hard chrome is offered as an option in severe applications.

The hermetically sealed immersible transducers are available in two standard sizes and four mounting configurations. This allows for maximum versatility of transducer placement on tank walls or bottom to optimize cleaning. This selection is supplemented by our fabricating capability for custom sizes. The standard 40kHz transducer is capable of being driven by 40, 80, 120 or 170kHz - providing you with the ultimate in flexibility.



TRANSDUCER ELEMENTS

Branson offers either piezoelectric or magnetostrictive technology in its immersible transducers. Both types offer excellent energy conversion, stable performance under all operating conditions, and are guaranteed for the life of the system. Piezoelectric transducers are offered in multiple frequencies from 25 kHz to 170 kHz. Generally lower frequencies are preferred for large, massive parts while higher frequencies are for more intricate parts and small particle removal. Magnetostrictive transducers are offered at 20 kHz and are best used where high power or focused energy is needed.



ADDITIONAL FEATURES

- A variety of junction box and cabling schemes for easy installation and maintenance.
- Hastalloy C for corrosive chemistries
- Hard chrome or titanium nitride coatings for extreme wear applications.

POWER SUPPLY SELECTION

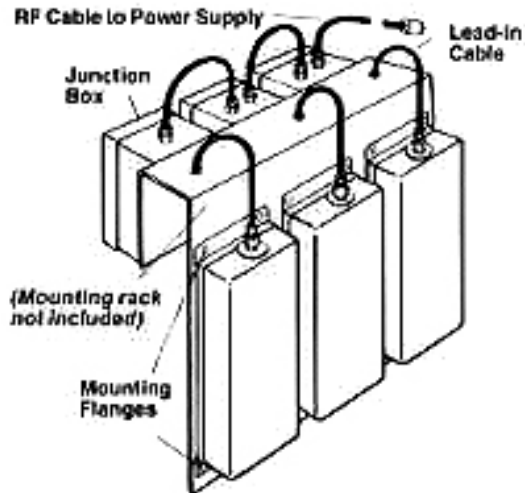
Each group of Branson immersible transducers must be served by a power



supply operating at the same frequency (20, 25, or 40 kHz) and rated for the same number of transducer elements.

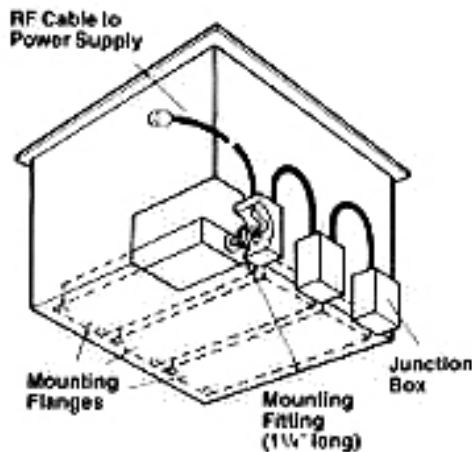
IMMERSIBLE TRANSDUCER CONFIGURATIONS

Branson offers three transducer configurations - FC, EB, and CB - which vary according to their mounting means and electrical connections:



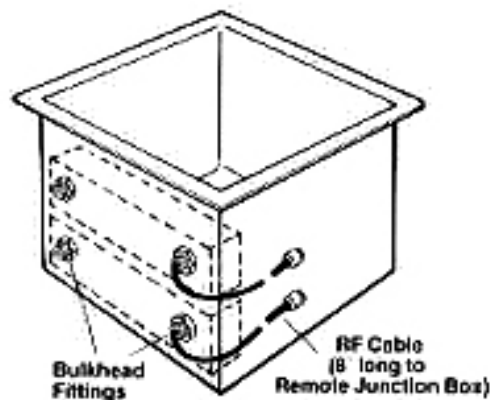
Type FC

The most versatile type; does not require holes in the tank. May be side or bottom mounted using integral mounting flanges. Watertight 3' lead cables included. Special lengths available; also right-angle fitting for tight radius turns.



Type EB

For bottom-mounting, especially where undertank clearance prevents use of type SB. May be affixed to tank bottom, using integral mounting flange. Standard 1 1/4" mounting fitting supplied; other lengths available.



Type CB

For side-mounting; most commonly only in high-power applications. One or two bulkhead fittings, depending on transducer size. Supplied with 8' RF cable, which allows master junction box to be remotely located. Special length cables available.

IMMERSIBLE TRANSDUCER SPECIFICATIONS

	Model 610-6	Model 618-12	Custom
Working Dimensions	6"W x 10"L x 3.25"H	6"W x 18"L x 3.25"H	Special sizes available on request.
Number of Transducers	6	12	Various
Frequencies Available	25 kHz 40 kHz 80 kHz 120 kHz 170 kHz	25 kHz 40 kHz 80 kHz 120 kHz 170 kHz	25 kHz 40 kHz 80 kHz 120 kHz 170 kHz

[Gen 8500HF](#) | [Gen 8500](#) | [Gen 8300](#) | [Gen G1KA](#) | [Tanks](#)
[Aqueous Products](#) | [Back to Products & Services Selection](#)
[Back to OEM Solutions](#)

Transducer Bonding Services

Power ultrasonic technology has found its way into many industries and applications that are unable to use traditional ultrasonic cleaning tanks. In some cases this is because the cleaning chamber must have a particular design to meet other application requirements. In some cases this is because the application is for liquid processing, not cleaning, and the process drives the chamber configuration. In some cases the ultrasonics is simply not processing a liquid at all but is facilitating powder flows, extrusions or other industrial processes.

Branson has been meeting this industry need for many years. We will bond transducers to a plate or other device which can then be mounted into your system. We also offer a true transducer bonding service. We will bond our ultrasonic transducers to your tank, weldment, or component. In either case we will drive it with a Branson power supply suitable for your application. We offer a variety of operating frequencies from 20 kHz to 170 kHz and several different transducer designs. Since the transducer and the attached device often act as a resonant unit it is desirable to involve Branson engineering early in your project to assure success.



Branson transducers and power supplies on your weldment or ours carry the Branson Warranty and are supported worldwide by Branson's extensive sales and service network.

[Ultrasonic Generators](#) | [Ultrasonic Tanks](#) | [Immersible Transducers](#)
[Transducer Bonding Services](#) | [Special Products](#)
[OEM Solutions Home](#) | [Industrial Cleaning Home](#)

BRANSON PRECISION PROCESSING

Branson Ultrasonics Corporation is the industry leader in the design, development, manufacture, and marketing of precision cleaning equipment. It is the only company of its caliber worldwide.

HISTORY



Norman G. Branson (*left*) founded Branson Instruments in 1946 in Danbury, CT, to harness ultrasonic energy for industrial purposes. His first product was the Audigage - a nondestructive material thickness tester. The company expanded in 1953 by forming Branson Cleaning Equipment Company to develop ultrasonic cleaning technologies to meet growing industry needs. Early product was designed to work only with water based solutions. Rapid growth in electronics manufacturing in the late 1950s led to the development of solvent degreasing equipment to meet the special requirements of that emerging industry. Since that time, Branson has been a leader in both of these critical cleaning technologies. In 1960, Branson opened their first manufacturing facility to meet overseas demand for cleaning products. Based in Holland, that plant is still in operation today and has now been joined by facilities in France, Slovakia, Malaysia, Hong Kong, China, and Mexico.

Acquired in 1968 by SmithKline & French for its work in medical imaging technology, Branson remained a part of that organization for over 15 years. Since 1984, Branson has been one of the more than 50 autonomous divisions of St. Louis-based [Emerson Electric Corporation](#), a Fortune 100 company.

TECHNOLOGY

At the core of ultrasonics is the creation and channeling of high frequency sound waves for industrial purposes. When ultrasonic energy is applied to a liquid small cavities are produced by the varying pressure gradient. This "cavitation" is the source of all of the benefits of ultrasonic cleaning.

To ensure corporate growth, Branson emphasizes the development of new technologies both within and outside the realm of ultrasonics. This focus is evident in the large Research and Development department maintained throughout the world. Many patents have been awarded as a result of these efforts to lead the industry. For example, Branson pioneered in the quest for higher frequency cleaning for precision applications with the introduction of the 400 kHz MicroCoustic product in 1987. Other frequencies have been added (80, 120, and 170 kHz) since.

RESOURCES

While the enabling technology is important, it is the application of the technology that is critical to the user. Branson maintains a number of Application Laboratories around the world, each staffed with professional technicians. It is in these laboratories that the customers' needs are met. A worldwide electronic database of these applications is maintained. Free application evaluation services are available to develop both the process and equipment requirements and the success of both are guaranteed.

With more than 1,700 employees and 70 sales and service offices, the broadest product line, and the strongest technical position in the world, Branson is prepared to meet your needs.

FOR YOUR FILES...

You can download a PDF file of our corporate profile for your reference [here](#).

Career Opportunities at Branson

Look Here For Future Job Opportunities!

**Branson Ultrasonics Corporation
Human Resources Department
Attention: Director Of Human Resources
P.O. Box 1961
Danbury, CT 06813-1961 USA
Tel (203) 796-0572 ~ Fax (203) 796-9802
Email: recruit@bransonultrasonics.com**

***Branson Ultrasonics Corporation is an equal opportunity employer.
We offer a competitive salary and a comprehensive benefits package.***



2005-2006 TRADE SHOW SCHEDULE

We receive a quantity of passes to all of the shows we exhibit in. If you would like a pass for free admission to any of the shows listed below, please [e-mail us](#), and include in the subject line the show you would like a pass for.

INDUSTRIAL PRODUCTS <i>degreasers, Benchmark® aqueous systems, and similar units</i>			
Name	Dates	Location	Booth #
Easttec	May 24-26, 2005	Springfield, MA	5544
MD&DI East	June 15-17, 2005	Javits Center New York City	1910
Orthopedic Supplier Expo	June 21-22, 2005	Stephens Center Rosemont, IL	C-5
Semicon Japan	Dec. 7-9, 2005	Chiba, Japan	-

COMMERCIAL PRODUCTS <i>Bransonic® and Sonifier®</i>			
Name	Dates	Location	Booth #
TBA	-	-	-




41 Eagle Road Danbury, CT 06813-1961
(203) 796-0400

The Weather In Danbury

This is a real time report, so you'll always know what to pack or bring.

Danbury, CT
55 °F / 13 °C
Overcast
at 8:03 AM



[Click for Forecast](#)

Driving Directions from Area Airports

From Kennedy International: Follow signs to Van Wyck Expressway to 678, Whitestone Bridge. After you cross the Whitestone Bridge, continue on Hutchinson River Parkway, to I-684 North towards Brewster. Go East on I-84 towards Danbury and get off I-84 at Exit 8. Go right at the end of the exit ramp and make a right at the second traffic light on Eagle Road. Go 1/2 mile and Branson will be on your right, before a sharp right bend in the road.

From LaGuardia: Follow signs to Grand Central Parkway East to I-678, Whitestone Bridge. After you cross the Whitestone Bridge, continue on Hutchinson River Parkway, to 684 North towards Brewster. Go East on I-84 towards Danbury and get off I-84 at Exit 8. Go right at the end of the exit ramp and make a right at the second traffic light on Eagle Road. Go 1/2 mile and Branson will be on your right, before a sharp right bend in the road.

From Newark Airport: Follow signs to 95 North (New Jersey Turnpike) to George Washington Bridge to 87 North (Major Degan Expwy), to 287 towards White Plains, to I-684 North towards Brewster. Go East on I-84 towards Danbury and get off I-84 at Exit 8. Go right at the end of the exit ramp and make a right at the second traffic light on Eagle Road. Go 1/2 mile and Branson will be on your right, before a sharp right bend in the road.

From Bradley International Airport (Hartford): Follow signs to 84 West and go West on I-84 towards Waterbury/Danbury. Get off I-84 at Exit 8. Go straight at the traffic light at the end of the exit ramp and move left into the middle lane. After you cross over the highway, you will go straight and then make a right at the third traffic light onto Eagle Road. Go 1/2 mile and Branson will be on your right, before a sharp right bend in the road.

Area Hotels

We recommend the following area hotels when coming to visit us. Mention Branson if you are staying at any of the starred (*) hotels to obtain the corporate rate:

Holiday Inn *

80 Newtown Road
Danbury, CT. 06810
203-792-4000

Ramada Inn *

Exit 8, Interstate 84 (I84)
Danbury, CT. 06810
203-792-3800

Best Inns & Suites

78 Federal Road
Danbury, CT. 06810
203-743-6701

Quality Inn *

Route 6 - Newtown Road
Danbury, CT. 06810
203-748-6677

Best Western Berkshire Inn

11 Stony Hill Road
Bethel, CT. 06801
203-744-3200

[Make Your Own Itinerary](#)

These are generated by Yahoo! Maps. Please note that we are Exit 8 off of 84-E.

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4. You may wish to review our [Privacy Statement](#).

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WORLDWIDE TRADEMARKS

- Bransonic
- Sonifier
- Sonomax
- Kleen-Sonic
- StencilSonic
- Magnapak
- Eurosonics
- MicroCoustic
- Benchmark Cleaning Equipment
- ProClean 2000
- OMNI 200
- MegaCoustic

For further information
on Intellectual Property
matters, contact Branson at:

Branson Ultrasonics Corporation
Cleaning Division
Attention: Jeffrey R. Hilgert
41 Eagle Road
Danbury, CT 06813-1961

TEL 203-796-0461

FAX 203-796-0535

E-mail JHilgert@bransonultrasonics.com

Materials Joining

Precision Cleaning

Automotive

Global Headquarters — Danbury, Connecticut

Branson is the industry leader in the design, development, manufacture, and marketing of plastics joining, precision cleaning, ultrasonic processing, and ultrasonic metal welding equipment — the only company of our caliber worldwide. We are committed to providing solutions to the needs of our customers, and providing the latest in technology, both in products and processes. Our global organization provides us with the resources and the facilities to support our customers on a worldwide basis.

With more than 1,800 employees and 70 sales and service offices throughout the world, Branson's resources are substantial. Technology and manufacturing facilities are in Connecticut, Michigan, New York, Canada, Mexico, Germany, Slovakia, China, Hong Kong, Japan, and Korea.

Corporate History

Norman G. Branson founded Branson Instruments in 1946 in Danbury, CT, to harness ultrasonic energy for industrial purposes.

The first product was the Audigage — a nondestructive material thickness tester. The company expanded in 1953 by forming Branson Cleaning Equipment

Co. to develop ultrasonic cleaning equipment for emerging industrial technologies.

In 1960 Branson acquired Sonic Energy Corporation, which designed and manufactured the Sonifier® cell disruptor for biological research. Growth continued with the founding in 1963 of Branson Sonic Power Co. to expand the uses of high-intensity ultrasonic equipment.

Since 1984 Branson has been among the more than 60 autonomous divisions of St. Louis-based Emerson, a Fortune 150 company.

Branson Sonic Power Co. and Branson Cleaning Equipment Co. merged in 1986 and the next year combined resources in Danbury, to form Branson Ultrasonics Corporation.

In 1988, Delta Sonics (Paramount, CA) and Ultrasons Annemasse (France) were acquired to enhance systems building capabilities for precision cleaning. In 1992, Branson acquired Vinton, Inc. in Rochester, NY, a manufacturer of linear and orbital vibration welders. This facility now produces non-ultrasonic plastics joining products including linear and orbital vibration welders, hot plate welders, spin welders, and laser IRAM welders. The cleaning portion of Westinghouse was acquired in 1993, bringing Magnapak technology to the precision cleaning product mix.

In 1998 Branson acquired AmTech (American Technology) of Connecticut, manufacturers and marketers of ultrasonic equipment for metal welding and

tube sealing, and KVT Technologies Inc. in Ontario, Canada, manufacturers of automotive fuel tank assembly equipment and systems.

We are now organized in two business units: *materials joining*, which includes plastics joining, metal welding, systems automation, and fuel tank assembly, as well as special applications such as ultrasonic cutting and ultrasonic processing; and *precision cleaning*, including industrial cleaning technologies, commercial products (Brasonic® cleaners and Sonifier® processors), and special applications.

Ultrasonics and More

Ultrasonic energy is the creation and channeling of high-frequency sound waves for industrial purposes.

With plastics assembly, the energy is channeled through an acoustic tool called a 'horn.' The vibrations generate heat and cause subsequent melt where parts join. A strong molecular bond results. This assembly technique is fast, efficient, non-contaminating and requires no consumables, such as glue, making it ideal for industries seeking energy efficiency and productivity. The same principle pertains to sealing textiles and films.

For ultrasonic metal welding, an ultrasonic welder forms a weld by pressing the parts to be joined together and scrubbing them against one another to break up and disperse the surface oxides and contaminants. The resultant clean base metal surfaces are held tightly together. A metallurgical bond is created without reaching the melt temperature of the metals being joined.

Branson continually explores new methods of plastics joining and precision processing. The company has expanded its plastics joining technologies to include linear, orbital, and programmable motion vibration welding; hot plate; and spin welding. Like ultrasonic assembly, these techniques are also "thermal," in that they rely on heat to melt plastics for bonding. Vibration welding uses the friction generated when vibrating one section against another to produce heat for melting; likewise spin welding rotates one component against the other to melt and bond. Hot plate welding utilizes a heated platen introduced between the sections to melt the interface. The latest product for joining thermoplastics is laser IRAM technology, which uses light/laser radiation to cause a controlled melt in the parts.

With precision cleaning and processing, ultrasonic energy is applied to liquid, where cavitation results. Cavitation, the formation and collapse of thousands of vacuum bubbles, creates a highly effective scrubbing of both exposed and hidden wetted surfaces. The use of ultrasonics achieves higher quality, and more consistent cleaning of parts for greater productivity.



In precision processing, new equipment and chemistries are being added to address environmental concerns and the need to meet increasingly stringent cleaning specifications. New environmentally-friendly degreaser lines have been developed, as have higher-frequency ultrasonics for submicron particles. Work in the processing areas of degassing, cell disruption, and chemical reaction enhancement have been particularly successful.

KVT Technologies specializes in the design and manufacture of custom built equipment for finishing and assembling plastic automotive fuel tanks. KVT provides fully integrated automation systems, including material handling.

Resources

To ensure corporate growth, Branson emphasizes the development of new technology. This focus is evident in the full Research and Development department at our worldwide headquarters, supported by advanced engineering centers in Asia-Pacific, Europe, and North America. Many patents have been awarded through the research efforts in Engineering and the Applications Laboratories.

In the fully-equipped Welding and Cleaning Applications Laboratories, customers' requirements for new processes are met. Branson's technical expertise also is shared through seminars offered at headquarters, regional centers, or in the customer's facility.

Product Highlights

Materials Joining: ultrasonic welders, linear and orbital vibration welders, hot plate welders, spin welders, metal welding systems, laser IRAM, thermal welders, and automated welding systems.

Precision Cleaning: Aqueous, semi-aqueous, and solvent cleaning systems, robotic handling systems, Branson[®] benchtop cleaners, and Sonifier[®] processors.

At a Glance -

- International headquarters in Danbury, CT.
- Executive offices, Engineering, Research and Development, Finance, Marketing, Human Resources, Customer Service, Manufacturing, Welding and Cleaning Applications Laboratories in headquarters.
- North American Regional Customer Technical Centers in Atlanta, Boston, Chicago, Detroit, Dallas, and Los Angeles. Sales and service offices in every major U.S. city.
- More than 70 sales and service offices throughout the world. Major facilities in U.S., Mexico, Germany, Slovakia, China, Hong Kong, and Japan.
- Wholly-owned subsidiaries: KVT Technologies, Inc., Canada; and Branson Ultrasonics, England. Joint venture: Shanghai Branson Ultrasonics, China.
- ISO-9001:2000 Certified for welding lines in

U.S.A., Germany, and Holland since 1994; and in Rochester, NY, and Rochester Hills, MI in 1998; cleaning line in 2000; KVT in 2002, and metal welding in 2003. Certified ISO-9002 in Mexico in 1998. ISO 14001 certified in Danbury, CT, in 1998.

Our Mission

Branson Ultrasonics is the world leader in materials joining and precision cleaning. The employees of Branson Ultrasonics are committed to providing 100% customer satisfaction through continuous improvement in:

- Customer & Supplier Alliances
- Technology & New Product Development
- Marketing & Sales
- Manufacturing
- Product Quality
- Services & Support

Our people are the source of our strength.

Education, involvement, and teamwork are essential for us to achieve superior products and services that meet or exceed our customers' requirements worldwide. The quality and integrity of our products and services define Branson's reputation.

Total customer satisfaction will result in increased global market participation, excellent business performance, and enhanced employee satisfaction.

Applications (a sampling)

Automotive - *Welding* tail lamps, instrument panels, bumpers, fuel tanks, manifolds, fuel filters, and numerous valves and sensors; *cleaning* ABS components, fuel injectors, electronic ignitions, and various precision parts.

Consumer products - *Welding* plastic watches, toys, toothpaste tubes, video & audio tape cassettes, inkjet cartridges, and computer floppy disks; *cleaning* jewelry, dental devices, computer disk drives, and audio-video equipment.

Electrical - *Welding* toggle switches, connectors, terminal blocks, switches; wire splicing, wire terminations; and *cleaning* printed circuit boards, stencils and screens, and other sensitive devices.

Plus - Myriad welding and cleaning applications in the medical, packaging, textile, optical, and metal-working industries.

Internet Web Site

www.bransonultrasonics.com

E-mail

Materials Joining:
info@BransonUltrasonics.com
Precision Processing:
info@BransonCleaning.com
AmTech Metal Welding:
welders@amtechultrasonic.com

Executive Officers

President —

Anthony E. Pajk

Sr. Vice President/ General Manager Worldwide

Edward R. Samuels

Vice President/ General Manager North America

Richard Gehrin

Vice President/ General Manager

Jonathan Harman -
Precision Cleaning

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Operations

Byron D. Peterson -
Human Resources

Robert G. Tibbetts -
Finance

Jon C. Piasecki -
Engineering & Automotive

Rodger Martin - Sales

How to Reach Us

Write:

Branson-Headquarters
41 Eagle Rd.
P.O. Box 1961
Danbury, CT 06813-1961

Call: (203) 796-0400

Fax: Precision Processing
(203) 796-0320

Materials Joining
(203) 796-9838

U.S. Regional Centers:

Danbury, CT -
(203) 796-0400

Atlanta - (770) 962-2111

Boston - (781) 938-8168

Chicago -
(847) 229-0800

Dallas - (972) 484-9228

Detroit - (248) 299-0400

Los Angeles -
(909) 305-2080

Markham, Ontario -
(905) 201-4633

Useful links for Branson Precision Cleaning Customers

TOP SITES

[Emerson website](#) - Solutions for a World in action.

[European Cleaning Systems website](#) - Amsonic-Branson Precision Cleaning.

RESOURCES/LINKS

[Alconox Inc](#)- manufactures a full line of critical cleaning detergents for a wide range of hard surface cleaning applications.

GOVERNMENT/REGULATORY

[US Patent and Trademark Office](#) - Database of front page information from US patents issued from 1/1/76.

[On-line transcription of Joseph Cascio's](#) - For information on the global importance - an on-line transcription of Joseph Cascio's speech before the House Science Committee on Technology called "The Increasing Importance of International Standards to the US Community and the Impact of ISO 14000 and 14001." Mr. Cascio is the Chairman of USTAG to ISO/TC207 and Vice President of the Global Environment and Technology Foundation. of ISO 14000 and 14001.

TRADE SHOWS

[PITTCON](#) - Solutions for Better Chemistry.

AFFILIATIONS

[The International Disk Drive Equipment and Materials Association](#)- was founded in 1986 specifically to promote the technological, manufacturing, marketing, and business progress of the disk drive vendor industry.

[The Independant Laboratory Distributers Association](#) - is an association of independent laboratory product distributors and their suppliers ILDA is committed to providing a forum for networking and educating its members and for promoting the association to the laboratory market.

[The Ultrasonics Industry Association](#) - is an organization dedicated to the advancement of the technology and applications of ultrasonics used to create changes in materials.

Last modified: undefined,undefined NaN, NaN

What's New at Branson

March, 2002



SonoSeries Ultrasonic Cleaning Technology

Branson's new SonoSeries ultrasonic technology offers a very efficient, cost effective alternative for large tanks and high power cleaning applications.

The SonoSeries utilizes a special 316 stainless steel tube transducer, that operates at 25khz and is available in varying lengths. The tube transducer produces a very intense and homogeneous ultrasonic field for optimum cleaning results. Each tube is capable of generating 2000 watts peak power and can operate in tanks over 100 °C.

Power to the SonoTube is supplied by the modular SonoModule power supply, with one module per tube. The power supply features adjustable power, and microprocessor controls with LCD display. Each power supply can house up to three modules.

In large tank applications the SonoSeries can be 20% less expensive than conventional ultrasonics.

May, 2001

Announcement

Telsonic AG (with headquarters in Switzerland) and Branson Ultrasonics Corporation (with headquarters in USA) have agreed to enter into a strategic business partnership.

Major synergies will result in the areas of technology and manufacturing. Individual marketing and sales activities of both companies will not be affected.

The partnership is effective June 11, 2001, and we are looking forward to a successful implementation.

March, 2001



Vacuum dryer for super-critical cleanliness requirements

Our updated vacuum dryer offers PLC controls and flexible process parameters for a variety of vacuum sequences and vacuum depth. It's available with gas or infrared



heating. Want to know more? [E-mail us.](#)

February, 2001



In-tank rotation

An article on Branson's in-tank rotation system will appear in the March issue of [A2C2](#). In-tank rotation is ideal for cleaning tightly packed batches of parts, and parts that cannot withstand tumbling. If you want to know more, read our [technical paper](#) on the process.

November, 2000



B Series Brochure now available

Economical, environmentally-safe, and versatile are just three ways we can describe our expanded line of vapor degreasers. In four sizes, with options like PLC-controlled vertical lifts and power covers, the B Series has models for every requirement. Download your PDF copy of the brochure [here](#), or by clicking on the photo.

BRANSON'S INDUSTRY AFFILIATIONS

We are proud to claim membership in the following organizations. Click on their logo to visit their website.



IDEMA

The International Disk Drive Equipment and Materials

Association was founded in 1986 specifically to promote the technological, manufacturing, marketing, and business progress of the disk drive vendor industry.



The Independent Laboratory Distributors Association is an association of independent laboratory product distributors and their suppliers. ILDA is committed to providing a forum for networking and educating its members and for promoting the association to the laboratory market.



The Ultrasonics Industry Association is an organization dedicated to the advancement of the technology and applications of ultrasonics used to create changes in materials.

BRANSON

Approach To Success

1. Application

We begin by studying your application. What kind of material do you need to clean? How complex are the parts? What are the cost parameters of your manufacturing process? Are there any special environmental concerns that need consideration? We look at everything from the size, shape and configuration of your parts to the material and manufacturing process you use. We can even uncover ways to cut manufacturing costs or overall process time, while remaining environmentally responsible.

2. Chemistry

Unlike some vendors that address only one type of cleaning chemistry, we offer you equipment for the industry's widest range of cleaning chemistries - aqueous, solvent or semi-aqueous. From our database of hundreds of chemistry suppliers, we will determine the best one for you. We look at your part, the soil and any potential environmental impact. Then, we work with you to select the optimum solution - just what you would expect from the industry leader.

3. Process

After we determine the right chemistry, we put together the process requirements. Each chemistry requires specific conditions for optimum results. For example, if a semi-aqueous chemistry is the wisest choice for your application, your system should include a separation tank, temperature controls, a specific rinse sequence, and a waste-handling strategy. Our process recommendation not only maximizes the performance of your chemistry, it can also reduce production costs, improve throughput, and minimize environmental impact

4. Equipment

Whatever your process requires, Branson has the equipment. From washing to rinsing to drying, we offer the broadest range of technologies to tailor the system to your specific needs. We'll precisely match our equipment to your application, chemistry and process. And every step, from the cleaning system's interface with the rest of your manufacturing process right through waste water handling, is part of our recommendation - an offer no other equipment manufacturer can make.

Privacy Statement for Branson Ultrasonics Corporation - Precision Processing Division

Branson Ultrasonics Corporation has created this privacy statement in order to demonstrate our firm commitment to privacy. The following discloses our information gathering and dissemination practices for this website.

1. We use your IP address to help diagnose problems with our server, and to administer our Web site. Your IP address is used to gather broad demographic information that we use for our own purposes (target marketing, etc.).
2. Our site's registration form requires users to give us contact information (like their name and email address) and demographic information (like their zip code or industry type). We use customer contact information from the registration form to send the user information about our company. Users may opt-out of receiving future mailings by checking dialog boxes within the form.
3. This site contains links to other sites. Branson Ultrasonics Corporation - Precision Processing Division is not responsible for the privacy practices or the content of such Web sites.
4. Our site uses order forms for customers to request information, products, and services. We collect visitor's contact information (like their email address). Contact information from the order forms is used to send products and information about our company to our customers. The customer's contact information is also used to reach with the visitor when necessary. Users may opt-out of receiving future mailings by checking dialog boxes within the forms.

Security

This site has security measures in place to protect the loss, misuse, and alteration of the information under our control. For information on measures that we take from within our firewall or from outside our firewall (server-side), please contact [Director of MIS](#).

Choice/Opt-Out

Our site provides users the opportunity to opt-out of receiving communications from us.

This site gives users the following options for removing their information from our database to not receive future communications or to no longer receive our service.

1. You can send email to WebSupport@BransonUltrasonics.com
2. You can send mail to the following postal address:
Website Support Administrator
Branson Ultrasonics Corporation
Precision Processing Division
41 Eagle Road
Danbury, CT 06813

Correct/Update

This site gives users the following options for changing and modifying information previously provided.

1. You can send email to WebSupport@Bransonultrasonics.com
2. You can send mail to the following postal address:
Website Support Administrator
Branson Ultrasonics Corporation
Precision Processing Division
41 Eagle Road
Danbury, CT 06813

Questions /Comments About This Statement, This Site or Branson

If you have any questions about this privacy statement, the practices of this site, or your dealings with this Web site, you can contact:

Jonathan Harman, General Manager
Branson Ultrasonics Corporation
Precision Processing Division
41 Eagle Road
Danbury, CT 06813
info@bransoncleaning.com
(203) 796-0337

Disruptor Horns

Description:

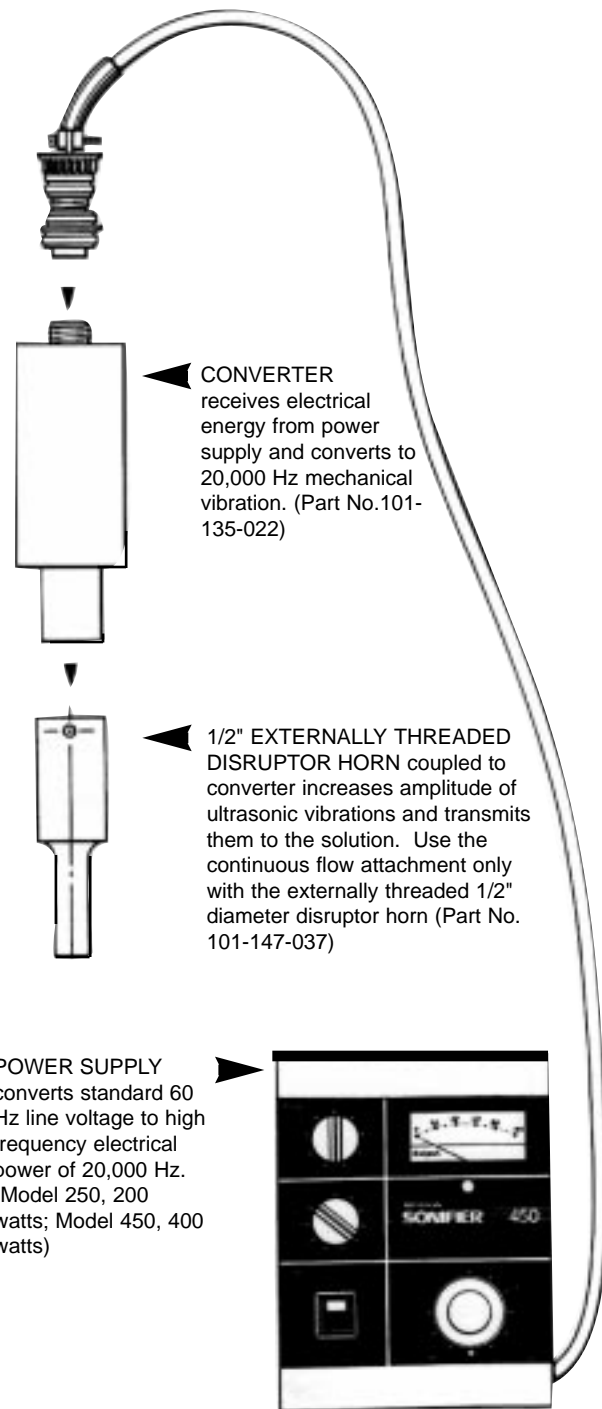
Horns (probes) transmit ultrasonic energy into a solution. The dimensions of the horn and the output control setting determine the amount of amplitude (tip movement) and degree of ultrasonic activity in the liquid. Generally, the smaller the tip diameter, the higher the amplitude. Larger tip diameters have less amplitude but can accommodate larger volumes. All Sonifier horns and tips are fabricated from titanium. Please note the charted amplitude ratings and liquid volumes when selecting horns.

A step horn with a threaded body enables the attachment of various screw-on accessories, such as a continuous flow cell. Tapped horn ends enable attachment of microtips. Tapped horns are supplied with removable flat tips.

High gain horns cannot be used with screw-on accessories but provide higher amplitude at 3/4" and 1" diameters than the same diameter step horn.

Exponential horns have lower tip amplitude but can withstand higher tip loading. Best suited for applications requiring the compressing of solids such as powders and tissue.

Typical Application:



CONVERTER receives electrical energy from power supply and converts to 20,000 Hz mechanical vibration. (Part No.101-135-022)

1/2" EXTERNALLY THREADED DISRUPTOR HORN coupled to converter increases amplitude of ultrasonic vibrations and transmits them to the solution. Use the continuous flow attachment only with the externally threaded 1/2" diameter disruptor horn (Part No. 101-147-037)

POWER SUPPLY converts standard 60 Hz line voltage to high frequency electrical power of 20,000 Hz. (Model 250, 200 watts; Model 450, 400 watts)

STEP HORNS WITH THREADED BODY

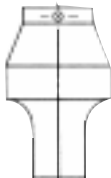
Tip Diameter	3/8" (9.5mm)	1/2" (13mm)	1/2" (13mm)	3/4" (18mm)
Tip Conf.	Solid	Tapped +	Solid	Solid
Intensity	Very High	High	High	Medium
Ampl. Range**	36-240	21-145	21-145	9.5-63
Volume (Liquid)	5-100 ml	10-250 ml	10-250 ml	25-500 ml
Part Number	101-147-039	101-147-037*	101-147-038	101-147-043

HIGH GAIN HORNS

Tip Diameter	3/4" (19mm)	1" (25.4mm)
Tip Conf.	Solid	Solid
Intensity	Medium	Low
Ampl. Range**	19-130	6.3-40.5
Volume (Liquid)	25-500 ml	50-1000 ml
Part Number	101-147-035	101-147-044

EXPONENTIAL HORNS

Tip Diameter	1/2" (13mm)	1/2" (13mm)
Tip Conf.	Tapped++	Solid
Intensity	Medium	Medium
Ampl. Range**	10-65	10-65
Volume (Liquid)	10-250 ml	10-250 ml
Part Number	101-147-040	101-147-041



* Available with graduated depth scale on horn tip, part number 101-147-036.
 ** Amplitudes quoted are total peak-to-peak movement in microns as measured on positions 1 and 10 of the output control
 + Replaceable flat tip, 1/4-20 thread, part number 101-147-013
 ++ Replaceable flat tip, 1/4-28 thread, part number 101-147-024

Microtips

Description:

Microtip probes are available in tapered and stepped configurations and are designed to process samples contained in small diameter vessels at extremely high intensity (refer to charts for recommended volumes).

Tapered microtips screw into standard 1/2" step horns with tapped ends.

The double stepped microtip consists of a coupler and a stepped tip and screws directly into the converter. It has lower amplitude than the tapered tip, but is capable of reaching into small diameter vessels of greater depth and can process solutions down to 0.5 ml.

The horns and microtips detailed on this sheet are also compatible with the earlier Branson Sonifier, Model 350. For information on horns for Sonifier Models 185-200, call us or your Customer Service Representative.

WARNING: because of their high amplitude, microtips are highly stressed and can break if operated in air or at an output control setting greater than 7 on the Sonifier II.

Typical Applications:

- Micro-tapered is recommended for processing spores, fungi, yeast, muscle, and connective tissue.
- Microtip - stepped is recommended for red and white blood cells, tissue culture cells, HELA cells, and cells which have a low to medium resistance to breakage.

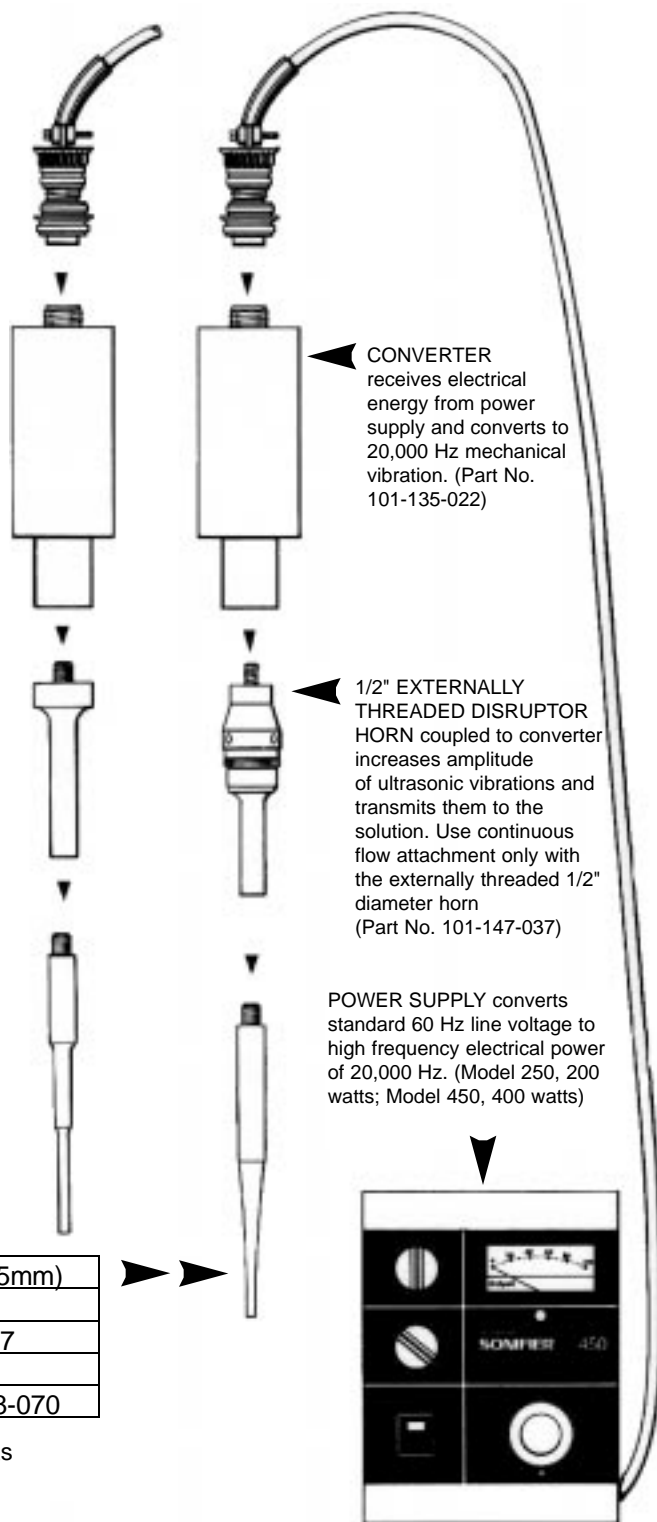
DOUBLE STEPPED MICROTIP

Tip Diameter	1/8" (3mm)
Intensity	Very High
Ampl. Range*	64-247
Volume (Liquid)	1/4 - 10 ml
Part Number	101-063-212

TAPERED MICROTIPS

Tip Diameter	1/8" (3mm)	3/16" (5mm)	1/4" (6.5mm)
Intensity	Ultra High	Very High	High
Ampl. Range*	116-494	59.5-302	59.5-247
Volume (Liquid)	1-10 ml	2-10 ml	3-10 ml
Part Number	101-148-062	101-148-069	101-148-070

* Amplitudes quoted are total peak to peak movement in microns, as measured on positions 1 and 7 of the output control.



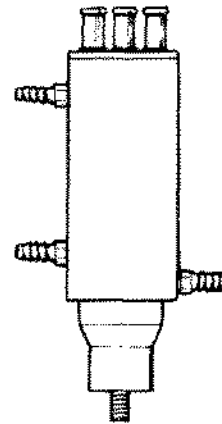
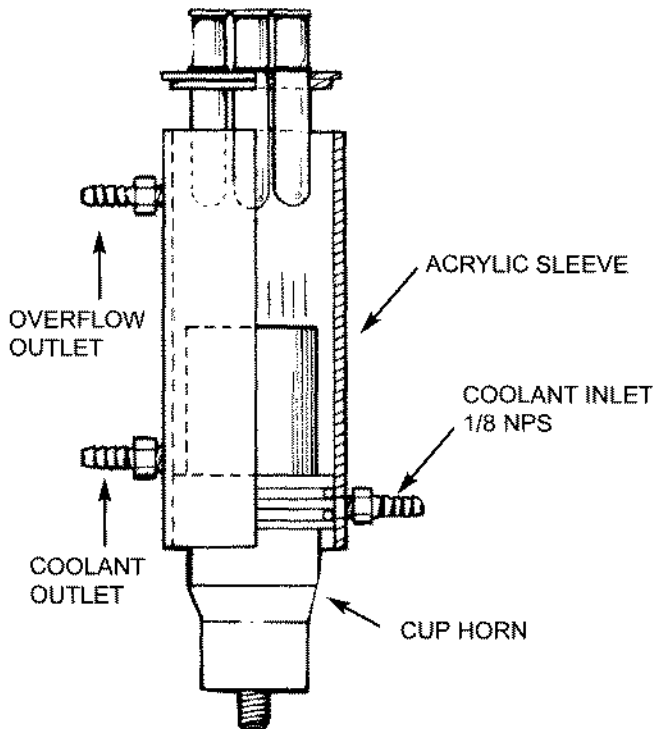
Cup Horn For Ultrasonic Cell Disruptors

Description:

The cup horn enables sonification of a sample without the horn coming in contact with the solution. It can simultaneously process a number of sealed vials or test tubes with identical parameters.

Typical Applications:

- Liposomes preparation
- Processes samples in complete isolation
- Precludes the possibility of any titanium migration
- Ideal for minute volume processing - down to 0.3 ml
- Processing of viruses, radioactive materials

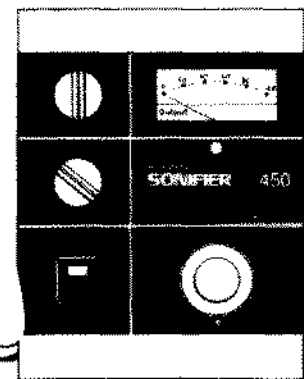


← CUP HORN processes multiple samples in sealed vessels (2" Dia. Part No. 101-147-047; 3" Dia. Part No. 101-147-048)



← CONVERTER receives electrical energy from power supply and converts to 20,000 Hz mechanical vibration. (Part No. 101-135-022)

POWER SUPPLY converts standard 60Hz line voltage to high frequency electrical power of 20,000 Hz.
Model 450, 400 watts)



High-intensity Cup Horn

Description:

Branson's water-jacketed cup horn ultrasonically processes samples in a test tube or a sealed vessel, thereby isolating the horn from the solution. One-piece solid titanium construction is utilized, allowing isolation of samples for treatment.

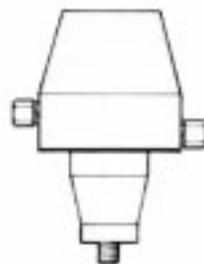
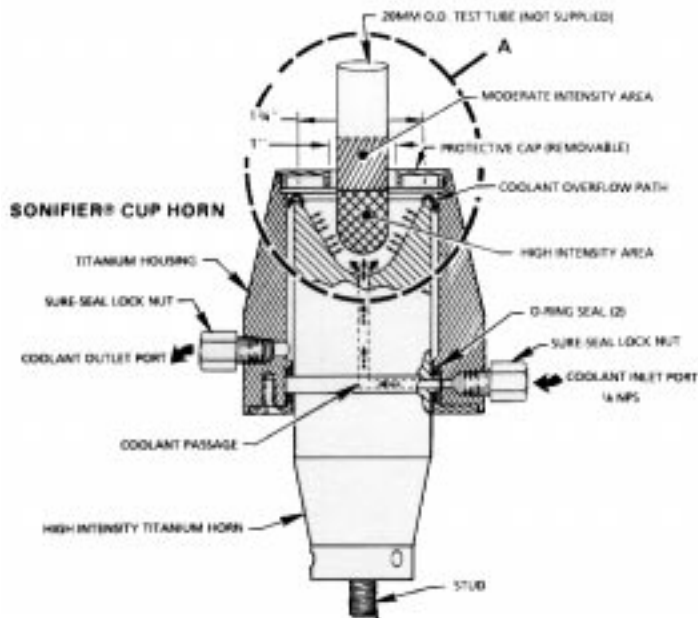
High-intensity cavitation is possible due to the horn's concaved shape. This design permits disruption of many cells and is used for emulsification, dispersion, creation of lipid vesicles, suspension, homogenization, and degassing.

Approximate overall length: 7" (180mm)
 Body diameter: 3-9/16" (91mm)
 Cavity size: 1-3/4" (43mm)
 Coolant port size: 1/8 NPT

Nalgon fitting for the coolant port is supplied.

Typical Applications:

- Blood chemistry
- Lipid vesicle preparation
- Tablet dispersion
- Waste homogenization
- HPLC solvent degassing
- Pigment dispersion
- Tissue culture
- Infectious solutions



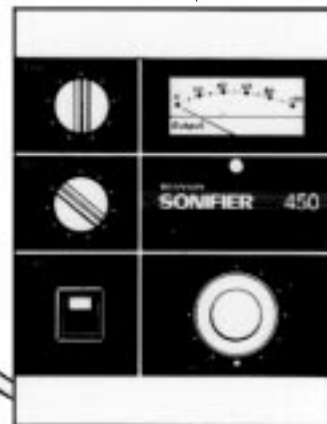
◀ HIGH-INTENSITY CUP HORN FOR PROCESSING SINGLE SEALED VESSELS (Part No. 101-147-046)



◀ CONVERTER receives electrical energy from power supply and converts to 20,000 Hz mechanical vibration. (Part No.101-135-022)



POWER SUPPLY converts standard 60 Hz line voltage to high frequency electrical power of 20,000 Hz. (Model 250, 200 watts; Model 450, 400 watts)



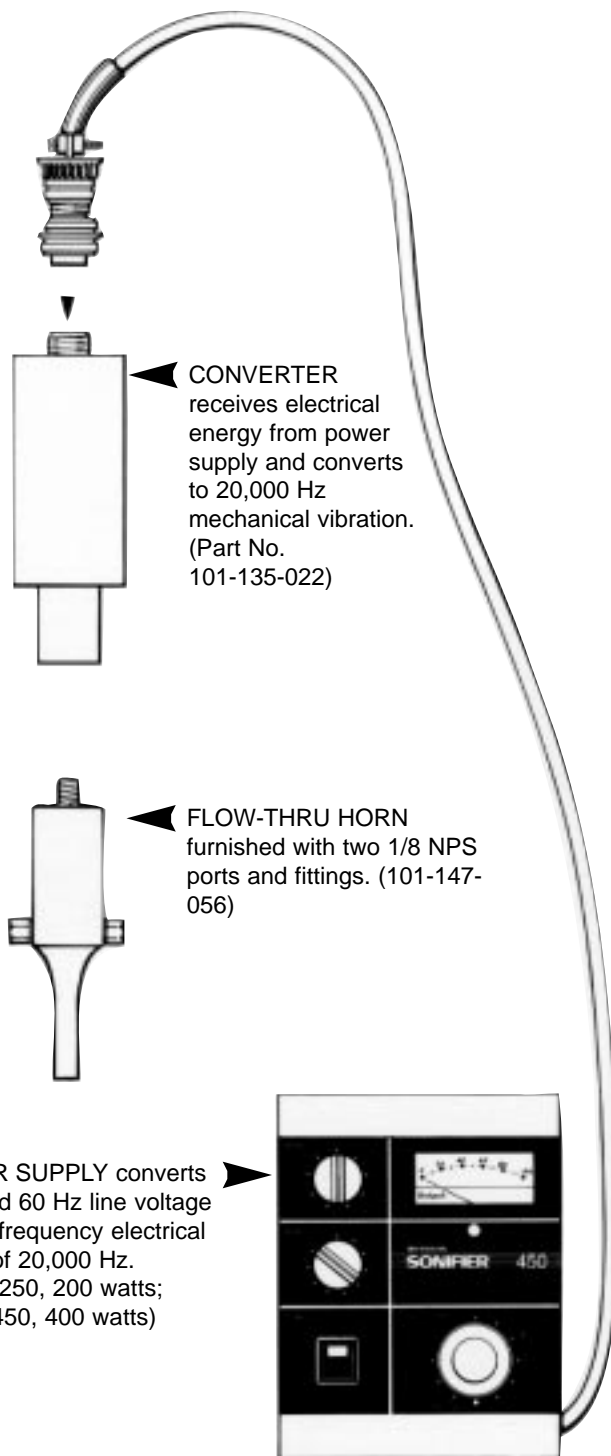
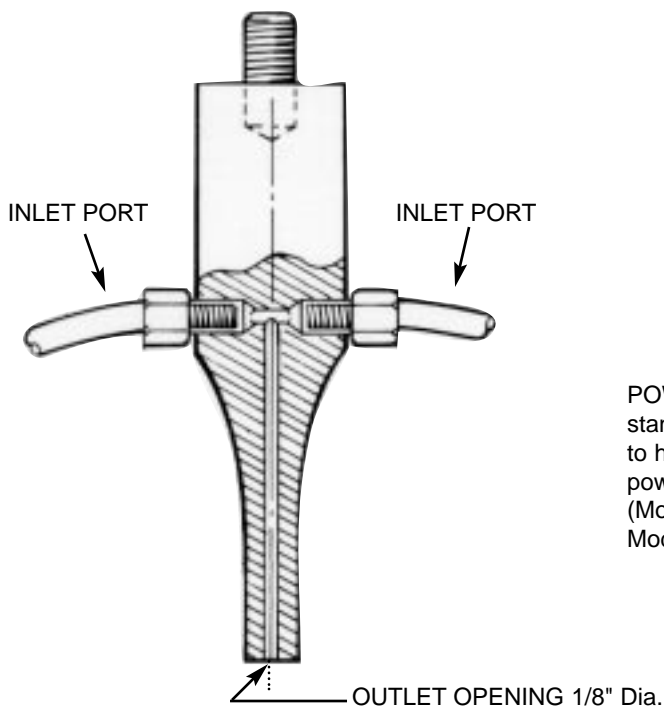
Flow-Thru Horn

Description:

Designed for pharmaceutical research, the flow-thru horn has two inputs or orifices at the non-vibrating nodal point of the horn. A premixed substance is fed through one of the inputs while the horn is ultrasonically activated. Because two inputs are available, two different types of material can be treated simultaneously. The processed solution exits at the tip of the horn. The horn may be used as a continuous-flow device to collect the solution in one large vessel.

Typical Applications:

- Mixing
- Emulsification
- Dispersion
- Formation of mists and fogs



Continuous Flow Attachment

Description:

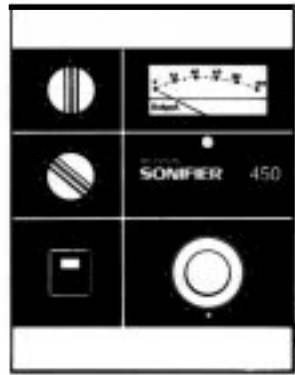
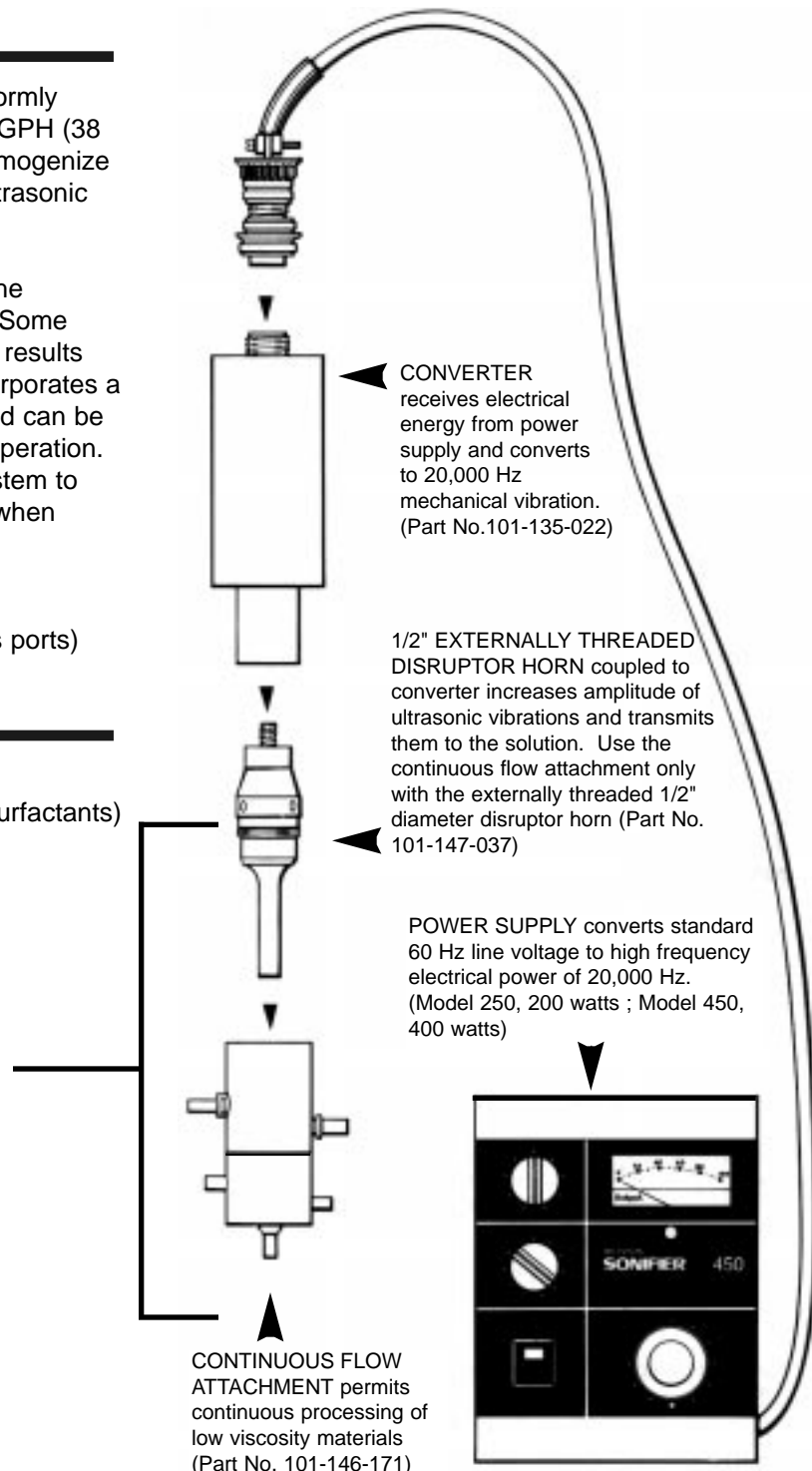
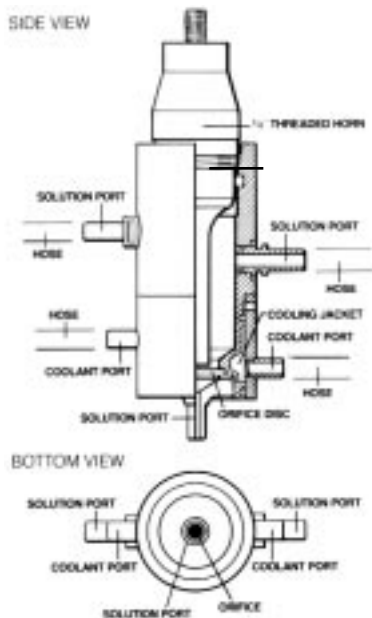
The stainless steel, in-line continuous flow cell uniformly processes low-viscosity solutions at rates up to 10 GPH (38 LPH). It can be used to emulsify, disperse, and homogenize by pumping a solution through a zone of intense ultrasonic activity.

The degree of processing is controlled by varying the amplitude of the ultrasonic horn and the flow rate. Some solutions may require recirculating until the desired results are obtained. The continuous flow attachment incorporates a cooling jacket through which a suitable cooling liquid can be circulated to retard heat build-up during extended operation. The attachment may also be sealed in a closed system to assure sterile conditions and inhibit contamination when working with infectious materials.

Overall Dimensions: Length - 5"
 Diameter - 3.8" (includes ports)

Typical Applications:

- Production of vaccines and antigens
- Emulsification of immiscible liquids (with or w/o surfactants)
- Removal of cell walls
- Dispersing metal oxides in solvents



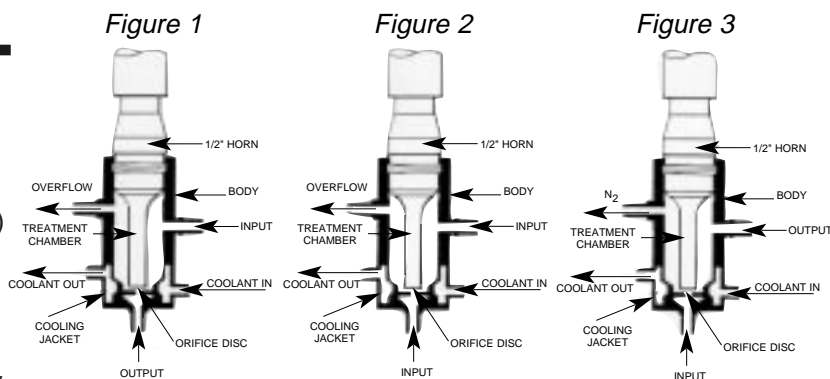
Usage Procedures:

To use your Branson continuous flow attachment:

1. Gently screw the clean continuous flow attachment onto the threaded disruptor horn (compress neoprene "O" rings to engage threads) until horn tip touches the orifice disc. **Caution:** Horn tip can damage the orifice disc if components are screwed too tightly together.
2. When horn tip is in contact with the disc, unscrew one complete turn. Each complete revolution increases or decreases the distance of the horn tip from the orifice by 0.30" (0.762mm). As a result, flow rates can be controlled and reset when needed. The smaller the distance between the tip and the disc, the slower the flow rate and the more intense the disruption, and vice versa.
3. Clamp the continuous flow attachment to a suitable stand and use appropriate input / output connectors (with 0.25" ID [6.35mm] hose), as shown in Figures 1, 2, and 3.
4. A gravity method or pump can be used to drive the solution through the continuous flow attachment. Before beginning flow, set the timer to hold, the duty cycle to constant, and select the desired power setting. Turn on the Sonifier II unit and immediately begin flow. You may want to discard first part of solution if it is not fully processed. If using a gravity flow method, be sure to turn the Sonifier off as soon as flow has stopped. *To prevent overheating, always avoid operating the Sonifier cell disruptor for more than a few seconds without liquid moving through the attachment.*

Troubleshooting:

Problem	Solution
Leaking at inlet/outlet	Replace 0.312" ID ports (7.65mm) "O" rings.
Air or foaming at horn interface	Replace 1.375" ID (34.52mm) "O" ring.
No or reduced flow rate	Ensure there is a space between horn face and orifice disc. Check for build-up of sludge or solids between orifice disc and base section, Part A.
Foaming of sample material	Check to ensure that solution level is above horn tip. Increase flow pressure.



EMULSION, DISPERSION, AND HOMOGENIZING

Solutions normally enter at the low side port and are processed beneath the horn face before exiting through the orifice at the bottom. An overflow port is provided, as well as connectors for circulating coolant. Solution may be fed to the attachment by either gravity feed or by use of a circulating pump (max. 5 PSI).

CELL DISRUPTION

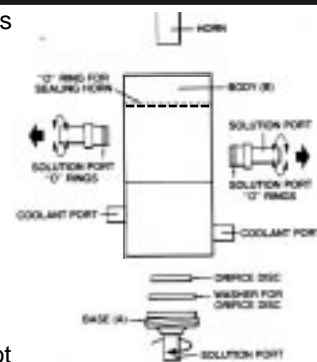
For cell disruption, it is advisable to reverse the flow of the solution, pumping it through the bottom opening, past the horn tip toward the low side port. **Note:** Because of limited ultrasonic exposure time, the attachment is not recommended for disruption of difficult cells such as strep or yeast.

FOAM CONTROL

To minimize foaming, use the reverse flow method. This will minimize foam build-up in the chamber, which, if allowed to accumulate, will result in a reduction in the transmission of ultrasonic energy into the solution. Introducing N₂ through the high side port will prevent peroxide formation, which can injure sensitive biological components.

Cleaning & Handling:

The continuous flow attachment requires careful handling, especially the ceramic disc. Replacement discs can be ordered from Branson. To disassemble for cleaning or sterilization, use the small open wrench supplied to unscrew the bottom or base (A) from the body (B), exposing the neoprene (rubber) washer and orifice disc. Solution ports are held in place by "O" rings and can be easily removed by a slight twisting and pulling action. Cooling ports are not removeable. To clean prior to autoclaving, rinsing and immersion in a Branson ultrasonic bench top cleaner is recommended. When reassembling, make sure that base section (A) is screwed onto the body (B) hand tight.



Replacement Parts:

Neoprene accessories:

- Washer for orifice disc (0.75" ID [19.05mm]) Part No. 100-114-027
- Solution port "O" rings (0.312" ID [7.65mm]) Part No. 200-087-024
- Sealing horn "O" ring (1.375" ID [34.52mm]) Part No. 200-087-059

Disc Orifice 1/8" (3.18mm) dia. Part No. 100-036-010
 Max. pressure 50PSI (3.5kg/sq.cm). Max. flow rate 10 GPH (38 LPH)

For industrial applications, continuous flow attachments are available which enable the processing of larger volumes. These attachments require a 900-watt Sonifier II unit and can accommodate 1" or 1-1/2" diameter horns. For detailed information about our industrial applications equipment, see the ULTRASONIC LIQUID PROCESSING technical sheet.

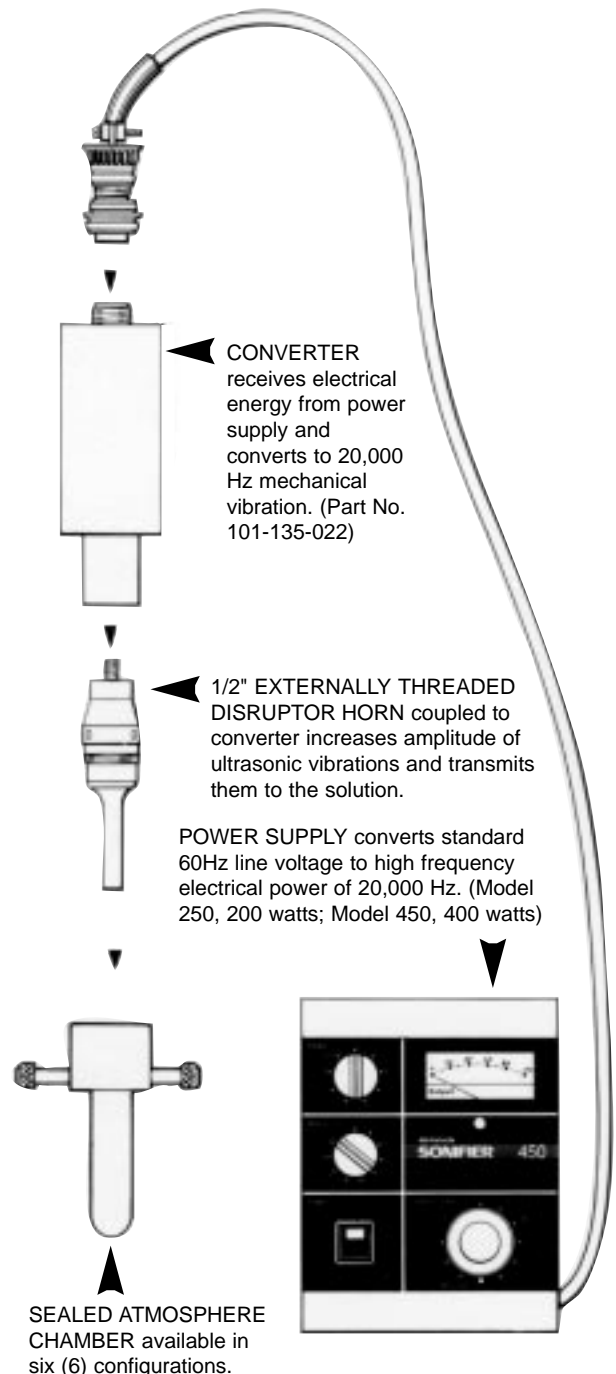
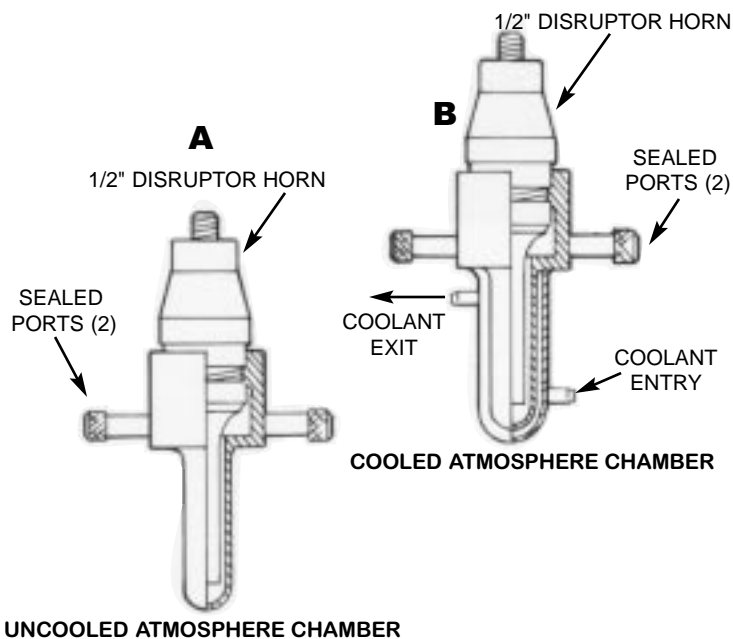
Sealed-Atmosphere Treatment Chamber

Description:

This accessory is designed for batch treatment of infectious materials in an isolated environment with an inert atmosphere and ice-bath cooling, if desired. The solid stainless steel chamber screws onto the horn with a neoprene O-ring seal and can be autoclaved. It is equipped with hose connections above the liquid level to permit purging with an inert gas and for filling/emptying without breaking the atmospheric seal. Standard chambers will permit treatment of 3-10 ml, 6-15 ml, or 25-50 ml volumes and can be obtained with or without a built-in cooling chamber.

Typical Applications:

- Pressure sonification to increase cavitation intensity
- Sonify in inert environments
- Hazardous material sonification
- Capture released gasses



SIZES AVAILABLE	"A" UNCOOLED	"B" COOLED
3 to 10 ml	101-021-001	101-021-004
6 to 15 ml	101-021-002	101-021-005
25 to 50 ml	101-021-003	101-021-006

Acoustic Enclosure Instructions

Description

Although ultrasound is above the audible range of the human ear, mechanical noise occurs when liquids are treated ultrasonically. The noise may be disturbing in a room with low ambient noise level if exposed for prolonged periods of time.

Operating the Sonifier® in the Soundproof Enclosure can minimize mechanical noise produced by ultrasonic processing. The sturdy cabinet is lined with waterproof, sound-abating material, which is impervious to most solutions or laboratory reagents and can be easily cleaned. A fully-transparent door enables viewing of the process while limiting the noise to an acceptable level.

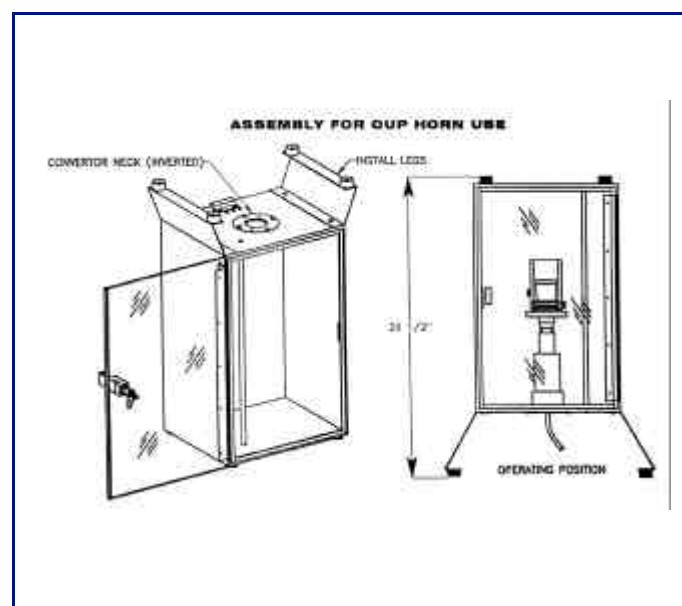
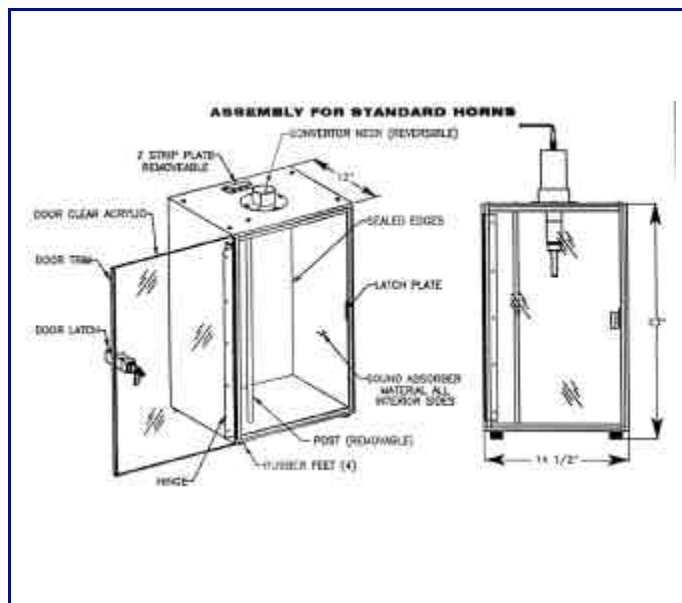
The decibel rating will lower by 20-25db.

Openings at the top and bottom of enclosure make for easy access for use with either a cup horn or standard probes (see illustrations at right).

Specifications

Actual Weight: 19.5 lbs.
Shipping Weight: 30 lbs.

I.D.: 12.75"L X 20.75"H X 10.5"D
O.D.: 14.5"L X 23"H X 12"D



The Sonifier[®] II

*For Ultrasonic
Cell
Disruption*



BRANSON

The Ultrasonic Concept

Cell disruptions, homogenizations and emulsifications as induced by Sonifier[®] II are the result of cavitation, created by ultrasonic vibrations.

Line current at 60 Hz, 117 volts, is increased to 20,000 Hz electrical energy through a solid state power supply. The electrical output from the power supply is applied to a converter, where it is changed to a mechanical vibration. Vibrating in a longitudinal direction, the converter transmits this motion to a specially designed acoustical tool known as a horn, or probe.

When the tip of the horn is immersed in a biological solution, the ultrasonic vibrations cause cavitation. Cavitation is the formation of microscopic bubbles within a solution caused by rapid reduction of local pressures and the subsequent collapse of these bubbles. When ultrasonic energy is transmitted through a solution it travels as a wave, alternately increasing and decreasing the pressure within the liquid. The intensity of these vibrations is sufficient to reduce the absolute pressure of the solution below its vapor pressure, resulting in local "cold boiling," or cavitation, to take place. This creates millions of very small, powerful vapor bubbles. The collapse of these minute bubbles during the positive portion of the cycle produces shock waves of sufficient magnitude to do useful work. Cavitation intensity depends on the amplitude of the horn and the properties of the medium. Ultrasonic cavitation provides fast, complete and controlled processing.

The ultrasonic vibrations transmitted through the horn can also be applied directly or indirectly to samples, using a variety of specially designed horns, tips or chambers that attach to the horn or converter.

The Branson Sonifier[®] II Ultra-efficient Cell Disruption

Performance Design Advantages

Built-in automatic tuning. Engineering that fits the needs of the operator. A compact shape that saves one-third the space required by other units. A slanted front panel for clear visibility and quick, convenient access to controls. And a choice of two units in power levels of 200 or 400 watts. All lab-efficient benefits designed by Branson into 'Sonifier' II, the new generation of ultrasonic cell disruptors.

These advantages provide easier, more accurate meter readings and simpler operation. They assure constant, peak performance—even when changing from standard probes to special tips for critical applications.

And because of its value-engineering, the 'Sonifier' II series costs less. Which means the finest cell disruptor in the field is also very competitively priced.

Lab & Pilot Applications are many and varied. The versatile 'Sonifier' II can be used to:

- Accelerate chemical reactions
- Degas liquids
- Disintegrate bacteria and yeast

- Disrupt cells and tissues
- Emulsify immiscible chemicals
- Extract macro-molecules
- Isolate subcellular organelles
- Prepare liposomes
- Release viruses from tissues

Here are the principle features that make all this possible:

Solid-State Power Supply designed for continuous operation. Automatic frequency control circuitry continuously monitors the power required to maintain the preset amplitude under varying load conditions. Internal sensing circuitry prevents overheating or damage to the instruments or components.

Broad Band Tuning eliminates the critical manual tuning function and the chance of human error. When changing from standard horns to special tips the power supply is automatically tuned to optimum performance levels.

Output Control permits the operator to control the intensity of activity in a solution by varying the amplitude of the ultrasonic vibrations. Thus, one compound can be disrupted while others, slightly more resistant, remain intact.

Horn Amplitude Rating (Cavitation Intensity)
Refer to color bands on pictured horns.

Horn	Intensity	Volume
■ Standard Disruptor	High	10-250 ml
■ Double Stepped Micro tip	Very high	250-500 μ l
■ Tapered Micro tip	Ultra high	0.25-2 ml



Sonifier II: Slanted for Ultrasonic

Timer provides the means to control ultrasonic energy applied in increments between 0-15 minutes. Continuous operation is achieved by turning the control to the "HOLD" position.

Duty Cycle includes a pulser mode which enables the ultrasonic energy to be applied in pulses, thereby limiting the temperature increase of the solution which can result from constant exposure to ultrasonics. The energy is applied at one pulse a second, the duration of the pulse can be adjusted from 0.1 to 0.9 second. Continuous sonics result when the switch is in the "constant" position.

Output Meter indicates the percentage of ultrasonic power emitted at any output control setting. The recording of meter reading and output control setting permits any established power level to be reproduced.

Converter (a Piezoelectric design) transforms electrical energy to mechanical vibrations at better than 95% efficiency. The solid-state circuitry and sealed housing eliminate the need for cooling during continuous operation.

Standard Disruptor Horn is made of a non-contaminating titanium alloy with excellent acoustical properties. Available with a solid or tapped end to accept replaceable tips. These horns have external threads to facilitate the attachment of various chambers.



SONIFIER® 250-450

Branson Ultrasonics Corporation pioneered high intensity ultrasonics and has manufactured Branson Sonifier Cell Disruptors for over 25 years. The new generation of cell disruptors, the 'Sonifier' II, is available in two power levels, 200 and 400 watts. For higher powered applications, Branson offers the 184V Liquid Processing System. This 900-watt unit is ideally suited for low volume production or for determining the scale-up parameters needed to process production volumes.

Specifications

L 16 $\frac{3}{4}$ " (425.45 mm)
W 7 $\frac{3}{8}$ " (187.32 mm)
H 8 $\frac{3}{8}$ " (212.72 mm)
WT 19 lbs. (8.62 kg) Model 250
25 lbs. (11.34 kg) Model 450

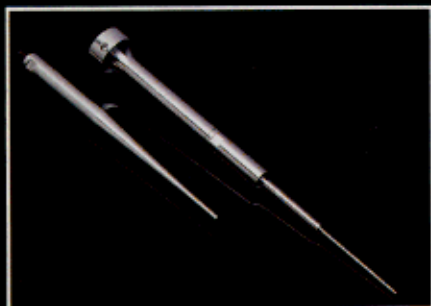
POWER REQUIREMENTS 117V, 5 amp, 50/60 Hz



Branson Sonifier Ultrasonic Cell Disruptors carry a one-year warranty on all components for defects in material and workmanship. They comply with FCC rules and regulations governing radio frequency interference and meet non-patient contact ground leakage specifications.

Accessories for Optimum Performance

Tapered Micro Tip attaches directly to a standard tapped disruptor horn. The amplitude at the end of a tapered tip is three and a half times greater than that of the standard horn. It is recommended for difficult applications such as spores, fungi, yeast, muscle, and connective tissue. Excellent results can be achieved on volumes ranging from 1 to 2 ml in a comparatively short period of time. The diameter of the tapered micro tip is $\frac{1}{8}$ " (3.2 mm). Diameters of $\frac{1}{4}$ " (6.4 mm) and $\frac{3}{16}$ " (4.8 mm) are also available.



Stepped Micro Tip is a two-piece horn consisting of a coupling section and a lower tip. The coupling section attaches directly to the converter. Recommended for use on extremely small volumes, the stepped tip can be used to treat volumes ranging from 250-500 μ l. Applications for this tip include red and white blood cells, tissue culture cells, HeLa cells and the complete range of cells which have low to medium resistance to breakage.



Soundproof Box. Even though ultrasound is above the audible range of the human ear, mechanical noise occurs when liquids are treated ultrasonically. The soundproof box reduces this noise to a lower level. Outside Dimension: 15 $\frac{1}{2}$ " x 15 $\frac{1}{2}$ " x 23 $\frac{1}{2}$ " (393.7mm x 393.7mm x 596.9mm).



Continuous-Flow Attachment permits continuous processing of low viscosity materials at rates up to 38 liters per hour. Designed



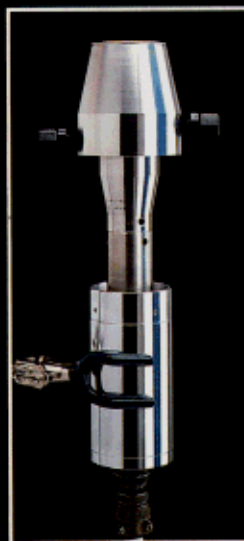
primarily for emulsifying, dispersing and homogenizing, the continuous-flow attachment will disrupt most cells. A water jacket, input, output and overflow connections are provided.

Glass Rosett Cooling Cell moderates sample temperature. The ultrasonic pressure mixes and circulates the liquid through the three side arms and the main chamber. By immersing the cell in a cooling bath, the temperature of the liquid can be maintained near that of the external bath.

Cup Horns perform two functions:
1. Samples can be sonified in sealed vessels, eliminating possible contamination from the horn, tip or any atmospheric condition.
2. Simultaneous processing can be performed in sealed vials or micro tubes under identical parameters.

The cup horns are offered in two styles.

Standard. A specially designed flat-faced horn is enclosed in a see-through cup. The horn provides maximum ultrasonic activity when used with a flat-bottomed sample container or when processing one or more test tubes.



High Intensity. A specially designed internal parabolic configuration provides maximum ultrasonic intensity for cell disruption, emulsification, dispersions, creation of liquid vessels, suspension, homogenization and degassing.

For further technical information, please write to:

BRANSON

BRANSON ULTRASONICS CORPORATION

Eagle Road, Danbury, CT 06813-1961 (203) 796-0400

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The Branson Sonifier S-150D digital ultrasonic cell disruptor is a versatile laboratory tool designed for biological and liquid processing applications. The S-150D delivers up to 100 watts of ultrasonic power to the thumb switch activated microprobe. It is particularly useful for smaller samples ranging in size from 200 microliters to 100 milliliters. Its compact size minimizes bench space while the angled front provides visibility and access to the controls. Sonifier cell disruptors are widely used in research and pharmaceutical laboratories for disrupting tissues, bacteria, viruses, spores and other cellular structures. Additional applications for the Sonifier S-150D include homogenization, emulsification, dispersion, fine mixing and acceleration of chemical reactions. The economical price puts this valuable tool within reach of even the smallest labs.

KEY FEATURES

- Designed for the need to process smaller samples
- 100 watts of power at the horn tip for difficult tasks
- Variable output to match amplitude to specific needs
- High visibility LED wattmeter to display output power
- Autotuning assures optimal performance at all levels
- Continuous & pulsed operation modes for flexibility
- Thumb switch on the probe for pulsing convenience
- High gain 1/8" microtip included as standard

SONIFIER® MODEL S-150D DIGITAL CELL DISRUPTOR

- Convenient probe/tip cradle built into the cabinet
- Complies with UL & CSA requirements for safety
- Meets CE standards for operation in Europe
- Available in multiple voltages for international use

OPTIONAL ACCESSORIES

- Other microtips: 3/32", 3/16", and 1/4"
- Plug-in timer for extended applications
- Sound enclosure to minimize noise

SPECIFICATIONS

<i>Dimensions:</i>	6.8"H X 7.5"W X 13.0"D
<i>Weight:</i>	9.2 pounds
<i>Output frequency:</i>	23 kilohertz
<i>Maximum output:</i>	100 watts
<i>Output range:</i>	20%-100%
<i>Input power:</i>	100V, 50/60 Hz, 6.1A 115V, 60 Hz, 5.8A 220V, 50 Hz, 3.0A
<i>Duty cycle:</i>	Continuous/intermittent

BRANSON ULTRASONICS CORPORATION

41 Eagle Road, Danbury, CT 06813-1961 • (203) 796-0339 • FAX (203) 796-2240 • www.Sonifier.com

Branson SE Asia
Hong Kong

Branson Europe
Dietzenbach, Germany

Branson Japan
Tokyo, Japan

Branson Canada
Markham, Ontario

Branson de Mexico
Nuevo Laredo, Mexico



The Branson Digital Sonifier® Ultrasonic Cell Disruptor is a versatile laboratory unit designed for biological and liquid processing applications where precise control and parameter measurement is required. Available in two power levels, the unit is capable of processing applications in volumes from 1ml to 500ml+. Its compact shape minimizes bench space, while the angled front provides clear visibility and access to controls. Applications appropriate for the Sonifier include all forms of liquid processing from biological cell disruption, emulsification, dispersion, and acceleration of chemical and biological reactions.

KEY FEATURES

- System modes in choice of: Continuous, Timed, Pulse, Temperature (with optional probe), and Pulse/Pause
- Front-panel, 80 character LCD display showing parameter settings, alarms, and messages
- Membrane front panel with numeric keypad for parameter entry and feature selection
- Digital parameter setting with valid parameter range checking
- Digital timer (9 hours, 59 minutes, 59 seconds)
- Twenty (20) presets for different parameter setups
- Separate front-panel stop and pause buttons for experimental cycles
- Power output of up to 200 watts (Model 250) and up to 400 watts (Model 450)
- Digital wattmeter
- Front panel bargraph display of relative power while running
- Amplitude is adjustable from 10-100%
- Sample hold using pulse/pause operation
- Automatic end-of-cycle using limits
- Parallel printer interface
- Printed report capability with date stamp and parameter information
- Serial interface RS-232C (for remote computer or terminal)
- User I/O offers remote start/stop control and the ability to view temperature, amplitude, and power values during experiments.
- Self-diagnostics check performed on power-up

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SONIFIER®

MODELS S-250D & 450D DIGITAL CELL DISRUPTOR

- At System Setup, select a language for display: English, German, Italian, French, or Spanish
- Ambient temp. between 41°F (5°C) and 122°F (50°C)
- Nominal 117V or 200-245V models available

ELECTRICAL SPECIFICATIONS

Power Requirements:

117V, 5 amps, 50/60 Hz

Output Power

Model 250: up to 200 electrical watts to converter

Model 450: up to 400 electrical watts to converter

Duty cycle: Continuous/Intermittent

MECHANICAL SPECIFICATIONS

Dimensions:

Height: 8-3/4"
Width: 7-3/8"
Length: 16-3/4"

Weight:

Model 250: 20lbs.

Model 450: 22 lbs.

The Digital Sonifier® Ultrasonic Cell Disruptor Models 250 and 450 comply with FCC rules and regulations governing RF interference and meet non-patient contact ground leakage specifications. They are CE compliant.

ULTRASONIC LIQUID PROCESSING



GENERAL DESCRIPTION OF PROCESS

Ultrasonic processing uses high frequency vibrations (20,000 cycles per second) to produce intense cavitation in liquids. Cavitation bubbles develop localized energy levels many times greater than energy levels achieved by mechanical mixing or high pressure devices.

Typical applications for the liquid processing cell include emulsification, dispersion, extraction, biological cell disruption, and acceleration of chemical reactions. Other cavitation applications involve removing entrapped gas, impregnation, cleaning microscopic contamination from hard-to-reach areas, and the breaking of crystals along their natural lines of cleavage.

Ultrasonics is usually most cost effective as a final treatment process or on applications which cannot be completed satisfactorily using conventional equipment and methods. Highly viscose materials will adapt more readily to cavitation if they can be heated to reduce viscosity or treated under pressure.

The Model 910BC processing system is designed for low volume production or for determining those scale-up variables which need to be investigated such as flow rate, pressure, ultrasonic power, horn amplitude, liquid temperature and viscosity. Once these have been established, a production system can be designed to produce the desired results and required volumes.

HOW ULTRASONICS WORK

A power supply transforms 117V line current to high frequency electrical energy at 20 kHz. This is fed to a piezoelectric element, called a converter, which changes the electrical energy to 20 kHz mechanical vibratory energy.

These vibrations are coupled to the horn which transmits the high frequency vibrations into the solution to produce intense cavitation.

PROCESSING CELL

Two processing cells are available, one for use with the 1" diameter horn and the other for a 1-1/2" diameter horn. Both cells are constructed of 300 series stainless steel; the orifice adapter is made of titanium. "O" rings made of Viton seal the chamber to the horn. The cells are capable of operating at 392°F (200°C) and pressures up to 500 psig (3448 kPa). The inlet and outlet ports are 3/8" IPS (9.5 mm).

Output rate will vary depending on the application and the amount of ultrasonic energy required to accomplish the desired results. Ten gallons per minute would be considered a lower energy application. Less than one gallon per minute would be considered a high energy application.

SCALE-UP

Complete systems can be configured to meet a wide variety of operating conditions. Performance can be predictably scaled from data obtained from small scale process evaluation. The most economical method for increasing capacity by a factor of 2 to 6 is using standard processing cells in parallel. For large scale factors, special chambers consisting of horn arrays with input and output manifolds can be designed.

Batch lots can usually be treated during transfer to storage vessels by selecting ultrasonic equipment necessary to process the batch in allowable time. Processing heat sensitive materials requiring high ultrasonic energy input may require passing the material through multiple processing cells in series with heat exchangers between stages.

WARRANTY

The Branson Model 910BC Power Supply carries a one-year warranty on all parts and workmanship. (Note: This warranty applies to power supplies purchased and operated in the United States. For warranty information on units purchased outside the U.S., contact your local representative.)

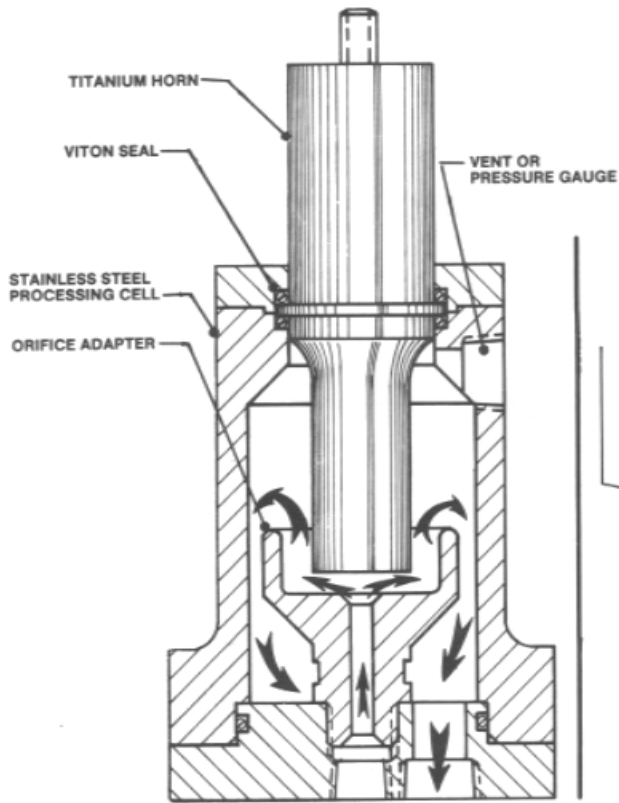


41 EAGLE ROAD, DANBURY, CONNECTICUT 06813-1961

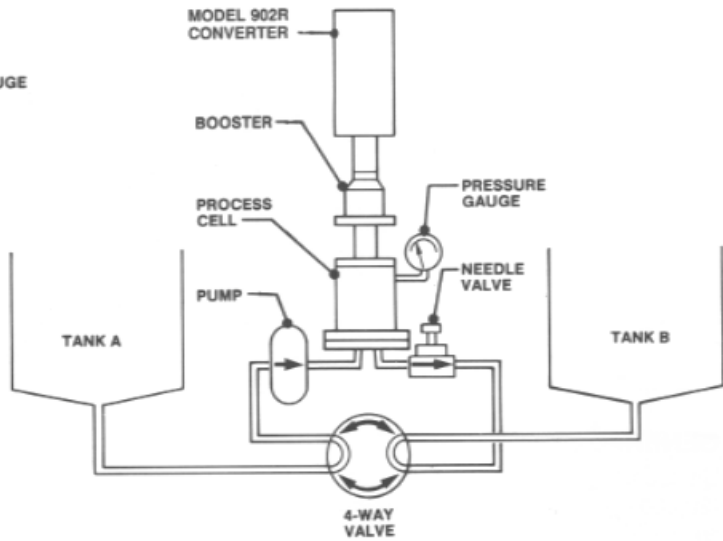
(203) 796-0400

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Revised, 8/91, Printed in U.S.A. 8/91

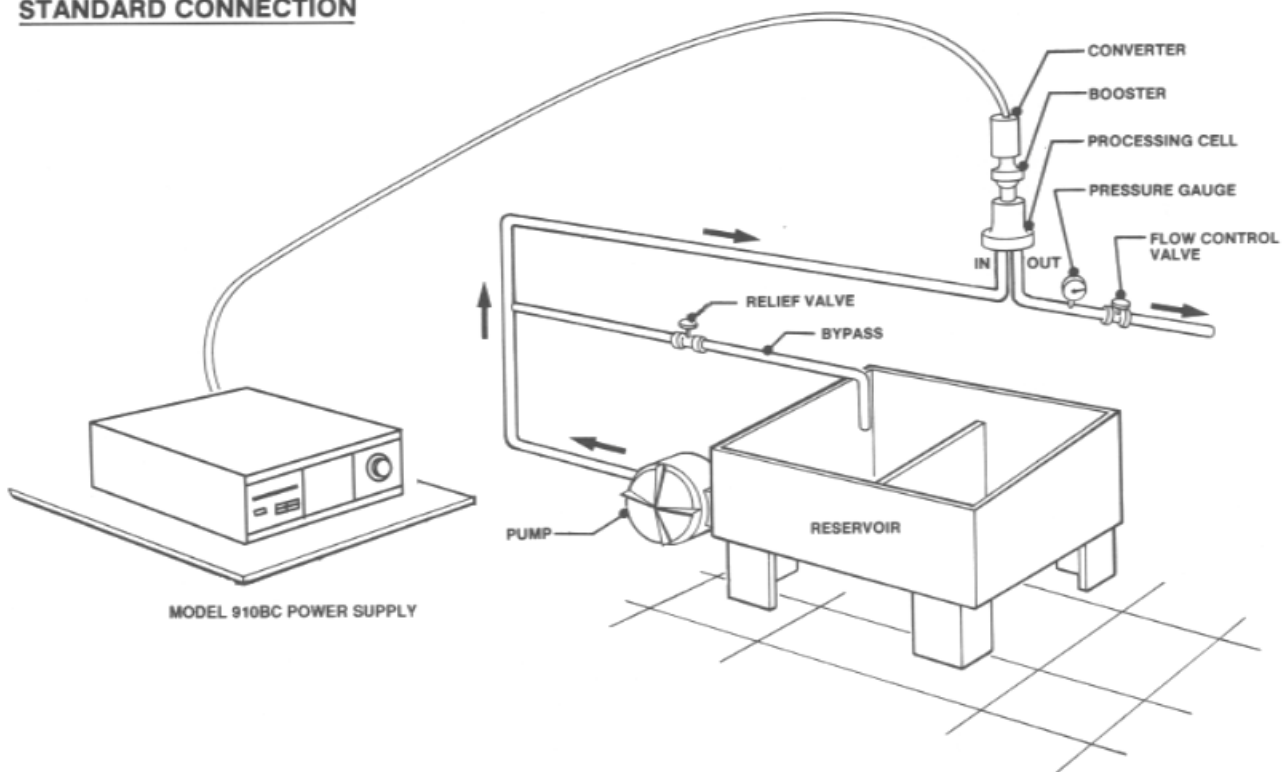
HOW IT WORKS — Intense mixing is achieved when liquid enters the cell and is exposed to the face of the horn which is vibrating at 20,000 Hz.



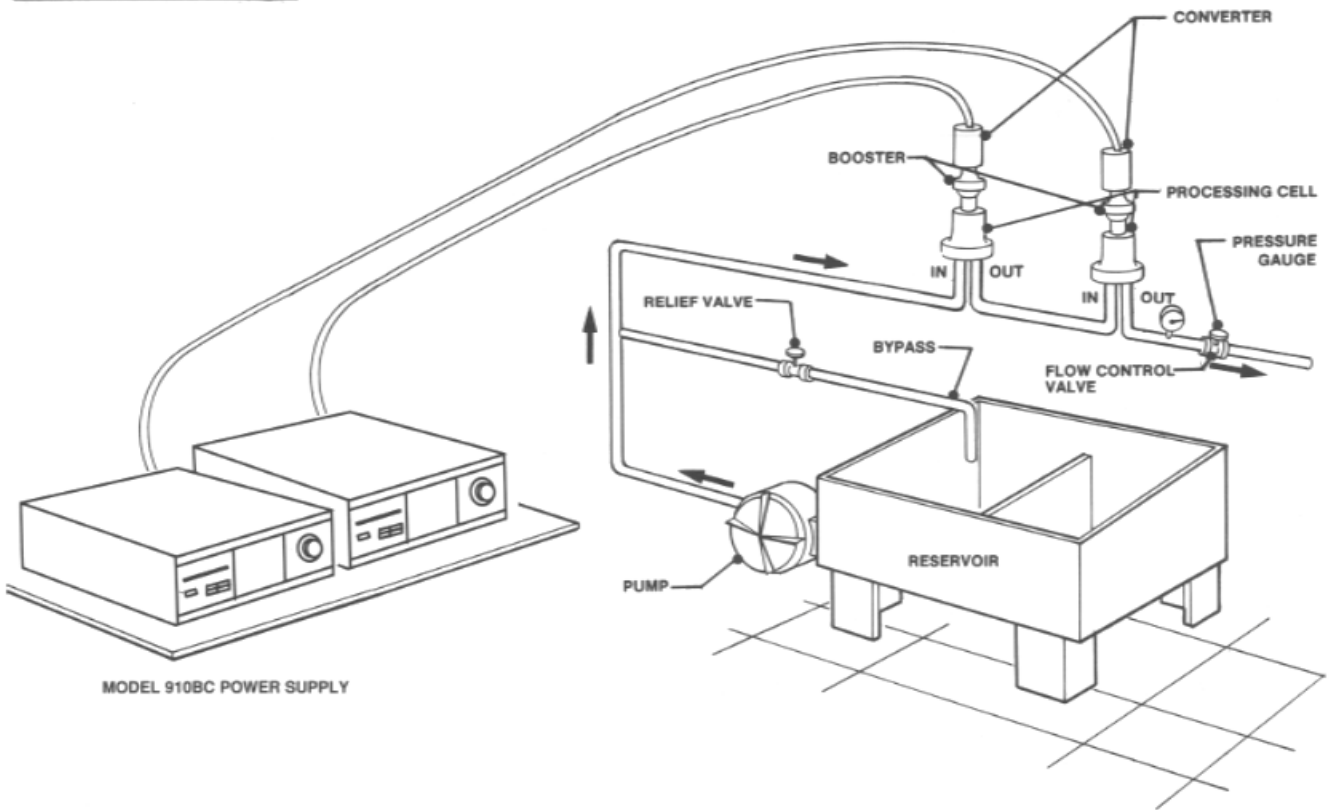
MULTIPLE PASS BATCH SYSTEM



STANDARD CONNECTION

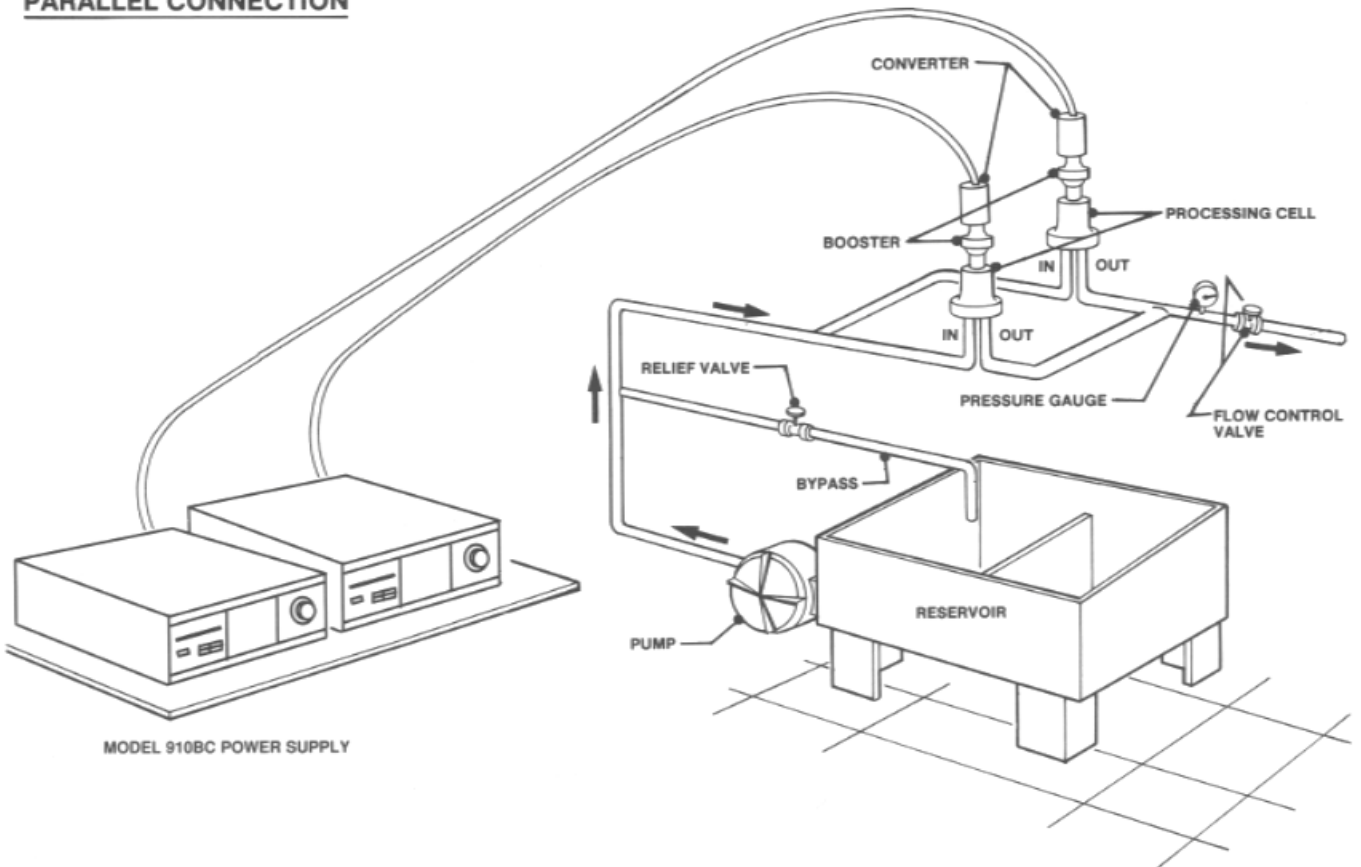


SERIES CONNECTION



MODEL 910BC POWER SUPPLY

PARALLEL CONNECTION



MODEL 910BC POWER SUPPLY

KEY EQUIPMENT FEATURES

- **Exclusive System Protection Monitor/Autotune (SPM/AT) Circuitry** ensures maximum reliability by necessitating correct operating conditions, terminating ultrasonic power when the system is operated under adverse conditions (e.g., excessive power supply loading, improper, loose, or failed horns or booster), thereby protecting power supply and other system components.
- **Patented Autotune** feature allows the power supply to track and compensate for changes in stack frequency that occur over time during production due to increased horn temperatures, wear to the horn face, or material buildup on the horn.
- **Automatic amplitude compensation** provides constant horn amplitude over the full range of rated power encountered during the operating cycle.
- **An internal amplitude control** may be used to vary horn amplitude and power output.
- **Fast response LED meter** displays power loading in 5% increments and provides excellent visibility and storage of the peak power achieved during the weld cycle; 100% of rated output of power supply is delivered at full meter reading.

MECHANICAL SPECIFICATIONS

Power Supply

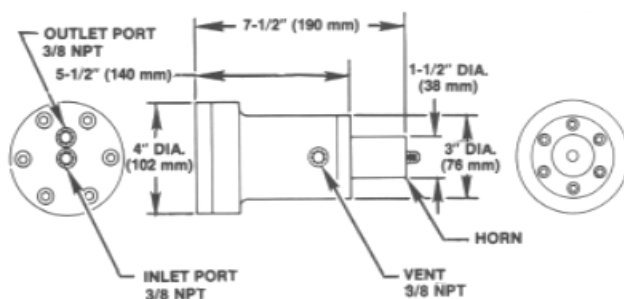
Dimensions:

Height:	6-1/4" (159 mm)
Width:	16-5/8" (422 mm)
Depth:	19-3/8" (492 mm) (plus 3" [76 mm] cable clearance)

Weight: 36 lbs. (16.3 kg)

Processing Cell

Weight: 9 lbs. (4.1 kg)



Note: Dimensions are nominal.

ELECTRICAL SPECIFICATIONS

Power Requirements:

Line voltage:	117V AC
Input current:	14 Amps

Electrical Connection: NEMA 5-15P plug provided, requires NEMA 5-15R receptacle.

Output Power:

Output power to converter:	1000 watts
Output power to load at 100% meter reading:	950 watts
Output power, continuous duty (max. recom.):	800 watts

Frequency: 20 kHz

External inputs/outputs:

Overload indication: } Weld on: }	Both 24V DC, 24mA negative logic and dry (clean) contact closure (120V AC, 60 VA) available.
External reset:	+ 24V external input (24V DC, 25mA)
0-5V power signal: (optional)	200k ohm min. load impedance

Note: All specifications subject to change without notice.

ORDERING INFORMATION

Branson EDP No.

910BC Power Supply, 117V, 50/60Hz; with 902R converter (air cooled) * and 8' J931 cable. For continuous duty.	101-063-292
Processing cell with seals and orifice adaptor for use with 1" titanium horn.	101-123-007
Processing cell with seals and orifice adaptor for use with 1" titanium horn with carbide face.	101-123-008
1" diameter titanium horn (for use in processing cell).	101-147-051
1" diameter titanium horn with carbide face (for use in processing cell).	101-147-054
Processing cell with seals and orifice adaptor with 1-1/2" titanium horn.	101-123-009
Processing cell with seals and orifice adaptor for use with 1-1/2" titanium horn with carbide face.	101-123-010
1-1/2" diameter titanium horn (for use in processing cell).	101-147-052
1-1/2" diameter titanium horn with carbide face (for use in processing cell).	101-147-053
Processing cell with seals and orifice adaptor for use with 1" horn.	109-043-144
Processing cell with seals and orifice adaptor for use with 1-1/2" horn.	109-043-145
Booster horn, ratio 1:1.5 (gold)	101-149-092
Booster horn, ratio 1:2 (silver)	101-149-094
Booster horn, titanium, ratio 1:2.5 (black)	101-149-091

*Converter requires 60 standard cubic ft/hr of compressed air for cooling.

BRANSON ULTRASONICS CORPORATION

41 Eagle Road, Danbury, CT 06813-1961

(203) 796-0400



900 Series Models 900MA and 900BCA 20 and 40 kHz Advanced Ultrasonic Power Supplies

General Description

Branson's *Advanced* power supplies are a revolutionary advance in ultrasonic power technology and process control. Although transparent to the user, the patented circuitry with closed loop amplitude control provides significant benefits in performance, consistency, and higher productivity, especially in applications requiring a high level of process control and weld quality. In many cases, it will reduce the standard deviation, thus increasing the Cpk (capability index) of the welding process.

Advanced models include the features and controls of standard 900M, B, and BC units, plus the following unique features and benefits.

Key Features

- **Electronic Amplitude Control** - Amplitude is an extremely important variable in ultrasonic welding. Electronic amplitude control makes it possible to not only set amplitude, but also to change amplitude *during* a weld cycle, and to maintain the specified amplitude regardless of variations in the incoming line voltage or applied load.
- **Amplitude Change** - Amplitude can be *increased or decreased* instantaneously *during* the weld, making possible a level of control of the process not previously feasible. (See Figure 1.) Infinitely variable control allows internal/external control of amplitude by a potentiometer or electronic signal. The control signal can come from a user-provided source, or from Branson's WPC-1 or WPC-2 Weld Profile Controllers. The working amplitude range is from 10 to 100%.

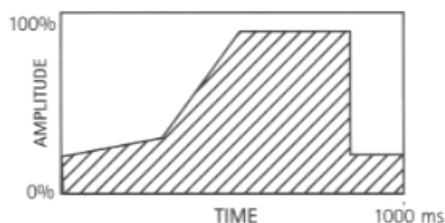
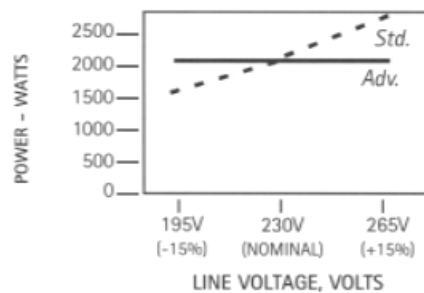


Figure 1. Sample Amplitude Profile

- **Line Regulation** - Output amplitude is maintained with a variation of only $\pm 2\%$ with line voltage variations of $\pm 15\%$, providing the func-

tion of a constant voltage transformer. This corrects for variations due to power source fluctuations (Figure 2) through closed loop amplitude control. It ensures *constant power in welding, and provides greater weld consistency and reliability*. The 200-245V unit has four user-selectable settings to most closely match the incoming line voltage.



Adv. = Advanced Power Supply, Std. = Standard Power Supply

Figure 2. Constant Amplitude/Power

- **Load Regulation** - Regardless of load, the power supply will deliver the selected amplitude from the converter. (Figure 3.)

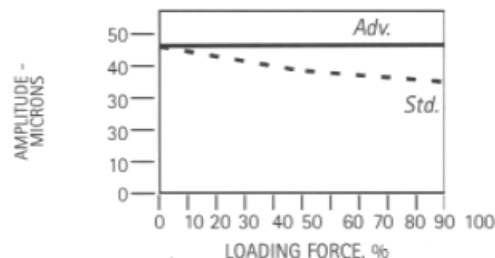


Figure 3. Amplitude vs. Loading

- **Force Requirement** - Because of constant amplitude, *significantly* less force, or conversely, less stack amplitude, is required to accomplish a weld using these power supplies. (Figure 4.)

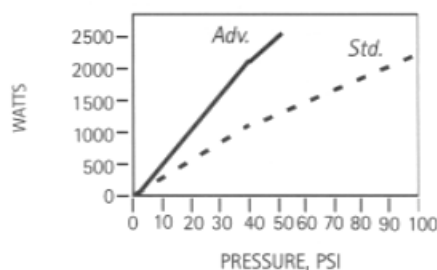


Figure 4. Power Output vs. Pressure

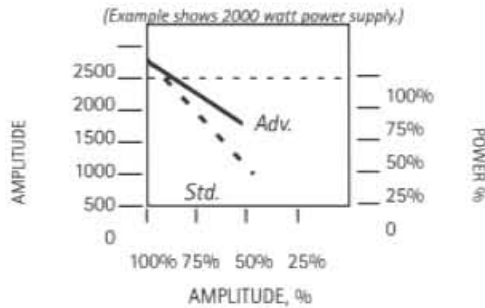
*3000 Watt units maintain $\pm 15\%$ and -10% .

**Applied
Technologies
Group**

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Fax (203) 796-9838
Email: info@bransonultrasonics.com

The advantages of lower force are less flash and less deflection of thin-walled parts during welding. The advantages of lower amplitude are the reduced possibility of part marking and the welding of more delicate parts.

- **Power vs. Amplitude Setting** - When changes in amplitude are made, the maximum power available also changes. With electronic amplitude, a direct relationship is maintained between amplitude setting and power. (Figure 5.)



Adv. = Advanced Power Supply; Std. = Standard Power Supply

Figure 5. Maximum Power Output - 2000 Watt Unit

- **Autotune plus Memory (AT/M)** - Provides fully-automatic tuning in a range of ± 500 Hz centered around 19.950 kHz for 20 kHz horns, and ± 100 around 39.900 kHz for 40 kHz horns, and stores horn frequency at the end of each weld. Horn frequency may also be stored with each Auto Seek function.
- **Auto Seek** is used to track the operating frequency when the system is idle. It automatically measures horn frequency by running the horn at a low-level amplitude (5%) to find and lock on to the horn operating frequency and store it in memory. Four selectable Auto Seek choices are available:
 1. On power-up
 2. Externally with automation controller
 3. Depressing "test" switch
 4. By once/minute timer to track heating, cooling, and other effects (e.g., in continuous and high cycle rate applications, the horn can increase in temperature and change frequency).
- **Selectable Starting Rates** - Dipswitch selectable start rates - 10, 35, 80, 105 milliseconds, to accommodate starting characteristics of a wide variety (range) of horns. (Figure 6.)

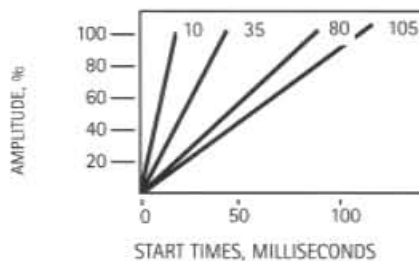


Figure 6. Selectable Start Rates

- **System Protection Monitor (SPM)** circuitry ensures maximum reliability by necessitating correct operating conditions to protect power supply, converter, and other system components. Three levels of power supply protection are provided: 1) phasing, 2) over voltage, 3) over current. This prevents operation outside the acceptable levels of performance of the components. The benefit of this circuitry is to avoid equipment failures and, thereby, downtime, as well as to provide greater weld accuracy and repeatability, and to reduce rejects.
- **High Cycle Rate** - The Advanced power supply is capable of in excess of 200 welds per minute. Actual cycle rate is dependent upon the application and controls.
- **Improved Power Measurement** - Power measurement includes both RF voltage and current, and is corrected for any amplitude setting. This provides accuracy and more consistent values when welding in the energy and peak power modes, or when using these parameters for limits.

Actuator/Converter Compatibility and Specifications

Actuator and converter compatibility, mechanical and electrical specifications for the Model 900 BCA are the same as the 900 B power supplies and may be found on data sheet 900-4 for 20 kHz and 900-11, 40 kHz. compatibility and specifications for the 900MA are the same as those for the 900M power supplies and are included on data sheet 900-1 (20 kHz) and 900-5 (40 kHz). For 3000 watt Advanced power supplies, refer to data sheet 900-22.

Ordering Information

All sales shall be subject to the Supplier's terms and conditions of sale as described in Branson's quotations and sales contracts.

Note: All of the following models are available in CE units. Contact Branson, Danbury, to order.

Branson EDP No.

Model 910MA Advanced Power Supply, 117V, 20 kHz, 1000W	101-132-268
Model 920MA Advanced Power Supply, 200-245V, 20 kHz, 2000W	101-132-212
Model 910BCA Advanced Power Supply, 117V, 20 kHz, 1000W	101-132-265
Model 920BCA Advanced Power Supply, 200-245V, 20 kHz, 2000W	101-132-269
Model 947MA Advanced Power Supply, 117V, 40 kHz, 700W	101-132-271
Model 947BCA Advanced Power Supply, 117V, 40 kHz, 700W	101-132-273

J954 Advanced features accessory cable 101-240-128

Recommended MBOS - 11.xx

Branson Worldwide Headquarters

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Revised and Printed in U.S.A. 11/99

High-intensity Cup Horn

Description:

Branson's water-jacketed cup horn ultrasonically processes samples in a test tube or a sealed vessel, thereby isolating the horn from the solution. One-piece solid titanium construction is utilized, allowing isolation of samples for treatment.

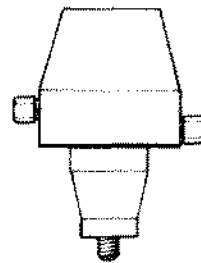
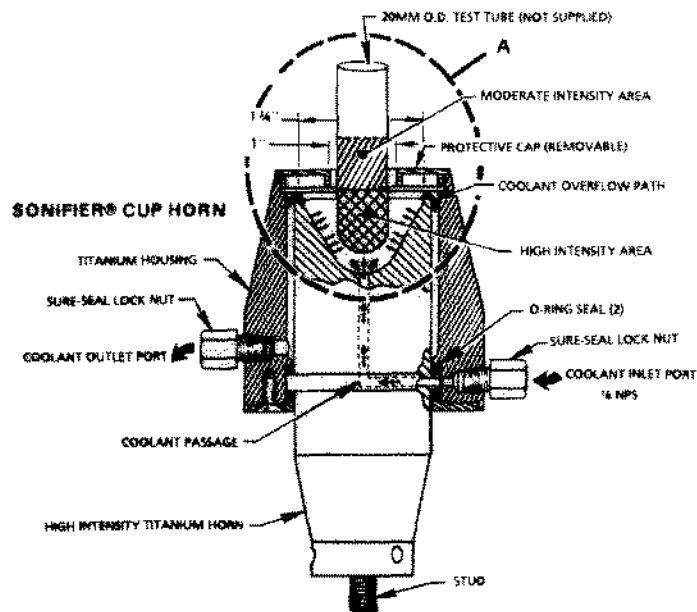
High-intensity cavitation is possible due to the horn's concaved shape. This design permits disruption of many cells and is used for emulsification, dispersion, creation of lipid vesicles, suspension, homogenization, and degassing.

Approximate overall length: 7" (180mm)
 Body diameter: 3-9/16" (91mm)
 Cavity size: 1-3/4" (43mm)
 Coolant port size: 1/8 NPT

Nalgon fitting for the coolant port is supplied.

Typical Applications:

- Blood chemistry
- Lipid vesicle preparation
- Tablet dispersion
- Waste homogenization
- HPLC solvent degassing
- Pigment dispersion
- Tissue culture
- Infectious solutions



← HIGH-INTENSITY CUP HORN FOR PROCESSING SINGLE SEALED VESSELS (Part No. 101-147-046)



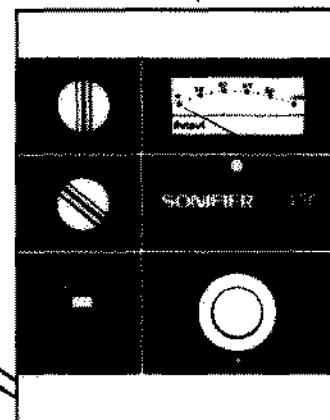
← CONVERTER receives electrical energy from power supply and converts to 20,000 Hz mechanical vibration. (Part No.101-135-022)



POWER SUPPLY converts standard 60 Hz line voltage to high frequency electrical power of 20,000 Hz.

Model 450

400 watts

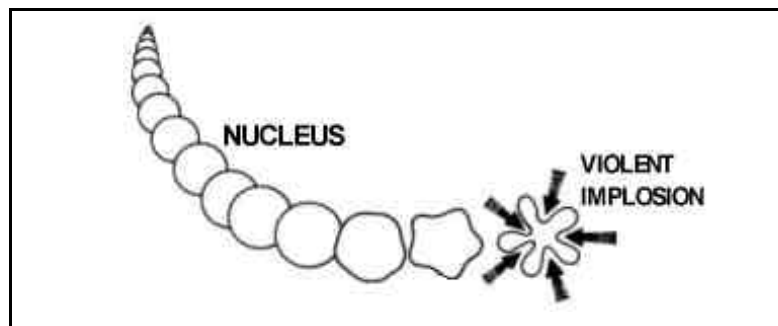




ULTRASONIC CLEANING PRIMER

THEORY OF ULTRASONICS

Ultrasonic cleaning depends upon cavitation, the rapid formation and violent collapse of minute bubbles or cavities in a cleaning liquid. This agitation by countless small and intense imploding bubbles creates a highly effective scrubbing of both exposed and hidden surfaces of parts immersed in the cleaning solution. As the frequency increases, the number of these cavities also increases but the energy released by each cavity decreases making higher frequencies ideal for small particle removal without substrate damage.

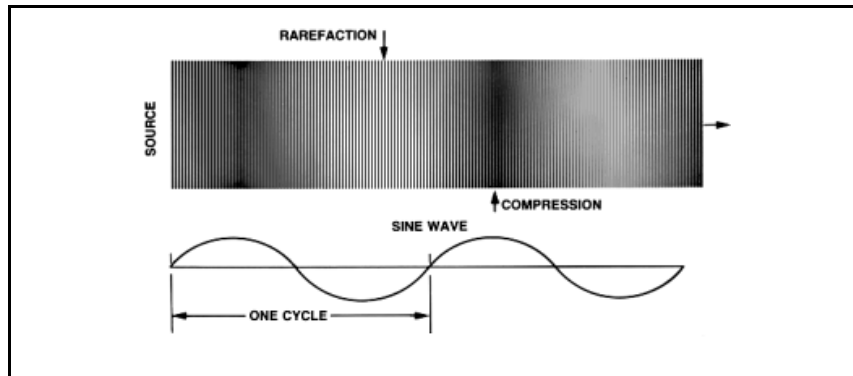


Growth and collapse (implosion) of a cavitation vacuum bubble

Cavitation is produced by introducing high frequency (ultrasonic), high intensity sound waves into a liquid. Consequently, the three essential components of any ultrasonic cleaning system are: a tank to contain the cleaning liquid, a transducer to convert electrical energy into mechanical energy, and an ultrasonic generator to produce a high frequency electrical signal.

TRANSDUCERS AND GENERATORS

The heart of any ultrasonic cleaning system is the transducer. At the present time, the two types of transducers offered are magnetostrictive, made of nickel or its alloys, and electrostrictive, made of lead zirconate titanate or other ceramics. Electrostrictive materials change their physical dimensions when placed in an electrical field of varying voltage. This is known as the "piezoelectric effect." Magnetostrictive transducers are made of materials which change dimensions in a varying magnetic field. Regardless of the type of transducer, the common, but primary factor, is the intensity of cavitation produced. Ultrasonic energy, like any sound wave, is a series of pressure points, or rather a series of compressions and rarefactions (see figure below). If the sound energy is of sufficient intensity, the liquid will actually be pulled apart at the rarefaction stage and small bubbles or cavities will be formed. With the following compression stages, the bubbles collapse or implode throughout the liquid, creating an extremely effective force which is uniquely suited to cleaning. This is the process known as cavitation.



Compression and rarefaction cycles of a sound wave

From theoretical considerations, it has been estimated that a pressure of more than 10,000 psi and a temperature greater than 20,000° F can exist within the collapsing bubble, and shock waves radiate in all directions at the instant of collapse. The energy released from a single cavitation bubble is extremely small, but many millions of bubbles collapse every second. Cumulatively, the effect is very intense and produces on the surface of the workpiece the intense scrubbing action which is characteristic of all ultrasonic cleaning.

Cavitation occurs throughout the liquid if the energy intensity is sufficient, and it is for this reason that ultrasonics can effectively clean holes and small crevices. It also accelerates chemical reactions and the rate at which surface films are dissolved.

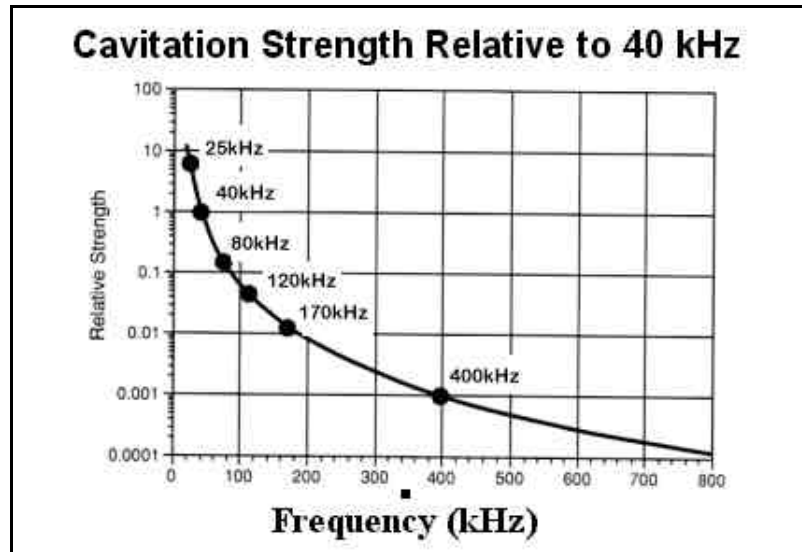
Cavitation only occurs when the local pressure in the liquid is reduced to a value less than its vapor pressure. The amplitude (power) of the ultrasonic waves generated by the transducer must be great enough to satisfy this condition. The minimum amount of power necessary to initiate cavitation is referred to as the threshold of cavitation. Different liquids will have different thresholds, but the thresholds must be exceeded to achieve ultrasonic cleaning. It is only the ultrasonic energy above the threshold that is contributing to the formation of cavitation bubbles and to ultrasonic cleaning.

Increases in ultrasonic energy above the threshold level will result in increases in cleaning up to a certain point. There is a level beyond which the liquid will be incapable of accepting increases in power and, at this point, the cavitation near the transducer radiating face will be of such violence as to cause the liquid carrier to become elastic, thus either reducing or eliminating further transmission of energy into the liquid. This effect is known as surface cavitation.

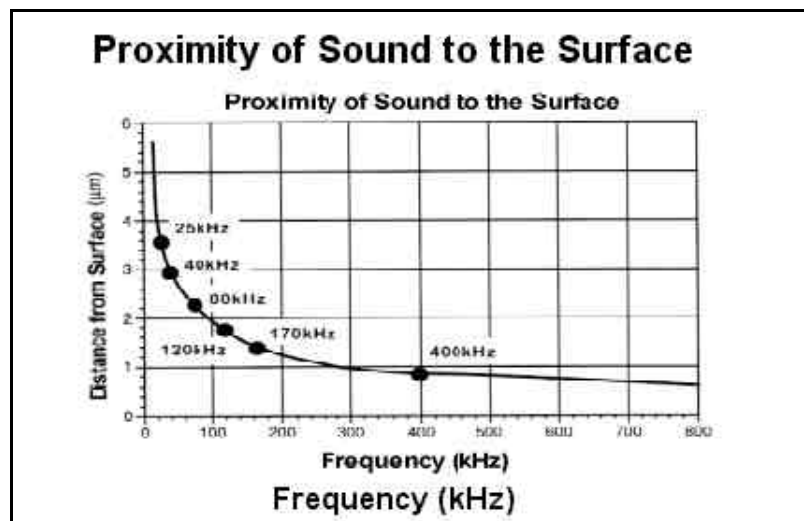
At the other end of the scale, there is a certain threshold below which cavitation will not occur. A minimum amount of power is required to cause cavitation. Once cavitation occurs, the power level can actually be reduced below this threshold and still maintain cavitation. The useful range with which we are concerned in ultrasonic cleaning is, thus, between the point at which surface cavitation occurs and the point to which energy may be reduced and still maintain cavitation. The sonic range over which cavitation can exist between threshold and maximum is usually separated by no more than a ratio of 2 or 3 to 1. For example, a tank having only a small amount of liquid over the transducer will be subject to surface cavitation at very low levels; a very deep tank or one that is heavily loaded with parts will take a much higher level of power to cause surface cavitation and will, in fact, require a much higher level of power to cause effective cleaning.

IMPORTANCE OF THE FREQUENCY

If the operating frequency is low (within the audible range) noise becomes a problem. As the equipment frequency drops below 20 kHz, operating noise not only becomes substantial but may exceed maximum safe limits as specified by the Occupational Safety and Health Act, or other regulatory measures. Lower frequencies from 20 kHz to 30 kHz are generally chosen for difficult applications where higher power levels are needed to remove soils and damage to the parts is not a problem. They are most often used for large or heavy parts or loads of smaller parts which form a dense mass. Branson offers 20 kHz magnetostrictive units and 25 kHz piezoelectric units.



Higher frequencies are more often used to clean smaller, more delicate parts or in circumstances where small particles must be removed. The higher frequencies are also used in applications where damage to the part itself may be a problem. Several factors can contribute to improved performance at higher frequencies. The number of cavities increases linearly with an increase in frequency producing a more intense scrubbing action that is capable of reaching into smaller geometries. If power is held constant, the size and therefore the energy contained in each cavity, is reduced. This effectively minimizes the risk of substrate damage. Higher frequencies also have the advantage of reducing the viscous boundary layer (Bernoulli effect) allowing the ultrasonics to "see" smaller particles. This is like lowering the water level in a stream so smaller stones can be seen.



Branson offers a wide range of intermediate frequencies including 40 kHz, 80 kHz, 120 kHz and 170 kHz. For extremely small particles. Frequencies above 350 kHz are generally chosen. Branson currently offers a MicroCoustics system at 400 kHz for these precision applications.

WHY AN ULTRASONIC SYSTEM?

The recognized advantages of ultrasonic cleaning are:

Precision

Because ultrasonic energy penetrates into crevices and cavities, any type of part or assembly can be cleaned. In many cases ultrasonic cleaning is the only way to meet specifications, as in the cleaning of precision parts or assemblies.

Speed

Ultrasonic cleaning is faster than any conventional cleaning method in the removal of soil and contamination from parts. Entire assemblies can be cleaned without disassembly. Often, its labor saving advantages make ultrasonics the most economical way of cleaning.

Consistency

Unlike manual cleaning, ultrasonics offers unmatched cleaning consistency, whether pieces to be cleaned are large or small, simple or complex, handled singly, in batches, or in an automated line.

SELECTING A CLEANING PROCESS and CLEANING SOLUTIONS

Before a cleaning system is purchased, the parts to be cleaned should be submitted for an application analysis where:

- 1) The materials of construction, configuration, and quantity of the parts to be cleaned are identified.
- 2) The soils to be removed are identified and analyzed.
- 3) The cleaning approach to be used, either aqueous or solvent, is determined and trials undertaken.

Only then can an appropriate ultrasonic cleaning system, designed for the cleaning process and the cleaning solution, be provided.

CHOOSING A CHEMISTRY

While all of a liquid's physical properties will have an effect on ultrasonic cleaning, the effects of vapor pressure, surface tension, viscosity, and density are the most pronounced. Since temperature influences these properties, it also has influence on the effectiveness of cavitation.

Considering the effects of these four key physical properties on cavitation, studies have shown that high density, low viscosity, and middle range surface tension and vapor pressure are the ideal conditions for most intense cavitation. Due to temperature effects on these four physical properties, the most intense cavitation will be considerably below the liquid's boiling point, but not so low as to get into the adverse regions of too low vapor pressure or too high surface tension. Different liquids will have different temperatures at which cavitation intensity will be the greatest because of the difference in physical properties and their rate change in temperatures. Thus the cavitation intensity will be less either below or above this ideal temperature.

Any cleaning system should be designed for use with the cleaning solution. Aqueous systems usually consist of open tanks in which the parts to be cleaned are immersed. A complex system may consist of several tanks,

incorporating recirculating pump and filter systems, rinse and drying stages, and other accessories.

Systems designed for use with solvents, often ultrasonic vapor degreasers, usually incorporate means for continuously reclaiming contaminated solvent. Ultrasonic vapor degreasing is accomplished in an integrated multiple-compartment system consisting of boiling solvent sumps and ultrasonic rinse sumps. The combination of warm solvent vapors and ultrasonic agitation thoroughly removes oil, grease, wax and other solvent-soluble soils. The parts emerge from the cleaning process warm, clean and dry.

IN SELECTING THE CLEANING SOLUTION, THREE FACTORS SHOULD BE CONSIDERED:

- 1) *Effectiveness:*
In choosing the most effective cleaning solution, experimentation may be necessary. Where ultrasonics is being applied to an existing application, it is probable that the solution presently being used can remain unchanged.
- 2) *Simplicity of use:*
Liquids should be judged for safety, simplicity of use, and longevity.
- 3) *Cost:*
The least expensive cleaning solution is not necessarily the least costly to use. Consideration must be given to its effectiveness, safety, and the number of parts processed with a given amount of solution. Naturally, the cleaning solution must be compatible with the materials to be cleaned as well as effective in removing the soils. Water is one of the most common cleaning liquids and, invariably, systems using aqueous-based solutions are simple to handle, have low operating costs, and are effective over a wide range of applications. There are some materials and soils, however, for which aqueous solutions are not particularly suitable and, to deal with these, there is a wide range of solvents available.

PARTS HANDLING

Another factor in ultrasonic cleaning concerns the loading of parts or the design of the basket or containers for holding the parts. The loading of parts in the ultrasonic cleaning tank should be such that neither the parts nor the basket are on the tank bottom. The sum of the parts' cross-sectional areas should not exceed 70% of the tank's cross-sectional area. Elastomers and non-rigid plastics will absorb ultrasonic energy and should be used cautiously for fixturing. Insulated parts may have to be specifically oriented. Incorrect basket design, or a basket having too high a mass, can greatly reduce the effectiveness of the best ultrasonic cleaning system. Any material more tightly woven than 50 mesh screen acts as a solid, while slightly larger openings scatter the ultrasonic waves. Openings larger than one-quarter inch tend to act as open material. Hooks, racks, and beakers can also be used to support parts.

- Jeffrey Hilgert



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IN-TANK ROTATION

...boosts ultrasonic cleaning

By: Bridget Smith, Branson Ultrasonics Corporation - Precision Cleaning Division, Danbury, CT

Ultrasonic cleaning's major strength is its ability to clean crevices and blind holes quickly and efficiently, without risk of damage to the part being cleaned. But what happens when you need to clean a part with an especially complex geometry - one that is difficult to clean while stationary? Or, in the case of a tightly packed cleaning batch, how would you ensure that each part is cleaned and dried properly? In both situations, any air entrapment that exists must be removed so that the water, which acts as a carrier for the ultrasonic energy, can reach all surfaces. Drying air must be able to penetrate all surfaces of a part in order to dry them. These are applications where in-tank rotation becomes an essential component in the cleaning and drying operation.

Before explaining in-tank rotation, it is important to outline the equipment within which this

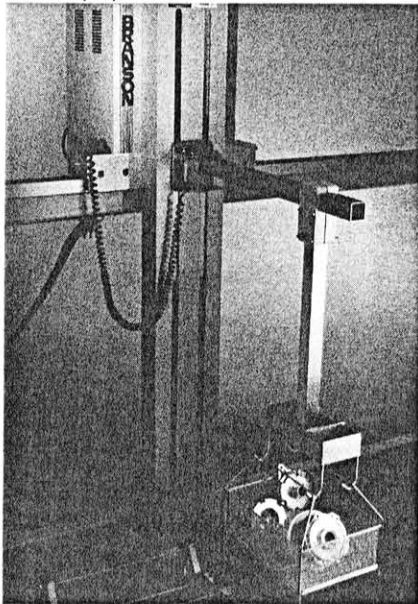


Figure 1

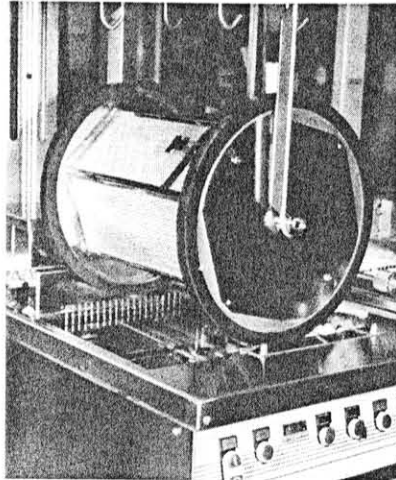


Figure 2

process would be used. In-tank rotation can be used on a single ultrasonic tank or as a component in a modular (wash, rinse, and drying tanks) cleaning system. It must be partnered with automation, such as Branson's two-dimensional robot (or TDR - see Figure 1). Benefits to utilizing the TDR include the ability to fully-program the automation and insure consistency of process.

A key component of this system is a specially designed drum (Figure 2) with flights along the inside circumference to aid part motion and tire-like rubber fittings on the outside edge to drive the drum. Figure 3 shows the edge of the drum which can be designed to load from the side or from the top. When cleaning parts that cannot withstand tumbling, a specially designed fixture may be used.

Once filled, the drum is picked up by the transport system and immersed into the tank (Figures 4 and 4a). Rubber rollers, powered by an external, enclosed

DC motor catch the edges of the drum and rotate it for a specified length of time. The roller

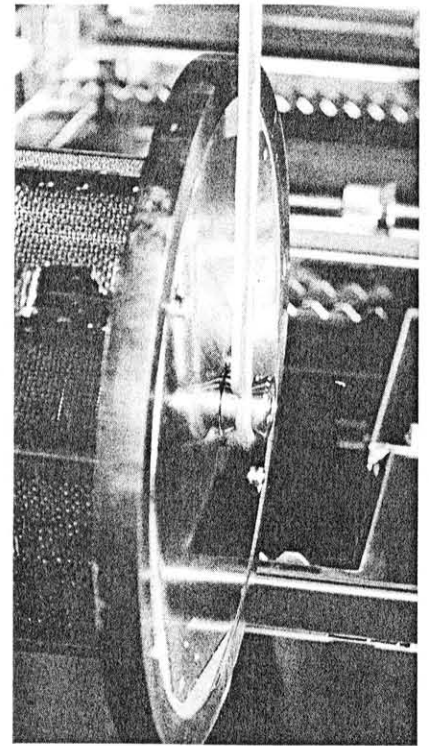


Figure 3

system (Figure 5 shows a close-up) can be installed as part of a specialized system, or retrofitted onto an existing system. When a cycle is completed the transport system moves the drum

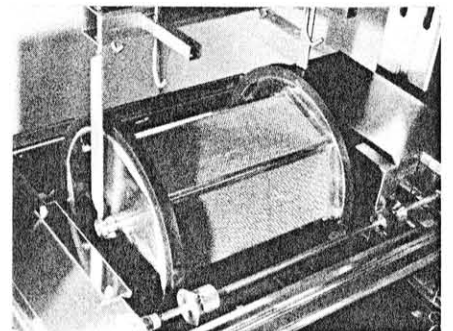


Figure 4

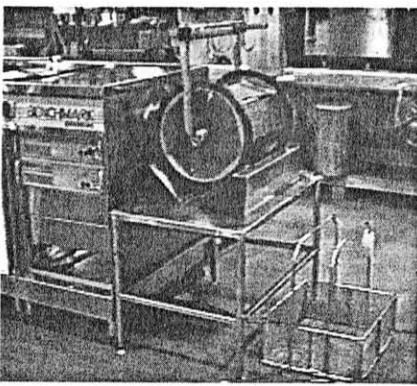


Figure 4a

from solution to rinse or dryer (Figure 6). In-tank rotation allows parts within the basket to be completely exposed to the cleaning solution as well as to the ultrasonics.

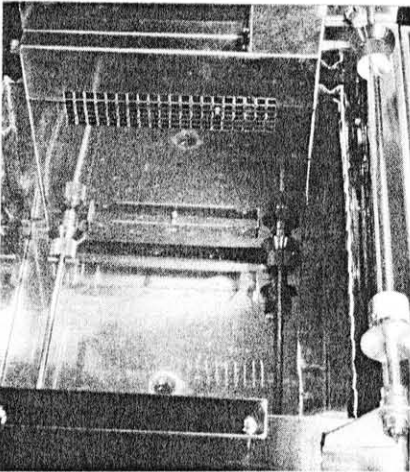


Figure 5

HOW WELL DOES IT WORK?

As previously explained, in-tank rotation allows for more efficient cleaning of complex parts or tightly packed batches. It also provides flexibility to clean many different types of parts with one system.

In one applications study, a customer needed to clean various medical parts that were composed of different materials, for example: stainless steel springs and fittings, latex gaskets and tubing, and miscellaneous polyethylene parts. The soil was the same throughout - mold release and particulate soils. The customer wanted to

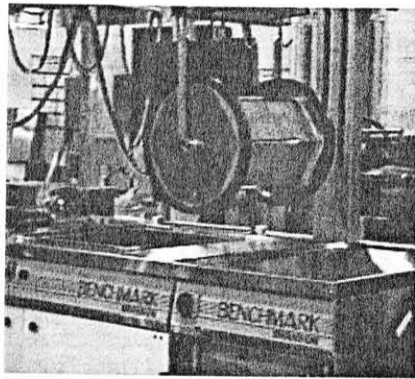


Figure 6

The drum is picked up, immersed, and when the cycle is complete, a transport system moves the drum on to rinse and dry stations.

use DI water to clean some components and an acidic aqueous chemistry for others. The parts would be cleaned in separate batches according to material.

The plastic parts were of particular concern to the manufacturer because plastics have a

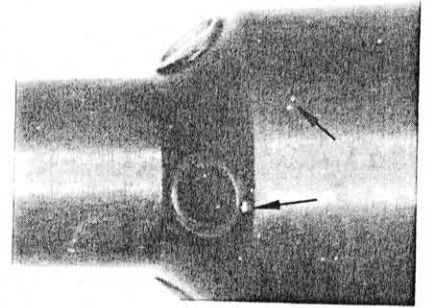


Figure 7

low softening point and needed to be completely dried in the operation. In-tank rotation allowed the manufacturer to use a lower temperature, which minimizes possible part deformation. For other parts, in-tank rotation prevented liquid cupping and allowed the water to drain away completely from all part crevices.

A successfully cleaned stainless steel part is shown. Note the presence of particulate on the part in the "before" photo (Figure 7), as indicated by the arrows, and its absence after cleaning (Figure 8).

If your operations require consistently clean and dry parts and you currently use ultrasonics, in-tank rotation may be an important addition to your cleaning process.

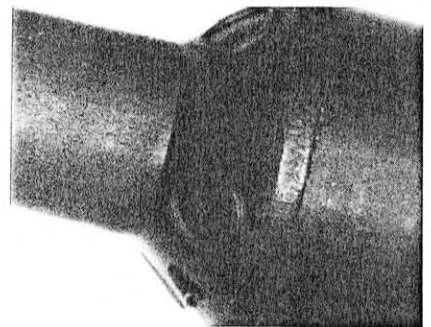


Figure 8

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THE ART OF RINSING

Cleaning generally consists of three components: cleaning, rinsing, and drying. Manufacturers involved in the practice of precision cleaning know that it is critical to understand each of these components and how they interact. The successful accomplishment of these steps is important to the overall cleanliness level achieved.

When washing a part, the contaminant is often removed through the introduction of a cleaning chemistry and mechanical force. Rinsing involves the removal of any residual soil and chemistry that remains after washing. In performing this task, it is important to do so without introducing new contaminants, such as dust or impurities in the water. Drying is the process by which residual rinse liquid is removed - hopefully, again, without introducing any new contaminants.

When people think of cleaning applications, much focus is typically placed on the washing stage of the operation. In precision cleaning, however, rinsing becomes a much more important step. The allowable contamination levels are lower, and spot-free drying is almost always a requirement.

THE TECHNOLOGY

Rinsing is a technology, just as washing is. It is measurable, controllable, and directly contributes to the effectiveness of the cleaning process. Effective rinsing can improve yield, reliability, and appearance; it is also an important factor in containing operation costs.

Rinsing removes two basic types of soils: 1) *solubles*, which encompass washing chemistries and other soils that *dissolve* in the cleaning media; and 2) *insolubles*, consisting of particulate *dispersed* throughout the cleaning media.

Rinsing is based on the principle of dilution. To develop an effective rinsing process, three questions must be answered:

- 1) What is there?
- 2) How much is there?
- 3) How much residue is acceptable?

What is there and how much there is can be determined with analytical testing. How much residue is acceptable is a more difficult question - one that must often be answered empirically by the end-user.

Often, acceptable residue levels are defined by testing a cleaned part for acceptable performance in its next operation or use. If the part performs acceptably after being put through the cleaning process, the cleanliness level is assumed to be acceptable.

Effective rinsing is based on the successful completion of two tasks: first, the soils must be separated from the part; then, the soils must be prevented from redepositing onto the part. This can be accomplished by several means - for example, sparging the surface to remove buoyant soils, filtering the solution for particulate, and maintaining continuous dilution of solubles and fine particulate.

Separating the soil often requires mechanical energy, especially with parts having complex shapes, or those that are "nested" in blind holes and/or crevices. The table below (*Figure 1*) lists several options to accomplish this.

RINSE METHODS				
METHOD	ENERGY	REMOVAL OF SOLUBLES	REMOVAL OF PARTICLES	RELATIVE COST
SPRAY	HIGH	GOOD	OK	LOW
IMMERSION	LOW	OK	POOR	LOW
AGITATION				
- BUBBLER	LOW	OK	POOR	LOW
- LIFT	MED	GOOD	GOOD	MED
- PROPELLER	HIGH	GOOD	GOOD	MED
- ULTRASONICS	HIGH	EXCEL	EXCEL	HIGH

Figure 1: Rating methods of soil separation in rinse applications

If ultrasonic agitation is used in the wash, it might also be helpful in the rinse. Many times, a higher frequency is used in the rinse than has been used in the wash. This facilitates smaller particle removal and reduces the potential of part damage.

Continuous filtration of the rinse baths is very important in precision rinsing. The level of retention of the filter (5 microns, 0.2 microns, etc.) should reflect the level of cleanliness required. In systems with multiple rinse tanks, the filter retention level is often reduced with each succeeding bath.

Continuous dilution is also a method of preventing redistribution and involves four key elements:

- 1) Concentration of tank chemistry in dragout (C), which is measured in parts per million (ppm) (1 oz/gal = approximately 7500 ppm)
- 2) Volume of dragout (V), which is the volume of water/chemistry moved (with the parts and carrier) from the wash to the rinse stage.
- 3) Flow rate of rinse water (F), which is measured in gallons per hour (gph).
- 4) Rinse tank equilibrium concentration (E), which is a function of flow rate and dragout, to the point at which incoming and outgoing chemistry levels are equal (see Figure 2)

These four rinsing factors are related by the following formula:

$$C \times V = F \times E$$

C X V defines the amount of chemistry entering the rinses. Precision rinsing generally requires low "Es," therefore, high "Fs" (or overflow rates) are required. *Figure 3* illustrates the process of continuous dilution.

One method for improving rinsing is the use of several rinse tanks in a series. The rinse formula applies to each successive tank. This allows a significant reduction in equilibrium concentration with a fixed overflow rate (F). This arrangement increases the capital costs of achieving a particular cleanliness level by requiring more rinse tanks, but it reduces operating costs by lowering the required overflow rate. It is important to note that the waterflow is in the opposite direction of the workflow. This is called "counter cascade" rinsing (*see Figure 4*). In applications with high dragout, a spray rinse may be used to remove the gross chemistry before the first immersion rinse, further increasing efficiency.

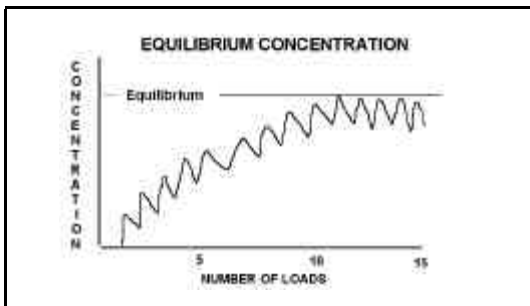


Figure 2

In precision applications, the quality of the rinsewater itself can be a factor in the effectiveness of the rinsing stage (*see Figure 5*). In most cases, deionized (DI) water is required. In the deionization process, organics are removed by carbon, and special functional exchange resins remove the ions. Biological growth is controlled with ultraviolet lights and special filtration. One method of measuring rinsewater quality is through resistivity or conductivity (*see Figure 6*). This is a measure of the electrical insulation properties of the water. Dirty and tap water may contain many ions that conduct electricity, lowering the resistivity.

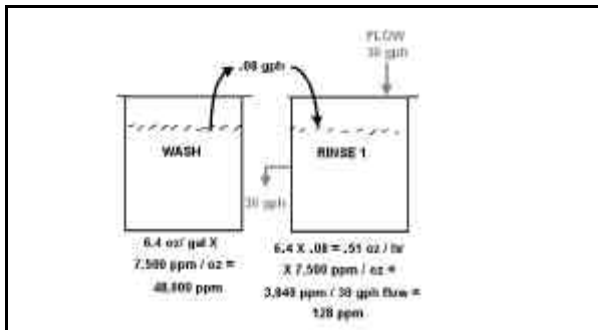


Figure 3: Continuous dilution

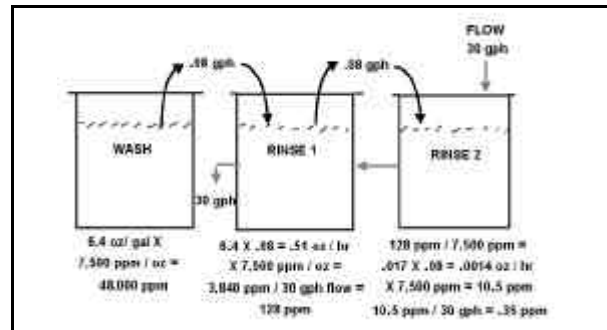


Figure 4: Counter-cascade dilution

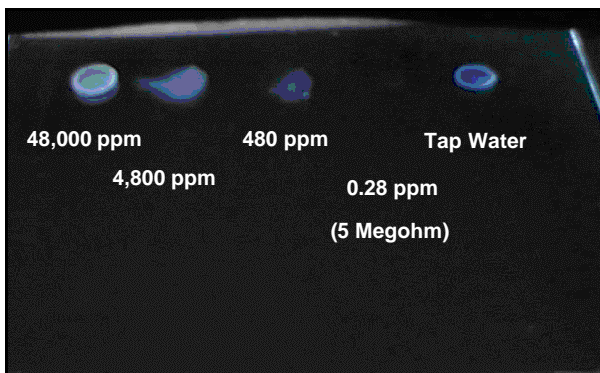


Figure 5: Precision rinsing water quality

DEIONIZED WATER QUALITY		
Resistance (Megohms)	Conductance (Microsiemens)	Total Dissolved Solids (ppm)
10.2	.055	None
10.0	.100	.115
4.0	.250	.288
1.0	1.000	1.150
0.4	2.500	2.875
		Lower Quality

Figure 6: DI water quality

EQUIPMENT CONSIDERATIONS

In addition to the process variables, rinse tank design can impact the effectiveness of rinsing. The flow pattern of the water can be important in rinsing, and this pattern is a function of the tank design. The most common design for rinse tanks is the single-sided, overflow weir design (see Figure 7). This design depends on dilution for effectiveness and has "dead spots" in the corners where mixing does not take place, thereby reducing its effectiveness.

Another more effective rinse tank design, which has become popular in precision rinsing, is the four-sided overflow model (see Figure 8). This design utilizes a laminar upflow of water, which improves mixing and eliminates dead spots. This design is also very effective at sweeping fine particulate off the surface, preventing redeposition on the parts. The overflow design is often augmented by the use of high-flow recirculation filtration, which further increases the sweeping action. The return of the filtered water typically enters the bottom of the rinse tank. Return manifolds that are specifically configured for the fixture are often used.

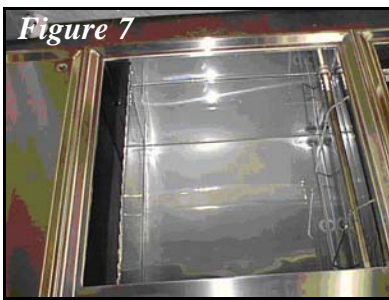


Figure 7: Single-sided overflow rinse tank

One of the important variables in rinsing is the clean-up rate. This is defined as "the time it takes for the contamination in the rinse tank to return to a steady level, after the parts enter the bath." An experiment was run to determine the clean-up rate for a four-sided overflow with recirculation/filtration and a single-sided rinse with recirculation/filtration and a sparger. The four-sided overflow rinse had a faster clean-up rate than the single-sided overflow rinse. There are several factors that contribute to the improved efficiency. The high internal flow and mixing in the four-sided design enhances solubility. The high volume laminar flow is efficient for particle removal and minimizes redeposition. In the four-sided design, the distance to the overflow is minimized, improving the sweeping action.

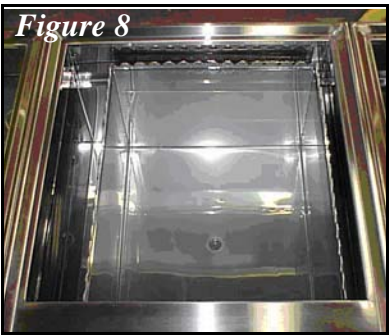


Figure 8: Four-sided overflow rinse tank

The four-sided overflow design can provide up to 60% advantage in rinsing over the conventional single-sided design. It has improved efficiency for both soluble soils and particulate. For fixed overflow rate, process throughput and cleanliness level, fewer rinse tanks may be required with a four-sided design. Alternately, for a fixed number of rinse tanks, a higher throughput may be possible. Below are two graphs (Figures 9 & 10) showing the clean-up rate for the two designs, using soluble soils and particulate.

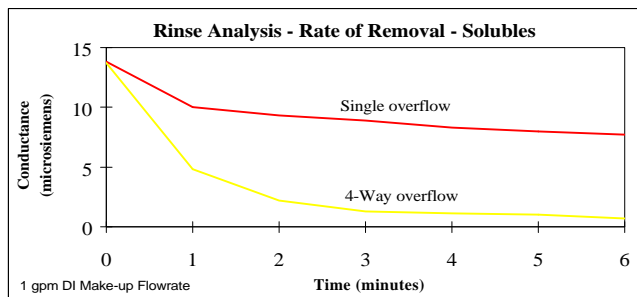


Figure 9: Rinse-analysis rate of removal-solubles

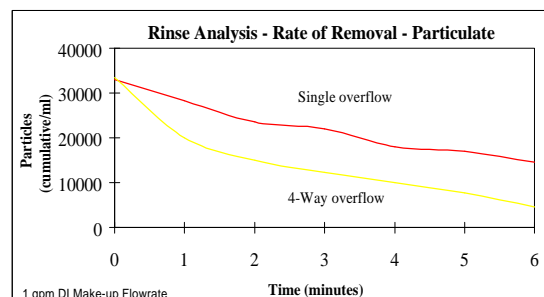


Figure 10: Rinse-analysis rate of removal-solubles

IN CONCLUSION

Effective rinsing is essential to the success of precision cleaning processes. The factors that most influence the rinsing process include:

- Type of soil (soluble or insoluble)
- Cleanliness specifications
- Agitation, flow rate, and filtration
- Overflow rate
- Rinsewater quality
- Equipment design

All of these factors must be taken into consideration when designing the optimum process for your needs.

- Edward Lamm

About the author

Edward W. Lamm is Worldwide Technology Manager for Precision Cleaning at Branson Ultrasonics Corporation. Following 15 years of experience in the petrochemical industry, he has been active since 1989 with both chemical and equipment manufacturers in the precision cleaning field. He holds an MS in Chemical Engineering and a BA in Chemistry.



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Ultrasonic cleaning

Ultrasonic in-line cleaning systems for wire and rod

By John A. Line

Ultrasonics, when used with aqueous-based chemicals, is an alternative for the wire manufacturers who are looking for ways to replace their CFC solvent systems in order to comply with the Clean Air Act. This act calls for a reduction or total elimination of the use of CFC solvents over the next few years.

This two-part paper will explain what ultrasonic energy is, how it's applied, the effects of chemistry, and the type of chemical required.

Most in-line cleaning cannot be done by chemical means alone; it requires some form of mechanical energy for adequate soil removal.

Mechanical energy can be applied by wiping, brushing, or ultrasonics. However, wiping and brushing have a common problem—wear of the surface in contact with the product, whereas applying energy in the form of ultrasonic energy eliminates this problem.

Ultrasonics is a noncontact, nondestructive method of cleaning which utilizes soundwaves as a means to achieve cavitation in a liquid.

Cavitation is the formation and implosion of vapor pockets resulting in the release of stored energy in the form of instantaneous high temperatures and pressures.

From theoretical considerations, it has been established that a pressure of more than 10,000 psi and a temperature greater than 20,000°F can exist within the collapsing bubble. The cavitation creates the "scrubbing action" that loosens and disperses the contaminate.

Combining ultrasonic cavitation energy with the proper chemistry provides highly efficient cleaning.

To apply ultrasonics correctly, an un-

derstanding of the basic ultrasonics rules, the function of the transducer, and its design is helpful.

The basic rule for applying ultrasonic is: parts must be immersed in a liquid—there is no such thing as dry cleaning—because cavitation bubbles are formed in a liquid. Ultrasonics does the "scrubbing." The entire liquid must be supplied with energy. As the product passes through the liquid areas without energy, there will be no cavitation activity and, consequently, no "scrubbing action."

The liquid should contain cleaning chemicals. It's the chemical that does the cleaning.

A transducer is a device that converts energy of one type to energy of another type. For instance, a loud-speaker converts electrical energy to sound and a phonograph pick-up converts mechanical energy to electrical energy. A cleaning transducer converts electrical energy to mechanical energy.

The transducers most commonly used for cleaning are either Piezoelectric (sometimes called electrostrictive) or Magnetostrictive.

The Piezoelectric transducer is made of lead zirconate, titanate, and/or other ceramics. Piezoelectric materials change their dimensions when placed in a varying voltage electrical field known as the Piezoelectric Effect.

The Piezoelectric modules are spot mounted onto a radiating plate. Efficiency is approximately 90 percent. Ultrasonic energy is measured in watts/gallon. Piezoelectric transducers are usually 25kHz or 40kHz.

The conventional Magnetostrictive transducer is made of nickel or its alloys.

Magnetostrictive materials are ferro magnetic metals, all of which exhibit a change in dimensions in a varying magnetic field. The nickel laminations are put together like a transformer core forming individual modules.

These modules are spot mounted onto a radiating plate. Efficiency is approximately 50 percent. Ultrasonic energy is measured in watts/gallon. Conventional Magnetostrictive transducers are usually 20kHz or 21kHz.

The third transducer is an adaptation of the conventional Magnetostrictive transducer.

This transducer uses nickel laminations strategically placed across the entire radiating plate. Efficiency is approximately 85 percent. Ultrasonic energy is measured in watts/in.² This transducer is 20kHz.

Cleaning transducers are used in various configurations—on tanks, cylindrical tubes, and immersible boxes.

The immersible transducer when connected to a generator is a complete ultrasonic cleaning unit housed in a waterproof stainless steel box. The immersible transducer is readily adaptable to existing or new tanks of various configurations. These can be Piezoelectric, 25kHz or 40kHz, or Magnetostrictive, 20kHz or 21kHz.

The cylindrical transducer is used for in-line cleaning systems for wire, rod, or strip. The cylindrical transducer is an adaptation of the 20kHz conventional Magnetostrictive transducer with nickel laminations bonded in a peripheral spoke arrangement on a stainless steel tube.

Transducerized tanks have the transducer bonded on the outside bot-

tom of the tank and can be used as a stand-alone unit or incorporated into a bench. Transducerized tanks can be Piezoelectric transducers, 25kHz or 40kHz, or Magnetostrictive 20kHz or 21kHz.

Piezoelectric or Magnetostrictive, which one should be used?

Selection of transducer design and frequency is application driven. The characteristics of each transducer fit specific applications. Today all transducers are good providing they are used for the right application.

As a rule of thumb, Piezoelectric transducers are used for precision cleaning or for applications where aggressive cleaning is not required.

Magnetostrictive transducers are used in heavy manufacturing industries where aggressive power and energy is required to meet line speeds and/or hard-to-remove soils.

Before equipment and chemical recommendations can be made, it is necessary to complete an engineering study of the specific cleaning requirement and physically clean the part to be cleaned in order to develop ultrasonic power required, residence time to ultrasonic power, type chemical to be used, type rinsing required and type drying. Once this has been completed, equipment configuration can be reviewed.

An ultrasonic aqueous cleaning system consists of:

- wash station,
- rinse station,
- drying station, and
- storage/make-up tank.

It will also include some process to remove soil from the wash station. Overall size of the system is dependent on the number of wires to be cleaned in-line, line speed, and ultrasonic exposure time.

A typical in-line system using cylindrical transducers functions by use of the flood box technique, where cleaning solution is pumped from an external storage tank into the cleaning chamber at a rate faster than overflow. Overflowing cleaning solution returns to the storage tank by gravity. Normal flow is counter to the direction of the product to ensure that the product exits through fresh clean solution. The product travels through the system in a straight line and passes through nylon guide blocks. Guide blocks are sized to accept the product to minimize "drag out." A liquid level sensor in the exit vestibule de-energizes the generator should the liquid level drop, thus protecting the transducer. Cylindrical transducer systems are used on applica-

tions with line speeds up to 2,000 ft./min.

A typical 20kHz cylindrical in-line cleaning system consists of one or more cylindrical transducers with the matching infeed/outfeed vestibules. The size of the storage tank, filter capacity, and flow rate is consistent with the specific process line. The cleaning solution is thermally degassed in the storage tank. This type of equipment is designed to fit between the wire processing station and take-up spooling equipment.

The importance of the rinsing stage and the complexity of the equipment provided for rinsing is proportional to the cleanliness required of the product. The degree of cleanliness required also determines the type of rinse used—tap water, softened water, deionized water, or distilled water. A simple spray rinse chamber has four spray nozzles, and the runoff can usually be drained off with other used "plant water." The flow rate is approximately two gallons/minute. However, if chemical residue is not suitable for flushing into the drain, a collection tank and a water treatment system are used.

Ultrasonic rinsing is used where the wires have to be super clean. An ultrasonic rinse station is usually a closed loop system with a water treatment system. Because of the intense energy in the cylindrical transducer, usually 1KW is all that is needed regardless of line speed. Heavily concentrated chemicals may require longer ultrasonic exposure time and, subsequently, would require a multi-kilowatt rinse station.

The necessity for drying is determined by the next process station and type wire. Generally, a plating process does not require drying whereas a coating process does. Like rinsing, the degree of dryness required determines the complexity and type of equipment supplied.

The most commonly used equipment is the air wipe. The air wipe uses air knives of the venturi vacuum pump type and compressed air. The wire passing through the center of the air knife has moisture sucked from the wire surface and the collected moisture can be directed to the drain. Sometimes two or more air wipes are used in-line.

Infrared heat or hot air drying tunnels are used if the product has to be completely dry. Length of the tunnel is dependent on the line speed and configuration of the product.

Tanks containing immersible transducers are used for multiple wire cleaning when the number of wires

and/or diameter of the wire is greater than the internal diameter of the cylindrical transducer. The width of the tank is governed by the number of wires to be cleaned and the length of the tank is governed by the line speed. Consider how that system can operate for a two-stage tank designed to clean 48 wires at a line speed of approximately 300 ft./min. The wash station works on the overflow weir principle with fresh cleaning solution being pumped to the middle of the tank. The liquid then overflows into the infeed and outfeed weir and returns to the storage tank. The storage tank, pump and filter are remotely located. There are 18 20kHz immersible transducers mounted on the bottom of the tank.

The rinse station also uses the overflow weir principle with fresh water being pumped into the center and allowed to overflow at the infeed and outfeed weirs and finally to drain.

The wires go through the guides and into the wash station over the transducers and into the rinse station. If a drying station is required, it would be remotely located.

A three-stage tank is used for cleaning 26 wires at a line speed of approximately 125 ft./min. The wash station has overflow weirs; the rinse station has spray nozzles; and the dry station has a hot air blow-off. There are nine 20kHz immersible transducers. Like the other tank, the storage tank, pump and filter are remotely located.

There are other configurations of ultrasonic cleaning systems, all designed for specific applications.

In selecting the cleaning solution, effectiveness, simplicity of use and cost should be considered.

John A. Line has been with Branson Ultrasonics Corporation, Danbury, Connecticut, USA, since Branson acquired the Magnapak ultrasonic cleaning product line. He is responsible for Magnapak technical, application support and product training for the company's domestic and international marketing organizations. He received his technical training at GMI and has 30 years' experience in the industrial equipment field, with the last 15 years in industrial ultrasonic cleaning. This paper was presented at the 64th Annual Convention of the Wire Association International, Detroit, Michigan, USA, June 1994.

THE ULTRASONIC ADVANTAGE

Cleaning is a problem we are all faced with every day in both our personal lives and our professional lives. In its broadest sense it is the removal of undesirable material from a particular place. In the more technical realm cleaning is usually performed to make a particular material or component acceptable to the next level of processing. This task is becoming increasingly difficult as geometries continue to decrease while production rates escalate.

Cleaning can be accomplished by a variety of means. One of the more common methods is immersion in a liquid. When this is the chosen methodology, it is usually a combination of chemistry and mechanical activity that is employed. Independently each will remove some soil; together the effect is multiplied many times.

Some typical sources of mechanical activity include brushing, spraying, and ultrasonics. Brushing is employed where the parts to be cleaned are geometrically simple, typically having large flat surfaces with no recessed areas or blind holes. For effective use of its mechanical energy, a spray must be aimed such that it impinges directly on the soil to be removed. This makes component orientation critical. Ultrasonics is often chosen because it is not as dependent upon either geometry or orientation for effective soil removal. Ultrasound travels in all directions in the solution and, in fact, will actually pass through the components to reach and clean areas which are otherwise inaccessible. Because ultrasonic energy penetrates into these crevices and cavities, any type of part or assembly can be cleaned.

There are a number of benefits realized from the application of ultrasonics to precision cleaning. These include:

- Enhanced cleaning speed - Ultrasonics is faster than any conventional cleaning method. Entire assemblies can be cleaned without disassembly. Often the labor-saving advantages make ultrasonics the most cost effective choice.
- Unmatched cleaning consistency - The ultrasonic activity is micro in nature and reaches all areas for uniform cleaning. This is true for large or small parts, simple or complex parts handled singly or in batches. Thorough soil removal is not operator dependent.
- Easier compliance with safety and environmental regulations through reduction of dangerous chemical concentrations or substitution of less aggressive cleaning media.
- Reduction of direct worker contact with hazardous cleaning substances.
- Savings in energy costs, labor and floor space.

In addition to the mechanical advantages provided by ultrasonics, there are a number of chemical or process benefits which can also be gained. These include:

- Speeding up the rate at which soil dissolves by intimately mixing the cleaning agent with the contaminants.

- Carrying fresh solution to the soiled surface through a "micro-streaming" effect.
- Attacking the molecular "cement" by which soil attaches itself to a workpiece surface.
- Preventing formation of a neutral film on the workpiece surface that may impede cleaning.
- Raising the temperature of the liquid, thereby increasing the rate of chemical activity.

Ultrasonics can bring substantial value to a precision cleaning application.

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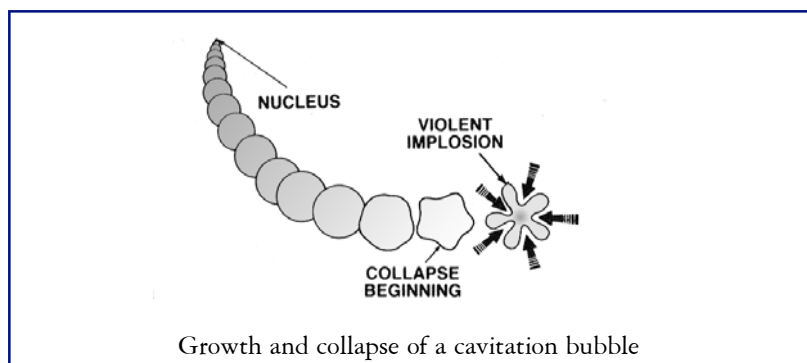
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Markham, Ontario

Branson de Mexico
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OPTIMIZING YOUR ULTRASONIC CLEANER

Ultrasonic cleaners have been workhorses in both laboratories and industry for decades. This acceptance is based on their ability to remove soils from inaccessible areas quickly, completely, and consistently without reliance on operator technique. Bransonic tabletop cleaners offer a number of features which allow the operator to optimize their performance.

Ultrasound is sound transmitted at frequencies beyond the range of human hearing. To understand how ultrasound can perform cleaning, it helps to understand the underlying principles and how they are applied in cleaning. High frequency energy is generated by an electrical power supply and applied to heavy duty, industrial piezoelectric transducers. These transducers convert this electrical energy to high frequency mechanical energy vibrating at a rate of 40,000 times per second, producing alternating high and low pressure waves within the cleaning liquid. The liquid is compressed during the high pressure phase of the wave cycle, then pulled apart during the low pressure phase. As the pressure in the liquid is reduced during the low pressure phase, cavities grow from microscopic nuclei to a maximum critical diameter, as shown in the diagram below. During the subsequent high-pressure phase, these cavities are compressed and implode. The released energy is powerful, but safe for parts because it is localized on a microscopic scale. This process is called "cavitation."

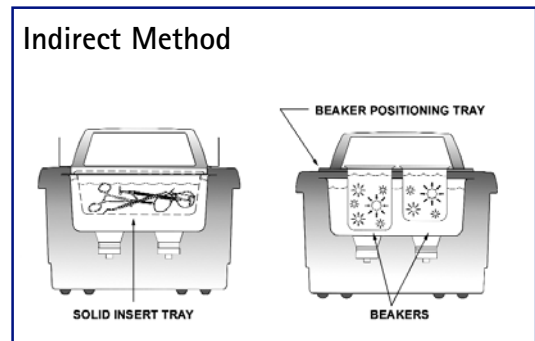
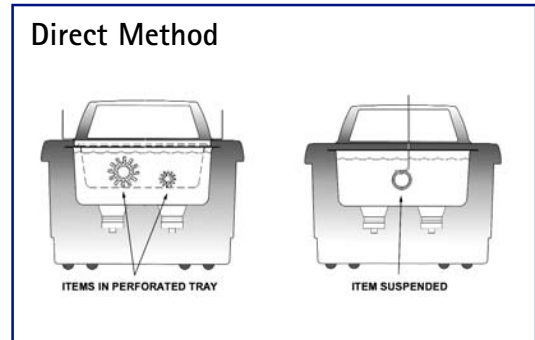


There are many factors affecting the strength of cavitation including temperature, surface tension, viscosity, and density of the liquid. When selecting an ultrasonic benchtop cleaner, it is important that it permit as much control as possible of these factors. If temperature and time can be controlled, then cleaning consistency can be improved. For example, a microprocessor-based digital thermostat allows selection and constant digital display of the solution temperature at the optimum point. The availability of heat can also increase the chemical activity of cleaning solutions, permitting safer concentrations. Many solutions operate best at temperatures between 120-150° F. Adding a wetting agent or surfactant to the bath can reduce surface tension of the liquid. Reduced surface tension will increase cavitation strength. Higher viscosity liquids tend not to cavitate well due to their inability to create and collapse cavities quickly. Higher density liquids create intense cavitation with a greater implosive force.

Application of these principles can result in faster more effective cleaning. See the reverse side of this sheet for helpful hints and important items to remember.

Remember, when using your cleaner...

- Never place parts or receptacles directly on the bottom of the unit. It can cause the unit to fail because the parts will reflect the ultrasonic energy back into the transducer(s). Always allow at least one inch between the tank bottom and the beaker or receptacle for adequate cavitation. Keep solution within one inch of the top of the unit when the beaker or tray is in place.
- If using a tray or basket to lower the parts into the solution, it is better to use a holder that is of open construction, either an open mesh basket or an insert tray, that is adequately perforated for drainage. This also permits free access of the sound waves to the parts.
- Renew cleaning solution often to increase ultrasonic cleaning activity. Solutions, as with most chemicals, become “spent” over time. Solutions can become contaminated with suspended soil particles, which can settle to the tank bottom and inhibit ultrasonic activity.
- Wait 5 to 10 minutes after activating the equipment for fresh solution to degas. This need not be repeated with subsequent use, as degassing is required only after the bath is freshly filled.
- Never use solvents in a small benchtop cleaner. It is neither safe nor environmentally responsible. Solvents vaporize quickly and can collect under the unit where ignition is possible from electrical components. Mineral acids and bleach can also damage the unit.



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The Impact of Ultrasonic Frequency on Particle Removal

Jonathan Harman & Edward W. Lamm

**Branson Ultrasonics Corp.
Precision Processing**

Introduction

What is the purpose of cleaning?

“ Preparing a part for its next operation or use”

Introduction

- ❑ “Cleaning” generally consists of three components
 - Wash
 - Rinse
 - Dry
- ❑ Successful completion of each component is important to overall cleaning
- ❑ Understanding the components and their inter-relationships is critical

Separating the Soil

- ❑ Requires mechanical energy, especially with complex shapes or small nested parts
- ❑ Several options are available

Separating the Soil

RINSE METHODS

METHOD	ENERGY USE	SOLUBLES REMOVAL	PARTICLES REMOVAL	RELATIVE COST
SPRAY	HIGH	GOOD	OK	LOW
IMMERSION	LOW	OK	POOR	LOW
AGITATION				
- BUBBLER	LOW	OK	POOR	LOW
- LIFT	MED	GOOD	GOOD	MED
- PROPELLER	HIGH	GOOD	GOOD	MED
- ULTRASONICS	HIGH	EXCEL	EXCEL	HIGH

Separating the Soils with Ultrasonics

- ❑ Ultrasonics are typically used in the rinse if they were used in the wash
- ❑ Higher frequencies is used in the rinse

Separating the Soil

□ Ultrasonic Frequencies

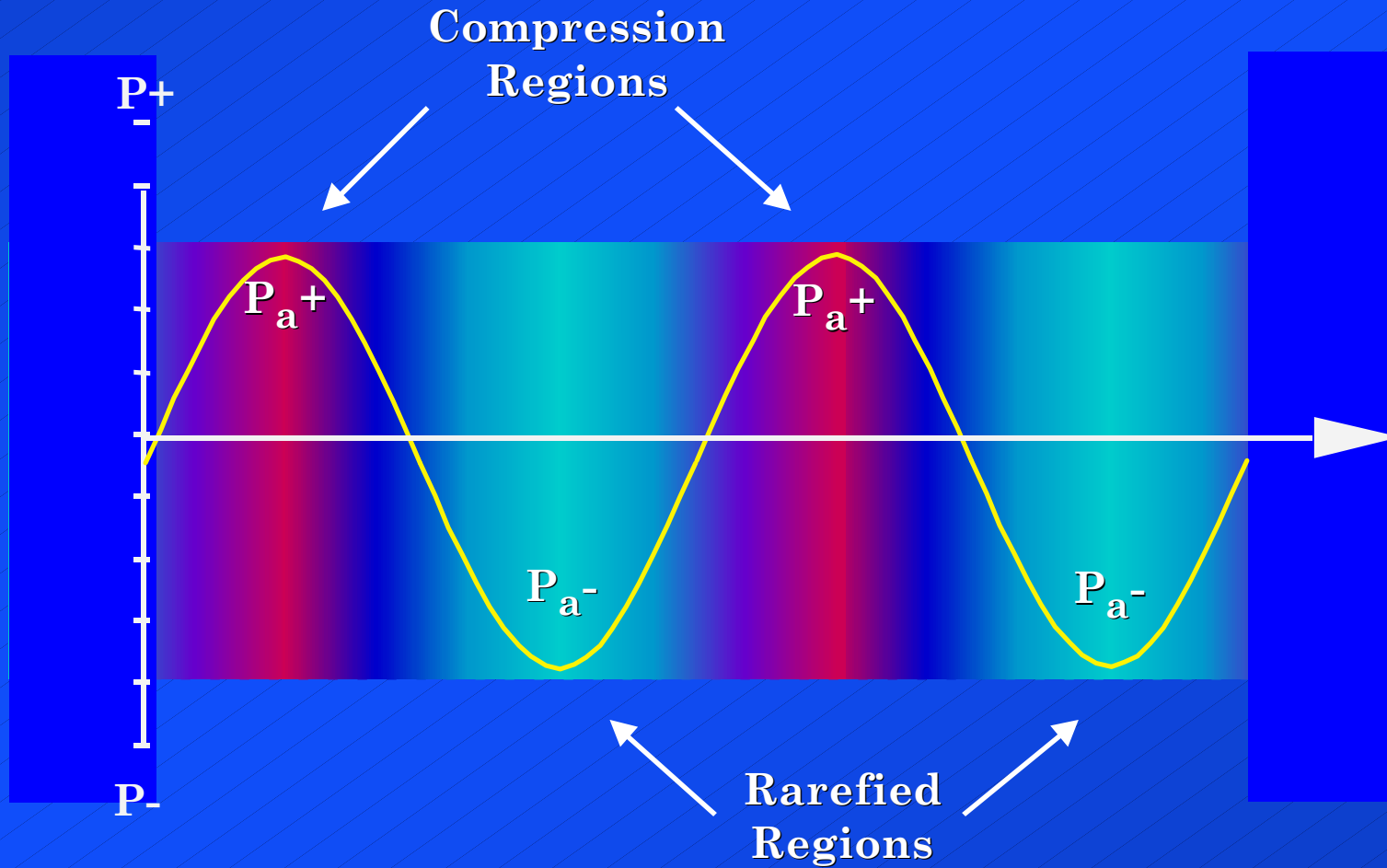
- ≤ 150 kHz - “Conventional” Ultrasonics Range
- 150 - 800 kHz - “High Frequency” Ultrasonic Range
- > 800 kHz - “Megasonic” Range

Cavitation

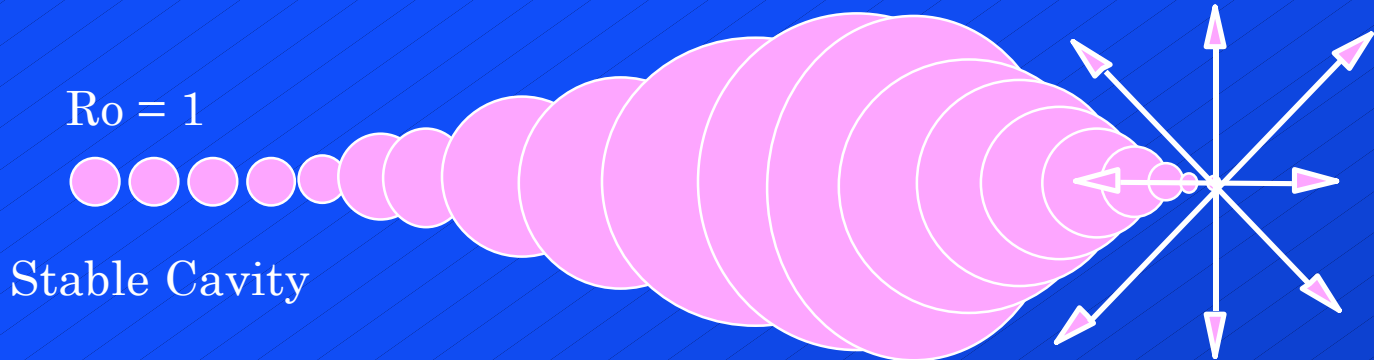
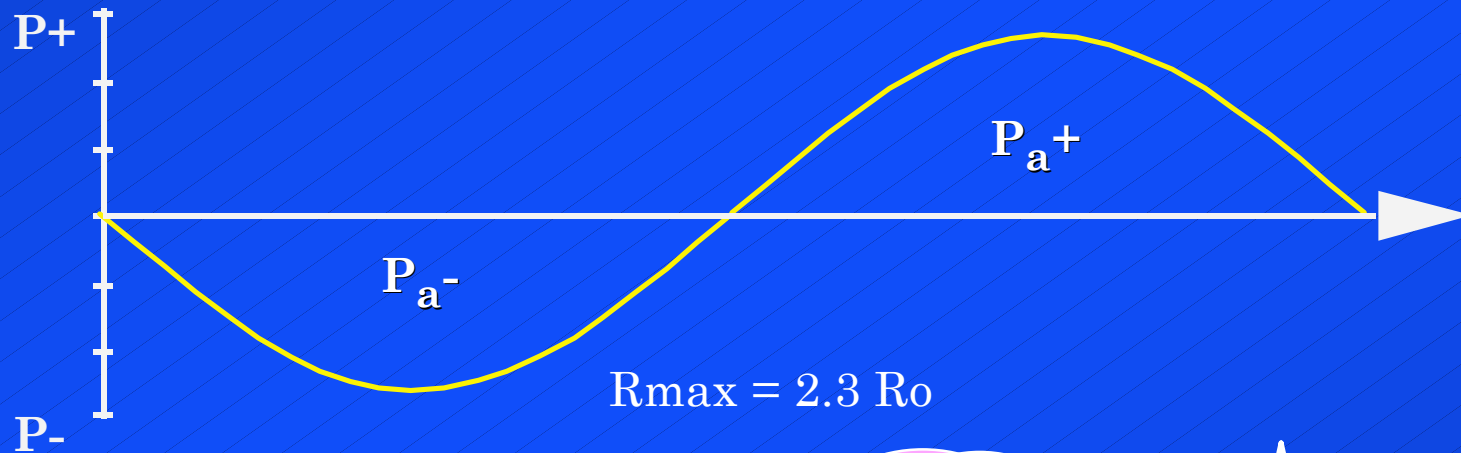
□ Cavitation

- Formation and collapse of microscopic bubbles
 - Gas or vapor in composition
- Threshold of cavitation
 - Pressure at which cavitation begins

Sound Pressure Regions

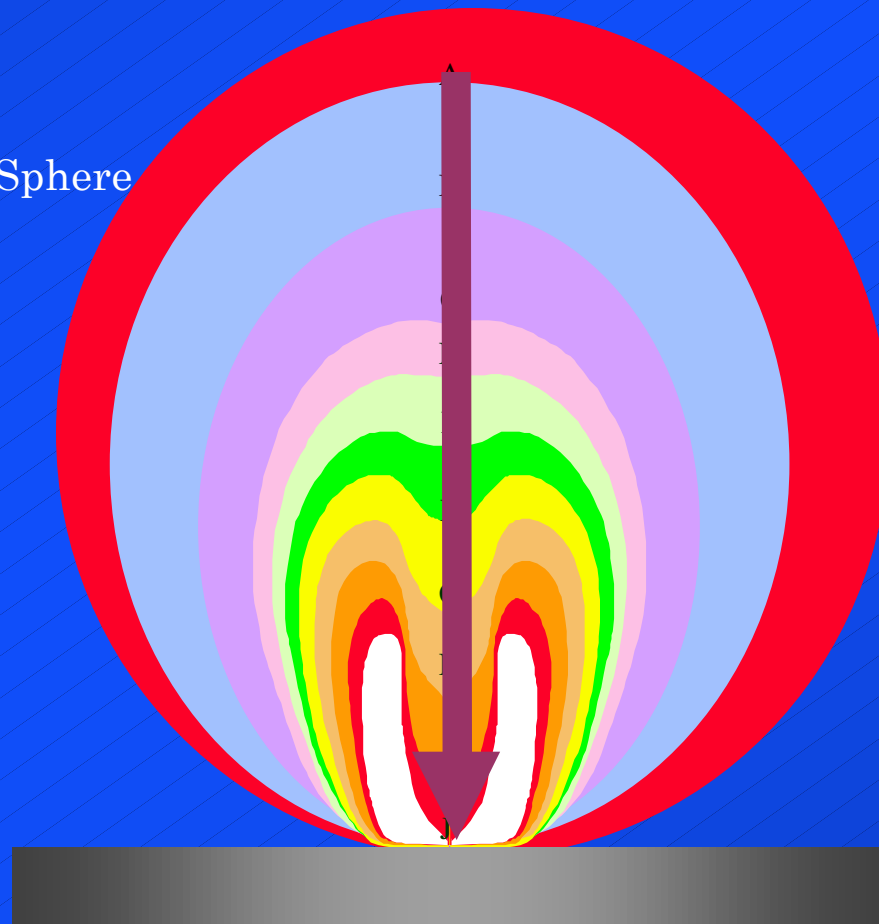


Cavity Growth Cycle

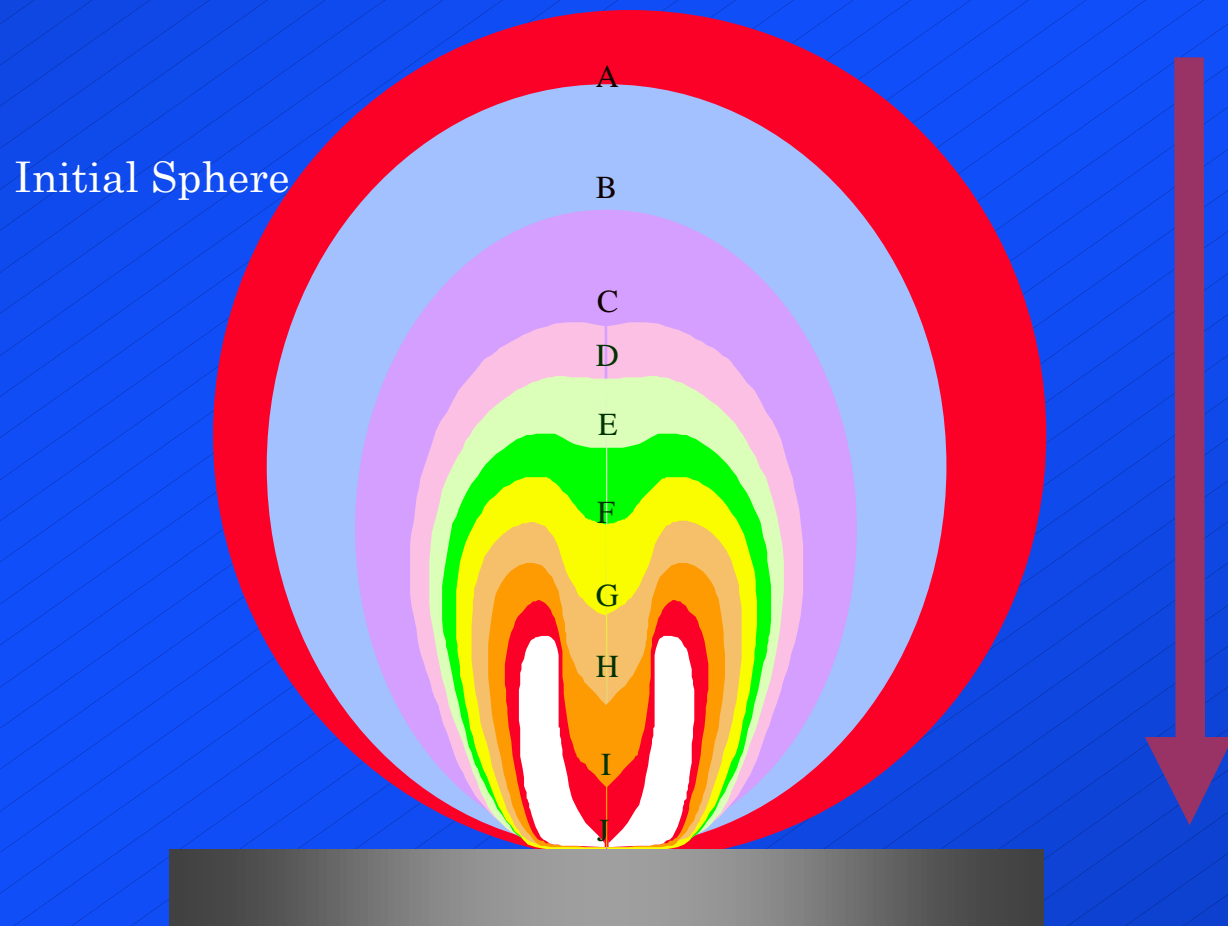


Cavitation Collapse Model

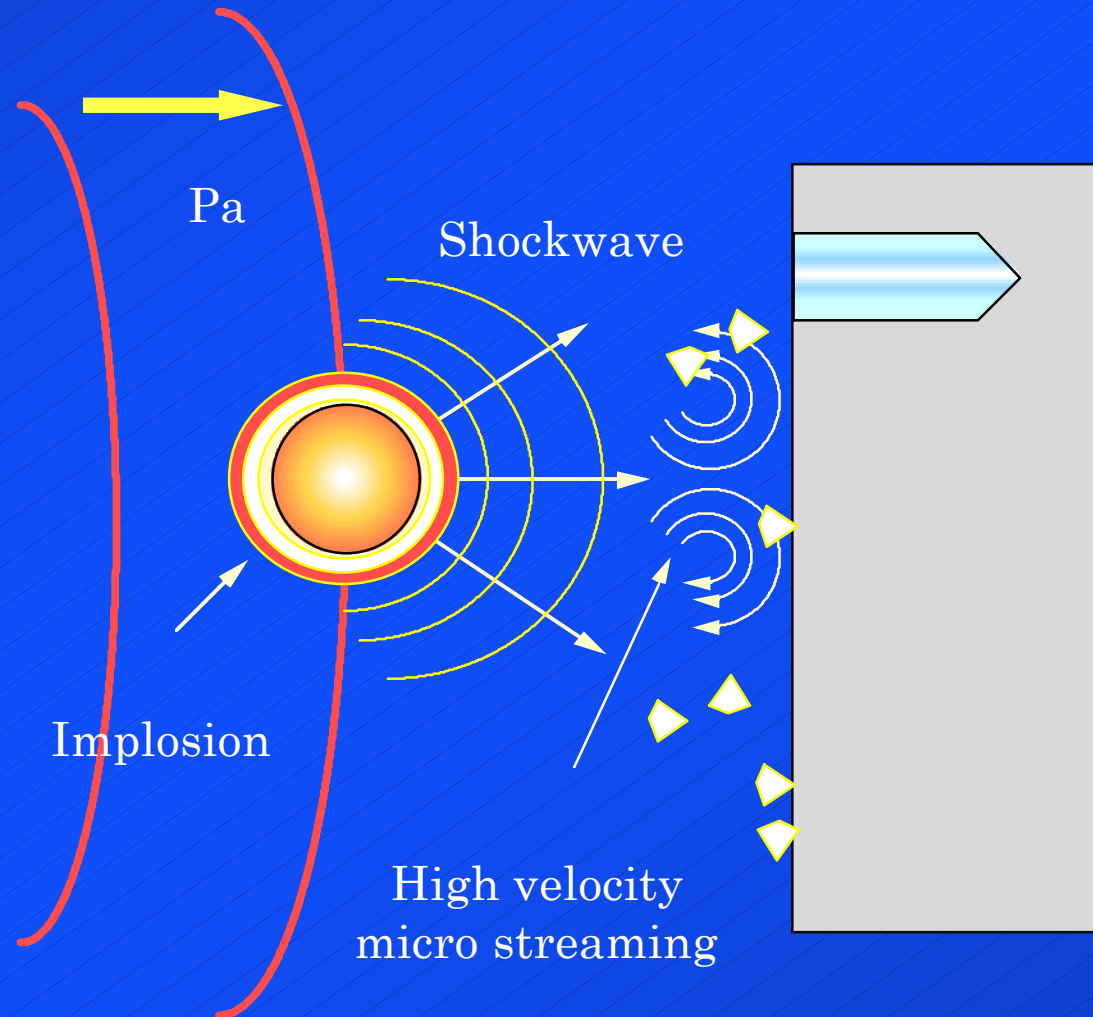
Initial Sphere



Cavitation Collapse Model

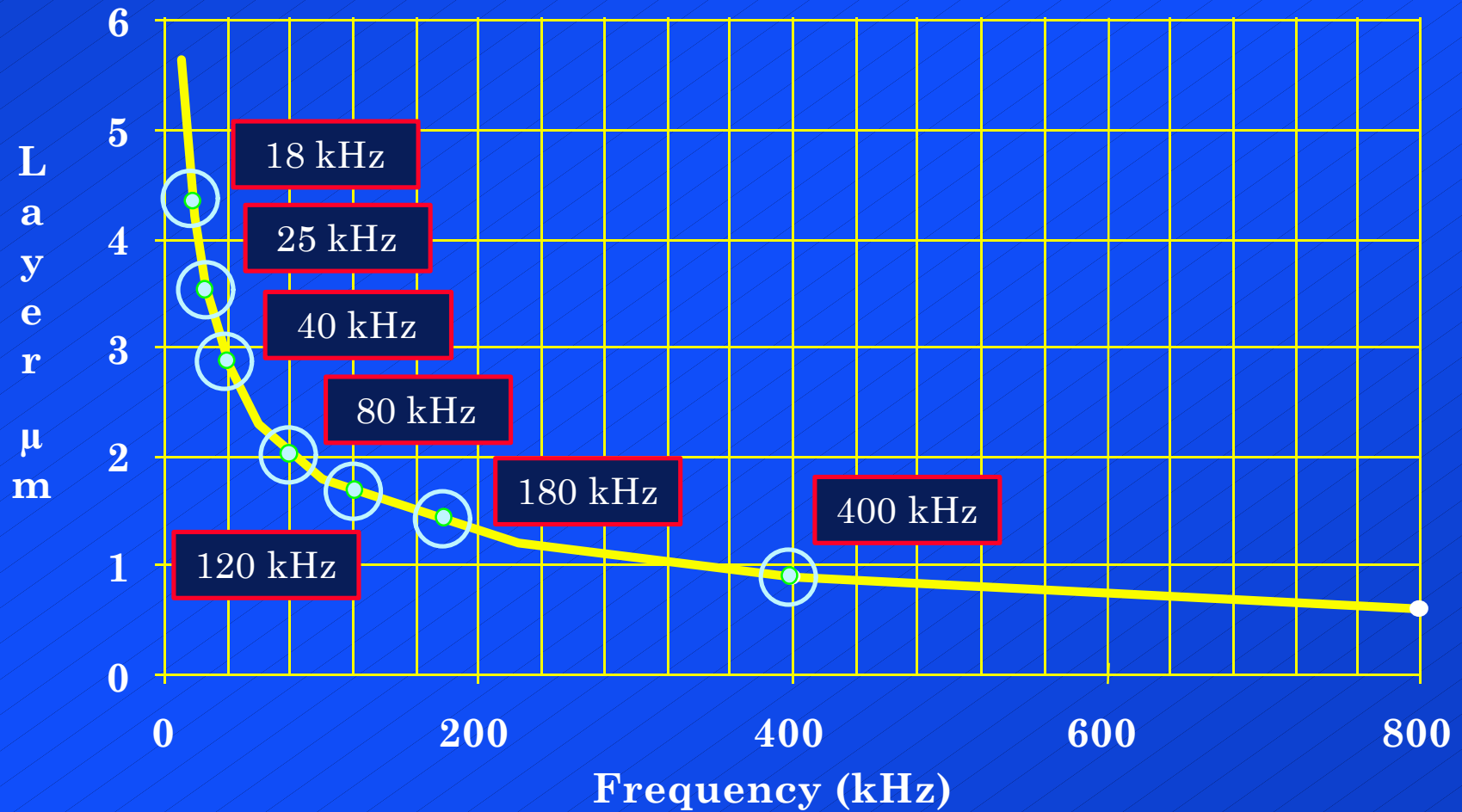


Mechanics of Cleaning Cavitation Implosion

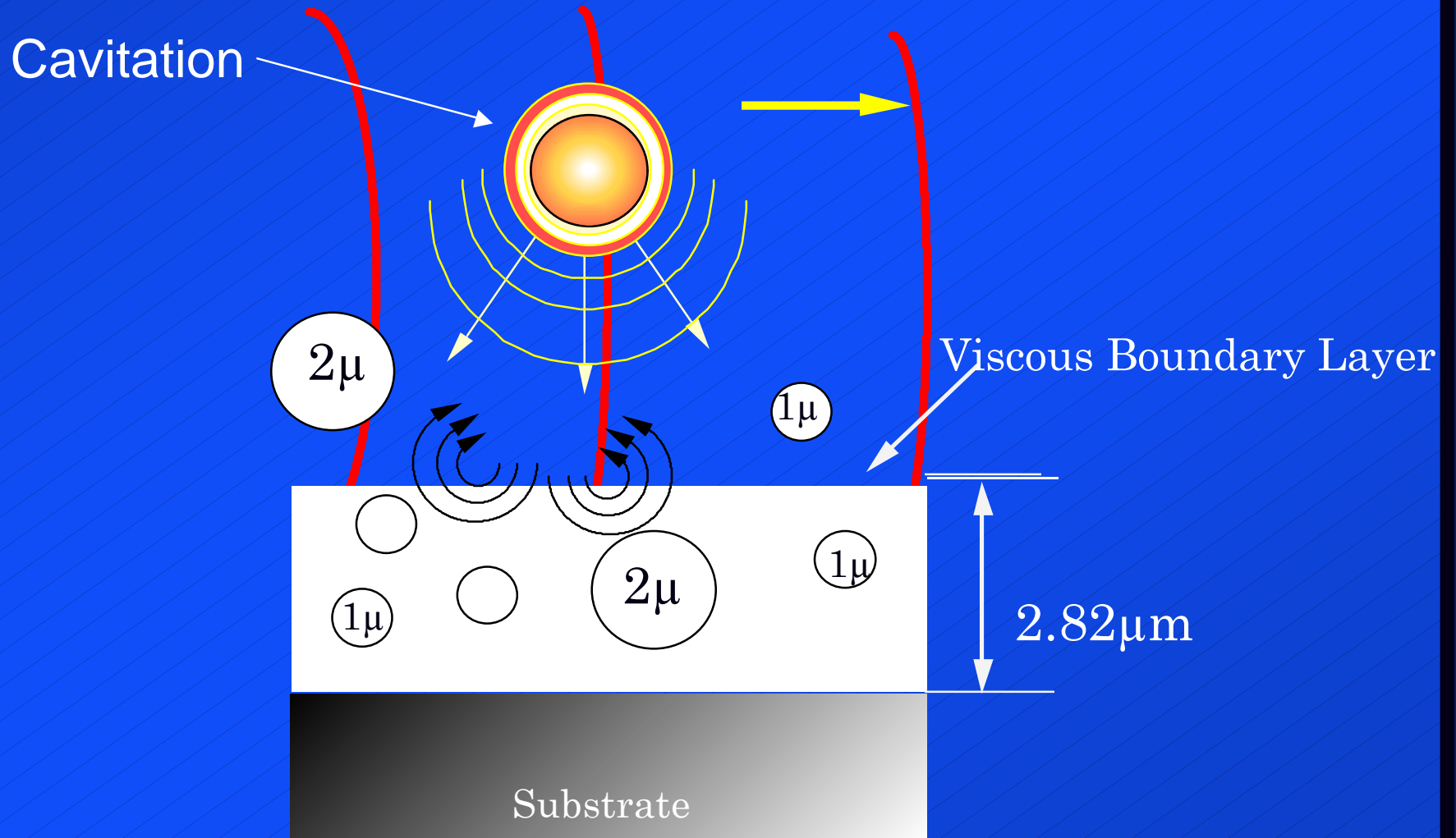


Viscous Boundary Layer

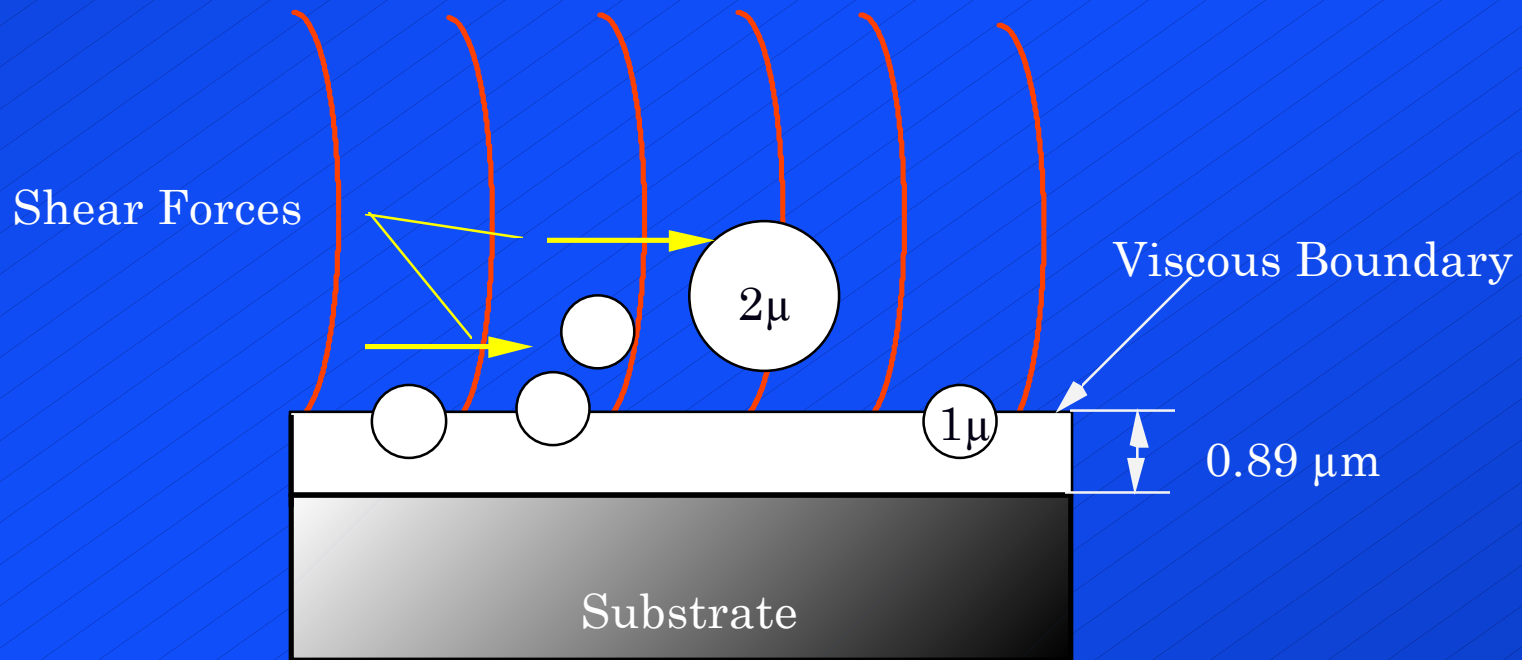
Proximity of Sound to the Surface



Mechanics of Cleaning Effect at 40 kHz

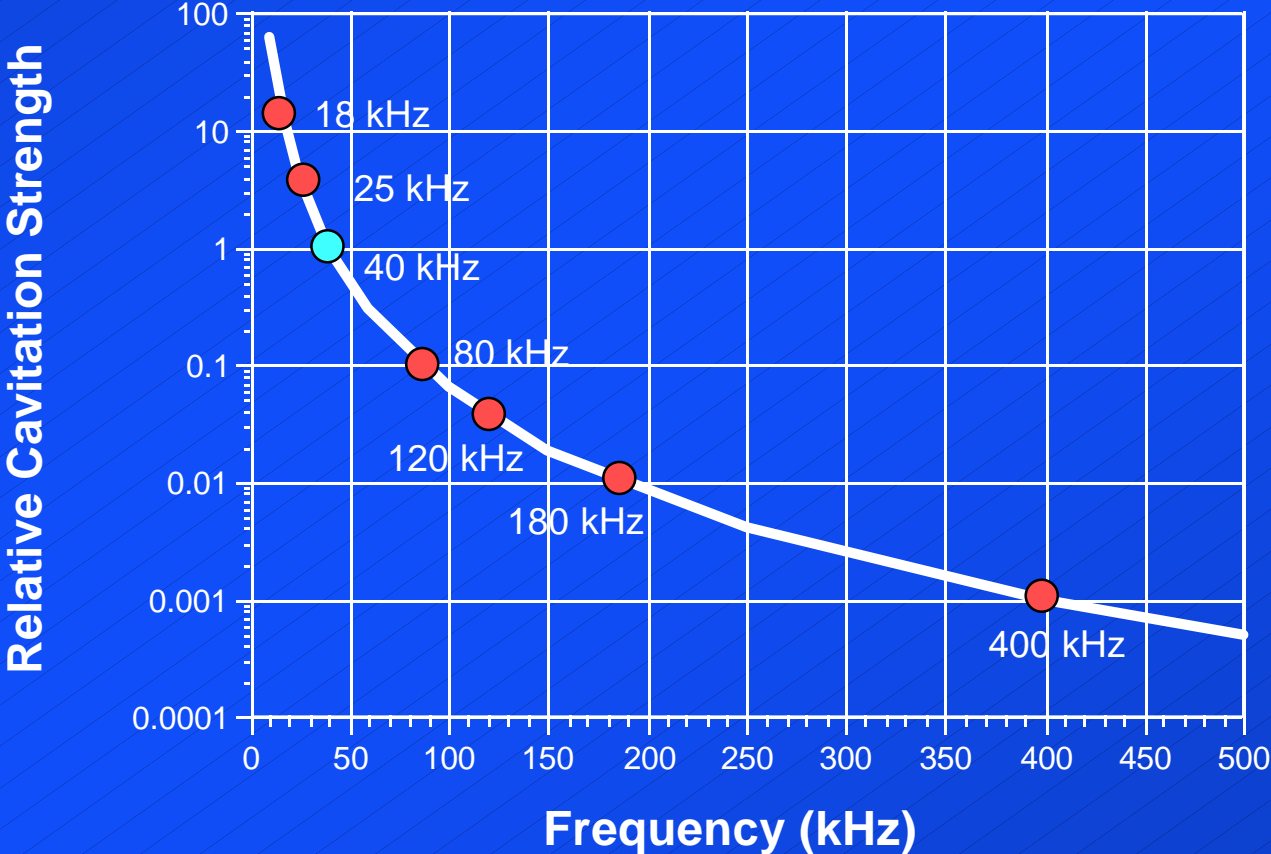


Mechanics of Cleaning Effect at 400 kHz



Cavitation Strength Compared to 40 kHz

Cavitation Strength vs Frequency



Case Study

Flat Panel Display

□ Factors Considered

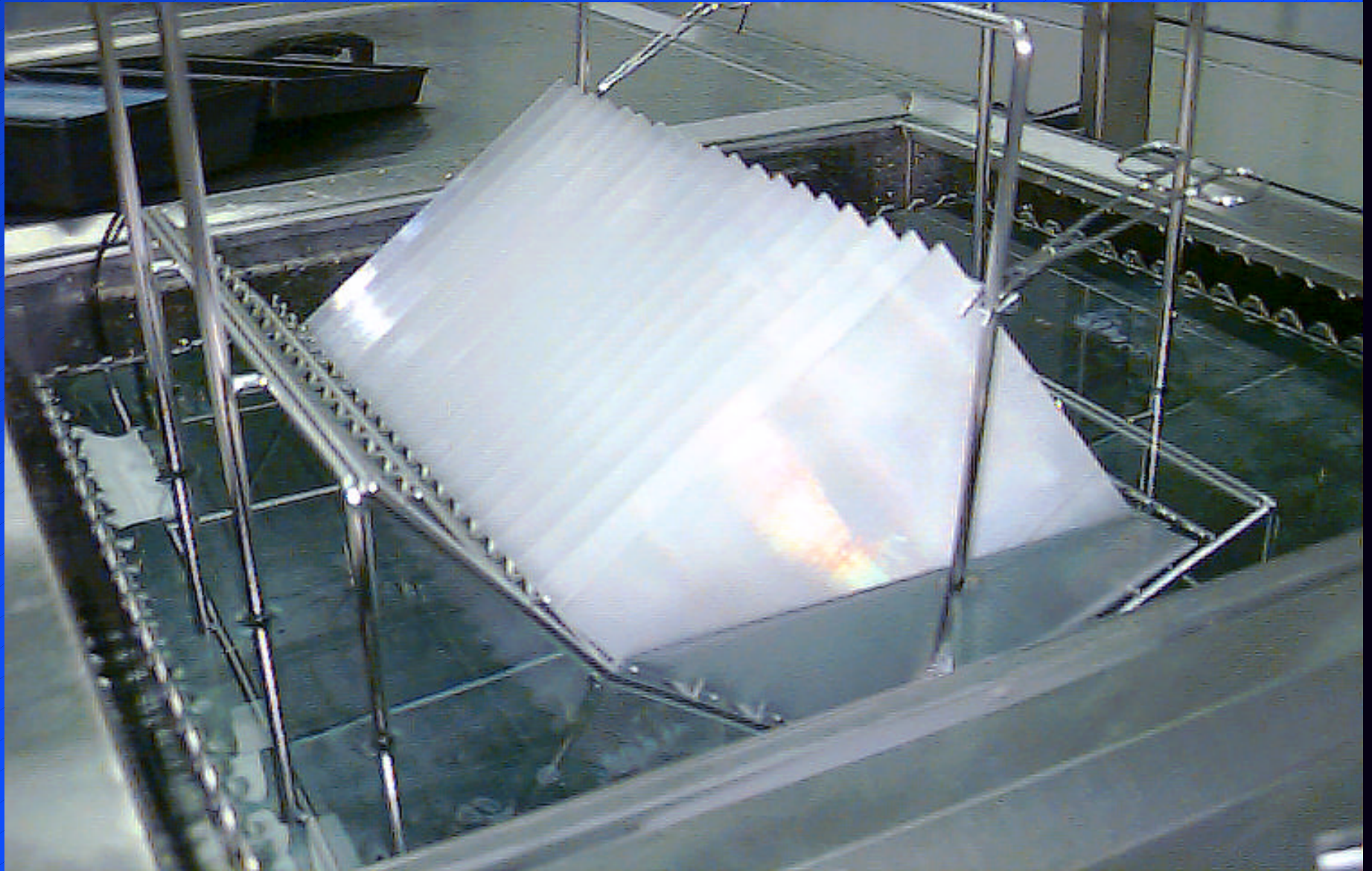
- Particle Size
- Temperature
- Frequency
- Exposure Time
- Power Output

Case Study

Flat Panel Display

□ Application

- Flat Panel Displays
- Particle counter used on dirty panels - particle distribution
- Particle sizes:
 - 7, 5, 3, 2, 1, 0.7, 0.5, 0.3 micron



X-20

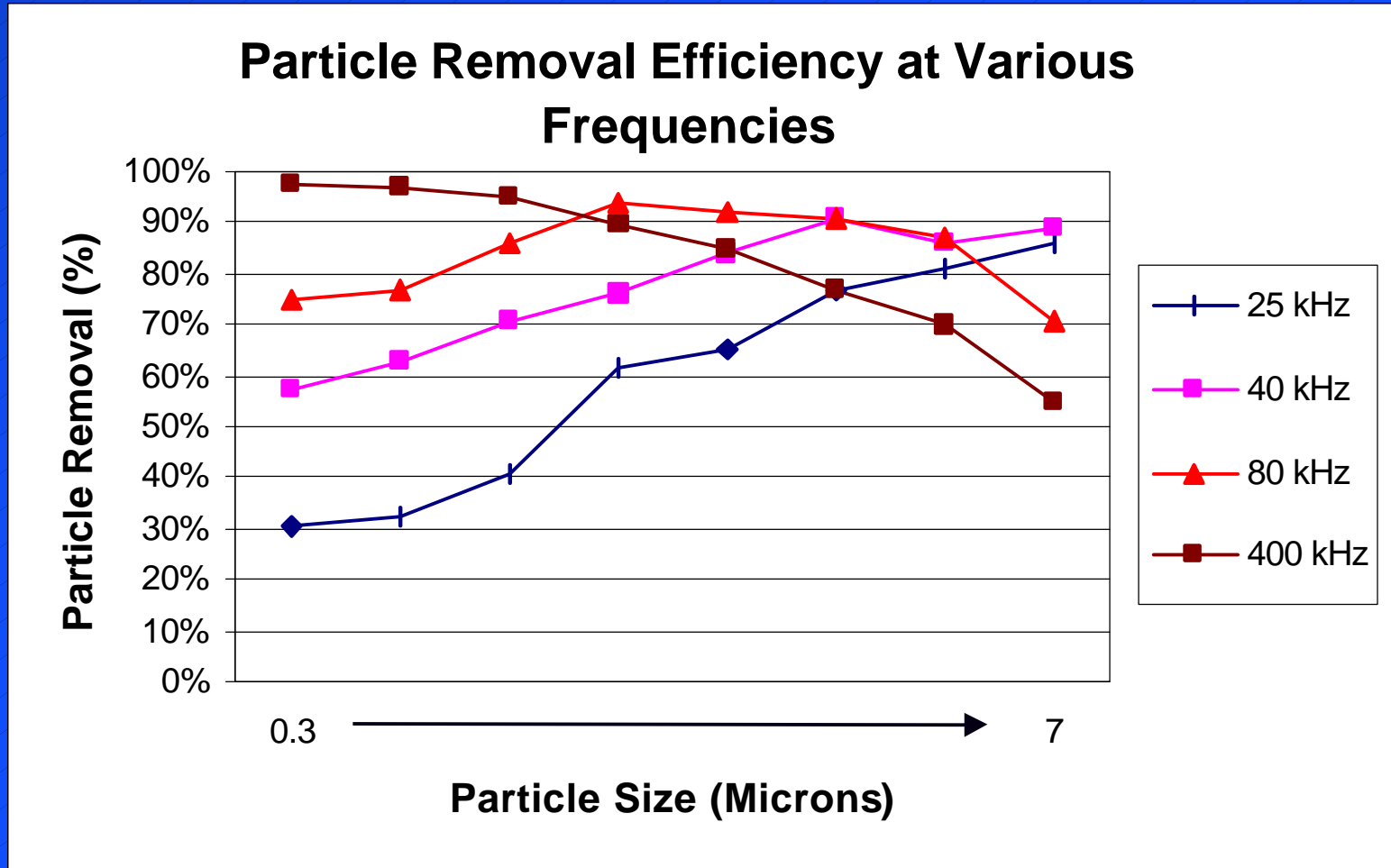
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Case Study

Flat Panel Display

- ❑ Flat panels loaded vertically in an electroplated carrier
- ❑ Panels immersed in surfactant and exposed to 25, 40, 80 and 400 kHz frequencies
- ❑ Panels ultrasonically rinsed in 12 megohm DI water
- ❑ Slow-Pull Dry at 2 inches per minute
- ❑ Panels were particle counted again after drying
- ❑ Particle removal efficiency analyzed

Particle Removal Data



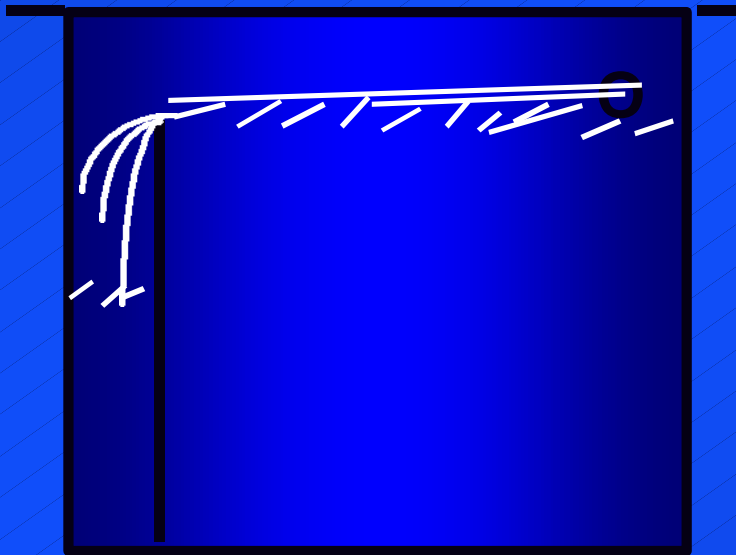
Results

- ❑ Small particle removal efficiency increases with frequency
- ❑ Acoustic boundary layer thickness decreases with increasing frequency
- ❑ Small particles may redeposit if not removed from the rinse bath - Filtration Needed

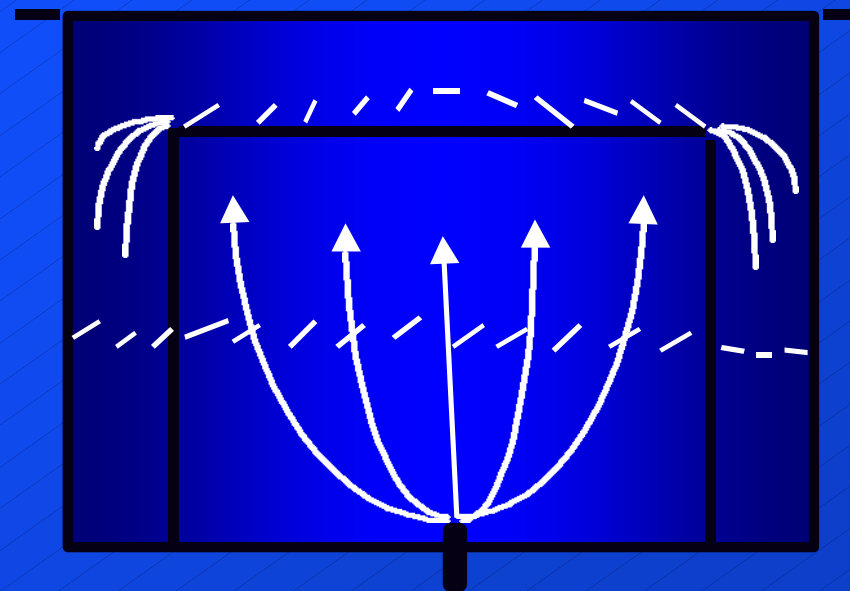
Preventing Redeposition

- For floating contaminants
 - Clear the surface

SPARGER SYSTEM



4-SIDED OVERFLOW



Preventing Redeposition

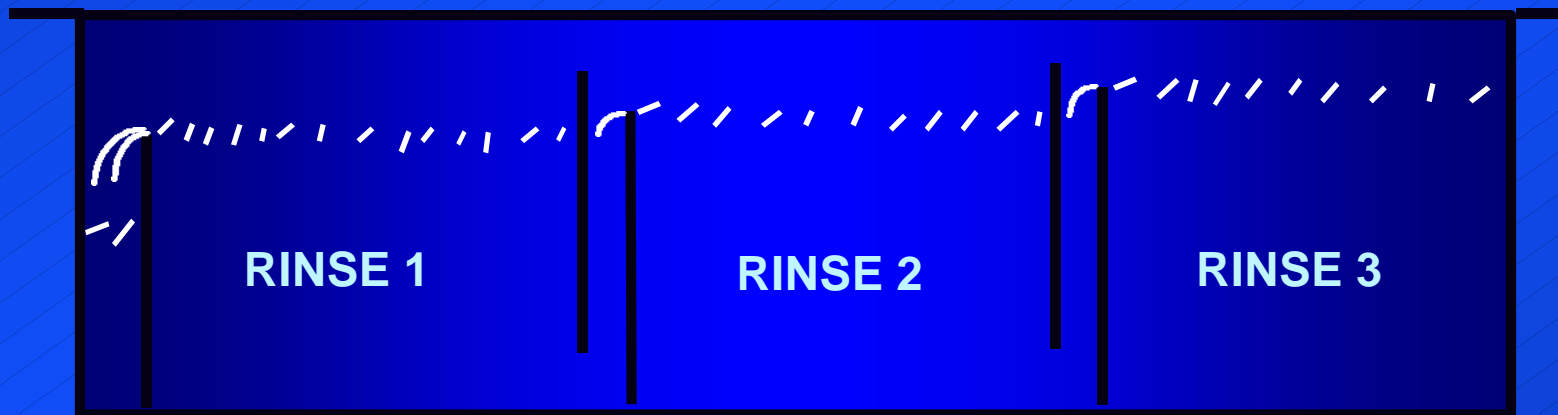
- ❑ Filter the rinse(s) for particles
- ❑ Filter retention is generally increased from bath to bath
- ❑ Final filter retention should reflect final cleanliness specifications

Preventing Redeposition

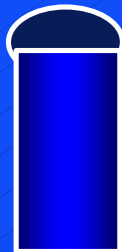
WORK FLOW



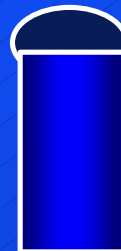
← WATER FLOW



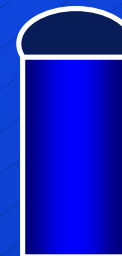
10 Micron
Filter



5 Micron
Filter



1 Micron
Filter



Filtration Considerations

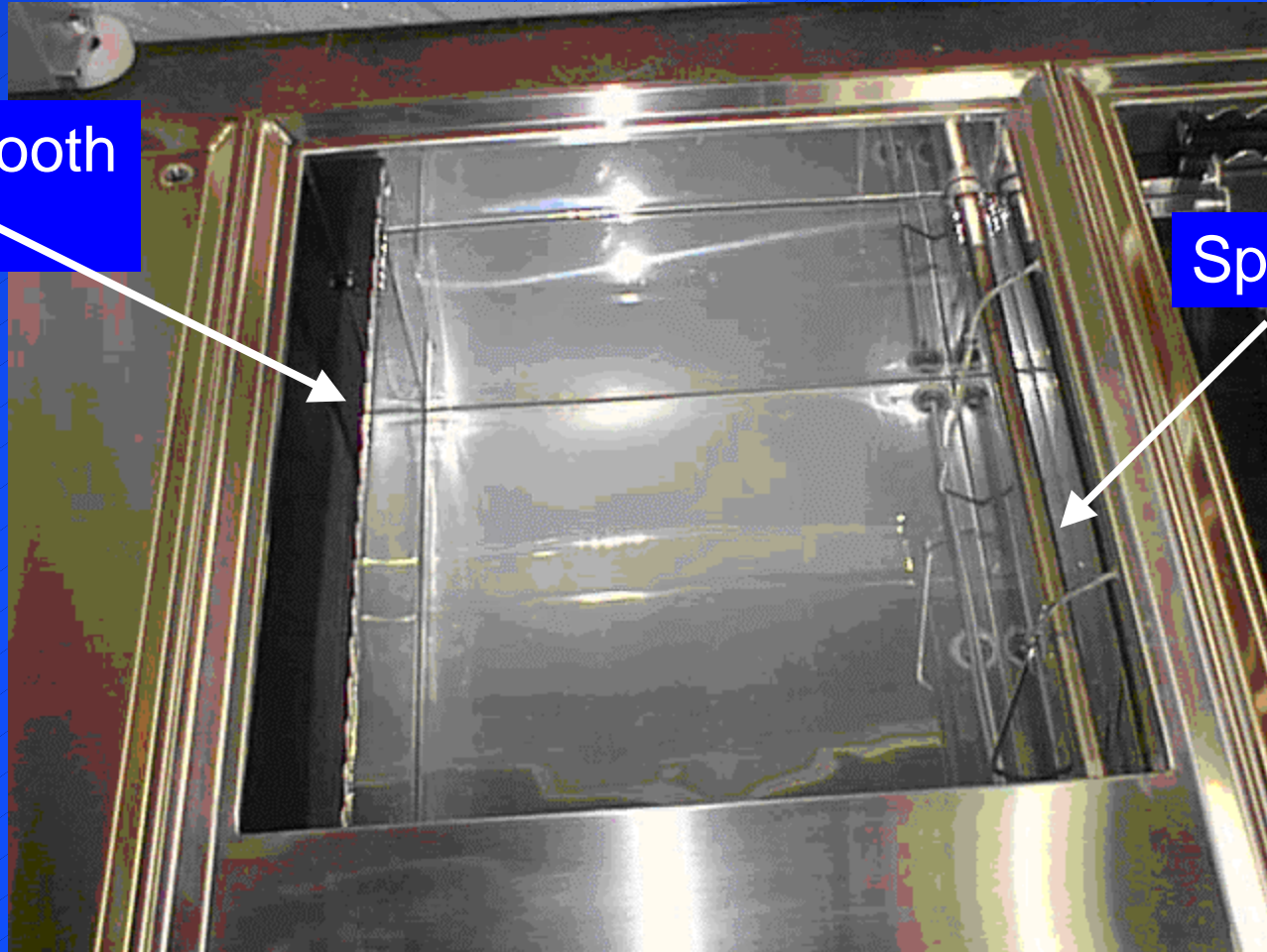
- ❑ Filtration is a critical to insure particulate removal
- ❑ Absolute & nominal filters
- ❑ Micron size

Equipment Considerations

- ❑ Flow patterns through rinse tanks can effect success
- ❑ Flow patterns are a function of equipment design
- ❑ Most common design is a single side overflow
 - They typically rely only on “Flow through” volume for dilution

Single Sided Overflow Weir

Saw-Tooth
Edge



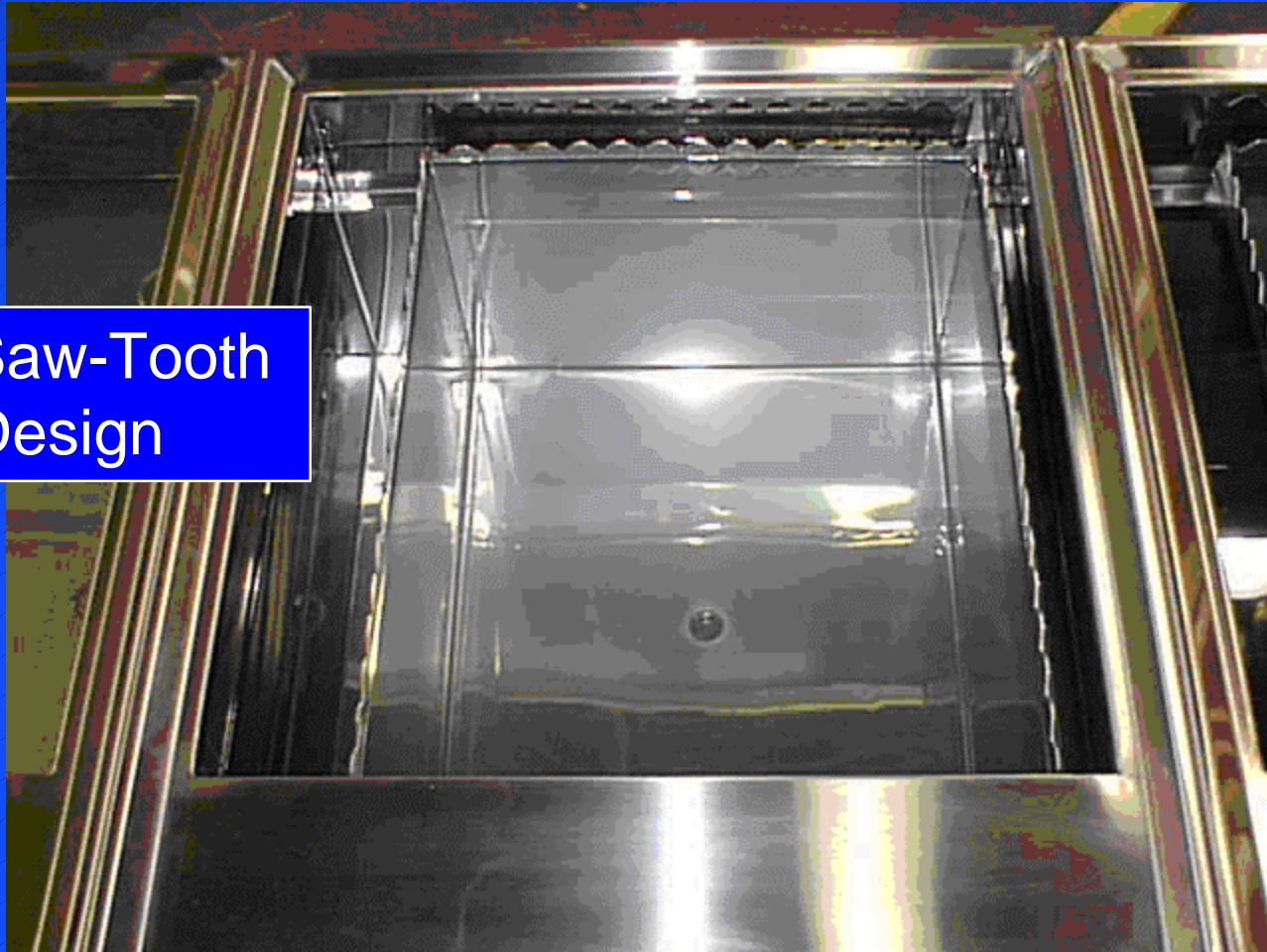
Sparger

Equipment Considerations

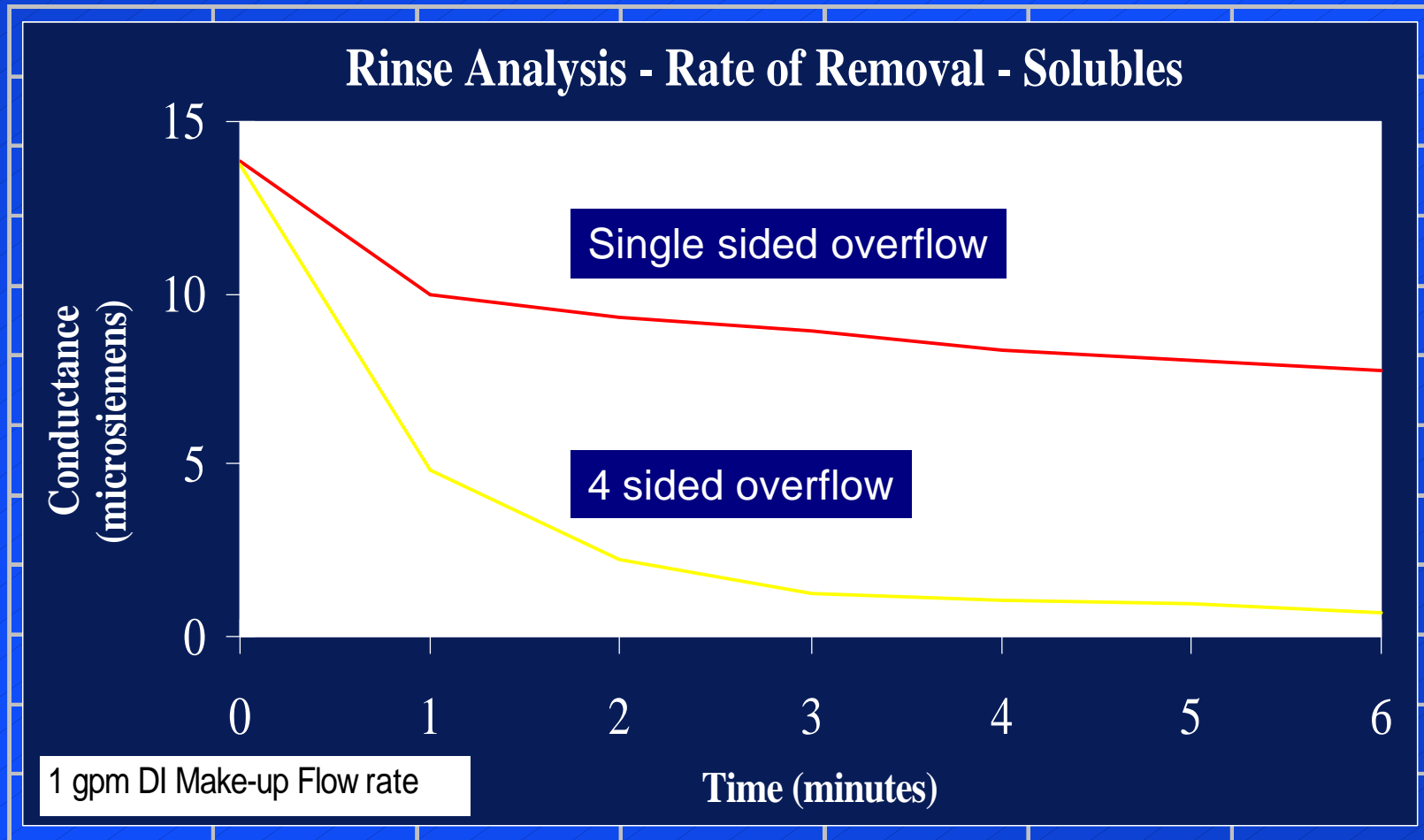
- **Four sided overflows are more effective**
 - Utilize “Flow through” to maintain water quality
 - Use a high volume pump to circulate rinse water
 - Introduced from the bottom with laminar upward flow
 - Overflow at four sides minimizes the distance soil must travel
 - “Dead spots” are eliminated

Four Sided Overflow Weir

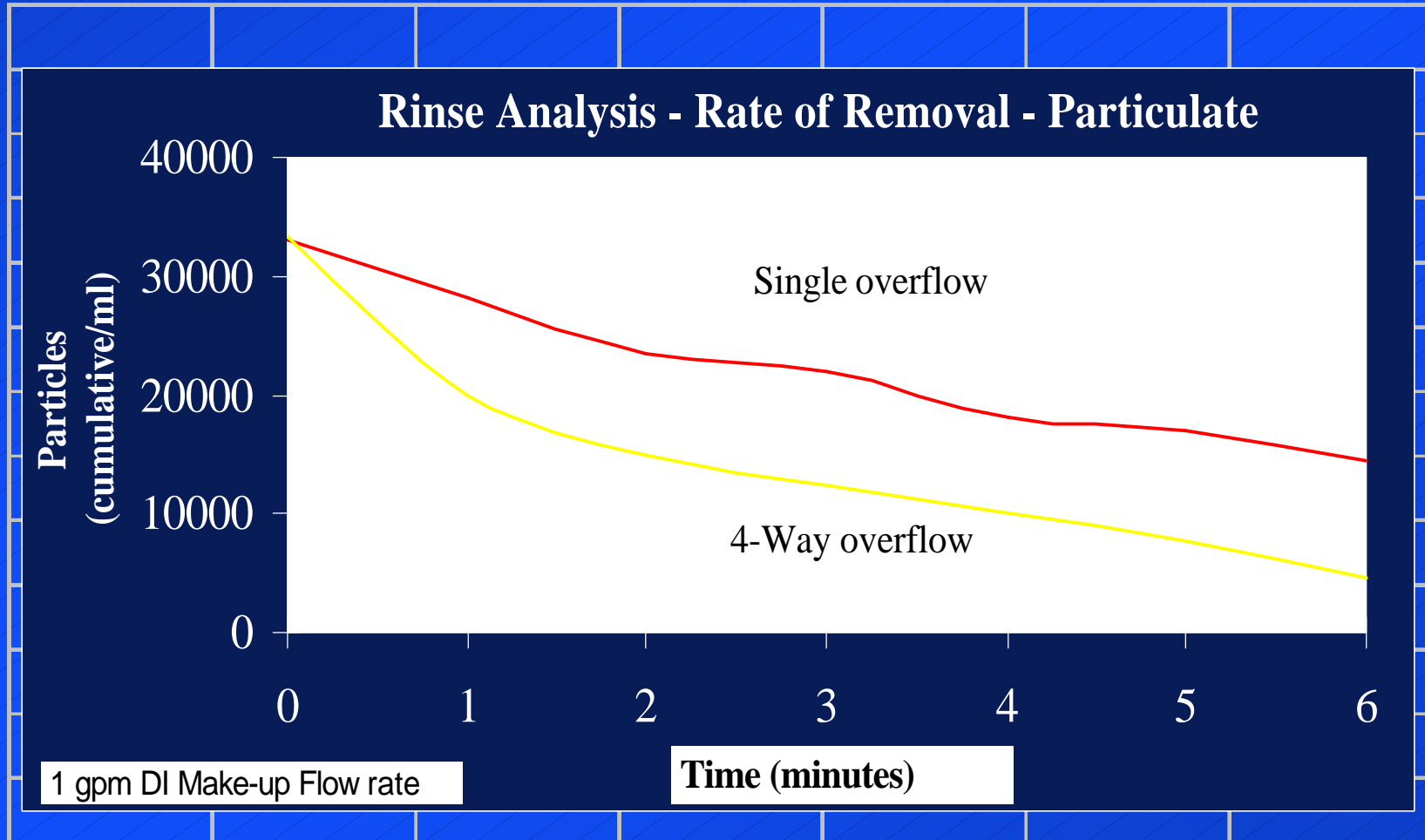
360° Saw-Tooth Weir Design



Equipment Considerations



Equipment Considerations



Equipment Considerations

- **Factors impacting better performance**
 - High internal flow promotes soil solubility
 - High volume laminar flow is efficient for particle removal
 - Four sides minimizes the distance that particles must go
 - Velocity minimizes redeposition

Additional Considerations

- ❑ **Equipment maintenance**
- ❑ **Preventative maintenance program**
 - monitor water quality
 - clean out rinse tanks
 - change out filters

Equipment Considerations

- **Four side overflows can provide up to 60% advantage**
 - Improved solubles removal per unit time
 - Improved particulate removal per unit time
 - Shorter rinse cycles for comparable quality

Summary

- ❑ **Two types of soils - Soluble and Insoluble**
- ❑ **Understand how much soil is acceptable**
- ❑ **Two tasks - Separate the soil and prevent redeposition**
 - **Surface (floating) soils**
 - **Particulates**
- ❑ **Equipment design can influence results**
 - **Four side overflows can offer up to 60% advantage**

Real Time Cleanliness Monitoring Wish List

- ❑ Need to determine level of cleanliness of parts
- ❑ Desire a method to monitor process cleanliness
- ❑ Aid in developing cleanliness monitoring through statistic process control

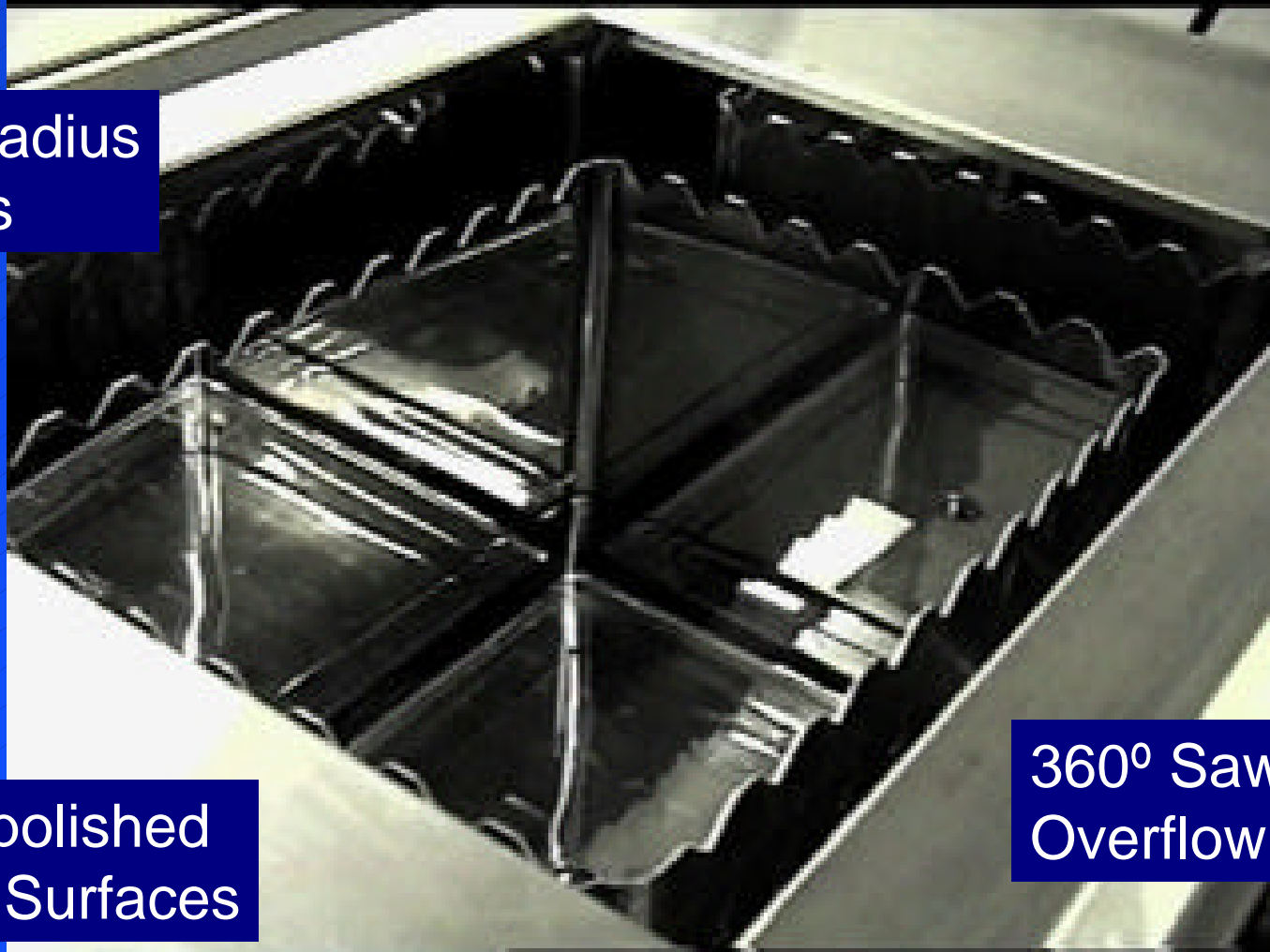
Answer: In-Line Particle Counting

In-line Particle Count Experiment

- ❑ Spiked a 4 sided overflow, coved corner, electropolished tank
- ❑ 3 cc of polishing compound
- ❑ Ran test at 4 recirculating filtered flow rates
- ❑ Varied fresh inlet flow rate

4 Sided Overflow, Coved Corner, Electropolished Tank

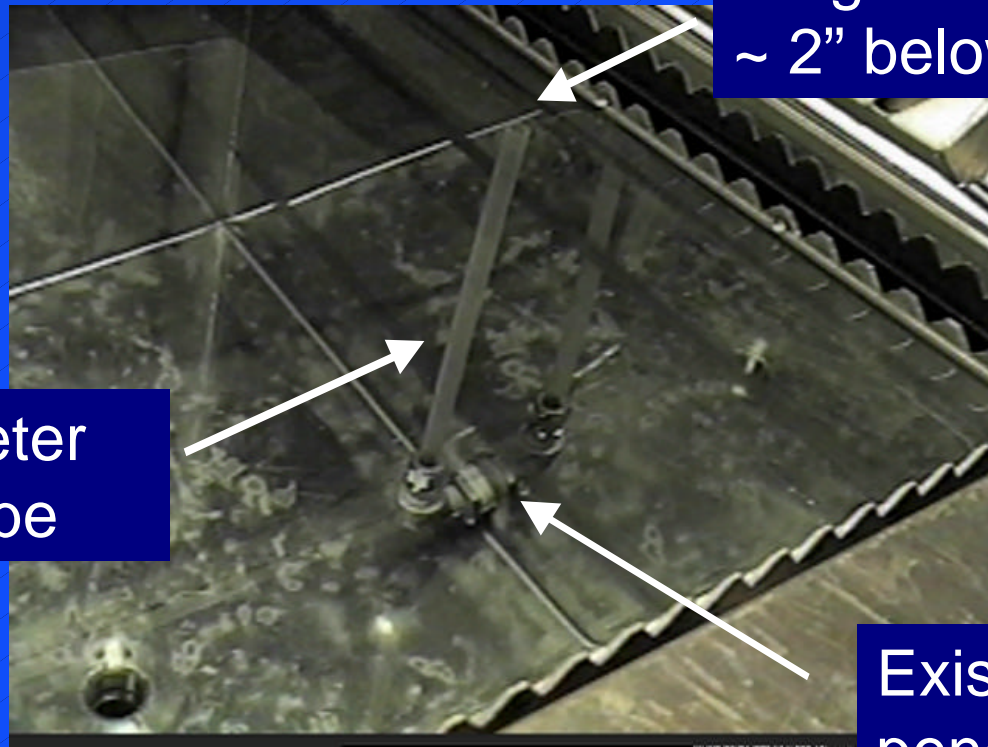
Wide Radius
Corners



Electropolished
Interior Surfaces

360° Saw Tooth
Overflow Weir

In-Line Particle Sampling



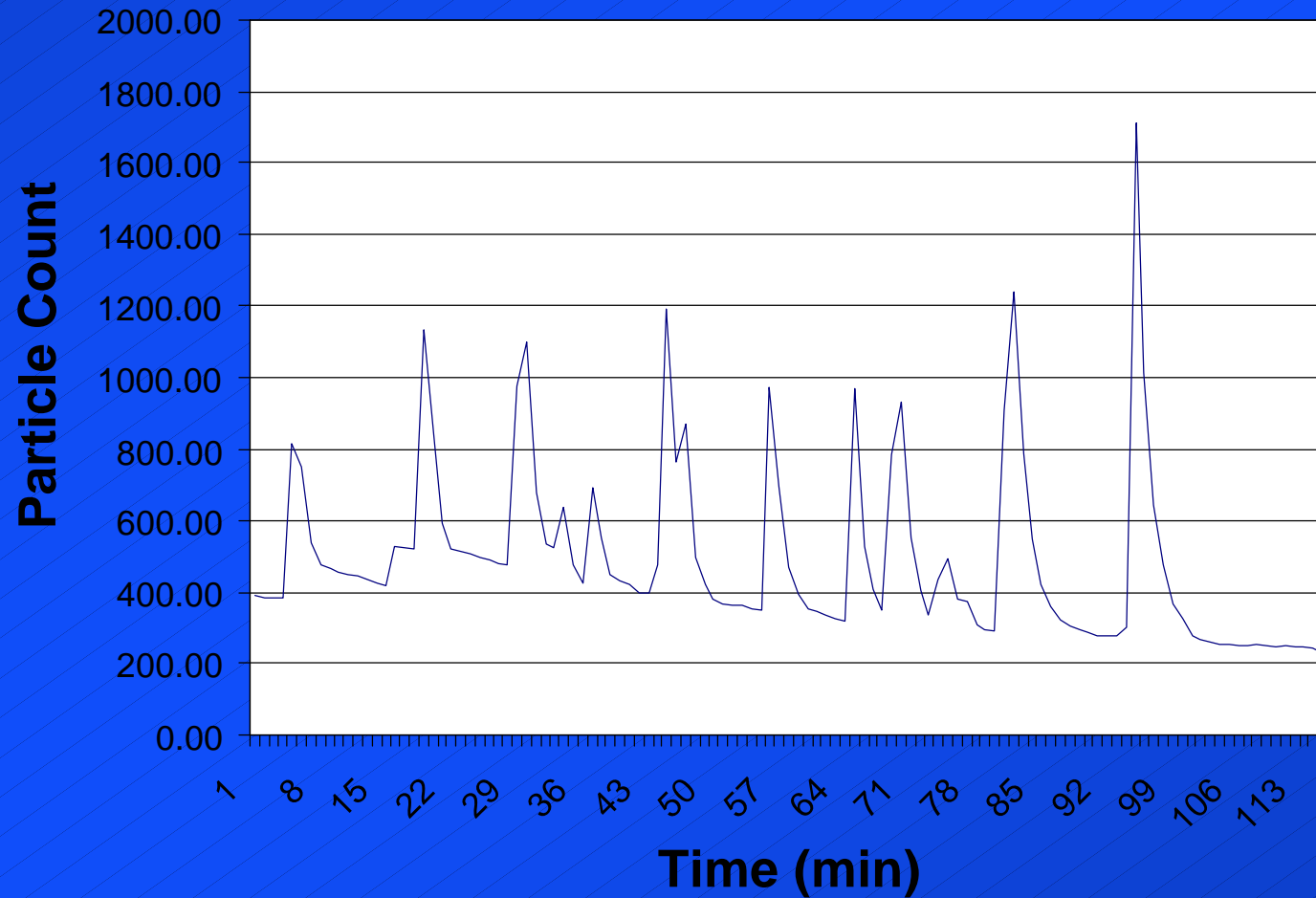
Height of sample tube
~ 2" below liquid level

1/2" diameter
sample tube

Existing tank
penetration

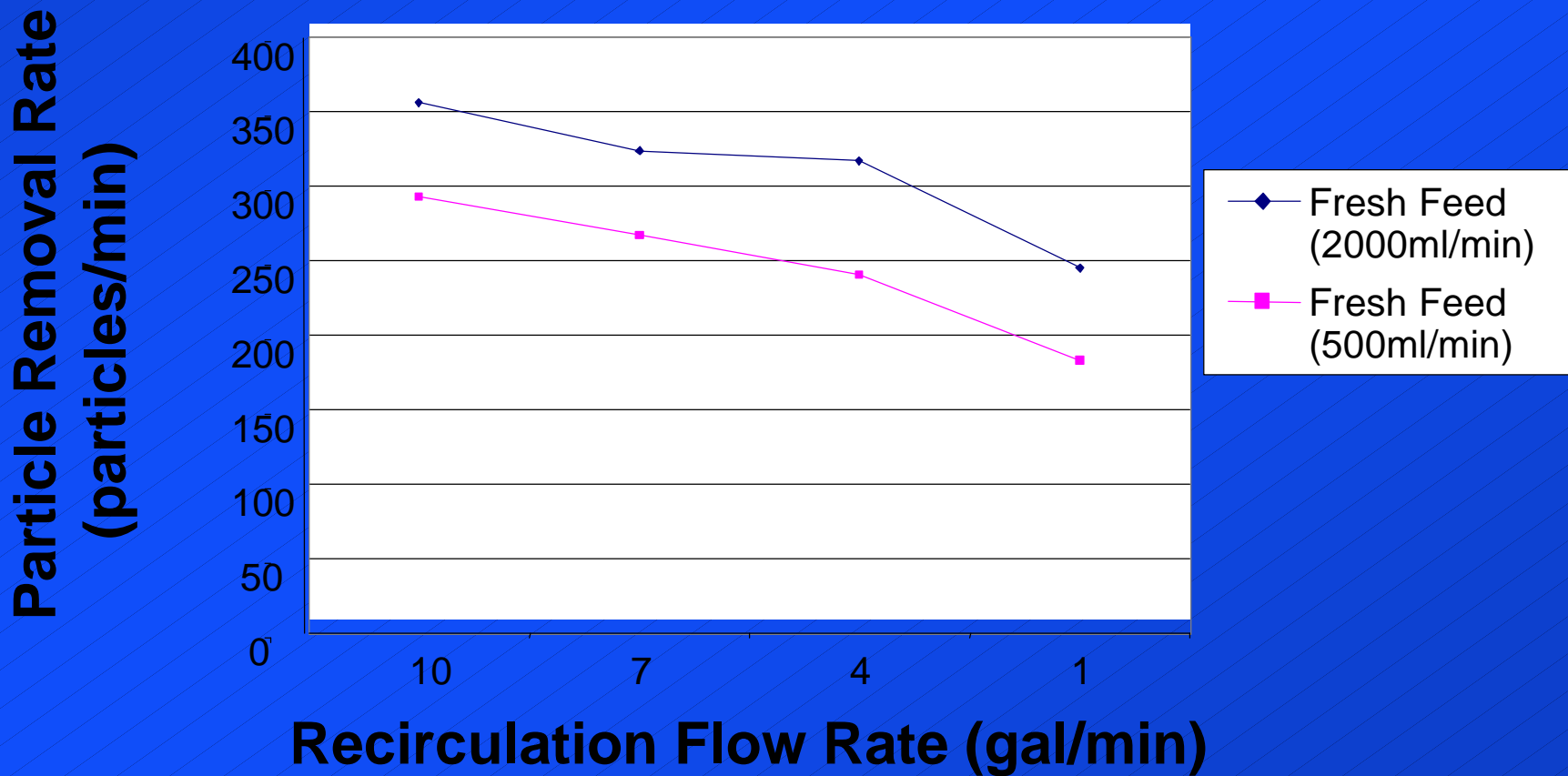
In-Line Particle Count Study

Experimental Tank Data



In-Line Particle Count Study

Fresh Feed Effect on Particle Removal Rate

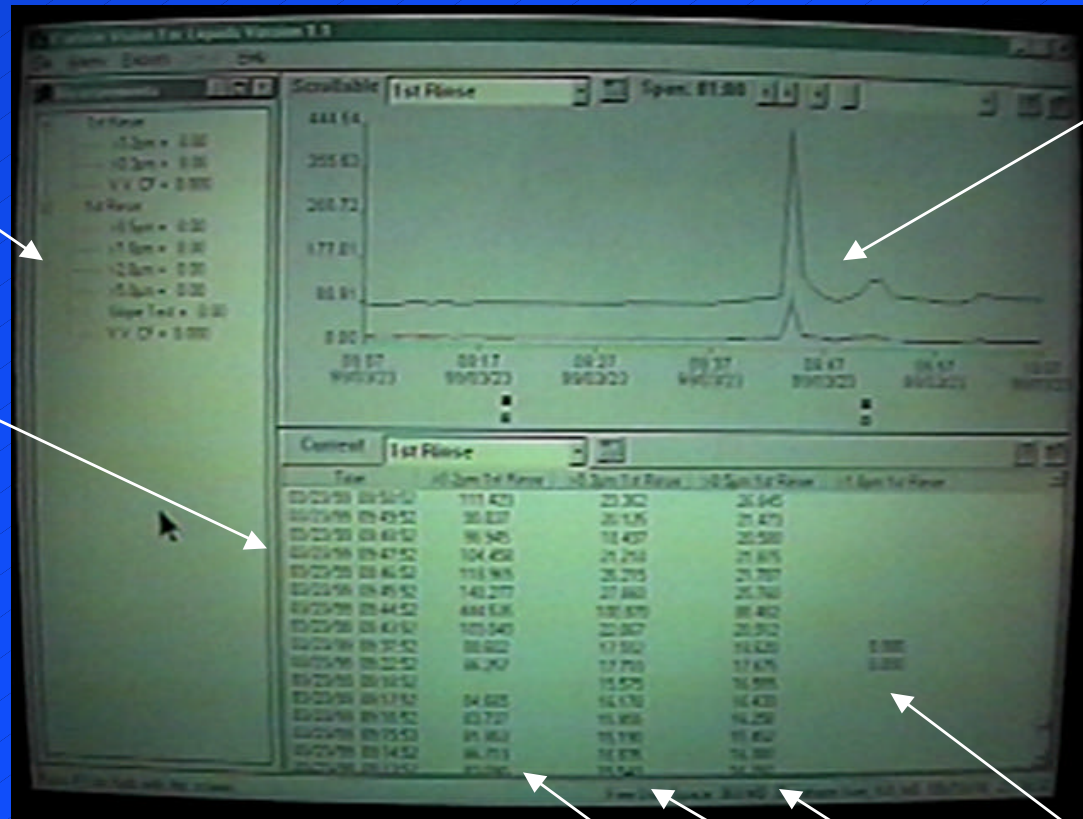


Software Data View

Live data

Date/Time Column

Graph of Data



Tabular data by micron size (0.2, 0.3, 0.5, & 1.0 µ)

Summary

- ❑ In-line particle counting permits real time cleanliness monitoring
- ❑ Generates data for statistical process control
- ❑ Establishes historic database for predicting process upsets

INJECTION MOLD CLEANING

The use of ultrasonic cleaning equipment for routine injection mold maintenance has been effectively employed for many years. It provides a number of benefits not achievable using more traditional methods. As a non-contact method, mold detail is not damaged during cleaning and critical tolerances can be maintained, extending mold life. The higher levels of cleanliness attained using ultrasonic cleaning also results in better releases and longer runs while improving productivity and minimizing scrap. The penetrating nature of ultrasonic cleaning removes residual polymer and releases from mechanically active mold components extending their life and can also remove buildups from internal cooling ports and channels, thereby improving polymer flows.

ULTRASONIC TECHNOLOGY

Ultrasonic cleaning depends upon cavitation, the rapid formation and violent collapse of minute bubbles or cavities in a cleaning liquid. This activity, when combined with an appropriate cleaning chemistry, creates a unique penetrating action that is highly effective, even in blind holes and tiny crevices. This combination of high energy, deep penetration, and non-contact gets results. No other process cleans faster, more safely, or more thoroughly.

THE EQUIPMENT

Ultrasonics is an immersion technology that requires three components. The first is a tank to hold the cleaning liquid. The second is a number of ultrasonic transducers, which convert electrical energy to sound energy, and finally, a generator to produce the required high frequency power, which is delivered to the transducers. Branson offers these parts in a number of configurations to meet the specific needs of your application. Sizes range from tabletop units for small molds or segments to fully integrated automated systems for larger molds or higher volumes found in larger molding operations.

THE CHEMISTRY

While the chemistry can vary based on the mold material or the type of soil, most molds are cleaned in a buffered alkaline solution. These materials are widely available and very cost effective to use. To help with chemistry selection and process development, Branson maintains a free application evaluation service. Parts submitted to the applications laboratory will be cleaned and returned with recommended chemistry, process, and equipment to meet your operational needs.

BEFORE CLEANING



Figure 1. Note encrusted material on mold surface.

AFTER CLEANING

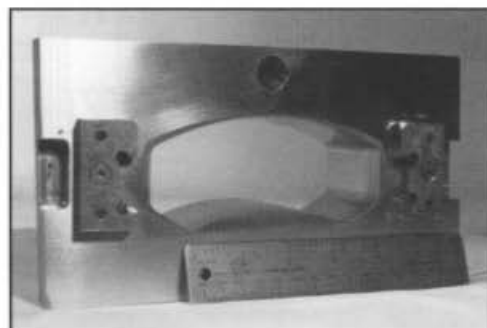


Figure 2. Material is removed, without mold damage.

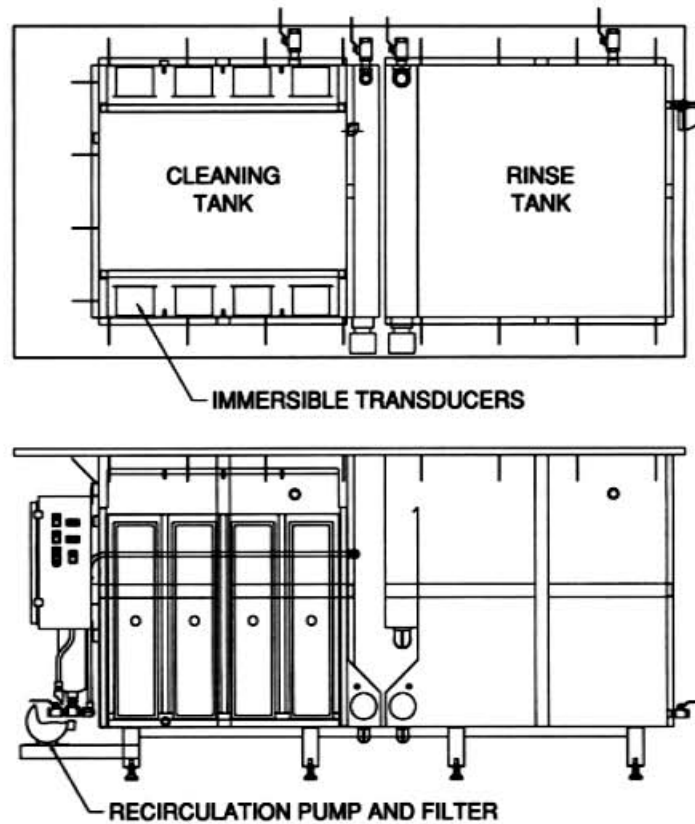
STANDARD FEATURES

- S-8300 Series ultrasonic generator for maximum power and process control
- Modern piezoelectric transducers for reliability
- Stainless steel construction for durability
- Thermostatically controlled heat to enhance ultrasonics and improve cleaning
- Optional pump and filter system available on all units

SYSTEM BENEFITS

- Substantially fewer man-hours spent on maintenance
- Improved mold life
- More shots between maintenance tasks
- Reduced scrap and waste
- System is easy to operate and maintain
- Better product finish and detail over time

TYPICAL SYSTEM *



* Larger and smaller units are available

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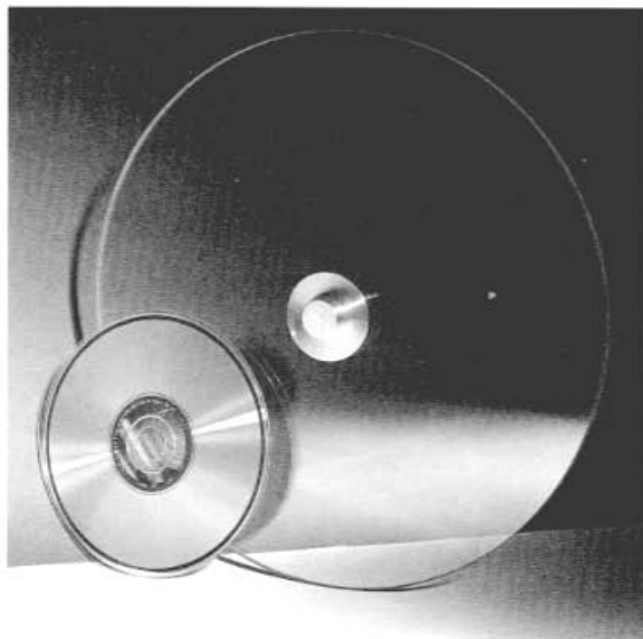
Cleaning Compact Disc Masters

Ultrasonic cleaning technology brings substantial savings to the compact disc recording industry by enabling the reuse of the six-millimeter thick glass master disc upon which the musical information is laser etched. Previously, these master discs were disposed after a single use because critical cleaning could not be achieved. Ultrasonic cleaning lowers the production cost of compact discs, an important factor to the future growth of the CD market.

CD Fabrication Process:

The heavy glass substrate, approximately a foot in diameter, receives an ultrathin layer of adhesive and a photoresist coating. It is then exposed to a laser beam which cuts microscopic pits into the photoresist, forming the code to be interpreted into music on a CD player. Because the pits are microscopic, even a single dust particle – large by comparison – can disrupt the recording, so cleaning is critical. The glass master then is immersed in a chemical solution that etches away areas exposed to the laser light and silver is thin deposited over the etched photoresist.

A metal master, or stamper, is obtained from the glass master and the glass is no longer needed for the remainder of the manufacturing process. Using the stamper, the individual discs are injection molded, cooled, and

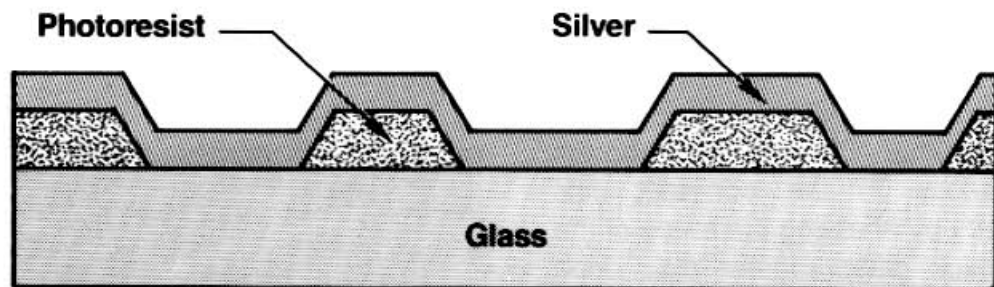


then covered with a thin protective coating. Labels are silkscreened and the disc is packaged for market.

Challenge:

Refurbish compact disc glass masters for reuse in the sensitive CD mastering process. Critical cleaning must be achieved without even the slightest marring of the glass substrate.

Compact Disc Master



Contaminants To Be Removed:

Silver, photoresist and adhesive layers must be removed from the glass master completely, as well as routine fingerprints, dust, and other manufacturing soils. The cleanliness level is determined by laser.

Former Cleaning Method:

None.

Ultrasonic System:

A multi-step aqueous process followed by solvent drying achieves critical cleanliness of the glass discs. The cleaning and rinsing tanks are mounted in a Branson stainless steel wet bench and the drying is performed within an adjacent Branson solvent dryer. The process is automated with a Branson TDR Two-Dimensional Robot handling system.

The cleaning steps are:

- Immersion in a heated ultrasonic bath using an acidic solution
- Overflow rinse

- Deionized water spray
- Three-stage cascade rinse using heated deionized water and ultrasonics in the middle stage
- HEPA-filtered hot air recirculating dryer.

Advantages:

- Provides a high-performance cleaning system where none previously existed.
- Allows exact process control and reduced labor costs through automation.
- Achieves critical cleaning of glass detail without damaging substrate
- Reduces expense of purchasing new CD glass masters for each recording.
- Alleviates dependency on glass manufacturer for master discs.
- Contains mastering process completely in-house.
- Pays back initial equipment cost in less than one month.

For application assistance, contact your nearest Branson office or Branson's Cleaning Applications Laboratory at (203) 796-0522.



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Ultrasonic Cleaning in the Plating Line

Ultrasonic cleaning prior to plating can provide significant cost savings in time and labor by minimizing or eliminating manual scrubbing and lengthy soak times. Ultrasonic agitation thoroughly and quickly removes buffing compound, shop dirt, and other soils from a variety of metal and plastic items. Ultrasonics reaches crevices, blind holes, and other hard-to-reach places of the workpiece,

resulting in a cleaner part. This means better adhesion, which improves the appearance and quality of the finished product.

The following applications describe two typical cleaning processes in the plating industry; one uses an aqueous system and the other process uses a new environmentally safer solvent.

APPLICATION: Belt Buckles

Description:

Ornate brass buckles to be silver plated.

Problem:

Poor adhesion in crevices of buckle.

Soils:

Buffing compound, dirt.

Previous Method:

Manually scrub each buckle with caustic solution for 30 minutes.

Ultrasonic Process:

Immerse rack of 10 belt buckles in heated 25 kHz ultrasonic bath with alkaline solution pH 9-10 at 165°F for 5 minutes. Rinse thoroughly in tap water for 2 minutes in a three-stage cascade rinse station. Dry parts in a forced hot air recirculating dryer at 250°F for 8 minutes.

Ultrasonic System:

Heated ultrasonic cleaning tank and ultrasonic generator, heated rinse tank.



Advantages:

- Reduce cleaning time from 30 minutes for one buckle, to seven minutes for 10 belt buckles.
- Improve productivity with ability to clean 10 buckles at once instead of one at a time.
- Eliminate manual scrubbing.
- Improve plating adhesion.
- Reduce exposure to hazardous chemicals.

APPLICATION: Medical Forceps

Description:

Forceps used in the medical industry need to be nickel/chrome plated.

Problem:

Plating defects due to inconsistent cleaning.

Soils:

Buffing compounds, machining oils.

Previous Method:

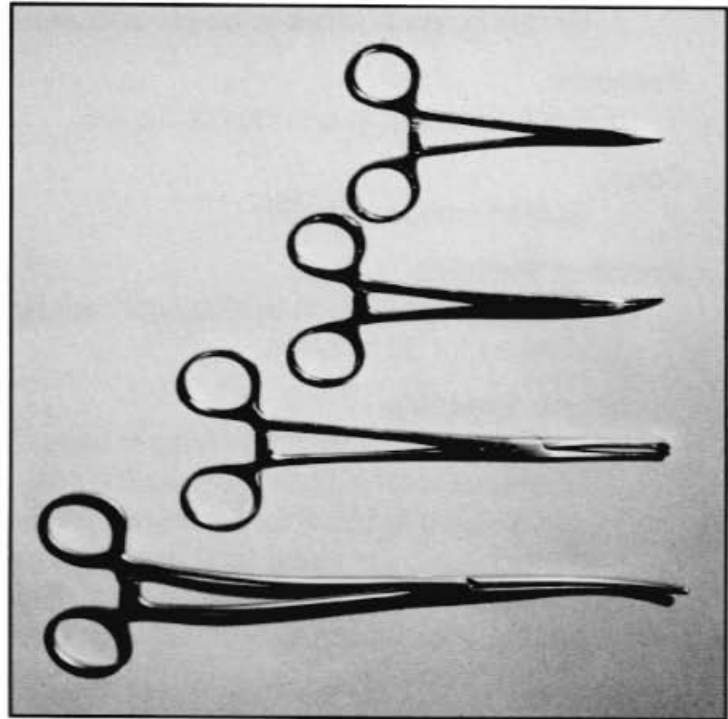
Solvent cleaning for 20 minutes in an ultrasonic vapor degreaser using 1,1,1, Trichloroethane.

Ultrasonic Process:

1. Two minute 40 kHz ultrasonic immersion clean in an alkaline detergent at 160°F for 2 minutes.
2. Hot water spray rinse followed by hot deionized water two-stage, four-way overflow rinses with ultrasonic agitation in the first immersion rinse stage.
3. Forced hot air recirculating dryer at 230°F for 7 minutes.

Advantages:

- Reduce number of plating rejects through improved cleaning of medical instruments.
- Reduce cleaning time from 20 minutes to 7 minutes.
- Replace hazardous solvents with a true water-based cleaning system.
- Increase throughput.
- Achieve consistent and repeatable cleaning results.
- Avoids need to seek alternatives to proven effective machining oils and buffing compounds.



For application assistance, contact your nearest Branson office or the Branson Cleaning Applications Laboratory at (203) 796-0522.



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CHOOSING THE RIGHT CLEANING CHEMISTRY

Factors to Consider

Selecting the best cleaning process is like putting a puzzle together with pieces that differ for each player. Several basic factors must be considered in deriving the best process, but differing weight is given to each factor according to what is most important for your production.

This technical brief will discuss factors that should be evaluated before the cleaning process is selected, and why. In some cases the decision already has been made to use aqueous or solvent cleaning equipment; then it is a matter of tailoring the chemistry to best meet the production requirements.

All precision cleaning is achieved with either aqueous or solvent-based chemistries. Although some adjustments to the process can be made, the two types of cleaning are not necessarily interchangeable. The cleaning operation will be completed with maximum efficiency only if the chemistry has a specific affinity for the soil. If it does not, even the addition of ultrasonics which usually enhances cleaning effectiveness while reducing chemical concentration, temperature, and process time, will not achieve sufficient cleaning.

The optimum process will balance technical, economical, and environmental needs.

Factors to consider include:

- Identification and characterization of soil.
- Identification of the substrate and importance of its surface condition to ultimate use of the part.
- Degree of cleanliness required.
- Facility capabilities.
- Environmental impact.
- Overall cost.

Selecting a Process: Aqueous, Semi-aqueous, or Solvent

Selection of a cleaning process is influenced mainly by the type of soil to be removed, the substrate, the required degree of cleanliness, the manufacturing process, and the cost. The size and shape of the workpieces seldom influence the type of cleaning chemistry used, but may determine the method of cleaning, such as ultrasonic cleaning, and the handling techniques employed.

Proper selection of the chemistry – aqueous, semi-aqueous, or solvent – is crucial to obtaining a clean part. Although the basic principles of chemistry provide a guide for determining the right cleaner, there are certainly many problems where the answer is of a more subtle nature. There is no absolute rule that can be used to select the right chemistry. But as a general rule of thumb, aqueous cleaners are best for inorganic soils, such as oxides, salts, and shop dust; and solvents are best for organic soils, such as grease, wax, and oils, with semi-aqueous transitions between the two types.

The **type of soils** to be removed obviously influences the choice of chemistry. Soil types may be broadly classified into several groups: (a) drawing compounds, (b) oil and grease, (c) chips and cutting fluids, (d) polishing and buffing compounds, (e) rust and scale, (f) soldering flux, or (g) miscellaneous surface contaminants, such as atmospheric soils and residues from mechanical inspection techniques. Desired cleaning is achieved when the chemistry has a specific affinity for the soil.

The **substrate** must also be considered because, for example, metals such as aluminum and magnesium are sensitive to attack by some chemicals. Corrosion-resistant steels, also referred to as stainless steels, have a high resistance to both acids and alkalies, but the degree of resistance depends on the alloying elements.

The **overall manufacturing process** also must be factored into the choice of cleaning process. Consider the step immediately before and after the cleaning. If the part is introduced to the cleaning station wet, then an aqueous solution probably will have to be used. Either alkaline solutions or solvents will take off buffing compounds and probably be compatible with the metal piece. However, if plating follows cleaning, then solvents should not be used due to solvent out-gassing during the plating procedure. Parts to be packaged following cleaning obviously will have to be dried first.

Precautions must be considered when cleaning steel parts which may rust. Chances are they won't rust in an ultrasonic bath because the degassing action of ultrasonics removes oxygen, but rusting may occur in the subsequent water rinse and drying. A small amount of rust inhibitor added to the rinse water or static immersion will leave a slight film on the part to prevent rusting.

Solvent Properties

Solvent cleaning is the dissolution of the contaminant by a liquid, such as organic solvents and chlorinated hydrocarbons. Solvents generally are grouped according to chemical composition and are non-ionizing liquids. They do not have the ability to form ions and their solutions will not conduct electricity. Solvents offer the advantage of high solubility for waxes, oils, greases, and many other organic materials. It is important that solvents contain stabilizers which will then provide the advantage of chemical neutrality and will not attack active metals such as aluminum and magnesium. Some solvents will corrode certain electronic plastic components at elevated temperatures and should be avoided in favor of low-boiling point solvents.

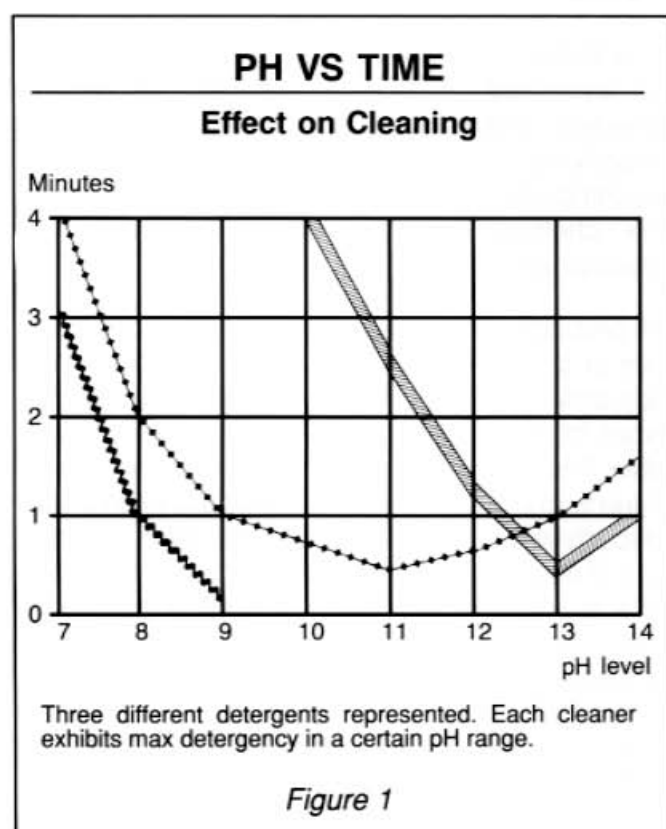
Semi-aqueous

Semi-aqueous cleaners are specialty mixtures composed of water-in-solvent emulsions. They are posed as alternatives to chlorinated solvents, particularly in the electronics and metal working industries. These types of cleaners are effective on rosin flux, adhesives, oils and grease, and water or solvent-soluble soils.

Aqueous Properties

The distinguishing feature of aqueous solutions is that they have the capacity to split the dissolving molecule into particles called ions. Each molecule will divide into an ion carrying a positive charge and an ion carrying a negative charge, so that the solution will conduct electricity.

Aqueous cleaners are classified according to pH or the degree of acidity or alkalinity of the cleaner. On a scale of zero to 14 with seven as neutral, less than seven denotes increasing acidity; numbers higher than seven designate increasing alkalinity (see Figure 1).



Aqueous cleaners contain combinations of ingredients such as surfactants, sequestering agents, saponifiers, emulsifiers, and chelators, as well as various forms of stabilizers and extenders. These ingredients are physically active and operate by reducing surface or interfacial tension, by formation of emulsions, and by suspension or flotation of insoluble particles.

AQUEOUS CHEMISTRY

Typical Acidic Solution

Formula:	Citric acid, ammonia, nonylphenol ethoxylate, thiourea
pH:	4.5
Uses:	Remove oxides from all metals, reactive compound from copper & copper alloy component

Typical Alkaline Solution

Formula:	Sodium hydroxide, soda ash, alkaline salts & wetting agents
pH:	13.5
Uses:	Removal of carbonaceous soils, heat scale, rust, oils & grease *attacks reactive metals

If there are salts or inorganic residues on the parts, then aqueous chemistry is best. For scale, only acids will work. Whereas water will dissolve many inorganic soils not soluble in the non-ionizing solvents, it will not dissolve most greases and organic materials. However, water serves as a medium for carrying detergent compounds which will act on such soils because of their properties of wetting, emulsification, saponification, or deflocculation. Water also acts as the dispersal medium for oils and particles which it cannot dissolve, but will carry in suspension.

Advantages with using aqueous, or water-based, solutions are that they are excellent for inorganic soils, are readily available, and are excellent where drying is not a factor.

Summary

Analyzing the chemistry component of the cleaning puzzle helps us understand that a decision cannot be reached based on one factor alone. A complexity of interrelated factors must be considered to derive the most efficient, effective, and environmentally sound cleaning method. A logical and thorough study of the particular cleaning problem with consideration of all consequences should be performed before choosing between solvent, semi-aqueous, or aqueous-based systems.

EXAMPLES

Here are examples of typical applications encountered in industry. Considerations for choosing solvent or aqueous chemistry are explored.

Removal of Pigmented Drawing Compounds

All pigmented drawing lubricants are difficult to remove from metal parts. Certain variables may fur-

ther complicate the removal, such as higher temperatures resulting from increased drawing pressures which increase the adherence of some compounds. Elapsed time between the drawing and cleaning operations is also a significant factor; the longer the compound is allowed to dry, the more difficult it becomes to remove.

Acidic aqueous cleaners composed of detergents and phosphoric acid prove effective in removing pigmented compounds. A consistent, high degree of cleanliness can be attained.

Vapor degreasing with solvents is of limited value in removing these compounds. The initial solvent vapor will usually remove soluble portions of the soil, leaving a residue of dry pigment that may be even more difficult to remove by other cleaning processes.

Removal of Oil and Grease

Vapor degreasing using 1,1,1 trichloroethane is an effective and widely-used method for removing a wider variety of oils and grease. Repeatable and consistent results are attained because the solvent is constantly distilled and filtered. Vapor degreasing is particularly well adapted to cleaning oil-impregnated parts, such as bearings, and for removing solvent-soluble soils from their interiors.

Alkaline solutions are efficient and economical for removing oil and grease by saponification or emulsification, or both. Alkaline solutions will etch aluminum and other nonferrous metal parts unless inhibitors are used. Presence of alkaline solution in crevices may result in galvanic corrosion, and even traces of alkali will contaminate paint and phosphate coating systems; therefore, water rinsing must be extremely thorough.

Removal of Polishing and Buffing Compounds

Polishing and buffing compounds are difficult to remove because the soil they deposit is composed of burned-on grease, metallic soaps, waxes, and other vehicles that are contaminated with fine particles of metal and abrasive.

Aqueous emulsion cleaners are effective for removing all types of buffing and polishing compounds. Solution temperatures and emulsion concentrations must be closely selected for optimum

soil removal. All emulsion cleaners must be followed by a thorough water rinse.

Vapor degreasing with solvent alcohol azeotropes is effective for most polishing compound removal. Cleaning with solvents will quickly remove most of the gross soil directly after buffing or polishing, and will easily remove tripoli and rouge. But solvents will not remove all types of polishing compounds. Effectiveness still will depend largely on the composition of the polishing compound and the selection of an appropriate polar solvent.

	AQUEOUS		SEMI-AQUEOUS
	Acidic*	Alkaline*	
Pigmented Drawing Compounds	Excellent	Fair	Fair
Oil & Grease	Poor	Good (may etch aluminum)	Good
Chips & Cutting Fluids	Fair	Excellent	Good
Polishing & Buffing Compounds	Fair	Excellent	Good
Rust & Scale	Excellent	Good	Poor
Rosin Flux	Poor	Fair	Excellent

*Inhibited solutions for base metal protection.

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Application Brief

Cleaning Printed Circuit Boards With Solvent-Alternative Chemistries

Printed circuit boards with through-hole and surface mount components are used in a variety of electronic industries. Thorough cleaning of these boards after soldering always has been crucial to reliability of the finished product. Flux residue from the soldering process previously had been removed easily with the mechanical action of ultrasonics in chlorofluorocarbon-based solvent chemistries. But recent concerns with the environmental effects of the ozone-depleting CFCs and legislative measures to curb their use, have created the necessity of alternative cleaning methods.

Branson has developed methods for successfully cleaning printed circuit boards with semi-aqueous chemistry and with saponified aqueous solutions. Both methods are environmentally acceptable CFC alternatives.

Boards with surface mount components benefit from cleaning with ultrasonic energy, which efficiently removes and flushes flux residue from beneath the inherently tighter clearances of the components.

Semi-aqueous cleaners are organically-based chemistries that behave in operation more like water-based cleaners than traditional safety solvents. Semi-aqueous cleaning products can cover a wide range of characteristics: they can be water-soluble organic compounds to pure hydrocarbons with emulsifying agents. Some are naturally occurring materials, while others are chemically engineered to produce certain properties.

Saponified aqueous solutions clean by converting rosin type flux into water-soluble soaps.

Cleaning Through-Hole Boards With Semi-Aqueous Solutions

Challenge:

Remove RMA-type flux and ionic contaminants from through-hole printed circuit boards without the use of ozone-depleting solvents, while providing the same level of cleanliness experienced with solvents.

Previous

Cleaning Method:

Solvent/vapor clean with FC-113 alcohol azeotropes.

Recommended

Process:

- Immerse boards vertically for 60 seconds in full concentration semi-aqueous material heated to 140°F within a 40 kHz ultrasonic tank.
- Primary rinse with warm deionized water spray for 60 seconds.
- Final precision rinses in warm deionized water overflow for 1–2 minutes.
- Forced hot air drying.

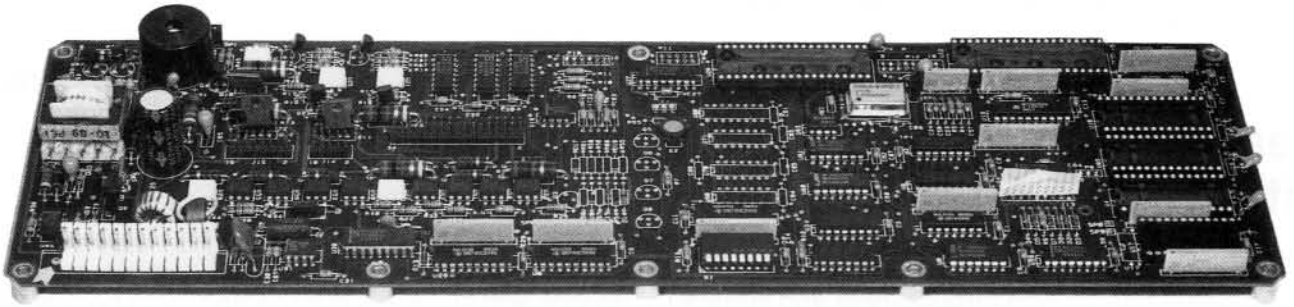
Equipment:

A Branson semi-aqueous batch or continuous process cleaner with dryer.

Benefits:

- Eliminates the need to use CFC-based solvents.
- Achieves the same cleanliness levels as CFC-based chemistries.
- Lower ionic contamination detected compared to CFC-based solvents.

Semi-aqueous solutions provide effective alternatives to CFC-based solvents. Because of their chemical properties, however, thorough rinsing in at least two separate steps must be undertaken for complete removal of the solution. As with any process involving water, drying must be included as the final step. This is important particularly with sensitive electronic components.



Semi-aqueous and saponified aqueous solutions offer effective alternatives to cleaning printed circuit boards whether the boards are fabricated with through-hole or surface mount devices or are mixed technology. Use of ultrasonic or MicroCoustic energy in the cleaning and rinsing process make these solutions efficient alternatives to CFC-based solvents.

Cleaning SMD Boards with Saponified Aqueous Solution

This application was developed for printed circuit boards with surface mount devices. These devices generally have clearances of only 1-3 mils from the board, which often is densely populated, so effective flux removal is difficult with conventional cleaning methods. The following method employs a cleaning technology that utilizes

saponified aqueous solution as an alternative to CFC-based solvents. As with semi-aqueous materials, saponified aqueous chemistry requires thorough rinsing augmented by mechanical action such as sprays, ultrasonics, or MicroCoustic® energy. A variety of drying techniques is available for the final step in the cleaning process.

Challenge:

Thoroughly and quickly remove RMA-type flux and ionic contaminants from surface mount printed circuit boards. This must be done without ozone-depleting solvents, but achieve the same level of cleanliness experienced with solvents.

Previous

Cleaning Method:

Solvent/vapor clean with FC-113 alcohol azeotropes.

Recommended

Process:

- Orient boards horizontally in immersion tank equipped with 40 kHz ultrasonics for 2 minutes. The saponified aqueous solution should be at 160°F with a 7% concentration by volume.
- Hot deionized water 40 kHz ultrasonic rinse for two minutes.
- Hot deionized water overflow rinse for one minute.
- High purity air knife blow-off followed by a hot air recirculating dryer.

Equipment:

A Branson aqueous batch or continuous process cleaner with dryer.

Benefits:

- Eliminates the need to use CFC-based solvents.
- Achieves the same cleanliness levels as CFC-based chemistries.
- Lower ionic contamination detected compared to CFC-based solvents.

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Application Brief

Aqueous Degreasing of Metal Parts

Ultrasonic cleaning is required in the metalworking industry for the removal of oils, greases, metalworking fluids, abrasive polishing compounds, and particulate contamination such as metal fines and shop soils. Cleaning agents based on CFC-113 azeotropes and chlorocarbon solvents, such as 1,1,1 trichloroethane, have been used widely for the removal of these soils. Due to associated ozone-depleting factors, however, these solvents are being phased-out of production and use.

Environmentally acceptable alternatives are available with aqueous solutions and recently-developed semi-aqueous chemistries. Ultrasonics coupled with either process helps achieve the same level of cleanliness metalworkers expected of solvents. Ultrasonics is particularly advantageous for efficiently cleaning parts that have blind holes, crevices, or intricate geometries.

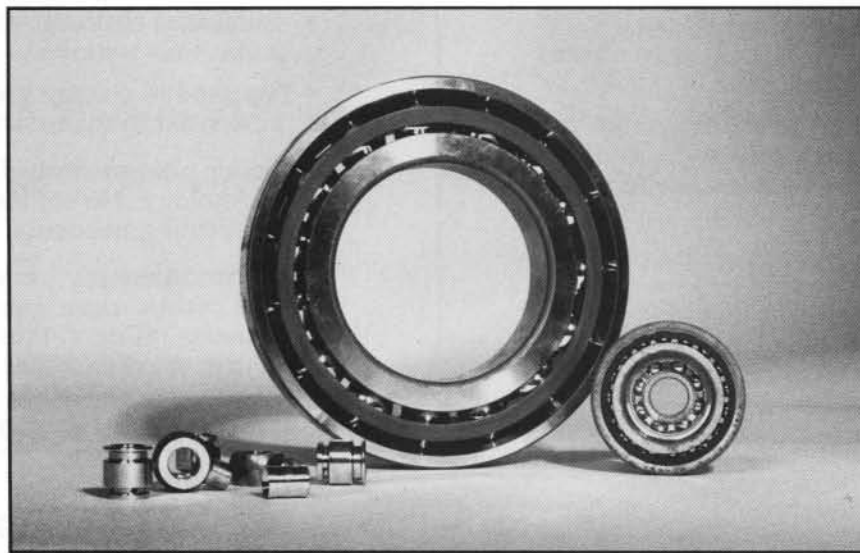
A distinguishing characteristic of the new semi-aqueous chemistries is that they are very application specific. Branson has developed detailed application reports for using the new chemistries to successfully clean metal components.

Branson also has designed equipment specifically for use with semi-aqueous cleaners, which require special considerations particularly in rinsing.

Semi-aqueous chemistries are hydrocarbon-based agents with polar and non-polar components for a balance of selective solvency. Soils are dissolved in the cleaner and washed away in the subsequent water rinse where the organic soil, hydrocarbon portion, separates from the aqueous effluent limiting waste discharge. Because of their chemical properties, however, thorough rinsing in at least two separate steps must be undertaken for complete removal of the solution. As with any process involving water, drying must be included as the final step.

Aqueous cleaners are inorganically-based chemistries that either emulsify, disperse, or solvate soils in liquid. Empowered with ultrasonics, they are effective even with removing organic substances.

These two solvent-alternative ultrasonic cleaning technologies are represented and evaluated in this application brief.



Cleaning Valve Bodies

Challenge:

Remove light machining and cutting oil from valve bodies.

Previous

Cleaning Method:

Solvent/vapor clean with a FC-113 alcohol azeotrope.

Recommended

Process:

- Immerse valve components into a heated ultrasonic tank (40 kHz) containing an alkaline oil emulsifying solution at 140°F for three minutes. Use 5% concentration by volume.
- Hot water spray rinse at 150°F for 45 seconds.
- Hot water triple cascade rinse with ultrasonics at 150°F for three minutes. Flow rate is 1 GPM.
- Air knife blow-off followed by a hot high purity air evaporative dryer at 280°F.

Equipment:

A Branson Aqueous Ultrasonic Cleaning System with dryer integrated with a TDR-50 automated transport system.

Benefits:

- Eliminates the need to use CFC-based solvents.
- No need to seek alternatives to proven effective machining oils.
- Emulsified oils removed from the cleaning solution by a pump and ultrafiltration package. Extends the life of the cleaning solution.
- Brighter, more eye-appealing product.

Cleaning Bearings

Challenge:

Remove grease and oil from stainless steel bearings without the use of CFCs and provide a similar level of cleanliness experienced with solvents.

Previous

Cleaning Method:

Solvent/vapor clean with 1,1,1 trichloroethane.

Recommended

Process:

- Immerse bearings horizontally into heated ultrasonic tank (40 kHz) containing semi-aqueous solution at 125°F for five minutes. Use full strength concentration.
- Ultrasonic hot water overflow rinse at 150°F for 90 seconds with a flow rate of 0.3 GPM. Effluent goes to separation tank where soil/hydrocarbon and water separate out.
- Hot water triple cascade rinse for three minutes at 160°F. Flow rate is 1.5 GPM.
- Air knife blow-off followed by forced hot air dryer. Drying temperature is 240°F.

Equipment:

A Branson semi-aqueous batch or continuous process cleaner with dryer.

Benefits:

- Enhanced cleaning – ionic as well as organic soils removed.
- No need to change grease or lubricants now used in manufacturing process.
- Better process control – simple process technology. No sophisticated control monitoring needed.
- Environmentally preferred – organic soil and hydrocarbon separate from the aqueous effluent, thus decreasing load on treatment facilities.

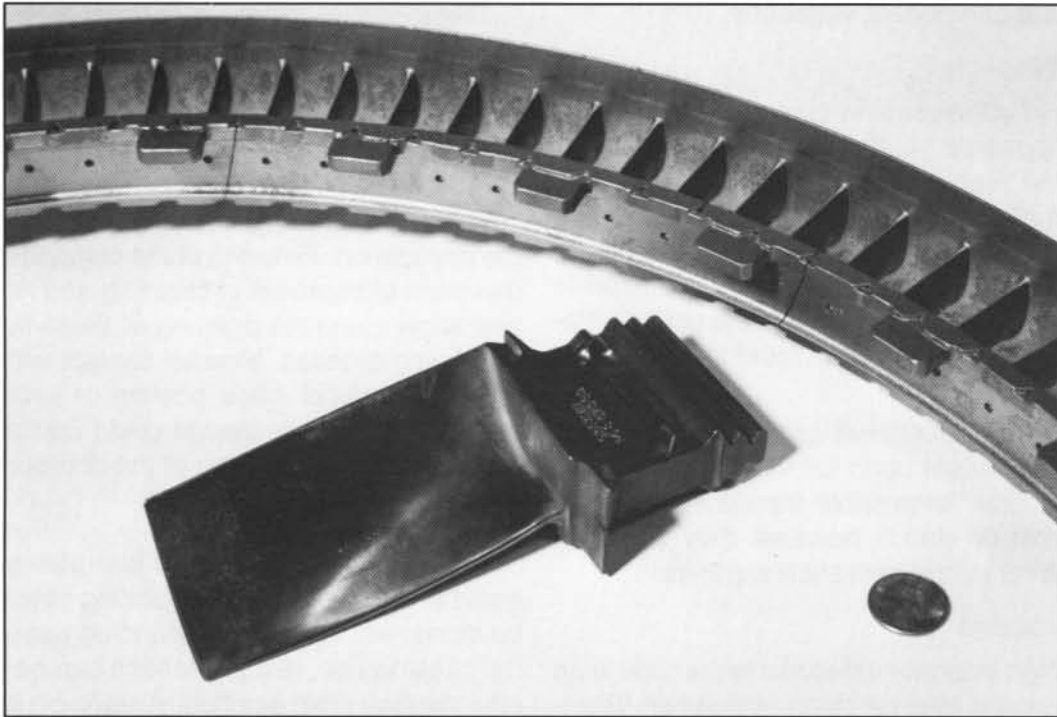
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Ultrasonic Cleaning of Aircraft Components



Many applications exist in the aircraft industry that can benefit from ultrasonic cleaning. Typical applications include brake parts, generator components, actuators, shuttle valves, filters, engine blades and vanes, aircraft wheels and bearings.

Turbine blades and nozzle vanes from jet engines (pictured) – critical operational components – can be cleaned successfully with ultrasonics. The ultrasonic cleaning of these components has yielded results equal to or better than those gained from traditional solvent cleaning methods without harmful metal loss, erosion of the base metal surface, or potential surface defects inherent with sand-blasting.

Following are some factors to be considered for effective cleaning of precision aircraft components.

Size

The size and shape of the components will vary. Some of the components are as small as one cubic

inch; the larger units might be as much as 30 inches in diameter by 10 inches high.

Material of Construction

The components are made of materials such as aluminum, stainless steel, carbon steel, copper, ceramic, and high-strength alloys.

Typical Contaminant

Soils range from organic residues to inorganic scales, rust, oxides, and carbon.

Reason for Cleaning

Most of the applications are for aircraft preventive maintenance and pertain to the safety of operation of each individual component. Air passages in the vanes and blades, for example, must be cleaned of carbon build-up to allow for adequate cooling during use. Rust can cause the malfunction of gears, and particulates can obstruct the proper flow of fluids.

Conventional Cleaning

Generally, the components are chemically treated with an aqueous-type cleaner. After this pretreatment, they are water pressure blasted, solvent sprayed, vapor or grit blasted. All of the above procedures result in inconsistent cleaning as the size and shape of components can vary over wide ranges. These operations require intensive labor to accommodate component variations.

Ultrasonics

The use of ultrasonics in precision cleaning for aircraft components greatly reduces the man-hour requirements. Many components previously handled individually in pressure spray operations are now batch loaded in ultrasonics for effective cleaning. Chemical pretreating generally is still used in front-end manufacturing areas with the use of ultrasonics limited to the precision cleaning portion of the process.

The size and amount of ultrasonic equipment will be directly dependent upon the size of the components. In general, immersible transducers will be the equipment of choice because they allow for easy upgrading as the operation expands.

Typical Process

1. 40 kHz high-intensity ultrasonic immersion in an 8% by volume alkaline cleaning solution (Branson Class 5 chemistry) at 180°F for a 3-5 minute processing period. Filtration required with membrane sizes as low as 1 micron. Selection of membrane size is application dependent. If oils are to be removed in this initial cleaning process, then the use of oil extraction equipment for the cleaning solution is required.
2. Hot tap water spray rinse with spray impingement focused on intricate areas of the aircraft component. Typical exposure time between 45 seconds to 1 minute. The use of tap water as an initial spray is recommended for the majority of the applications encountered in this industry.
3. Hot deionized (DI) water ultrasonic immersion rinse (40 kHz). DI water in this primary immer-

sion rinse is supplied by subsequent overflow rinses. Depending upon the critical nature of the application, additional four-sided overflow rinses may be required. DI water quality is again application dependent. Typical rinse water quality is assumed to be between 3-5 Megohm.

4. Forced hot air recirculating dryer operating at a temperature of approximately 230°F. HEPA filtration units can be provided if the application requires a low particulate drying environment.

Fixturing

It is well documented that fixturing is a critical player in the cleaning, rinsing, and drying phases of the application. Fixturing of the components should minimize entrapment of cleaning and rinsing fluids and allow complete draining of these fluids during the drying process. Minimal contact with the component is critical since pooling or entrapment of water by the fixture design could cause extended drying times and spotting of the component.

Rust Prevention

If the application calls for rust prevention, inorganic or organic type rust inhibiting chemistries can be furnished. Typically, depending upon the material construction, rust prevention can be performed after the final rinse position. A static dip in an appropriate rust preventative prior to hot air drying is suitable. However, some applications will rust in the rinse water. In such cases inhibitors must be implemented in the rinse water itself through use of metering or injection pumps.

For those applications that require a thin film of oil for storage, water displacing oils have been successfully implemented for such purposes. Water displacing oils will eliminate the need for hot air dryers and will provide a thin coat of oil for storage requirements. Depending upon the complexity of the component being processed, one or two water displacing oil stations can be implemented.

For case histories on specific components or help with your aircraft component cleaning needs, contact your nearest Branson office or Branson's Cleaning Applications Laboratory at (203) 796-0522.

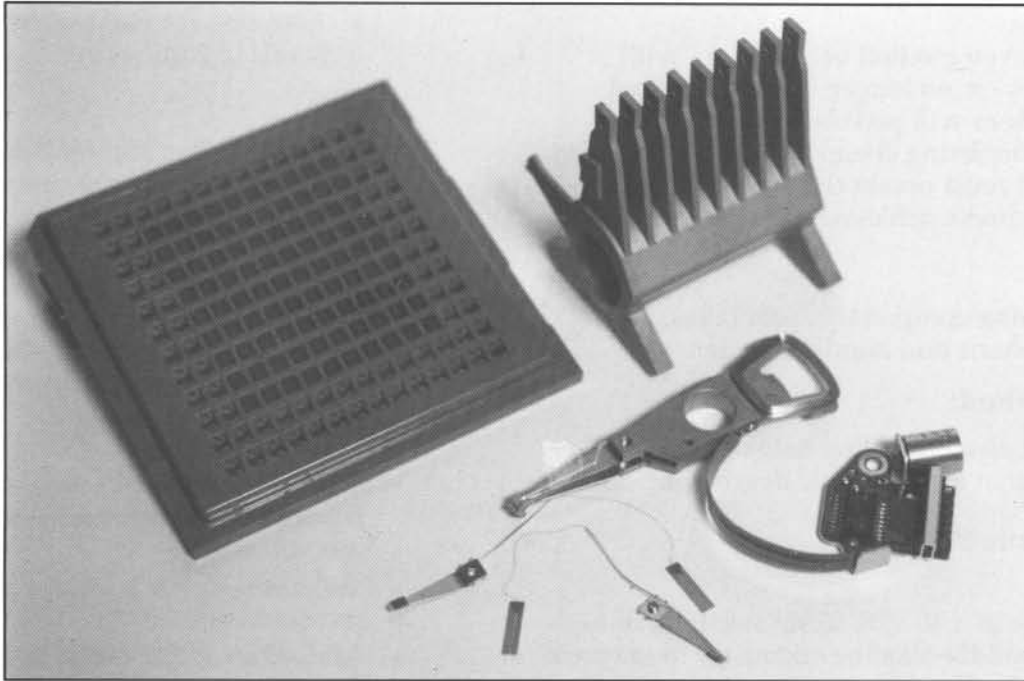


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Precision Cleaning of Disk Drive Components

Application Brief



The challenge for many companies that manufacture read-write devices for computers is to eliminate the use of ozone-depleting chemicals but still obtain comparable cleanliness levels of their disk drive components. A high degree of cleanliness is critical to long-term performance and reliability of disk drive components. The demand for high storage capacity in a reduced-size disk drive makes the cleaning process increasingly important.

A typical manufacturing process involves machining to close tolerances on flatness and contours that are critical to read-write computer functions. Cleaning is essential to remove machining compounds, particulate, atmospheric and handling soils from metal and composite materials. Precision cleaning typically is performed in Class 100 or better clean rooms to maintain cleanliness integrity. After cleaning, assembly and encapsulation of the drives is completed and the drive is setup into computers.

Branson has developed a method for precision cleaning of disk drive components using aqueous chemistry, which successfully replaces solvent-based cleaning processes. Ultrasonics, which produces the microscopic gentle scrubbing action of cavitation in the cleaning solution, is recommended for effective and efficient cleaning. It also is recommended that ultrasonics be used in at least one of the rinse stations to enhance the rinsing activity.

Close attention must be given to fixturing and spacing of drive assemblies to maximize their exposure to process fluids and to minimize fluid entrapment or pooling. Deionized water and process piping should be non-contaminating and inert to process chemicals.

Environmental issues such as waste water treatment are addressed in closed-loop systems which filter and recycle the water for maximum benefit.

APPLICATION: Disk Drive Components

Description:

Precision cleaning is required for disk drive components prior to assembly and encapsulation to assure product reliability.

Problem:

The proven method of cleaning - with solvents - is no longer viable as federal regulations will prohibit usage of ozone-depleting chemicals. A new cleaning method must obtain the same high degree of cleanliness achieved with solvents.

Soils:

Machining compounds, particulate, and atmospheric and handling soils.

Previous Method:

Solvent cleaning using halogenated solvents in an ultrasonic degreaser.

New Ultrasonic Process:

CLEAN

1. Immerse in a 40 kHz ultrasonic tank of neutral to mildly-alkaline chemistry to enhance removal and prevent redeposition of soil from the devices.
 - Filtration at micron and submicron levels is required for particulate removal.

RINSE

2. Spray rinse with deionized water. DI water quality is to be a minimum of five megohm.
 - Full coverage spray pattern is achieved with four-side spray impingement.
3. Four-sided hot DI water overflow rinse with 40 kHz ultrasonics. Rinse is fed by the preceding rinse position for water conservation.
 - Filtration for particulate to submicron levels (0.5 micron).

Ultrasonic Process, continued:

RINSE, continued

4. Four-sided hot DI overflow. Influent water quality is to be 15-18 megohm.
 - Filtration for particulate at submicron levels (0.2 micron).

DRY

5. Primary drying accomplished with forced hot air recirculating through a HEPA filter.
6. Final drying accomplished by placing partially dried components in heated vacuum chamber. Chamber pressure is reduced to between 4-10 torr to complete drying cycle by flashing off residual water from internal passages after hot air drying.

Advantages:

- Replaces ozone-depleting solvent chemistry with environmentally-acceptable aqueous solution.
- Achieves higher level of cleanliness than previous method.
- Minimizes water usage in rinse stages through recycling DI water systems.
- Completely automated, no manual intervention.
- Simple, repeatable process.
- Throughput levels consistent with solvent cleaning.



For application assistance, contact your nearest Branson office or the Branson Cleaning Applications Laboratory at (203) 796-0522.



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Cleaning Ceramic Latex Molds

Ceramic molds, widely-used in the rubber industry, necessitate special methods to assure proper cleaning. The tough soils involved – baked-on carbonaceous soils of rubber, latex, and release agents – must be removed completely or they can interfere with forming and releasing of product. This interference can lead to roughage, breaks, and tears. The time allotted for cleaning, however, must be kept short to minimize down time and achieve optimum production, particularly in high-volume facilities.

Previous cleaning operations frequently relied on either hand scrubbing with abrasives, which took large amounts of time and effort, or dipping the molds in a strong mineral acid, which created safety problems as well as disposal issues.

Today the most efficient method of removing difficult soils and keeping production moving is ultrasonic cleaning. Ultrasound provides the safest, most widely-used and effective means of mechanical agitation. It provides the thorough, noncontact, overall scrubbing action needed to remove the stubborn baked-on carbonaceous soils found on ceramic latex molds without scratching or abrasion.

Ultrasonic cleaning is a function of cavitation, the rapid formation and violent collapse of minute bubbles or cavities in a liquid. Cavitation is produced in a liquid by the alternating patterns of compression and rarefaction generated during sound wave half cycles. As the liquid is stretched beyond its tensile strength during rarefaction, these cavities grow from microscopic nuclei. During the subsequent compression phase, they implode violently.



The agitation caused by countless imploding bubbles creates a highly-effective scrubbing of both exposed and hidden surfaces of the ceramic latex mold as it is immersed in the cleaning liquid. Ultrasonics cleans molds uniformly and consistently with repeatability at speeds required to meet or increase production rates without sacrificing quality and precision.

Cleaning Ceramic Latex Molds – The Process

- Challenge:** Remove latex residue, releasing agents, and tenacious soils from ceramic latex molds.
- Previous Cleaning Method:** Use of strong mineral acids and subsequent hand scrubbing with abrasives to achieve acceptably-cleaned molds.
- Recommended Process:**
1. Vertical immersion of molds for 15 seconds in a heated 25 kHz ultrasonic tank containing Branson RS solution – a high-alkaline cleaning solution.
 2. Hot water spray rinse.
 3. Hot water overflow rinse at 160°F.
 4. Hot air knife blow-off.
 5. Forced hot air drying system. (optional)
- Equipment:** A Branson aqueous batch cleaning process system.
- Benefits:**
- Higher quality latex/rubber products.
 - No residue left on mold after rinsing.
 - Rapid cleaning for higher throughput.
 - Completely automated for lower cost/mold.
 - Non-contact cleaning extends mold life.
 - Simple, repeatable process for high reliability.

For application assistance, contact your nearest Branson office or Branson's Cleaning Applications Laboratory at (203) 796-0522.

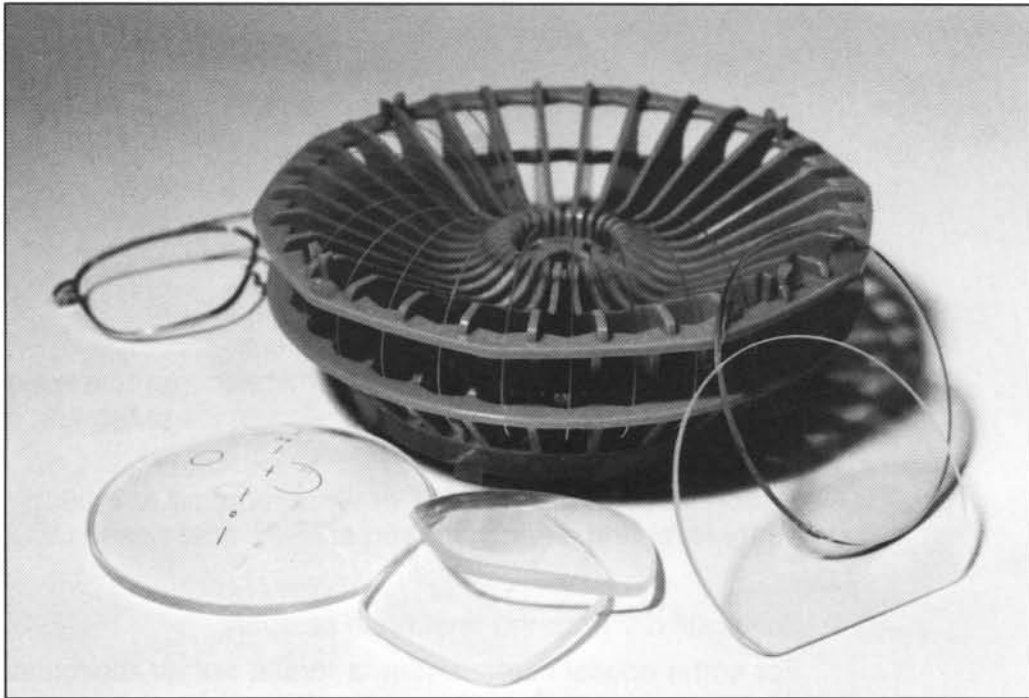


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Optical Lens Cleaning



Precision cleaning of optical surfaces is an essential and critical step in the production of high-quality optical components. Any evidence of particulate matter, film, or water spotting will cause irregularities on the optical surface, leading to improper adhesion of thin-film coatings and rejection of the finished product.

Stacking wax and mounting pitch, cerium oxide residue, lacquers, glass fines, grinding coolant, fingerprints, and airborne dust and dirt particles can all accumulate on the optical surface at various stages, necessitating techniques throughout the manufacturing process to safely remove the contamination.

Branson has developed and proven a specific aqueous cleaning process to produce

glass lenses cleaned to the critical levels required for subsequent coating operations.

Aqueous chemistries for optics are inorganically-based and either emulsify, disperse, or solvate soils in liquid. These chemistries are concentrated formulas that are environmentally acceptable replacements for cleaning optical lenses. The addition of ultrasonics provides increased cleaning efficiency to remove heavy or tenacious organic soils.

The critical factors in removing these soils are ultrasonics and the temperature of the cleaning solution. These two combined effectively soften and lift soils from the lens surface.

Cleaning Optical Lenses

Challenge: Remove wax, pitch, lacquers, and other residue from optical lenses.

Previous Cleaning Method: Solvent/vapor cleaning with 1,1,1 trichloroethane.

Recommended Process:

CLEAN:

Optical lenses are cleaned in a heated 40 kHz ultrasonic tank containing an alkaline solution at 180° F.

Heavily soiled lenses will benefit from a pre-clean ultrasonic cycle using the same chemistry. When emulsified wax and pitch levels are high, filtration is recommended to extend the life of the chemistry.

RINSE:

Hot water spray rinse at 150° F. Hot deionized (DI) water two-stage cascade rinse with 40 kHz ultrasonics in the first rinse station. Incoming water 150° F.

Micron filtration of incoming water is required to maintain the purity level and cleanliness required for final rinse stations.

DRY:

Slow-pull dry from the final rinse position.

For some optical components, a forced hot air recirculating dryer may be required as a secondary drying method. HEPA filtration is recommended to maintain cleanliness of the parts.

Equipment: A Branson modular ultrasonic aqueous cleaning system with a dryer. An automated transport system will insure repeatable and consistent cleaning.

Benefits:

- Aqueous cleaning produces cleaner parts than solvent cleaning.
- No need to change wax, pitch, or lacquer specifications.
- Eliminates the need to use ozone-depleting solvents in cleaning and/or drying operations.
- Optional closed-loop DI water reclamation can eliminate discharge.

For application assistance, contact your nearest Branson office or Branson's Cleaning Applications Laboratory at (203) 796-0522.



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VAPOR DEGREASING EMISSIONS

Background

Now that the ban on the use of CFCs and 1,1,1, trichloroethane is in place, the focus has shifted to other chlorinated solvents and the use of more expensive halogenated solvents. A substantial reduction in the losses of these solvents will result in major cost savings that would provide for rapid return on any new investment in equipment.

Recent studies have shown that implementation of the technology most frequently recommended is capable of reducing emissions by 50-70 percent or more in some cases. Equipment incorporating this technology provides the added advantage of substantially reduced worker exposure to solvent in the workplace environment.

The focus in recent years by Branson and government agencies has been on "control devices" that minimize solvent emissions from vapor degreasers. Two such widely used devices are superheat and refrigerated freeboard chillers. EPA sanctioned studies show that these devices are effective at controlling emissions.

Superheat

Dragout is the amount of solvent (primarily liquid) carried out by the parts as they are removed from the degreaser. The fact that dragout is a major contributor to solvent loss has been known for years. Excessive dragout caused by improper parts handling is indicated by the dripping that occurs as the parts exit the degreaser.

The minimum amount of dragout is achieved when components are arranged on racks or in baskets that drain properly. Even when fixtured properly, all parts will inherently retain some solvent. The importance and magnitude of this unavoidable "minimum" amount of dragout has not been carefully monitored in the past. Dragout has been found to be a much larger contributor to solvent emissions than most people have realized, but this mode of loss can be eliminated by the use of superheat technology. This technology removes virtually all entrapped solvent from parts. It works by suspending the parts in vapor that has been heated approximately 30-50 degrees F above the boiling point of the solvent (superheated). By elevating the part temperature beyond the boiling point, all entrapped and surface solvent is vaporized, ensuring practically no dragout.

Refrigerated freeboard chillers are an additional way to reduce solvent emissions. They typically operate at sub-zero temperatures. Positioned at the top of the degreaser opening, they provide a cold zone which prevents fugitive vapors from rising and escaping from the degreaser.

Properly designed degreasers will result in significantly lower solvent losses. Clearly, the use of the technologies described above are a cost-effective investment which will save substantially on solvent costs and contribute to compliance with current and proposed EPA regulations.

EPA Regulations (NESHAP)

The U.S. EPA has issued the final national emissions' standards for hazardous air pollutants for new and existing halogenated solvent cleaning machines. These standards cover both vapor degreasing and immersion (cold) cleaning using Trichloroethylene, Perchloroethylene and Methylene chloride. Under these new standards, companies operating existing degreasers have until December 1997 (36 months) to comply with these requirements.

In developing these standards, EPA focused on equipment achieving a level of emission control between 50% and 70%. The standards give solvent cleaning customers operating batch or in-line vapor degreasers three (3) options for compliance:

1. Installing one of several combinations of emission control equipment **and** implementing automated parts handling (i.e., Branson TDRs) and specified work practices;
2. Meeting an idling mode emission limit, in conjunction with automated parts handling and work practice requirements; or
3. Meeting a limit on total emissions.

The multiple compliance options in the NESHAPs recognizes a broad number of different industries and operating conditions associated with the use of halogenated solvent cleaners. The EPA's standards allow companies considerable flexibility in complying with emission control requirements.

Under the new standards, companies must submit an initial notification report for each solvent cleaning machine by August 29, 1995. The report should include the intended compliance approach and estimated annual solvent consumption.

Companies operating existing equipment (defined as degreasers in operation before November 29, 1993) have to implement compliance by December 1997. New vapor degreasers must comply **immediately** with the standards. Initial compliance notification for these new machines is required within 150 days of start up or by May 1, 1995, whichever date is later.

Compliance with one of the control combination options (See Table 1) for batch vapor degreasers must be demonstrated by periodic monitoring of each of the control systems chosen. An example of such is the measurement of hoist speed and visual inspection of covers.

Customers choosing to comply with the alternate total emission limit must keep monthly records of solvent addition and removal. Total emissions from the cleaning machine, based on a 3 month rolling average, must be equal to or less than the established limit for the vapor degreaser (See Table 2). For degreasers without a solvent/air interface, (i.e., Branson's Ecological Vapor Degreaser, EVD) the EPA has established a compliance formula based on cleaning capacity.



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Table 1. Control Equipment Combinations and Idling Limits

	Control Equipment Combination Options ^{1, 2}	Alternative Idling Limit ^{2, 3} (lb/ft ² - hr)
Batch Vapor ⁴ (≤13 ft ²)	1: FBR = 1.0, FRD 2: FRD, RRD 3: FRD, DWL 4: FRD, WMC 5: FRD, SHV 6: FRD, CA 7: FBR = 1.0, RRD, DWL 8: FBR = 1.0, RRD, SHV 9: FBR = 1.0, WMC, SHV 10: FRD = 1.0, SHV, CA	0.045
Batch Vapor ⁴ (>13 ft ²)	1: FBR = 1.0, FRD, RRD 2: FBR = 1.0, FRD, SHV 3: FBR = 1.0, RRD, SHV 4: FRD, DWL, RRD 5: FRD, RRD, SHV 6: FRD, WMC, SHV 7: FRD, SHV, CA	0.045
In-Line ⁵ (Existing)	1: FBR = 1.0, FRD 2: FBR = 1.0, SHV 3: FRD, DWL 4: DWL, CA	0.021
In-Line ⁵ (New)	1: FRD, SHV 2: FRD, CA 3: SHV, CA	0.021
Batch Cold Cleaning	1: CVR, Water Layer 2: FBR = 0.75, CVR ⁶	n/a

¹ FBR - freeboard ratio, FRD - freeboard refrigeration device, RRD - reduced room draft, WMC - working-mode cover, DWL - dwell, SHV - superheated vapor, CA - carbon adsorption, CVR - manual cover.

² Compliance with the proposed equipment or idling emission standard also requires automated parts handling and work practices.

³ 0.045 lb/ft² = 0.22 kg/m²; 0.021 lb/ft² = 0.10 kg/m².

⁴ New and existing equipment; 13 ft² = 1.21 m².

⁵ Vapor and cold cleaning.

⁶ Compliance also requires work practices.

**Table 2. Total Emissions Limits for Cleaning Machines
with a Solvent/Air Interface**

	Average Emission ^{1, 2} (lb/ft ² - month)
Batch Vapor (Existing & New)	30.7
In-Line (Existing)	31.4
In-Line (New)	20.3
Batch Cold Cleaning	n/a

¹ 3-month rolling average
² 30.7 lb/ft² = 150 kg/m²; 31.4 lb/ft² = 153 kg/m²; 20.2 lb/ft² = 99 kg/m²

KEY ELEMENTS OF RINSING

A chemical common to nearly all aqueous cleaning processes is water (H₂O). It is used to prepare most aqueous cleaning solutions, but most importantly, it is used as a rinse medium to remove soils that will leave residue on a precision-cleaned surface.

The quality of water in precision rinsing applications is critical since its primary function is to remove residue from a cleaned surface and not leave any impurities on the surface that may be contained in the water itself. There are many quality levels of water available. The purity level will depend on the needs of the application and how clean the surface must be for the next processing step.

Water Purity Levels

Hard water contains inorganic ions that can form water insoluble salts which react with cleaning agents. Soft water is produced by passing water through an ion exchange process. This may form insoluble salts with the softening medium sodium chloride (NaCl), which is water-soluble. As a result, it will leave a residue when the water evaporates in the drying cycle. Soft water is relatively free of ions, but can contain organic and biological agents.

Ultrapure or semiconductor-grade water has virtually all of the contaminants removed from it. It has extremely low levels of impurities to reduce the deposit of residues on a clean surface. Removal of organic contamination is accomplished by passing water through activated carbon prior to the resin exchange beds. Ion exchange resin columns are employed to remove ions (impurities) from the water by polar exchange. These resins are replaced periodically as they become loaded with impurities. Ultrapure water is commonly called deionized (DI) water.

The quality of deionized water is measured by electrical conductivity or resistivity. These electrical measurements of the purity of the water do not however measure the organic content, biological or particulate contamination. Therefore, carbon filtration, ultraviolet light and specialized particle filtration should be considered when evaluating the overall use of water in rinse applications.

Another important consideration in rinsing is the equipment that is used to manage the water in a

method that will enhance rinse effectiveness. Equipment design is a key element. There are numerous equipment designs used in rinsing. Most commonly used is a single-sided overflow rinse. In this design water enters from the bottom of the tank and rises to a single overflow weir located on one side at the top of the tank where the water overflows (some actually top feed and top exit!). The effluent water can then be diverted to another rinse tank forming a cascade arrangement or simply diverted to drain or recovery (Figure 1).

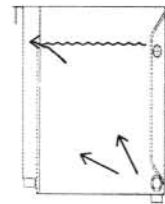


Figure 1

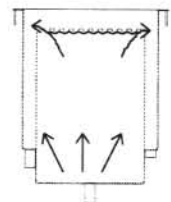


Figure 2

Equipment Considerations

Another more uncompromising design commonly used in precision rinsing applications is the 4-way overflow rinse design (Figure 2). In this design water enters from the bottom center of the tank and is diffused in laminar flow throughout the entire area of the tank where it overflows on all four sides. A separate pump and filter capture a portion of the overflow, filter it and reintroduce the water back into the tank bottom. Fresh water is injected into the recirculation loop to ensure that water quality is maintained at the appropriate resistivity level. If the water quality falls below a pre-set resistivity level, additional fresh water is injected to maintain higher purity levels and application requirements. The 4-way design guarantees even water distribution on all four sides of the tank and eliminates any dead spots commonly found in single sided rinse tanks. Additionally, the pump and filter loop increases the liquid flow and force exerted on the components being rinsed to flush out solubles and dislodge particles on the components surface. In unison, a very effective, consistent and repeatable rinse is attained.

The graphs in Figures 3 and 4 depict the effectiveness of contaminant removal comparing the two rinse equipment designs as described above. The rate of soluble contaminant removal from the 4-way design is approximately 60% more effective than the single overflow design. This is directly related to the

effectiveness of the design that allow solubles to quickly go into solution and particles quickly swept away for removal. Once dissolved and displaced from the components' surface a rapid purge of the water away from the process area of the rinse tank is provided by the high-flow pumping system.

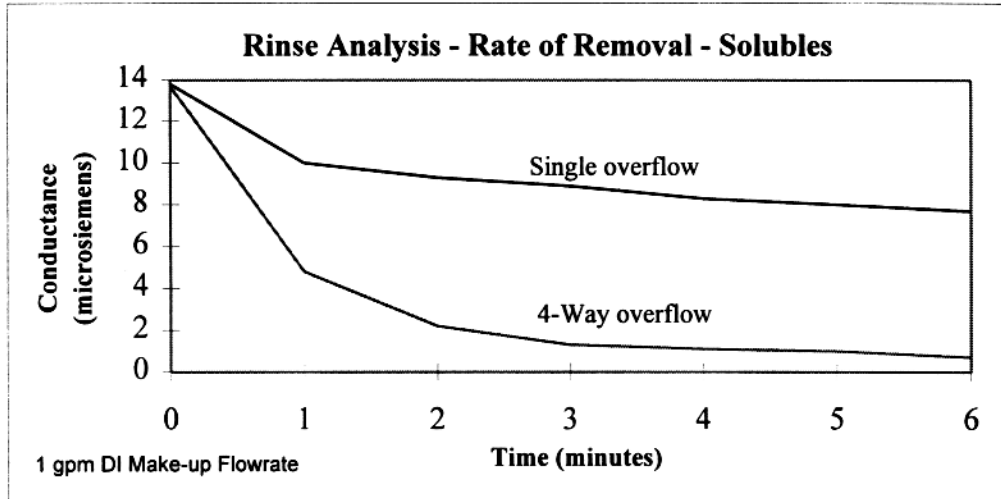


Figure 3

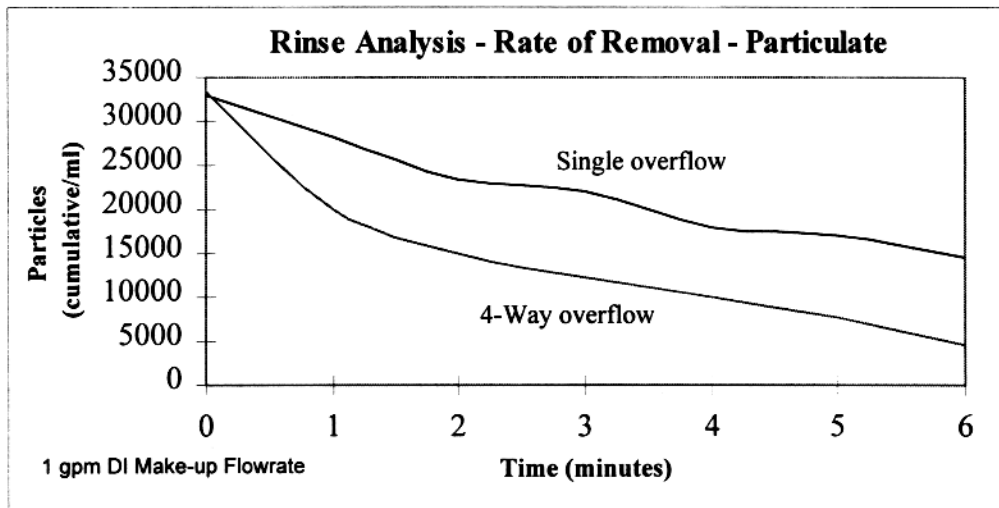


Figure 4

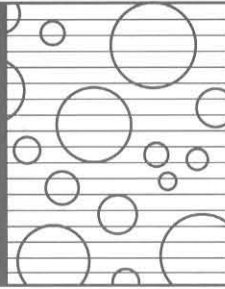
Summary

Proper water quality selection is critical to the cleanliness needs of the application. However, water quality is only one significant element to consider for effective rinsing. Specific equipment design, as

documented by this brief and evidenced by the fact that 4-way overflow rinse tanks offer a combined benefit of effective contamination removal and reduced operating costs, is equally critical.

BRANSON

Sound Ideas For Business



MU 001

MAGNAPAK®
ULTRASONICS

HIGH POWER 20 KHZ CLEANING

Technology for Productivity

TYPICAL APPLICATIONS

- **Automotive**
 - ◆ Diesel injectors ◆ Carburetors ◆ Steering components
 - ◆ Transmissions ◆ Compressor Parts ◆ Filters
 - **Electroplating**
 - ◆ Hardware ◆ Auto Trim ◆ Silver Plate
 - Drawn Carbon-steel Wire
 - Drawn Welding Wire
 - Stainless Steel Welding Rods
 - Standard Copper Wire
 - Copper-clad Wire
 - Coaxial Cable
 - Magnet Wire
 - Inconel Tube
 - Appliance Parts
 - Molds
 - Hydraulics
 - Textile Equipment
 - Television Tubes
 - Nuclear Components
 - Glassware
-

Why Ultrasonics?

Ultrasonic Cleaning

Ultrasonics is a nondestructive method of cleaning which utilizes sound waves as the means to achieve cavitation in a liquid. Cavitation is the formation and implosion of vapor pockets resulting in the release of stored energy in the form of instantaneous high temperatures and pressures.

This cavitation creates the "scrubbing" action that loosens and disperses the contamination in an ultrasonic cleaning system. Combining cavitation energy with the proper chemical cleaning agent provides highly efficient cleaning.

The basic elements for an ultrasonic cleaning system are: (1) a generator to provide high frequency electrical energy; (2) a transducer to convert electrical energy to mechanical sound energy; and (3) a tank to hold the cleaning medium. The contaminated part is submerged in the cleaning medium, the ultrasonics are activated, and cleaning begins.

The Magnapak Series offers a complete range of ultrasonic cleaning equipment that can meet most cleaning requirements, from the small shop to major production line operations, with these important, cost-saving benefits:

Faster Cleaning

Magnapak ultrasonic cleaning takes a fraction of the time required with conventional methods. Frequently there is a tenfold increase in productivity with less floor space required.

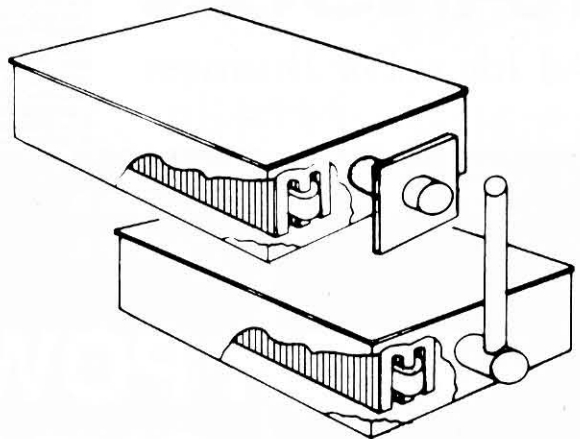
Magnapak ultrasonics feature high power (high watt density) levels to achieve the fastest soil removal.

Total Cleaning

Ultrasonic cleaning action envelopes the entire part. Complex assemblies can be thoroughly cleaned. Rejects are reduced, and recycling, repeat cleaning or additional cleaning steps can be eliminated.

Environmental Acceptability

Because cavitation provides such a high percentage of the total cleaning effect, lower concentrations of chemical solutions can be achieved – significantly reducing problems of worker safety and pollution control. Often non-corrosive chemicals can be substituted minimizing toxic fumes and disposal problems.



Immersible Transducers

Immersible transducers are self-contained units for placement along the bottom or sides of an existing or custom-designed tank. They offer excellent application flexibility.

The Magnapak immersible transducer is available in three basic module sizes which makes it possible to install units in a wide variety of configurations to meet special requirements presented by the work being cleaned. This modular flexibility, in the use of either single or multiple units, is a significant factor in matching equipment with application requirements at lower cost.



Transducerized Tanks

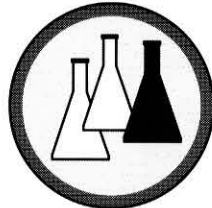
Standard transducerized tanks are fabricated from 304 stainless steel with all-welded, crevice-free construction, preventing entrapment of contaminants and providing compatibility with most chemical cleaning agents. The Magnapak transducerized tank is available in seven different sizes.

CYLSONIC® CLEANING

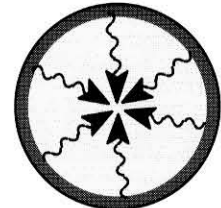
A Magnapak Cylsonic cleaning unit is a cylindrical transducer coupled to a flood box for in-line cleaning. This transducer offers concentrated high-power cleaning. Counter flow of cleaning solution assures product exit through the cleanest solution.

The Cylsonic cleaning unit can be profitably applied to the cleaning of wire, strip, tubing, cable, rod, interconnected in-line parts, and similar longitudinal configurations. Single and multiple strand cleaning is available.

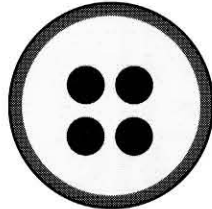
Modular 1kW design may be series coupled to match virtually any line speed. Compact cleaning reduces chemical use, and cavitation reduces chemical concentration, thereby significantly reducing operation costs.



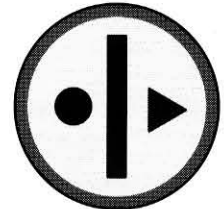
Multi-chemical capability



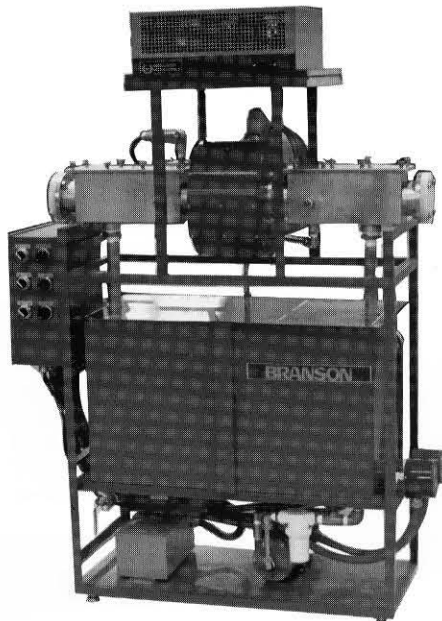
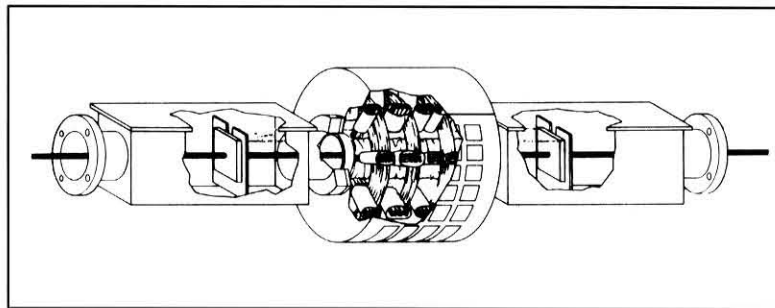
Concentrated high power cleaning



Cleans single or multiple strands



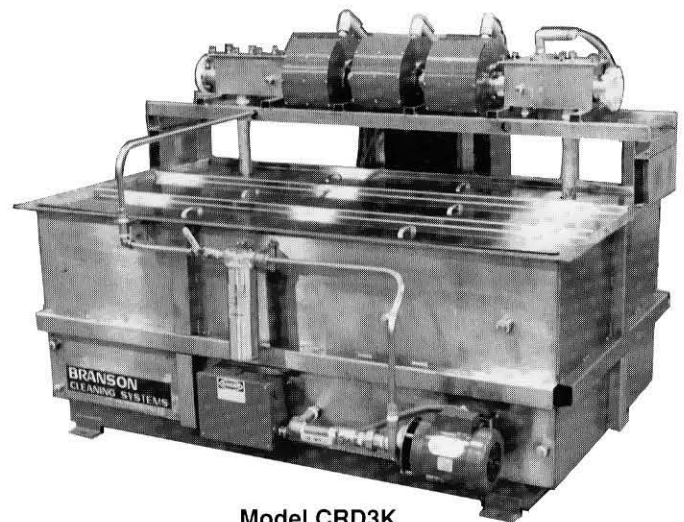
Cleans variety of shapes



Model CS1KGTP

INTEGRAL 1 KW CYLSONIC CLEANING SYSTEM MODEL CS1KGTP

The integral Cylsonic system is designed to function as a pilot for a production cleaning line or for low production volume applications. It combines all the operating components mounted on a common base.

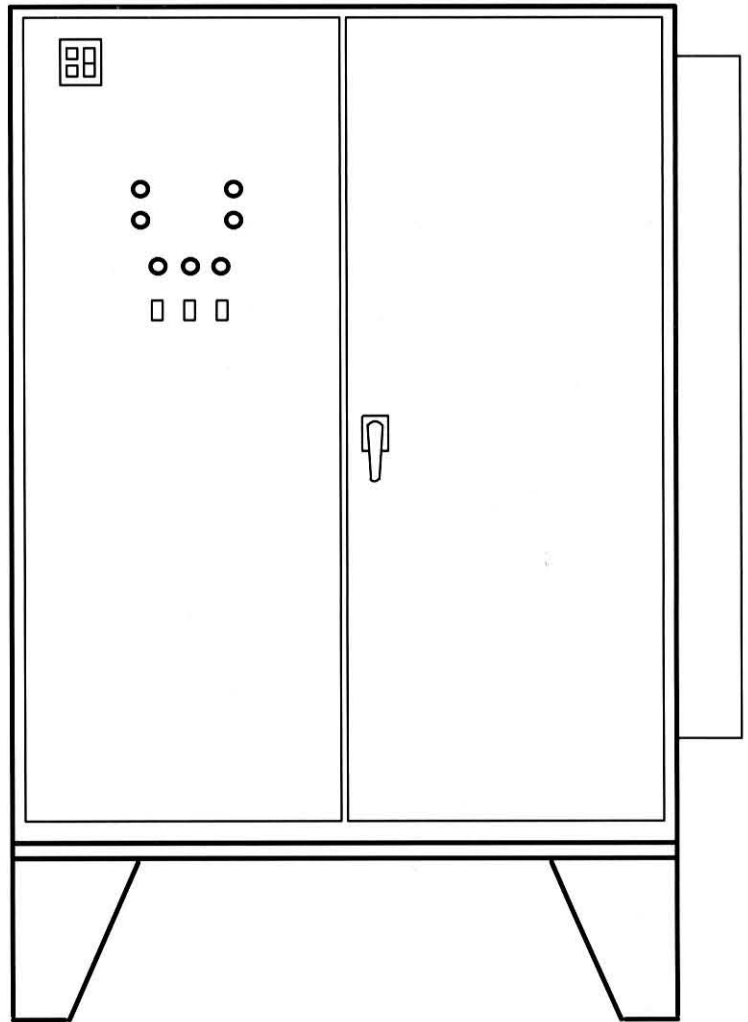
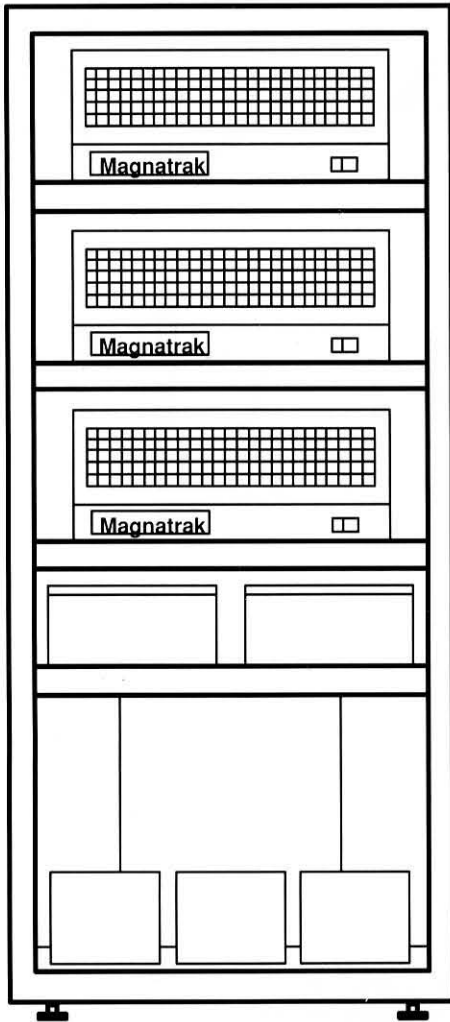


Model CRD3K

RUGGED-DUTY SYSTEMS MODELS CRD2K AND CRD3K

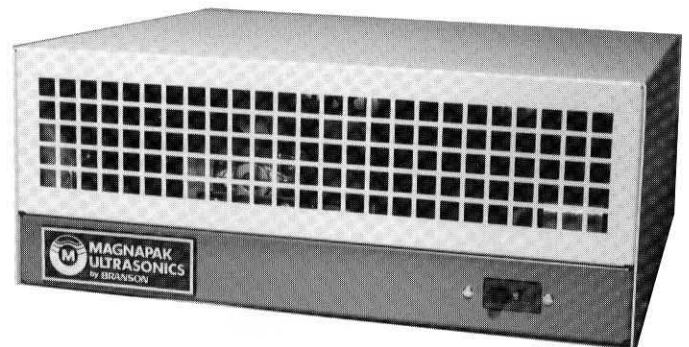
These heavy duty systems are designed for applications such as drawing compound removal and rod and wire descaling following mechanical breaking. The units are designed with a 2 or 3 kW Cylsonic assembly that is mounted directly above an all stainless steel, three-compartment storage tank.

TYPICAL HEAVY-DUTY NEMA TYPE PACKAGES



MAGNATRAK® ULTRASONIC GENERATORS

Magnatrac® generator design features all solid-state, field-proven circuitry enabling continuous high-power operation under the most severe production conditions. The circuit design provides instant starting without warm-up. Automatic frequency tracking adjusts to the optimum operating frequency, eliminating the necessity for any operator adjustments (Model G1KA). Model CG1KA has frequency controlled by a stable temperature compensation oscillator board.



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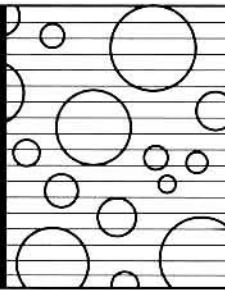
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Dietzenbach-Steinberg, Germany



CYLSONIC® ULTRASONIC CLEANING EQUIPMENT

Cylsonic® cleaning adds a further dimension to conventional ultrasonic cleaning because it uses a cylindrical tube or pipe instead of a tank. This tube or pipe is fitted with peripheral transducers and is incorporated in a resonant-tuned circuit to give tremendous energy levels not achieved by any other ultrasonic cleaning equipment. The resonant-tuned circuit focuses the energy along the in-line center line to allow non-contact cleaning, except for the cleaning solution.

The Cylsonic cylindrical transducer has nickel laminations bonded in a peripheral "spoke" arrangement on a thick-walled stainless steel pipe. The design focuses cavitation energy and increases cleaning intensity. The net effect of this tuned arrangement and the focused energy is ultrasonic energy power levels up to 100 watts per square inch, several times higher than even the conventional Magnapak high-intensity transducer.

The cylindrical cleaning chamber is 7.5 inches long and has an interior diameter of 2.9 inches. A protective housing with an expanded metal air vent makes the overall dimensions of the transducer 7.5 inches long by 12.15 inches outer diameter.

The cleaning area has a high rate of liquid turnover. The counterflow of the cleaning solution moves soil from the cleaning area in the opposite direction of the product movement. The product exits the cleaning area through the cleanest solution. The combination of high power, cylindrical geometry and solution counterflow provides an ultra-clean product.

STATIONS & SYSTEMS

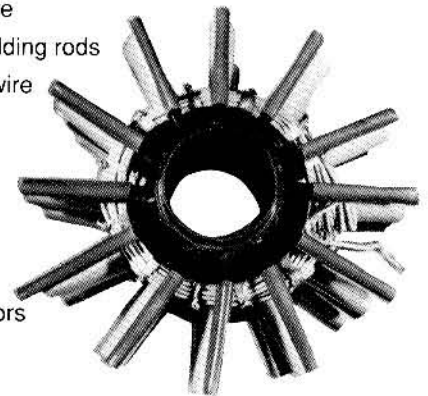
Cylsonic clean/rinse stations consist of Cylsonic transducer(s), generator(s), infeed/outfeed vestibules, liquid level sensor/interlock, and Radio Frequency Interference (RFI) filters mounted on a common frame. Cylsonic systems are integral units complete with a solution storage tank.

Additional rinsing may be achieved by passing the product through an ultrasonic station, a static liquid bath, or a spray chamber. If liquid removal is necessary before the product moves to the next production step, it can be achieved with an air wipe.

APPLICATIONS

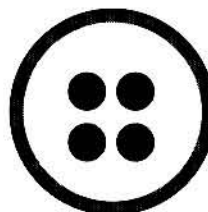
Successful Cylsonic cleaning applications include:

- Drawn carbon-steel wire
- Drawn welding wire
- Stainless steel welding rods
- Standard copper wire
- Copper-clad wire
- Coaxial cable
- Magnet wire
- Inconel tube
- Integrated circuits
- Electrical connectors

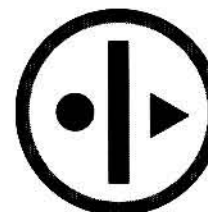


FEATURES

- Cleans at high speeds, as much as 10 times faster than conventional ultrasonic methods.
- Has high rate of liquid turnover.
- Allows product to feed through without bending, reducing potential for product damage.
- Simplifies work handling.
- Adapts easily to customer line speeds by series coupling of transducer modules.
- Multiple strand cleaning capability.
- Provides ease of service or maintenance.



Cleans single or multiple strands



Cleans variety of shapes



Concentrated high power cleaning

CYLSONIC® CLEANING STATIONS

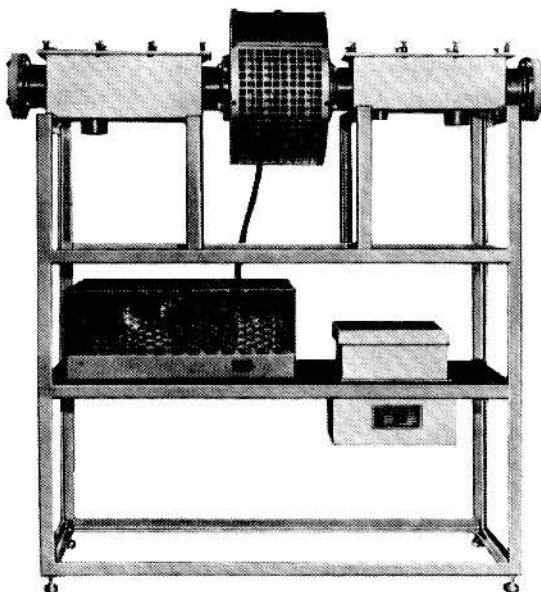
CYLSONIC CLEAN & RINSE STATIONS MODELS CS1K-CS6K

Cylsonic clean and rinse stations require Cylsonic transducer(s), Cylsonic generator(s), Radio Frequency Interference filter(s) (RFI), and a method for keeping solution in the cleaning chamber. The basic station, Model CS1K, consists of these components:

- Infeed vestibule with overflow weir.
- 1000 Watt Cylsonic generator @ 20 kHz.
- 1000 Watt Cylsonic transducer.
- Outfeed vestibule with overflow weir.
- Interlock for low liquid level protection.
- Epoxy-painted, steel support frame.
- RFI suppression circuit.
- Pass line 44".

Options include 50 Hz and non-standard voltage for Models CS3K-CS6K.

Model	U/S Power 20kHz	Overall Dim. HxWxD "	Generator Model	Generator Location	Input Power 60 Hz
CS1K	1000W	51.5 x 41.3 x 20.82	1 CG1KA	Mounted on station frame.	115V 1ph
CS2K	2000W	51.5 x 51.7 x 20.82	2 CG1KA or 1 CG2KAC		115V 1ph
CS3K	3000W	51.5 x 62.4 x 20.82	1 CG3KAC	Remotely located in NEMA-1 rack or NEMA-12 enclosure	Either 220 3ph or 460V 3ph
CS4K	4000W	51.5 x 73.0 x 20.82	1 CG4KAC		
CS5K	5000W	51.5 x 83.6 x 20.82	1 CG5KAC		
CS6K	6000W	51.5 x 94.6 x 20.82	1 CG6KAC		



Model CS1K

INTEGRAL 1 KW CYLSONIC CLEANING SYSTEM MODEL CS1KGTP (shown at right)

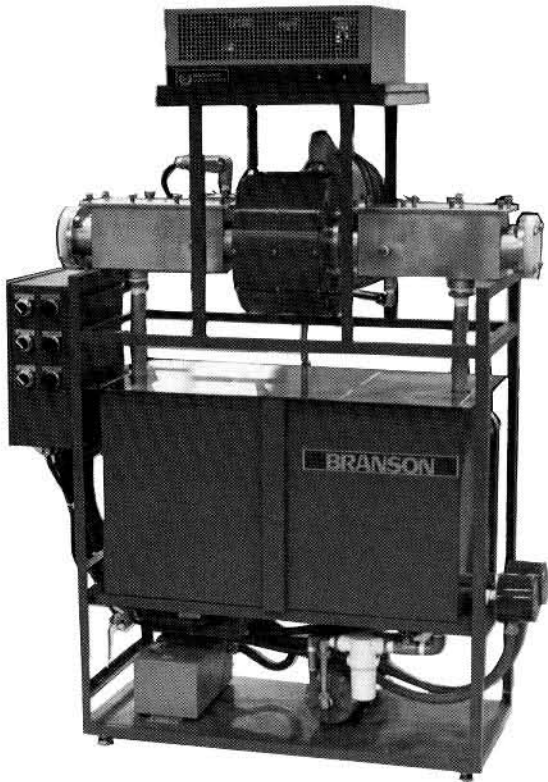
The integral Cylsonic system is designed to function as a pilot for a production cleaning line or for low production volume applications. It combines all the operating components mounted on a common base.

FEATURES

- 1 kW Cylsonic cylindrical transducer for focused high-power density ultrasonic cleaning.
- 1 kW Magnatrac generator providing reliable, field-proven all solid state circuitry for generating 20 kHz power for driving transducer.
- Stainless steel infeed and outfeed vestibules based on flood-box technique to allow straight in-line product feedthrough. Eliminates product bending and associated guides or rollers.
- Stainless steel storage tank with split cover arrangement for collection, heating, and recycling of cleaning solution.
- Stainless steel pump for pumping cleaning solution from storage tank to outfeed vestibule.
- Liquid level interlock to prevent generator operation without solution in transducer cleaning chamber.
- Liquid level interlock to prevent heater and pump operation without solution in storage tank.
- Thermostatically controlled stainless steel electrical immersion heater in storage tank for heating chemical solution.
- Transformer for single power source hook-up either 230V 3 phase or 460V 3 phase.
- Switches and indicator lights for heater and pump control.
- All stainless steel plumbing.
- RFI suppression circuitry.
- Non-standard voltage and 50 Hz available as options.

CS1KGTP Specifications

Overall dimensions	63.2H x 20.8W x 44.6D inches
Transducer center line abv floor level	44 inches
Transducer inside diameter	2.94 inches
Transducer length	7.0 inches
Storage tank capacity	34 gal.
Ultrasonic generator power @20 kHz	1 kW
Pumping capacity	5 gpm
Heating capacity	5 kW (220V) 6 kW (440V)
Electrical requirements	Either 230V, 3 ph, 60 Hz, 8kVA or 460V, 3 ph, 60 Hz, 9kVA



Model CS1KGTP

**RUGGED-DUTY SYSTEMS
MODELS CRD2K AND CRD3K**

These heavy duty systems are designed for applications such as drawing compound removal and rod and wire descaling following mechanical breaking. The units are designed with a 2 or 3 kW Cylsonic assembly that is mounted directly above an all stainless steel three-compartment storage tank.

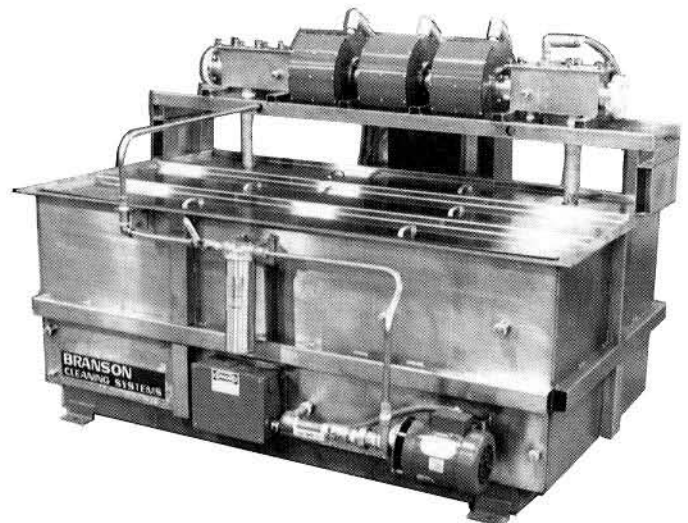
FEATURES

- Receiving sump for collection of cleaning solution.
- Settling sump where heavy particulate matter settles out of the cleaning solution.
- Heating and pumping sump.
- Cylsonic transducer(s) for focused, high-density ultrasonic cleaning.
- Stainless steel infeed and outfeed vestibules based on flood-box technique to allow straight in-line product feedthrough. This arrangement eliminates product bending and associated guides or rollers.
- Liquid level interlock to prevent generator operation without solution in transducer section.
- Liquid level interlock to prevent heater and pump operation without solution in storage tank.
- Digital temperature control.
- Switches and indicator lights for heater and pump control.

CRD2K & CRD3K FEATURES, cont.

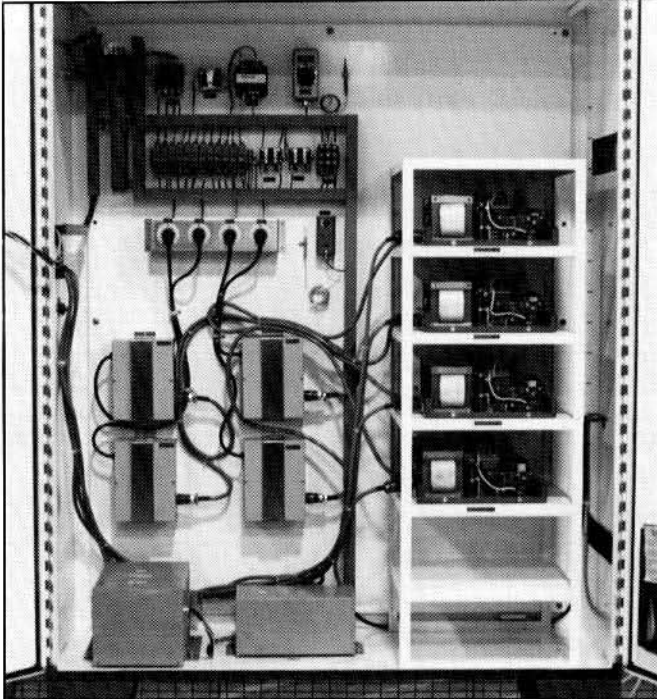
- All stainless steel plumbing.
- Full stainless steel cover (split design arrangement) for storage tank.
- Generators remotely located.
- Provisions for coalescing system.
- Provisions for auto liquid make-up system.
- Clean-out doors.
- Optional non-standard voltage and 50 Hz.

CRD2K & CRD3K Specifications	
Overall dimensions	50.0H x 75.0W x 63.8D inches
Transducer center line abv floor level	44 inches
Transducer inside diameter	2.90 inches
Storage tank capacity (total)	220 gal.
Ultrasonic power @ 20 kHz	2kW/3 kW
Pumping capacity	15 gpm
Heating capacity	30 kW
Electrical requirements (excl. generator)	Either 230V, 60 Hz, 3ph, or 460V, 60 Hz, 3ph, 35 kVA

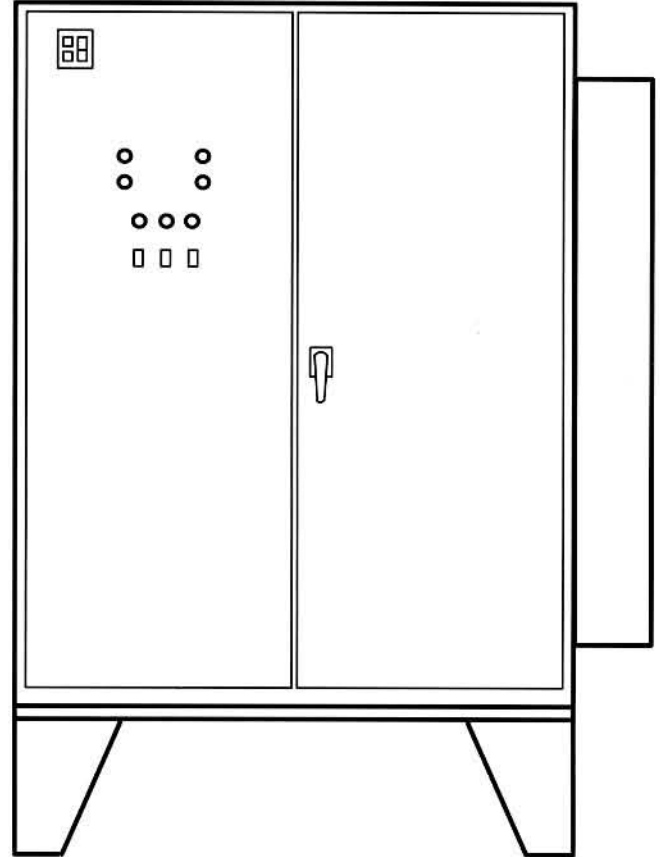


Model CRD3K

BRANSON MULTI-GENERATOR RACKS AND ENCLOSURES



Inside View



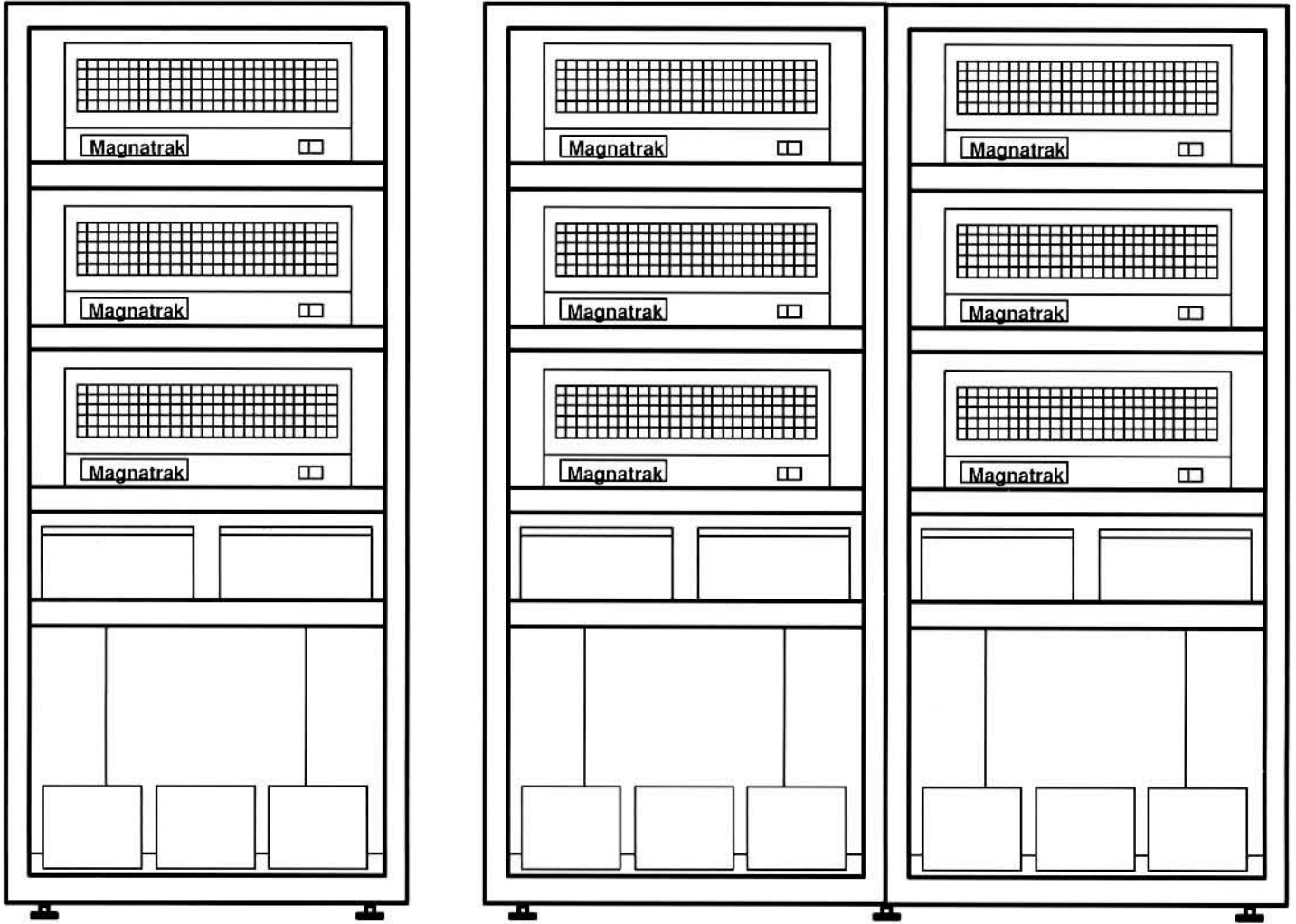
NEMA-12 TYPE ENCLOSURE

The Branson NEMA-12 type enclosure is cooled by a Kooltronic air conditioner and is intended for use indoors to protect the enclosed equipment against fibers, flyings, lint, dust, dirt and light splashing. It is designed to accept one to six generators. Its overall dimensions are 72" high x 60" wide x 24" deep.

FEATURES

- Master on/off control button on front door.
 - Individual switches and indicator lights on front door for controlling enclosed generators.
 - Adjustable temperature control with high and low temperature safety devices.
 - Transformers for single power hook-up at either 230 Volt, 3 phase, 60 Hz or 460 Volt, 3 phase, 60 Hz.
 - Non-standard frequency and voltage are available as optional extra.
-

BRANSON MULTI-GENERATOR RACKS AND ENCLOSURES



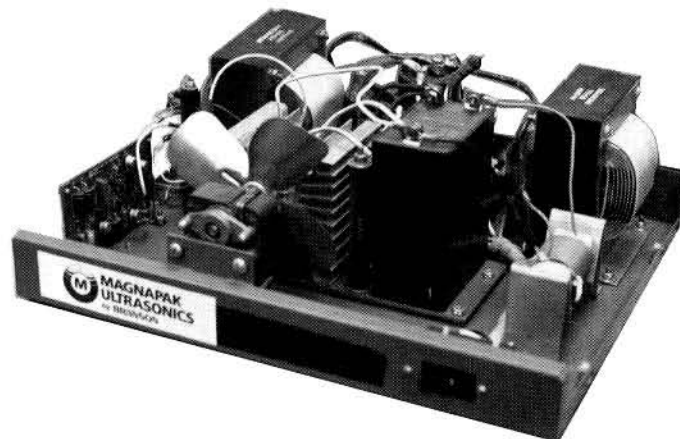
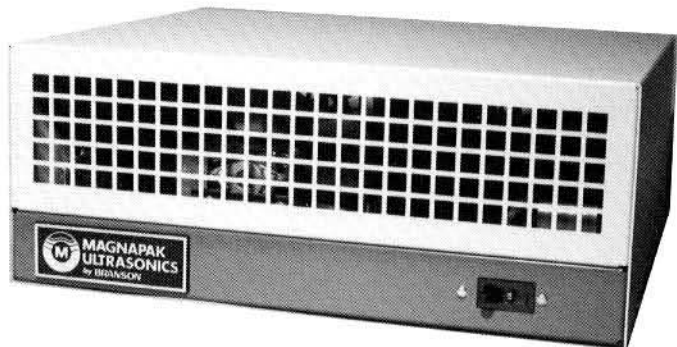
NEMA 1 TYPE RACK

The Branson NEMA-1 type racks are intended for use indoors to prevent accidental contact of personnel with the racked generators. The racks are also used for stacking of generators. Two standard racks are available for one to three generators and three to six generators.

Racks are designed for single power hook-up at either 230 Volt, 3 phase, 60 Hz or 460 Volt, 3 phase, 60 Hz. Non-standard frequency and voltage are available as optional extra.

Rack Size	Overall Dim. H x W x D "
For 1-3 generators	53 x 24 x 24
For 3-6 generators	53 x 48 x 24

MAGNATRAK® ULTRASONIC GENERATORS



Model CG1KA

Magnapak ultrasonic solid state generators accept 115V, 1 phase, 50/60 Hz AC line voltage input, convert it to DC, and then into a nominal 20.8 kHz frequency for driving the transducer.

The proven circuit design of the Magnatrac generator line features solid state SCR and ASCR (asymmetrical silicon controlled rectifier) devices.

The generator is a self-contained unit and includes all required power circuitry protection and cooling. A front-mounted circuit breaker, which also serves as an on/off switch, is the only control required to operate the unit. Solid state circuitry requires no warm-up time; wave generation begins when the circuit breaker is switched on. The 20.8 kHz frequency circuit is controlled by a stable temperature compensated oscillator board.

Model	Overall Dim. HxWxD "	Output 20 kHz	Input 50/60 Hz	Weight	Cooling
CG1KA	7 x 17 x 14	1000 W	115V, 1ph	48 lbs.	Air



BRANSON ULTRASONICS CORPORATION

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Branson Canada
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Branson Southeast Asia
Hong Kong

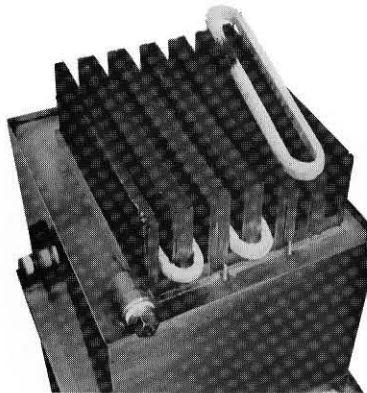
Branson Europe
Dietzenbach-Steinberg, Germany

BRANSON

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MAGNAPAK® ULTRASONICS



MAGNAPAK® TRANSDUCERS

An ultrasonic transducer is a device which converts electrical energy to mechanical energy. When the transducer is attached to a radiating surface, such as the bottom of a cleaning tank, the mechanical energy is converted to ultrasonic cavitation energy which produces efficient cleaning. The Magnapak® transducer is a 20 kHz, spaced-lamination, magnetostrictive transducer. The design features match the acoustic impedance of the transducer with the cleaning solution, thereby optimizing energy transfer for cleaning. Each lamination is individually attached and acts as a driving element working in unison with all the others to contribute to the whole piston-like vibration of the radiating surface.

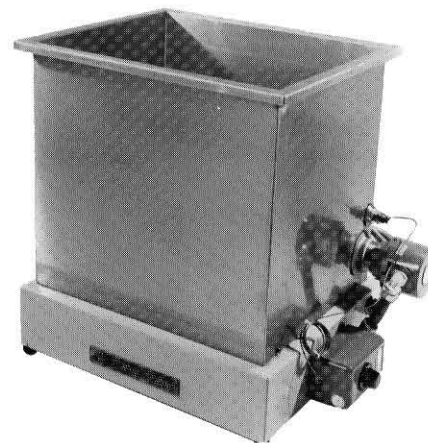
TANKS

T-Series Tanks (Transducerized Tanks) The T Series of tanks have Magnapak transducer units attached directly to the bottom of the tank. Those with the "HS" suffix have double-wall construction, strip heaters, and a controlling thermostat. The tanks with the "HI" suffix have single-wall construction, immersion heaters, and a controlling thermostat. Heat and sound insulation, with or without a cover, is available as an option. This series is also designed with a lip which permits drop-in table-top type arrangements.

MAGNAPAK® TANKS & MAGNATRAK® GENERATOR



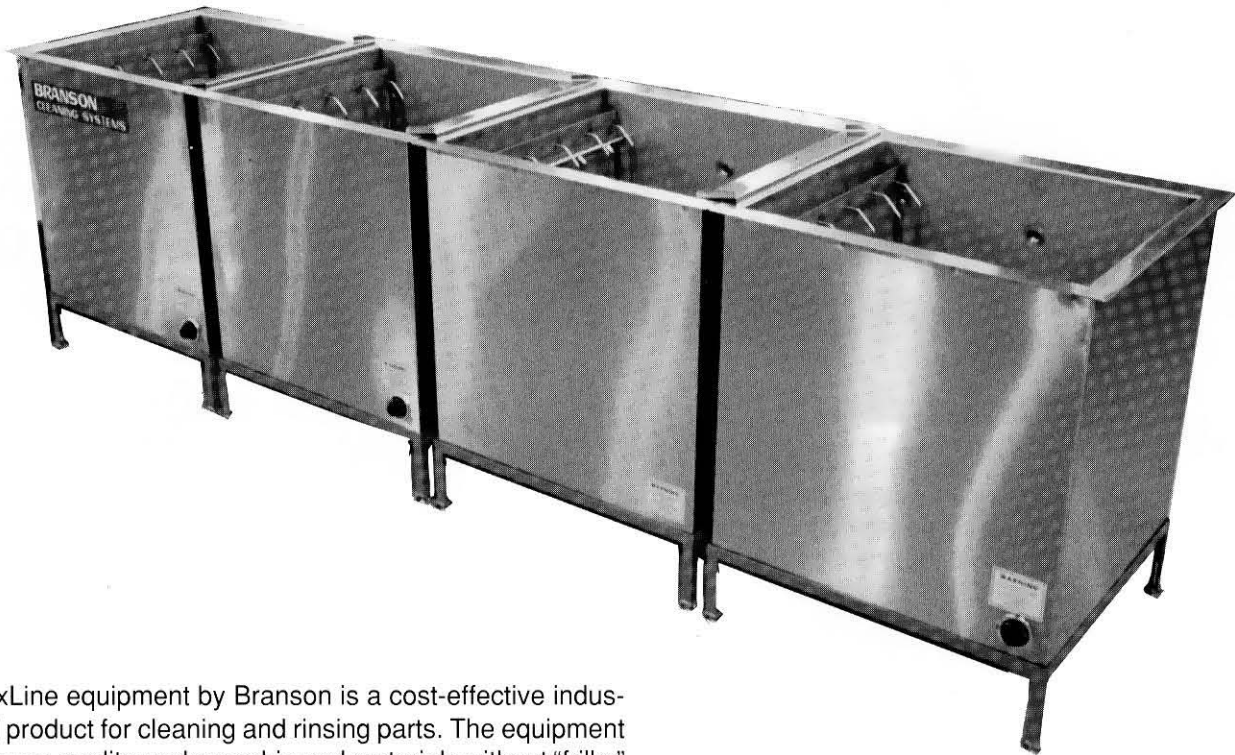
Model T1K8.7HS



Model T2K25HI

Model	Ultrasonic Power (watts)	Capacity (gallons)	Tank Dimensions						Heater kW	Single Phase 60 Hz	Weight (lb.)
			Inside (inches)			Outside (inches)					
			L	W	D	L	W	D			
T1K8.7HS	1000	8.7	14.0	12.0	12.0	18.0	16.0	17.1	1.6	115V	56
T1K9HS	1000	9.0	19.0	10.0	11.0	23.0	14.0	16.1	2.0	115V	45
T2K25HS	1000	12.0	19.0	10.0	16.0	23.0	14.0	21.1	2.0	115V	52
T2K25HI	2000	25.0	20.0	16.0	18.0	26.0	18.0	23.7	5.0	220V	83
T3K39HI	3000	39.4	23.0	19.0	22.0	42.0	24.0	32.0	5.0	220V	240

MAGNAPAK FLEXLINE CLEANING AND RINSING TANKS



FlexLine equipment by Branson is a cost-effective industrial product for cleaning and rinsing parts. The equipment features quality workmanship and materials without "frills." FlexLine offers more features and capabilities than standard table-top equipment, and greater flexibility in tank arrangement than fixed console systems.

The basic component of the FlexLine is a standard 304 stainless steel tank with protective skirting. This tank can be configured in a variety of ways for:

- Ultrasonic cleaning
- Spray under immersion
- Weir overflow
- Surface sparging
- Spray rinsing
- Overflow rinsing
- Cascade rinsing

Because the FlexLine system is based on standard components, quick delivery is assured. It also allows for a very flexible configuration of tanks that can easily be adapted should production requirements change.

FlexLine equipment is available in two tank sizes, 12 inches by 16 inches and 20 inches by 24 inches. All tanks are supplied with a stable painted steel support stand. This brings the system to a convenient 36-inch working height.

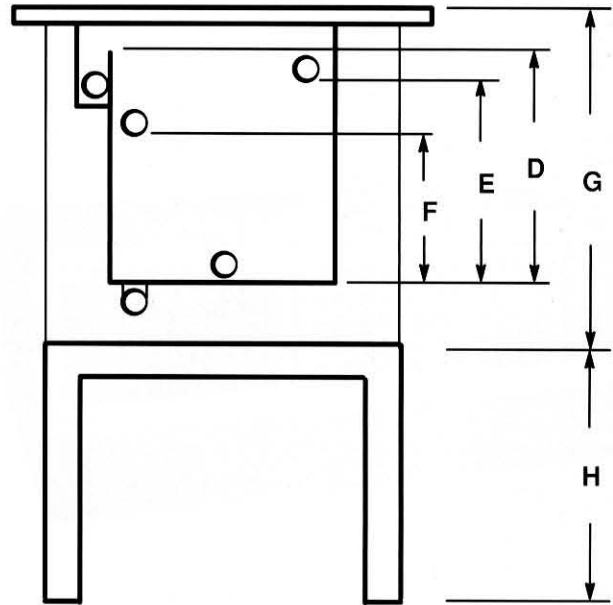
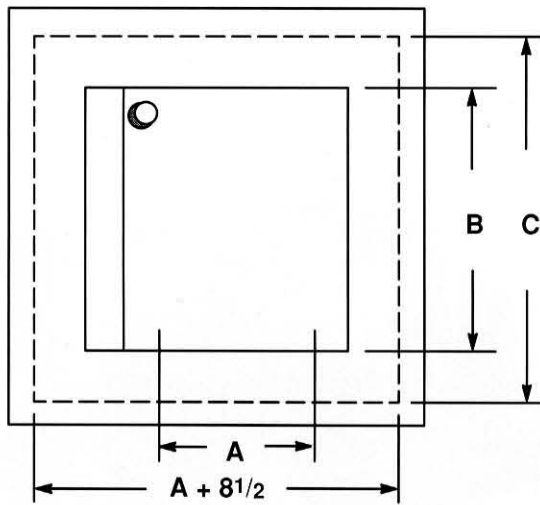
FEATURES & BENEFITS

- 304 stainless steel construction
- Protective tank skirting
- Standard overflow weir
- Support stand
- Drip tray
- Stainless steel covers with handles
- Ease of maintenance
- Maximum flexibility
- Quickest delivery
- Cost-effective design
- Thermostatically-controlled heat.

CONFIGURING OPTIONS

- 20 kHz magnetostrictive ultrasonics
 - 25 kHz or 40 kHz piezoelectric ultrasonics
 - Single or double spray headers
 - Sparger manifold
 - Overflow rinse
 - Cascade rinse, 2-3 tank arrangement
 - Thermostatically-controlled heat
 - Recirculating pump and filter
 - Parts baskets
-

BASIC TANK

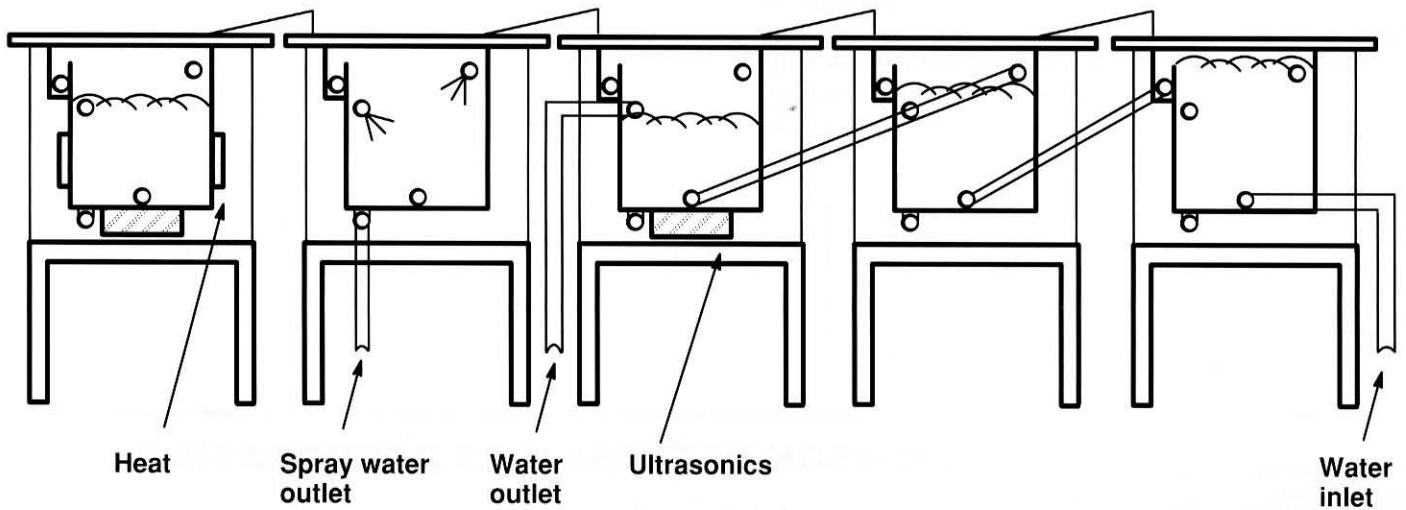


Model	A	B	C	D	E	F	G	H	Heat	Drain dia.	Inlet dia.	Spray/Sparger nozzles	Transducer
1216	12	16	19	15	13 1/2	12	22	14	2000	1	1/2	6	1000 Watts
2024	20	24	27	23	21 1/2	20	30	6	4000	1	1/2	10	3000 Watts

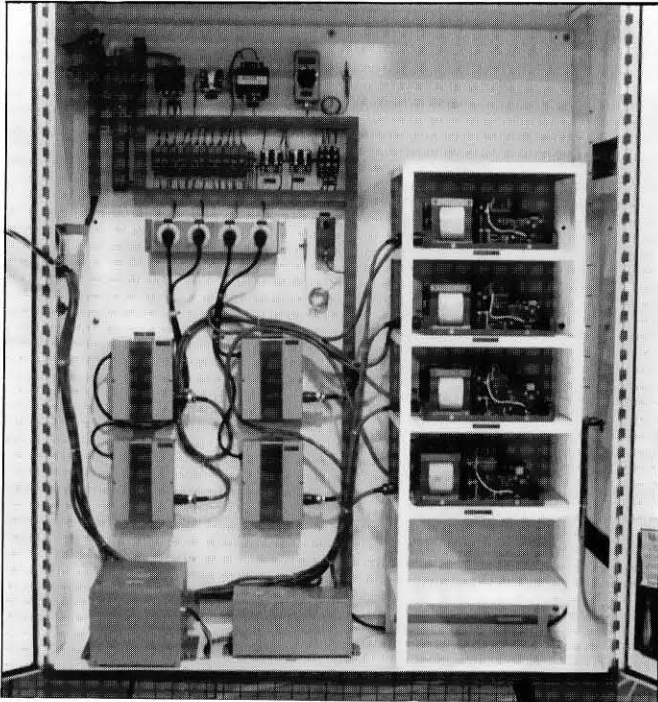
- NOTE:**
- Dimensions are in inches, and are approximate.
 - External dimensions do not include 1" flange around tank.

TYPICAL CONFIGURATION OF CLEANING & RINSE TANKS

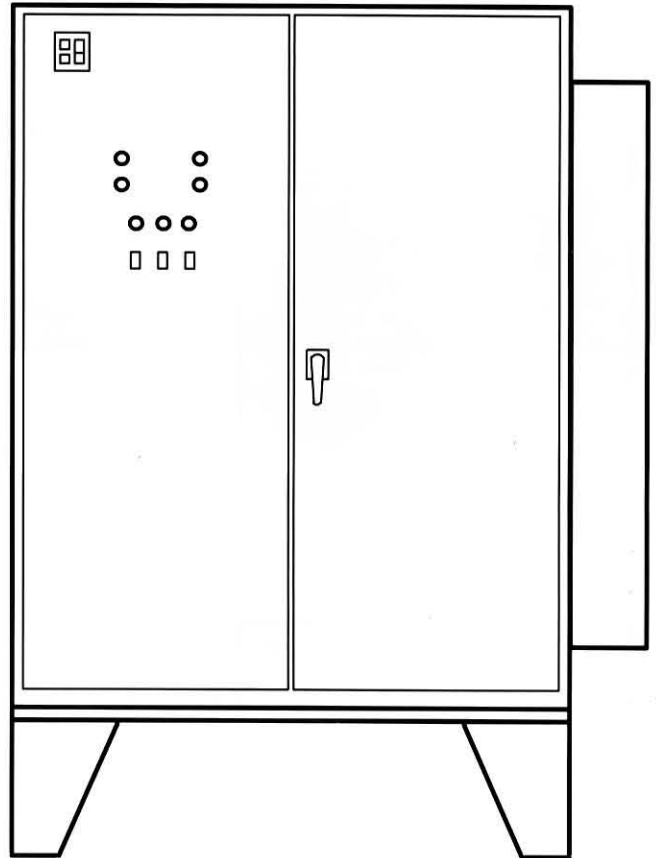
1 ultrasonic cleaning tank with heat; 1 spray rinse tank; 3 cascade rinse tanks; drip trays



BRANSON MULTI-GENERATOR RACKS AND ENCLOSURES



Inside View



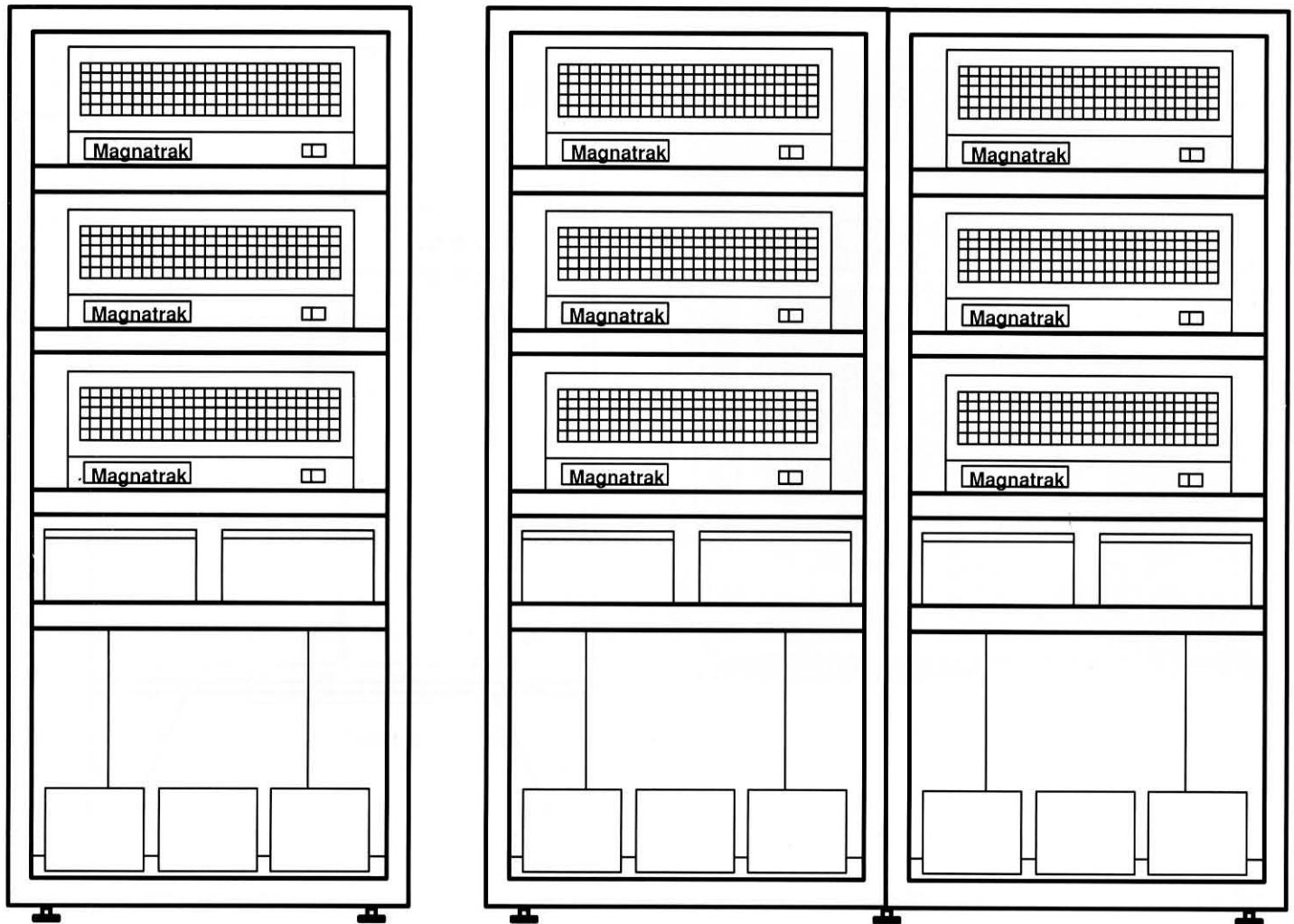
NEMA-12 TYPE ENCLOSURE

The Branson NEMA-12 type enclosure is cooled by a Kooltronic air conditioner and is intended for use indoors to protect the enclosed equipment against fibers, flyings, lint, dust, dirt and light splashing. It is designed to accept one to six generators. Its overall dimensions are 72" high x 60" wide x 24" deep.

FEATURES

- Master on/off control button on front door.
- Individual switches and indicator lights on front door for controlling enclosed generators.
- Adjustable temperature control with high and low temperature safety devices.
- Transformers for single power hook-up at either 230 Volt, 3 phase, 60 Hz or 460 Volt, 3 phase, 60 Hz.
- Non-standard frequency and voltage are available as optional extra.

BRANSON MULTI-GENERATOR RACKS AND ENCLOSURES



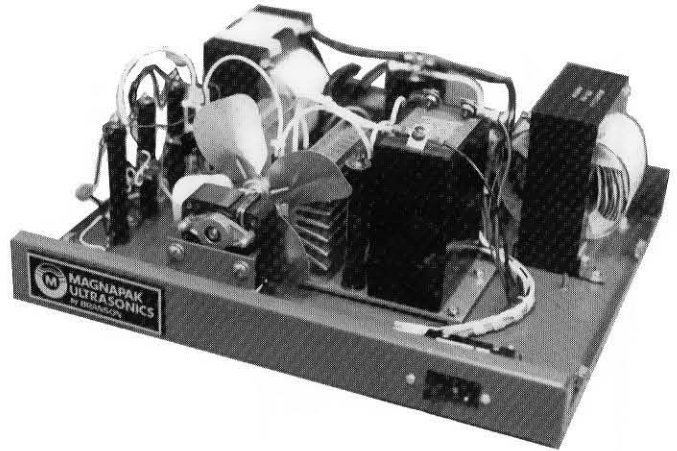
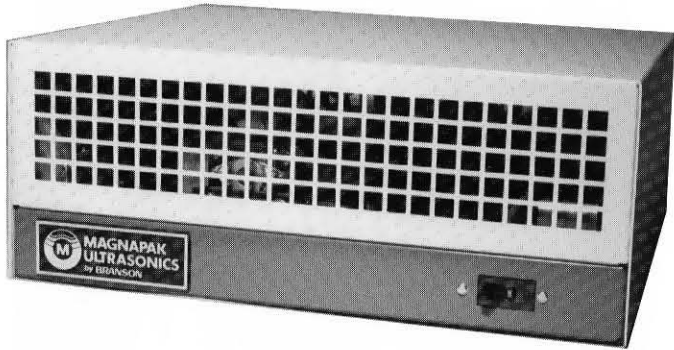
NEMA 1 TYPE RACK

The Branson NEMA-1 type racks are intended for use indoors to prevent accidental contact of personnel with the racked generators. The racks are also used for stacking of generators. Two standard racks are available for one to three generators and three to six generators.

Racks are designed for single power hook-up at either 230 Volt, 3 phase, 60 Hz or 460 Volt, 3 phase, 60 Hz. Non-standard frequency and voltage are available as optional extra.

Rack Size	Overall Dim. H x W x D "
For 1-3 generators	53 x 24 x 24
For 3-6 generators	53 x 48 x 24

**MAGNATRAK®
ULTRASONIC GENERATORS**



Model G1KA

Magnapak ultrasonic solid state generators accept 115V, 1 phase, 50/60 Hz AC line voltage input, convert it to DC, and then into a nominal 20.8 kHz frequency for driving the transducer.

The proven circuit design of the Magnatrac generator line features solid state SCR and ASCR (asymmetrical silicon controlled rectifier) devices.

The generator is a self-contained unit and includes all required power circuitry protection and cooling. A front-mounted circuit breaker, which also serves as an on/off switch, is the only control required to operate the unit. The circuit design provides instant starting without warm-up and automatic frequency tracking which automatically adjusts to optimum operating frequency without operator adjustment.

Model	Overall Dim. HxWxD "	Output 20 kHz	Input 50/60 Hz	Weight	Cooling
G1KA	7 x 17 x 14	1000 W	115V, 1ph	48 lbs.	Air



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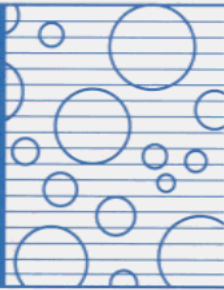
Branson Japan
Tokyo, Japan

Branson United Kingdom
London, England

Branson Canada
Markham, Ontario

Branson Southeast Asia
Hong Kong

Branson Europe
Dietzenbach-Steinberg, Germany



MAGNAPAK® TRANSDUCERS & MAGNATRAK® GENERATOR

Immersible ultrasonic transducers provide flexibility and practicality to a cleaning system. Should a change occur in production rates or parts, with the use of immersibles the system does not become obsolete. Instead, the immersibles are easily rearranged in the cleaning tank to meet the new requirements. They even can be moved from one production line to another without having to change the line.

In contemplating the use of ultrasonic cleaning, either in existing units or new applications, the principle of "do-it-yourself" engineering is practical. One unit can be set up easily for tryout of the application to ensure it fits your specific needs under your plant operating conditions.

MAGNAPAK® TRANSDUCERS

An ultrasonic transducer is a device which converts electrical energy to mechanical energy. When this transducer is attached to a radiating surface, such as the bottom of a cleaning tank, the mechanical energy is converted to ultrasonic cavitation energy which produces efficient cleaning.

The Magnapak® transducer is a 20 kHz, spaced-lamination, magnetostrictive transducer. The design features match the acoustic impedance of the transducer with the cleaning solution, thereby optimizing energy transfer for cleaning. Each lamination is individually attached and acts as a driving element working in unison with all the others to contribute to the whole piston-like vibration of the radiating surface.

IMMERSIBLE TRANSDUCERS

Immersible transducers are self-contained units for use along the bottom or sides of an existing or custom-designed tank. The 304 stainless steel all-welded construction provides good chemical compatibility with most cleaning compounds.

The Magnapak immersible transducer is available in three basic module sizes. These sizes accommodate any special configurations necessary to meet the requirements presented by a specific application. The modular approach provides flexibility by:

- Minimizing troubleshooting and maintenance.
- Providing easy modification to transducer layout.
- Reducing operating cost by selectively energizing areas of the tank.

Immersible transducers offer excellent application flexibility. This modular flexibility in the use of single or multiple units is a significant factor in matching equipment with application requirements at lower costs.

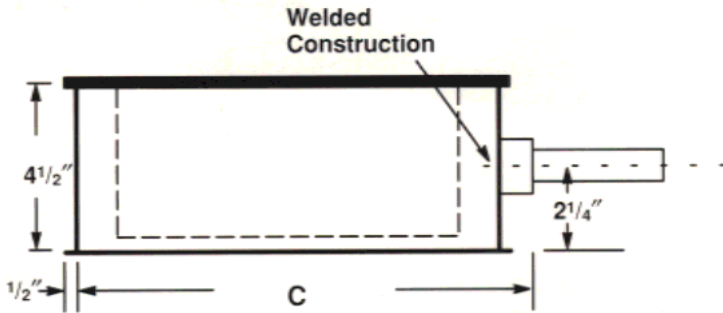
TYPICAL APPLICATIONS

- **Automotive**
 - ◆ Diesel injectors ◆ Carburetors ◆ Steering components
 - ◆ Transmissions ◆ Compressor Parts ◆ Filters
- **Electroplating**
 - ◆ Hardware ◆ Auto Trim ◆ Silver Plate
- **Appliance Parts**
- **Molds**
- **Hydraulics**
- **Textile Equipment**
- **Television Tubes**
- **Nuclear Components**
- **Glassware**

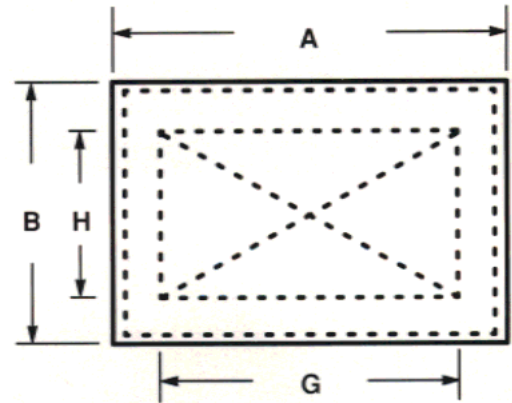
IMMERSIBLE TRANSDUCERS

The Magnapak immersible transducer is available in three basic module sizes which make it possible to install units in a variety of configurations to meet special requirements presented by the work being cleaned.

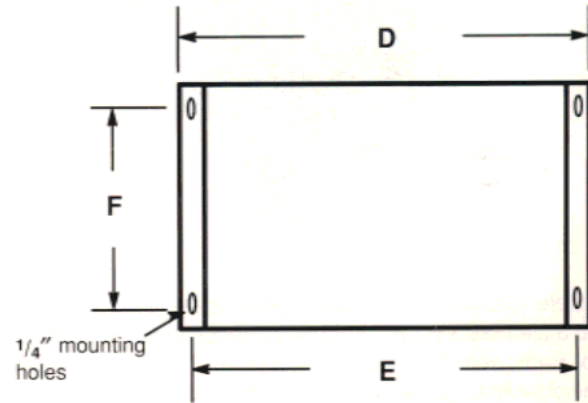
Side View



Top View



Bottom View

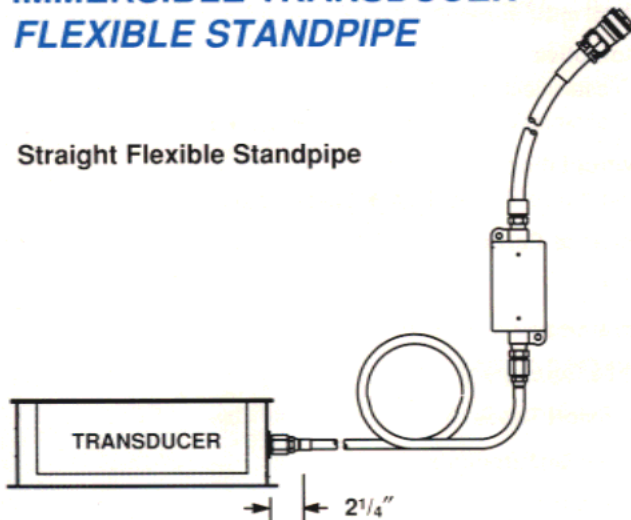


SPECIFICATIONS (Dimensions in inches)

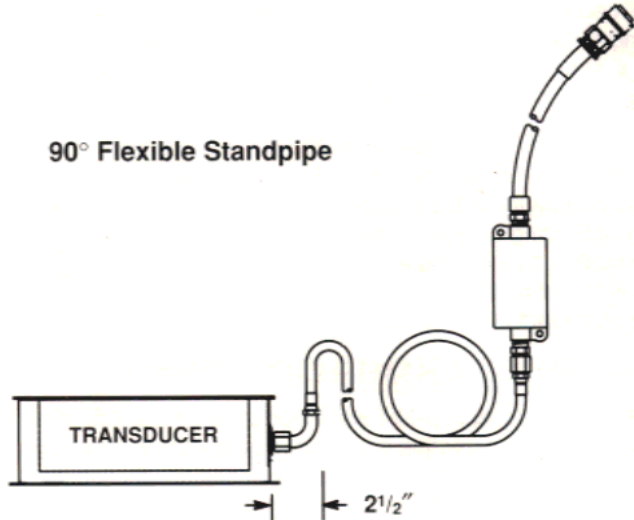
Model	Power (Watts)	Approx. Shipping Weight	A	B	C	D	E	F	G	H
I 820	1000	55 lbs.	19 ³ / ₄	7 ¹ / ₄	21 ¹ / ₃	20 ¹ / ₄	19 ³ / ₄	5 ³ / ₄	17	6
I 1114	1000	55 lbs.	13 ³ / ₄	10 ¹ / ₃	15 ¹ / ₃	14 ¹ / ₄	13 ³ / ₄	8 ³ / ₄	11	9
I 830	1000	75 lbs.	29 ³ / ₄	7 ¹ / ₄	31 ¹ / ₃	30 ¹ / ₄	29 ³ / ₄	5 ³ / ₄	27	6

IMMERSIBLE TRANSDUCER FLEXIBLE STANDPIPE

Straight Flexible Standpipe



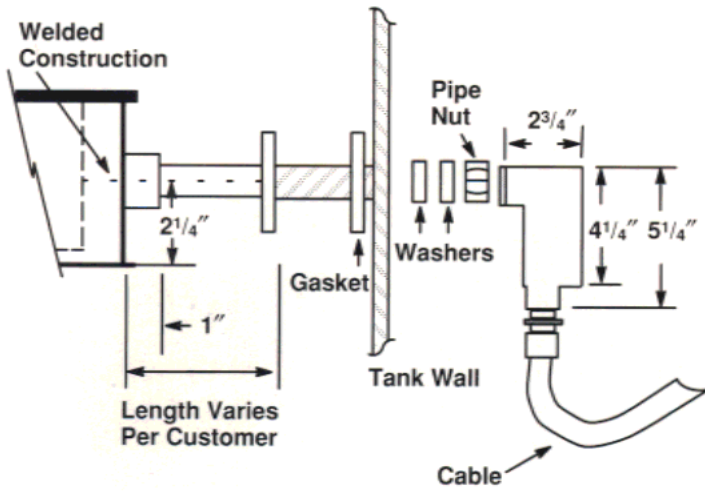
90° Flexible Standpipe



Note: When ordering Flexible Standpipe, part numbers include: cover for outlet box, outlet box, 6 feet flexible hose, adapter, fitting,

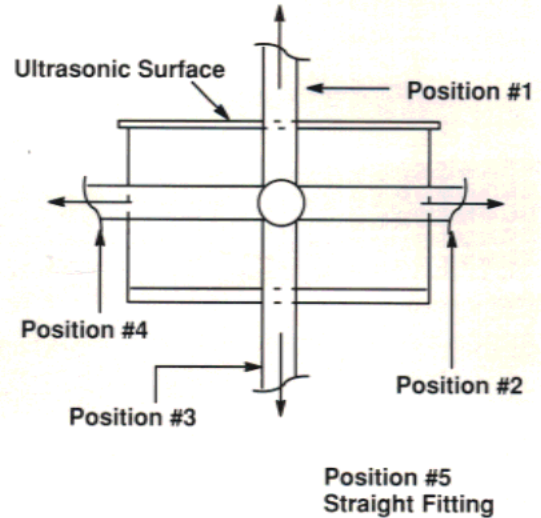
6 feet 12 gauge wire, 8 feet RF cable with Amphenol plug.

IMMERSIBLE TRANSDUCER END BULKHEAD

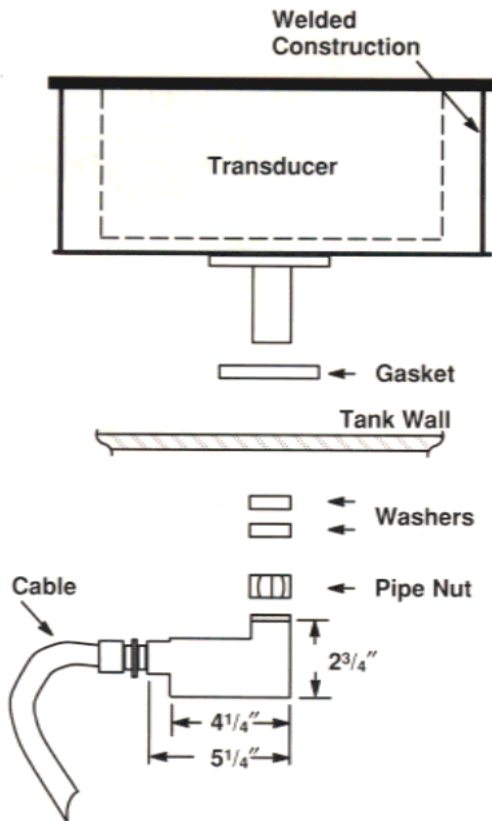


IMMERSIBLE TRANSDUCER STANDPIPE TYPE

Rigid standpipe type transducers are available on special order. Contact the factory for pricing.



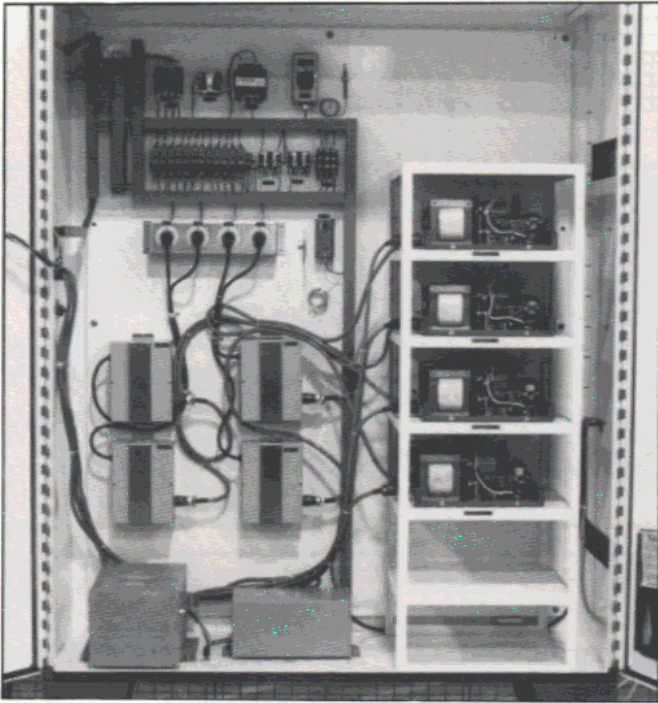
IMMERSIBLE TRANSDUCER BOTTOM BULKHEAD



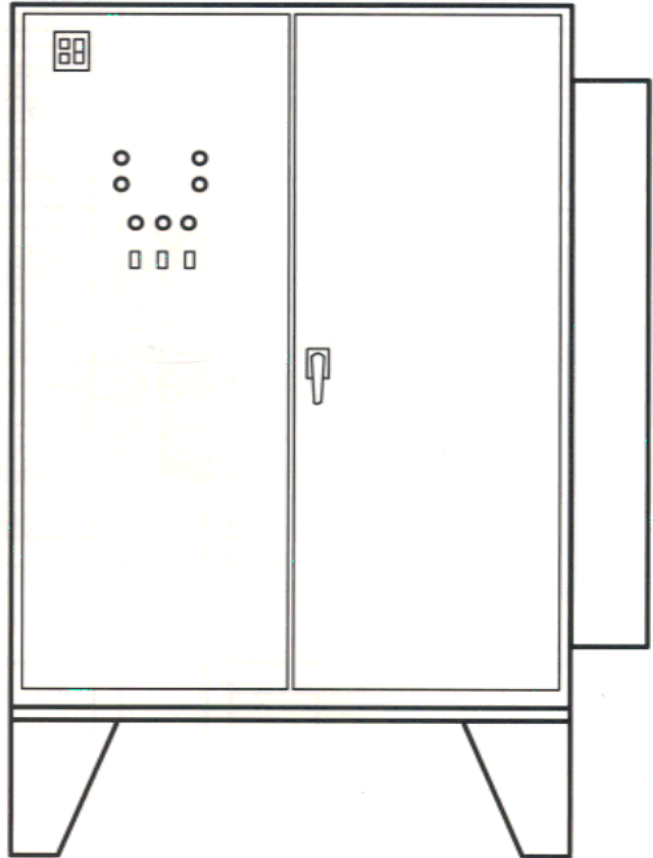
Note: When ordering rigid standpipe-type immersible transducers, specify model number and conduit position (No. 1, 2, 3, 4, 5). Standard length of rigid stainless steel conduit is 36" with 8' cable length for hook-up to generator. Outlet box is also standard and included in part number.

Note: When ordering bulkhead-type immersible transducers, specify model number and indicate END or BOTTOM mounting within tank. Standard cable length for hook-up to generator is eight feet.

BRANSON MULTI-GENERATOR RACKS AND ENCLOSURES



Inside View



NEMA-12 TYPE ENCLOSURE

The Branson NEMA-12 type enclosure is cooled by a Kooltronic air conditioner and is intended for use indoors to protect the enclosed equipment against fibers, flyings, lint, dust, dirt and light splashing. It is designed to accept one to six generators. Its overall dimensions are 72" high x 60" wide x 24" deep.

FEATURES

- Master on/off control button on front door.
 - Individual switches and indicator lights on front door for controlling enclosed generators.
 - Adjustable temperature control with high and low temperature safety devices.
 - Transformers for single power hook-up at either 230 Volt, 3 phase, 60 Hz or 460 Volt, 3 phase, 60 Hz.
 - Non-standard frequency and voltage are available as optional extra.
-

BRANSON MULTI-GENERATOR RACKS AND ENCLOSURES



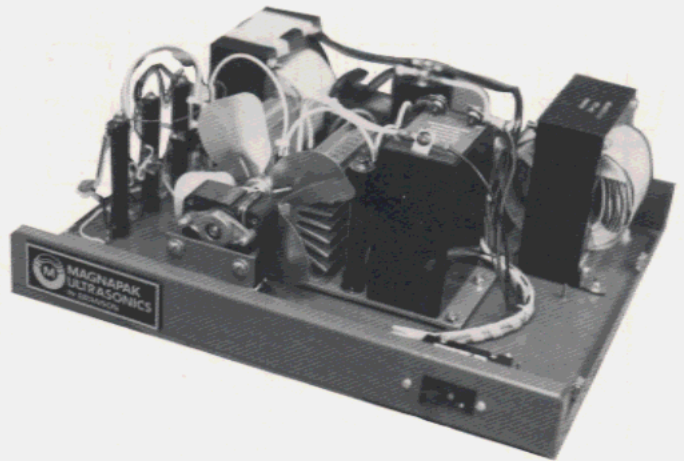
NEMA 1 TYPE RACK

The Branson NEMA-1 type racks are intended for use indoors to prevent accidental contact of personnel with the racked generators. The racks are also used for stacking of generators. Two standard racks are available for one to three generators and three to six generators.

Racks are designed for single power hook-up at either 230 Volt, 3 phase, 60 Hz or 460 Volt, 3 phase, 60 Hz. Non-standard frequency and voltage are available as optional extra.

Rack Size	Overall Dim. H x W x D "
For 1-3 generators	53 x 24 x 24
For 3-6 generators	53 x 48 x 24

MAGNATRAK® ULTRASONIC GENERATOR



Magnapak ultrasonic solid state generators accept 115V, 1 phase, 50/60 Hz AC line voltage input, convert it to DC, and then into a nominal 20.8 kHz frequency for driving the transducer.

The proven circuit design of the Magnatrac generator line features solid state SCR and ASCR (asymmetrical silicon controlled rectifier) devices.

The generator is a self-contained unit and includes all required power circuitry protection and cooling. A front-mounted circuit breaker, which also serves as an on/off switch, is the only control required to operate the unit. The circuit design provides instant starting without warm-up, and automatic frequency tracking which automatically adjusts to optimum operating frequency without operator adjustment.

Model	Overall Dim. HxWxD "	Output 20 kHz	Input 50/60 Hz	Weight	Cooling
G1KA	7 x 17 x 14	1000 W	115V, 1ph	48 lbs.	Air



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AQUEOUS ULTRASONIC CLEANING SYSTEM



OMNI 2000 CLEANING SYSTEM

Model 1012

The *OMNI 2000* cleaning system by Branson is a fully-configured ultrasonic cleaning and rinsing system with a built-in dryer. The equipment incorporates quality workmanship and materials without including unnecessary extras.

The *OMNI 2000* offers a full range of hard-working features, while occupying only a fraction of the floor space of comparable systems. All controls are mounted in a convenient control box and operate at 24 Volts for safety.

CLEANING

Precision cleaning is accomplished in the first chamber. This chamber is equipped with Branson Series 7000 industrial 40 kHz ultrasonic components and thermostatically-controlled heat. A recirculating pump and filter system to continuously remove particulate material is standard.

RINSING

The *OMNI 2000* includes two rinse chambers in a cascade arrangement. Rinse water overflows from chamber three into chamber two. This counter-

flowing feature provides excellent rinsing while substantially reducing water consumption. Chamber two includes ultrasonic components as standard to assure that all soils and cleaning chemistry are driven from blind holes and crevices before the dry cycle.

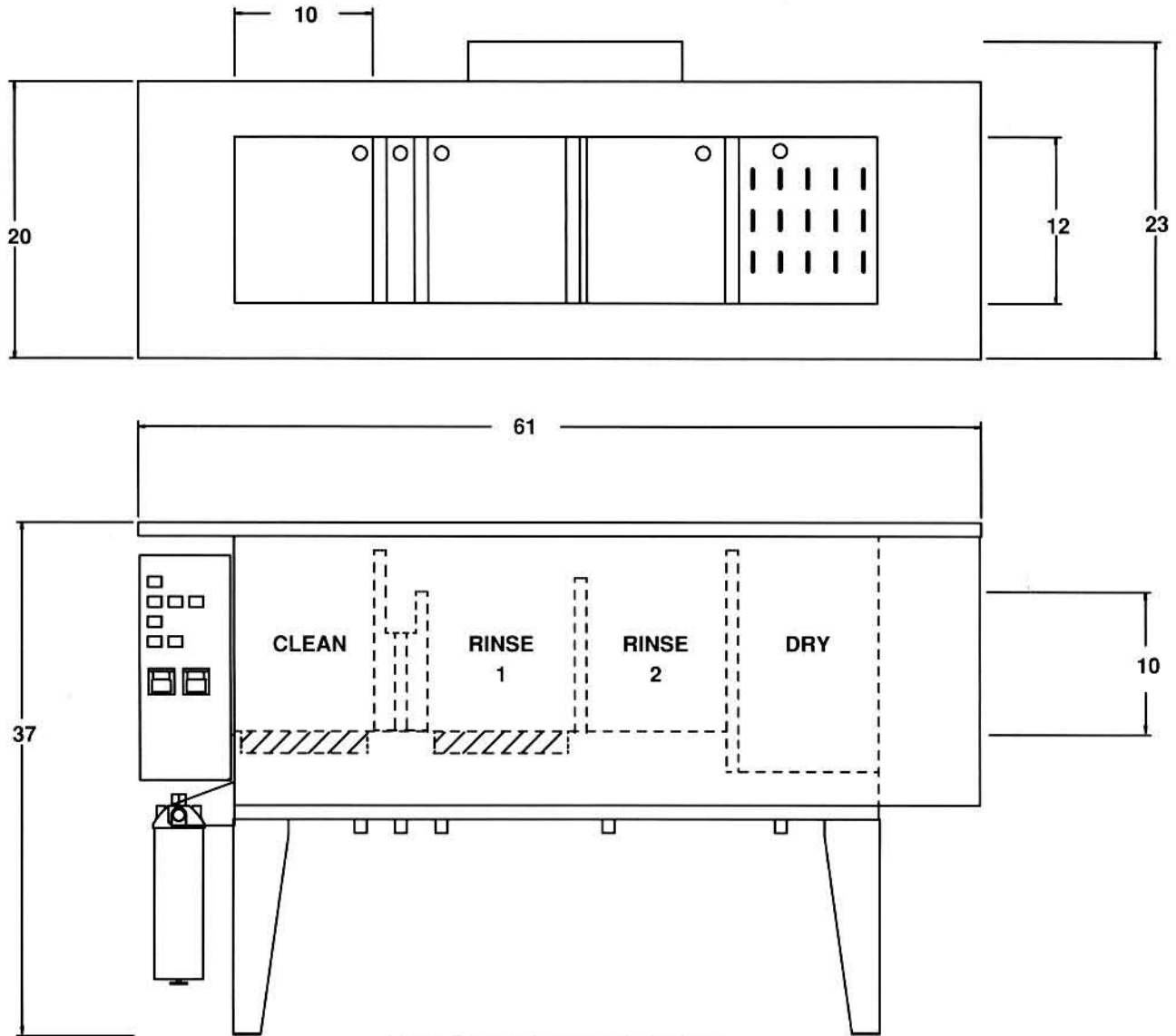
DRYING

The drying chamber utilizes both elevated temperature and rapid air movement to produce dry parts. The chamber is furnished with a 3" vent duct to facilitate moist air removal.

FEATURES & BENEFITS

- Clean, rinse, and dry in a single unit
- Small footprint minimizes floor space needs
- Low voltage controls for safety
- Ultrasonics on rinse tank for superior performance
- Standard pump and filter extend cleaning bath life
- Convenient working height
- Durable stainless steel construction
- Easy access to routine maintenance components
- Convenient control panel for easy operation.

BASIC DESIGN



Note: Dimensions are in inches.

SPECIFICATIONS

Working tank size:	10"x12"x10" deep	Ultrasonic output:	420 watts/tank
Drain sizes:	1/2" NPT	Dryer heat:	3,000 watts
Cleaning tank temperature:	Ambient to 160°F	Dryer airflow:	55 cfm
Recirculation flow rate:	1-3 GPM	Dryer temperature:	230°F
Filter retention:	10 microns	Input voltage:	230V, 1 phase



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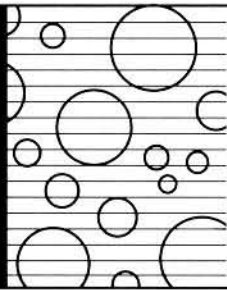
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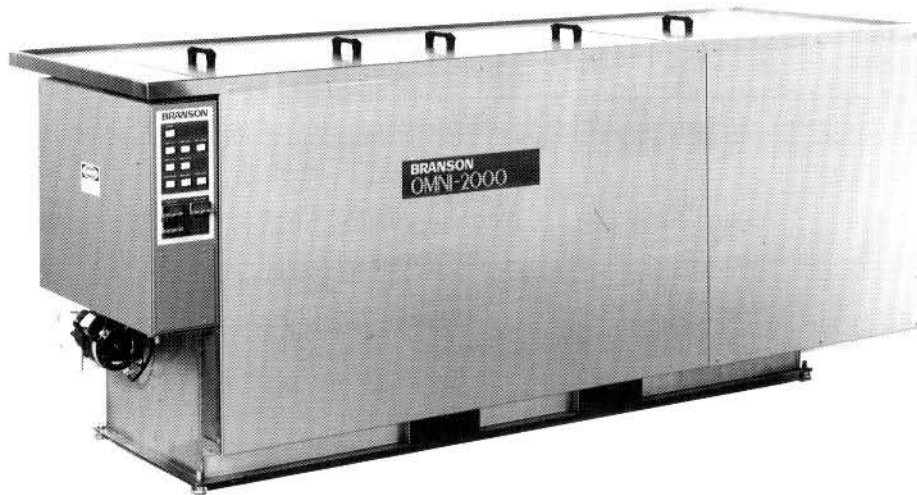
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AQUEOUS ULTRASONIC CLEANING SYSTEM



OMNI 2000 CLEANING SYSTEMS

Models 1620 and 1620-RI

The *OMNI 2000* cleaning system by Branson is a fully-configured ultrasonic cleaning and rinsing system with a built-in dryer. Also available, as an option, is a rust inhibitor station in the second rinse tank. The equipment incorporates quality workmanship and materials without including unnecessary extras.

The *OMNI 2000* offers a full range of hard-working features, while occupying only a fraction of the floor space of comparable systems. All controls are mounted in a convenient control box and operate at 24 volts for safety.

CLEANING

Precision cleaning is accomplished in the first process tank. This tank is equipped with Branson industrial 40 or 25 kHz ultrasonic components and thermostatically-controlled heat. A recirculating pump and filter system to continuously remove particulate material is standard.

RINSING

The *OMNI 2000* includes two heated rinse tanks in a cascade arrangement. Rinse water overflows from tank three into tank two. This counter-flowing feature provides excellent rinsing while substantially reducing water consumption. Tank two includes ultrasonic components as standard to assure that all soils and cleaning chemistry are driven from blind holes and crevices before the dry cycle.

RUST INHIBITING OPTION

As an option, the user may choose to use the second rinse tank as a rust inhibitor dip prior to drying. This model, 1620-RI, is useful when cleaning steel components. The valving associated with this system allows easy conversion from a single overflow rinse back to a dual tank cascade rinse in seconds if your process changes.

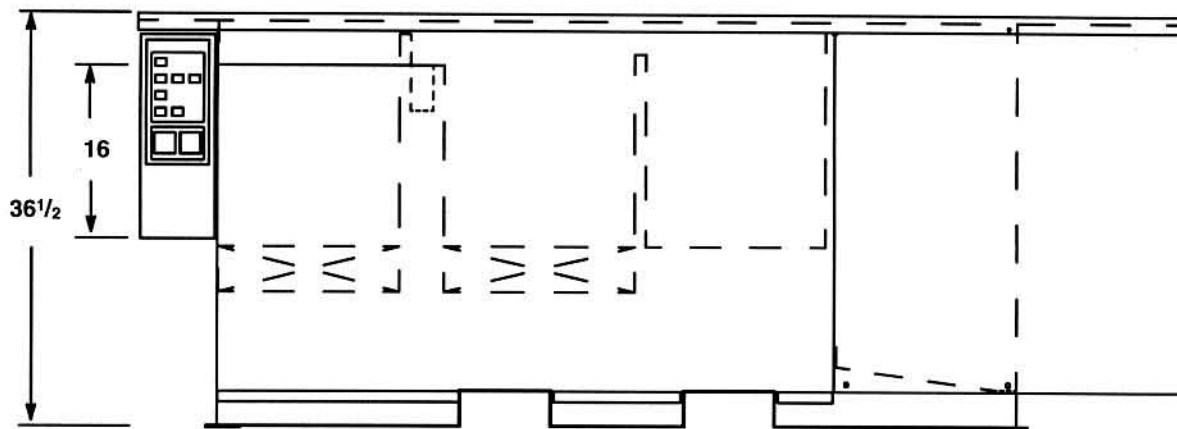
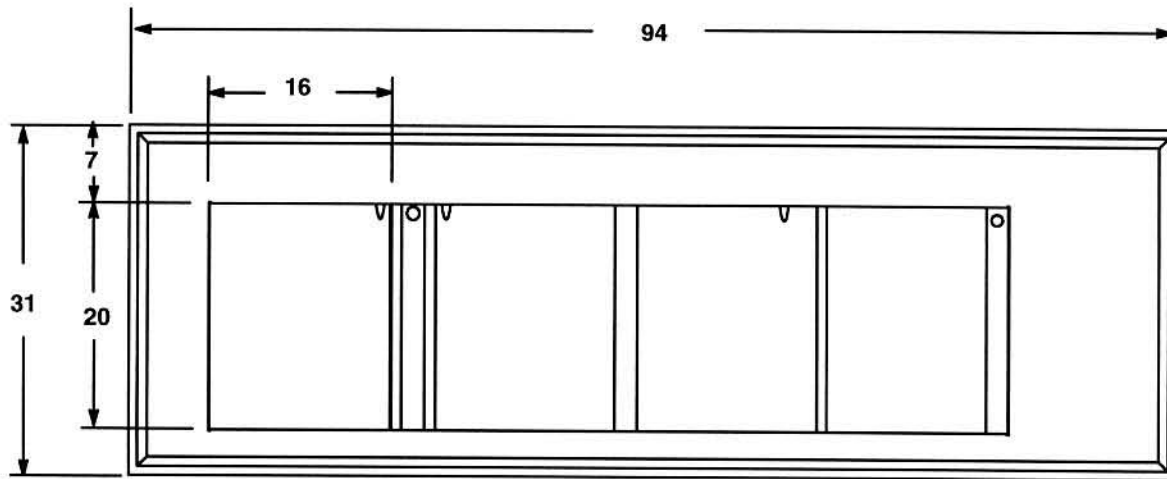
DRYING

The drying station utilizes both elevated temperature and rapid air movement to produce dry parts. The chamber is furnished with a 3" vent duct to facilitate moist air removal.

FEATURES & BENEFITS

- Clean, rinse, and dry in a single unit.
- Small footprint minimizes floor space needs.
- Low voltage controls for safety.
- Standard filtration to extend cleaning bath life.
- Ultrasonics on rinse tank for superior performance.
- Convenient working height.
- Durable stainless steel construction.
- Easy access to routine maintenance components.
- Convenient control panel for easy operation.
- Recessed work surface for fluid spill containment.
- Automation interface port for transport systems (e.g., Branson TDR).
- Rust inhibition option for steel parts.

BASIC DESIGN



Note: Dimensions are in inches.

SPECIFICATIONS

Working tank size:	16"x20"x16" deep
Process tank material:	316L bright annealed
Drain sizes:	3/4" NPT
Cleaning tank temperature:	Ambient to 160°F
Recirculation flow rate:	1-3 GPM
Filter retention:	10 microns
Ultrasonic output:	1000 watts/tank
Dryer heat:	6,000 watts
Dryer airflow:	550 cfm
Dryer temperature:	250°F maximum
Input voltage:	208-240V AC, 35 amps, 3 phase

OPTIONS

- Wash Tank Surface Sparger
- Oil Removal Package (Coalescer, Ultrafiltration)
- DI Water Heater
- DI Water Treatment System
- Automated Material Handling (TDR)
- Rotating Baskets
- Series 8500 Advanced Power Supply
- Hinged Power Cover for Dryer



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AQUEOUS ULTRASONIC CLEANING SYSTEM



**FLEXLINE CLEANING AND
RINSING TANKS**

FlexLine equipment by Branson is a cost-effective industrial product for cleaning and rinsing parts. The equipment features quality workmanship and materials without "frills." FlexLine offers more features and capabilities than standard table-top equipment, and greater flexibility in tank arrangement than fixed console systems.

The basic component of the FlexLine is a standard 304 stainless steel tank with protective skirting. This tank can be configured in a variety of ways for:

- Ultrasonic cleaning
- Spray under immersion
- Weir overflow
- Surface sparging
- Spray rinsing
- Overflow rinsing
- Cascade rinsing

Because the FlexLine system is based on standard components, quick delivery is assured. It also allows for a very flexible configuration of tanks that can easily be adapted should production requirements change.

FlexLine equipment is available in two tank sizes, 12 inches by 16 inches and 20 inches by 24 inches. All tanks are supplied with a stable painted steel support stand. This brings the system to a convenient 36-inch working height.

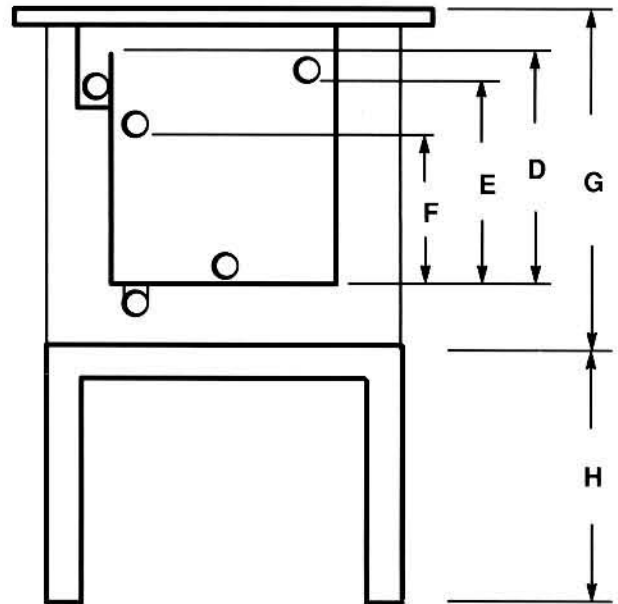
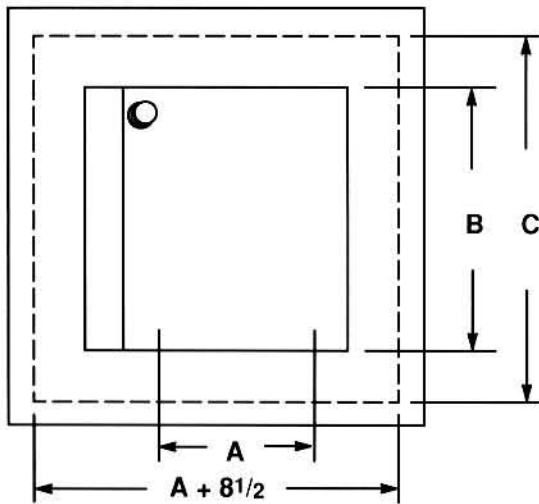
FEATURES & BENEFITS

- 304 stainless steel construction
- Protective tank skirting
- Standard overflow weir
- Support stand
- Drip tray
- Stainless steel covers with handles
- Ease of maintenance
- Maximum flexibility
- Quickest delivery
- Cost-effective design

CONFIGURING OPTIONS

- 20 kHz magnetostrictive ultrasonics
- 25 kHz or 40 kHz piezoelectric ultrasonics
- Single or double spray headers
- Sparger manifold
- Overflow rinse
- Cascade rinse, 2-3 tank arrangement
- Thermostatically-controlled heat
- Recirculating pump and filter
- Parts baskets

BASIC TANK

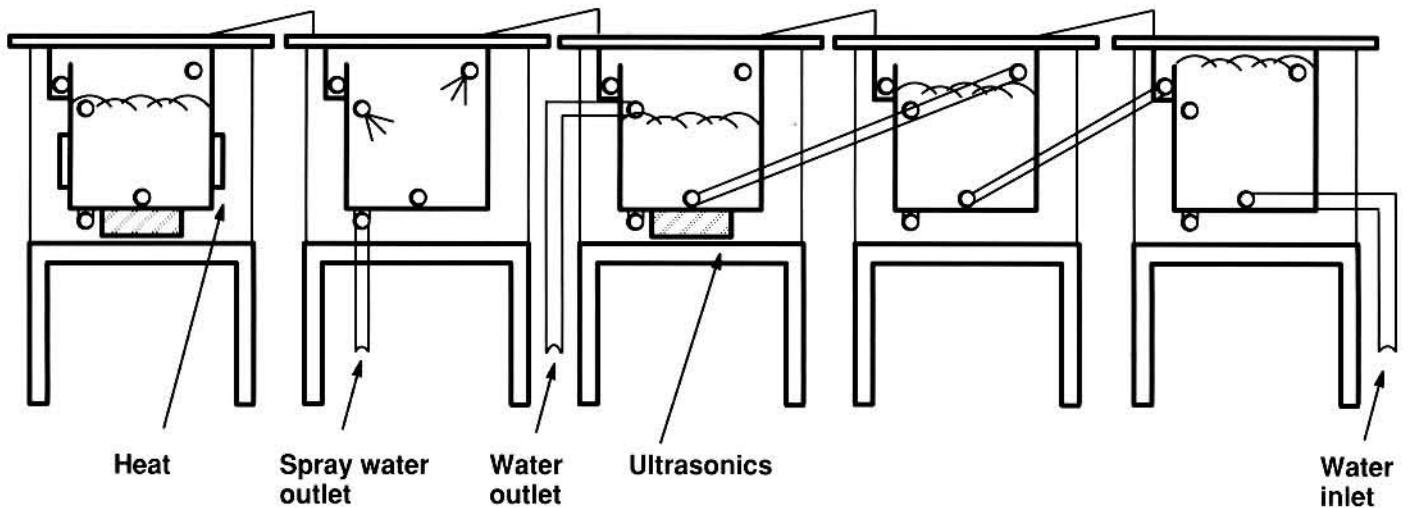


Model	A	B	C	D	E	F	G	H	Heat	Drain dia.	Inlet dia.	Spray/Sparger nozzles	Transducer elements
1216	12	16	19	15	13 1/2	12	22	14	2000	1	1/2	6	18
2024	20	24	27	23	21 1/2	20	30	6	4000	1	1/2	10	36

- NOTE:**
- Dimensions are in inches.
 - External dimensions do not include 1" flange around tank.

TYPICAL CONFIGURATION OF CLEANING & RINSE TANKS

1 ultrasonic cleaning tank with heat; 1 spray rinse tank; 3 cascade rinse tanks; drip trays



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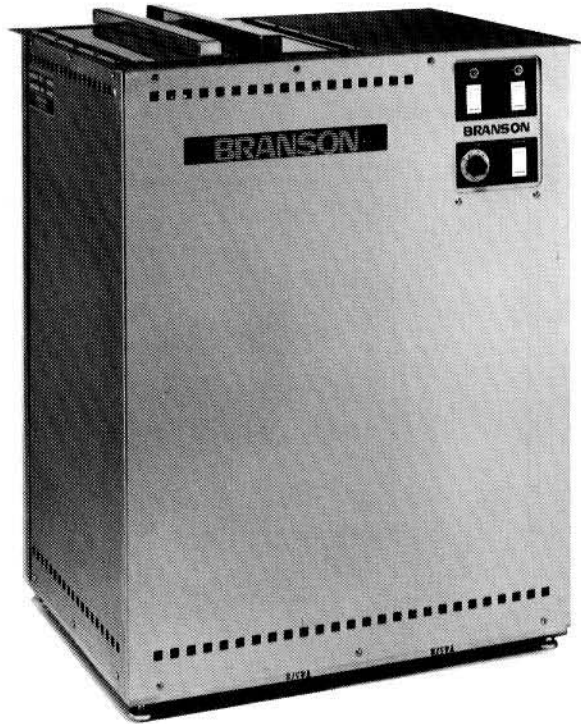
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FLEXLINE BENCH-MOUNTABLE RECIRCULATING HOT AIR DRYER

Drying water-wetted parts can range from a simple process to a complex procedure, depending on the parts' geometry, temperature, material of construction, and on process requirements. Drying techniques include evaporative, such as hot air, vacuum, purged nitrogen, and infrared; mechanical displacement, such as centrifugal and air knife; and displacement by other means, such as solvents and oils.

HOT AIR DRYERS

The Branson FlexLine Hot Air Dryer utilizes evaporation, one of the most common drying techniques. Air is heated to above 200°F, which enables it to absorb moisture from the parts. Room air is filtered, heated, and circulated through the drying chamber. The "wet" air is exhausted through an adjustable damper and duct connection. The air is recirculated at high volumes (550 cubic feet per minute) within the drying chamber. A small volume of make-up air is continually introduced and exhausted to keep the internal air from becoming saturated. A significant advantage of Branson's recirculated hot-air dryer is that the energy used to elevate the temperature is recovered or reused, minimizing overall energy consumption.

The rate of drying is dependent upon the topography of the part, the amount of water on the part, the flow rate, and the temperature of the recirculated air. To enhance the drying capability of the hot air dryer, the amount of drag-out water from the last rinse stage should be kept to a minimum. This can be done by suspending the parts over the rinse tank for a while after they emerge to allow any excess to drip back to the tank. Also, if the water temperature of the final rinse and of the part are elevated, less moisture will be carried into the dryer. In many cases, an air knife blow-off follows the final rinse to remove excess surface water before parts enter the hot air dryer where moisture is completely removed from every facet.

DESIGN

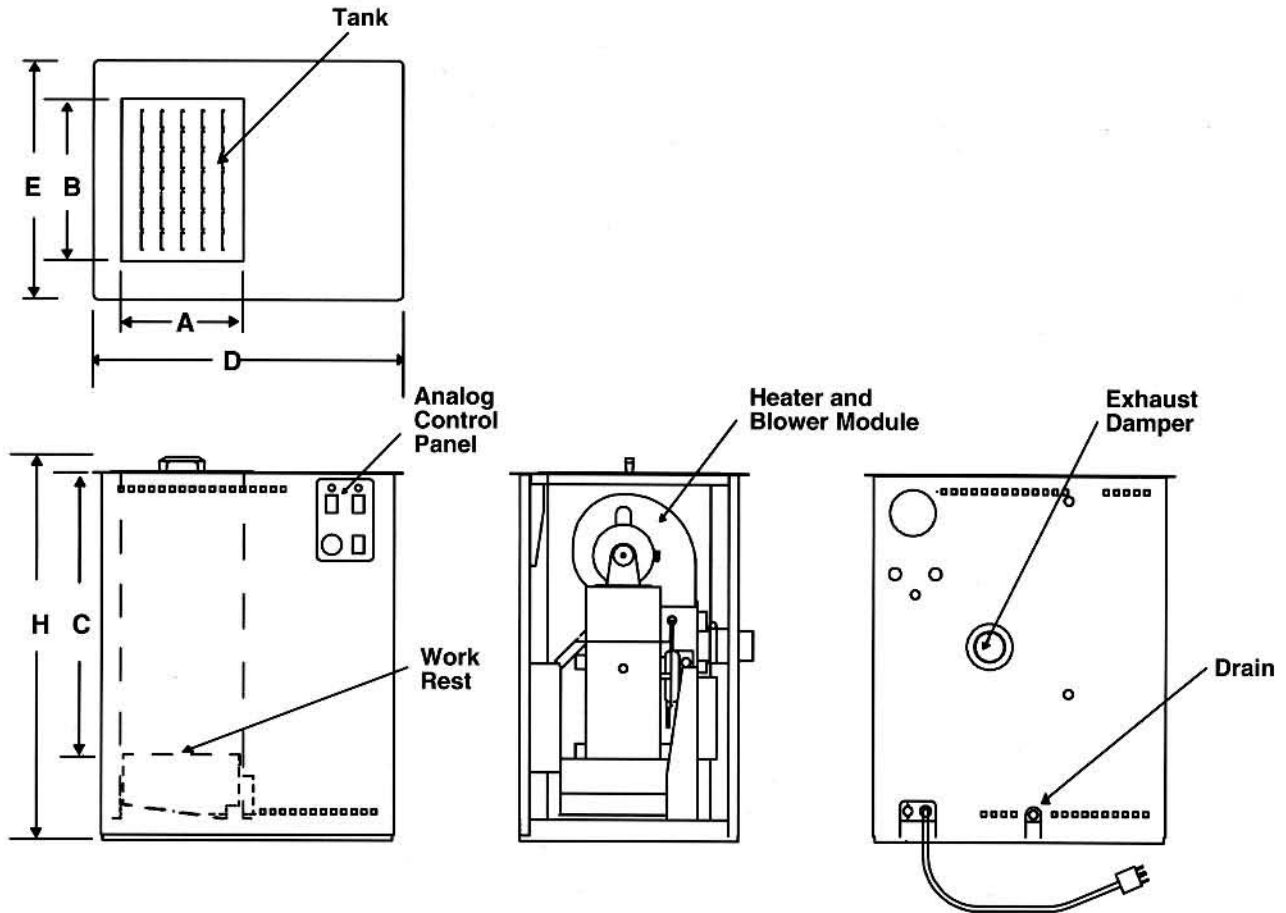
Branson's FlexLine Hot Air Dryers feature 304 stainless steel construction. The tank has a bottom slope to an easily serviceable drain for removal of any water.

Pneumatically-operated, double hinged covers are optional and can be interfaced, as an option, with automation units such as Branson's Two-Dimensional Robot (TDR) transport.

Several equipment safety features are built in with the heating function. A temperature controller is capable of holding temperature settings from ambient to 250°F. An air flow switch deactivates the heater if a blower failure should occur. If the heater should become too hot, an interlock automatically shuts down the system. Heaters can be removed easily for servicing.

Dryers can be installed in a bench or contained separately as the final step in the aqueous or semi-aqueous cleaning system. The cleaning, rinsing, and drying stations are coordinated for process control by the automated two-dimensional robot (TDR). This microprocessor-controlled transport allows exact timing of each step for consistency and efficiency. *See individual data sheets for more details on the ultrasonic tanks, the rinse and spray tanks, the dryers and the TDR-15 or TDR-50 transport systems.*

BASIC DESIGN



Model	A	B	C	D	E	H	Heat
FLEX-D 1216	12	16	26 1/2	30 1/2	23 1/2	36	6000W
FLEX-D 2024	20	24	26 1/2	38 1/2	29 1/2	36	6000W

Note: Dimensions are in inches.

Blower CFM: 550
 Maximum Operating Temperature: 250°
 Exhaust Diameter: 3"
 Drain: 1/2 NPT

Model	Power
FLEX-D 1216	208-230V, 1Ø, 26A
FLEX-D 2024	208-230V, 1Ø, 26A

OPTIONS

- Electrically-operated double-hinged cover.
- Digital temperature control/readout.



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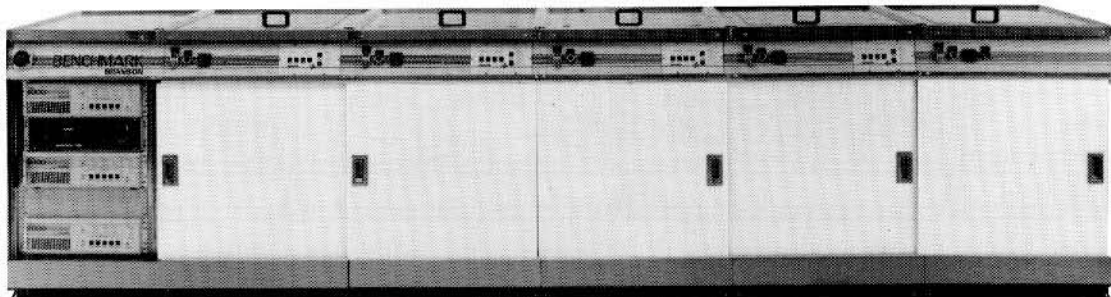
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BENCHMARK SERIES PRECISION CLEANING SYSTEMS



Branson Ultrasonics, the leader in ultrasonic cleaning technology, introduces the Benchmark Series of ultrasonic precision cleaning systems.

Benchmark cleaning systems incorporate design standards by which all other cleaning systems are judged. Construction features include the very latest in cleaning technology, from state-of-the-art advanced ultrasonic power supplies to cleaning process technology.

ENVIRONMENTALLY SAFE AND EFFICIENT OPERATION

Benchmark precision cleaning systems are designed to provide an environmentally safe cleaning alternative to CFC cleaning. The system is designed to minimize the impact on the environment by utilizing soil removal modules like coalescers or ultrafiltration units which extend the useful life of cleaning chemistries. Cascade rinsing modules minimize water use, and efficient recirculating hot air dryers reduce energy usage. Complete closed loop rinse water reclamation/purification systems are easily adapted.

DURABLE, UNIQUE DESIGN

Stainless steel construction is used throughout including the base structural frame. Benchmark systems are resistant to corrosive environments and process chemistry, and are compatible with clean room environments. Polished work surfaces are recessed to contain and divert process liquids back into their respective tank.

Process tanks are mounted without seals or gaskets, but are mechanically designed to eliminate liquid from entering support equipment and user-accessible areas. Stainless steel drip pans are standard and are integral within the base structural frame.

The uniqueness of Benchmark cleaning systems starts with the modular design. Individual clean, rinse, and dry modules are selected to form a continuous cleaning process tailored to the specific needs of *your* applications, not pre-configured which may hinder your ability to properly clean delicate components, or expand as your cleaning requirements change.

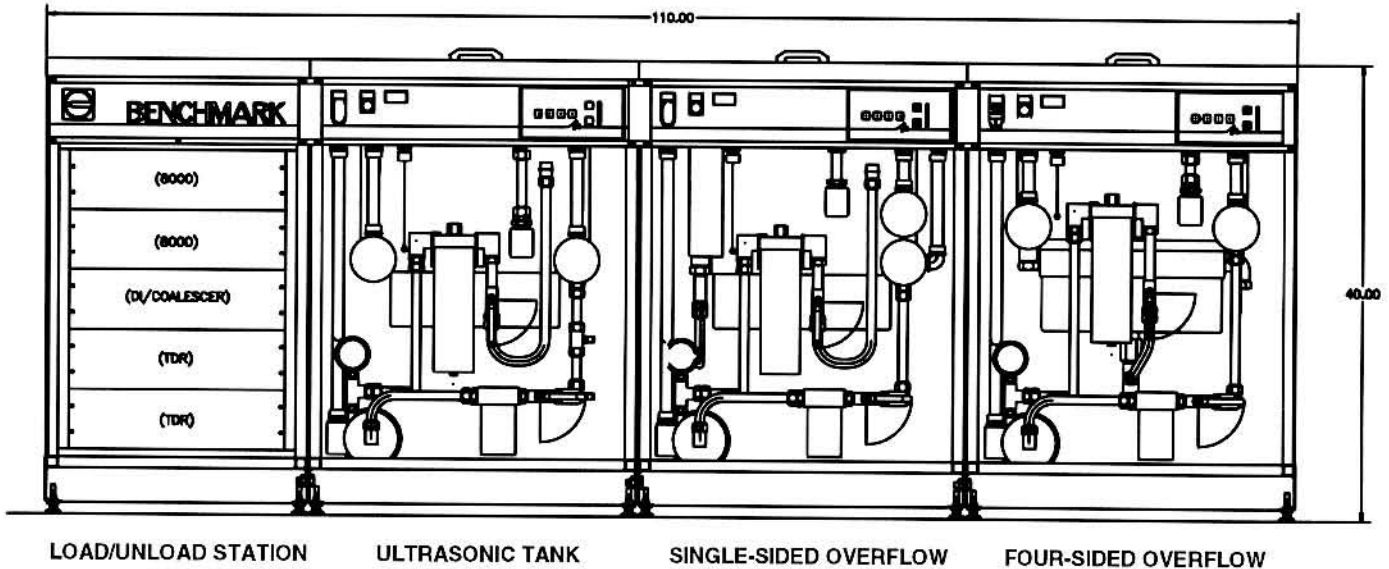
A Benchmark system is more than just another precision cleaning system – it is an *investment* in cleaning technology. As your cleaning needs change in the future, you can be certain that Branson's Benchmark Series will be there with the ability to quickly add additional clean, rinse, and dry modules, if the need arises. All modules are designed with similar components, yet are specific to the needs of your application. Whether you are considering using aqueous or semi-aqueous chemistries, Benchmark systems are completely compatible with both.

All electrical controls operate at 24 volts and comply with NEC regulations for safety. Electrical controls are angle-mounted in a stainless steel, hinged control panel, thus preventing accidental activation by users of the system. Controls are ergonomically designed for ease of use and visual monitoring. Serviceability is from the front of the system, allowing easy access and maintenance of the complete module.

CUSTOM SYSTEMS – OFF THE SHELF

Benchmark systems are designed from an end-user viewpoint. Quality, reliability, process flexibility, and serviceability are designed in. When you specify the Branson Benchmark cleaning system, you create a custom-tailored cleaning system from standard, off-the-shelf Branson components. Virtually any combination of cleaning, rinsing, and drying modules is available.

BASIC DESIGN



Note: Dimensions are in inches.

FEATURES & BENEFITS

- Series 8000 Advanced power supplies with selectable sweep frequency, line/load regulation, auto frequency tracking, and true variable power assure total control of the cleaning process.
- 316L stainless steel, bright-annealed process tanks with folded corner construction for process cleanliness, tank durability, and ultrasonic erosion minimization.
- Digital readout and controls for heaters.
- Low voltage electrical controls with water-tight switches for safety.
- Stainless steel cabinet and frame for durability. All stainless steel plumbing including all valves.
- Recessed work surface with "drain-back" feature for liquid containment.
- Load/unload module with industry standard 19-inch rack mount for power supplies and process control peripherals. Also serves as single point electrical power hook-up and distribution center isolated from the wet process.
- Stainless steel guards for heaters and spray rinse bars.

OPTIONS

- Heated process tanks.
- Pump and filter with pressure gauges for filter integrity.
- Conductivity/resistivity monitors.
- HEPA filtration on dryers.
- Coalescing filtration package.
- Ultrafiltration package.
- Externally mounted heaters.
- Surface sparger.
- Spray over immersion rinsing.
- Overflow wash (dual cleaning process).
- Impact resistant plastic doors.
- Water purification systems.
- Parts handling baskets (fixed or rotational).
- Transport systems.



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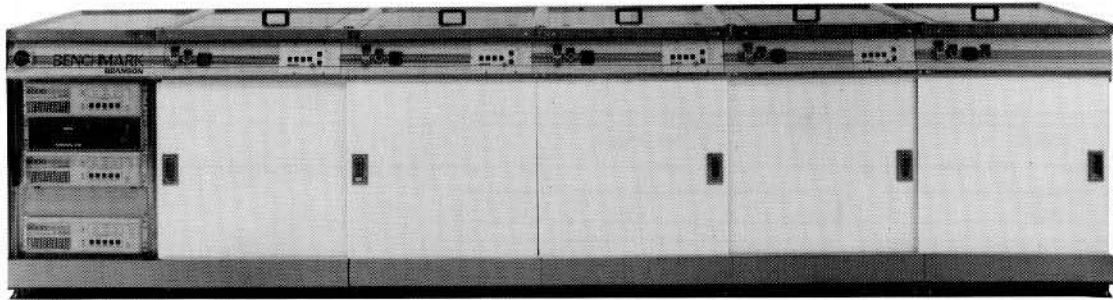
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AQUEOUS/SEMI-AQUEOUS ULTRASONIC CLEANING SYSTEM

BENCHMARK SERIES PRECISION RINSE MODULES



Benchmark precision aqueous and semi-aqueous ultrasonic cleaning systems are used extensively for a wide range of industrial applications wherever critical cleaning is important. With today's advanced chemistry, organic as well as inorganic contaminants can be removed.

Precision cleaning with aqueous solutions requires a process sequence of ultrasonic immersion, rinsing, and drying. This type of cleaning can be accomplished most efficiently with individual process modules integrated to form a compact cleaning system.

Branson offers all of the equipment components needed for a precision aqueous ultrasonic cleaning system. Heated cleaning and pre-clean tanks may be used with or without ultrasonics. Stainless steel (316L bright annealed) ultrasonic immersion tanks have folded-corner construction for maximum durability and process cleanliness; transducers of 25 kHz or 40 kHz are bottom-mounted on the tank.

Rinsing of any contaminant residue and cleaning solution is an important step in both the aqueous and semi-aqueous processes. The basic rinse module has an overflow weir; the cascade rinse configuration is stepped for rinsing with progressively cleaner water (ultrasonics can be incorporated in any module); and the rinse tank has adjustable spray manifolds protected by stainless steel guards.

DESIGN

Branson offers three standard types of rinse tanks – the Benchmark Modular Rinse (BMO), 4-way overflow (BM4), Modular Spray Rinse (BMS) – as well as a variety of customized rinse tanks. The tanks are readily available in basic sizes, and any other size can be made to specification. The overflow and spray tanks are one module each. Cascade rinsing is accomplished by combining modules for multiple-step rinsing.

RINSE TANKS

The overflow rinse tank allows the residue to float over the top, which assures circulation of clean water for effective rinsing of components. Rinse water may be heated in the tank with a stainless steel, thermostatically-controlled immersion type heater. Ultrasonics are available as an option; the transducer elements are bottom-mounted and are covered with a gasketed stainless steel guard that permits servicing.

For more critical rinsing applications, 4-way overflow tanks are available. The design of the 4-way overflow insures that particulate and/or contaminants on the surface of the water are completely removed. Also each 4-way overflow module contains its own separate pump and filter for particulate removal and rapid water movement across the components.

SPRAY TANKS

Spray rinsing is particularly useful for removing large amounts of detergent prior to precision ultrasonic rinsing, which minimizes contamination transfer to the rinse water. Spray tanks feature adjustable stainless steel spray manifolds along both sides of the module.

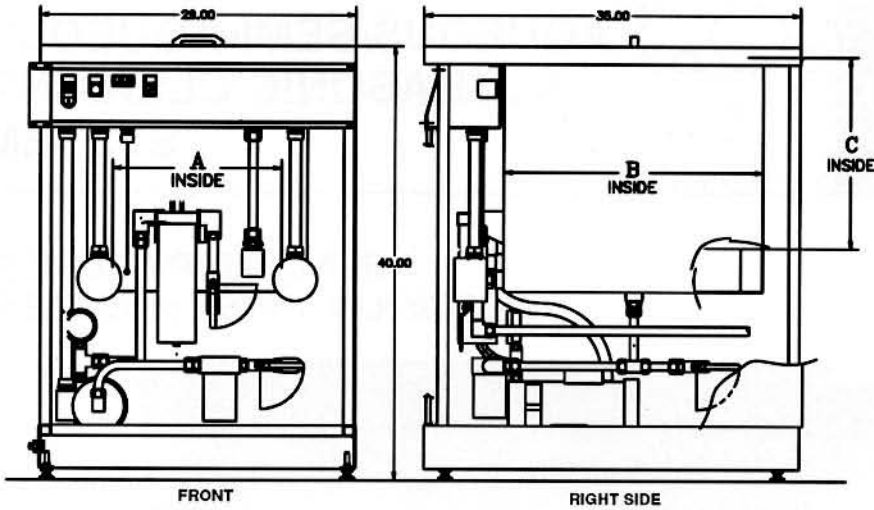
CASCADE RINSE

The cascade rinse configuration is a series of overflow rinse modules combined in a stair-step effect. This allows the flow of water from right to left, which is counter to the movement of the part, so the part is rinsed with progressively cleaner water.

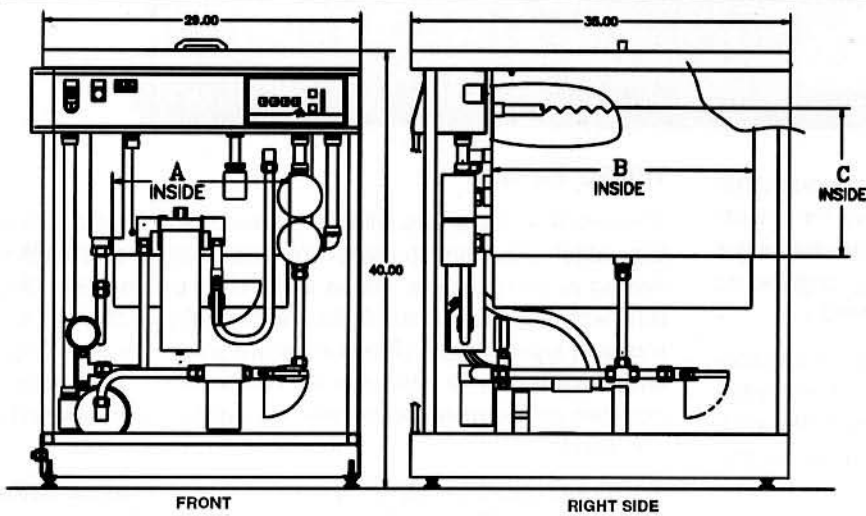
Deionized water often is used when precision rinsing is necessary. Ultrasonics may be bottom-mounted in any or all of the modules for a particularly effective rinse. Heat is available and can be added as an option.

BASIC DESIGN (Note: Dimensions are in inches.)

BENCHMARK SPRAY TANK

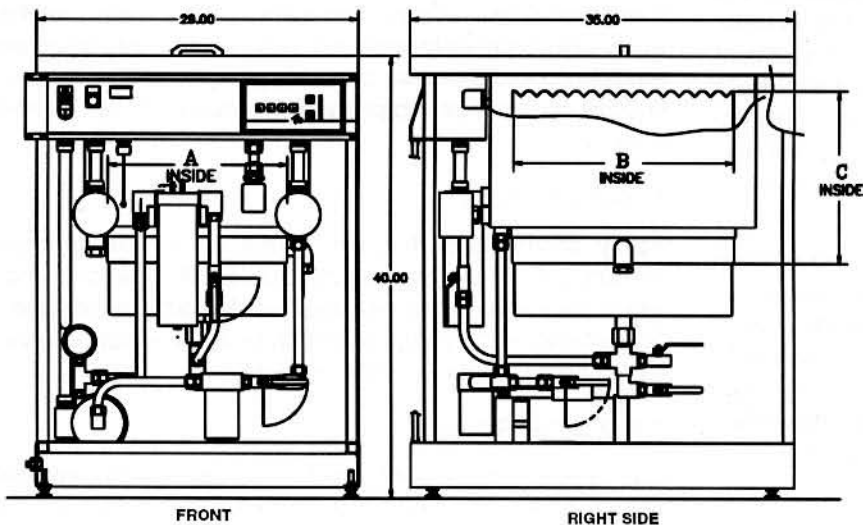


MODEL	TANK SIZE	Working Tank Area		
		A	B	C
BMS 1216	12 X 16	12.00	19.75	14.00
BMS 1620	16 X 20	16.00	23.75	18.00
BMS 2024	20 X 24	21.25	25.50	22.00
BMS 2032	20 X 32	21.25	33.50	22.00



BENCHMARK SINGLE-SIDED OVERFLOW

MODEL	TANK SIZE	Working Tank Area		
		A	B	C
BMO 1216	12 X 16	12.00	19.75	10.00
BMO 1620	16 X 20	16.00	23.75	14.00
BMO 2024	20 X 24	21.25	25.50	18.00
BMO 2032	20 X 32	21.25	33.50	18.00



BENCHMARK FOUR-SIDED OVERFLOW

MODEL	TANK SIZE	Working Tank Area		
		A	B	C
BM4 1216	12 X 16	12.00	16.00	12.00
BM4 1620	16 X 20	16.00	20.00	16.00
BM4 2024	20 X 24	20.00	24.00	20.00
BM4 2032	20 X 32	20.00	32.00	20.00



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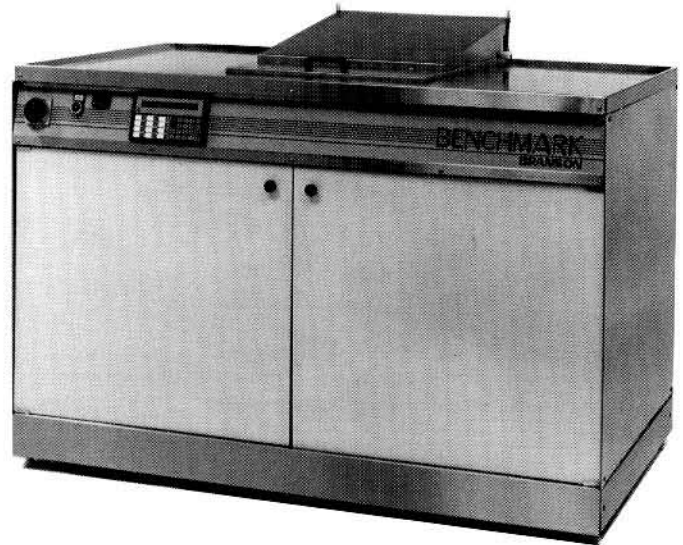
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HIGH PERFORMANCE HOT AIR DRYER

BENCHMARK SERIES



GENERAL DESCRIPTION

The Branson High Performance Hot Air Dryer is a self-contained unit that utilizes evaporation, one of the most common drying techniques. Air is heated to above 200°F, which enables it to absorb moisture from the parts. Room air is filtered, heated, and circulated through the drying chamber. The "wet air" is exhausted to an adjustable damper and duct connection. The air is circulated at high volumes (up to 2000 cubic feet per minute) within the drying chamber. A small volume of make-up air is continuously introduced to and exhausted to keep the internal air from becoming saturated. A significant advantage of Branson's recirculated hot air dryer is that the energy used to elevate the temperature is reused, minimizing overall energy consumption.

A programmable logic controller (PLC) controls all functions of the drying sequence. Drying temperature, time, process alarms, and power cover (if provided), can all be controlled using the touch panel of the PLC. For ease of use, a manual start switch is conveniently located on the instrument panel for dry cycle initiation.

Branson's High Performance Dryer features stainless steel construction and hinged front doors that allow immediate access for maintenance. The tank has a bottom slope to insure removal of any water.

An electrically-operated power cover is optional; it can be interfaced, as an option, with automation such as Branson's two dimensional robot (TDR) transport.

Several equipment safety features are built-in with the heating function. A solid state temperature controller is capable of holding temperatures from ambient to 250°F.

An air flow switch deactivates the heater if a blower failure should occur. If the heater should become too hot, an over temperature alarm on the front of the PLC is activated, and the heater automatically shuts down.

Communication between the operator and the PLC is simplified with the addition of an operator interface terminal (see Branson Bulletin S-1033). This terminal replaces many devices which have traditionally been hard wired. Text messages provide information that is easily understood. In the case of alarm and default messages, problems can be quickly identified for correction. Security is also provided by the PLC to prevent unauthorized changes to process times, drying temperatures, and blower operation.

In addition, the operator interface panel messages are easily displayed in text form providing important information to the cleaning system operator. This vital information can be stored in a data bank for future reference by maintenance or manufacturing department engineers.

High performance dryers are typically located as the final step in aqueous or semi-aqueous cleaning systems. The entire cleaning, rinsing and drying process can be coordinated for process control by an automated two dimensional robot (TDR). This microprocessor controlled transport allows exact timing for each step for consistency and efficiency.

KEY FEATURES AND BENEFITS

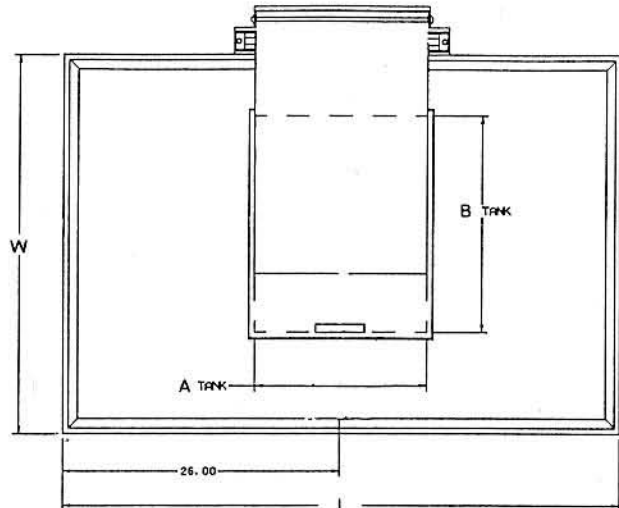
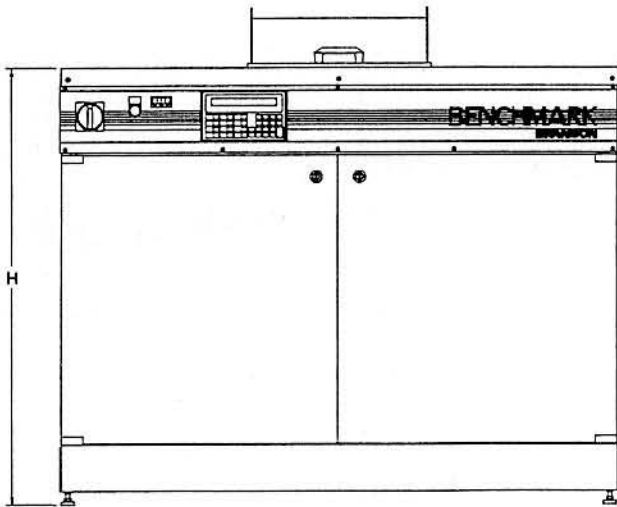
- Recirculating hot air for efficiency.
- All stainless steel construction for long life.
- High efficiency, high flow blowers for fast drying.
- Non-contaminating heaters.
- Low loss duct design for improved efficiency.
- High air flow for improved drying.

OPTIONS

- HEPA filtration for precision drying applications - 99.97% effective at 0.3 micron particles.
- Linear actuated power cover with releasable hinge for operator safety.

HIGH PERFORMANCE DRYER SPECIFICATIONS

- 3 standard sizes: 1216, 1620, 2024
- Temperature range ambient to 250°F +/-3°F
- High response NiChrome heaters
- Stainless steel dripfree counter
- PLC controls:
 - Single line back-lit display
 - NEMA 4 membrane operator interface
 - RS232 and RS422 compatible
 - Simple function key inputs
 - Safety limits programmed in
 - Allows automatic and/or manual operation of the entire drying unit



Model	Dimensions			Electrical Specifications	Air Flow/ Module
	Overall	A	B		
1216	36" L x 35" W x 40" H	12"	16"	230V AC, 3 phase, 60Hz, 17 amp, 6KW heat	900 cfm
1620	52" L x 35" W x 40" H	16"	20"	230V AC, 3 phase, 60Hz, 35 amp, 12KW heat	1800 cfm
2024	52" L x 35" W x 40" H	20"	24"	230V AC, 3 phase, 60Hz, 35 amp, 12KW heat	2700 cfm

Note: Dimensions are approximate.



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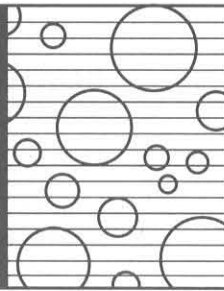
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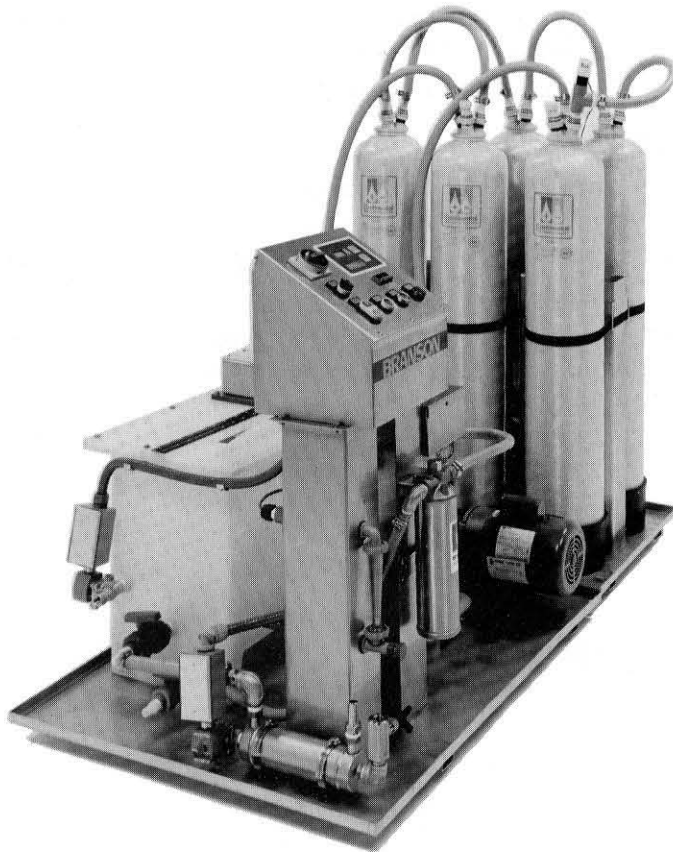
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AQUAFIER WATER PURIFICATION SYSTEM



GENERAL DESCRIPTION

The Branson *Aquafier* is an economical treatment system that recycles rinsewater from various cleaning processes. This closed-loop water purification system is specifically designed to continuously purify rinsewater from aqueous and semi-aqueous based cleaning systems. Collected water is circulated through a series of carbon and resin exchange beds to supply recycled, high purity, deionized water at point of use. It can also be used as a single pass deionized (DI) water source.

The *Aquafier* is a compact, fully-configured industrial water purification system. It incorporates all of the elements necessary to produce high quality rinsewater at a rate of up to 5 gpm. Following the receiver reservoir and pre-filter are five beds. A series of carbon, anodic, and cathodic resins are selected based on your application. Resins are contained in pre-packaged beds for easy replacement by plant maintenance personnel or sub-contracted resin regeneration companies.

PROCESS CONTROL

Process control and monitoring is an important part of any water treatment system. The *Aquafier* includes liquid level controls in the reservoir, flow control valve, back pressure regulator, and all necessary non-contaminating plumbing and valving to operate the unit. High temperature and pressure safeties are standard. A one megohm water quality light provides early warning when exchange beds need replacing. The standard digital resistivity monitor displays point-of-use water quality from 0.1 to 18 megohms.

KEY FEATURES AND BENEFITS

- **Closed loop system** - Eliminates rinsewater discharge, reduces water consumption, and saves energy by recycling hot rinsewater.
- **Single pass operation** - Cost effective DI water generation.
- **Compatible** with both aqueous and semi-aqueous systems.
- **Removes both organic and inorganic impurities.**
- **Provides high quality DI water for precision cleaning.**
- **Fully automatic** for ease of operation.
- **Interchangeable** with three industry standard bed sizes for process flexibility.
- **Backed by a national service network.**

SYSTEM SPECIFICATIONS

- 14 gallon polypropylene reservoir.
- Low liquid level float switch.
- Automatic water make-up.
- Stainless steel and CPVC valving.
- 1 HP stainless steel pump, 5 gpm at 100 feet of head.
- Stainless steel liquid-filled pressure gauges.
- 10 micron stainless steel pre-filter and 2 micron outlet filter.
- 0 - 5 gpm flow meter for precise flow setting.
- Relief valve to prevent system dead-heading.
- Check valves to prevent reverse flow and potential cross contamination.

ELECTRICAL SPECIFICATIONS

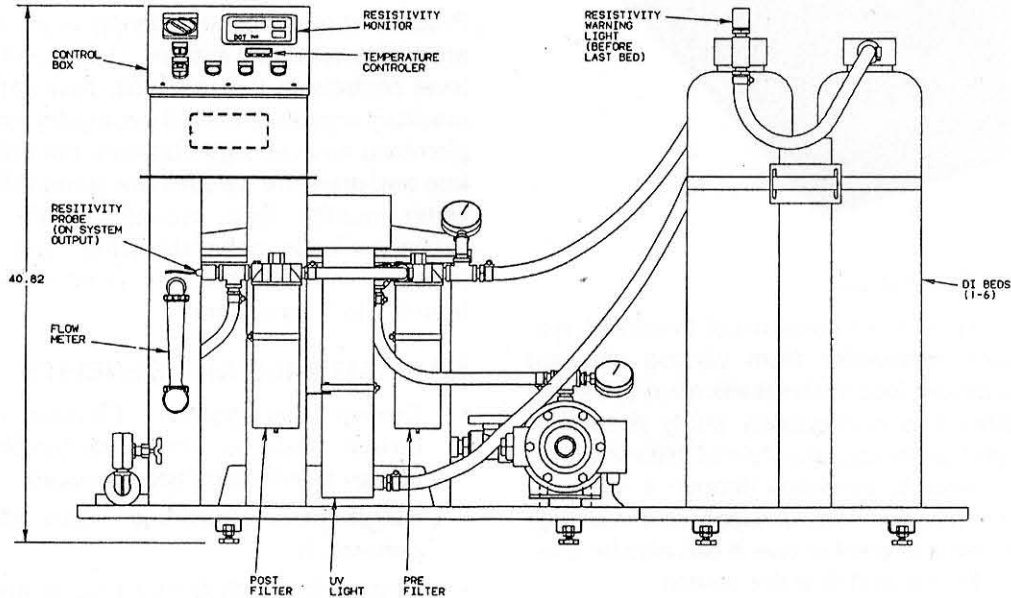
- 230V AC, 60 Hz, 20 amps, single phase
- Remote/local control switch
- IEC standard electrical devices
- Digital temperature readout
- Digital resistivity indicator with setpoint alarm
- Low resistivity alarm light
- 24V AC controls

EXCHANGE BEDS

- System capacity up to six beds.
- Optional bed volumes of 0.5, 1.2, 2.2 cubic feet.
- Additional exchange beds can be mounted in parallel for immediate system replenishment with no downtime.
- Choice of carbon, anion, cation, and mixed resin beds.
- Exchange beds mounted on a stainless steel drip pan with secure latches.
- Quick disconnect fittings.

OPTIONS

- Ultraviolet light for microorganism elimination with light intensity alarm.
- Heat exchanger for recovering hot DI water in excess of 140°F.
- Polypropylene surge tank for complete draining and storage of DI water during system maintenance.



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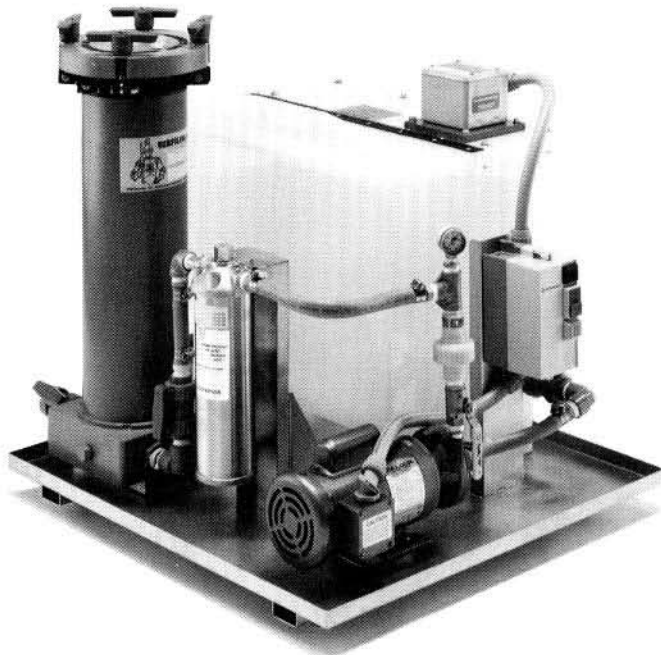
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COALESCING SYSTEMS



Among the many cleaning uses of an ultrasonic cleaning system, one of the most important is the effective removal of oil from dirty components. As this oil gradually contaminates the cleaning solution, the cleaning system loses its cleaning capability and inconsistent, unreliable cleaning performance results.

Branson separation coalescers are designed to remove oil from cleaning solutions. These highly-effective systems separate oil from water or other immiscible fluids by coalescing and gravity separation.

HOW IT WORKS

Coalescers offer a means of separating immiscible fluids such as oil/detergent from aqueous ultrasonic cleaning systems. The oil/detergent mixture is pumped through the coalescing (oleophilic) element which retains the oil (light phase) droplets on its surface until they conglomerate and rise and then accumulate on the top of the chamber where they are periodically bled off. The water (heavy phase) discharges via the bottom outlet and returns to the cleaning system. Branson coalescers will handle dissimilar liquids with specific gravity differences of 0.09 and greater.

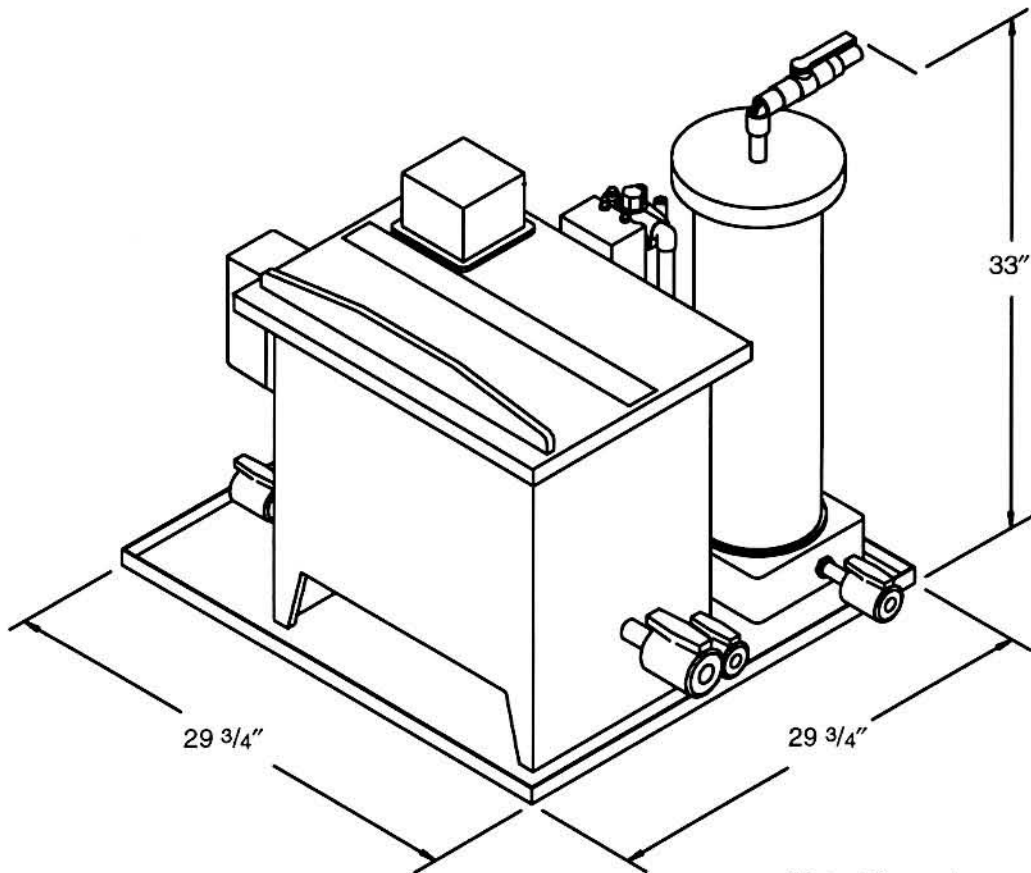
THE HARDWARE

The coalescer is a completely self-contained unit, consisting of a stainless steel pump, pre-filter, thick-walled polypropylene holding tank with liquid level safety devices, motor starter, hoses, and coalescing element to meet a variety of application needs. The pre-filter is rated at 10 micron retention, assuring the removal of particulates.

FEATURES & BENEFITS

- Quick payback – extends aqueous cleaning solutions, minimizing disposal costs.
- No down time while restoring liquid to original cleanliness.
- Protects expensive cleaning equipment from damaging oil, dirt, and abrasives.
- Collected oil is virtually water-free and can be filtered for reuse.
- Maintains cleaning solution surfaces free of oil, eliminating recontamination of components.
- Simplifies reclamation and disposal.
- Self-contained unit, easy to install, trouble-free.
- Adjustable flow rate to optimize the cleaning process.
- Completely assembled and pre-engineered.
- Quick change particulate filter.

BASIC DESIGN



Note: Dimensions are in inches.

SYSTEM SPECIFICATIONS

Electrical requirements:	208-240V AC, 1 phase, 50/60 Hz, 2.6 amps
Plug (stand-alone model):	NEMA 6-15
Working capacity:	10 gallons
Total capacity (entire system):	17 gallons
Flow rate:	Adjustable, maximum 4.5 gpm
Maximum system temperature:	160° F
Materials:	Stainless steel plumbing and filtration housings Stainless steel holding tank



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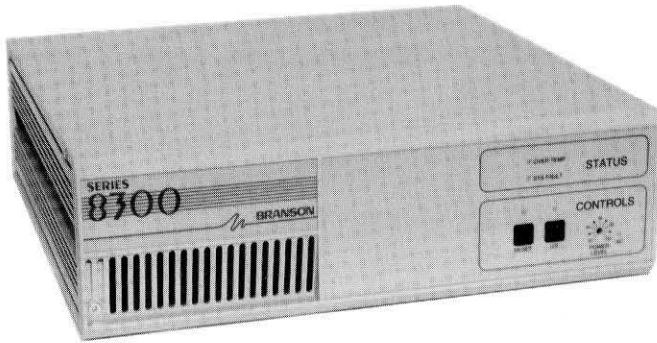
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ULTRASONIC CLEANING GENERATOR

SERIES 8300



Branson's *Series 8300 Ultrasonic Generator* offers a range of features to meet any production cleaning requirements. Used on a simple cleaning tank or with immersible transducers in an integrated cleaning system, the *Series 8300* will deliver precise cleaning quickly, consistently, and cost effectively.

KEY FEATURES & BENEFITS

- **Line / load regulation** compensates for liquid level and temperature changes as well as line voltage and load variations. Changes are held to less than 3% for very consistent cleaning.
- **True variable power control** makes the cavitation intensity (not duty cycle) infinitely and linearly variable from 20% to 100% which allows matching the power to your application requirements.
- **Sweep frequency** minimizes standing waves and improves ultrasonic activity distribution. The sweep operates at a rate of 80 Hz per second across a bandwidth of 1400 Hz.

- **Auto tuning** maintains optimum operating frequency around *your* application. The generator automatically and dynamically adjusts to your conditions regardless of changes in the operating environment.
- **Input / output (I/O) interface** option permits remote on / off control of the generator. This is ideal for systems applications or where the generator may be inaccessible.
- **Safety features** to protect the generator include over-temperature, overload, open circuit, and short circuit. Panel mounted fault lights indicate a problem.

ADDITIONAL STANDARD FEATURES

- Indirect cabinet cooling - sensitive components are isolated from potentially dirty cooling air.
- 19 inch, 3 DIN rack mount cabinet.
- Status indicators on safety and fault alarms.
- CSA certified and meets FCC regulations.
- Two-year warranty period.

SPECIFICATIONS

Element configurations: 12, 18, 24, 36, 48
Input Voltage: 120V(12 ele only), 208V to 230V
Avg. output power: 40 watts per element
Output frequency: 25 or 40 kHz
Regulatory Approvals: FCC and CSA
Dimensions: 17.5"W, 16.8"D, 5.5"H
Weight: 30 lbs. (13.6kg)

BRANSON ULTRASONIC CLEANING TANKS



Branson ultrasonic tanks provide versatile ways to meet localized cleaning needs in a variety of industrial settings. Type 316L bright annealed stainless steel construction permits use of a wide range of cleaning chemistries. Hard chrome is offered as an option in severe applications.

The four standard sizes range from 5 to 38 gallon capacities. This selection is supplemented by our fabricating capability for custom sizes. All tanks can include optional thermostatically controlled heat to improve cleaning.

HEATED TANK SPECIFICATIONS

	Model 1012-12	Model 1216-18	Model 1620-24	Model 2024-36
Working Dimensions	10"W x 12"L x 10"D	12"W x 16"L x 12"D	16"W x 20"L x 16"D	20"W x 24"L x 20"D
Overall Dimensions*	14"W x 16"L x 16"H	16"W x 20"L x 18"H	20"W x 24"L x 22"H	24"W x 28"L x 26"H
Heater Power	1000 Watts	2000 Watts	3000 Watts	3000 Watts
Power Requirements	120v/1p/8.5A	230v/1p/8.7A	230v/1p/13A	230v/1p/13A

* includes 7/8" horizontal mounting flange on all four sides

TRANSDUCER ELEMENTS

Branson offers efficient piezoelectric transducers on its tanks. These composite PZT units offer excellent energy conversion, stable performance under all operating conditions, and are guaranteed for the life of the system (excluding cavitation erosion). Transducers are offered in two frequencies: 25 kHz and 40 kHz. Generally 25 kHz is preferred for large, massive parts and 40 kHz for smaller, more intricate parts or components with complex geometry.

ADDITIONAL FEATURES

- Stainless steel fill and drain connections.
- Optional stainless steel covers and a selection of baskets with varying mesh sizes.

POWER SUPPLY SELECTION

Each Branson cleaning tank must be served by a separate power supply operating at the same frequency (25 or 40 kHz) and rated for the same number of transducer elements. See data on the reverse side of this brochure.



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ADVANCED ULTRASONIC CLEANING GENERATOR



SERIES 8500

Branson's *Series 8500 Advanced Ultrasonic Generator* offers a full range of features to meet any precision cleaning requirements. Used on a simple cleaning tank or in a fully integrated cleaning system, the *Series 8500* will deliver precise cleaning quickly, consistently, and cost effectively.

KEY FEATURES & BENEFITS

- **Line / load regulation** compensates for liquid level and temperature changes as well as line voltage and load variations. Changes are held to less than 3% for very consistent cleaning.
- **True variable power control** makes the cavitation intensity (not time) infinitely variable from 0% to 100% which allows matching the power to your application. A bright LED display indicates the selected level.
- **Selectable sweep frequency** permits the process engineer to select both band width and sweep rate to eliminate standing waves and improve ultrasonic activity distribution.
- **Auto tuning** maintains optimum operating frequency around *your* application. It allows the generator to dynamically adjust to changing bath conditions optimizing performance around parameters such as temperature, liquid level, and tank loading.

- **Power modulation mode** is a unique patented feature which produces four times the peak power in the bath. This is helpful for tenacious soils or for driving difficult to cavitate chemistries like semi-aqueous and hydrocarbon formulations.
- **Two input / output (I/O) interface** options permit remote control of operating parameters. One is for *on/off only*. The other enables *full remote control* of the generator for automation or the addition of a PLC to record statistical information on ultrasonic performance.

ADDITIONAL STANDARD FEATURES

- User-adjustable power and frequency controls.
- Indirect cabinet cooling - sensitive components are isolated from potentially dirty cooling air.
- 19 inch, 3 DIN rack mount cabinet.
- Status indicators on safety and fault alarms.
- Bright LED display for easy viewing.
- Two-year warranty period.

SPECIFICATIONS

Element configurations: 12, 18, 24, 36, 48
Input Voltage: 120V(12 ele only), 220V +/- 15%
Avg. output power: 40 watts per element
Output frequency: 25 or 40 kHz
Regulatory Approvals: FCC and CSA or CE
Dimensions: 17.5"W, 16.8"D, 5.5"H
Weight: 30 lbs. (13.6kg)

GENERATOR SPECIFICATIONS

Model	Frequency	Transducer Elements	Voltage Requirements	Average Output Power
S-8525-12 S-8540-12	25 kHz 40 kHz	12 12	120 V or 220 V +/-15% 50 / 60 Hz	500 Watts
S-8525-18 S-8540-18	25 kHz 40 kHz	18 18	220 V +/- 15% 50 / 60 Hz	750 Watts
S-8525-24 S-8540-24	25 kHz 40 kHz	24 24	220 V +/- 15% 50 / 60 Hz	1000 Watts
S-8525-36 S-8540-36	25 kHz 40 kHz	36 36	220 V +/- 15% 50 / 60 Hz	1500 Watts
S-8525-48 S-8540-48	25 kHz 40 kHz	48 48	220 V +/- 15% 50 / 60 Hz	2000 Watts

NUMBERING SYSTEM

Each Series 8500 Ultrasonic generator has a model number which contains information useful for selecting other compatible components.

For example: S-8540-12. This model number, stamped on the generator nameplate, indicates the model (Series 8500), the operating frequency (40 kHz), and the total number of transducer elements the generator can drive (12 elements).

These may be on one cleaning tank or a combination of immersible transducer cans with a total of twelve elements.

REGULATORY APPROVALS

All Series 8500 ultrasonic generators meet FCC Rules and Regulations. They conform to the EN 60-204-1 standards and carry either the CSA or CE mark.



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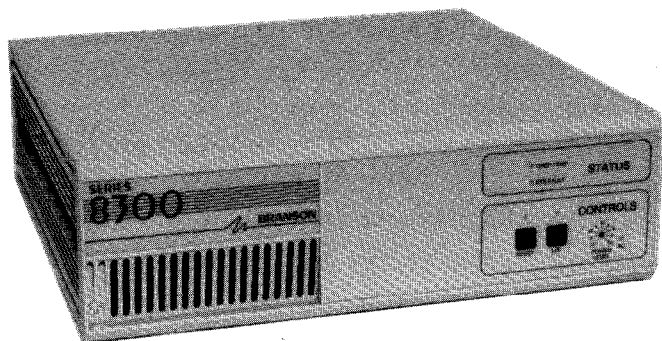
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ULTRASONIC CLEANING GENERATOR

SERIES 8300



Branson's *Series 8300 Ultrasonic Generator* offers a range of features to meet any production cleaning requirements. Used on a simple cleaning tank or with immersible transducers in an integrated cleaning system, the *Series 8300* will deliver precise cleaning quickly, consistently, and cost effectively.

KEY FEATURES & BENEFITS

- **Line / load regulation** compensates for liquid level and temperature changes as well as line voltage and load variations. Changes are held to less than 3% for very consistent cleaning.
- **True variable power control** makes the cavitation intensity (not duty cycle) infinitely and linearly variable from 20% to 100% which allows matching the power to your application requirements.
- **Sweep frequency** minimizes standing waves and improves ultrasonic activity distribution. The sweep operates at a rate of 80 Hz per second across a bandwidth of 1400 Hz.

- **Auto tuning** maintains optimum operating frequency around *your* application. The generator automatically and dynamically adjusts to your conditions regardless of changes in the operating environment.
- **Input / output (I/O) interface** option permits remote on / off control of the generator. This is ideal for systems applications or where the generator may be inaccessible.
- **Safety features** to protect the generator include over-temperature, overload, open circuit, and short circuit. Panel mounted fault lights indicate a problem.

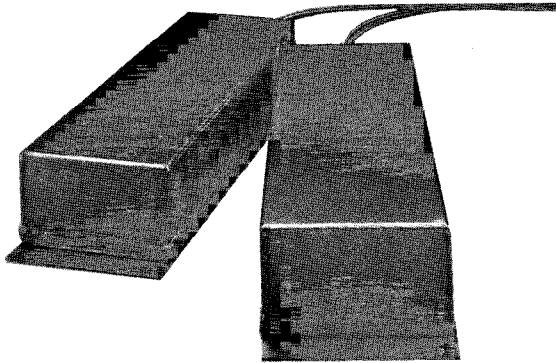
ADDITIONAL STANDARD FEATURES

- Indirect cabinet cooling - sensitive components are isolated from potentially dirty cooling air.
- 19 inch, 3 DIN rack mount cabinet.
- Status indicators on safety and fault alarms.
- CSA certified and meets FCC regulations.
- Two-year warranty period.

SPECIFICATIONS

Element configurations: 12, 18, 24, 36, 48
 Input Voltage: 120V(12 ele only), 208V to 230V
 Avg. output power: 40 watts per element
 Output frequency: 25 or 40 kHz
 Regulatory Approvals: FCC and CSA
 Dimensions: 17.5"W, 16.8"D, 5.5"H
 Weight: 30 lbs. (13.6kg)

BRANSON IMMERSIBLE ULTRASONIC TRANSDUCERS



Branson immersible transducers provide versatile ways to add ultrasonics to new or existing tankage in a variety of industrial settings. Type 316L bright annealed stainless steel construction permits use of a wide range of cleaning chemistries. Hard chrome is offered as an option in severe applications.

The hermetically sealed immersible transducers are available in two standard sizes and four mounting configurations. This allows for maximum versatility of transducer placement on tank walls or bottom to optimize cleaning. This selection is supplemented by our fabricating capability for custom sizes.

IMMERSIBLE TRANSDUCER SPECIFICATIONS

	Model 610-6	Model 618-12	Custom
Working Dimensions	6"W x 10"L x 3.25"H	6"W x 18"L x 3.25"H	Special sizes available on request.
Number of Transducer Elements	Six	Twelve	Various
Frequencies Available	25 kHz, 40 kHz	25 kHz, 40 kHz	25 kHz, 40 kHz

TRANSDUCER ELEMENTS

Branson offers either piezoelectric or magnetostrictive technology in its immersible transducers. Both types offer excellent energy conversion, stable performance under all operating conditions, and are guaranteed for the life of the system. Piezoelectric transducers are offered in two frequencies: 25 kHz and 40 kHz. Generally 25 kHz is preferred for large, massive parts while 40 kHz is for more intricate parts and small particle removal. Magnetostrictive transducers are offered at 20 kHz and are best used where high power or focused energy is needed.

ADDITIONAL FEATURES

- A variety of junction box and cabling schemes for easy installation and maintenance.
- Hard chrome or titanium nitride coatings for extreme wear applications.

POWER SUPPLY SELECTION

Each group of Branson immersible transducers must be served by a power supply operating at the same frequency (20, 25, or 40 kHz) and rated for the same number of transducer elements. See data on the reverse side of this brochure for more information.



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HIGH FREQUENCY ULTRASONIC CLEANING GENERATORS



SERIES 8500HF

Branson's *Series 8500HF High Frequency Ultrasonic Generators* offer a full range of features to meet all precision cleaning requirements. Used on a simple cleaning tank or in a fully integrated cleaning system, the *Series 8500HF* will deliver precise cleaning quickly, consistently, and cost effectively. All of the generators operate with the same transducer designs.

KEY BENEFITS

- **Small Particle Removal** - High frequency ultrasonics has been shown to be very effective for the removal of small particles.
- **Reduced Damage** - High frequency ultrasonics effectively cleans while reducing the potential for damage that can occur with conventional ultrasonics.
- **True Variable Power Control** - Makes the cavitation intensity variable from 0% to 100% to match the power to the application. The power is controlled using amplitude, which assures consistent and safe process control. Power can be manually controlled or through a PLC. A bright LED display indicates the selected power level.
- **Single Transducer Design** - Assures flexibility to change your system at any time.

- **Broad Range Sweep Frequency** - Permits the process engineer to select both band width and sweep rate to eliminate standing waves and improve ultrasonic activity distribution.
- **Auto Tuning** - Maintains optimum operating frequency around your application. It allows the generator to dynamically adjust to changing conditions, optimizing performance around parameters such as temperature, liquid level, and tank loading.
- **Input/Output (I/O) Interface** - Permits full remote control of the generator for automation or the addition of a PLC to record statistical information on ultrasonic performance.
- **Line/load Regulation** - Compensates for liquid level and temperature changes as well as line voltage and load variations. Changes are held to less than 3% for very consistent cleaning.

ADDITIONAL STANDARD FEATURES

- User-adjustable power and frequency controls.
- Indirect cabinet cooling-sensitive components are isolated from potentially dirty cooling air.
- 19 inch, 3 DIN rack mountable cabinet.
- Status indicators on safety and fault alarms.
- Bright LED display for easy viewing.
- Two-year warranty period.

SPECIFICATIONS

Input Voltage: 220V +/- 15%
Avg. output power: 40 watts per element
Output frequency: 80, 120, 170 kHz
Regulatory Approvals: FCC and CSA or CE
Dimensions: 17.5"W, 16.8"D, 5.5"H
Weight: 30 lbs. (13.6kg)

REGULATORY APPROVALS

All Series 8500HF ultrasonic generators meet FCC regulations. They conform to the EN 60-204-1 standards and carry either the CSA or CE mark..

NUMBERING SYSTEM

Each Series 8500HF Ultrasonic generator has a model number which contains information useful for selecting other compatible components.

For example: S-8580-12. This model number, stamped on the generator nameplate, indicates the model (Series 8500HF), the operating frequency (80 kHz), and the total number of transducer elements the generator can drive (12 elements). These may be on one cleaning tank or a combination of immersible transducer cans with a total of twelve elements.

GENERATOR SPECIFICATIONS

Model Transducer	Operating Frequency	Average Elements	Output Power
S-85170-6	170 kHz	6	250 Watts
S-85170-12	170 kHz	12	500 Watts
S-85120-12	120 kHz	12	500 Watts
S-85120-18	120 kHz	18	750 Watts
S-8580-12	80 kHz	12	500 Watts
S-8580-18	80 kHz	18	750 Watts
S-8580-24	80 kHz	24	1000 Watts



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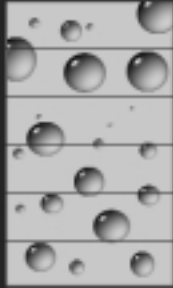
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Bulletin S-1067

B SERIES ULTRASONIC VAPOR DEGREASERS

OVERVIEW

The Branson *B Series Ultrasonic Vapor Degreasers* are the latest in a series of environmentally sound, cost effective precision degreasers. Branson, well known for ultrasonics, is also the global leader in solvent cleaning technology. The B Series integrates over 50 years of degreasing experience with the demanding needs of a changing marketplace to offer you a functional solvent solution to your cleaning needs. Similar in operation to traditional two sump units, they incorporate all of the important environmental and safety features you need, including onboard compressors for both primary and sub-zero cooling and high-frequency ultrasonics. All controls are clustered on compact, front-mounted, digital control panels. The B Series is ideal for use with most commercially-available vapor degreasing solvents.

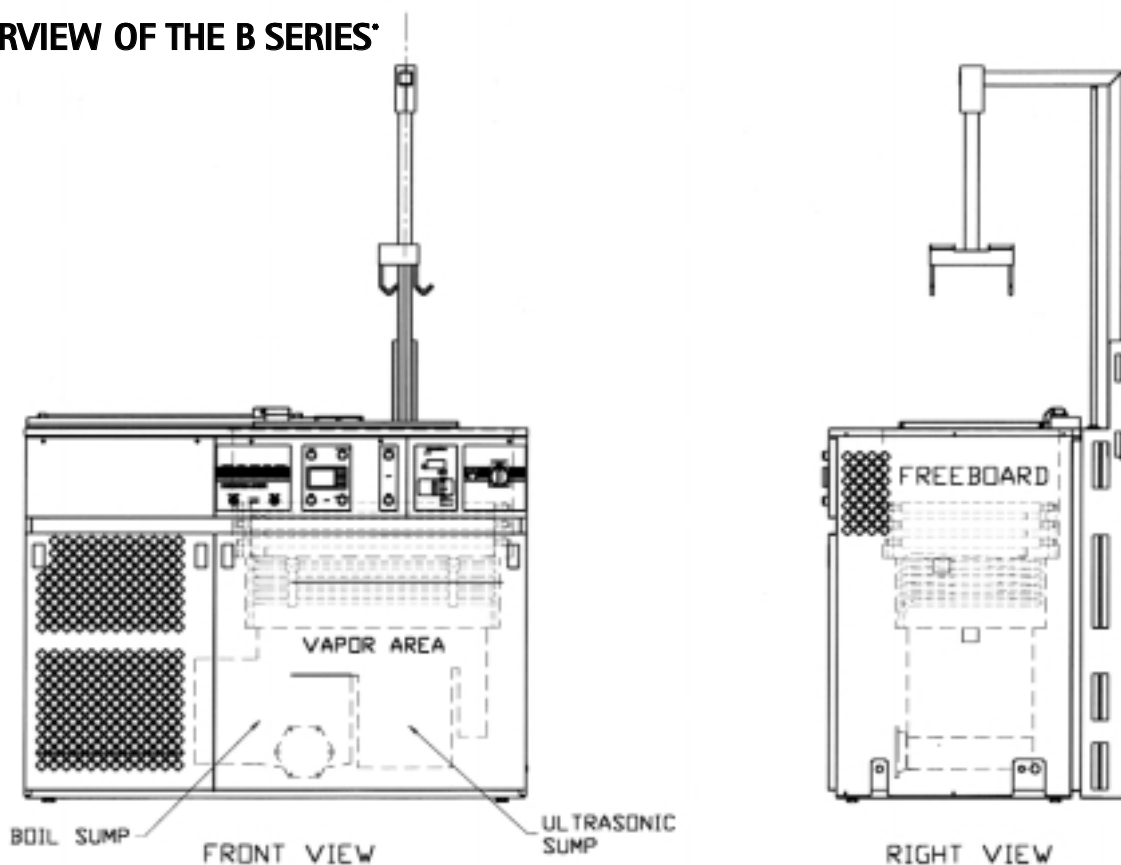
FEATURES

- **Freeboard ratio** of greater than 120% to eliminate diffusion losses
- **Refrigerated primary condensing coil** to condense the bulk of the solvent vapors
- **Refrigerated sub-zero freeboard condenser** to provide a cold air barrier, minimizing fugitive losses
- **Sliding cover** to eliminate drafts and minimize evaporation during periods of inactivity
- **Offset boiling sump** with liquid level control (*except on B452R*)
- **Bag filter** to reduce solvent loss during routine maintenance
- **Internal water separator** to reduce losses
- **Stainless plumbing** for solvent-wetted areas
- **Low voltage controls** for operator safety
- **"Ready" light** indicates to operator that it is safe to process parts
- **Coolant indicator** confirms that the refrigeration system is operating
- **High vapor level sensor** to prevent accidental solvent boil off
- **Heater Over Temp sensor** to prevent solvent degradation and heater damage
- **Early warning contamination indicator** to signal the need for solvent replacement
- **Temperature control of ultrasonic sump** (*except on B452R*)
- **Lift-off skirt panels** to facilitate maintenance

In addition to the benefits associated with minimizing solvent losses, the B Series degreasers have many other features which contribute to safety and reliability. Key among these are:



OVERVIEW OF THE B SERIES*



* The system shown is the B950R with the optional vertical lift.

While there are slight differences between each model, this drawing is representative of the basic system layout.

SPECIFICATIONS

	MODEL B452R	MODEL B950R	MODEL B1950R	MODEL B3550R
Working dimensions	10" X 12" X 8"D	12" X 16" X 12"	16" X 20" X 14.5"	20" X 24" X 17"
Boil sump heat	2000W immersion heat	4000W immersion heat	8000W immersion heat	14000W immersion heat
Ultrasonic heat	NA	1000W	1500W	2000W
Ultrasonics *	250W @ 40 kHz standard	500W @ 40 kHz standard	1000W @ 40 kHz standard	1500W @ 40 kHz standard
Distillation rate **	7 gph	14 gph	28 gph	49 gph
Recirculation	1 gpm @ 10 μ	2 gpm @ 10 μ	4 gpm @ 10 μ	6 gpm @ 10 μ
Load capacity **	200lbs. steel/hr	400lbs. steel/hr	800lbs. steel/hr	1400lbs. steel/hr
Vapor zone	28.7"L X 15.2"W X 8.5"D	32.7" X 19.2" X 12"	40.7" X 23.2" X 14.5"	48.7" X 27.2" X 17"
Control voltage	24 volts	24 volts	24 volts	24 volts
Solvent capacity	9.2 gallons	26 gallons	50 gallons	82 gallons
Overall	54.7" X 28.5" X 46" H	64.7" X 32.5" X 48.7"	88" X 36.5" X 59"	110" X 40.5" X 68"
Input power	208 or 230V, 3 ϕ , 27A	208 or 230V, 3 ϕ , 39A	208 or 230V 3 ϕ , 62A, or 460, 3 ϕ , 33A	208 or 230V, 3 ϕ , 81A, or 460, 3 ϕ , 42A
Shipping weight	500lbs. with pallet	750lbs. with pallet	950lbs. with pallet	1200lbs. with pallet
Options for all systems: PLC-controlled vertical lift, power cover, TDR interface, and desiccant dryer				

* Higher frequencies available upon request.

** Based on HCFC, HFE, and HFC solvents. Specifications subject to change without notice

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INDUSTRIAL VAPOR DEGREASER



MODEL BTC-200 ULTRASONIC BENCH-TOP UNIT

The Branson bench-top cleaner BTC-200 integrates state-of-the-art electronic controls with maintenance practicality in an ultrasonic vapor degreaser. The two-sump unit contains all of the environmental and safety features found in larger solvent cleaning units. It is ideal for use with existing low cost solvents like trichloroethylene and methylene chloride, as well as many of the newly introduced HCFC, HFC and HFE solvents.

With a 4.8-gallon solvent capacity, the compact BTC-200 is ideal for use at individual work stations in a laboratory or a manufacturing line. A self-contained unit needing only electrical and water hookup, the BTC-200's portability provides cleaning flexibility within the workplace.

ENVIRONMENTAL & SAFETY CONTROLS

The bench-top ultrasonic vapor degreaser is designed to comply with EPA regulations on emissions, an important environmental and economic consideration. A 100% freeboard area contains solvent vapors within the unit when parts are processed properly. Below the freeboard, full peripheral cooling coils efficiently condense the vapors into liquid, which then returns to the sumps through the internal water separator.

The control panel features low voltage controls, digital readout, and electronic annunciators for warning of improper conditions.

For both environmental and processing benefit, vapor levels are monitored constantly by temperature sensors. These sensors determine when the vapor blanket has been established and the operator is informed by a "ready" light signal on the control panel. Solvent and heater high-temperature sensors work to protect the boil sump from solvent breakdown or excessive contamination. An early-warning light on the control panel alerts the operator when the solvent is becoming contaminated.

Another equipment safety feature is the coolant flow switch which shuts the heat off if coolant flow to the coils falls below 0.25 gpm.

MAINTENANCE FEATURES

All maintenance procedures can be performed from the front of the unit. Water and solvent drains are clearly marked and accessible on the front. The improved internal water separator/desiccant dryer can be maintained easily without dismantling the unit.

DESIGN FEATURES

High-intensity ultrasonics are provided within the BTC-200 for more efficient cleaning and longer equipment life. The unit is equipped with an R.F.I. filter to meet FCC radio frequency interference standards.

Each of the stainless steel tank compartments in the unit has unobstructed work space for full use of the sumps.

The solvent-resistant cabinet is durable, yet sleek and clean in appearance. A sliding stainless steel cover minimizes vapor disturbance and is standard with each unit. A bench-mountable version of the BTC-200 also is available.

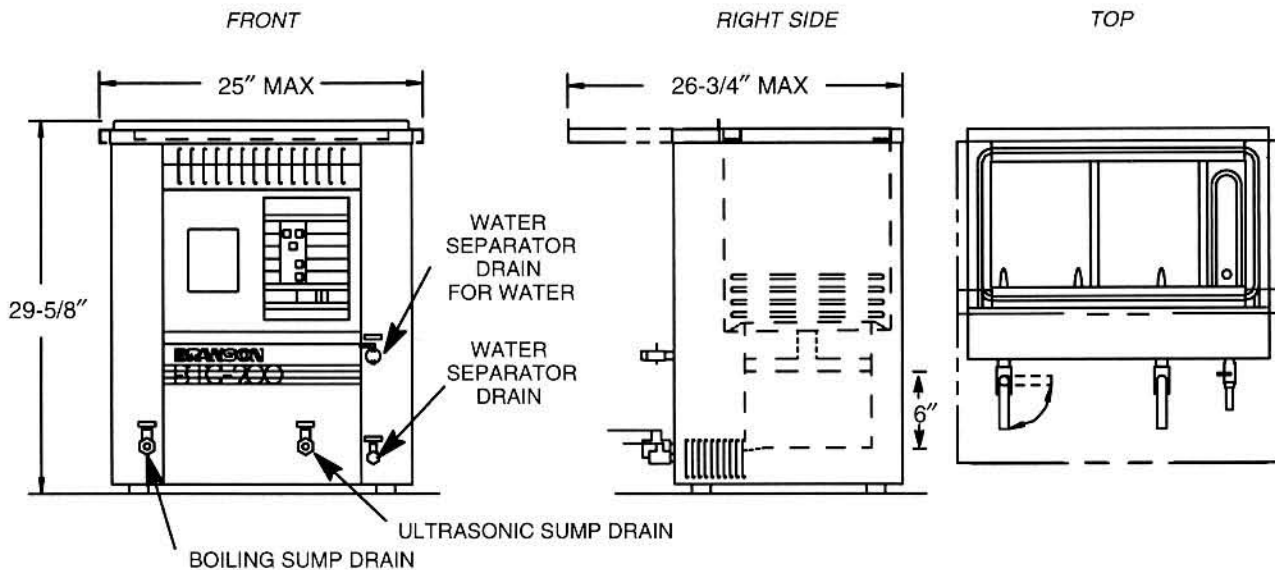
CLEANING SEQUENCE

Model BTC-200 ultrasonic vapor degreaser provides a complete, multi-stage process comprised of:

1. initial vapor rinsing
2. ultrasonic cleaning
3. final vapor rinsing
4. drying.

Parts are lowered into the vapor zone above the boiling sump where gross contamination is shed off the dirty work-piece. Low watt density heaters efficiently generate the vapor blanket for this initial rinse. Parts then are immersed in the ultrasonic sump where cavitation, the rapid formation and implosion of countless minute bubbles in the solvent, scrubs away any stubborn residue and penetrates hidden recesses, crevices, or threaded passageways. When parts are raised into the vapor zone, they receive a final vapor rinse. This vapor zone is maintained by a stainless steel full peripheral cooling coil. Parts emerge from the freeboard area clean and dry. Contaminated solvent is distilled continuously, providing clean solvent for the ultrasonic sump.

Proper entrance and exit speeds, and correct residence time within the vapor zone and freeboard area are recommended for efficient operation of your BTC-200 or any solvent cleaning system. Branson will work with you to determine the correct speeds and times for your process.



STANDARD FEATURES

- 24 volt control circuits for safety
- Electronic annunciators
- Digital temperature readout
- Ready light
- Boil sump temperature sensor
- 120 volt input for convenience
- Early warning solvent contamination alert
- Coolant flow safety
- Low liquid level safety
- Vapor level safety
- 100% freeboard saves solvent
- Four 40 kHz piezoelectric transducers
- Full peripheral cooling coil
- Front drains facilitate maintenance
- 304 stainless steel tanks
- Solvent-resistant cabinet
- Internal water separator with desiccant capacity
- 4.8-gallon solvent capacity
- Sliding stainless steel cover conserves solvent

OPTIONS

- Bench-mountable version
- Desiccant dryer kit for use with some azeotropes
- Stainless steel basket
- Workstation platform
- Sub-zero freeboard coil for additional conservation
- Chiller for cooling water

SPECIFICATIONS

Working dimensions	
Ultrasonic Sump	8" x 10" x 6"
Boiling Sump	8" x 10" x 6"
Vapor zone	20" x 10" x 6"
Total Solvent Capacity	4.8 gal.
Generator	EMA 10-4 40 kHz
Power Requirement	120V, 1-phase, 12 amps
Boil Sump Heat	1200 watts
Distillation Rate* (no load)	3.3 gal/hr
Cooling Water @ 60°F	0.75 gpm
Load Capacity	180 lbs./hr.
Weight	96 lbs.

*Based on Trichloroethylene.

Note: Specifications subject to change without notice.

SOLVENT COMPATIBILITY

Methylene chloride, trichloroethylene, HCFC, HFC, HFE.

WARRANTY

The Branson BTC-200 comes with a one-year warranty on parts and labor.



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ULTRASONIC VAPOR DEGREASER

LED SERIES



OVERVIEW

The Branson *LED Series Ultrasonic Vapor Degreasers* incorporate all of the latest advances in emission controls and high-efficiency ultrasonics to create one of the easiest to operate and highest value degreasers available today. All models in this series include a boiling tank for vapor generation and gross cleaning, an ultrasonic tank for critical cleaning, and an internal water separator. They are unique in that they include, as standard, a patented conductive superheat plate to assure that minimal solvent leaves the unit with processed parts. They are designed for use with low cost solvents like trichloroethylene and methylene chloride, as well as many of the newer materials including HCFC, HFC, HFE, n-propyl bromide and more.

ENVIRONMENTAL FEATURES

The *LED Series Degreasers* include many engineered improvements designed to exceed EPA environmental regulations on solvent emissions. Some of these features also facilitate OSHA compliance. Among these features, where applicable, are; 120% freeboard, an attached power sliding cover, standard sub-zero secondary cooling coils, patented conductive superheat plate and welded plumbing connections to eliminate undetected leaks.

In addition to these standard features several options are available to further reduce emissions. These include a desiccant kit for azeotropes, open-mesh stainless steel parts baskets, and a TDR automated hoist system to control system operating methods.

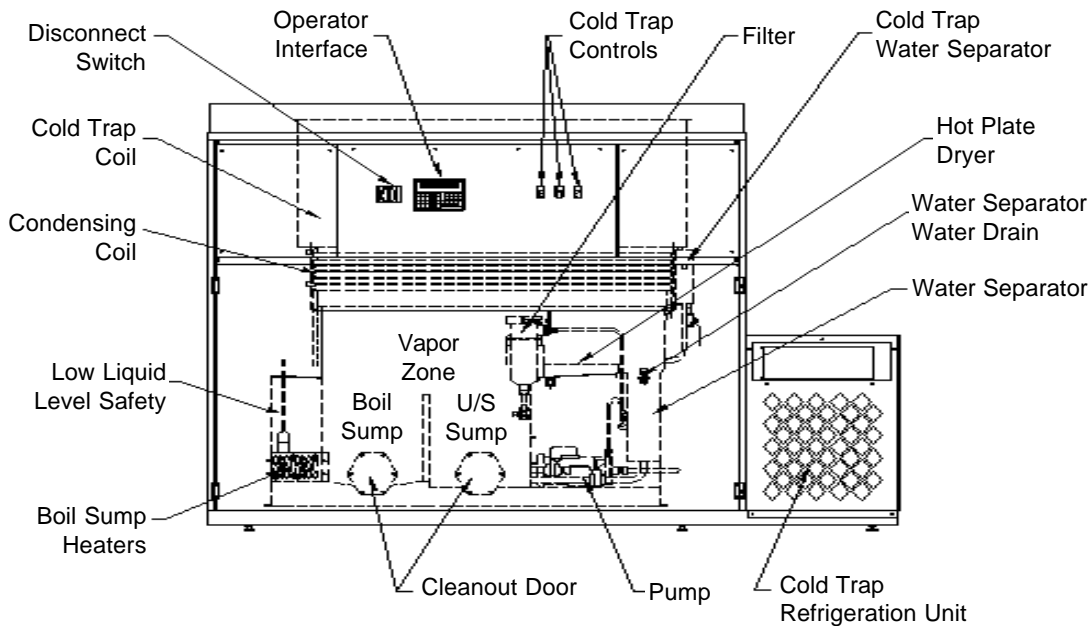
SAFETY FEATURES

In addition to the benefits associated with keeping solvent away from the operator, the *LED Series Degreasers* have many other features which contribute to safety and reliability, including:

- **Low voltage controls** for safety
- **PLC controls** for process consistency
- **Coolant flow and temperature safety switches** assure the cooling is functional
- **High vapor level sensor** to prevent solvent boil off.
- **Low solvent sensor** to prevent heater damage and solvent decomposition.

DESIGN FEATURES

Ruggedly built with stainless steel construction, *LED's* are excellent for both heavy-duty production work and high precision cleaning. Each of the two compartments in these compact degreasers has unobstructed work space for the rapid cleaning of large, small, simple or complex parts. The boil tank is heated by low watt density stainless steel immersion heaters for efficient vapor generation. The ultrasonic tank is powered by Branson's S-8500 Series ultrasonic equipment.



DIMENSIONS

MODEL	OVERALL			TANKS			H2O SEP.			FREEBOARD	VAPOR ZONE		
	L	H	W	L	H	W	L	H	W	H	H	W	L
1216	89"	59"	36"	12"	16"	12"	5"	16"	10"	19"	12"	19"	45"
1620	109"	68"	40"	16"	20"	14"	5"	20"	12"	24"	14"	23"	57"
2024	139"	74"	44"	20"	24"	16"	5"	24"	13"	29"	16"	27"	69"

STANDARD FEATURES

- PLC controls for consistency
- Low voltage controls for safety
- All stainless steel primary cooling coils
- Conductive superheat plate conserves solvent
- Low watt density immersion heat
- Large, easy-access clean-out ports
- Internal water separator/desiccant dryer
- Automated sliding stainless steel power cover
- S-8500 Series 25kHz to 170kHz ultrasonic components available.
- Recirculation pump and bag filter
- Sloped bottom in boil tank
- All tankage is 304 stainless steel
- Compact footprint
- Coolant flow switch for safety

SPECIFICATIONS

MODEL	CAPACITY	HEAT	COOLING	DISTILL. RATE*	WORK CAP.*	RECIRC.	POWER ✓
1216	26 gal.	4KW	1.8 gpm @ 45°F	18 gph	600lbs. steel/hr.	2.2 gpm	230v 3ph 28A
1620	54 gal.	8KW	3.5 gpm @ 45°F	37 gph	1200lbs. steel/hr.	4 gpm	230v 3ph 53A
2024	87 gal.	14KW	6 gpm @ 45°F	65 gph	2000lbs. steel/hr.	4 gpm	230v 3ph 69A

* Based on HFC/HFE solvents

✓ 208V available



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ULTRASONIC VAPOR DEGREASERS



MODEL B452R

- **Primary condensing coil** to condense the bulk of the vapors preventing them from reaching the sub-zero condenser
- **Captured sliding cover** to eliminate drafts and seal the unit during periods of inactivity
- **Stainless plumbing** for corrosion resistance
- **Internal water separator** keeps all solvent within the unit at all times

OVERVIEW

The Branson B452R Ultrasonic Vapor Degreaser is the latest in a series of environmentally sound, cost effective precision degreasers. It integrates 50 years of degreasing experience with the demanding needs of a changing marketplace to offer you a functional solvent solution to your cleaning needs. Similar in operation to a traditional two sump unit, it incorporates all of the important environmental and safety features you need, including onboard compressors for both primary and sub-zero cooling. All controls are clustered on a compact, front-mounted, digital control panel. It is ideal for use with low-cost solvents like trichloroethylene, perchloroethylene, and methylene chloride, as well as many of the newer materials including AK225, HFC, HFE, N-propyl bromide and more.

ENVIRONMENTAL FEATURES

The B452R is designed to comply with Federal and local regulations on solvent emissions, an important environmental and economic consideration. Some of these features can also facilitate OSHA compliance. The unit includes, as standard, a number of engineered improvements designed specifically to minimize solvent losses. The following list details some of these more important features:

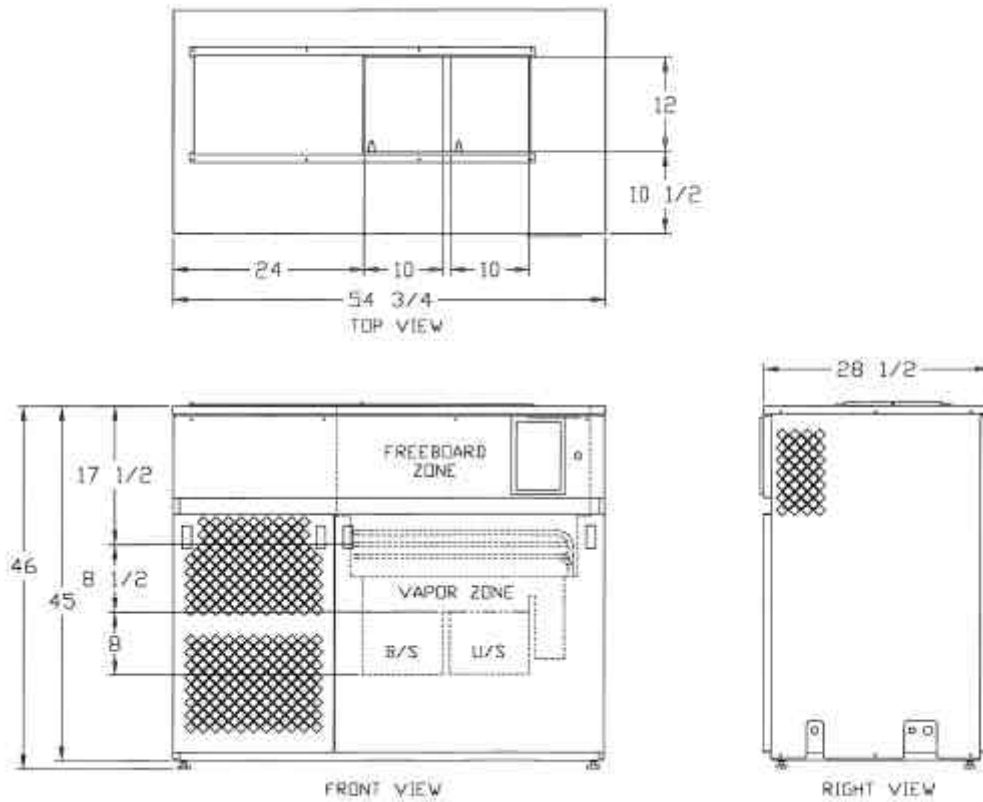
- **Freeboard ratio** of greater than 120% to eliminate diffusion losses
- **Sub-zero freeboard condenser** to provide a cold air barrier minimizing fugitive losses

SAFETY FEATURES

In addition to the benefits associated with keeping solvent away from the operator, the B452R has many other features which contribute to safety and reliability. Key among these are:

- **Low voltage controls** for operator safety
- **"Ready" light** to assure the unit is set to run
- **Coolant indicator** indicates the refrigeration equipment is functional
- **High vapor level sensor** to prevent accidental solvent boil off
- **Heater Over Temp sensor** to prevent solvent degradation and heater damage
- **Early warning contamination indicator** to signal the need for solvent replacement

SPECIFICATIONS



Ultrasonic sump	10" X 12" X 8"D
Boil sump	10" X 12" X 8"D
Vapor zone	28.75"L X 15.25"W X 8.5"D
Overall	54.75" X 28.5" X 84.5" H
Solvent capacity	9.2 gallons
Recirculation	1 gpm @ 10μ

Boil sump heat	2000W immersion heat
Distillation rate*	7 gph
Load capacity*	150# steel/hr
Ultrasonics	250W @ 40 kHz
Control voltage	24 volts
Input power	208 or 230V, 3ph, 25A

* Based on HCFC, HFE, and HFC solvents.
 Specifications subject to change without notice.

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TWO-DIMENSIONAL ROBOT TDR-15



The Branson TDR-15 is a proven batch transport system. It includes a stable, ruggedly constructed gantry, mechanical winch, and a choice of three electronic control systems to form a reliable automation system. The standard control package is a specially-designed microprocessor-based system. PLC and PC control packages are also available. The unit is capable of handling up to 33 lbs. of parts.

PROGRAMMABILITY

The TDR-15 can be easily programmed in several ways, depending on the control system. A hand-held keypad/programmer can be used to “walk” through the process, and the steps stored by simply pressing the “save” button. This process can also be directly entered using XY coordinates and the keypad. The maximum number of steps available is 255, contained within 10 programs.

Optional PLC or PC-based controls offer the flexibility of open architecture and the ability to allow parallel processing of baskets with different programs. When programming this system, you manually move the system through the process using the joystick and noting the distances between each step. You then enter the process into the program via keypad.

All three control systems utilize optical encoders for positioning and are repeatable within $\pm 3/8$.” They all include an operator interface to enter data and indicate system status, and self-diagnostics for troubleshooting.

EXPANDABILITY

A single TDR head can dramatically increase process throughput and repeatability. As your business grows, additional heads may be required to meet future demands. Up to two additional heads can be added to give a maximum of three heads in a system (two with PLC or PC controls). Each head in the system is programmed individually to efficiently perform its task while continuously communicating with other heads. Inter-head communications guarantee coordinated, trouble-free operation of even the most complex processes.

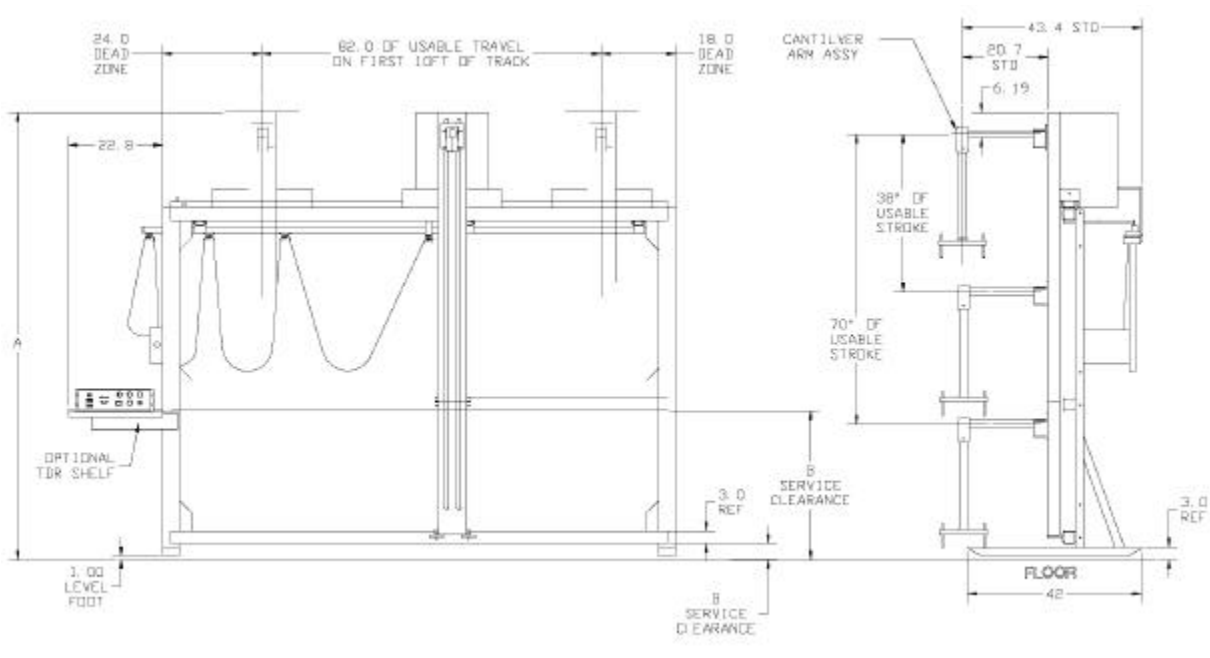
The standard TDR-15 comes with a basic track length of 10 feet. If a longer unit or additional heads are required, modularized increments of 5-foot sections of track and cabling can be added, up to a maximum of 40 feet.

PROCESS CONTROL

Increased productivity is gained by process control through automation with use of the TDR-15. The microprocessor system comes with eight 5-volt inputs and four 24-volt outputs (can be expanded to eight). These allow the automation to control the process variables utilized in cleaning, as well as allowing the system to interface with other parts of the manufacturing process.

The PLC and PC-based systems have an expanded number of I/Os available and can be interfaced with a manufacturing information or SPC system through an optional communication interface.

The ability to control automation speed can enhance process control, and, in the case of vapor degreasers, is required by law. The TDR can be programmed to change speeds to improve the throughput. Whatever speed the transport is moving, an electronically-controlled ramping and braking program ensures smooth acceleration and stopping. A four-point basket eliminates the need for balancing loads. The maximum horizontal speed is 60 fpm, and the maximum vertical speed is 23 fpm.



TDR-15 DIMENSIONS (inches)

Model	A Overall Height	B	
		38"	70"
91	91.5	19.3	N/A
108	108.0	35.8	3.9
126	126.0	N/A	21.9
150	150.0	N/A	45.9

Overall TDR length. Usable travel + 42" + 12".
Overall usable track = track length - 38".

Service clearance is area under bottom rail to floor

STANDARD FEATURES

- Load capacity of 33 lbs. (15 kg) & 11 lbs. (5 kg) fixturing
- Ten-foot track length.
- Four-point basket pickup for stability
- Cantilevered arm (no moving parts over process stations)
- Microprocessor-based controls
- 19" rack mounted control box
- LED readouts
- Connector for remote PC
- Keypad or keystroke programmability
- Ten-program memory
- Self-diagnostic electronics
- Four horizontal and four vertical speeds

- Ramping and electronic braking for smooth operation
- Eight internal outputs
- Four external outputs
- Communication capability with Branson and competitive products

OPTIONS

- Additional work heads
- Four additional external output controls
- PC interface cabling
- Additional track in 5-foot increments
- Alternate input voltages
- Multi-program selector box
- PLC and PC controls

SPECIFICATIONS

Electrical reqs.	120 VAC, 1 phase, 5 Amps
Max. track length	40 feet (non-PLC)
Max. horiz. travel distance	33 feet per head
Travel speeds (fpm)	
<i>Horizontal</i>	15, 30, 45, 60
<i>Vertical</i>	6, 11, 17, 23
Max. load	33lbs. (15 kg), parts 11lbs. (5 kg), fixturing
Max. number heads	Three (Two with PLC /PC)

Note: All specifications to change without notice.

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Bulletin S-994

TWO-DIMENSIONAL ROBOT TDR-50



The Branson TDR-50 is a proven batch transport system. It includes a stable, ruggedly constructed gantry, mechanical winch, and a choice of three electronic control systems to form a reliable automation system. The standard control package is a specially-designed microprocessor-based system. PLC and PC control packages are also available. The unit is capable of handling up to 110 lbs. of parts.

PROGRAMMABILITY

The TDR-50 can be easily programmed in several ways, depending on the control system. A hand-held keypad/programmer can be used to “walk” through the process, and the steps stored by simply pressing the “save” button. This process can also be directly entered using XY coordinates and the keypad. The maximum number of steps available is 255, contained within 10 programs.

Optional PLC or PC-based controls offer the flexibility of open architecture and the ability to allow parallel processing of baskets with different programs. When programming this system, you manually move the system through the process using the joystick and noting the distances between each step. You then enter the process into the program via keypad.

All three control systems utilize optical encoders for positioning and are repeatable within $\pm 3/8$.” They all include an operator interface to enter data and indicate system status, and self-diagnostics for troubleshooting.

EXPANDABILITY

A single TDR head can dramatically increase process throughput and repeatability. As your business grows, additional heads may be required to meet future demands. Up to two additional heads can be added to give a maximum of three heads in a system (two with PLC or PC controls). Each head in the system is programmed individually to efficiently perform its task while continuously communicating with other heads. Inter-head communications guarantee coordinated, trouble-free operation of even the most complex processes.

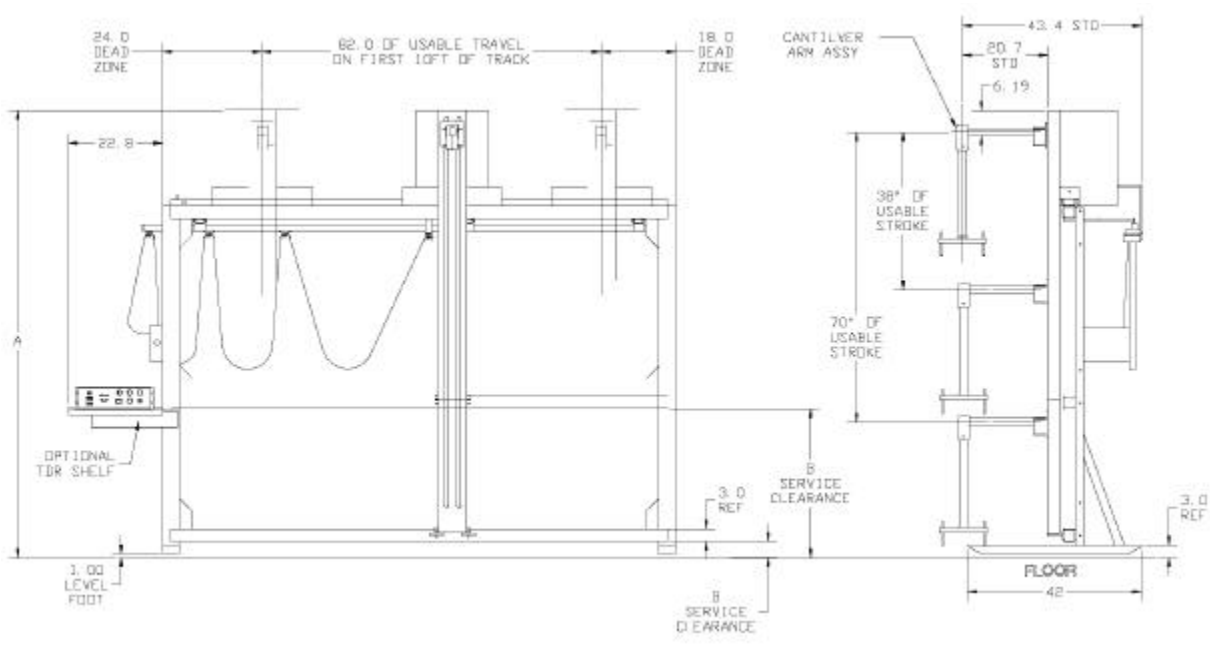
The standard TDR-50 comes with a basic track length of 10 feet. If a longer unit or additional heads are required, modularized increments of 5-foot sections of track and cabling can be added, up to a maximum of 40 feet.

PROCESS CONTROL

Increased productivity is gained by process control through automation with use of the TDR-50. The microprocessor system comes with eight 5-volt inputs and four 24-volt outputs (can be expanded to eight). These allow the automation to control the process variables utilized in cleaning, as well as allowing the system to interface with other parts of the manufacturing process.

The PLC and PC-based systems have an expanded number of I/Os available and can be interfaced with a manufacturing information or SPC system through an optional communication interface.

The ability to control automation speed can enhance process control, and, in the case of vapor degreasers, is required by law. The TDR can be programmed to change speeds to improve the throughput. Whatever speed the transport is moving, an electronically-controlled ramping and braking program ensures smooth acceleration and stopping. A four-point basket eliminates the need for balancing loads. The maximum horizontal speed is 60 fpm, and the maximum vertical speed is 23 fpm.



TDR-50 DIMENSIONS (inches)

Model	A Overall Height	B	
		38"	70"
91	91.5	19.3	N/A
108	108.0	35.8	3.9
126	126.0	N/A	21.9
150	150.0	N/A	45.9

Overall TDR length. Usable travel + 42" + 12".
Overall usable track = track length - 38".

Service clearance is area under bottom rail to floor

STANDARD FEATURES

- Load capacity of 110 lbs. (50 kg) & 22 lbs. (10 kg) fixturing
- Ten-foot track length.
- Four-point basket pickup for stability
- Cantilevered arm (no moving parts over process stations)
- Microprocessor-based controls
- 19" rack mounted control box
- LED readouts
- Connector for remote PC
- Keypad or keystroke programmability
- Ten-program memory
- Self-diagnostic electronics
- Four horizontal and four vertical speeds

- Ramping and electronic braking for smooth operation
- Eight internal outputs
- Four external outputs
- Communication capability with Branson and competitive products

OPTIONS

- Additional work heads
- Four additional external output controls
- PC interface cabling
- Additional track in 5-foot increments
- Alternate input voltages
- Multi-program selector box
- PLC and PC controls

SPECIFICATIONS

Electrical reqs.	120 VAC, 1 phase, 5 Amps
Max. track length	40 feet (non-PLC)
Max. horiz. travel distance	33 feet per head
Travel speeds (fpm)	
<i>Horizontal</i>	15, 30, 45, 60
<i>Vertical</i>	6, 11, 17, 23
Max. load	110lbs. (50 kg), parts 22lbs. (10 kg), fixturing
Max. number heads	Three (Two with PLC /PC)

Note: All specifications to change without notice.

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STANDARD CLEANING BASKETS



Branson offers a broad selection of parts handling baskets to meet a wide range of precision cleaning needs. They have been specifically designed to provide free circulation of cleaning and rinsing agents while standing up to the requirements of day to day production.

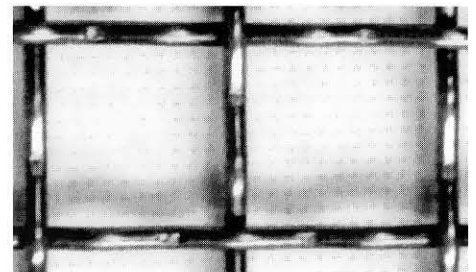
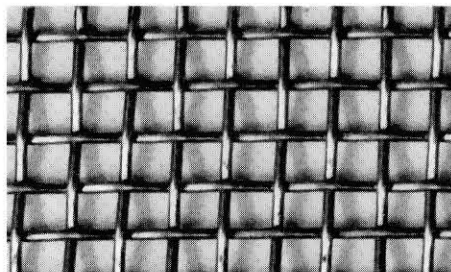
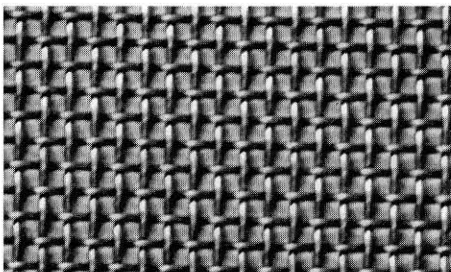
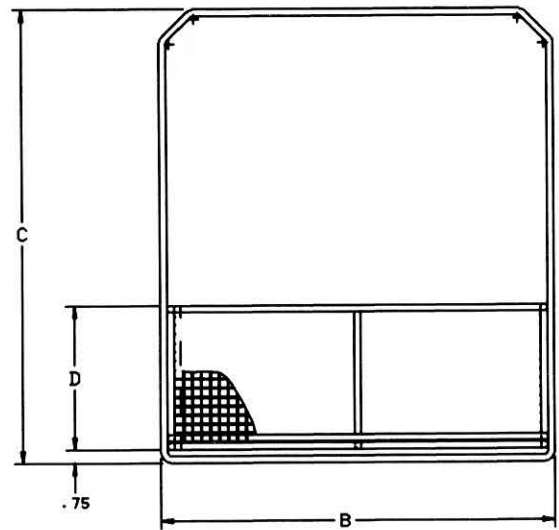
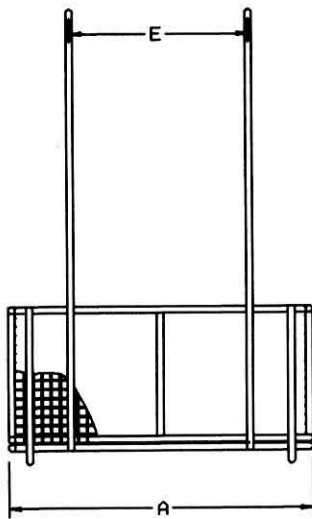
KEY FEATURES & BENEFITS

- **All stainless steel construction** makes baskets compatible with most cleaning processes. Type 304 stainless steel is acceptable for use with all alkaline solutions and many acids. Check with your Branson representative for confirmation of compatibility.
- **Different mesh sizes** are available to optimize the free flow of liquids and drying air while retaining parts in the baskets. Three standard mesh sizes are available from 1/16" to 7/8" openings. See the table below for details.
- **Carryover and dragout** of cleaning solution are minimized by open design and construction.
- **Electropolished finish** is standard on all baskets and components.
- **Two Dimensional Robot (TDR)** compatible with all five tank sizes.

Mesh Size	Openings Per Inch	Opening Size (Inches)	Wire Dia. (Inches)	Percent Open
1	1 x 1	0.88	0.120	77
4	4 x 4	0.187	0.063	56
8	8 x 8	0.078	0.047	39

SPECIFICATIONS

Tank Size	Width "A"	Length "B"	Handle Ht. "C"	Depth "D"	Handle Space "E"	Weight (Pounds)
10" x 12"	7.00"	10.25"	12.65"	5.50"	3.50"	6
12" x 16"	9.00"	14.00"	17.25"	6.00"	4.50"	8
16" x 20"	13.00"	18.00"	21.25"	7.00"	6.00"	14
20" x 24"	17.00"	22.00"	25.25"	8.00"	10.00"	18
20" x 32"	17.00"	29.00"	25.25"	8.00"	10.00"	25



MESH (Actual Size)



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HIGH FREQUENCY GENERATORS SERIES 8500HF

Branson's Series 8500HF High Frequency Ultrasonic Generators offer a full range of features to meet all precision cleaning requirements. Used on a simple cleaning tank or in a fully integrated cleaning system, the Series 8500HF will deliver precise cleaning quickly, consistently, and cost effectively. All of the generators operate with the same transducer designs.



KEY BENEFITS

Small Particle Removal - High frequency ultrasonics has been shown to be very effective for the removal of small particles.

Reduced Damage - High frequency ultrasonics effectively cleans while reducing the potential for damage that can occur with conventional ultrasonics.

True Variable Power Control - Makes the cavitation intensity variable from 10% to 100% to match the power to the application. The power is controlled using amplitude, which assures consistent and safe process control. Power can be manually controlled or through a PLC. A bright LED display indicates the selected power level.

Single Transducer Design - Assures flexibility to change your system at any time.

Broad Range Sweep Frequency - Permits the process engineer to select both band width and sweep rate to eliminate standing waves and improve ultrasonic activity distribution.

Auto Tuning - Maintains optimum operating frequency around your application. It allows the generator to dynamically adjust to changing conditions, optimizing performance around parameters such as temperature, liquid level, and tank loading.

Input/Output (I/O) Interface - Permits full remote control of the generator for automation or the addition of a PLC to record statistical information on ultrasonic performance.

Line/load Regulation - Compensates for liquid level and temperature changes as well as line voltage and load variations. Changes are held to less than 3% for very consistent cleaning.

ADDITIONAL STANDARD FEATURES

- User-adjustable power and frequency controls.
- Indirect cabinet cooling - sensitive components are isolated from potentially dirty cooling air.
- 19 inch, 3 DIN rack mount cabinet.
- Status indicators on safety and fault alarms.
- Bright LED display for easy viewing.
- Two-year warranty period.

SPECIFICATIONS*

Input Voltage:	220V +/- 15%, 50/60 Hz
Avg. output power:	40 watts per element
Output frequency:	80, 120, 170 kHz
Regulatory Approvals:	FCC and CSA or CE
Dimensions:	17.5"W, 16.8"D, 5.5"H
Weight:	30 lbs. (13.6kg)

GENERATOR SPECIFICATIONS

Model	Frequency	Transducer Elements	Average Output Power
S-85170-6	170 kHz	6	250 Watts
S-85170-12		12	500 Watts
S-85120-12	120 kHz	12	500 Watts
S-85120-18		18	750 Watts
S-8580-12	80 kHz	12	500 Watts
S-8580-18		18	750 Watts
S-8580-24		24	1000 Watts

NUMBERING SYSTEM

Each Series 8500HF Ultrasonic generator has a model number which contains information useful for selecting other compatible components. For example: S-8580-12. This model

number, stamped on the generator nameplate, indicates the model (Series 8500HF), the operating frequency (80 kHz), and the total number of transducer elements the generator can drive (12 elements). These may be on one cleaning tank or a combination of immersible transducer cans with a total of twelve elements.

REGULATORY APPROVALS

All Series 8500HF ultrasonic generators meet FCC Rules and Regulations. They conform to the EN 60-204-1 standards and carry either the CSA or CE mark.

[Gen 8500](#) | [Gen 8500HF](#) | [Gen 8300 Tanks](#) | [Tranducers](#)
[Aqueous Products](#) | [Back to Ultrasonic Generator Selection](#)

ADVANCED GENERATOR SERIES 8500

Branson's *Series 8500 Advanced Ultrasonic Generator* offers a full range of features to meet any precision cleaning requirements. Used on a simple cleaning tank or in a fully integrated cleaning system, the *Series 8500* will deliver precise cleaning quickly, consistently, and cost effectively.

We are proud to offer 48 hour delivery on most of our Series 8500 Ultrasonic Generators; call for details.



KEY FEATURES & BENEFITS

Line/load regulation compensates for liquid level and temperature changes as well as line voltage and load variations. Changes are held to less than 3% for very consistent cleaning.

True variable power control makes the cavitation intensity (not time) infinitely variable from 0% to 100% which allows matching the power to your application. A bright LED display indicates the selected level.

Selectable sweep frequency permits the process engineer to select both band width and sweep rate to eliminate standing waves and improve ultrasonic activity distribution.

Auto tuning maintains optimum operating frequency around *your* application. It allows the generator to dynamically adjust to changing bath conditions optimizing performance around parameters such as temperature, liquid level, and tank loading.

Power modulation mode is a unique patented feature which produces four times the peak power in the bath. This is helpful for tenacious soils or for driving difficult to cavitate chemistries like semi-aqueous and hydrocarbon formulations.

Two input/output (I/O) interface options permit remote control of operating parameters. One is for *on/off only*. The other enables *full remote control* of the generator for automation or the addition of a PLC to record statistical information on ultrasonic performance.

ADDITIONAL STANDARD FEATURES

- User-adjustable power and frequency controls.
- Indirect cabinet cooling - sensitive components are isolated from potentially dirty cooling air
- 19 inch, 3 DIN rack mount cabinet
- Status indicators on safety and fault alarms
- Bright LED display for easy viewing
- Two-year warranty period

SPECIFICATIONS*

Element configurations:	12, 18, 24, 36, 48
Input Voltage:	120V(12 elements only), 220V +/- 15%, 50/60 Hz
Avg. output power:	40 watts per element
Output frequency:	25 or 40 kHz
Regulatory Approvals:	FCC and CSA or CE
Dimensions:	17.5"W, 16.8"D, 5.5"H
Weight:	30 lbs (13.6kg)
<p>* For compatible ultrasonic tanks or immersible transducers, use the navigation at the bottom of this page.</p>	

GENERATOR OPTIONS

Model	Frequency	Trans-ducers	Voltage Requirements	Ave. Output Power
S-8525-12 S-8540-12	25 kHz 40 kHz	12	120 V or 220 V +/-15%	500 Watts
S-8525-18 S-8540-18	25 kHz 40 kHz	18	220 V +/- 15%	750 Watts
S-8525-24 S-8540-24	25 kHz 40 kHz	24	220 V +/- 15%	1000 Watts

S-8525-36	25 kHz	36	220 V +/- 15%	1500 Watts
S-8540-36	40 kHz			
S-8525-48	25 kHz	48	220 V +/- 15%	2000 Watts
S-8540-48	40 kHz			
All units operate at either 50/60 Hz				

NUMBERING SYSTEM

Each Series 8500 Ultrasonic generator has a model number which contains information useful for selecting other compatible components. For example: S-8540-12. This model number, stamped on the generator nameplate, indicates the model (Series 8500), the operating frequency (40 kHz), and the total number of transducer elements the generator can drive (12 elements). These may be on one cleaning tank or a combination of immersible transducer cans with a total of twelve elements.

REGULATORY APPROVALS

All Series 8500 ultrasonic generators meet FCC Rules and Regulations. They conform to the EN 60-204-1 standards and carry either the CSA or CE mark.

[Gen 8500](#) | [Gen 8500HF](#) | [Gen 8300 Tanks](#) | [Tranducers](#)
[Aqueous Products](#) | [Back to Ultrasonic Generator Selection](#)

ULTRASONIC CLEANING GENERATOR SERIES 8300

Branson's *Series 8300 Ultrasonic Generator* offers a full range of features to meet any precision cleaning requirements. Used on a simple cleaning tank or in a fully integrated cleaning system, the *Series 8300* will deliver precise cleaning quickly, consistently, and cost effectively.

We are proud to offer 48 hour delivery on most of our Series 8300 Ultrasonic Generators; call for details.



KEY FEATURES & BENEFITS

Line/load regulation compensates for liquid level and temperature changes as well as line voltage and load variations. Changes are held to less than 3% for very consistent cleaning.

True variable power control makes the cavitation intensity (not time) infinitely variable from 20% to 100% which allows matching the power to your application requirements.

Sweep frequency minimizes standing waves and improves ultrasonic activity distribution. The sweep operates at a rate of 80 Hz across a bandwidth of 1000 Hz.

Auto tuning maintains optimum operating frequency around *your* application. It allows the generator to dynamically adjust to changing bath conditions optimizing performance around parameters such as temperature, liquid level, and tank loading.

Input/output (I/O) interface option permits remote on/off control of the generator. This is ideal for systems applications or where the generator may be inaccessible.

Safety features to protect the generator include over-temperature, overload, open circuit and short circuit. Panel mounted fault lights indicate a problem.

ADDITIONAL STANDARD FEATURES

- Indirect cabinet cooling - sensitive components

are isolated from potentially dirty cooling air.

- 19 inch, 3 DIN rack mount cabinet.
- Status indicators on safety and fault alarms.
- CSA certified and meets FCC regulations.
- Two-year warranty period.

SPECIFICATIONS*

Element configurations:	12, 18, 24, 36, 48
Input Voltage:	120V(12 elements only), 208V to 230V, 50/60 Hz
Avg. output power:	40 watts per element
Output frequency:	25 or 40 kHz
Regulatory Approvals:	FCC and CSA
Dimensions:	17.5"W, 16.8"D, 5.5"H
Weight:	30 lbs (13.6kg)
For compatible ultrasonic tanks or immersible transducers, use the navigation at the bottom of this page.	

GENERATOR OPTIONS

Model	Frequency	Trans- ducers	Voltage Requirements	Ave. Output Power
S-8325-12 S-8340-12	25 kHz 40 kHz	12	120 V or 220 V +/- 15%	500 Watts
S-8325-18 S-8340-18	25 kHz 40 kHz	18	220 V +/- 15%	750 Watts
S-8325-24 S-8340-24	25 kHz 40 kHz	24	220 V +/- 15%	1000 Watts
S-8325-36 S-8340-36	25 kHz 40 kHz	36	220 V +/- 15%	1500 Watts
S-8325-48 S-8340-48	25 kHz 40 kHz	48	220 V +/- 15%	2000 Watts
All units operate at either 50/60 Hz				

NUMBERING SYSTEM

Each Series 8300 Ultrasonic generator has a model number which contains information useful for selecting other compatible components. For example: S-8340-12. This model number, stamped on the generator nameplate, indicates the model (Series 8300), the operating frequency (40 kHz), and the total number of transducer elements the generator can drive (12 elements). These may be on one cleaning tank or a combination of immersible transducer cans with a total of twelve elements.

REGULATORY APPROVALS

All Series 8300 ultrasonic generators meet FCC Rules and Regulations. They conform to the EN 60-204-1 standards and carry either the CSA or CE mark.

[Gen 8500](#) | [Gen 8500HF](#) | [Gen 8300 Tanks](#) | [Tranducers](#)
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MAGNETOSTRICTIVE GENERATOR SERIES G1KA

Branson's *Magnatrak Series G1KA Magnetostrictive Ultrasonic Generator* offers an alternative to piezoelectric equipment to meet industrial production cleaning requirements. Used on a simple cleaning tank or in a fully integrated cleaning system, the *Series G1KA* will deliver precise cleaning quickly, consistently, and cost effectively.



KEY FEATURES & BENEFITS

Magnatrak G1KA generators feature all solid state electronics packaged in a durable industrial housing. This lower frequency magnetostrictive ultrasonic equipment is ideal for cleaning heavy or massive parts. Often used in the metalworking and plating industries, it can remove larger or heavier levels of contamination quickly and effectively.

The use of robust PSCR silicon devices contributes to long-term reliability. This proven technology stands up to even the most demanding applications. The circuit design incorporates automatic frequency tracking eliminating the need for any operator adjustments to achieve optimum cleaning under varying circumstances. The on/off power switch acts as a circuit breaker to protect against line or equipment problems and is instantly re-setable for convenience.

All *Magnatrak Series G1KA* generators operate at a nominal 115 volt input. This allows them to be used anywhere in the plant without the need to run special high power wiring.

SPECIFICATIONS*

Element configurations:	1000w arrays
Input Voltage:	115V +/- 10%, 50/60 Hz
Avg. output power:	1000 watts
Output frequency:	20 kHz
Regulatory Approvals:	FCC
Cooling:	Air

Dimensions:	17"W, 14"D, 7"H
Weight:	48 lbs. (21.8kg)
<p>* For compatible ultrasonic tanks or immersible transducers, use the navigation at the bottom of this page.</p>	

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CLEANING SYSTEM OMNI 2000 MODEL 1012

OVERVIEW

The Branson *OMNI 2000-1012 Cleaning System* is a fully-configured ultrasonic cleaning and rinsing system with a built-in dryer. The equipment incorporates quality materials and workmanship without unnecessary extras. It offers a full range of hard working features while occupying only a fraction of the floor space of comparable systems. All controls are mounted in a convenient control box and operate at 24 volts for safety.



CLEANING

Precision cleaning is accomplished in the first tank. This tank is equipped with Branson's 25 or 40 kHz industrial ultrasonic components and thermostatically controlled heat.

RINSING

The *OMNI 2000-1012* includes two rinse tanks in a cascade arrangement. Rinse water overflows from tank three into tank two. This counterflowing feature provides excellent rinsing while substantially reducing water consumption. The first rinse also includes ultrasonic components as standard to assure that all soils and cleaning chemistries are driven from blind holes and crevices before the dry cycle. Clean and rinse ultrasonics can be run simultaneously.

DRYING

The drying chamber utilizes both elevated temperature and rapid air movement to produce dry parts. The chamber is furnished with a 3" vent duct to facilitate moist air removal.

FEATURES & BENEFITS

- Clean, rinse and dry in a single unit
- Small footprint minimizes floor space needs
- Low voltage controls for safety
- Ultrasonics on two tanks for performance
- Standard pump & filter extends bath life
- Easy access to maintenance components
- Convenient control panel for ease of operation
- Durable stainless steel construction
- Convenient working height
- A recirculating pump and filter system to continuously remove particulate material is standard

SPECIFICATIONS

Overall dimensions:	61"x20"x37"H
Working tank size:	10"x12"x10"D
Wash tank temperature:	70° F to 160° F
Recirculation flow rate:	1-3 gpm
Filter retention:	10μ standard (others available)
Ultrasonic output:	500W per tank
Dryer heat:	3000 watts
Dryer temperature:	230° F maximum
Input power:	230 volt, 60 Hz, 22A

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CLEANING SYSTEM OMNI 2000 MODEL 1620

OVERVIEW

The Branson *OMNI 2000-1620 Cleaning System* is a fully-configured ultrasonic cleaning and rinsing system with optional rust inhibition and a built-in dryer. The equipment incorporates quality materials and workmanship without unnecessary extras. It offers a full range of hard working features while occupying only a fraction of the floor space of comparable systems. All controls are mounted in a convenient control box and operate at 24 volts for safety.



CLEANING

Precision cleaning is accomplished in the first tank. This tank is equipped with Branson's 25, 40 or 80 kHz industrial ultrasonic components and thermostatically controlled heat.

RINSING

The *OMNI 2000-1012* includes two rinse tanks in a cascade arrangement. Rinse water overflows from the second rinse tank into the first. This counterflowing feature provides excellent rinsing while substantially reducing water consumption. The first rinse also includes ultrasonic components as standard to assure that all soils and cleaning chemistries are driven from blind holes and crevices before the dry cycle. Clean and rinse ultrasonics can be run simultaneously. The second rinse tank can be configured as a rust inhibition station when cleaning ferrous materials.

DRYING

The drying chamber utilizes both elevated temperature and rapid air movement to produce dry parts. The chamber is furnished with a 3" vent duct to facilitate moist air removal.

FEATURES & BENEFITS

- Clean, rinse and dry in a single unit
- Small footprint minimizes floor space needs
- Low voltage controls for operator safety
- Ultrasonics on two tanks for performance
- Standard pump & filter extends bath life
- Easy access to maintenance components
- Rust inhibition option for ferrous parts
- Built in interface for material handling
- Durable stainless steel construction
- A recirculating pump and filter system to continuously remove particulate material is standard.

SPECIFICATIONS

Overall dimensions:	94"x31"x37"H
Working tank size:	16"x20"x16"D
Wash tank temperature:	70° F to 160° F
Recirculation flow rate:	1-3 gpm
Filter retention:	10μ standard (others available)
Ultrasonic output:	1000W per tank
Dryer heat:	6000 watts
Dryer temperature:	250° F maximum
Input power:	230 volt, 3ph, 60 Hz, 41A

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CLEANING SYSTEMS

FLEXLINE SERIES - MODEL 1216

OVERVIEW

The Branson *FlexLine 1216 Cleaning System* is a cost-effective modular ultrasonic cleaning, rinsing and drying system. The equipment incorporates quality materials and workmanship without unnecessary extras. It offers more features and capabilities than tabletop units and greater flexibility than fixed-configuration console units.



The basic component of the *FlexLine Series* is a standard 316 stainless steel tank with protective skirting. This base tank can be configured in a variety of ways for:

- Immersion ultrasonic cleaning or rinsing
- Ultrasonics at 20, 25, 40, 80, 120, or 170 kHz
- Weir overflow
- Spray under immersion
- Surface sparging
- Spray rinsing
- Overflow rinsing
- Cascade rinsing

Based on standard components, a system can be easily designed and quickly delivered. Should production processes change, the equipment is easily modified.

FEATURES & BENEFITS

- Maximum flexibility
- Cost-effective design
- Available for quick delivery
- Broad range of pre-engineered configurations
- Stands to bring tanks to working height
- Overflow weir standard in all tanks

- Stainless steel covers and drain backs
- Durable 316 stainless steel construction

SPECIFICATIONS

Overall module dimension:	23"x21"x36"H
Working tank size:	12"x16"x15"D
Wash tank temperature:	70° F to 160° F
Optional pump flow rate:	1-3 gpm
Spray/sparger nozzles:	6/bar
Filter retention:	10μ standard (others available)
Ultrasonic output:	750W per tank
Inlet size:	1/2" NPT
Drain size:	1" NPT
Input power:	230 volt, 50/60 Hz, 1 phase

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CLEANING SYSTEMS

FLEXLINE SERIES MODEL 2024

OVERVIEW

The Branson *FlexLine 2024 Cleaning System* is a cost-effective modular ultrasonic cleaning, rinsing and drying system. The equipment incorporates quality materials and workmanship without unnecessary extras. It offers more features and capabilities than tabletop units and greater flexibility than fixed-configuration console units.



The basic component of the *FlexLine Series* is a standard 316 stainless steel tank with protective skirting. This base tank can be configured in a variety of ways for:

- Immersion ultrasonic cleaning or rinsing
- Ultrasonics at 20, 25, 40, 80, 120, or 170 kHz
- Weir overflow
- Spray under immersion
- Surface sparging
- Spray rinsing
- Overflow rinsing
- Cascade rinsing

Based on standard components, a system can be easily designed and quickly delivered. Should production processes change, the equipment is easily modified.

FEATURES & BENEFITS

- Maximum flexibility
- Cost-effective design
- Available for quick delivery
- Broad range of pre-engineered configurations
- Stands to bring tanks to working height
- Overflow weir standard in all tanks

- Stainless steel covers and drain backs
- Durable 316 stainless steel construction

SPECIFICATIONS

Overall module dimension:	31"x26"x36"H
Working tank size:	20"x24"x23"D
Wash tank temperature:	70° F to 160° F
Optional pump flow rate:	1-3 gpm
Spray/sparger nozzles:	10/bar
Filter retention:	10μ standard (others available)
Ultrasonic output:	1500W per tank
Inlet size:	1/2" NPT
Drain size:	1" NPT
Input power:	230 volt, 50/60 Hz, 1 phase

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MODULAR AQUEOUS CONSOLES BENCHMARK SERIES

OVERVIEW

Benchmark Series precision modular cleaning systems incorporate design features and design standards by which all other systems are judged. From state-of-the-art ultrasonic generators to the latest in process management, the *Benchmark Series* will meet your needs. They are designed from an end-user point of view. Quality, reliability, process flexibility, and serviceability are all designed in. Virtually any combination of cleaning, rinsing, and drying modules is available.

These systems are designed to minimize environmental impact. They use soil management techniques like coalescing and ultrafiltration, water management tools like cascade rinsing and closed-loop deionized water modules, and efficient recirculating dryers to minimize waste streams.



UNIQUE DESIGN, DURABLE UNITS

The uniqueness of the *Benchmark Series* starts with the modular design. Individual pre-engineered clean, rinse, and dry modules are selected to form a continuous cleaning process tailored to the specific needs of your application. Systems are not pre-configured which may limit process flexibility and results or make future process changes difficult and expensive. Available in standard tank sizes from 12" x 16" to 20" x 32", a *Benchmark* system is more than another cleaning line - it is an investment in cleaning technology. As your needs or technology change there will be *Benchmark* modules available to quickly re-configure your system.



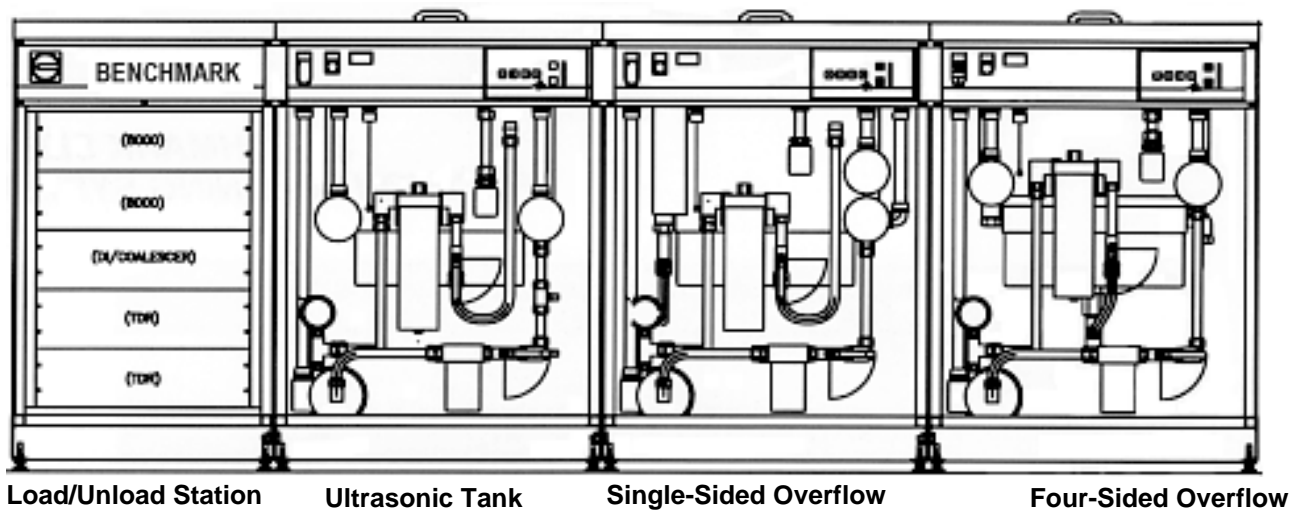
Stainless steel construction is used throughout including structural components. *Benchmark Series* units are resistant to corrosive environments and process chemistry and are generally compatible with cleanroom environments.

FEATURES & BENEFITS

Advanced ultrasonic generators with sweep frequency, line/load regulation, auto frequency tracking, and true variable power to assure total control of the ultrasonic cleaning or rinsing baths

- Four standard tank sizes - 12" x 16", 16" x 20", 20" x 24", and 20" x 32"
- Load/unload module with industry standard 19" rack mount for ultrasonic generators and other instrumentation
- 24 volt electrical controls for safety
- Recessed work surface with "drain back" feature for liquid containment and to prevent cross contamination
- All stainless steel plumbing including valving
- Solid state temperature controllers with set points and digital readouts
- Process tanks are bright annealed type 316 stainless steel with folded corner construction for process cleanliness
- Recirculation/Filtration in every tank

TYPICAL SYSTEM



OPTIONS

- Ultrasonic cleaning frequencies from 20 kHz to 400 kHz to meet varying process needs
- Cove corner highly polished process tanks for critical applications like semiconductor or disk drive component cleaning
- Conductivity/resistivity bath monitors
- Coalescing or ultrafiltration equipment for cleaning bath maintenance
- Deionized water systems for ultrapure rinsing
- In-tank rotation systems for parts handling during processing
- Part baskets and carriers
- Batch and mass-transfer handling equipment to move production through the system

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HIGH PERFORMANCE HOT AIR DRYER BENCHMARK SERIES

OVERVIEW

Benchmark Series High Performance Hot Air Dryers incorporate design features and design standards by which all others systems are judged. They have been developed from an end-user point of view - quality, reliability, process flexibility, and serviceability are all designed in. Room air is heated to expand its moisture-carrying capability and recirculated in high volume to extract liquids from parts following precision cleaning operations.



UNIQUE DESIGN FOR EFFICIENCY

The uniqueness of the *Benchmark Series* starts with the updraft airflow design. Significant testing has proven this design to be far more effective in most applications than traditional downdraft dryers. *Benchmark Dryers* can heat air from ambient to 250° F as required by specific application. This hot air can be recirculated, re-using the energy used to bring it up to operating temperature and thereby limiting operating costs. With recirculation rates up to 2100 cfm you can be assured of dry parts in the shortest possible time.

The entire process is Programmable Logic Controller (PLC) managed for precise drying and process repeatability and there is a built-in interface for linear material handling equipment.

FEATURES & BENEFITS

- Chamber sizes from 12" x 16" to 20" x 32"
- Wide temperature range from ambient to 250° F (+/- 3%) to accommodate different types of applications
- High volume airflow up to 2700 cfm to quickly and effectively remove all moisture

- Full Programmable Logic Controller (PLC) to facilitate consistency even with changes to manage multiple applications
- Updraft design for efficient air usage and shortest dry cycles
- All stainless steel construction for durability
- Low-loss air duct design to optimize flow
- High response, non-contaminating Nichrome heater elements

OPTIONS

- HEPA filtration for high precision drying applications - 99.97% effective retention at particle sizes down to 0.3 microns
- Power cover with releasable hinge for operator safety
- Sliding power cover
- Forced air blow-off for gross water removal

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TWO-DIMENSIONAL ROBOT TDR MODELS 15 & 50

OVERVIEW

The Branson *TDR Series* two-dimensional robots are microprocessor or PLC based automated parts handling systems. Designed by cleaning people for use in cleaning operations, these units are ruggedly constructed and appropriate for use in either production or clean room environments. *TDR Series* transport systems are available in two weight ranges (up to 15kg and up to 50kg) and a variety of heights to accommodate most production needs.

PROGRAMMABILITY

TDR Series transport systems can be programmed through any of three ways:

- Entering x/y coordinates into a hand-held keypad
- "Self - teaching" by walking the unit through the program using the hand-held keypad
- Downloading a previously stored program from a PC through the onboard RS-232 connector

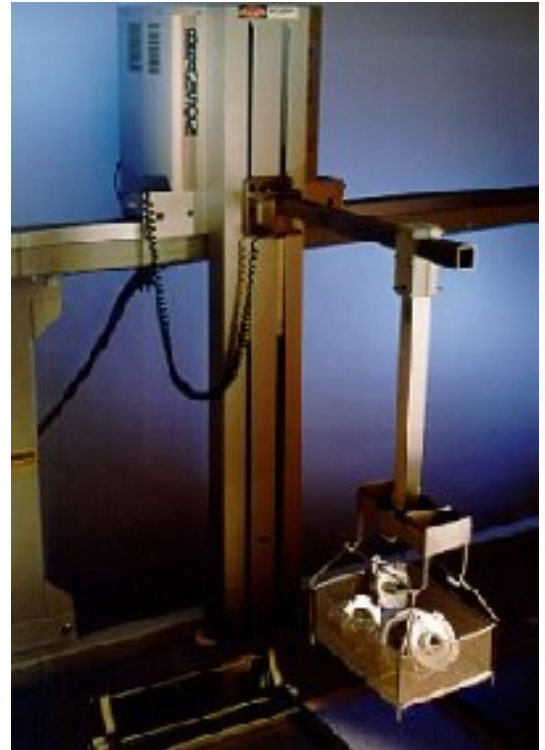
Operating steps can be inserted, deleted, or replaced simply by using keystrokes. The microprocessor has the capacity to store up to 255 steps which can be divided among a maximum of ten programs.

CONTROL FEATURES

The microprocessor is contained in a compact 19" rack-mountable control box. Located on the front of the box are: auto/manual mode selector, keypad pendant connector, RS-232 port, manual motor controls, an emergency stop switch, and LED display devices. LED displays indicate position and current activity as well as error codes if the self-diagnosing software senses problems.

EXPANDABILITY

Although a single *TDR Transport* head can dramatically increase process throughput, additional heads may be required for higher production now or in the future. Up to two additional heads can be added. Inter-head communication guarantees coordinated, troublefree operation even with complex applications. Standard units are 10 feet long with additional track and accessories



available in 5 foot increments up to 40 feet maximum.

PRODUCTIVITY

There are many paths to productivity using *TDR Series* transport equipment. Units work essentially unattended for full production shifts improving throughput. The consistent nature of operation will reduce process rejects improving yield. With eight 5v input channels and four 24v output channels, the *TDR* can control cleaning equipment parameters or act interactively with shop floor integration programs. Variable speed horizontal movement allows tailoring to the specific cleaning application.

STANDARD FEATURES

- Load capacity of 15kg or 50kg plus fixture weight
- Ten foot standard track length
- Four-point basket pickup for stability
- Cantilevered pickup arm for cleanliness
- Dedicated microprocessor-based controls
- 19" rack mountable control box
- Large, bright LED readouts
- RS-232 port for use with a remote PC
- Keypad or "self-learn" programming
- Ten program registers for different processes
- Self-diagnostic electronics
- Four horizontal and four vertical speeds
- Electronic breaking for smooth operation
- Eight external input channels (5v)
- Four internal output channels (24v)
- Communications with Branson equipment

OPTIONS

- PLC to integrate process management and handling
- Up to two additional work heads
- Four additional output channels (24v)
- PC interface cabling
- Additional track length
- Alternate voltages
- Multi-program selector box

SPECIFICATIONS

Power input:	120v, 50/60 Hz, 1 Ph
Maximum track:	40 feet
Max. horiz. travel:	33 feet
Max. number of heads:	Three

Max. payload per head:	15kg <u>or</u> 50kg
Horizontal speeds:	11, 30, 45, & 60 fpm

CURRENT LITERATURE

Download a PDF copy of our [TDR-15](#) or [TDR-50](#) brief



You'll need Adobe's free Acrobat Reader to view PDF files. Click the icon to download.

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CLEANING BATH MAINTENANCE SYSTEM COALESCER

OVERVIEW

Removal of oil from parts during manufacturing is one of the most common applications for aqueous ultrasonic cleaning equipment. As oil gradually contaminates the cleaning bath, the system loses its capability and produces inconsistent, unreliable cleaning results. The Branson *Coalescer* is one of a series of environmentally sound, cost-effective waste and water treatment products. This compact, fully-configured industrial chemistry treatment system is designed to separate oily soils from cleaning solutions extending their useful life. It relies on the immiscibility and different specific gravities of the cleaning solution and the oil being removed.



EQUIPMENT DESCRIPTION

The *Coalescer* is a completely self-contained unit consisting of a receiver tank to accept incoming solution, a stainless steel pump, a pre-filter, and the coalescing element itself. The standard pre-filter retains particles down to 10 microns with smaller retentions available.

HOW IT WORKS

The oil/detergent mixture is pumped through the oleophilic coalescing element which retains the light phase (oil) droplets on its surface until they conglomerate and rise to the top of the chamber where they are bled off. The heavy phase (cleaning solution) discharges via the bottom outlet and returns to the cleaning system. Branson coalescers will handle dissimilar liquids with specific gravity differences of 0.09 and greater.

FEATURES & BENEFITS

- Extends aqueous cleaning solution life minimizing operating and disposal costs
- Protects expensive cleaning equipment from damaging oil, dirt, and abrasives
- Collected oil is virtually water-free and can be filtered for reuse

- Maintains the cleaning bath surface "oil-free" preventing recontamination of clean parts
- Self-contained unit is easy to install and retrofit on existing cleaning systems
- Adjustable flow rate to optimize separation and the cleaning process
- Heated reservoir maintains process chemistry temperature

SPECIFICATIONS

Receiver capacity:	10 gallons
Total capacity:	17 gallons
Pump flow:	4.5gpm
Prefilter retention:	10 microns
Maximum temperature:	160° F
Power requirements:	230v, 60Hz, 1 phase, 12 amps

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DEIONIZED WATER SYSTEM AQUAFIER

OVERVIEW

The Branson *Aquafier* is one of a series of environmentally sound, cost-effective waste and water treatment products. This compact, fully-configured industrial water purification system incorporates all of the elements necessary to produce high quality rinse water at rates up to 5 gpm. Used in either a single pass or closed-loop configuration, *Aquaifiers* are capable of producing quality water at 17 megohms resistivity. The unit uses commercially available beds for easy regeneration or replacement.



EQUIPMENT DESCRIPTION

The *Aquafier* consists of a receiver tank to accept incoming water followed by a series of 4 pre-packaged resin beds and 1 spare. These beds can be anodic, cathodic, mixed, or carbon, based on the specific application. The unit includes liquid level controls in the receiver tank, flow control valve, back pressure regulator and all necessary non-contaminating plumbing and valving to permit operation. High pressure and temperature safeties are standard. Process monitoring is facilitated by the onboard digital resistivity monitor which measures water quality at point of use from 0.1 to 18 megohms.

FEATURES & BENEFITS

- Closed loop operation reduces water consumption and reuses hot rinse water for energy conservation
- Removes both organic and inorganic impurities
- Economically provides high quality deionized water at point of use
- Fully automatic operation for consistency and ease of operation
- Capable of accepting three industry-standard resin bed sizes: 0.5, 1.2, and 2.2 cubic feet
- Compatible with aqueous and semi-aqueous processing systems
- Digital temperature and resistivity readouts with setpoints

- 24 volt controls for safety
- Early Warning light to indicate bed depletion
- Automatic water volume makeup in the receiver tank
- Check valves to prevent cross contamination
- Stainless steel liquid-damped pressure gauges

SPECIFICATIONS

Receiver capacity:	14 gallons
Pump capacity:	5gpm @ 100ft head
Flow meter range:	0.5-5.0 gpm
Prefilter retention:	10 microns
Final filter retention:	2 microns- other retentions available
Power requirements:	230v, 60Hz 1 phase, 10 amps

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SOLVENT CLEANING & VAPOR DEGREASING

Liquid vapor degreasing with solvent has been an accepted method of precision cleaning for over 50 years. It incorporates washing, rinsing, drying, and solvent reclamation in compact, cost-effective unit. This alone makes it a very attractive process for many production cleaning applications.

Degreasing and the Environment

Environmental concerns raised in the last decade have changed both the chemistry and hardware technology for degreasing. Solvents have been modified or replaced to eliminate ozone depletion potential and other hazards. Equipment designs and operating processes have been totally re-engineered to reduce solvent losses to near zero. All Branson solvent degreasers meet NESHAP regulations, Environmental Protection Agency directives, and other applicable regulations.

The Solvent Advantage

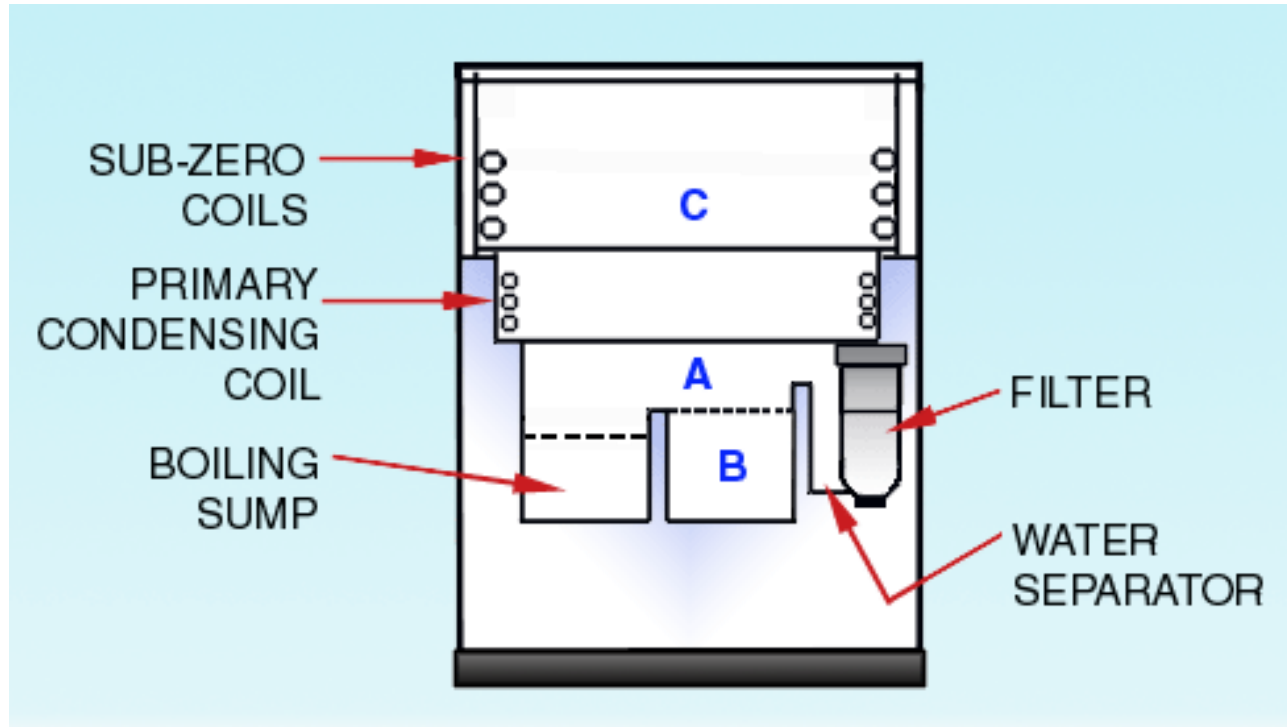
There are many benefits provided by solvent degreasing. Key among these are:

- No process chemistry to mix or maintain
- Solvent is reclaimed automatically in the unit - no significant waste stream
- Few process variables to be managed
- Very easy and cost effective to automate
- Results are not operator dependent
- Cost effective to purchase *and* operate
- Typically smaller footprint

A Simple Process

Perhaps the most attractive aspect of liquid vapor degreasing as a cleaning technology is the simplicity of the process itself:

- Parts are placed in a basket or carrier
- They are moved into the vapor zone (A) for pre-cleaning with hot vapors
- Then parts are transferred to the precision cleaning sump (B) for ultrasonic cleaning
- Parts cooled in the cleaning sump are returned to the hot vapor zone (A) for final rinsing
- A final stop in the freeboard area (C) allows any residual solvent vapors to return to the vapor zone



Solvent Compatibility

Branson's full line of precision ultrasonic vapor degreasers have been designed to operate with a broad range of commercially available solvents. This includes many of the traditional materials like methylene chloride, trichlorethylene, and perchloroethylene. They are also suitable for use with newer solvents like HCFC, HFC, HFE, n-propyl bromide, [AK225](#), and others.

[BTC 200](#) | [B SERIES](#) | [LED](#) | [ROBOTS](#)
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ULTRASONIC VAPOR DEGREASER MODEL BTC-200

OVERVIEW

The Branson *BTC-200 Ultrasonic Vapor Degreaser* is one of a series of environmentally sound, cost effective precision degreasers. It integrates state-of-the-art controls with maintenance practicality in a standard two sump ultrasonic vapor degreaser. It incorporates all of the important environmental and safety features typically found in larger units. All controls are clustered on a compact front-mounted digital control panel. It is ideal for use with traditional solvents like trichloroethylene and methylene chloride, as well as many of the newer materials including HCFC, HFC, HFE, n-propyl bromide, [AK-225](#), and more.



With a 4.8 gallon solvent capacity, the compact *BTC-200* is ideal for use at individual production work stations or as a tool to develop processes for larger equipment.

ENVIRONMENTAL FEATURES

The *BTC-200* is designed to comply with EPA environmental regulations on solvent emissions, an important environmental and economic consideration. Some of these features also facilitate OSHA compliance. The unit includes, as standard, a number of engineered improvements designed specifically to minimize solvent losses. The following list details some of these more important features:

- Freeboard ratio of 100% to minimize diffusion losses due to drafts
- Peripheral condensing coil to efficiently condense solvent vapors minimizing emissions.
- Captured sliding cover to eliminate drafts and help seal the unit during periods of inactivity.
- Internal water separator keeps all solvent within the unit at all times

SAFETY FEATURES

In addition to the benefits associated with keeping solvent away from the operator, the *BTC-200* has many other features which contribute to safety and reliability. Key among these are:

- Low voltage controls for operator safety
- "Ready" light to assure the unit is set to run
- High vapor level sensor to prevent solvent boil off.
- Coolant flow indicator assures flow through the condensing coils
- Low solvent sensor to prevent heater damage
- Early warning contamination indicator to signal the need for solvent replacement

MAINTENANCE

All maintenance procedures can be performed from the front or top of the unit. All services also enter conveniently from the front.

STANDARD FEATURES

- 24 volt controls for safety
- Digital temperature readouts
- 40 kHz industrial ultrasonics
- 304 Stainless steel construction
- Full peripheral cooling coils
- One year warranty

OPTIONS

- Desiccant dryer kit for azeotropic solvents
- Stainless steel mesh baskets
- Platform to raise the working height
- Chiller for cooling water

SPECIFICATIONS

Total solvent capacity:	4.8 Gallons
Boil tank heat:	1200 watts
Distillation rate based on HFC/HFE:	5.5 gph
Load capacity (steel):	80 lbs./hr
Cooling water @ 60° F:	0.75 gpm
Power requirements:	120v, 60 Hz, 1 ph, 12 amps
Weight:	96 pounds
Dimensions	
Ultrasonic tank:	8" x 10" x 6"D
Boiling tank:	8" x 10" x 6"D

Vapor zone: 20" x 10" x 6"D

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ULTRASONIC VAPOR DEGREASER B-SERIES

OVERVIEW

The Branson *B-Series Ultrasonic Vapor Degreaser* is the latest in a series of environmentally sound, cost effective precision degreasers. Branson, well known for ultrasonics, is also the global leader in solvent cleaning technology. The B-Series integrates over 55 years of degreasing experience with the demanding needs of a changing marketplace to offer you a functional solvent solution to your cleaning needs. Similar in operation to a traditional two sump unit, they incorporate all of the important environmental and safety features you need, including two onboard compressors for both primary and sub-zero cooling and 40 kHz ultrasonics. All controls are clustered on a compact front-mounted 24 volt digital control panels. The B-Series is ideal for use with most commercially available vapor degreasing solvents.



FEATURES

- Freeboard ratio of greater than 120% to eliminate diffusion losses
- Refrigerated primary condensing coil to condense the bulk of the solvent vapors
- Refrigerated sub-zero freeboard condenser to provide a cold air barrier minimizing fugitive losses
- Sliding cover to eliminate drafts and help seal the unit during periods of inactivity.
- Offset boiling sump with liquid level control (*except on B452R*)
- Bag filter to minimize solvent loss during maintenance
- Cooled internal water separator to reduce losses
- Stainless plumbing for solvent-wetted areas

SAFETY FEATURES

In addition to the benefits associated with minimizing solvent losses the B-Series degreasers have many other features which contribute to safety and reliability. Key among these are:

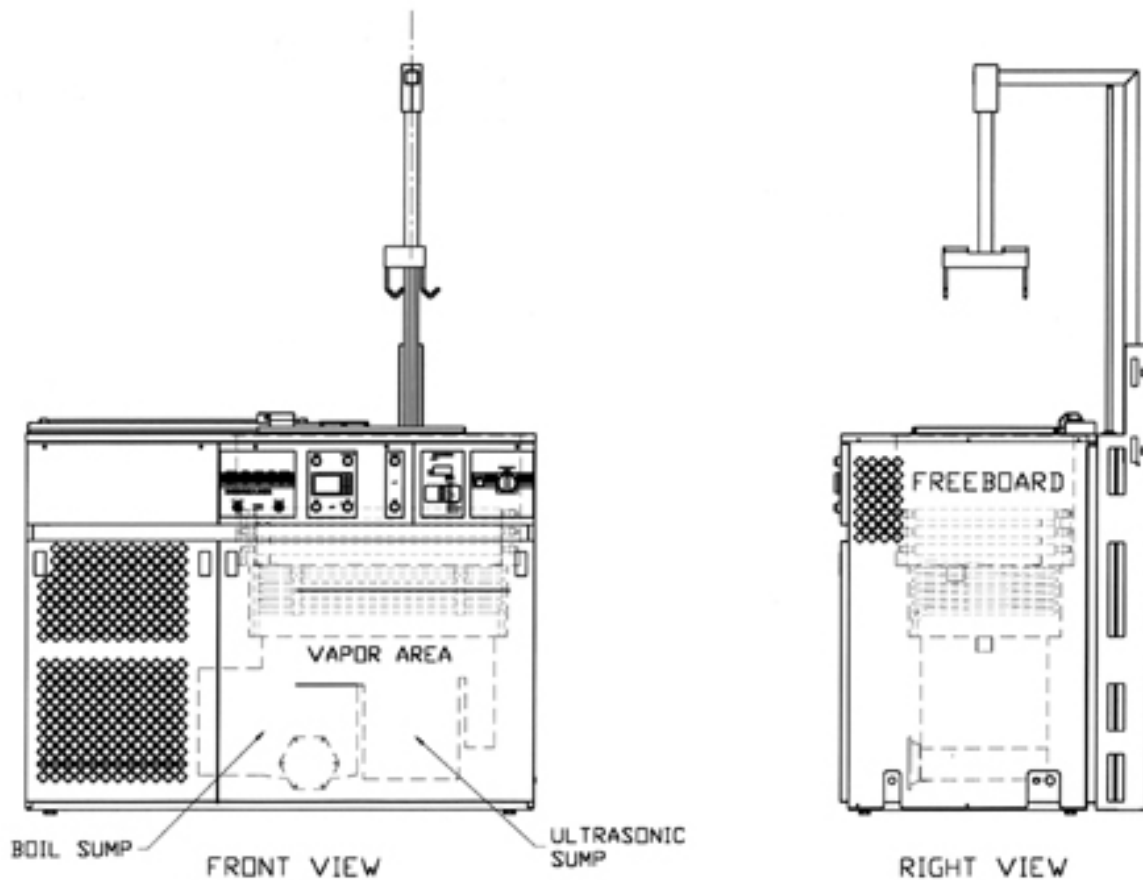
- Low voltage controls for operator safety
- "Ready" light to notify operator the unit is set to run
- Coolant indicator gives visual confirmation the refrigeration is functioning

- High vapor level sensor to prevent solvent boil off.
- Heat Over Temp sensor to prevent heater damage
- Early warning contamination indicator to signal the need for solvent replacement
- Temperature control of ultrasonic sump (except on B452R)
- Lift off skirt panels to facilitate maintenance

OPTIONS

- PLC-controlled vertical & dual axis lift (B452 & B950)
- Split power cover
- TDR interface
- Desiccant dryer
- 460 V (B1950 & B3550)
- Stainless steel mesh baskets
- Water cooled compressors for cleanroom installations
- High frequency ultrasonics - 80 to 170 kHz

OVERVIEW OF THE B-SERIES



*The system shown is the B950R with the optional vertical lift.
While there are slight differences between each model, this drawing is representative of the basic system layout

SPECIFICATIONS

	Model B452R	Model B950R	Model B1950R	Model B3550R
Working dimensions	10"X12"X8"D	12"X16"X12"	16"X20"X14.5"	20"X24"X17"
Boil sump heat	2000 immersion heat	4000 immersion heat	8000 immersion heat	14000 immersion heat
Ultrasonic heat	400W	1000W	1500W	2000W
Ultrasonics*	250W@40 kHz std	500W@40 kHz std	1000W@40 kHz std	1500W@40 kHz std
Distillation rate**	7 gph	14 gph	28 gph	49 gph
Recirculation	1 gpm @ 10 μ	2 gpm @ 10 μ	4 gpm @ 10 μ	6 gpm @ 10 μ
Load capacity**	200lbs.steel/hr	400lbs.steel/hr	800lbs.steel/hr	1400lbs.steel/hr
Vapor zone	28.7"LX15.2"WX8.5"D	32.7"LX19.2"WX12"D	40.7"LX23.2"WX14.5"D	48.7"LX27.2"WX17"D
Control voltage	24 volts	24 volts	24 volts	24 volts
Solvent capacity	9.2 gallons	26 gallons	50 gallons	82 gallons
Overall	54.7" X 28.5" X 46"	64.7" X 32.5" X 48.7"	89.5" X 36.5 " X 60"	110" X 40.5 " X 68"
Input power	208 or 230V 3 ϕ 27A	208 or 230V 3 ϕ 39A	208 or 230V 3 ϕ 62A or 460, 3 ϕ 33A option	208 or 230V 3 ϕ 81A or 460, 3 ϕ 42Aoption
Shipping weight	500lbs. with pallet	750lbs. With pallet	1000lbs. With pallet	1500lbs. With pallet

* Higher frequencies available upon request

**Based on HCFC, HFE, and HFC solvents. Specifications subject to change without notice

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ULTRASONIC VAPOR DEGREASER LED SERIES LOW EMISSIONS DEGREASER

OVERVIEW

The Branson *LED Series Ultrasonic Vapor Degreasers* incorporate all of the latest advances in emission controls and high-efficiency ultrasonics to create one of the easiest to operate and highest value degreasers available today. All models in this series include a boiling tank for vapor generation and gross cleaning, an ultrasonic tank for critical cleaning, and an internal water separator. They are unique in that they include, as standard, a patented conductive superheat plate to assure that minimal solvent leaves the unit with processed parts. They are designed for use with traditional solvents like trichloroethylene and methylene chloride, as well as many of the newer materials including HCFC, HFC, HFE, n-propyl bromide, [AK-225](#), and more.



ENVIRONMENTAL FEATURES

The *LED Series degreasers* includes many engineered improvements designed to exceed EPA environmental regulations on solvent emissions. Some of these features also facilitate OSHA compliance. Among these features are 120% freeboard, a bi-parting power sliding cover, standard sub-zero secondary cooling coils, patented conductive superheat plate and welded plumbing connections to eliminate undetected leaks.

In addition to these standard features, several options are available to further reduce emissions. These include a desiccant kit for azeotropes, open-mesh stainless steel parts baskets, and a TDR automated hoist system to control system operating methods.

SAFETY FEATURES

In addition to the benefits associated with keeping solvent away from the operator, the *LED Series Degreasers* have many other features which contribute to safety and reliability. Key among these are:

- Low voltage controls for safety
- PLC controls for process consistency
- Refrigerant temperature safety switch assures the refrigeration is functional
- High vapor level sensor to prevent solvent boil off.
- Low solvent sensor to prevent heater damage and solvent decomposition.

DESIGN FEATURES

Ruggedly built with stainless steel construction, *LEDs* are excellent for both heavy-duty production work and high precision cleaning. Each of the two compartments in these compact degreasers has unobstructed work space for the rapid cleaning of large, small, simple or complex parts. The boil tank is heated by low watt density stainless steel

immersion heaters for efficient vapor generation. The ultrasonic tank is powered by Branson's S-8500 Series ultrasonic equipment.

DIMENSIONS

Model	Overall			Process Tanks		
	L	W	H	L	W	D
1216	89"	36"	59"	12"	16"	12"
1620	109"	40"	68"	16"	20"	14"
2024	139"	44"	74"	20"	24"	16"

STANDARD FEATURES

- | | |
|--|---|
| <ul style="list-style-type: none"> ● PLC controls for consistency ● Low voltage controls for safety ● All stainless steel cooling coils ● Conductive superheat plate conserves solvent ● Low watt density immersion heat ● Large easy-access clean out ports ● Internal water separator/desiccant dryer | <ul style="list-style-type: none"> ● Automated sliding stainless steel power cover ● 40 kHz ultrasonic components - other frequencies available ● Recirculation pump and filter ● Sloped bottom in boil tank ● All tankage is 304 stainless steel ● Compact footprint ● Coolant flow switch for safety |
|--|---|

SPECIFICATIONS

Model	Capacity	Heat	Cooling	Distill Rate*	Work Cap.*	Recirc.	Power
1216	26 gal.	4KW	1.2gpm@ 45F	18 gph	600lbs steel/hr	2.2 gpm	60 Hz
1620	54 gal.	8KW	2.4gpm@ 45F	37 gph	1200lbs steel/hr	4 gpm	60 Hz
2024	87 gal.	14KW	4.2gpm@ 45F	65 gph	2000lbs steel/hr	4 gpm	60 Hz

* based on HFC/HFE

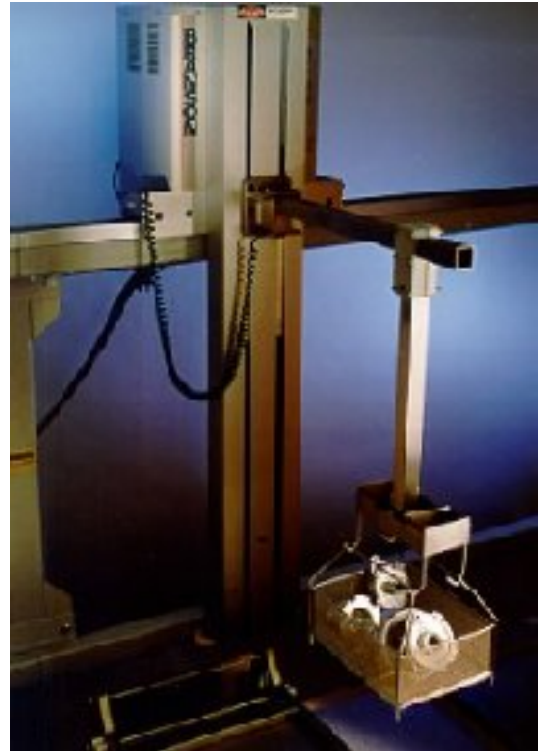
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TWO-DIMENSIONAL ROBOT MODEL TDR

OVERVIEW

The Branson *TDR Series* two-dimensional robots are microprocessor or PLC based automated parts handling systems. Designed by cleaning people for use in cleaning operations, these units are ruggedly constructed and appropriate for use in either production or clean room environments. *TDR Series* transport systems are available in two weight ranges (up to 15kg and up to 50kg) and a variety of heights to accommodate most production needs.



PROGRAMMABILITY

TDR Series transport systems can be programmed through any of three ways:

- Entering x/y coordinates into a hand-held keypad
- "Self - teaching" by walking the unit through the program using the hand-held keypad
- Downloading a previously stored program from a PC through the onboard RS-232 connector

Operating steps can be inserted, deleted, or replaced simply by using keystrokes. The microprocessor has the capacity to store up to 255 steps which can be divided among a maximum of ten programs.

CONTROL FEATURES

The microprocessor is contained in a compact 19" rack-mountable control box. Located on the front of the box are: auto/manual mode selector, keypad pendant connector, RS-232 port, manual motor controls, an emergency stop switch, and LED display devices. LED displays

indicate position and current activity as well as error codes if the self-diagnosing software senses problems.

EXPANDABILITY

Although a single *TDR Transport* head can dramatically increase process throughput, additional heads may be required for higher production now or in the future. Up to two additional heads can be added. Inter-head communication guarantees coordinated, troublefree operation even with complex applications. Standard units are 10 feet long with additional track and accessories available in 5 foot increments up to 40 feet maximum.

PRODUCTIVITY

There are many paths to productivity using *TDR Series* transport equipment. Units work essentially unattended for full production shifts improving throughput. The consistent nature of operation will reduce process rejects improving yield. With eight 5v input channels and four 24v output channels, the *TDR* can control cleaning equipment parameters or act interactively with shop floor integration programs. Variable speed horizontal movement allows tailoring to the specific cleaning application.

STANDARD FEATURES

- Load capacity of 15kg or 50kg plus fixture weight
- Ten foot standard track length
- Four-point basket pickup for stability
- Cantilevered pickup arm for cleanliness
- Dedicated microprocessor-based controls
- 19" rack mountable control box
- Large, bright LED readouts
- RS-232 port for use with a remote PC
- Keypad or "self-learn" programming
- Ten program registers for different processes
- Self-diagnostic electronics
- Four horizontal and four vertical speeds
- Electronic breaking for smooth operation
- Eight external input channels (5v)
- Four internal output channels (24v)
- Communications with Branson equipment

OPTIONS

- PLC to integrate process management and handling
- Up to two additional work heads
- Four additional output channels (24v)
- PC interface cabling
- Additional track length
- Alternate voltages
- Multi-program selector box

SPECIFICATIONS

Power input:	120v, 50/60 Hz, 1 Ph
Maximum track:	40 feet
Max. horiz. travel:	33 feet
Max. number of heads:	Three
Max. payload per head:	15kg <u>or</u> 50kg
Horizontal speeds:	11, 30, 45, & 60 fpm

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OC OPTICAL CLEANER CONCENTRATED CLEANING FORMULA

APPLICATIONS AND USE

Branson OC Optical Cleaner is a concentrated, broad spectrum cleaning solution which is an alkaline, non-foaming, liquid detergent specially formulated to remove a variety of soils normally encountered in the optical, glass, and lens manufacturing industry.

A blend of liquid nonionic surfactants and detergent bases, the superior detergent properties, wetting capabilities and free rinsing properties of Branson OC solution combine to provide an exceptional cleaner for removing difficult soils and contaminants. It removes general soils, fingerprints, cerium oxide, pitch, and blocking waxes from optical lenses. It is very effective in removing polishing compounds from glass and optical surfaces prior to deposition of coatings.

APPLICATION PROCEDURES

Branson OC Solution is mixed easily with cold or hot water in a concentration of 7-10% by volume. Branson OC Solution can be used over a temperature range of 130°F to 180°F (82°C) in suitable commercial and industrial cleaning tanks. Higher temperatures are required for waxy soil removal.

For optimum cleaning, Branson OC should be operated at recommended temperatures. Cleaning time is dictated by the quantity and nature of the soil. Operating Branson OC below the recommended concentrations, temperatures, or time will generally result in poor cleaner performance, characterized by cloudiness and water breaks. Operating Branson OC above the recommended parameters may lead to component metal attack or cause the surfactants to separate from the solution causing poor cleaning. It is imperative that the solution be allowed to "degas" at operating temperature for a minimum of 10 minutes prior to placing the parts into the cleaning solution. It is best if ultrasonic energy is applied during this time to enhance degassing. Thorough rinsing is suggested for removal of cleaning solution. As with any process involving water, drying should be considered as the final step.

The selection and use of the proper ultrasonic cleaning equipment and component fixturing will influence the cleaning efficiency and performance of Branson OC.

When water replenishment quantities meet or exceed 15% of the tank volume, the cleaning ability of the operating solutions may be so reduced as to make further additions of Branson OC unproductive and uneconomical. At this point, it is usually more practical to make up a new solution. Periodic pH variation checks can give an indication of solution effectiveness.

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CHEMICAL CHARACTERISTICS

Chemical Composition	Blend of liquid nonionic alkaline surfactants and detergents
Flash Point	None
Recommended Diluent	Water
Biodegradable	Yes
Phosphate Free	Yes
Normal Use Concentration	.7-10% by volume
Normal Use Temperature	130-180°F (55-82°C)
pH at Use Temperature	9.8
Rinsability	Good

Effect of Working Solution on Metals

Stainless Steel	None
Steel	None
Copper	None
Brass	None
Aluminum	None
Magnesium	None*
Zinc	None*
Tin	None*

*No effect if solution temperature is less than 140°F.

PRECAUTIONARY CONSIDERATIONS

- BRANSON OC SOLUTION CONTAINS MILDLY ALKALINE DETERGENTS, AND DIRECT CONTACT MAY RESULT IN BURNS OF EYES OR SKIN IRRITATION.
- AVOID PROLONGED SKIN CONTACT.
- WASH THOROUGHLY AFTER HANDLING.
- DO NOT TAKE INTERNALLY.
- IF DIRECT CONTACT OCCURS, FLUSH REPEATEDLY WITH COOL, CLEAR WATER.
- KEEP OUT OF REACH OF CHILDREN.

DISPOSAL

Dispose in accordance with all local, state, and federal regulations.

BRANSON CONCENTRATED CLEANING SOLUTIONS

MC-1, MC-2 MC-3 Metal Cleaner

ECElectronic Cleaner

ISIndustrial Strength Cleaner

GPGeneral Purpose Cleaner

OROxide Remover

BCRBuffing Compound Remover

LRSLiquid Rust Stripper

JCJewelry Cleaner

OCOptical Cleaner

For additional information concerning these solutions, contact Branson or a Bransonic® dealer.

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HMIS RATINGS:
Health: 1
Flammability: 0
Reactivity: 0
Personal Protection: B

Section 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Branson OC	Emergency Telephone Number: (800)535-5053
Chemical Family: General purpose cleaner	Date Prepared: AUG 20, 2003
Company Identification: Branson Ultrasonics Corp.	MSDS Number: 3844
41 eagle Rd.	MFGD. BY: ABC Compounding Co., Inc.
Danbury, CT 06813	6970 Jonesboro Rd.
	Morrow, Ga. 30260

Section 2: COMPOSITION, INFORMATION ON INGREDIENTS

CAS NUMBER	CHEMICAL NAME	% BY WGT.	OSHA PEL/ACGIH TLV	SARA 302/304(1)*	SARA 313 (2)*	STATE INFO(3)(4)
102-71-6	Triethanolamine	< 10.0	5 mg/m3 / 5 mg/m3	NO	NO	NO

* See Section 15 for more information n/e = none established - n/a = not applicable

Section 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

CAUTION. May cause irritation to the eyes and skin.

Primary Route of Entry: Eye contact, skin contact

Acute/Potential Health Effects:

EYES: May cause irritation to the eyes experienced as discomfort or pain with excess blinking and tear production and redness or swelling of the conjunctiva.

SKIN: May cause mild skin irritation. Prolonged or repeated contact may cause defatting or drying of skin.

INHALATION: Not harmful.

INGESTION: May cause nausea, vomiting and diarrhea.

Section 3: HAZARDS IDENTIFICATION - continued:

Chronic / Long Term Effects: No data.

Signs and Symptoms of Overexposure: Ingestion may cause nausea, vomiting and diarrhea. Prolonged dermal exposure may cause drying of the skin.

Target Organ Effects: No data.

Reproductive/Developmental Information: No data.

Carcinogenic Information: This material is not listed as a carcinogen by IARC, NTP or OSHA.

Section 4: FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation persists.

SKIN: Flush skin with plenty of water for at least 15 minutes. Get medical attention if irritation persists.

INHALATION: No specific treatment is necessary since this material is not likely to be hazardous by inhalation.

INGESTION: Give large quantities of water or milk. Induce vomiting. Get medical attention.

Section 5: FIRE FIGHTING MEASURES

Flash Point: No flash by standard methods.

Extinguishing Media: Use appropriate methods for combating surrounding fire.

Special Fire Fighting Instructions: Wear a self contained breathing apparatus with a full face piece operated in the positive pressure demand mode.

Section 6: ACCIDENTAL RELEASE MEASURES

Absorb spill with inert material. Flush area well with water to remove trace residue. Surfaces may become slippery after spillage.

Section 7: HANDLING AND STORAGE

Store in a cool, dry area. Keep from freezing. Keep container closed when not in use. Keep out of reach of children.

Section 8: EXPOSURE CONTROLS and PERSONAL PROTECTION

Eye Protection: Wear safety glasses or goggles.

MSDS Number: 3844

Skin Protection: To prevent repeated or prolonged contact, wear impervious gloves (made from rubber, nitrile or neoprene).

Respiratory Protection: No special requirements are needed for this material.

Engineering Controls: Use general ventilation.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Clear, amber liquid with characteristic odor

pH Concentrate: 10.0

Solubility in Water: Complete

Vapor Pressure [mmHg]: n/e

Evaporation Rate (Butyl Acetate=1): n/a

Vapor Density [Air=1]: n/e

Specific Gravity [H2O=1]: 1.10

Boiling Point: > 212 F

Section 10: REACTIVITY

Stability: Stable

Hazardous Polymerization: Will not occur

Conditions to avoid: High temperature

Hazardous Decomposition Products: CO, CO2

Incompatibility: Strong acids, oxidizers

Section 11: TOXICOLOGICAL INFORMATION

No data.

Section 12: ECOLOGICAL INFORMATION

No data.

Section 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: TRANSPORTATION INFORMATION

D.O.T. Shipping Name / Class:

Corrosive liquid, Basic, Inorganic, NOS, 8, UN3266, II (Contains Phosphates)

Section 15: REGULATORY INFORMATION

U.S. Federal Regulations:

TSCA (Toxic Substances Control Act): The intentional ingredients of product are listed.

MSDS Number: 3844

Title III Section 311/312 Hazardous Categories - 40 CFR 370.2:

ACUTE (X) Chronic () Fire () Pressure () Reactive () Not Applicable ()

(1) Title III Section 302/304 Extremely Hazardous Substances - 40 CFR 355 Appendix A

(2) Title III Section 313 Toxic Chemicals - 40 CFR 372.65

If indicated under Section 2 of this MSDS, this product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right to Know Act of 1986. This information must be included in all MSDS that are copied and distributed for this material.

RCRA Status: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. If this product becomes a hazardous waste it would be assigned RCRA Code(s)
None

State and Local Regulations: Certain states maintain their own ingredient lists which differ slightly from the Federal standards. If indicated under Section 2 of this MSDS, states listed below may have regulations on ingredients contained in this product. Check with your state for any additional regulations.

(3) California proposition 65 (Safe Drinking Water & Toxic Enforcement Act of 1986)

(4) Massachusetts (Hazardous Substance Disclosure by Employers)

Section 16: OTHER INFORMATION

This information was compiled from current manufacturer's MSDS's of the component parts of the product.

Disclaimer: The Manufacturer believes that the information contained in the Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with, nor followed in violation of applicable laws, regulations, rules or insurance requirements.

JEWELRY CLEANER CONCENTRATED CLEANING FORMULA

APPLICATIONS AND USE

Branson Jewelry Cleaner is a specialized biodegradable, phosphate-free alkaline cleaner for cleaning jewelry and precious metals.

A unique blend of nonionic surfactants, detergent bases, and wetting agents provides a safer cleaning medium for valuable jewelry.

Branson Jewelry Cleaner solution removes the general soils, particulates, fingerprints, oils, and oxides that accumulate with normal use. Gemstones and precious metals alike are quickly and safely restored to their original brilliance with this free-rinsing solution, and the luster of rings and watchbands is renewed.

Branson Jewelry Cleaner is safe for use with virtually all metals and alloys. Spent solution should be neutralized and disposed of in accordance with local, state, and federal regulations.

APPLICATION PROCEDURES

Branson Jewelry Cleaner is easily mixed with water in a concentration of 10-12% by volume and can be used in commercial cleaning tanks at temperatures of up to 140°F (60°C). Optimum cleaning performance will be realized at higher solution temperatures.

It is imperative that the solution be allowed to "degas" at operating temperature for a minimum of 10 minutes prior to placing the parts into the cleaning solution. It is best if ultrasonic energy is applied during this time to enhance degassing. Thorough rinsing is suggested for removal of cleaning solution. As with any process involving water, drying should be considered as the final step.

CHEMICAL CHARACTERISTICS

Chemical Composition:	Blend of liquid nonionic alkaline surfactants, detergents, and wetting agents.	Biodegradable:	Yes
Flash Point:	None	Phosphate Free:	Yes
Recommended Diluent:	Water	Normal Concentration:	10-12% by volume
		Normal Temperature:	70-140°F (22-60°C)
		pH at Use Temperature:	12.1
		Rinsability:	Good

See the MSDS for further information

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HMIS RATINGS:
Health: 2
Flammability: 0
Reactivity: 0
Personal Protection: B

Section 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Branson JC	Emergency Telephone Number: (800)535-5053
Chemical Family: Butyl based cleaner	Date Prepared: April 29, 2004
Company Identification: Branson Ultrasonics Corp.	MSDS Number: 3649
41 eagle Rd.	MFGD. BY: ABC Compounding Co., Inc.
Danbury, CT 06813	6970 Jonesboro Rd.
	Morrow, Ga. 30260

Section 2: COMPOSITION, INFORMATION ON INGREDIENTS

CAS NUMBER	CHEMICAL NAME	% BY WGT.	OSHA PEL/ACGIH TLV	SARA 302/304(1)*	SARA 313 (2)*	STATE INFO(3)(4)	CERCLA RQ
111-76-2	2-Butoxyethanol	< 7.0	25ppm-skin 25ppm-skin	NO	YES	NO	
6834-92-0	Sodium Metasilicate	< 7.0	15 mg/m3/ 10 mg/m3	NO	NO	NO	

* See Section 15 for more information n/e = none established - n/a = not applicable

Section 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER. Corrosive. May cause irritation of skin and respiratory tract.
May be absorbed through skin.

Primary Route of Entry: Eye contact, skin contact/absorption, inhalation

Acute/Potential Health Effects:

EYES: Causes severe irritation experienced as discomfort or pain, excess blinking and tear production, with redness and swelling of the conjunctiva.

SKIN: Brief contact may cause slight irritation. Prolonged contact may cause more severe irritation with pain, local redness and swelling.

INHALATION: High concentrations of vapor or mists may cause irritation of the respiratory tract.

INGESTION: May cause headache, dizziness, incoordination, nausea, vomiting, diarrhea and general weakness.

Section 3: HAZARDS IDENTIFICATION - continued:

Chronic / Long Term Effects: 2-Butoxyethanol has caused red blood cell hemolysis in lab animals and secondary injury to the liver and kidney.

Signs and Symptoms of Overexposure: Dermal exposure may cause local redness and swelling, pain and discomfort. Prolonged skin contact may result in absorption of harmful amounts.

Target Organ Effects: Lungs and upper respiratory tract, eyes, skin, liver, kidney

Reproductive/Developmental Information: No data.

Carcinogenic Information: This material is not listed as a carcinogen by IARC, NTP or OSHA.

Section 4: FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

SKIN: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Get medical attention immediately.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

INGESTION: Seek medical attention immediately. Call a poison control center or doctor for treatment advice. Have person sip a glass of water if able to swallow. Never give anything by mouth to an unconscious person.

Section 5: FIRE FIGHTING MEASURES

Flash Point: No flash by standard methods.

Extinguishing Media: Use appropriate methods for combating surrounding fire.

Special Fire Fighting Instructions: Wear a self contained breathing apparatus with a full face piece operated in the positive pressure demand mode. Chemical resistant PPE is recommended.

Section 6: ACCIDENTAL RELEASE MEASURES

Stop all leaks. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Absorb spill with inert material (e.g. dry sand, earth). Prevent runoff from entering drains, sewers or other bodies of water. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to containers for disposal.

Section 7: HANDLING AND STORAGE

Follow all MSDS/label precautions even after container is emptied because they may contain product residues. Use with adequate ventilation. Do not get in eyes, on skin or clothing. Store in a cool dry place. Keep container closed when not in use. Keep out of reach of children.

Section 8: EXPOSURE CONTROLS and PERSONAL PROTECTION

Eye Protection: Wear safety glasses or goggles.

MSDS Number: 3649

Skin Protection: To prevent repeated or prolonged contact, wear impervious gloves (made from rubber, nitrile or neoprene), clothing and boots.

Respiratory Protection: When respiratory protection is required, use an organic vapor & particulate cartridge. All respiratory programs must meet OSHA's 29 CFR 1910.34 & ANSI Z88.2 requirements.

Engineering Controls: Good general ventilation required.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Clear, red liquid with butyl odor
pH Concentrate: 12.0
Solubility in Water: Complete
Vapor Pressure [mmHg]: n/e
Evaporation Rate (Butyl Acetate=1): n/e
Vapor Density [Air=1]: n/e
Specific Gravity [H2O=1]: 1.07
Boiling Point: > 212 F

Section 10: REACTIVITY

Stability: Stable
Hazardous Polymerization: Will not occur
Conditions to avoid: High temperature
Hazardous Decomposition Products: None
Incompatibility: Strong acids, alkalis, oxidizing agents

Section 11: TOXICOLOGICAL INFORMATION

2-Butoxyethanol: SKIN-Rabbit; 24 hr uncovered-minimal erythema in 2/5; no irritation 3/5

Section 12: ECOLOGICAL INFORMATION

2-Butoxyethanol: Toxicity to fish-fathead minnow; 96h; LC50 Results: 1700 mg/l.

Section 13: DISPOSAL CONSIDERATIONS**Waste Disposal Method:**

Wastes must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: TRANSPORTATION INFORMATION**D.O.T. Shipping Name / Class:**

Corrosive Liquid, Basic, Inorganic, N.O.S., 8

UN 3266, II (Contains Sodium Metasilicate)

Section 15: REGULATORY INFORMATION**U.S. Federal Regulations:**

TSCA (Toxic Substances Control Act): The intentional ingredients of product are listed.

MSDS Number: 3649

Title III Section 311/312 Hazardous Categories - 40 CFR 370.2:

ACUTE (X) Chronic (X) Fire () Pressure () Reactive () Not Applicable ()

(1) Title III Section 302/304 Extremely Hazardous Substances - 40 CFR 355 Appendix A

(2) Title III Section 313 Toxic Chemicals - 40 CFR 372.65

If indicated under Section 2 of this MSDS, this product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right to Know Act of 1986. This information must be included in all MSDS that are copied and distributed for this material.

RCRA Status: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. If this product becomes a hazardous waste it would be assigned RCRA Code(s)
D002

State and Local Regulations: Certain states maintain their own ingredient lists which differ slightly from the Federal standards. If indicated under Section 2 of this MSDS, states listed below may have regulations on ingredients contained in this product. Check with your state for any additional regulations.

(3) California proposition 65 (Safe Drinking Water & Toxic Enforcement Act of 1986)

(4) Massachusetts (Hazardous Substance Disclosure by Employers)

Section 16: OTHER INFORMATION

This information was compiled from current manufacturer's MSDS's of the component parts of the product.

Disclaimer: The Manufacturer believes that the information contained in the Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with, nor followed in violation of applicable laws, regulations, rules or insurance requirements.

BC

BUFFING COMPOUND REMOVER CONCENTRATED CLEANING FORMULA

APPLICATIONS AND USE

Branson BC Concentrated Solution is a biodegradable, phosphate and caustic free cleaner developed for removing buffing compound.

A blend of non-ionic surfactants, detergents, and emulsifiers, Branson BC has been formulated to remove the most difficult buffing compounds and carriers. The non-viscous liquid rapidly removes tripoli, rouge, lime, diamond tripoli, etc. from buffed and polished components. It rinses freely and quickly.

Branson BC is used whenever the removal of buffing or polishing compounds is required. It is often used in the manufacture of jewelry, flatware, hollowware, hardware, decorative accessories, etc.

Branson BC is safe to use with most metals without causing etching or discoloration.

APPLICATION PROCEDURES

Branson BC Solution is readily mixed with water in a concentration of 6-7% by volume and can be used in tabletop or industrial cleaning tanks at solution temperatures of up to 180°F (82°C). Operation at higher temperatures improves cleaning performance.

For optimum cleaning, Branson BC should be operated at recommended temperatures. Cleaning time is dictated by the quantity and nature of the soil. Operating Branson BC below the recommended concentrations, temperatures, or time will generally result in poor cleaner performance, characterized by cloudiness and water breaks. Operating Branson BC above the recommended parameters may lead to component metal attack or cause the surfactants to separate from the solution causing poor cleaning. It is imperative that the solution be allowed to "degas" at operating temperature for a minimum of 10 minutes prior to placing the parts into the cleaning solution. It is best if ultrasonic energy is applied during this time to enhance degassing. Thorough rinsing is suggested for removal of cleaning solution. As with any process involving water, drying should be considered as the final step.

CHEMICAL CHARACTERISTICS

Chemical Composition:	Blend of liquid, non-ionic alkaline surfactants, detergents, and emulsifiers	Biodegradable:	Yes
Flash Point:	None	Normal Concentration:	6-7% by volume
Recommended Diluent:	Water	Normal Temperature:	70-180°F
		pH at Rinse Temperature:	6.4
		Rinsability:	Good
			<i>See the MSDS for further information</i>

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Section 3: HAZARDS IDENTIFICATION - continued:

Chronic / Long Term Effects: 2-Butoxyethanol has caused red blood cell hemolysis in lab animals and secondary injury to the liver and kidney.

Signs and Symptoms of Overexposure: Prolonged skin contact may result in absorption of harmful amounts.

Target Organ Effects: Liver, kidney

Reproductive/Developmental Information: No data.

Carcinogenic Information: This material is not listed as a carcinogen by IARC, NTP or OSHA.

Section 4: FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

SKIN: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Get medical attention immediately.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

INGESTION: Seek medical attention immediately. Call a poison control center or doctor for treatment advice. Have person sip a glass of water if able to swallow. Never give anything by mouth to an unconscious person.

Section 5: FIRE FIGHTING MEASURES

Flash Point: No flash by standard methods.

Extinguishing Media: Use appropriate methods for combating surrounding fire.

Special Fire Fighting Instructions: Wear a self contained breathing apparatus with a full face piece operated in the positive pressure demand mode. Chemical resistant PPE is recommended.

Section 6: ACCIDENTAL RELEASE MEASURES

Stop all leaks. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Absorb spill with inert material (e.g. dry sand, earth). Prevent runoff from entering drains, sewers or other bodies of water. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to containers for disposal.

Section 7: HANDLING AND STORAGE

Follow all MSDS/label precautions even after container is emptied because they may contain product residues. Use with adequate ventilation. Do not get in eyes, on skin or clothing. Store in a cool, dry place. Keep container closed when not in use. Keep out of reach of children.

Section 8: EXPOSURE CONTROLS and PERSONAL PROTECTION

Eye Protection: Wear safety glasses or goggles.

MSDS Number: 3651

Skin Protection: To prevent repeated or prolonged contact, wear impervious gloves (made from rubber, nitrile or neoprene), clothing and boots.

Respiratory Protection: When respiratory protection is required, use an organic vapor & particulate cartridge. All respiratory programs must meet OSHA's 29 CFR 1910.34 & ANSI Z88.2 requirements.

Engineering Controls: Good general ventilation required.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Clear, blue liquid with slight butyl odor
pH Concentrate: 5.0
Solubility in Water: Complete
Vapor Pressure [mmHg]: n/e
Evaporation Rate (Butyl Acetate=1): n/e
Vapor Density [Air=1]: n/e
Specific Gravity [H2O=1]: 1.01
Boiling Point: > 212 F

Section 10: REACTIVITY

Stability: Stable
Hazardous Polymerization: Will not occur
Conditions to avoid: High temperature
Hazardous Decomposition Products: None
Incompatibility: Strong acids, alkalis, oxidizing agents

Section 11: TOXICOLOGICAL INFORMATION

2-Butoxyethanol: SKIN-Rabbit; 24 hr uncovered-minimal erythema in 2/5; no irritation 3/5

Section 12: ECOLOGICAL INFORMATION

2-Butoxyethanol: Toxicity to fish-fathead minnow; 96h; LC50 Results: 1700 mg/l.

Section 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Wastes must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: TRANSPORTATION INFORMATION

D.O.T. Shipping Name / Class:

Not regulated.

Section 15: REGULATORY INFORMATION

U.S. Federal Regulations:

TSCA (Toxic Substances Control Act): The intentional ingredients of product are listed.

MSDS Number: 3651

Title III Section 311/312 Hazardous Categories - 40 CFR 370.2:

ACUTE (X) Chronic (X) Fire () Pressure () Reactive () Not Applicable ()

(1) Title III Section 302/304 Extremely Hazardous Substances - 40 CFR 355 Appendix A

(2) Title III Section 313 Toxic Chemicals - 40 CFR 372.65

If indicated under Section 2 of this MSDS, this product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right to Know Act of 1986. This information must be included in all MSDS that are copied and distributed for this material.

RCRA Status: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. If this product becomes a hazardous waste it would be assigned RCRA Code(s)
None

State and Local Regulations: Certain states maintain their own ingredient lists which differ slightly from the Federal standards. If indicated under Section 2 of this MSDS, states listed below may have regulations on ingredients contained in this product. Check with your state for any additional regulations.

(3) California proposition 65 (Safe Drinking Water & Toxic Enforcement Act of 1986)

(4) Massachusetts (Hazardous Substance Disclosure by Employers)

Section 16: OTHER INFORMATION

This information was compiled from current manufacturer's MSDS's of the component parts of the product.

Disclaimer: The Manufacturer believes that the information contained in the Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with, nor followed in violation of applicable laws, regulations, rules or insurance requirements.

OR OXIDE REMOVER CONCENTRATED CLEANING FORMULA

APPLICATIONS AND USE

Branson OR Concentrated Solution is a blend of detergents in an acidic carrier which is phosphate-free and biodegradable.

This formulation has been developed to rapidly remove rust and oxides from many metals. It is used in cleaning and reconditioning relay and switch contacts, removing oxides that result from assembly operations utilizing soldering, brazing, or welding, and similar applications. It can also be effective on ferrous materials for removing surface oxides resulting from storage.

Although the solution may etch or attack reactive metals, it is especially effective with stainless steel, copper, and tin components.

APPLICATION PROCEDURES

Branson OR Solution is readily mixed in a concentration of 6-7% by volume and can be used at solution temperatures of up to 120°F (48°C) in cleaning tanks. Optimum performance will be realized at this slightly elevated solution temperature.

Cleaning tanks, heating coils and related components should be fabricated from stainless steel or other materials capable of withstanding acidic solutions.

For optimum cleaning, Branson OR should be operated at recommended temperatures. Cleaning time is dictated by the quantity and nature of the soil. Operating Branson OR below the recommended concentrations, temperatures, or time will generally result in poor cleaner performance, characterized by cloudiness and water breaks. Operating Branson OR above the recommended parameters may lead to component metal attack or cause the surfactants to separate from the solution causing poor cleaning. It is imperative that the solution be allowed to "degas" at operating temperature for a minimum of 10 minutes prior to placing the parts into the cleaning solution. It is best if ultrasonic energy is applied during this time to enhance degassing. Thorough rinsing is suggested for removal of cleaning solution. As with any process involving water, drying should be considered as the final step.

The selection and use of the proper ultrasonic cleaning equipment and component fixturing will influence the cleaning efficiency and performance of Branson OR.

CHEMICAL CHARACTERISTICS

Chemical Composition:	Blend of detergents in an acidic carrier	Biodegradable:	Yes
Flash Point:	None	Normal Concentration:	6-7% by volume
Recommended Diluent:	Water	Normal Temperature:	70-120°F
		pH at Rinse Temperature:	3.8
		Rinsability:	Good

See the MSDS for further information

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HMIS RATINGS:
 Health : 1
 Flammability : 0
 Reactivity : 0
 Personal Protection: B

Section 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: BRANSON OR	Emergency Telephone Number: (800)535-5053
Chemical Family : Oxide Remover	Date Prepared April 29, 2004
Company Identification: Branson Ultrasonics Corp.	MSDS Number: 3653
41 eagle Rd.	MFGD. BY: ABC Compounding Co., Inc.
Danbury, CT 06813	6970 Jonesboro Rd.
	Morrow, Ga. 30260

Section 2: COMPOSITION, INFORMATION ON INGREDIENTS

CAS NUMBER	CHEMICAL NAME	% BY WGHT.	OSHA PEL/ ACGIH TLV	SARA 302/ 304(1)*	SARA 313 (2)*	STATE INFO(3)(4)	CERCLA RQ
77-92-9	Citric Acid	< 11.0	n/e / n/e	NO	NO	NO	
1336-21-6	Ammonium Hydroxide	< 2.0	50 ppm / 50 ppm	NO	YES	NO	1000 lbs

* See Section 15 for more information n/e = none established - n/a = not applicable

Section 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

CAUTION. Causes eye and skin irritation. Avoid breathing vapors.
 Clear, pink liquid; odorless.

Primary Route of Entry: Eye contact, skin contact, inhalation
 Acute/Potential Health Effects

EYES: May cause irritation to the eyes experienced as discomfort or pain with excess blinking and tear production and redness or swelling of the conjunctiva.

SKIN: May cause mild skin irritation. Prolonged or repeated contact may cause defatting or drying of skin.

INHALATION: Vapor may cause irritation of the respiratory tract.

INGESTION: May cause nausea, vomiting and diarrhea.

Section 3: HAZARDS IDENTIFICATION - continued:

Chronic / Long Term Effects: No data.

Signs and Symptoms of Overexposure:

Ingestion may cause nausea, vomiting and diarrhea.
Prolonged dermal exposure may cause drying of the skin.

Target Organ Effects:

No data.

Reproductive/Developmental Information:

No data.

Carcinogenic Information:

This material is not listed as a carcinogen by IARC, NTP or OSHA.

Section 4: FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation persists.

SKIN: Flush skin with plenty of water for at least 15 minutes. Get medical attention if irritation persists.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

INGESTION: Give large quantities of water or milk. Induce vomiting. Get medical attention.

Section 5: FIRE FIGHTING MEASURES

Flash Point: No flash by standard methods

Extinguishing Media: Use appropriate methods for combatting surrounding fire.

Special Fire Fighting Instructions: Wear a self contained breathing apparatus with a full face piece operated in the positive pressure demand mode.

Section 6: ACCIDENTAL RELEASE MEASURES

Stop all leaks. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Absorb spill with inert material (e.g. dry sand, earth). Eliminate all ignition sources. Prevent runoff from entering drain, sewers, streams or other bodies of water. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to containers for disposal.

Section 7: HANDLING AND STORAGE

Follow all MSDS/label precautions even after container is emptied because they may contain product residues. Use with adequate ventilation. Do not get in eyes or on skin. Store in a cool, dry place. Keep container closed when not in use. Keep out of reach of children.

Section 8: EXPOSURE CONTROLS and PERSONAL PROTECTION

Eye Protection: Wear safety glasses or goggles. Remove contacts.

MSDS Number : 3653

Skin Protection: To prevent repeated or prolonged contact, wear impervious gloves (made from rubber, nitrile or neoprene).

Respiratory Protection: When respiratory protection is required, use an ammonia cartridge. A respiratory program that meets OSHA's 29 CFR 1910.34 & ANSI Z88.2 requirements must be followed.

Engineering Controls: Use general ventilation.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor :Clear, pink liquid; odorless.
pH Concentrate :3.0

Solubility in Water : Complete
Vapor Pressure [mmHg] :n/e
Evaporation Rate (Butyl Acetate=1) :n/a
Vapor Density [Air=1] :n/e
Specific Gravity [H2O=1] :1.055
Boiling Point :>212 F

Section 10: REACTIVITY

Stability Stable
Hazardous Polymerization :Will not occur
Conditions to avoid :High temperature
Hazardous Decomposition Products: CO, CO2
Incompatibility :Strong acids, oxidizers

Section 11: TOXICOLOGICAL INFORMATION

No data

Section 12: ECOLOGICAL INFORMATION

No data

Section 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: TRANSPORTATION INFORMATION

D.O.T. Shipping Name / Class:
Not regulated.

Section 15: REGULATORY INFORMATION

U.S. Federal Regulations:
TSCA (Toxic Substances Control Act):The intentional ingredients of product are listed.
Title III Section 311/312 Hazardous Categories - 40 CFR 370.2:

MSDS Number : 3653

ACUTE (X) Chronic () Fire () Pressure () Reactive () Not Applicable ()
(1) Title III Section 302/304 Extremely Hazardous Substances - 40 CFR 355 Appendix A
(2) Title III Section 313 Toxic Chemicals - 40 CFR 372.65

If indicated under Section 2 of this MSDS, this product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right to Know Act of 1986. This information must be included in all MSDS that are copied and distributed for this material.

RCRA Status: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. If this product becomes a hazardous waste it would be assigned RCRA Code(s)
None

State and Local Regulations: Certain states maintain their own ingredient lists which differ slightly from the Federal standards. If indicated under Section 2 of this MSDS, states listed below may have regulations on ingredients contained in this product
Check with your state for any additional regulations.

- (3) California proposition 65 (Safe Drinking Water & Toxic Enforcement Act of 1986)
- (4) Massachusetts (Hazardous Substance Disclosure by Employers)

Section 16: OTHER INFORMATION

This information was compiled from current manufacturer's MSDS's of the component parts of the product.

Disclaimer: The Manufacturer believes that the information contained in the Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with, nor followed in violation of applicable laws, regulations, rules or insurance requirements.

EC ELECTRONIC CLEANER CONCENTRATED CLEANING FORMULA

APPLICATIONS AND USE

Branson EC Concentrated Cleaning Formula is an alkaline ultrasonic cleaning solution which is a low foaming, liquid detergent, specially formulated to remove oils, resins, rosins, and other soils from hard surfaces normally encountered in electronic, plating, and other related industries.

Branson EC is an ideal cleaner for demanding applications in electronics cleaning. Because it contains no conductive metal cations, it cannot leave conductive residues. Once a part or assembly has been cleaned with Branson EC, it stays clean. Its coupling ability keeps soils suspended in the cleaning solution preventing redeposition on cleaned material. In addition, it is not flammable and is corrosion inhibited.

Branson EC cleaning solution meets the most demanding environmental requirements, since it is a biodegradable aqueous cleaner, with no ozone-depleting potential and low volatile organic content.

Branson EC can be used in a variety of electronic industry cleaning applications, including: cleaning during manufacturing assembly of infrared detectors, cleaning electronic contacts and leads, and cleaning ceramic insulators and components. Whether cleaning through-hole or surface mount boards, Branson EC does the job effectively and economically.

APPLICATION PROCEDURES

Branson EC solution is to be slowly mixed with warm water to a concentration of 2-5% by volume. Branson EC Solution can be used in a temperature range from 130°-160°F (55-72°C). Optimum temperature is 140°F.

For optimum cleaning, Branson EC should be operated at recommended temperatures. Cleaning time is dictated by the quantity and nature of the soil and by the type. Operating Branson EC below the recommended concentrations, temperatures, and times will generally result in poor cleaner performance, characterized by cloudiness and water breaks. Operating EC above the recommended concentration, temperature, and time may cause component metal attack or cause the surfactants to separate from the solution causing poor cleaning. It is imperative that the solution "degas" at operating temperature for minimum of 10 minutes prior to introducing the parts into the cleaning solution. It is best if ultrasonic energy is applied during this time to enhance degassing. Thorough rinsing is suggested for removal of cleaning solution. As with any process involving water, drying should be considered as the final step.

The selection and use of the proper ultrasonic cleaning equipment and component fixturing will influence the cleaning efficiency and performance of Branson EC.

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CHEMICAL CHARACTERISTICS

Chemical Composition	Blend of nonionic alkaline surfactants and detergents
Flash Point	None
Recommended Diluent	Water
Biodegradable	Yes
Phosphate Free	Yes
Normal Use Concentration	.2-5% by volume
Normal Use Temperature	130-160°F (55-72°C)
pH at Use Temperature	12.5
Rinsability	Good

Effect of Working Solution on Metals

Stainless Steel	None
Steel	None
Copper	None
Brass	None
Aluminum	Slight etch
Magnesium	None
Zinc	None
Tin	None

PRECAUTIONARY CONSIDERATIONS

- BRANSON EC CONCENTRATED SOLUTION CONTAINS- ALKALINE DETERGENTS, AND DIRECT CONTACT MAY RESULT IN BURNS OF EYES OR SKIN IRRITATION.
- AVOID PROLONGED SKIN CONTACT.
- WASH THOROUGHLY AFTER HANDLING.
- DO NOT TAKE INTERNALLY.
- IF DIRECT CONTACT OCCURS, FLUSH REPEATEDLY WITH COOL, CLEAR WATER.
- KEEP OUT OF REACH OF CHILDREN.

DISPOSAL

Dispose in accordance with all local, state, and federal regulations.

BRANSON CONCENTRATED CLEANING SOLUTIONS

MC-1, MC-2 MC-3 Metal Cleaner

ECElectronic Cleaner

ISIndustrial Strength Cleaner

GPGeneral Purpose Cleaner

OROxide Remover

BCRBuffing Compound Remover

LRSLiquid Rust Stripper

JCJewelry Cleaner

OCOptical Cleaner

For additional information concerning these solutions, contact Branson or a Bransonic® dealer.

BRANSON ULTRASONICS CORPORATION

HMIS RATINGS:
 Health : 3
 Flammability : 1
 Reactivity : 0
 Personal Protection: G

Section 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Branson EC	Emergency Telephone Number: (800)535-5053
Chemical Family : Monoethanolamine Solution	Date Prepared April 29, 2004
Company Identification: Branson Ultrasonics Corp.	MSDS Number: 3819
41 eagle Rd.	MFGD. BY: ABC Compounding Co., Inc.
Danbury, CT 06813	6970 Jonesboro Rd.
	Morrow, Ga. 30260

Section 2: COMPOSITION, INFORMATION ON INGREDIENTS

CAS NUMBER	CHEMICAL NAME	% BY WGHT.	OSHA PEL/ACGIH TLV	SARA 302/304(1)*	SARA 313 (2)*	STATE INFO(3)(4)
110-91-8	Morpholine	< 8.0	20 ppm / 20 ppm	NO	NO	NO
141-43-5	Monoethanolamine	< 73.0	3 ppm / 3 ppm	NO	NO	NO

* See Section 15 for more information n/e = none established - n/a = not applicable

Section 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER. Corrosive. Harmful if inhaled or absorbed through skin. Causes eye and skin burns. Harmful and corrosive if swallowed.

Primary Route of Entry: Eye contact, skin contact/absorption, inhalation
 Acute/Potential Health Effects

EYES: Causes severe irritation experienced as discomfort or pain, excess blinking and tear production, with redness and swelling of the conjunctiva.

SKIN: Brief contact may cause slight irritation. Prolonged contact may cause more severe irritation with pain, local redness and swelling and possible tissue destruction.

INHALATION: High concentrations of vapor or mists may cause irritation of the respiratory tract. Prolonged exposure may cause injury to the respiratory tract.

INGESTION: Harmful if swallowed. Causes severe irritation or chemical burns of the mouth, throat, esophagus and stomach.

Section 3: HAZARDS IDENTIFICATION - continued:

Chronic / Long Term Effects: Repeated overexposure may cause damage to kidneys and liver.

Signs and Symptoms of Overexposure:

Dermal exposure may cause local redness and swelling, pain and discomfort.
Prolonged skin contact may result in absorption of harmful amounts.
Inhalation may aggravate asthma and inflammatory or fibrotic pulmonary disease.

Target Organ Effects:

Liver, kidney

Reproductive/Developmental Information:

No data.

Carcinogenic Information:

This material is not listed as a carcinogen by IARC, NTP or OSHA.

Section 4: FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

SKIN: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Get medical attention immediately.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

INGESTION: Seek medical attention immediately. Call a poison control center or doctor for treatment advice. Have person sip a glass of water if able to swallow. Never give anything by mouth to an unconscious person. Do not induce vomiting.

Section 5: FIRE FIGHTING MEASURES

Flash Point: 205 degrees F (TCC Method)

Extinguishing Media: Dry chemical, CO₂, foam or water spray is recommended.

Special Fire Fighting Instructions: Wear a self contained breathing apparatus with a full face piece operated in the positive pressure demand mode. Chemical resistant PPE is recommended.

Section 6: ACCIDENTAL RELEASE MEASURES

Stop all leaks. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Absorb spill with inert material (e.g. dry sand, earth). Prevent runoff from entering drain, sewers, streams or other bodies of water. Absorb unrecoverable product. Transfer contaminated absorbant, soil and other materials to containers for disposal.

Section 7: HANDLING AND STORAGE

Follow all MSDS/label precautions even after container is emptied because they may contain product residues. Use with adequate ventilation. Do not get in eyes, on skin or clothing. Store in a cool, dry place. Keep container closed when not in use. Keep out of reach of children.

Section 8: EXPOSURE CONTROLS and PERSONAL PROTECTION

Eye Protection: Wear safety glasses or goggles.

MSDS Number : 3819

Skin Protection: Wear impervious gloves (made from rubber, nitrile or neoprene), clothing and boots.

Respiratory Protection: When respiratory protection is required, use an organic vapor cartridge. A respiratory program that meets OSHA's 29 CFR 1910.34 & ANSI Z88.2 requirements must be followed.

Engineering Controls: Good general ventilation required.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor :Clear, colorless to light amber liquid with slight ammonia odor

pH Concentrate :> 12

Solubility in Water : Complete

Vapor Pressure [mmHg] :n/e

Evaporation Rate (Butyl Acetate=1) :n/e

Vapor Density [Air=1] :n/e

Specific Gravity [H2O=1] :1.026

Boiling Point :> 212 F

Section 10: REACTIVITY

Stability Stable

Hazardous Polymerization :Will not occur

Conditions to avoid :High temperature

Hazardous Decomposition Products: None

Incompatibility :Strong acids, alkalies, oxidizing agents

Section 11: TOXICOLOGICAL INFORMATION

No data

Section 12: ECOLOGICAL INFORMATION

Toxic to aquatic organisms.

Section 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Wastes must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: TRANSPORTATION INFORMATION

D.O.T. Shipping Name / Class:

Corrosive Liquid, Basic, Inorganic, N.O.S., 8

UN3267, II (Contains Ethanolamine)

Section 15: REGULATORY INFORMATION

U.S. Federal Regulations:

TSCA (Toxic Substances Control Act):The intentional ingredients of product are listed.

Title III Section 311/312 Hazardous Categories - 40 CFR 370.2:

MSDS Number : 3819

ACUTE (X) Chronic (X) Fire () Pressure () Reactive () Not Applicable ()
(1) Title III Section 302/304 Extremely Hazardous Substances - 40 CFR 355 Appendix A
(2) Title III Section 313 Toxic Chemicals - 40 CFR 372.65

If indicated under Section 2 of this MSDS, this product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right to Know Act of 1986. This information must be included in all MSDS that are copied and distributed for this material.

RCRA Status: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. If this product becomes a hazardous waste it would be assigned RCRA Code(s)
D002

State and Local Regulations: Certain states maintain their own ingredient lists which differ slightly from the Federal standards. If indicated under Section 2 of this MSDS, states listed below may have regulations on ingredients contained in this product. Check with your state for any additional regulations.

- (3) California proposition 65 (Safe Drinking Water & Toxic Enforcement Act of 1986)
- (4) Massachusetts (Hazardous Substance Disclosure by Employers)

Section 16: OTHER INFORMATION

This information was compiled from current manufacturer's MSDS's of the component parts of the product.

Disclaimer: The Manufacturer believes that the information contained in the Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with, nor followed in violation of applicable laws, regulations, rules or insurance requirements.

GP

GENERAL PURPOSE CONCENTRATED CLEANING FORMULA

APPLICATIONS AND USE

Branson GP Concentrated Solution is a biodegradable, phosphate and caustic free alkaline cleaner formulated for general purpose and normal maintenance cleaning applications.

Liquid non-ionic surfactants and detergents are combined in a formulation with excellent detergent, wetting and free rinsing properties which provide exceptional performance for general maintenance cleaning in virtually all industries with virtually all base materials.

Branson GP solution removes general soils, fingerprints, dust, packaging particulates, and light oils and greases from components and products found in machine and metalworking shops, chemical plants and petrochemical refineries, automotive plants, appliance factories, telecommunications equipment producers, printing plants, and many other industrial, manufacturing, and fabricating facilities.

APPLICATION PROCEDURES

Branson GP Solution is easily mixed with water to form a concentration of 10-12% by volume and can be used at temperatures ranging from ambient to 180°F (82°C). Optimum performance is achieved at higher solution temperatures.

Tanks, heating coils, immersion heaters, and any other components which may be exposed to the solution for extended periods should be fabricated from stainless steel or other suitable materials.

For optimum cleaning, Branson GP should be operated at recommended temperatures. Cleaning time is dictated by the quantity and nature of the soil. Operating Branson GP below the recommended concentrations, temperatures, or time will generally result in poor cleaner performance, characterized by cloudiness and water breaks. Operating Branson GP above the recommended parameters may lead to component metal attack or cause the surfactants to separate from the solution causing poor cleaning. It is imperative that the solution be allowed to "degas" at operating temperature for a minimum of 10 minutes prior to placing the parts into the cleaning solution. It is best if ultrasonic energy is applied during this time to enhance degassing. Thorough rinsing is suggested for removal of cleaning solution. As with any process involving water, drying should be considered as the final step.

CHEMICAL CHARACTERISTICS

Chemical Composition:	Blend of liquid, non-ionic alkaline surfactants and detergents
Flash Point:	None
Recommended Diluent:	Water
Biodegradable:	Yes
Normal Concentration:	10-12% by volume
Normal Temperature:	70-180°F
pH at Rinse Temperature:	12.1
Rinsability:	Good

See the MSDS for further information.

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HMIS RATINGS:
Health: 2
Flammability: 0
Reactivity: 0
Personal Protection: B

Section 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Branson GP
Chemical Family: Butyl based cleaner
Company Identification: Branson Ultrasonics Corp.
41 eagle Rd.
Danbury, CT 06813
Emergency Telephone Number: (800)535-5053
Date Prepared: April 29, 2004
MSDS Number: 3650
MFGD. BY: ABC Compounding Co., Inc.
6970 Jonesboro Rd.
Morrow, Ga. 30260

Section 2: COMPOSITION, INFORMATION ON INGREDIENTS

CAS NUMBER	CHEMICAL NAME	% BY WGHT.	OSHA PEL/ACGIH TLV	SARA 302/304(1)*	SARA 313 (2)*	STATE INFO(3)(4)	CERCLA RQ
111-76-2	2-Butoxyethanol	< 7.0	25ppm-skin 25ppm-skin	NO	YES	NO	
6834-92-0	Sodium Metasilicate	< 7.0	15 mg/m3/ 10 mg/m3	NO	NO	NO	

* See Section 15 for more information n/e = none established - n/a = not applicable

Section 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER. Corrosive. May cause irritation of skin and respiratory tract.
May be absorbed through skin.

Primary Route of Entry: Eye contact, skin contact/absorption, inhalation

Acute/Potential Health Effects:

EYES: Causes severe irritation experienced as discomfort or pain, excess blinking and tear production, with redness and swelling of the conjunctiva.

SKIN: Brief contact may cause slight irritation. Prolonged contact may cause more severe irritation with pain, local redness and swelling.

INHALATION: High concentrations of vapor or mists may cause irritation of the respiratory tract.

INGESTION: May cause headache, dizziness, incoordination, nausea, vomiting, diarrhea and general weakness.

Section 3: HAZARDS IDENTIFICATION - continued:

Chronic / Long Term Effects: 2-Butoxyethanol has caused red blood cell hemolysis in lab animals and secondary injury to the liver and kidney.

Signs and Symptoms of Overexposure: Dermal exposure may cause local redness and swelling, pain and discomfort. Prolonged skin contact may result in absorption of harmful amounts.

Target Organ Effects: Lungs and upper respiratory tract, eyes, skin, liver, kidney

Reproductive/Developmental Information: No data.

Carcinogenic Information: This material is not listed as a carcinogen by IARC, NTP or OSHA.

Section 4: FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

SKIN: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Get medical attention immediately.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

INGESTION: Seek medical attention immediately. Call a poison control center or doctor for treatment advice. Have person sip a glass of water if able to swallow. Never give anything by mouth to an unconscious person.

Section 5: FIRE FIGHTING MEASURES

Flash Point: No flash by standard methods.

Extinguishing Media: Use appropriate methods for combating surrounding fire.

Special Fire Fighting Instructions: Wear a self contained breathing apparatus with a full face piece operated in the positive pressure demand mode. Chemical resistant PPE is recommended.

Section 6: ACCIDENTAL RELEASE MEASURES

Stop all leaks. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Absorb spill with inert material (e.g. dry sand, earth). Prevent runoff from entering drains, sewers or other bodies of water. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to containers for disposal.

Section 7: HANDLING AND STORAGE

Follow all MSDS/label precautions even after container is emptied because they may contain product residues. Use with adequate ventilation. Do not get in eyes, on skin or clothing. Store in a cool dry place. Keep container closed when not in use. Keep out of reach of children.

Section 8: EXPOSURE CONTROLS and PERSONAL PROTECTION

Eye Protection: Wear safety glasses or goggles.

MSDS Number: 3650

Skin Protection: To prevent repeated or prolonged contact, wear impervious gloves (made from rubber, nitrile or neoprene), clothing and boots.

Respiratory Protection: When respiratory protection is required, use an organic vapor & particulate cartridge. All respiratory programs must meet OSHA's 29 CFR 1910.34 & ANSI Z88.2 requirements.

Engineering Controls: Good general ventilation required.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Clear, red liquid with butyl odor
pH Concentrate: 12.0
Solubility in Water: Complete
Vapor Pressure [mmHg]: n/e
Evaporation Rate (Butyl Acetate=1): n/e
Vapor Density [Air=1]: n/e
Specific Gravity [H2O=1]: 1.07
Boiling Point: > 212 F

Section 10: REACTIVITY

Stability: Stable
Hazardous Polymerization: Will not occur
Conditions to avoid: High temperature
Hazardous Decomposition Products: None
Incompatibility: Strong acids, alkalis, oxidizing agents

Section 11: TOXICOLOGICAL INFORMATION

2-Butoxyethanol: SKIN-Rabbit; 24 hr uncovered-minimal erythema in 2/5; no irritation 3/5

Section 12: ECOLOGICAL INFORMATION

2-Butoxyethanol: Toxicity to fish-fathead minnow; 96h; LC50 Results: 1700 mg/l.

Section 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Wastes must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: TRANSPORTATION INFORMATION

D.O.T. Shipping Name / Class:

Corrosive Liquid, Basic, Inorganic, N.O.S., 8

UN 3266, II (Contains Sodium Metasilicate)

Section 15: REGULATORY INFORMATION

U.S. Federal Regulations:

TSCA (Toxic Substances Control Act): The intentional ingredients of product are listed.

MSDS Number: 3650

Title III Section 311/312 Hazardous Categories - 40 CFR 370.2:

ACUTE (X) Chronic (X) Fire () Pressure () Reactive () Not Applicable ()

(1) Title III Section 302/304 Extremely Hazardous Substances - 40 CFR 355 Appendix A

(2) Title III Section 313 Toxic Chemicals - 40 CFR 372.65

If indicated under Section 2 of this MSDS, this product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right to Know Act of 1986. This information must be included in all MSDS that are copied and distributed for this material.

RCRA Status: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. If this product becomes a hazardous waste it would be assigned RCRA Code(s)
D002

State and Local Regulations: Certain states maintain their own ingredient lists which differ slightly from the Federal standards. If indicated under Section 2 of this MSDS, states listed below may have regulations on ingredients contained in this product. Check with your state for any additional regulations.

(3) California proposition 65 (Safe Drinking Water & Toxic Enforcement Act of 1986)

(4) Massachusetts (Hazardous Substance Disclosure by Employers)

Section 16: OTHER INFORMATION

This information was compiled from current manufacturer's MSDS's of the component parts of the product.

Disclaimer: The Manufacturer believes that the information contained in the Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with, nor followed in violation of applicable laws, regulations, rules or insurance requirements.

GP GENERAL PURPOSE POWDER CLEANING SOLUTION

APPLICATIONS AND USE

Branson GP Powder Solution is a high-performance, heavy-duty ultrasonic cleaning powder. It is fast acting and long lasting, and offers superior performance at a cost savings, plus time and space. It is easy to handle, mild to operator hands, and biodegradable—no acid, caustic, or fuming problems. It is odorless, ammonia-free, and non-flammable.

Branson GP Powder Solution removes general oils, fingerprints, dust, packaging particulates, and light oils and greases from components and products found in machine and metalworking shops, chemical plants and petrochemical refineries, automotive plants, appliance factories, telecommunications equipment producers, printing plants, and many other industrial, manufacturing and fabricating facilities. It is safe on all metals of all types including aluminum and magnesium (if rinsed promptly), plastic and rubber components, and glass and porcelain. Other contaminants include: dental instruments, blood, buffing and polishing compounds.



APPLICATION PROCEDURES

Two pounds of concentrate powder will make up to 75 gallons of cleaning solution.

Each scoop generates up to 1 gallon of general purpose cleaning solution (scoop provided in each container). Fill the tank with warm to hot tap water and sprinkle 1 scoop of powder into tank. As with any solution, rinse thoroughly after cleaning.

CHEMICAL CHARACTERISTICS

Chemical Composition:	non-corrosive/corrosion inhibited
Flash Point:	none
Recommended Diluent:	water
Biodegradable:	yes
PH at Use Temperature:	9.3
Percent Phosphorus (wt/wt):	6.80%
Shelf Life:	Indefinite
Normal Use Concentration:	3 oz. generates 1 gallon of solution

DISPOSAL

When diluted in tank can be poured down drain.

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Material Safety Data Sheet
 May be used to comply with OSHA's Hazard
 Communication Standard
 29 CFR 1910.1200. Standard must be consulted for
 Specific requirements

U.S. Department of Labor
 Occupational Safety and Health Administration
 (Non-Mandatory Form)
 Form Approved
 OMB No. 1218-0072

Identity (as used on labels and list)		Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.	
DP 2300 GENERAL PURPOSE CLEANER			
Section I			
Manufacturer's Name		Emergency Telephone Number	
Diversified Chemical Products, Inc.		(800) 320-0084	
Address (Number, Street, City, State, and ZIP Code)		Telephone Number for Information	
60 Germay Drive		(302) 656-5293	
Germay Industrial Park		Date Prepared	
Wilmington DE 19804		August 12, 2004	
		Signature of Preparer (optional)	
Section II - Hazardous Ingredients/Identity Information			
Hazardous Components (Specific Chemical Identity; Common Name[s]) OSHA PEL ACGIH TLV Other Limits % (Optional)			
The formula for DP 2300 contains no ingredients that are classified as hazardous under the OSHA Hazard Communication Standard 29 CFR 1910.1200. The formula contains no ingredients that are reported to be carcinogenic by any reference source including IARC, NTP, EPA, and OSHA.			
Health=1 (slight)			
Flammable=0			
Reactivity=0			
Special=0			
Section III - Physical/Chemical Characteristics			
Boiling Point		Specific Gravity(H ₂ O = 1)	
Liquid-212 F/ 100 C ; Powder-N/A		1.04 g/ml (liquid); N.D. (powder)	
Vapor Pressure (mm Hg.)		pH 1% solution	
N/A		9.3 – 9.5 +/- 0.2	
Vapor Density (AIR = 1)		Evaporation Rate (Butyl Acetate = 1)	
N/A		N/A	
Solubility in Water		Freezing Point	
75g/litre-powder ; liquid completely		liquid approx. 32° F; Powder N/A	
Appearance and Odor			
Odorless blue powder with light yellow and white particles – clear blue in solution.			
Section IV - Fire and Explosion Hazard Data			
Flash Point (Method Used)	Flammable Limits	LEL	UEL
None	N/A	N/A	N/A
Extinguishing Media			
Any Type			
Special Fire-Fighting Procedures			
Use self-contained breathing apparatus and protective equipment			
Unusual Fire and Explosion Hazards			
None			
Section V - Reactivity Data			
Stability	Unstable		Conditions to avoid
	Stable	X	
Incompatibility (Materials to Avoid)			
Avoid strong acids			
Hazardous Decomposition or Byproducts			
If in contact with fire, may release CO ₂ gas			
Hazardous Polymerization	May Occur		Conditions to avoid
	Will Not Occur	X	

MSDS DP2300 GENERAL PURPOSE CLEANER Continued

Section VI - Health Hazard Data

<i>Route(s) of Entry:</i>	<i>Inhalation?</i>	<i>Skin?</i>	<i>Ingestion?</i>
	Yes (powder)	No	Yes

Health Hazards (Acute and Chronic)
 Ingestion may cause discomfort/diarrhea; Inhalation of dust may irritate the mucus membranes

<i>Carcinogenicity:</i>	<i>NTP?</i>	<i>IARC Monographs?</i>	<i>OSHA Regulated?</i>
	None	None	None

Signs and Symptoms of Exposure:
 Prolonged exposure to dust may irritate the mucus membranes

Medical Conditions Generally Aggravated by Exposure:
 None

Emergency First Aid Procedures:
Eyes: Flush with copious amounts of water for 15 minutes. Seek medical attention if irritation persists.
Skin: Flush with copious amounts of water. Seek medical attention if irritation persists.
Ingestion: Drink large quantities of water. Contact physician promptly.
Inhalation: Remove to fresh air.

Section VII - Precautions for Safe Handling and Use

Steps to be taken in case Materials is released or spilled
 Flush with water or sweep/shovel to disposal system; material will foam. **Material is completely biodegradable**

Waste Disposal Method
 Can be flushed away with water, or disposed of in normal systems

Precautions in Handling and Storage
 Store in cool, dry place, as with other detergents

Other Precautions
 Keep liquid from freezing

Section VII - Control Measures

Respiratory protection (Specify Type)
 Approved nuisance mask

<i>Verification</i>	<i>Local Exhaust</i>	<i>Special</i>
	Satisfactory	N/A
	<i>Mechanical (General)</i>	<i>Other</i>
	N/A	N/A

<i>Protective Gloves</i>	<i>Eye Protection</i>
None normally required	Safety glasses recommended

<i>Other Protective Clothing or Equipment</i>	<i>Work/Hygienic Practices</i>
Not required	Normal GMP

IS

INDUSTRIAL STRENGTH CONCENTRATED CLEANING FORMULA

APPLICATIONS AND USE

Branson IS Concentrated Solution is a biodegradable, phosphate and caustic free alkaline cleaner formulated for heavy-duty industrial use. A blend of liquid non-ionic surfactants and detergents, the superior detergent properties, wetting capabilities and free rinsing properties of Branson IS Solution combine to provide an exceptional cleaner for removing difficult soils and contaminants.

Branson IS Solution readily removes grease, oils, and particulates from automotive, aircraft, and similar mechanical components. It will remove oils and drawing compounds from stampings, clean shop oils, greases, and similar soils from components prior to secondary finishing operations including painting, plating, and application of various electrostatic spray coatings.

Branson IS Solution can be safely used with most base metals and alloys without pitting or discoloration.

APPLICATION PROCEDURES

Branson IS Solution is easily mixed with cold or hot water in a concentration of 8-10% by volume. Branson IS Solution can be used over a temperature range from room temperature to 180°F (82°C), and can be used in both tabletop and industrial cleaning tanks. Optimum cleaning performance will be realized at higher solution temperatures.

Cleaning tanks, heating coils, and any system components which will contain or be exposed to the solution should be fabricated from a suitable grade of stainless steel.

For optimum cleaning, Branson IS should be operated at recommended temperatures. Cleaning time is dictated by the quantity and nature of the soil. Operating Branson IS below the recommended concentrations, temperatures, or time will generally result in poor cleaner performance, characterized by cloudiness and water breaks. Operating Branson IS above the recommended parameters may lead to component metal attack or cause the surfactants to separate from the solution causing poor cleaning. It is imperative that the solution be allowed to "degas" at operating temperature for a minimum of 10 minutes prior to placing the parts into the cleaning solution. It is best if ultrasonic energy is applied during this time to enhance degassing. Thorough rinsing is suggested for removal of cleaning solution. As with any process involving water, drying should be considered as the final step.

CHEMICAL CHARACTERISTICS

Chemical Composition:	Blend of liquid, non-ionic alkaline surfactants and detergents	Biodegradable:	Yes
Flash Point:	None	Normal Concentration:	8-10% by volume
Recommended Diluent:	Water	Normal Temperature:	70-180°F
		pH at Rinse Temperature:	12.1
		Rinsability:	Good

See the MSDS for further information

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HMIS RATINGS:
Health: 2
Flammability: 0
Reactivity: 0
Personal Protection: B

Section 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Branson IS
Chemical Family: Butyl based cleaner
Company Identification: Branson Ultrasonics Corp.
41 eagle Rd.
Danbury, CT 06813

Emergency Telephone Number: (800)535-5053
Date Prepared: April 29, 2004
MSDS Number: 3656
MFGD. BY: ABC Compounding Co., Inc.
6970 Jonesboro Rd.
Morrow, Ga. 30260

Section 2: COMPOSITION, INFORMATION ON INGREDIENTS

CAS NUMBER	CHEMICAL NAME	% BY WGT.	OSHA PEL/ACGIH TLV	SARA 302/304(1)*	SARA 313 (2)*	STATE INFO(3)(4)	CERCLA RQ
111-76-2	2-Butoxyethanol	< 7.0	25ppm-skin 25ppm-skin	NO	YES	NO	
6834-92-0	Sodium Metasilicate	< 7.0	15 mg/m3/ 10 mg/m3	NO	NO	NO	

* See Section 15 for more information n/e = none established - n/a = not applicable

Section 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER. Corrosive. May cause irritation of skin and respiratory tract.
May be absorbed through skin.

Primary Route of Entry: Eye contact, skin contact/absorption, inhalation

Acute/Potential Health Effects:

EYES: Causes severe irritation experienced as discomfort or pain, excess blinking and tear production, with redness and swelling of the conjunctiva.

SKIN: Brief contact may cause slight irritation. Prolonged contact may cause more severe irritation with pain, local redness and swelling.

INHALATION: High concentrations of vapor or mists may cause irritation of the respiratory tract.

INGESTION: May cause headache, dizziness, incoordination, nausea, vomiting, diarrhea and general weakness.

Section 3: HAZARDS IDENTIFICATION - continued:

Chronic / Long Term Effects: 2-Butoxyethanol has caused red blood cell hemolysis in lab animals and secondary injury to the liver and kidney.

Signs and Symptoms of Overexposure: Dermal exposure may cause local redness and swelling, pain and discomfort. Prolonged skin contact may result in absorption of harmful amounts.

Target Organ Effects: Lungs and upper respiratory tract, eyes, skin, liver, kidney

Reproductive/Developmental Information: No data.

Carcinogenic Information: This material is not listed as a carcinogen by IARC, NTP or OSHA.

Section 4: FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

SKIN: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Get medical attention immediately.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

INGESTION: Seek medical attention immediately. Call a poison control center or doctor for treatment advice. Have person sip a glass of water if able to swallow. Never give anything by mouth to an unconscious person.

Section 5: FIRE FIGHTING MEASURES

Flash Point: No flash by standard methods.

Extinguishing Media: Use appropriate methods for combating surrounding fire.

Special Fire Fighting Instructions: Wear a self contained breathing apparatus with a full face piece operated in the positive pressure demand mode. Chemical resistant PPE is recommended.

Section 6: ACCIDENTAL RELEASE MEASURES

Stop all leaks. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Absorb spill with inert material (e.g. dry sand, earth). Prevent runoff from entering drains, sewers or other bodies of water. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to containers for disposal.

Section 7: HANDLING AND STORAGE

Follow all MSDS/label precautions even after container is emptied because they may contain product residues. Use with adequate ventilation. Do not get in eyes, on skin or clothing. Store in a cool dry place. Keep container closed when not in use. Keep out of reach of children.

Section 8: EXPOSURE CONTROLS and PERSONAL PROTECTION

Eye Protection: Wear safety glasses or goggles.

MSDS Number: 3656

Skin Protection: To prevent repeated or prolonged contact, wear impervious gloves (made from rubber, nitrile or neoprene), clothing and boots.

Respiratory Protection: When respiratory protection is required, use an organic vapor & particulate cartridge. All respiratory programs must meet OSHA's 29 CFR 1910.34 & ANSI Z88.2 requirements.

Engineering Controls: Good general ventilation required.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Clear, red liquid with butyl odor
pH Concentrate: 12.0
Solubility in Water: Complete
Vapor Pressure [mmHg]: n/e
Evaporation Rate (Butyl Acetate=1): n/e
Vapor Density [Air=1]: n/e
Specific Gravity [H2O=1]: 1.07
Boiling Point: > 212 F

Section 10: REACTIVITY

Stability: Stable
Hazardous Polymerization: Will not occur
Conditions to avoid: High temperature
Hazardous Decomposition Products: None
Incompatibility: Strong acids, alkalis, oxidizing agents

Section 11: TOXICOLOGICAL INFORMATION

2-Butoxyethanol: SKIN-Rabbit; 24 hr uncovered-minimal erythema in 2/5; no irritation 3/5

Section 12: ECOLOGICAL INFORMATION

2-Butoxyethanol: Toxicity to fish-fathead minnow; 96h; LC50 Results: 1700 mg/l.

Section 13: DISPOSAL CONSIDERATIONS**Waste Disposal Method:**

Wastes must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: TRANSPORTATION INFORMATION**D.O.T. Shipping Name / Class:**

Corrosive Liquid, Basic, Inorganic, N.O.S., 8

UN 3266, II (Contains Sodium Metasilicate)

Section 15: REGULATORY INFORMATION**U.S. Federal Regulations:**

TSCA (Toxic Substances Control Act): The intentional ingredients of product are listed.

MSDS Number: 3656

Title III Section 311/312 Hazardous Categories - 40 CFR 370.2:

ACUTE (X) Chronic (X) Fire () Pressure () Reactive () Not Applicable ()

(1) Title III Section 302/304 Extremely Hazardous Substances - 40 CFR 355 Appendix A

(2) Title III Section 313 Toxic Chemicals - 40 CFR 372.65

If indicated under Section 2 of this MSDS, this product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right to Know Act of 1986. This information must be included in all MSDS that are copied and distributed for this material.

RCRA Status: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. If this product becomes a hazardous waste it would be assigned RCRA Code(s)
D002

State and Local Regulations: Certain states maintain their own ingredient lists which differ slightly from the Federal standards. If indicated under Section 2 of this MSDS, states listed below may have regulations on ingredients contained in this product. Check with your state for any additional regulations.

(3) California proposition 65 (Safe Drinking Water & Toxic Enforcement Act of 1986)

(4) Massachusetts (Hazardous Substance Disclosure by Employers)

Section 16: OTHER INFORMATION

This information was compiled from current manufacturer's MSDS's of the component parts of the product.

Disclaimer: The Manufacturer believes that the information contained in the Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with, nor followed in violation of applicable laws, regulations, rules or insurance requirements.

MC-1 METAL CLEANER-1 CONCENTRATED CLEANING FORMULA

APPLICATIONS AND USE

Branson MC-1 Concentrated Solution is a biodegradable, caustic-free alkaline cleaner formulated for heavy duty industrial use.

A blend of liquid non-ionic surfactants and detergents, the superior penetrating properties, wetting capabilities and free rinsing properties of Branson MC-1 Solution combine to provide an exceptional cleaner for removing difficult soils and contaminants. It removes oils and a variety of soils from aluminum and aluminum alloys as well as copper, brass, and steel substrates. Branson MC-1 is particularly effective for removing fabricating oils, cutting oils, and polishing oils.

Branson MC-1 tolerates high levels of contamination. It cleans by displacement - oils, soils, and greases float to the solution surface where they can be removed manually or with mechanical skimmers. Branson MC-1 contains a special blend of alkalis and detergents in addition to dispersants, deflocculents, and emulsifiers. The cleaning solution cleans rapidly, penetrating into blind holes and between adjacent surfaces.

APPLICATION PROCEDURES

Branson MC-1 Solution is mixed easily with cold or hot water in a concentration of 7-10% by volume. Branson MC-1 Solution can be used over a temperature range from 130°F to 180°F (82°C) in suitable commercial and industrial cleaning tanks.

For optimum cleaning, Branson MC-1 should be operated at recommended temperatures. Cleaning time is dictated by the quantity and nature of the soil. Operating Branson MC-1 below the recommended concentrations, temperatures, or time will generally result in poor cleaner performance, characterized by cloudiness and water breaks. Operating Branson MC-1 above the recommended parameters may lead to component metal attack or cause the surfactants to separate from the solution causing poor cleaning. It is imperative that the solution be allowed to "degas" at operating temperature for a minimum of 10 minutes prior to placing the parts into the cleaning solution. It is best if ultrasonic energy is applied during this time to enhance degassing. Thorough rinsing is suggested for removal of cleaning solution. As with any process involving water, drying should be considered as the final step.

The selection and use of the proper ultrasonic cleaning equipment and component fixturing will influence the cleaning efficiency and performance of Branson MC-1.

CHEMICAL CHARACTERISTICS

Chemical Composition:	Blend of liquid, non-ionic alkaline surfactants and detergents	Biodegradable:	Yes
Flash Point:	None	Normal Concentration:	7-10% by volume
Recommended Diluent:	Water	Normal Temperature:	130-180°F
		pH at Rinse Temperature:	9.4
		Rinsability:	Good
			<i>See the MSDS for further information</i>

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HMIS RATINGS:
Health: 1
Flammability: 0
Reactivity: 0
Personal Protection: B

Section 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Branson MC-1	Emergency Telephone Number: (800)535-5053
Chemical Family: General purpose cleaner	Date Prepared: AUG 20, 2003
Company Identification: Branson Ultrasonics Corp.	MSDS Number: 3820
41 eagle Rd.	MFGD. BY: ABC Compounding Co., Inc.
Danbury, CT 06813	6970 Jonesboro Rd.
	Morrow, Ga. 30260

Section 2: COMPOSITION, INFORMATION ON INGREDIENTS

CAS NUMBER	CHEMICAL NAME	% BY WGT.	OSHA PEL/ACGIH TLV	SARA 302/304(1)*	SARA 313 (2)*	STATE INFO(3)(4)
-	This product contains	-	-	-	-	-
-	no hazardous	-	-	-	-	-
-	ingredients.	-	-	-	-	-

* See Section 15 for more information n/e = none established - n/a = not applicable

Section 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

CAUTION. May cause irritation to the eyes and skin.

Primary Route of Entry: Eye contact, skin contact

Acute/Potential Health Effects:

EYES: May cause irritation to the eyes experienced as discomfort or pain with excess blinking and tear production and redness or swelling of the conjunctiva.

SKIN: May cause mild skin irritation. Prolonged or repeated contact may cause defatting or drying of skin.

INHALATION: Not harmful.

INGESTION: May cause nausea, vomiting and diarrhea.

Section 3: HAZARDS IDENTIFICATION - continued:

Chronic / Long Term Effects: No data.

Signs and Symptoms of Overexposure: Ingestion may cause nausea, vomiting and diarrhea. Prolonged dermal exposure may cause drying of the skin.

Target Organ Effects: No data.

Reproductive/Developmental Information: No data.

Carcinogenic Information: This material is not listed as a carcinogen by IARC, NTP or OSHA.

Section 4: FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation persists.

SKIN: Flush skin with plenty of water for at least 15 minutes. Get medical attention if irritation persists.

INHALATION: No specific treatment is necessary since this material is not likely to be hazardous by inhalation.

INGESTION: Give large quantities of water or milk. Induce vomiting. Get medical attention.

Section 5: FIRE FIGHTING MEASURES

Flash Point: No flash by standard methods.

Extinguishing Media: Use appropriate methods for combating surrounding fire.

Special Fire Fighting Instructions: Wear a self contained breathing apparatus with a full face piece operated in the positive pressure demand mode.

Section 6: ACCIDENTAL RELEASE MEASURES

Absorb spill with inert material. Flush area well with water to remove trace residue. Surfaces may become slippery after spillage.

Section 7: HANDLING AND STORAGE

Store in a cool, dry area. Keep from freezing. Keep container closed when not in use. Keep out of reach of children.

Section 8: EXPOSURE CONTROLS and PERSONAL PROTECTION

Eye Protection: Wear safety glasses or goggles.

MSDS Number: 3820

Skin Protection: To prevent repeated or prolonged contact, wear impervious gloves (made from rubber, nitrile or neoprene).

Respiratory Protection: No special requirements are needed for this material.

Engineering Controls: Use general ventilation.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Clear, amber liquid, odorless

pH Concentrate: 9.0

Solubility in Water: Complete

Vapor Pressure [mmHg]: n/e

Evaporation Rate (Butyl Acetate=1): n/a

Vapor Density [Air=1]: n/e

Specific Gravity [H2O=1]: 1.15

Boiling Point: > 212 F

Section 10: REACTIVITY

Stability: Stable

Hazardous Polymerization: Will not occur

Conditions to avoid: High temperature

Hazardous Decomposition Products: CO, CO2

Incompatibility: Strong acids, oxidizers

Section 11: TOXICOLOGICAL INFORMATION

No data.

Section 12: ECOLOGICAL INFORMATION

No data.

Section 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: TRANSPORTATION INFORMATION

D.O.T. Shipping Name / Class:

Corrosive liquid, Basic, Inorganic, NOS, 8, UN3266, II (Contains Phosphates)

Section 15: REGULATORY INFORMATION

U.S. Federal Regulations:

TSCA (Toxic Substances Control Act): The intentional ingredients of product are listed.

MSDS Number: 3820

Title III Section 311/312 Hazardous Categories - 40 CFR 370.2:

ACUTE (X) Chronic () Fire () Pressure () Reactive () Not Applicable ()

(1) Title III Section 302/304 Extremely Hazardous Substances - 40 CFR 355 Appendix A

(2) Title III Section 313 Toxic Chemicals - 40 CFR 372.65

If indicated under Section 2 of this MSDS, this product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right to Know Act of 1986. This information must be included in all MSDS that are copied and distributed for this material.

RCRA Status: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. If this product becomes a hazardous waste it would be assigned RCRA Code(s)
None

State and Local Regulations: Certain states maintain their own ingredient lists which differ slightly from the Federal standards. If indicated under Section 2 of this MSDS, states listed below may have regulations on ingredients contained in this product. Check with your state for any additional regulations.

(3) California proposition 65 (Safe Drinking Water & Toxic Enforcement Act of 1986)

(4) Massachusetts (Hazardous Substance Disclosure by Employers)

Section 16: OTHER INFORMATION

This information was compiled from current manufacturer's MSDS's of the component parts of the product.

Disclaimer: The Manufacturer believes that the information contained in the Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with, nor followed in violation of applicable laws, regulations, rules or insurance requirements.

MC-2

METAL CLEANER-2

CONCENTRATED CLEANING FORMULA

APPLICATIONS AND USE

Branson MC-2 Concentrated Solution is a biodegradable, phosphate and caustic-free alkaline cleaner formulated for general purpose and normal maintenance cleaning applications. Liquid non-ionic surfactants and detergents are combined in a formulation with excellent detergent, wetting and free rinsing properties which provides exceptional performance for general maintenance cleaning in virtually all industries with virtually all base materials.

Branson MC-2 is an ultrasonic cleaning solution which removes oils and a variety of soils from ferrous metals, steel alloys, titanium alloys, copper alloys, and stainless steel. Branson MC-2 is not recommended for aluminum or aluminum alloys. Branson MC-2 will tolerate high levels of contamination. It is especially effective in removing fabricating oils, cuttings oils, and polishing oils.

Branson MC-2 is an emulsifying cleaner; oils, soils, and greases are entrapped in the cleaning solution and suspended so they can not redeposit on the clean parts. Branson MC-2 contains a special blend of alkalis and detergents in addition to dispersants, deflocculents, and emulsifiers. The cleaning solution cleans rapidly, penetrating into blind holes and between adjacent surfaces.

APPLICATION PROCEDURES

Branson MC-2 Solution is mixed easily with cold or hot water in a concentration of 7-10% by volume. Branson MC-2 Solution can be used over a temperature range from 130°F to 180°F (82°F) in suitable commercial and industrial cleaning tanks.

For optimum cleaning, Branson MC-2 should be operated at recommended temperatures. Cleaning time is dictated by the quantity and nature of the soil. Operating Branson MC-2 below the recommended concentrations, temperatures, or time will generally result in poor cleaner performance, characterized by cloudiness and water breaks. Operating Branson MC-2 above the recommended parameters may lead to component metal attack or cause the surfactants to separate from the solution causing poor cleaning. It is imperative that the solution be allowed to "degas" at operating temperature for a minimum of 10 minutes prior to placing the parts into the cleaning solution. It is best if ultrasonic energy is applied during this time to enhance degassing. Thorough rinsing is suggested for removal of cleaning solution. As with any process involving water, drying should be considered as the final step.

The selection and use of the proper ultrasonic cleaning equipment and component fixturing will influence the cleaning efficiency and performance of Branson MC-2.

CHEMICAL CHARACTERISTICS

Chemical Composition:	Blend of liquid, non-ionic alkaline surfactants and detergents	Biodegradable:	Yes
Flash Point:	None	Normal Concentration:	7-10% by volume
Recommended Diluent:	Water	Normal Temperature:	130-180°F
		pH at Rinse Temperature:	12.5
		Rinsability:	Good
		<i>See the MSDS for further information</i>	

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HMIS RATINGS:
 Health: 1
 Flammability: 2
 Reactivity: 0
 Personal Protection: B

Section 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Branson MC-2	Emergency Telephone Number: (800)535-5053
Chemical Family: Degreaser/Cleaner	Date Prepared: April 29, 2004
Company Identification: Branson Ultrasonics Corp.	MSDS Number: 6495
41 eagle Rd.	MFGD. BY: ABC Compounding Co., Inc.
Danbury, CT 06813	6970 Jonesboro Rd.
	Morrow, Ga. 30260

Section 2: COMPOSITION, INFORMATION ON INGREDIENTS

CAS NUMBER	CHEMICAL NAME	% BY WGHT.	OSHA PEL/ACGIH TLV	SARA 302/304(1)*	SARA 313 (2)*	STATE INFO(3)(4)
141-43-5	Monoethanolamine	< 5.0	3 ppm / 3 ppm	NO	NO	NO
5989-27-5	D'limonene	< 3.0	n/e / n/e	NO	NO	NO
64-02-8	Tetrasodium salt of Ethylenediamine- tetraacetic acid	< 2.0	n/e / n/e	NO	NO	NO

* See Section 15 for more information

n/e = none established - n/a = not applicable

Section 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER. Corrosive. Causes irritation of skin and respiratory tract.
 Clear, yellow liquid with citrus/orange fragrance. COMBUSTIBLE.

Primary Route of Entry: Eye contact, skin contact, inhalation

Acute/Potential Health Effects:

EYES: Causes severe irritation, experienced as discomfort or pain, excess blinking and tear production, with redness and swelling of the conjunctiva.

SKIN: Brief contact may cause slight irritation. Prolonged contact may cause more severe irritation with pain, local redness and swelling and possible tissue destruction.

INHALATION: High concentrations of mist may cause irritation of the respiratory tract.

INGESTION: May cause headache, dizziness, incoordination, nausea, vomiting, diarrhea and general weakness.

Section 3: HAZARDS IDENTIFICATION - continued:

Chronic / Long Term Effects: None known.

Signs and Symptoms of Overexposure: Dermal exposure may cause local redness and swelling, pain and discomfort.

Target Organ Effects: No data.

Reproductive/Developmental Information: No data.

Carcinogenic Information: This material is not listed as a carcinogen by IARC, NTP or OSHA.

Section 4: FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

SKIN: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Get medical attention immediately.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

INGESTION: Seek medical attention immediately. Call a poison control center or doctor for treatment advice. Have person sip a glass of water if able to swallow. Never give anything by mouth to an unconscious person.

Section 5: FIRE FIGHTING MEASURES

Flash Point: 180 degrees F (TCC method)

Extinguishing Media: Use appropriate methods for combating surrounding fire.

Special Fire Fighting Instructions: Wear a self contained breathing apparatus with a full face piece operated in the positive pressure demand mode. Chemical resistant PPE is recommended.

Section 6: ACCIDENTAL RELEASE MEASURES

Stop all leaks. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Absorb spill with inert material (e.g. dry sand, earth). Prevent runoff from entering drains, sewers or other bodies of water. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to containers for disposal.

Section 7: HANDLING AND STORAGE

Follow all MSDS/label precautions even after container is emptied because they may contain product residues. Use with adequate ventilation. Do not get in eyes, on skin or clothing. Store in a cool, dry place. Keep container closed when not in use. Keep out of reach of children.

Section 8: EXPOSURE CONTROLS and PERSONAL PROTECTION

Eye Protection: Wear safety glasses or goggles.

MSDS Number: 6495

Skin Protection: To prevent repeated or prolonged contact, wear impervious gloves (made from rubber, nitrile or neoprene), clothing and boots.

Respiratory Protection: When respiratory protection is required, use an organic vapor cartridge. A respiratory program that meets OSHA's 29 CFR 1910.34 & ANSI Z88.2 requirements must be followed.

Engineering Controls: Good general ventilation required.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Clear, yellow liquid with citrus/orange fragrance
pH Concentrate: 12.0
Solubility in Water: Complete
Vapor Pressure [mmHg]: n/e
Evaporation Rate (Butyl Acetate=1): n/e
Vapor Density [Air=1]: n/e
Specific Gravity [H2O=1]: 1.02
Boiling Point: > 212 F

Section 10: REACTIVITY

Stability: Stable
Hazardous Polymerization: Will not occur
Conditions to avoid: High temperature
Hazardous Decomposition Products: None
Incompatibility: Strong acids, alkalis, oxidizing agents

Section 11: TOXICOLOGICAL INFORMATION

No data.

Section 12: ECOLOGICAL INFORMATION

No data.

Section 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Wastes must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: TRANSPORTATION INFORMATION

D.O.T. Shipping Name / Class:

Corrosive Liquid, Basic, Inorganic, N.O.S., 8

UN 3267, II (Contains Ethanolamine)

Section 15: REGULATORY INFORMATION

U.S. Federal Regulations:

TSCA (Toxic Substances Control Act): The intentional ingredients of product are listed.

MSDS Number: 6495

Title III Section 311/312 Hazardous Categories - 40 CFR 370.2:

ACUTE (X) Chronic () Fire (X) Pressure () Reactive () Not Applicable ()

(1) Title III Section 302/304 Extremely Hazardous Substances - 40 CFR 355 Appendix A

(2) Title III Section 313 Toxic Chemicals - 40 CFR 372.65

If indicated under Section 2 of this MSDS, this product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right to Know Act of 1986. This information must be included in all MSDS that are copied and distributed for this material.

RCRA Status: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. If this product becomes a hazardous waste it would be assigned RCRA Code(s)
None

State and Local Regulations: Certain states maintain their own ingredient lists which differ slightly from the Federal standards. If indicated under Section 2 of this MSDS, states listed below may have regulations on ingredients contained in this product. Check with your state for any additional regulations.

(3) California proposition 65 (Safe Drinking Water & Toxic Enforcement Act of 1986)

(4) Massachusetts (Hazardous Substance Disclosure by Employers)

Section 16: OTHER INFORMATION

This information was compiled from current manufacturer's MSDS's of the component parts of the product.

Disclaimer: The Manufacturer believes that the information contained in the Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with, nor followed in violation of applicable laws, regulations, rules or insurance requirements.

MC-3 METAL CLEANER 3 CONCENTRATED CLEANING FORMULA

APPLICATIONS AND USE

Branson MC-3 Concentrated Solution is a biodegradable, phosphate- and caustic-free alkaline cleaner formulated for general purpose and normal maintenance cleaning applications.

Liquid nonionic surfactants and detergent bases are combined in a formulation with excellent detergent, wetting and free rinsing properties which provides exceptional performance for general maintenance cleaning in virtually all Industries with virtually all base materials.

Branson MC-3 is an ultrasonic cleaning solution which removes oils and a variety of soils from ferrous metals, steel alloys, titanium alloys, copper and copper alloys, and stainless steel. Branson MC-3 is a very effective, specially-formulated cleaner for aluminum and aluminum alloys. Branson MC-3 will tolerate high levels of contamination. It is especially effective in removing fabricating oils, cutting oils, and polishing oils.

Branson MC-3 is an emulsifying cleaner; oils, soils, and greases are entrapped in the cleaning solution and suspended so they can not redeposit on the clean parts. Branson MC-3 contains a special blend of alkalis and detergents in addition to dispersants, deflocculents, and emulsifiers. The cleaning solution cleans rapidly, penetrating into blind holes and between adjacent surfaces.

APPLICATION PROCEDURES

Branson MC-3 solution is easily mixed with water to form a concentration of 7-10% by volume; and can be used at temperatures ranging from ambient to 160°F (70°C).

For optimum cleaning, Branson MC-3 should be operated at recommended temperatures. Cleaning time is dictated by the quantity and nature of the soils and by the type. Operating Branson MC-3 below the recommended concentrations, temperatures, and times generally will result in poor cleaner performance, characterized by cloudiness and water breaks. Operating Branson MC-3 above the recommended concentration, temperature, and time may cause component metal attack or cause the surfactants to separate from the solution causing poor cleaning. It is imperative that the solution be allowed to 'degas' at operating temperature for a minimum of 10 minutes prior to placing the parts into the cleaning solution. It is best if ultrasonic energy is applied during this time to enhance degassing. Thorough rinsing is suggested for removal of cleaning solution. As with any process involving water, drying should be considered as the final step.

The selection and use of the proper ultrasonic cleaning equipment and component fixturing will influence the cleaning efficiency and performance of MC-3.

When water replenishment quantities meet or exceed 15% of the tank volume, the cleaning ability of the operating solutions may be so reduced as to make further additions of Branson MC-3 unproductive and uneconomical. At this point, it is usually more practical to prepare a new solution. Periodic pH variation checks will indicate solution effectiveness.

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CHEMICAL CHARACTERISTICS

Chemical Composition	Blend of liquid nonionic alkaline surfactants and detergents
Flash Point	None
Recommended Diluent	Water
Biodegradable	Yes
Phosphate Free	Yes
Normal Use Concentration	.7-10% by volume
Normal Use Temperature	120-160°F (50-70°C)
pH at Use Temperature	12.4
Rinsability	Good

Effect of Working Solution on Metals

Stainless Steel	None
Steel	None
Copper	None
Brass	None
Aluminum	None
Magnesium	None
Zinc	None
Tin	None

PRECAUTIONARY CONSIDERATIONS

- BRANSON MC-3 CONCENTRATED SOLUTION CONTAINS ALKALINE DETERGENTS, AND DIRECT CONTACT MAY RESULT IN BURNS OF EYES OR SKIN IRRITATION.
- AVOID PROLONGED SKIN CONTACT.
- WASH THOROUGHLY AFTER HANDLING.
- DO NOT TAKE INTERNALLY.
- IF DIRECT CONTACT OCCURS, FLUSH REPEATEDLY WITH COOL, CLEAR WATER.
- KEEP OUT OF REACH OF CHILDREN.

DISPOSAL

Dispose in accordance with all local, state, and federal regulations.

BRANSON CONCENTRATED CLEANING SOLUTIONS

MC-1, MC-2 MC-3 Metal Cleaner

ECElectronic Cleaner

ISIndustrial Strength Cleaner

GPGeneral Purpose Cleaner

OROxide Remover

BCRBuffing Compound Remover

LRSLiquid Rust Stripper

JCJewelry Cleaner

OCOptical Cleaner

For additional information concerning these solutions, contact Branson or a Bransonic® dealer.

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HMIS RATINGS:
Health: 1
Flammability: 0
Reactivity: 0
Personal Protection: B

Section 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Branson MC-3
Chemical Family: Cleaner
Company Identification: Branson Ultrasonics Corp.
41 eagle Rd.
Danbury, CT 06813
Emergency Telephone Number: (800)535-5053
Date Prepared: April 29, 2004
MSDS Number: 3845
MFGD. BY: ABC Compounding Co., Inc.
6970 Jonesboro Rd.
Morrow, Ga. 30260

Section 2: COMPOSITION, INFORMATION ON INGREDIENTS

CAS NUMBER	CHEMICAL NAME	% BY WGHT.	OSHA PEL/ ACGIH TLV	SARA 302/ 304(1)*	SARA 313 (2)*	STATE INFO(3)(4)	CERCLA RQ
6834-92-0	Sodium Metasilicate	< 9.0	15 mg/m3 / 10 mg/m3	NO	NO	NO	

* See Section 15 for more information n/e = none established - n/a = not applicable

Section 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER. Corrosive. May cause irritation of skin and respiratory tract.
Clear, amber, odorless liquid.

Primary Route of Entry: Eye contact, skin contact

Acute/Potential Health Effects:

EYES: Causes severe irritation, experienced as discomfort or pain, excess blinking and tear production, with redness and swelling of the conjunctiva.

SKIN: Brief contact may cause slight irritation. Prolonged contact may cause more severe irritation with pain, local redness and swelling and possible tissue destruction.

INHALATION: High concentrations of mist may cause irritation of the respiratory tract.

INGESTION: May cause headache, dizziness, incoordination, nausea, vomiting, diarrhea and general weakness.

Section 3: HAZARDS IDENTIFICATION - continued:

Chronic / Long Term Effects: None known.

Signs and Symptoms of Overexposure Dermal exposure may cause local redness and swelling, pain and discomfort.

Target Organ Effects No data.

Reproductive/Developmental Information: No data.

Carcinogenic Information: This material is not listed as a carcinogen by IARC, NTP or OSHA.

Section 4: FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

SKIN: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Get medical attention immediately.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

INGESTION: Seek medical attention immediately. Call a poison control center or doctor for treatment advice. Have person sip a glass of water if able to swallow. Never give anything by mouth to an unconscious person.

Section 5: FIRE FIGHTING MEASURES

Flash Point: No flash by standard methods.

Extinguishing Media: Use appropriate methods for combating surrounding fire.

Special Fire Fighting Instructions: Wear a self contained breathing apparatus with a full face piece operated in the positive pressure demand mode. Chemical resistant PPE is recommended.

Section 6: ACCIDENTAL RELEASE MEASURES

Stop all leaks. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Absorb spill with inert material (e.g. dry sand, earth). Prevent runoff from entering drains, sewers or other bodies of water. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to containers for disposal.

Section 7: HANDLING AND STORAGE

Follow all MSDS/label precautions even after container is emptied because they may contain product residues. Use with adequate ventilation. Do not get in eyes, on skin or clothing. Store in a cool, dry place. Keep container closed when not in use. Keep out of reach of children.

Section 8: EXPOSURE CONTROLS and PERSONAL PROTECTION

Eye Protection: Wear safety glasses or goggles.

MSDS Number: 3845

Skin Protection: To prevent repeated or prolonged contact, wear impervious gloves (made from rubber, nitrile or neoprene), clothing and boots.

Respiratory Protection: When respiratory protection is required, use a particulate cartridge. All respiratory programs must meet OSHA's 29 CFR 1910.34 & ANSI Z88.2 requirements.

Engineering Controls: Good general ventilation required.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Clear, amber liquid; odorless
pH (10% solution): 11.0
Solubility in Water: Complete
Vapor Pressure [mmHg]: n/e
Evaporation Rate (Butyl Acetate=1): n/e
Vapor Density [Air=1]: n/e
Specific Gravity [H2O=1]: 1.14
Boiling Point: > 212 F

Section 10: REACTIVITY

Stability: Stable
Hazardous Polymerization: Will not occur
Conditions to avoid: High temperature
Hazardous Decomposition Products: None
Incompatibility: Strong acids, alkalis, oxidizing agents

Section 11: TOXICOLOGICAL INFORMATION

No data.

Section 12: ECOLOGICAL INFORMATION

No data.

Section 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Wastes must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: TRANSPORTATION INFORMATION

D.O.T. Shipping Name / Class:

Corrosive Liquid, Basic, Inorganic, N.O.S., 8

UN 3266, II (Contains Sodium Metasilicate)

Section 15: REGULATORY INFORMATION

U.S. Federal Regulations:

TSCA (Toxic Substances Control Act): The intentional ingredients of product are listed.

MATERIAL SAFETY DATA SHEET Trade Name: Branson MC-3

Page 4 of 4

MSDS Number: 3845

Title III Section 311/312 Hazardous Categories - 40 CFR 370.2:

ACUTE (X) Chronic (X) Fire () Pressure () Reactive () Not Applicable ()

(1) Title III Section 302/304 Extremely Hazardous Substances - 40 CFR 355 Appendix A

(2) Title III Section 313 Toxic Chemicals - 40 CFR 372.65

If indicated under Section 2 of this MSDS, this product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right to Know Act of 1986. This information must be included in all MSDS that are copied and distributed for this material.

RCRA Status: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. If this product becomes a hazardous waste it would be assigned RCRA Code(s)
D002

State and Local Regulations: Certain states maintain their own ingredient lists which differ slightly from the Federal standards. If indicated under Section 2 of this MSDS, states listed below may have regulations on ingredients contained in this product. Check with your state for any additional regulations.

- (3) California proposition 65 (Safe Drinking Water & Toxic Enforcement Act of 1986)
- (4) Massachusetts (Hazardous Substance Disclosure by Employers)

Section 16: OTHER INFORMATION

This information was compiled from current manufacturer's MSDS's of the component parts of the product.

Disclaimer: The Manufacturer believes that the information contained in the Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with, nor followed in violation of applicable laws, regulations, rules or insurance requirements.

LRS LIQUID RUST STRIPPER CLEANING FORMULA

APPLICATIONS AND USE

Branson Liquid Rust Stripper Concentrate is a double-chelated, highly caustic, non-foaming cleaner and degreaser.

Branson Liquid Rust Stripper is used for derusting and descaling of ferrous metals. It is used for paint stripping, degreasing, mold cleaning and heavy-duty cleaning in the metal, petroleum, food and transportation industries. Heavy greases, oils, and carbonaceous soils are readily removed from internal combustion engine parts and components. Light to medium scale can be removed from titanium. LRS will attack active metals like aluminum or magnesium.

Excellent for use with ultrasonics for cleaning of automotive, aerospace, components, and removal of carbonized and greasy soils in CIP applications, cleaning of food processing equipment and bottle washing. Spent solution should be neutralized and disposed of in accordance with local, state, and federal regulations.

APPLICATION PROCEDURES

Branson Liquid Rust Stripper should be carefully mixed with cool water in a maximum concentration of 4-8 ounces per gallon. The prepared solution can be used over a temperature range of 160-180° F (72-93° C) in industrial cleaning tanks. Optimum cleaning performance is achieved at the higher end of the solution temperature range.

Tanks, heating coils, immersion heaters, and any other system components, which will be exposed to the solution, must be fabricated from a suitable stainless steel alloy.

It is imperative that the solution be allowed to "degas" at operating temperature for a minimum of 10 minutes prior to placing the parts into the cleaning solution. It is best if ultrasonic energy is applied during this time to enhance degassing. Thorough rinsing is suggested for removal of cleaning solution. As with any process involving water, drying should be considered as the final step.

CHEMICAL CHARACTERISTICS

Chemical Composition:	Double-chelated, highly caustic non-foaming liquid alkaline cleaner.	Biodegradable:	No
Flash Point:	None	Normal Concentration:	6-8 oz. per gallon
Recommended Diluent:	Water	Normal Temperature:	160-180° F
		pH at Rinse Temperature:	13
		Rinsability:	Fair

See the MSDS for further information

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HMIS RATINGS:
Health: 3
Flammability: 0
Reactivity: 1
Personal Protection: D

Section 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Liquid Rust Stripper	Emergency Telephone Number: (800)535-5053
Chemical Family: Alkali Cleaner	Date Prepared: April 29, 2004
Company Identification: Branson Ultrasonics Corp.	MSDS Number: 6505
41 eagle Rd.	MFGD. BY: ABC Compounding Co., Inc.
Danbury, CT 06813	6970 Jonesboro Rd.
	Morrow, Ga. 30260

Section 2: COMPOSITION, INFORMATION ON INGREDIENTS

CAS NUMBER	CHEMICAL NAME	% BY WGT.	OSHA PEL/ACGIH TLV	SARA 302/304(1)*	SARA 313(2)*	STATE INFO(3)(4)	CERCLA RQ
1310-73-2	Sodium Hydroxide	< 50.0	2 mg/m3 / 2 mg/m3	NO	NO	NO	1000 lbs

* See Section 15 for more information n/e = none established - n/a = not applicable

Section 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER. POISON. Corrosive. May be harmful or fatal if swallowed. Causes moderate to severe skin burns. Causes eye damage. Avoid breathing vapor or mists. Clear, brown liquid; odorless.

Primary Route of Entry: Eye contact, skin contact, inhalation

Acute/Potential Health Effects:

EYES: Contact can cause severe damage including burns and blindness.

SKIN: Prolonged or repeated contact, even to dilute concentrations, can cause a high degree of tissue destruction.

INHALATION: Breathing of this material is harmful. Exposure to vapor, mist or liquid can produce burns of the respiratory tract.

INGESTION: Harmful or fatal if swallowed. Corrosive. Can cause severe burns and complete tissue perforation of mucous membranes of mouth, throat and stomach.

Section 3: HAZARDS IDENTIFICATION - continued:

Chronic / Long Term Effects: No known chronic effects.

Signs and Symptoms of Overexposure: Contact of any kind will result in damage to skin, eyes, and gastro-respiratory tract.

Target Organ Effects: Lungs and upper respiratory tract, gastrointestinal tract, eyes, skin.

Reproductive/Developmental Information: No data.

Carcinogenic Information: This material is not listed as a carcinogen by IARC, NTP or OSHA.

Section 4: FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

SKIN: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Get medical attention immediately.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

INGESTION: Seek medical attention immediately. Do not induce vomiting. If victim is alert, give 1/2 to 1 glass of water. Call a poison control center or doctor for treatment advice.

Section 5: FIRE FIGHTING MEASURES

Flash Point: No flash by standard methods

Extinguishing Media: Dry chemical, CO2 or foam is recommended. Dilution with water may release heat.

Special Fire Fighting Instructions: Wear a self contained breathing apparatus with a full face piece operated in the positive pressure demand mode. Chemical resistant PPE is recommended.

Section 6: ACCIDENTAL RELEASE MEASURES

Stop all leaks. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Absorb spill with inert material (e.g. dry sand, earth). Prevent runoff from entering drains, sewers or other bodies of water. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to containers for disposal.

Section 7: HANDLING AND STORAGE

Follow all MSDS/label precautions even after container is emptied because they may contain product residues. Use with adequate ventilation. Do not get in eyes, on skin or clothing. Store in a cool, dry place. Keep container closed when not in use. Keep out of reach of children.

Section 8: EXPOSURE CONTROLS and PERSONAL PROTECTION

Eye Protection: Wear safety glasses or goggles and face shield. Remove contact lenses.

Skin Protection: To prevent repeated or prolonged contact, wear impervious gloves (made from rubber, vinyl or neoprene), clothing and boots.

Respiratory Protection: When respiratory protection is required, use an organic vapor & particulate cartridge. All respiratory programs must meet OSHA's 29 CFR 1910.34 & ANSI Z88.2 requirements.

Engineering Controls: Good general ventilation required.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Clear, brown liquid with characteristic caustic odor
pH Concentrate: > 13.0
Solubility in Water: Complete
Vapor Pressure [mmHg]: n/e
Evaporation Rate (Butyl Acetate=1): n/e
Vapor Density [Air=1]: n/e
Specific Gravity [H2O=1]: 1.485
Boiling Point: > 212 F

Section 10: REACTIVITY

Stability: Stable
Hazardous Polymerization: Will not occur
Conditions to avoid: High temperature
Hazardous Decomposition Products: None
Incompatibility: Strong acids, water, certain metals

Section 11: TOXICOLOGICAL INFORMATION

Sodium Hydroxide: Acute Dermal LD50 - Rabbit: 1350 mg/kg.
Primary Skin Irritation - Rabbit: Severe. Primary Eye Irritation - Rabbit: Severe

Section 12: ECOLOGICAL INFORMATION

Sodium Hydroxide: Aquatic Ecotoxicity: Fish (fathead minnow): LC50 (96 hr): 179 mg/L

Section 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: TRANSPORTATION INFORMATION

D.O.T. Shipping Name / Class:

Corrosive Liquid, Basic, Inorganic, N.O.S., 8, UN 3266, II

(Contains Sodium Hydroxide)

Section 15: REGULATORY INFORMATION

U.S. Federal Regulations:

TSCA (Toxic Substances Control Act): The intentional ingredients of product are listed.

MSDS Number: 6505

Title III Section 311/312 Hazardous Categories - 40 CFR 370.2:

ACUTE (X) Chronic () Fire () Pressure () Reactive (X) Not Applicable ()

(1) Title III Section 302/304 Extremely Hazardous Substances - 40 CFR 355 Appendix A

(2) Title III Section 313 Toxic Chemicals - 40 CFR 372.65

If indicated under Section 2 of this MSDS, this product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right to Know Act of 1986. This information must be included in all MSDS that are copied and distributed for this material.

RCRA Status: Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. If this product becomes a hazardous waste it would be assigned RCRA Code(s)
D002

State and Local Regulations: Certain states maintain their own ingredient lists which differ slightly from the Federal standards. If indicated under Section 2 of this MSDS, states listed below may have regulations on ingredients contained in this product. Check with your state for any additional regulations.

(3) California proposition 65 (Safe Drinking Water & Toxic Enforcement Act of 1986)

(4) Massachusetts (Hazardous Substance Disclosure by Employers)

Section 16: OTHER INFORMATION

This information was compiled from current manufacturer's MSDS's of the component parts of the product.

Disclaimer: The Manufacturer believes that the information contained in the Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with, nor followed in violation of applicable laws, regulations, rules or insurance requirements.

CYLSONIC

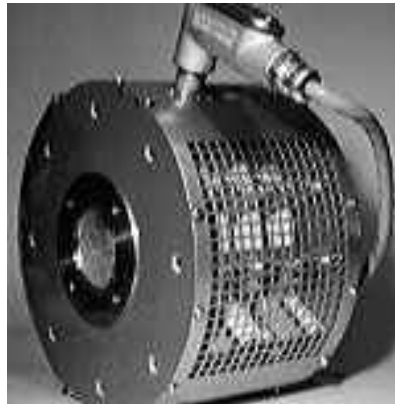
ULTRASONIC INLINE WIRE CLEANING

OVERVIEW

The Branson *Cylsonic Ultrasonic Wire Cleaner* is a production tool designed specifically around the need to clean wire inline during or following the drawing process. The *Cylsonic* processor assembly uses heavy duty magnetostrictive ultrasonic transducer elements arrayed radially around the circumference of a 2.9" diameter process tube. Wire is passed through the tube following drawing and exposed to a very high intensity ultrasonic field. This methodology will improve cleaning over traditional "wipe methods" significantly and often enhances throughput and improves productivity by permitting higher line speeds

TYPICAL APPLICATIONS

Ultrasonic exposure can be used to improve a variety of operations used daily in the wire industry. Typical applications for this processor include:



- Removal of drawing soaps and lubricants following the drawing process
- Removal of oxides and scale after quenching or annealing operations
- Final cleaning before coating to improve adhesion

SYSTEM DESCRIPTION

The *Cylsonic* wire cleaner utilizes high power 20 kHz magnetostrictive transducers to assure maximum energy in the process tube. The tube is constructed of Schedule 80, type 316 stainless steel for compatibility with a broad range of cleaning liquids. Multiple *Cylsonic* transducer head assemblies can be used in series to increase ultrasonic exposure and permit cleaning at line speeds up to 1000 fpm. Stainless steel flanges and gasket systems are available to facilitate multi-head use. Branson *Cylsonic* wire cleaners are driven by our G1KA ultrasonic generators. *Cylsonic* wire cleaning modules are generally incorporated in a complete wire cleaning stations including cleaning solution management, rinsing, and drying if required.

MODULE SPECIFICATIONS

Dimensions	
Overall :	8" x 12.5" Dia. 16.5" dia. includes conduit box)
Process Chamber:	8" x 2.8" Dia.
Other	
Construction:	304 Stainless
Operating Frequency:	20 kHz
Operation temperature:	45° F to 105° F (7° C to 40° C)
Shipping weight:	40 lbs. (16kg.)

[WF3-16](#) | [PENTAGONAL](#) | [PH1 & PH2](#)
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WF3-16

ULTRASONIC INLINE WIRE CLEANING

OVERVIEW

The Branson *WF3-16 Ultrasonic Wire Cleaner* is a production tool designed specifically around the need to clean wire during or following the drawing process. The *WF3-16* processor assembly uses ultrasonic transducer elements arrayed radially around the circumference of a 3.0" diameter process tube. Wire is passed through the tube following drawing and exposed to a very high intensity ultrasonic field. This methodology will improve cleaning over traditional "wipe methods" significantly and often enhances throughput and improves productivity by permitting higher line speeds

TYPICAL APPLICATIONS

Ultrasonic exposure can be used to improve a variety of operations used daily in the wire industry. Typical applications for this processor include:

- Removal of drawing soaps and lubricants following the drawing process
- Removal of oxides and scale after quenching or annealing operations
- Final cleaning before coating to improve adhesion



SYSTEM DESCRIPTION

The *WF3-16* wire cleaner utilizes highly efficient 40 kHz piezoelectric transducers to assure maximum energy in the process tube. The tube is constructed of Schedule 80, type 316 stainless steel for compatibility with a broad range of cleaning liquids. Multiple *WF3-16* transducer head assemblies can be used in series to increase ultrasonic exposure and, therefore, throughput. Stainless steel flanges and gasket systems are available to facilitate multi-head use. Branson *WF3-16* wire cleaners are driven by our S8540 ultrasonic generators. These generators are equipped with a number of features which bring flexibility

to liquid processing applications. They include line/load power control, amplitude control and several frequency options to optimize processing.

SPECIFICATIONS

Dimensions	
Overall:	11" x 10" Dia.
Process Chamber:	8" x 2.9" Dia.
Construction:	316 Stainless
Other	
Operating Frequency:	40 kHz
Operation temperature:	35° F to 220° F (2° C to 104° C)
Shipping weight:	40 lbs. (16 kg.)

[CYLSONIC](#) | [PENTAGONAL](#) | [PH1 & PH2](#)
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Pentagonal

ULTRASONIC INLINE LIQUID PROCESSING

OVERVIEW

The Branson *Pentagonal Ultrasonic Liquid Processor* is a production tool designed specifically around the need to process higher volume liquids in a continuous flow environment. It is a five-sided process tube with 6.4" from flat side to opposite apex. The *Pentagonal* processor assembly uses ultrasonic transducer elements bonded to each of the five sides of the process tube. This design assures uniform ultrasonic activity throughout the volume of the processor. Liquids to be processed are passed through the tube and exposed to a very high intensity ultrasonic field. This methodology can significantly enhance throughput and improve productivity while often improving processed product.

TYPICAL APPLICATIONS

Ultrasonic exposure can be used to enhance a variety of physical and chemical routines used daily in industry. Typical applications for this processor include:

- Degassing
- Disintegration
- Dispersion
- Mixing
- Emulsification
- Extraction



SYSTEM DESCRIPTION

The *Pentagonal* processor assembly utilizes highly efficient 40 kHz piezoelectric transducers to assure maximum energy in the process tube. The tube is constructed of type 316 stainless steel for compatibility with a broad range of liquids. FDA standards may be met by using a Teflon® or Excelon® inner process tube. Multiple processors can be used in series to increase ultrasonic exposure and, therefore, throughput. Stainless steel flanges and gasket systems are available to facilitate multi-head use. Branson *Pentagonal* processors are driven by our S-8540 ultrasonic generators. These generators are equipped with a number of features which bring flexibility to liquid processing applications. They include line/load power control, amplitude control and several frequency options to optimize processing.

SPECIFICATIONS

Dimensions	
Overall diameter:	12"
Overall length:	20" or 30"
Process chamber diameter:	Approx. 6"
Chamber capacity:	4 gallons
Other	
Construction:	316 Stainless
Operating Frequency:	40 kHz
Operation temperature:	35° F to 190° F (2° C to 88° C)
Shipping weight:	60 lbs. (27.3 kg.)

CURRENT LITERATURE

[Download a PDF copy](#) of our Pentagonal Liquid Processor brief (1.34Mb)



to download.

You'll need Adobe's free Acrobat Reader to view PDF files. Click the icon

[CYLSONIC](#) | [WF3-16](#) | [PH1 & PH2](#)
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pH-1 & pH-2

MINIATURE ULTRASONIC PROCESS TRANSDUCERS

OVERVIEW

Branson originally developed the *pH-1* and *pH-2* miniature ultrasonic transducers as an accessory for sensor packages in the instrumentation industry. They are still used to clear debris from pH and other sensitive sensors in remote or dirty applications. They provide a very reliable, compact method of assuring accurate data under very difficult sensing conditions. They have since been adapted to other non-sensor applications where small size and reliability are critical.

SYSTEM DESCRIPTION

The pH-1 transducer assembly utilizes a highly efficient 40 kHz piezoelectric industrial transducer element to assure maximum energy at the radiating surface. It is packaged in a 3" diameter by 3" long housing and is fully immersible. The housing is constructed of type 316 stainless steel for compatibility with a broad range of process liquids. A 3/4" stainless steel flange is available to facilitate mounting.

The pH-2 transducer assembly operates at a frequency of 70 kHz which has the added benefit of smaller particle removal. The pH-2 is packaged somewhat differently. The 70 kHz ceramic is essentially "clad" in a type 316 stainless steel jacket which is fitted with a 3" tube with an offset through which power is introduced. The product takes on an appearance somewhat like a lollipop with a bent stick. Both the pH-1 and pH-2 transducers are driven by a dedicated ultrasonic generator. The generator includes a variable power control so power can be precisely matched to the application. It is packaged in a NEMA IV enclosure for maximum protection in harsh environments.

SPECIFICATIONS

pH-1 Transducer	
Overall dimensions:	3"H x 4.5" Dia
Construction:	316 Stainless steel
Operating frequency:	40 kHz
Operation temperature:	35° F to 180° F (2° C to 82° C)
pH-2 Transducer	

Overall dimensions:	5"Lx1.9"Wx1.4"H
Transducer dimensions:	1.9" Dia.x 0.5"H
Operating frequency:	70 kHz
Operating temperature:	35° F to 180° F
Ultrasonic Generator	
Overall dimensions:	11.5"Lx9"Wx4.5"H
Operating frequency:	per transducer
Power requirements:	115 or 220V, 1 ph., 50/60 Hz
Weight:	17 lbs. (7.4 kg)

[CYLSONIC](#) | [WF3-16](#) | [PENTAGONAL](#)
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Now
Available!

With More Power in the Tank



Branson[®] Ultrasonic Cleaners

Branson Precision Cleaning Power

Ultrasonic cleaning is faster, more consistent, and safer than any other method. Hand scrubbing, soaking, or steam don't even come close.

It's now powerful enough to remove heavy oils, buffing compounds, or proteins, consistent enough to manage difficult laboratory cleaning every time and safe enough for those delicate electronic components or fine jewelry.

Ultrasonic sound waves moving through a cleaning solution create an effect called cavitation, the rapid formation and collapse of microscopic bubbles. This violent collapse, along with the cleaning chemistry, scrubs every wetted surface. The deep cleaning action of ultrasonics removes the most stubborn contaminants, even from blind holes and internal surfaces. And heat enhances this process.

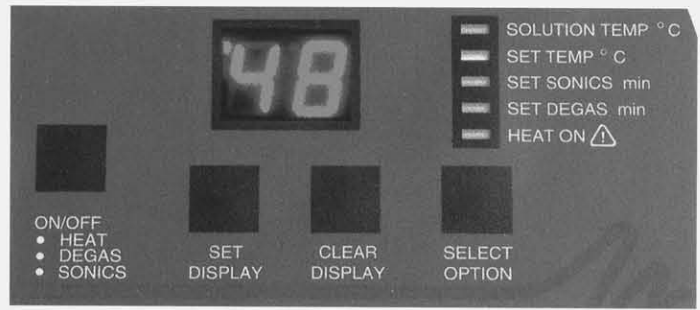
No one knows ultrasonics better than Branson. Over fifty years ago we pioneered ultrasonic cleaning, and ultrasonics is still our primary business. Branson cleaners incorporate everything we've learned from our experience, our research, and especially our customers.

New Transducers Improve The Performance

The Branson cleaners now include the same high power, rugged transducers found on industrial systems sold to the automotive, electronics, and metal-working industries. These Langevin-type metal/ceramic devices use engineered ceramics to assure both durability and superior power. Coupled with a new sweep frequency capability, you get the best possible cleaning every time, all the time. With these new features, the Branson ultrasonic cleaners will operate all day, every day, for years — at peak performance.



Industrial type ultrasonic transducer assures maximum power in the cleaning tank.



Digital models feature microprocessor controlled timer and thermostat with fingertip input and clear LED readout of parameters.

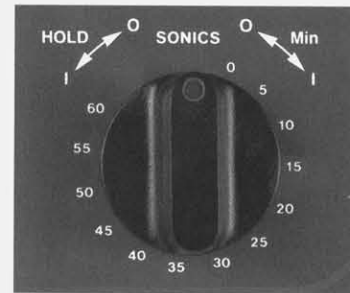
Designed With You In Mind

Branson cleaners have been designed to be functional, reliable, and most important, easy to use. All controls are mounted in an easily accessible control panel above and behind the cleaning tank. They're easily seen and are above any liquid for safety and reliability. Smaller models feature convenient built-in pour drains while the larger models incorporate tank drains with valves. Because we designed the Branson units to respond to your needs and requests, there's a great mix of features.

You can choose from models including:

- Ultrasonics with digital heat control, digital timer, and temperature monitor
- Ultrasonics with heat and mechanical timer
- Ultrasonics with mechanical timer

Digital models offer you maximum control of cycle time up to 99 minutes and bath temperatures to 70°C. Clear readouts and one-touch setting make this a great choice. You can count on batch-to-batch consistency because the unit automatically resets to the last setting. Just reload the tank and restart! Our rugged mechanical timers are adjustable up to 60 minutes and incorporate a hold feature for continuous cleaning. There are five Branson cleaner sizes from 1/2 gallon to 5 1/2 gallon capacity. Check the product/feature matrix for the Branson that best meets all of your needs!

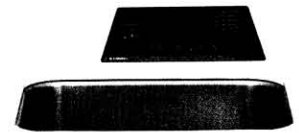


Rugged 60 minute mechanical timer features a hold position for continuous operation.



8510

BRANSON



5510

BRANSON

Model 8510

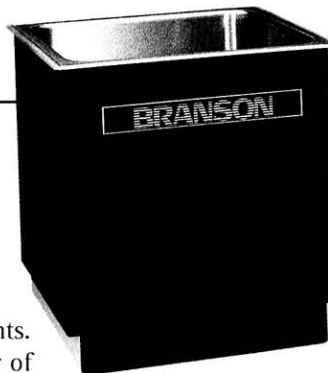
Model 5510

BRANSONIC FEATURES		TANK SIZE (L, W, D)	19 1/2" x 11 1/2" x 6"	11 1/2" x 9 1/2" x 6"
		OVERALL SIZE (L, W, D)	24" x 18" x 14 1/2"	16" x 15 1/2" x 14 1/2"
		TANK CAPACITY	5.5 gal.	2.5 gal.
		WEIGHT	26 lbs.	14 lbs.
		FREQUENCY	40kHz	40kHz
		DRAIN	YES	YES
DIGITAL CONTROL PLUS HEAT, AND TIMER	120V Models 230/240V Models		B8510-DTH <i>CPN-952-818</i> B8510E-DTH <i>CPN-952-838</i>	B5510-DTH <i>CPN-952-518</i> B5510E-DTH <i>CPN-952-538</i>
MECHANICAL TIMER PLUS HEAT	120V Models 230/240V Models		B8510-MTH <i>CPN-952-817</i> B8510E-MTH <i>CPN-952-837</i>	B5510-MTH <i>CPN-952-517</i> B5510E-MTH <i>CPN-952-537</i>
MECHANICAL TIMER	120V Models 230/240V Models		B8510-MT <i>CPN-952-816</i> B8510E-MT <i>CPN-952-836</i>	B5510-MT <i>CPN-952-516</i> B5510E-MT <i>CPN-952-536</i>

Part numbers are in italics.

Higher Capacity DHA-1000 Ultrasonic Cleaner

This low-cost ultrasonic cleaner is designed especially for medium and heavy duty industrial applications. It is fully integrated, with ultrasonic generator and cleaning tank in a single enclosure. Solution capacity is 10 gallons – enough to handle large, bulky parts or for batch cleaning of small components. It's the only industrial size ultrasonic cleaner of its type available today.



Tank Dimensions: 14"L x 16"W x 10 1/2"D
Overall Dimensions: 17"L x 19"W x 19"H

DHA-1000 (120v) P/N 000-914-506
DHA-1000 (230v) P/N 000-914-606
Cover P/N 100-246-802
Basket P/N CPN-916-032

PC-650 Ultrasonic Cleaner

The PC-650 is offered in 2 frequencies to match cleaning capability to your application. At 40kHz it is ideal for cleaning pipettes, lab glassware, and other items requiring general cleaning. At 75kHz it is best used to remove small particles (<2 microns) from precision parts like laser optics or printer cartridges.

Tank Dimensions: 19 1/2"L x 5 3/4"W x 6"D
Overall Dimensions: 20 1/4"L x 6 1/4"W x 10 1/2"H



Model 3510

Model 2510

Model 1510

11 1/2" x 6" x 6"
16" x 12" x 14 1/2"
1.5 gal.
12 lbs.
40kHz
YES
B3510-DTH CPN-952-318
B3510E-DTH CPN-952-338
B3510-MTH CPN-952-317
B3510E-MTH CPN-952-337
B3510-MT CPN-952-316
B3510E-MT CPN-952-336

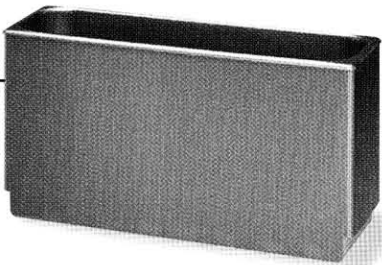
9 1/2" x 5 1/2" x 4"
13 1/2" x 12" x 11 1/2"
.75 gal.
9 lbs.
40kHz
NO
B2510-DTH CPN-952-218
B2510E-DTH CPN-952-238
B2510-MTH CPN-952-217
B2510E-MTH CPN-952-237
B2510-MT CPN-952-216
B2510E-MT CPN-952-236

6" x 5 1/2" x 4"
10" x 12" x 11 1/2"
.5 gal.
7 lbs.
40kHz
NO
B1510-DTH CPN-952-118
B1510E-DTH CPN-952-138
B1510-MTH CPN-952-117
B1510E-MTH CPN-952-137
B1510-MT CPN-952-116
B1510E-MT CPN-952-136

Now Available with 2-year Guarantee.

Manufactured in an **ISO 9002** quality environment.

All Branson products meet FCC, CSA, and CE standards.



B-200 Jewelry and Optical Cleaner

Branson's Model 200 cleaner is compact and stylish, with the convenience of plug-in-anywhere operation. This model has the ultrasonic cleaning ability to handle a wide variety of applications; it is specifically designed to clean jewelry and optical pieces quickly and effectively. A 5-minute timer, cover, and parts basket are included.



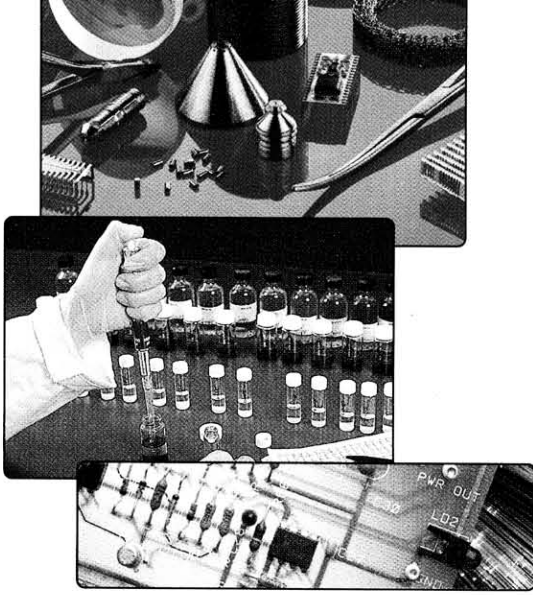
PC-650 40kHz (120v) Unheated	P/N 000-951-030
PC-650 40kHz (120v) Heated	P/N 000-951-330
PC-650 75kHz (120v) Heated	P/N CPN-951-330
Cover	P/N 000-410-105
Basket	P/N CPN-916-033

B-200 (120v)	P/N 100-951-010
B-200 (230v)	P/N 100-951-011
Tank Dimensions:	6 1/2" L x 3 1/2" W x 2 1/4" D
Overall Dimensions:	8 3/4" L x 4 1/2" W x 5" H

Rugged Enough for Industry

Consistent Enough to Meet
Medical and Laboratory Standards

Safe Enough for Delicate Electronic
Parts and Precious Jewelry



Typical Applications

Scientific Labs

Thoroughly removes blood, proteins, and contaminants

- Lab Glassware, Test Tubes, Pipettes
- Optical and Contact Lenses, Eyeglass Frames
- Scientific Instruments, Components

Industry

Deep cleans to remove dirt, grease, waxes, and oils

- Switches
- Relays and Motors
- Gears
- Precision Bearings
- Metal and Plastic Parts
- Assemblies

Electronics

Removes flux and contaminants instantly, thoroughly

- PC Boards, SMDs
- Ceramic Substrates
- Capacitors
- Lapping Heads
- Packaging Components
- Quartz Crystals
- High-resolution Glass Plates

Medical and Dental Labs

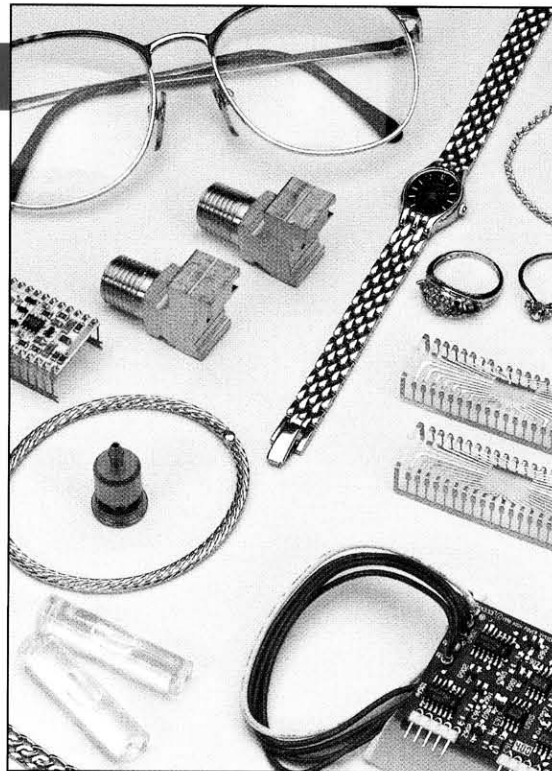
Used with sterilization, it's a safer, surer way to clean dental and medical instruments

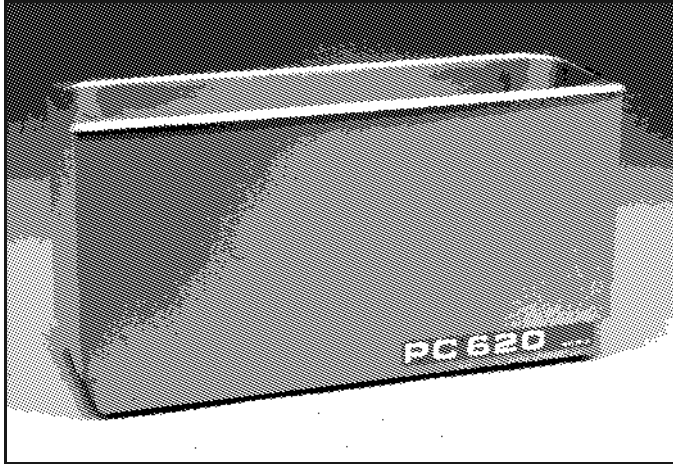
- Cannulae, Syringe Parts, Surgical Instruments, Blood Oxygenators
- Dental Instruments, Burs, Dentures, Caps, Plates

Jewelry

Cleans thoroughly, restores brilliance

- Watches
- Clock Movements
- Precious Metals and Gemstones
- Intricate Settings
- Chains, Charms
- Coins





MODEL PC-620 ULTRASONIC PIPETTE CLEANER

OVERVIEW

PC-620 Bransonic® benchtop units are designed to ultrasonically clean pipettes and other tubular glassware. Lipids, blood, and proteins are easily removed from the capillary bore of the pipette through the cavitation process. Useful in medical and scientific laboratories, the ultrasonic pipette cleaner is available in both heated and unheated versions.

An optional stainless steel cover is available. A pipette basket is recommended, as parts should not rest on bottom of tank. The basket holds the pipettes inside the ultrasonic tank.

COMPLETE INTEGRATED UNIT

The Model PC-620 has a 2-3/4 gallon capacity cleaning tank and ultrasonic generator enclosed in a sheet metal housing. The stainless steel tank has no corner welds or other dirt catching surfaces, and is provided with a bottom mounted drain. Circuitry is solid state for long trouble-free service. High efficiency piezoelectric transducers are attached to the tank bottom and operate at 40 kHz.

CLEANING APPLICATIONS

The Model PC-620 is not only designed for pipette cleaning. Its unique size makes it ideal for large and odd-size parts that conventional cleaners cannot handle. The many uses of this model include cleaning metal and plastic machine parts, electrical and electronic components, surgical and dental instruments, as well as mixing and degassing chemical solutions. Branson also offers a variety of cleaning chemistries suitable for your particular cleaning needs.

SPECIFICATIONS:

PC620R-1 Unheated

Part Number 000-951-030 (115 volts)

PC620R-2 Heated

Part Number 000-951-330 (115 volts)

PC620E-1 Unheated

Part Number 000-951-130 (230 volts)

Tank Dimensions:

19-1/2"L x 5-3/4"W x 6"D
(495 mm x 133 mm x 152 mm)

External Dimensions:

20-1/4"L x 6-1/4" W x 10-1/2"D
(521 mm x 159 mm x 267 mm)

Power Requirements:

115 volts, single phase, 60 Hz, or
230 volts, single phase, 50/60 Hz

Capacity:

2-3/4 gallon (8.5 liters)

Shipping weight:

23 lbs. (10.4 kg)

CERTIFICATIONS AND APPROVALS

The unit is equipped with an RFI filter to meet FCC radio frequency interference standards, and is UL and CSA listed.

Branson has qualified for ISO 9001 and ISO 14000.

BRANSON ULTRASONICS CORPORATION

41 Eagle Road, Danbury, CT 06813-1961 • (203) 796-0339 • FAX (203) 796-2240 • www.BransonCleaning.com

Branson SE Asia
Hong Kong

Branson Europe
Dietzenbach, Germany

Branson Japan
Tokyo, Japan

Branson Canada
Markham, Ontario

Branson de Mexico
Nuevo Laredo, Mexico



BRANSONIC® MODEL B200 ULTRASONIC CLEANER

TYPICAL APPLICATIONS

JEWELRY

The Model B200 ultrasonic cleaner, when used with Branson's Jewelry Cleaner, is all you need to clean jewelry items such as gold, gemstones, platinum, rings, and watch bands.

Branson's Model B200 ultrasonic cleaner is compact and stylish, with the convenience of plug-in-anywhere operation. While designed to clean jewelry and optical pieces quickly and effectively, it also has the ultrasonic cleaning ability to handle a wide variety of other applications.

The Model B200 contains a stainless steel tank with a 15-ounce capacity. The tank is contained within an impact-resistant plastic housing. A cover and parts basket are included as standard accessories. This versatile unit features a 5-minute timer that shuts off automatically. All you need to do is add the appropriate solution for your application, clean your parts, and follow with a thorough rinse.

The cleaner uses ultrasonic energy (40 kHz) in the form of sound waves to create millions of tiny microscopic vacuum cavities in the solution. As these cavities collapse, they release high frequency energy, loosening dirt on all surfaces that the solution touches. This activity, called cavitation, occurs thousands of times per second to gently yet thoroughly scrub contamination off the article being cleaned. When you lift your parts out of the cleaner, they are microscopically clean.

Branson's Jewelry Cleaner Concentrate is a specialized, biodegradable, phosphate-free alkaline cleaner for jewelry and precious metals. A unique blend of nonionic surfactants, detergent bases, and wetting agents provides a safe cleaning medium for valuable jewelry. Gemstones and precious metals are quickly restored to their original brilliance with this free-rinsing solution.

OPTICS

The Model B200 can also be used with Branson's Optical Cleaner for cleaning of contact lenses, eyeglasses, and other optical components. Effective for the removal of handling soils such as fingerprints and dust, it will also remove a wide range of other contaminants.

SPECIFICATIONS

Model Number	B200, 117V, 60 Hz	B200, 220V, 50/60Hz
Tank Capacity	15 ounces	15 ounces
Tank Dimensions	6½"L x 3½"W x 2¼"D	6½"L x 3½"W x 2¼"D
Overall Dimensions	8¾"L x 4½"W x 5"D	8¾"L x 4½"W x 5"D
Shipping Weight	3 lbs.	3 lbs.
Part Number	100-951-010	100-951-011

OTHER CLEANING APPLICATIONS

- Instrument & clock parts
- Small geological samples
- Coins & hobby items
- Small electrical/electronic components
- Metal & plastic machined parts
- Recorder & drafting pens

BRANSON ULTRASONICS CORPORATION

41 Eagle Road, Danbury, CT 06813-1961 • (203) 796-0400 • FAX (203) 796-2240 • www.Brasonics.com

Branson SE Asia
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Branson Canada
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Branson de Mexico
Nuevo Laredo, Mexico



INTEGRATED ULTRASONIC CLEANING SYSTEMS

BC Series

- Digital timer - sets from 1-99 minutes and counts down from reach “cycle start.” Includes high visibility digital display.
- Convenient controls - mounted above and behind the cleaning tank – within reach, but away from the cleaning unit.
- Complete with accessories - including a stainless steel parts basket and stainless steel cover with handle.
- 2 year warranty.

Branson's BC Series Ultrasonic Cleaning Systems offer a full range of features to meet most precision cleaning requirements. These compact units incorporate 3/16, 14 gauge, all stainless steel construction, a modern, solid-state ultrasonic generator and 25 or 40 kHz industrial transducers to deliver precise cleaning quickly, consistently, and cost effectively.

KEY FEATURES

- Microprocessor-controlled for precise process management.
- Digital temperature control – variable setpoint to 80°C with bright digital display.

TYPICAL APPLICATIONS

The BC Series units, with their greater power per unit volume, can reduce cleaning cycle time or handle more difficult industrial cleaning applications, including:

- More densely-packed, smaller parts
- Heavier or more tenacious soils
- Investment removal from cast parts
- Larger machined components

SPECIFICATIONS

Model Number	BC-1218-25-12	BC-1218-40-12	BC-1620-25-18	BC-1620-40-18
Part Number	CPN-914-002	CPN-914-001	CPN-914-004	CPN-914-003
Tank Dimensions	17-5/8" L x 11-3/4" W x 13-3/4" D	17-5/8" L x 11-3/4" W x 13-3/4" D	19-5/8" L x 15-3/4" W x 15-3/4" D	19-5/8" L x 15-3/4" W x 15-3/4" D
Tank Capacity	12 gallons	12 gallons	21 gallons	21 gallons
Overall Dimensions	20" L x 19" W x 23" H	20" L x 19" W x 23" H	22" L x 24" W x 25" H	22" L x 24" W x 25" H
Ultrasonic Frequency	25 kHz	40 kHz	25 kHz	40 kHz
Transducer Elements	12	12	18	18
Power reqs. at 230v, 1 ph.	13 Amps	13 Amps	18 Amps	18 Amps
Temperature	Max 80°C	Max 80°C	Max 80°C	Max 80°C
Shipping Weight	120 lbs.	120 lbs.	154 lbs.	154 lbs.

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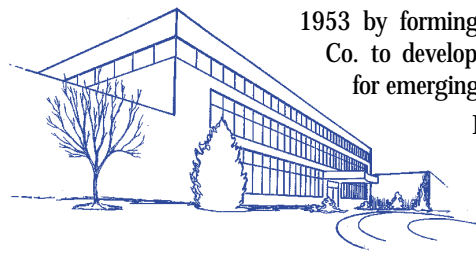
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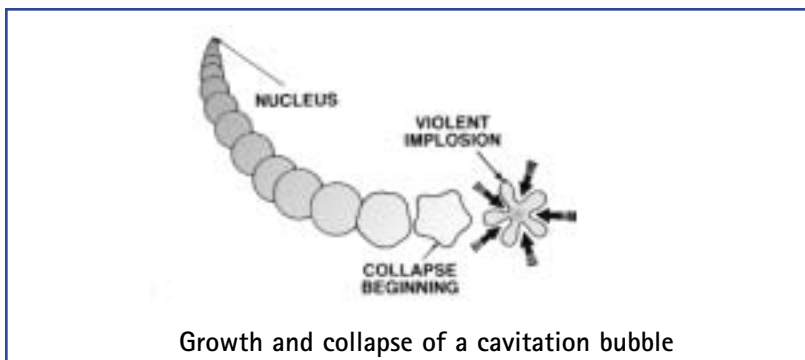
OPTIMIZING YOUR ULTRASONIC CLEANER

Ultrasonic cleaners have been workhorses in both laboratories and industry for decades. This acceptance is based on their ability to remove soils from inaccessible areas quickly, completely, and consistently without reliance on operator technique. Brasonic tabletop cleaners offer a number of features which allow the operator to optimize their performance.

Ultrasound is sound transmitted at frequencies beyond the range of human hearing. To understand how ultrasound can perform cleaning, it helps to understand the underlying principles and how they are applied in cleaning. High frequency energy is generated by an electrical power supply and applied to heavy duty, industrial piezoelectric transducers. These transducers convert this electrical energy to high frequency mechanical energy vibrating at a rate of 40,000 times per second, producing alternating high and low pressure waves within the cleaning liquid. The liquid is compressed during the high pressure phase of the wave cycle, then pulled apart during the low pressure phase. As the pressure in the liquid is reduced during the low pressure phase, cavities grow from microscopic nuclei to a maximum critical diameter, as shown in the diagram below. During the subsequent high-pressure phase, these cavities are compressed and implode. The released energy is powerful, but safe for parts because it is localized on a microscopic scale. This process is called "cavitation."

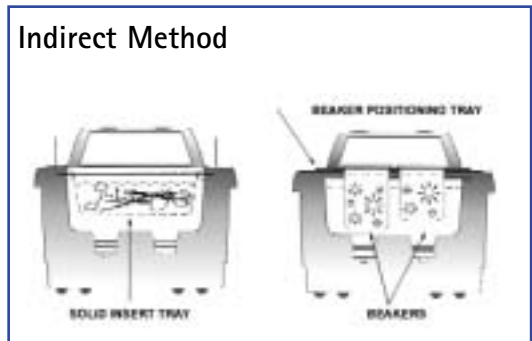
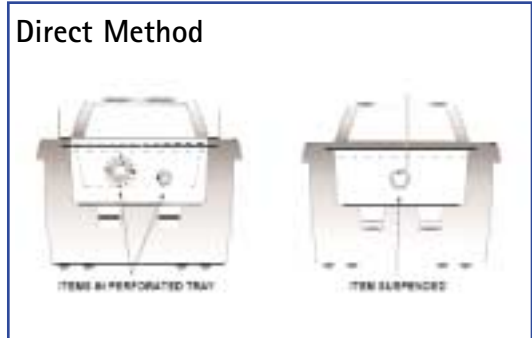
There are many factors affecting the strength of cavitation including temperature, surface tension, viscosity, and density of the liquid. When selecting an ultrasonic benchtop cleaner, it is important that it permit as much control as possible of these factors. If temperature and time can be controlled, then cleaning consistency can be improved. For example, a microprocessor-based digital thermostat allows selection and constant digital display of the solution temperature at the optimum point. The availability of heat can also increase the chemical activity of cleaning solutions, permitting safer concentrations. Many solutions operate best at temperatures between 120-150° F. Adding a wetting agent or surfactant to the bath can reduce surface tension of the liquid. Reduced surface tension will increase cavitation strength. Higher viscosity liquids tend not to cavitate well due to their inability to create and collapse cavities quickly. Higher density liquids create intense cavitation with a greater implosive force.

Application of these principles can result in faster more effective cleaning. See the reverse side of this sheet for helpful hints and important items to remember.



Remember, when using your cleaner...

- Never place parts or receptacles directly on the bottom of the unit. It can cause the unit to fail because the parts will reflect the ultrasonic energy back into the transducer(s). Always allow at least one inch between the tank bottom and the beaker or receptacle for adequate cavitation. Keep solution within one inch of the top of the unit when the beaker or tray is in place.
- If using a tray or basket to lower the parts into the solution, it is better to use a holder that is of open construction, either an open mesh basket or an insert tray, that is adequately perforated for drainage. This also permits free access of the sound waves to the parts.
- Renew cleaning solution often to increase ultrasonic cleaning activity. Solutions, as with most chemicals, become “spent” over time. Solutions can become contaminated with suspended soil particles, which can settle to the tank bottom and inhibit ultrasonic activity.
- Wait 5 to 10 minutes after activating the equipment for fresh solution to degas. This need not be repeated with subsequent use, as degassing is required only after the bath is freshly filled.
- Never use solvents in a small benchtop cleaner. It is neither safe nor environmentally responsible. Solvents vaporize quickly and can collect under the unit where ignition is possible from electrical components. Mineral acids and bleach can also damage the unit.



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**MODEL B-300
TABLETOP ULTRASONIC
CLEANER**

OVERVIEW

The B-300 tabletop ultrasonic cleaner will provide quick, consistent, high quality cleaning over a wide range of applications. Ultrasonics takes advantage of the multi-directional nature of sound to dislodge even the most difficult soils from cracks and crevices not reached by any other cleaning method. When used with water and your favorite cleaning or disinfecting solution, the B-300 will deliver clean, bright parts or instruments in just minutes. While used in many fields, this cleaner has been found to be especially useful for jewelry artisans, optical shops and veterinarians.

COMPLETE INTEGRATED UNIT

The B-300 includes a stainless steel cleaning tank using industrial-style ultrasonic transducer technology. The deep drawn tank has no corner welds or other dirt-catching surfaces, making it easy to keep clean. Ultrasonic power is provided by a rugged 40 kHz power supply. Both are housed in a wrap-around, sealed metal enclosure for safety and reliability. Controls are front-mounted for easy access, and the unit includes an automatic 15 minute timer. All units come complete with a cover and perforated stainless steel parts basket so you can get right to work.

CLEANING APPLICATIONS

Ultrasonic cleaners are ideal for removing difficult soils or contamination in hard-to-reach places. Possible uses are limited only by the imagination. Jewelers use them to remove brazing fluxes, polishing compounds and watch lubricants. Optical shops use them during lens manufacture and for sample frame cleaning. Veterinarians find them useful for cleaning instruments before sterilization. Even personal care salons use them for cleaning and disinfecting instruments.

Branson also offers a line of application specific cleaning chemistries to make your work even easier. Ask your distributor or check our website at www.bran-sonic.com for information.

How can you save time and money with a B-300 and Branson chemistry?

SPECIFICATIONS

Tank Dimensions:

11.8" L x 3.9" W x 2.9" D
(300 mm L x 100 mm W x 75 mm D)

External Dimensions:

13.2" L x 5.3" W x 5.9" H
(335 mm L x 135 mm W x 150 mm H)

Power Requirements:

115 Volts, single phase, 60 Hz

Part Number CPN-951-028

230 Volts, single phase, 50/60 Hz

Part Number CPN-951-026

Capacity:

$\frac{1}{2}$ gallon (1.9 liters)

Shipping weight: 4.6 lbs.

(2.1 kg)

CERTIFICATIONS AND APPROVALS

The B-300 tabletop ultrasonic cleaner complies with FCC Rules and Regulations, is UL and CSA listed, and meets European CE requirements.

Branson has qualified for ISO 9001 quality standards and ISO 14000 environmental standards.

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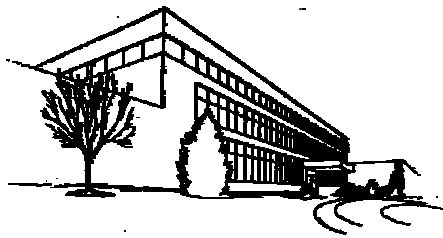
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Branson's DHA-1000 Ultrasonic Cleaning System offers a full range of features to meet most precision cleaning requirements. These compact units incorporate all stainless steel tank construction, a modern, solid-state ultrasonic generator with 40 kHz industrial transducers to deliver precise cleaning quickly, consistently, and cost effectively.

SPECIFICATIONS

Part Number - 115V	000-914-506
Part Number - 220V	000-914-606
Part Number - Cover	100-246-802
Part Number - Basket	CPN-916-032
Tank Dimensions	14" L x 16" W x 10.5" D
Tank Capacity	10 gallons
Overall Dimensions	17" L x 19" W x 19" H
Power Requirements	115V, 3A or 220V, 7A
Heater Power	1000 Watts
Shipping Weight	70 lbs.

INTEGRATED ULTRASONIC CLEANING SYSTEMS DHA-1000

KEY FEATURES

- Deep-drawn stainless steel tank with rounded corners for easy cleaning.
- Ultrasonic generator, transducers, and cleaning tank in one compact unit.
- Convenient analog controls mounted below a drip lip - within easy reach, but away from the solution.
- Optional accessories include a cover with handle and stainless steel parts basket.
- Requires only electrical connection for full operation.
- One year warranty.

TYPICAL APPLICATIONS

The DHA units are ideal for cleaning larger parts which will not fit into smaller Bransonic tabletop ultrasonic cleaners. Applications include:

- Larger laboratory glassware/apparatus
- Fabricated metal sub-assemblies
- Larger or multiple printed circuit boards
- Injection molded plastic parts

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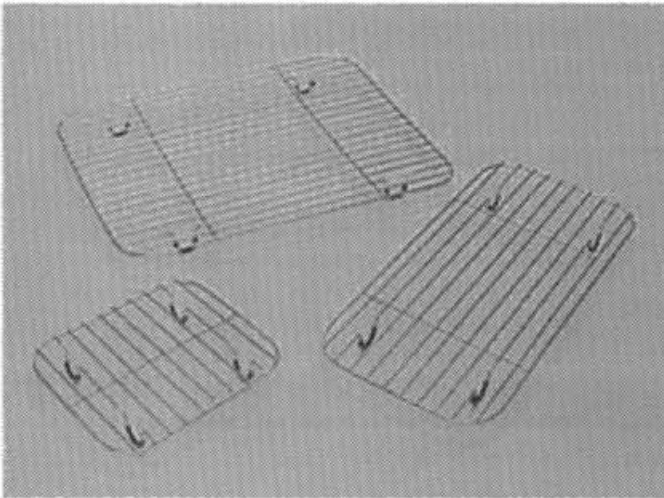
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When using an ultrasonic cleaner it is important not to place components directly on the tank bottom. This can inhibit the ultrasonic activity and possibly damage the unit.

Common practice is to use parts baskets to suspend items in the solution. Baskets, however, are not practical for all cleaning applications.

The use of support racks in the bottom of the ultrasonic cleaner tank is frequently an excellent alternative. Support racks allow the total volume of the tank to be used. They provide a stable flat surface upon which parts, fixtures, or containers may be placed with confidence. Their open design with integral rubberized "feet" does not inhibit chemistry circulation or ultrasonics and provides for positive drainage.

Additional racks are also useful as countertop drain boards following cleaning or processing. They hold containers or components off the table to facilitate air circulation and drying.

SUPPORT RACKS

for use with tabletop
ultrasonic cleaners

KEY BENEFITS

- A complete range of sizes providing for access to the full volume of your tank
- A stable, flat platform for placement of items for cleaning or processing
- Assurance that items will not be placed on the tank bottom potentially damaging the equipment
- Sizes consistent with most available tabletop ultrasonic cleaning units

SPECIFICATIONS

<u>Model</u>	<u>Part Number</u>	<u>Size</u>	<u>Fits</u>
SR-15	CPN-916-039	5" x 5.5" x 0.8"	1/2 Gal Unit
SR-25	CPN-916-040	5" x 9" x 0.8"	3/4 Gal Unit
SR-35	CPN-916-041	5.5" x 11" x 0.8"	1 1/2 Gal Unit
SR-55	CPN-916-042	8.5" x 11" x 0.8"	2 1/2 Gal Unit
SR-85	CPN-916-043	11" x 19" x 0.8"	5 1/2 Gal Unit

- All 300 series stainless construction for chemical compatibility
- Electro-welded design for durability
- Bright electropolished finish for cleanliness

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BRANSONIC CONCENTRATED CLEANING FORMULAS

BC - BUFFING COMPOUND

Branson BC Buffing Compound Concentrate is a biodegradable, phosphate and caustic free cleaner developed for removing buffing compound.

A blend of non-ionic surfactants, detergents, and emulsifiers, Branson BC has been formulated to remove the most difficult buffing compounds and carriers. The nonviscous liquid rapidly removes tripoli, rouge, lime, diamond tripoli, etc. from buffed compounds, and rinses freely and quickly.

EC - ELECTRONICS CLEANER

Branson EC Electronic Cleaner Concentrate is a biodegradable, phosphate and caustic free alkaline cleaner formulated for heavy-duty industrial use.

EC Concentrate solution is formulated to remove oils, resins, rosins and other typical soils from hard surfaces normally encountered in the electronic, plating, and other related industries.

Applications include: Cleaning during manufacturing assembly of infrared detectors, cleaning electrical contacts and leads, and cleaning ceramic insulators, and component. Whether cleaning through-hole or surface mount boards, Branson EC does the job effectively and economically.

GP- GENERAL PURPOSE

Branson GP General Purpose Concentrate is a biodegradable caustic-free alkaline cleaner formulated for general purpose and normal maintenance cleaning application.

GP solution removes general soils, fingerprints, dust, packaging particulates, and light oils and greases from components and products found in machine and metalworking shops, chemical plants and petrochemical refineries, automotive plants, appliance factories, telecommunications equipment companies, printing plants, and other industrial manufacturing and fabricating facilities.

IS - INDUSTRIAL STRENGTH

Branson IS Industrial Strength Concentrate is a biodegradable, phosphate-and caustic-free alkaline cleaner formulated for heavy-duty industrial use.

Branson IS solution readily removes grease, oils and particulates from automotive, aircraft, and similar mechanical components; removes oils and drawing compounds from stampings; cleans shop oils, greases and similar soils from components prior to secondary finishing operations including painting, plating, application of various electrostatic spray coatings; and removes grease, oils, and light carbon deposits from valves, fittings, and similar components used in very sector of industry.

JC - JEWELRY CLEANER

Branson Jewelry Cleaner Concentrate is a specialized biodegradable, phosphate-free alkaline cleaner for cleaning jewelry and precious metals.

Jewelry Cleaner solution removes the general soils, particulate, fingerprints, oils, and oxides that accumulate with normal use. Gemstones and precious metals alike are quickly and safely restored to their original brilliance with this free rinsing solution, and the luster of rings and watchbands is renewed.

LRS - LIQUID RUST STRIPPER

Branson LRS Liquid Rust Stripper Concentrate is a doublechelated, highly caustic non-foaming cleaner and degreaser.

Branson Liquid Rust Stripper is used for derusting and descaling of ferrous metals. It is used for paint stripping, degreasing, mold cleaning and heavy-duty cleaning in the metal, petroleum, food and transportation industries. Heavy greases, oils, and carbonaceous soils are readily removed from internal combustion engine parts and components. Light to medium scale can be removed from titanium.

Excellent for ultrasonic cleaning of automotive and aerospace components, and removal of carbonized and greasy soils in CIP applications, cleaning of food processing equipment and bottle washing.

MC - 1 METAL CLEANER

Branson MC-1 Metal Cleaner Concentrate is a biodegradable, phosphate and caustic free alkaline cleaner formulated for heavy-duty industrial use.

MC-1 concentrate solution removes oils, greases and a wide variety of soils from aluminum and aluminum alloys as well as copper, brass, and steel substrates. Effective in removing fabricating, cutting, and polishing oils, MC-1 displaces soils to allow for easy removal manually, or with a skimmer.

MC - 2 METAL CLEANER

Branson MC-2 Metal Cleaner Concentrate is a biodegradable, phosphate and caustic free alkaline cleaner formulated for general purpose and normal maintenance cleaning applications. MC-2 Concentrate solution removes oils, greases and a wide variety of soils from ferrous metals, steel alloys, titanium alloys, copper and copper alloys and stainless steel (not recommended for aluminum or aluminum alloys).

Effective in removing fabricating, cutting and polishing oils. MC-2 is an emulsifying cleaner preventing soils from redepositing on clean parts.

MC - 3 METAL CLEANER

Branson MC-3 Metal Cleaner Concentrate is a biodegradable, phosphate and caustic free alkaline cleaner formulated for heavy-duty industrial use.

MC-3 concentrate solution removes oils, greases and a wide variety of soils from aluminum and aluminum alloys as well as copper, brass, and steel substrates. Effective in removing fabricating, cutting, and polishing oils. MC-3 is an emulsifying cleaner so soils cannot redeposit on clean parts.

OC - OPTICAL CLEANER

Branson OC Optical Cleaner Concentrate is an alkaline, nonfoaming, liquid detergent formulated for the optical, glass and lens manufacturing industry.

It removes general soils, fingerprints, cerium oxide, pitch, and blocking waxes from optical lenses. It is very effective in

removing polishing compounds from glass and optical surfaces prior to deposition of coatings.

OR - OXIDE REMOVER

Branson OR Oxide Remover Concentrate is a blend of detergents in an acidic base, which is phosphate-free and biodegradable.

This formulation has been developed to rapidly remove rust and oxides from all metals, and is used in cleaning and reconditioning relays and switches, removing oxides that result from assembly operations utilizing soldering, brazing, or welding, and similar applications.

SOLUTIONS; AMOUNTS AND EFFECTS

Solution amounts may vary. The amount used depends on the detergent and the type of soil to be removed. Follow the instructions on the solutions container. The table below lists the effect of solutions on metals.

	<u>STEEL</u>	<u>BRASS</u>	<u>ALUMINUM</u>	<u>MAGNESIUM</u>	<u>ZINC</u>	<u>S.S. STEEL</u>	
						<u>COPPER</u>	<u>TIN</u>
BC Buffing Cmpd	none	slight stain	none	none	attacks	none	none
EC Electronics Clnr	none	none	slight etch	none	none	none	none
GP General Purpose	none	none	slight etch*	none	none	none	none
IS Industrial Strength	none	none	slight etch*	none	none	none	none
JC Jewelry	none	none	none	none	none	none	none
OC Optical	none	none	none	none***	none***	none	none***
OR Oxide Remover	slight etch	none	slight attack	attacks	attacks	none	none
MC-1 Metal Cleaner	none	none	none	none	none	none	none
MC-2 Metal Cleaner	none	none	slight etch	none	none	none	none
MC-3 Metal Cleaner	none	none	none	none	none	none	none
LRS Rust Stripper	none	none	attacks**	attacks**	attacks	none	slight attack

* Slight etch on some aluminum alloys.

** Warning: Free hydrogen may be released if solution comes in contact with reactive metals.

*** No effect if solution temperature is less than 140 deg. F.



BRANSON ULTRASONICS CORPORATION

41 Eagle Road, Danbury, CT 06813-1961 • (800-732-9262) • FAX (203) 796-2240

Branson Southeast Asia

Hong Kong

Branson United Kingdom

London, England

Branson Europe

Dietzenbach-Steinberg, Germany

Branson Canada

Markham, Ontario

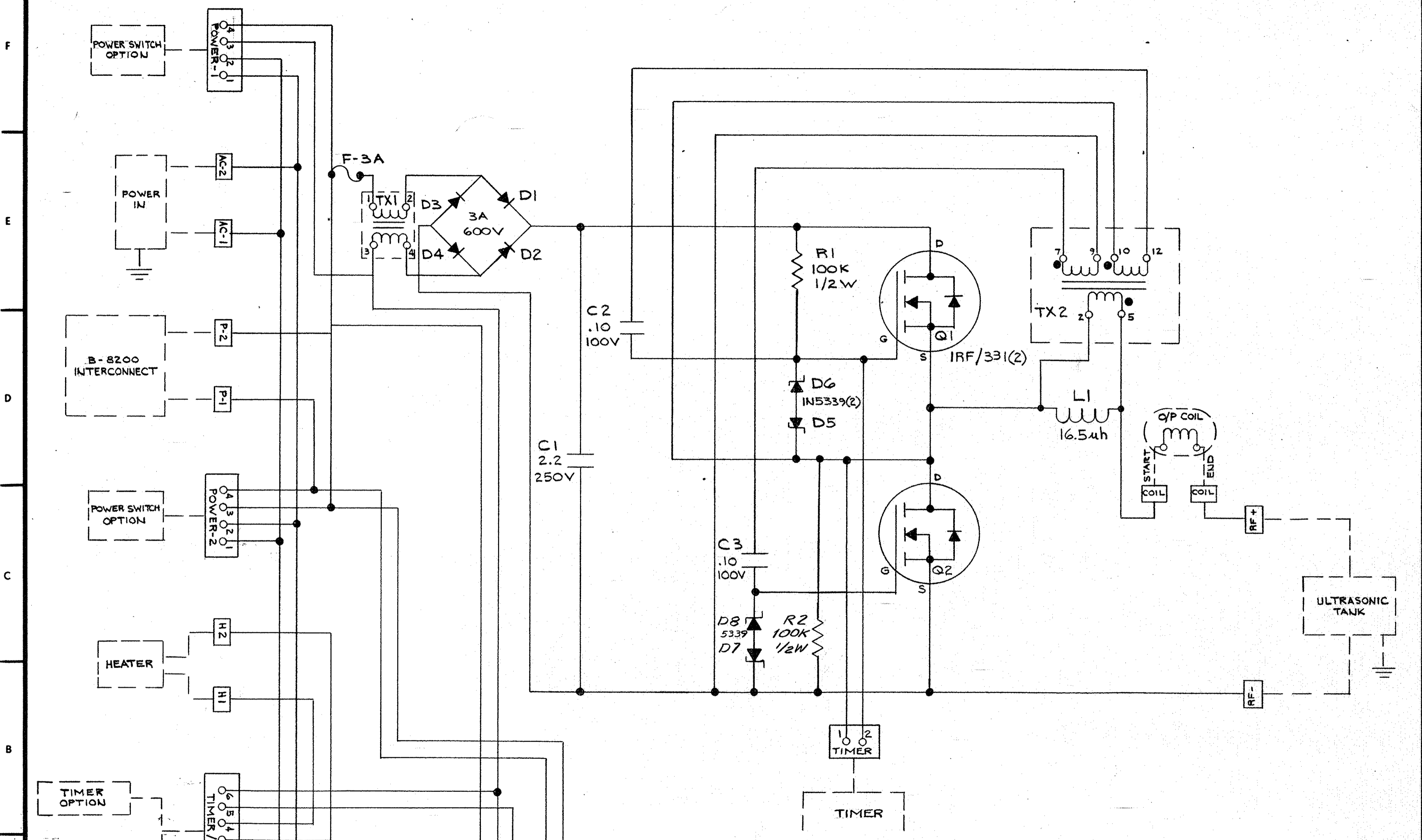
Branson Japan

Tokyo, Japan

Branson de Mexico

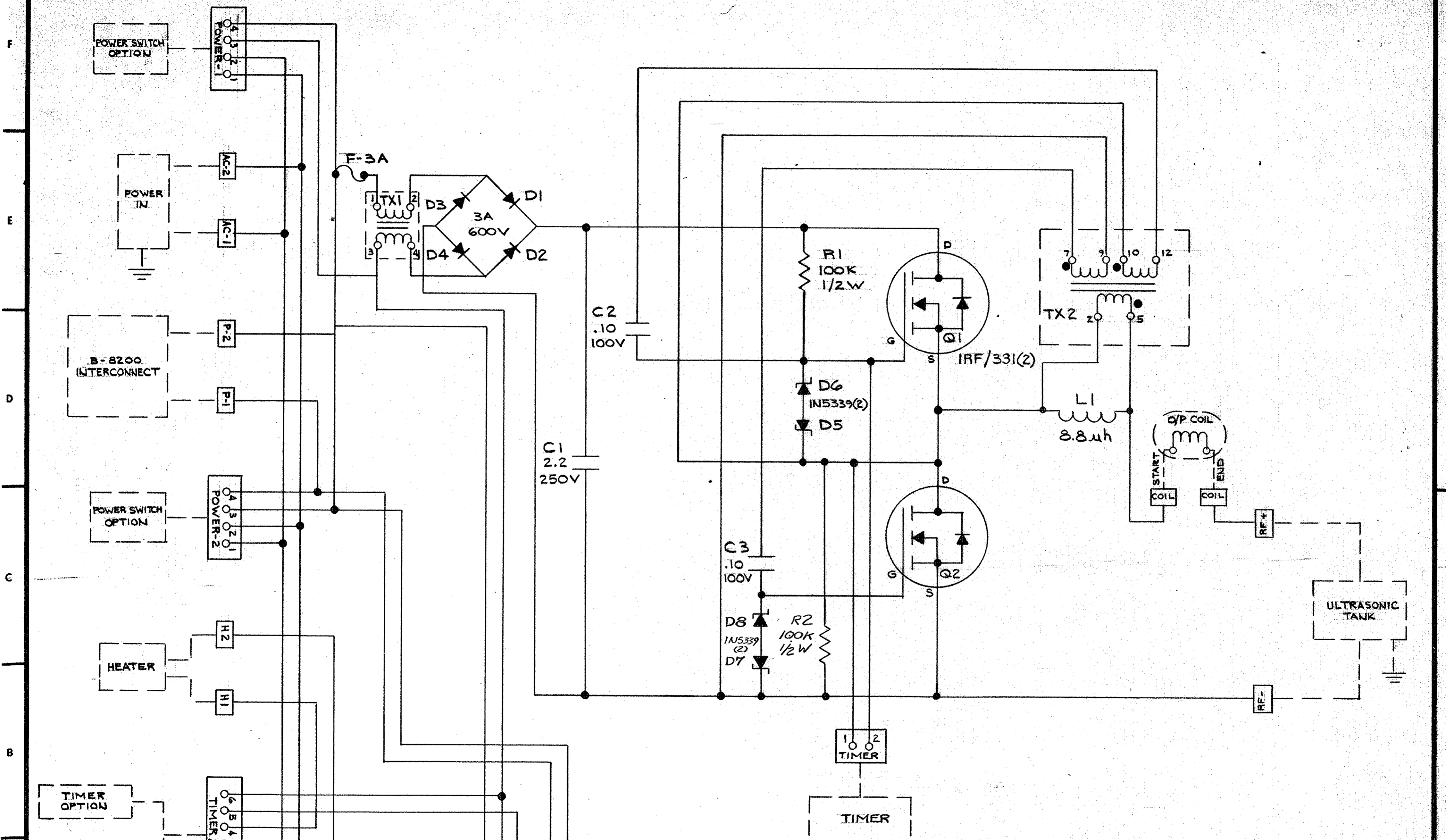
Nuevo Laredo, Mexico

REV	BY	DATE	DESCRIPTION	ECN
1	JRS	2-59	PER ECK	8704



MATERIAL		USED ON		BRANSON SONIC POWER COMPANY Eagle Rd. Danbury, Conn 06810 division of Branson Ultrasonics Corporation			
FINISH				TITLE SCHEMATIC BIZOO BRANSONIC			
UNLESS OTHERWISE SPECIFIED		SUPERSEDED BY		SCALE		DES. DATE DR. G.R. 1-5-59 CH. APP.	
BREAK ALL CORNERS AND EDGES FRAC. ± 1/64 HOLES .XX ± .01 +.005 .XXX ± .005 -.002 ANGLE ± 1° ALL DIMS ARE IN INCHES		B.S.P. NO.		QTY.		SHEET 1 OF 1	
				C DWG. NO. 913-242-095		REV. 1	

REV	BY	DATE	DESCRIPTION	ECN
1	MS	2-89	PER ECR	8704



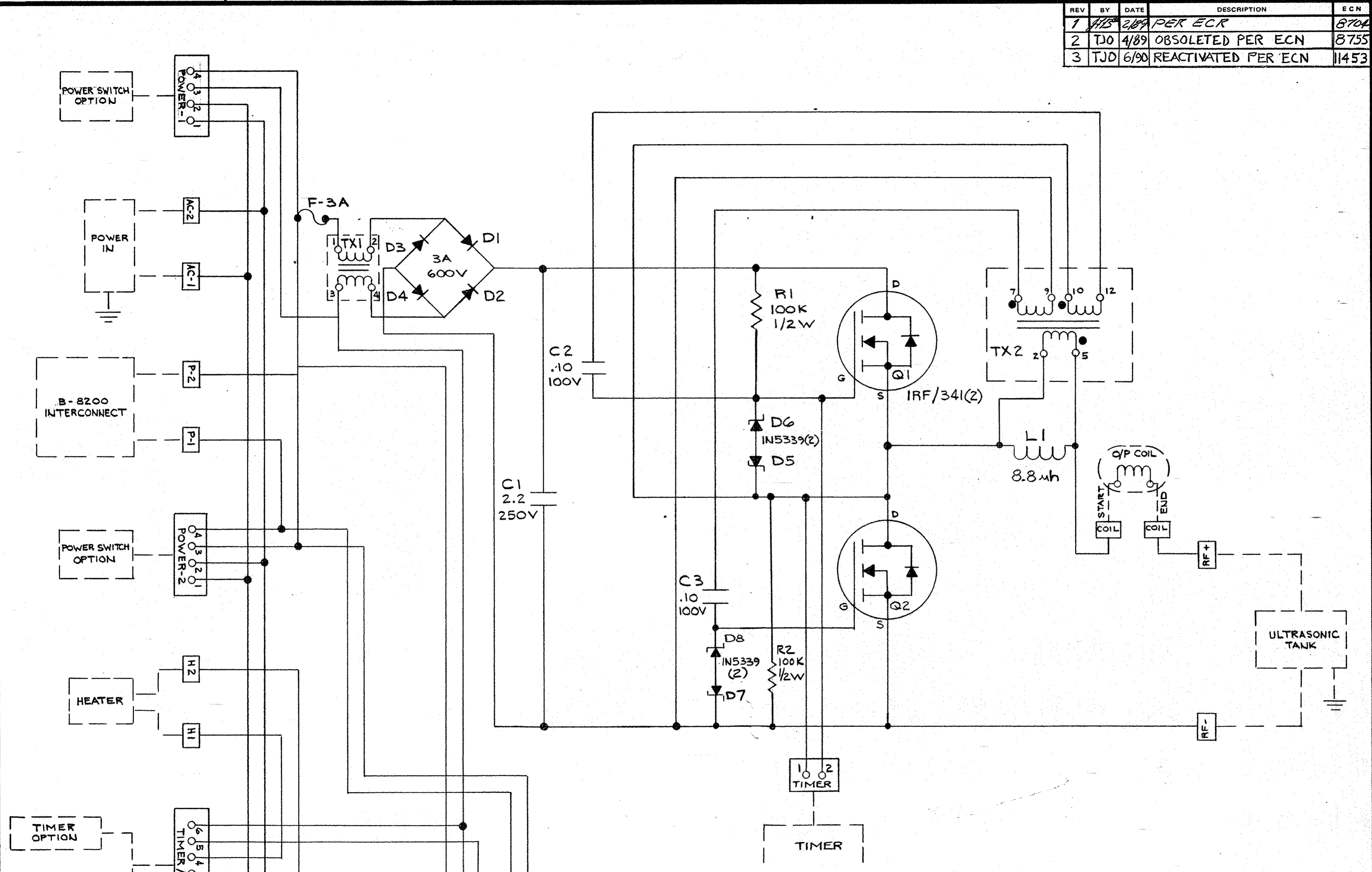
MATERIAL	USED ON	BRANSON SONIC POWER COMPANY Eagle Rd. Danbury, Conn 06810 Division of Branson Ultrasonics Corporation			
FINISH		TITLE SCHEMATIC B2200 BRANSONIC			
UNLESS OTHERWISE SPECIFIED		SUPERSEDED BY	SCALE	DES.	DATE
BREAK ALL CORNERS AND EDGES			H	DR	G.R. 1-5-89
FRAC. ± 1/64	HOLES	B.S.P. NO.	QTY.	CH.	
.XX ± .01	+ .005			APP.	
.XXX ± .005	- .002	SHEET 1			
ANGLE ± 1°	ALL DIMS ARE IN INCHES	OF 1			
		C	DWG. NO.	REV.	
			913-242-0967	1	

FF19

BSP 14674

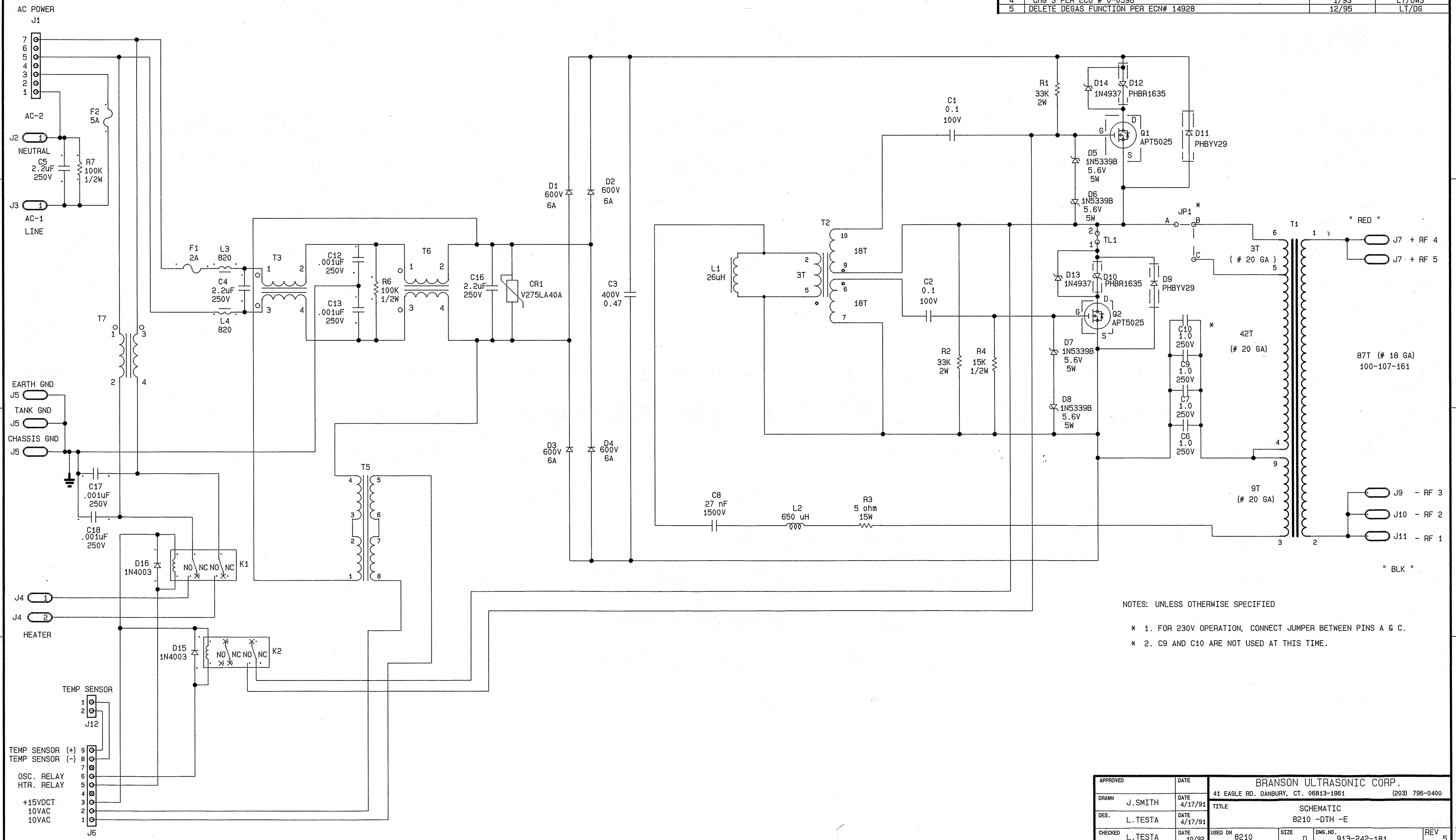
REV	BY	DATE	DESCRIPTION	ECN
1	HIS	2/89	PER ECR	8704
2	TJO	4/89	OBSOLETE PER ECN	8755
3	TJO	6/90	REACTIVATED PER ECN	11453

F
E
D
C
B
A



MATERIAL	USED ON	BRANSON SONIC POWER COMPANY Eagle Rd. Danbury, Conn 06810 division of Branson Ultrasonics Corporation			
FINISH		TITLE SCHEMATIC B5200 BRANSONIC			
UNLESS OTHERWISE SPECIFIED		SUPERSEDES	NEXT ASSY.	DES.	DATE
BREAK ALL CORNERS AND EDGES		SUPERSEDED BY	SCALE	DR. B.R. 1-5-88	
FRAC. ±1/64	HOLES	B.S.P. NO.	QTY.	CH.	
.XX ±.01	+.005			APP.	
.XXX ±.005	-.002	SHEET 1			
ANGLE ±1°	ALL DIMS ARE IN INCHES	OF 1			
			DWG. NO.	REV.	
			C 913-242-098	3	

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
1	UPDATED FOR RFI AND VDE CHG'S	6/92	LT/JWS
2	UPDATED FOR RFI	9/92	LT/JWS
3	ADDED NOTES, CHG C12, 13, 17, 18 TO .001uF	10/92	LT/JWS
4	CHG'S PER ECO # 0-0598	1/93	LT/JWS
5	DELETE DEGAS FUNCTION PER ECN# 14928	12/95	LT/DG



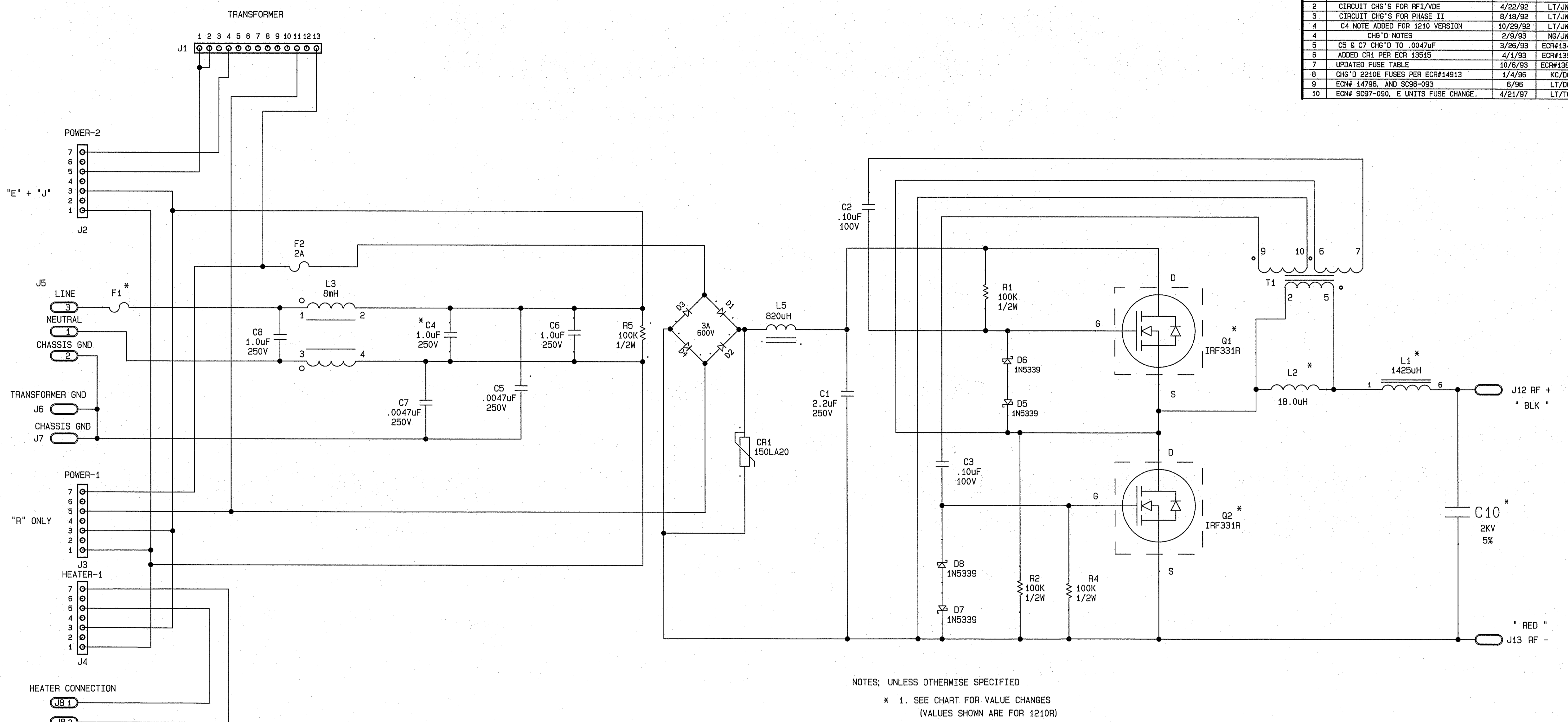
NOTES: UNLESS OTHERWISE SPECIFIED

- * 1. FOR 230V OPERATION, CONNECT JUMPER BETWEEN PINS A & C.
- * 2. C9 AND C10 ARE NOT USED AT THIS TIME.

TEMP SENSOR (+)
TEMP SENSOR (-)
OSC. RELAY
HTR. RELAY
+15VDCT
10VAC
10VAC

APPROVED		DATE		BRANSON ULTRASONIC CORP.			
DRAWN J. SMITH		DATE 4/17/91		41 EAGLE RD. DANBURY, CT. 06813-1961 (203) 796-0400			
DES. L. TESTA		DATE 4/17/91		TITLE SCHEMATIC			
CHECKED L. TESTA		DATE 10/92		USED ON 8210		SIZE D DWS. NO. 913-242-181	
PRJ. ENG		DATE		SCALE NONE		REV 5 SHEET 1 OF 1	

REVISIONS			
REV.	DESCRIPTION	DATE	E.C.N. BY/APPR.
1	C4, C6 CHG. D TO 1.0uF, WAS .47uF	10/23/91	LT/JWS
2	CIRCUIT CHG'S FOR RFI/VDE	4/22/92	LT/JWS
3	CIRCUIT CHG'S FOR PHASE II	8/18/92	LT/JWS
4	C4 NOTE ADDED FOR 1210 VERSION	10/29/92	LT/JWS
4	CHG'D NOTES	2/9/93	NG/JWS
5	C5 & C7 CHG'D TO .0047uF	3/26/93	ECR#13492
6	ADDED CR1 PER ECR 13515	4/1/93	ECR#13515
7	UPDATED FUSE TABLE	10/6/93	ECR#13831
8	CHG'D 2210E FUSES PER ECR#14913	1/4/96	KC/DG
9	ECN# 14796, AND SC96-093	6/96	LT/DG
10	ECN# SC97-090, E UNITS FUSE CHANGE.	4/21/97	LT/TO



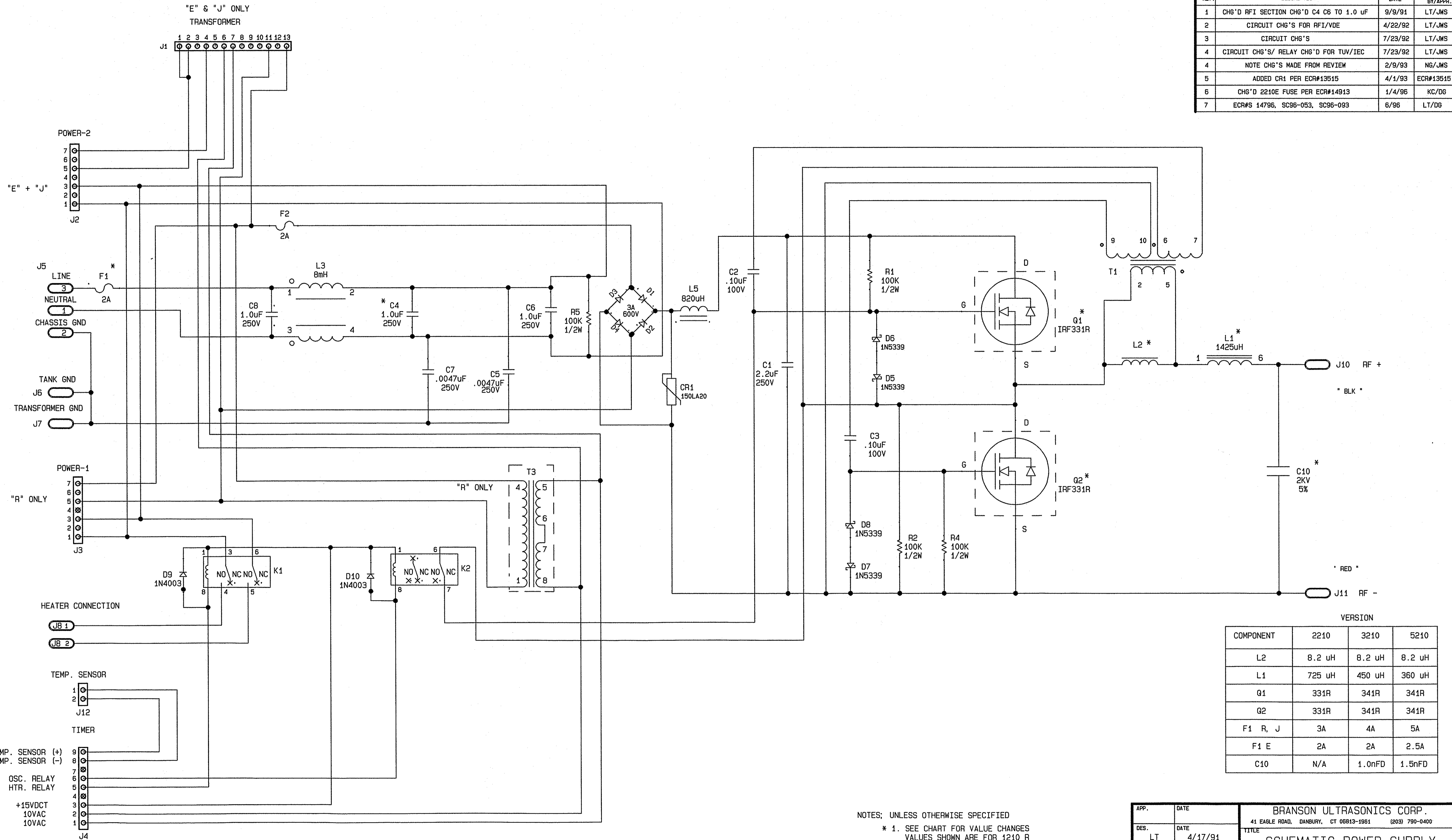
NOTES: UNLESS OTHERWISE SPECIFIED

- * 1. SEE CHART FOR VALUE CHANGES (VALUES SHOWN ARE FOR 1210R)
- * 2. C4 IS NOT USED ON 1210 MODELS
- * 3. C10 IS NOT USED ON 1210 AND 2210 MODELS

MODELS				
COMPONENT	1210	2210	3210	5210
L1	1425 uH	725 uH	450 uH	360 uH
L2	18.0 uH	8.2 uH	8.2 uH	8.2uH
Q1	331R	331R	341R	341R
Q2	331R	331R	341R	341R
F1 R, J MTH/MT	2A/1A	3A/2A	4A/2A	5A/3A
F1 E MTH/MT	1A/ 1/2A	2A/3.15A	2A/3.15A	2.5A/3.15A
C10	N/A	N/A	1.0nfd	1.5nfd

APP.	DATE	BRANSON ULTRASONICS CORP.			
DES.	DATE	41 EAGLE ROAD, DANBURY, CT 06813-1961 (203) 798-0400			
LT	4/17/91	TITLE			
SCHEMATIC POWER SUPPLY		1210 - 5210 MT/MTH EJUR			
DWG.	DATE	USED ON	SIZE	DWG. NO.	REV.
JWS	4/17/91	BSONIC	D	913-242-164	10
CHK.	DATE	SCALE	B.S.P.	SHEET	
LT	7/10/91	NONE	PCAD 8.5 GEN.	1 OF 1	
PRJ. ENBR.	DATE				

REVISIONS			
REV.	DESCRIPTION	DATE	BY/APPR.
1	CHG'D RFI SECTION CHG'D C4 C6 TO 1.0 uF	9/9/91	LT/JWS
2	CIRCUIT CHG'S FOR RFI/VDE	4/22/92	LT/JWS
3	CIRCUIT CHG'S	7/23/92	LT/JWS
4	CIRCUIT CHG'S/ RELAY CHG'D FOR TUV/IEC	7/23/92	LT/JWS
4	NOTE CHG'S MADE FROM REVIEW	2/9/93	NG/JWS
5	ADDED CR1 PER ECR#13515	4/1/93	ECR#13515
6	CHG'D 2210E FUSE PER ECR#14913	1/4/96	KC/DG
7	ECR#S 14796, SC96-053, SC96-093	6/96	LT/DG



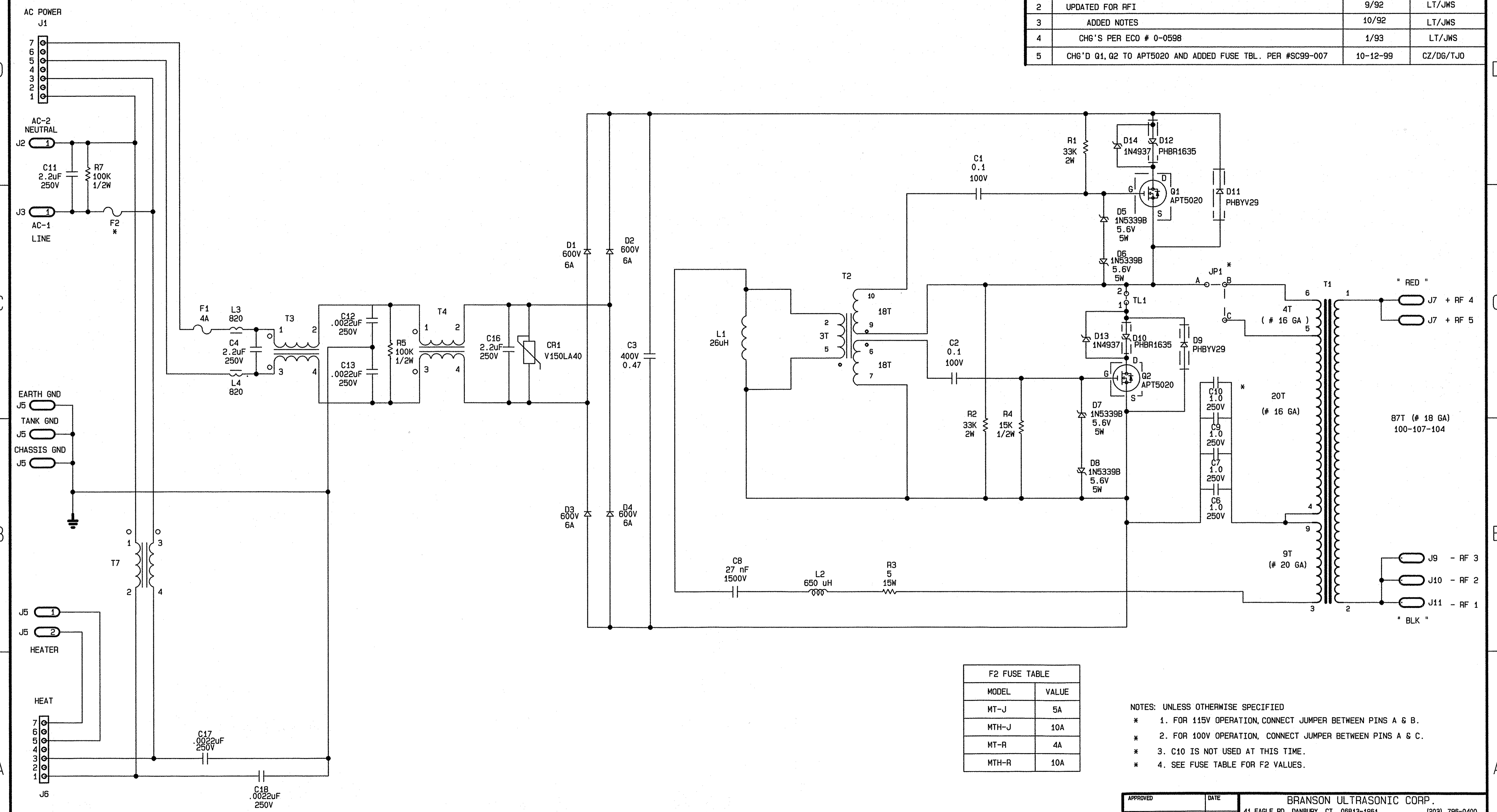
COMPONENT	VERSION		
	2210	3210	5210
L2	8.2 uH	8.2 uH	8.2 uH
L1	725 uH	450 uH	360 uH
Q1	331R	341R	341R
Q2	331R	341R	341R
F1 R, J	3A	4A	5A
F1 E	2A	2A	2.5A
C10	N/A	1.0nFD	1.5nFD

NOTES; UNLESS OTHERWISE SPECIFIED

- SEE CHART FOR VALUE CHANGES
VALUES SHOWN ARE FOR B1210 R
(FUSE F1 FOR B1210 E IS 1.0A)
- T3 USED ON "R" UNITS ONLY
- C4 NOT USED ON B1210.
- C10 IS NOT USED ON 1210 AND 2210.

APP.	DATE	BRANSON ULTRASONICS CORP.			
DES.	DATE	41 EAGLE ROAD, DANBURY, CT 06813-1951 (203) 790-0400			
LT	4/17/91	TITLE			
DWG.		SCHEMATIC POWER SUPPLY			
JWS		1210 - 5210 DTH EJ R			
CHK.	DATE	USED ON	SIZE	DWG. NO.	REV.
LT	7/10/91	BSONIC	D	913-242-169	7
PRJ. ENGR.	DATE	SCALE	B.S.P.	SHEET	
		NONE	PCAD GENERATED	1 OF 1	

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
1	UPDATED FOR RFI AND VDE CHG'S	6/92	LT/JWS
2	UPDATED FOR RFI	9/92	LT/JWS
3	ADDED NOTES	10/92	LT/JWS
4	CHG'S PER ECO # 0-0598	1/93	LT/JWS
5	CHG'D Q1, Q2 TO APT5020 AND ADDED FUSE TBL. PER #SC99-007	10-12-99	CZ/DG/TJO

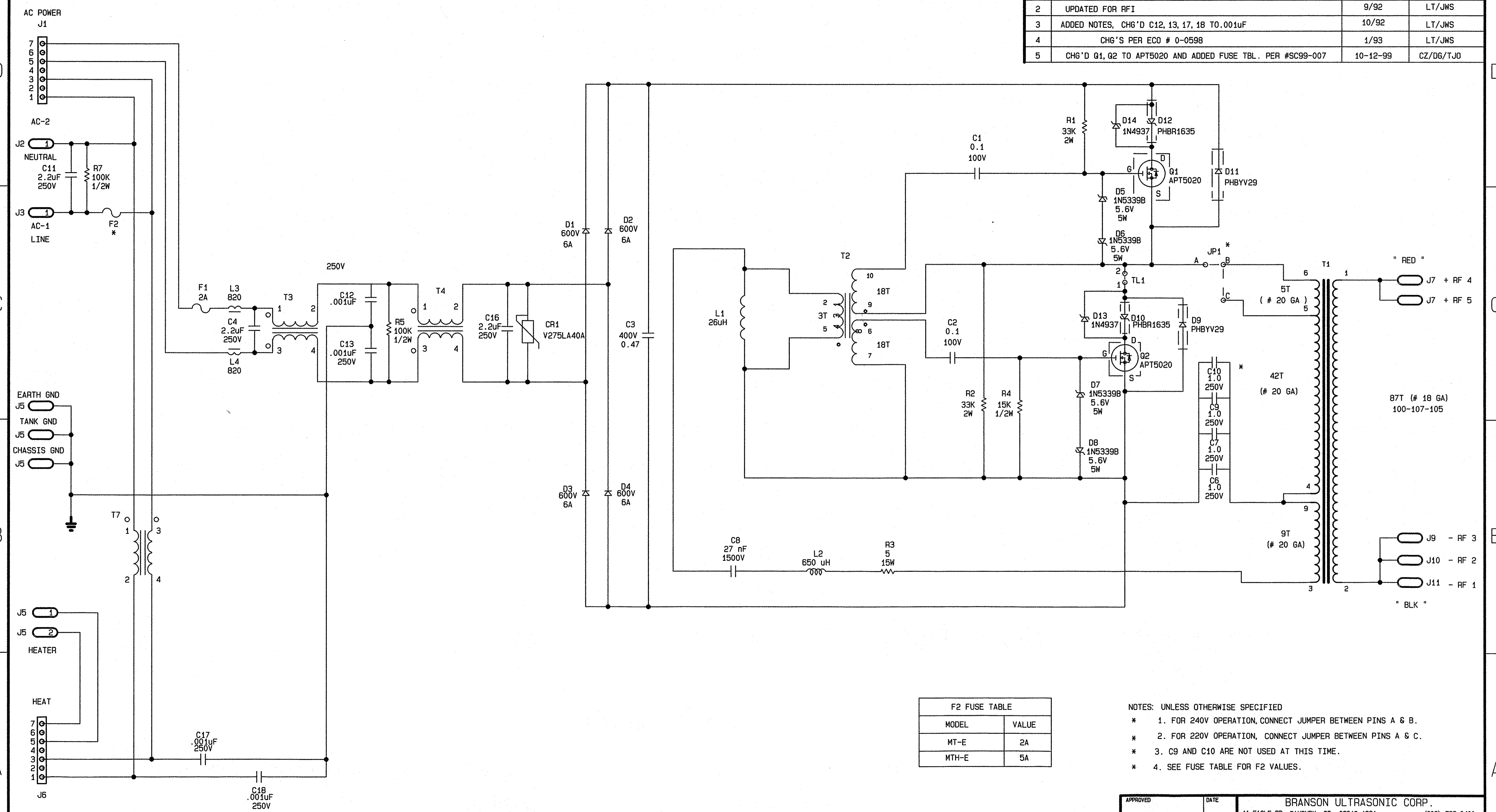


MODEL	VALUE
MT-J	5A
MTH-J	10A
MT-R	4A
MTH-R	10A

- NOTES: UNLESS OTHERWISE SPECIFIED
- * 1. FOR 115V OPERATION, CONNECT JUMPER BETWEEN PINS A & B.
 - * 2. FOR 100V OPERATION, CONNECT JUMPER BETWEEN PINS A & C.
 - * 3. C10 IS NOT USED AT THIS TIME.
 - * 4. SEE FUSE TABLE FOR F2 VALUES.

APPROVED	DATE	BRANSON ULTRASONIC CORP.			
DRAWN	DATE	41 EAGLE RD. DANBURY, CT. 06813-1961 (203) 796-0400			
DES.	DATE	TITLE			
CHECKED	DATE	8210 -MT/MTH -JR			
PRJ. ENG	DATE	USED ON	SIZE	DWG. NO.	REV
		8210/8510/SM85	D	913-242-179	5
		SCALE	NONE		SHEET
					1 OF 1

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
1	UPDATED FOR RFI AND VDE CHG'S	6/92	LT/JWS
2	UPDATED FOR RFI	9/92	LT/JWS
3	ADDED NOTES, CHG'D C12, 13, 17, 18 TO .001uF	10/92	LT/JWS
4	CHG'S PER ECO # 0-0598	1/93	LT/JWS
5	CHG'D Q1, Q2 TO APT5020 AND ADDED FUSE TBL. PER #SC99-007	10-12-99	CZ/DG/TJO



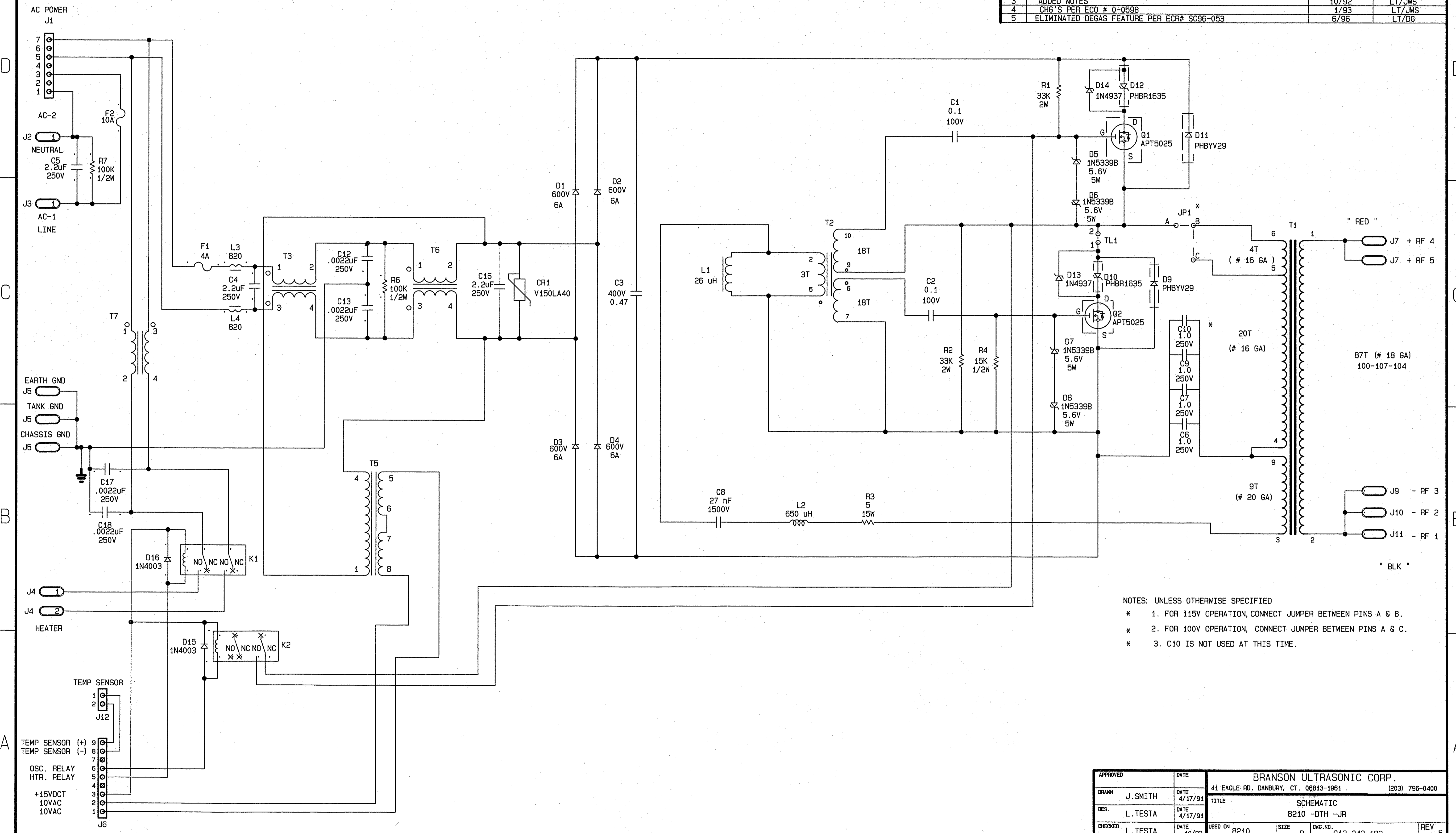
MODEL	VALUE
MT-E	2A
MTH-E	5A

NOTES: UNLESS OTHERWISE SPECIFIED

- * 1. FOR 240V OPERATION, CONNECT JUMPER BETWEEN PINS A & B.
- * 2. FOR 220V OPERATION, CONNECT JUMPER BETWEEN PINS A & C.
- * 3. C9 AND C10 ARE NOT USED AT THIS TIME.
- * 4. SEE FUSE TABLE FOR F2 VALUES.

APPROVED		DATE	BRANSON ULTRASONIC CORP.			
DRAWN	J. SMITH	4/17/91	41 EAGLE RD. DANBURY, CT. 06813-1961 (203) 796-0400			
DES.	L. TESTA	4/17/91	TITLE SCHEMATIC			
CHECKED	L. TESTA	10/92	USED ON	8210/B510/SMB5	SIZE	D
PRJ. ENG			DWG. NO.	913-242-178	REV	5
SCALE			NONE		SHEET 1 of 1	

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
1	UPDATED FOR RFI AND VDE CHG'S	6/92	LT/JWS
2	UPDATED FOR RFI	9/92	LT/JWS
3	ADDED NOTES	10/92	LT/JWS
4	CHG'S PER ECO # 0-0598	1/93	LT/JWS
5	ELIMINATED DEGAS FEATURE PER ECR# SC96-053	6/96	LT/DG



NOTES: UNLESS OTHERWISE SPECIFIED
 * 1. FOR 115V OPERATION, CONNECT JUMPER BETWEEN PINS A & B.
 * 2. FOR 100V OPERATION, CONNECT JUMPER BETWEEN PINS A & C.
 * 3. C10 IS NOT USED AT THIS TIME.

AC POWER
 J1
 7
 6
 5
 4
 3
 2
 1
 AC-2
 J2
 NEUTRAL
 C5
 2.2uF
 250V
 R7
 100K
 1/2W
 J3
 AC-1
 LINE
 F1
 4A
 L3
 820
 T3
 C12
 .0022uF
 250V
 R6
 100K
 1/2W
 T6
 C16
 2.2uF
 250V
 CR1
 V150LA40
 C3
 400V
 0.47
 D1
 600V
 6A
 D2
 600V
 6A
 D3
 600V
 6A
 D4
 600V
 6A
 L1
 26 uH
 T2
 10
 18T
 9
 3T
 5
 6
 18T
 7
 C2
 0.1
 100V
 R2
 33K
 2W
 R4
 15K
 1/2W
 R3
 5
 15W
 C8
 27 nF
 1500V
 L2
 650 uH
 C1
 0.1
 100V
 R1
 33K
 2W
 D14
 1N4937
 D12
 PHBR1635
 Q1
 APT5025
 D11
 PHBYV29
 D5
 1N5339B
 5.6V
 5W
 D6
 1N5339B
 5.6V
 5W
 JP1
 *
 A
 B
 C
 T1
 4T
 (# 16 GA)
 6
 1
 9T
 (# 20 GA)
 3
 2
 4
 9
 20T
 (# 16 GA)
 C10
 1.0
 250V
 C9
 1.0
 250V
 C7
 1.0
 250V
 C6
 1.0
 250V
 87T (# 18 GA)
 100-107-104
 J7 + RF 4
 J7 + RF 5
 J9 - RF 3
 J10 - RF 2
 J11 - RF 1
 " RED "
 " BLK "

APPROVED	DATE	BRANSON ULTRASONIC CORP.		
J. SMITH	4/17/91	41 EAGLE RD. DANBURY, CT. 06813-1961 (203) 796-0400		
DES.	DATE	TITLE		
L. TESTA	4/17/91	SCHEMATIC		
CHECKED	DATE	USED ON	SIZE	DWG. NO.
L. TESTA	10/92	8210	D	913-242-182
PRJ. ENG	DATE	SCALE	NONE	REV
				5
				SHEET 1 OF 1

BRANSONIC[®]

ULTRASONIC CLEANERS

OPERATOR'S MANUAL

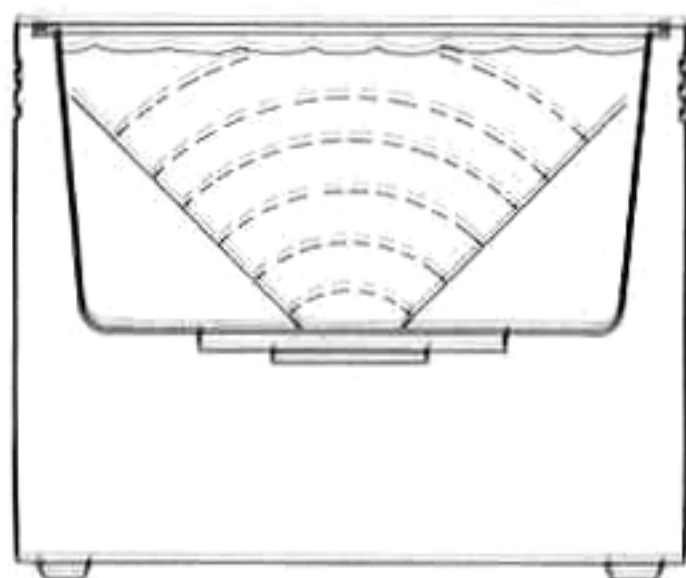
MODELS

1200, 2200, 3200, 5200, 8200

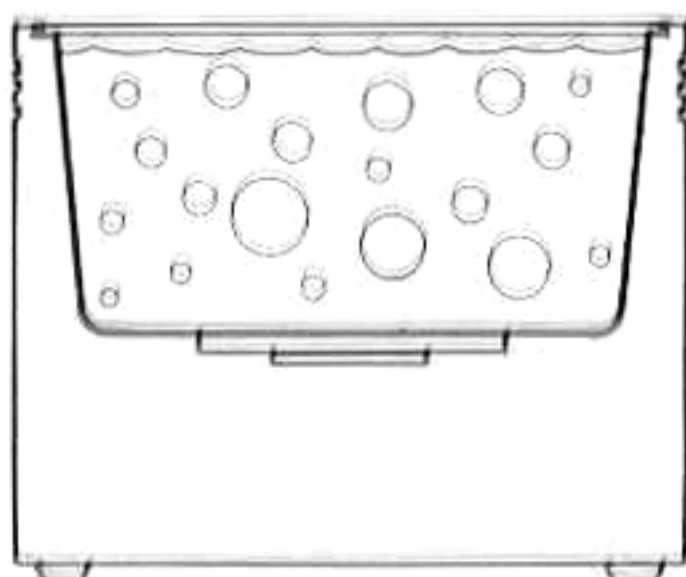
ULTRASONIC CLEANING

How it works

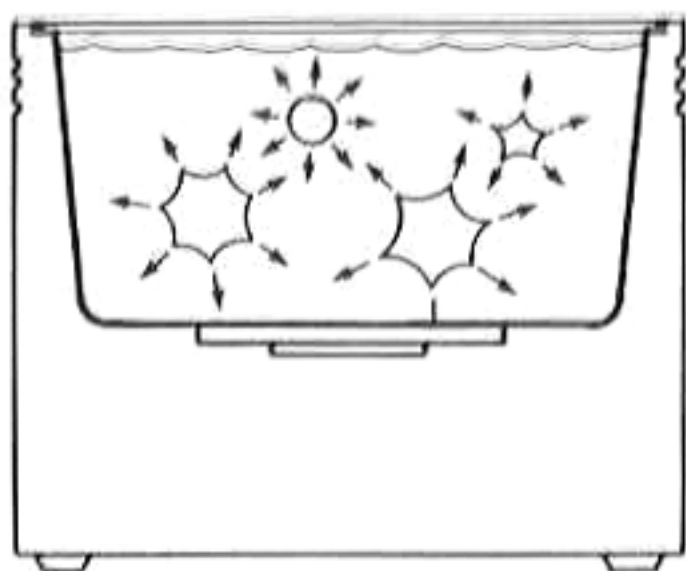
Ultrasonic sound is sound transmitted at frequencies beyond the range of human hearing. Your Branson Ultrasonic Cleaner operates at ultrasonic frequencies for cleaning.



As the sound waves from the transducer radiate through the liquid in the tank, they cause alternating high and low pressures in the liquid.



During the low pressure stage, millions of bubbles form and grow. This process is called CAVITATION, meaning "formation of cavities".



During the high pressure stage, the bubbles collapse, or "implode", releasing enormous amounts of energy. These implosions act like an army of tiny scrub brushes. They work in all directions, attack every surface and invade all recesses and openings.

Ultrasonic cleaning is very effective for cleaning hard materials but less effective for cleaning soft or porous materials. The harder the surface, the more effective the sonic scrubbing action. Since metals, glass, ceramics and hard plastics conduct sound, they are ideal candidates for ultrasonic cleaning.

ACHIEVING THE BEST RESULTS

Determine the right cleaning method

Several important factors affect the operation of your Branson Ultrasonic Cleaner and should be considered in order to achieve the best cleaning results.

There are two methods of cleaning — direct and indirect. Each has advantages and disadvantages. When in doubt, test run samples using both methods to determine which one produces the best results.

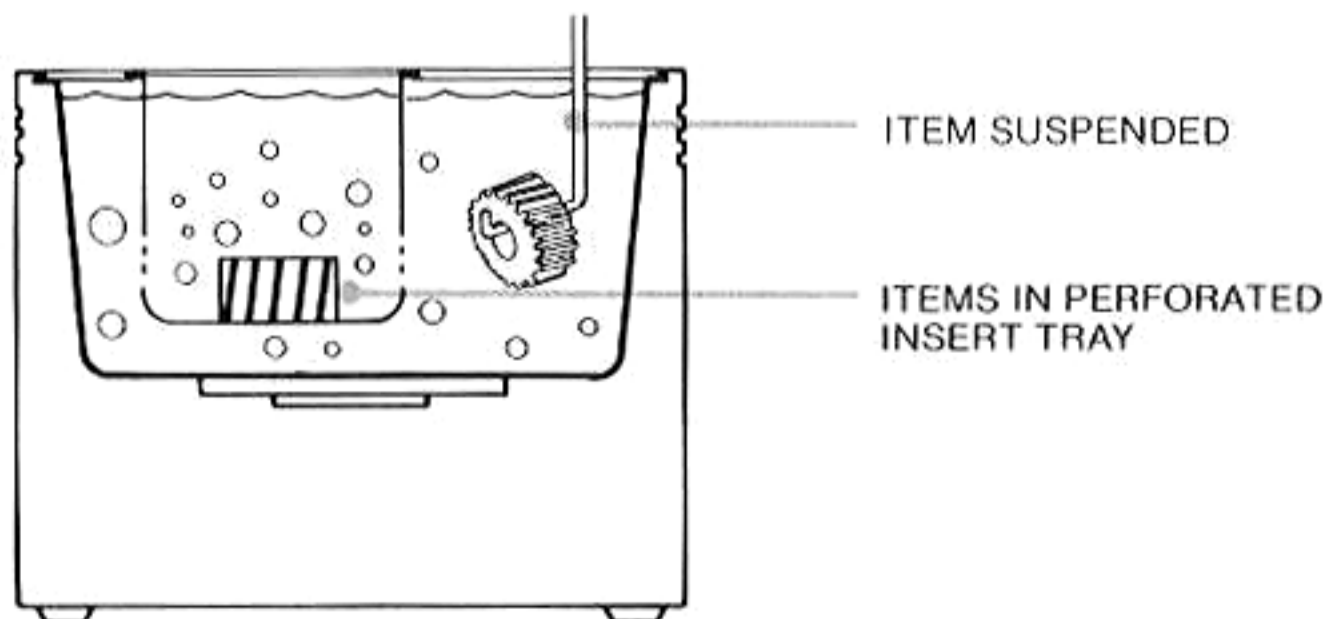
Direct method

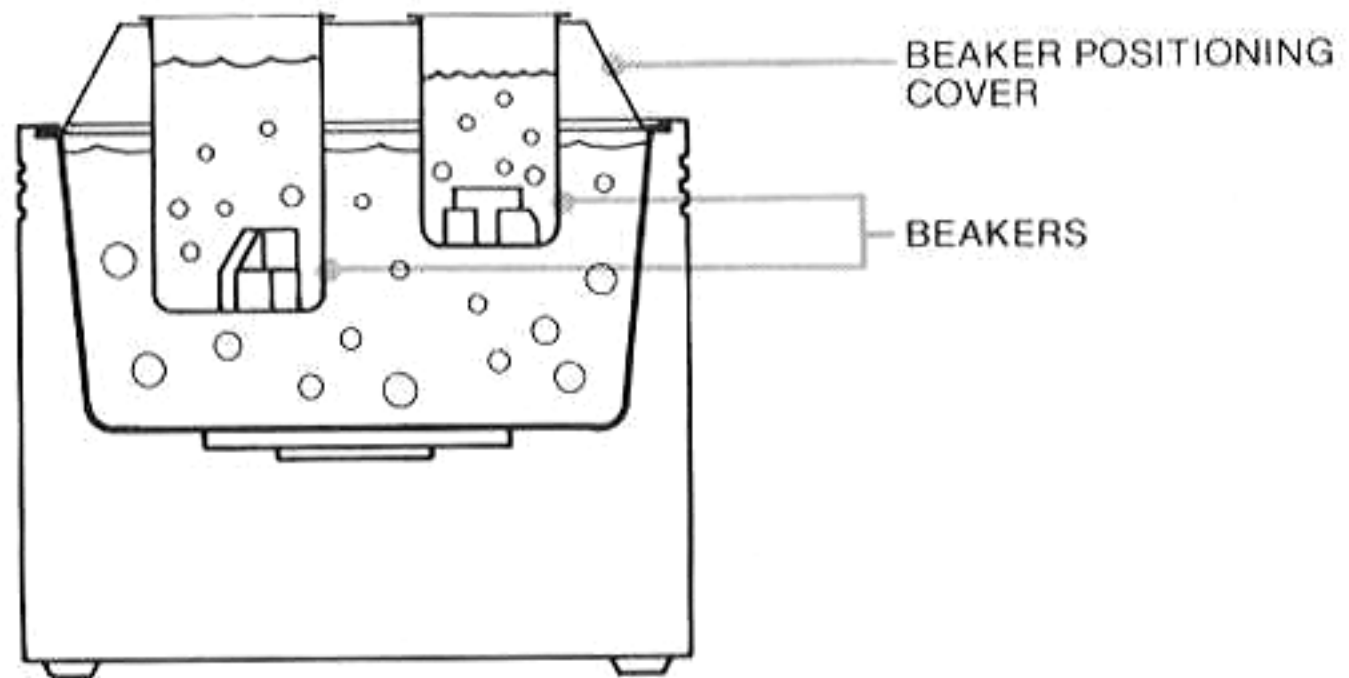
The direct method is very satisfactory for many cleaning jobs. In this method:

- The cleaning solution is poured directly into the tank.
- The items to be cleaned are placed in a perforated tray and lowered into the tank. Items also can be suspended on a wire and submerged in the solution.

The advantages of the direct method are its simplicity of operation and its cleaning effectiveness. However:

- All removed soil remains in the tank.
- Only one solution can be used at a time.
- Highly acidic or caustic solutions can erode the tank surface.





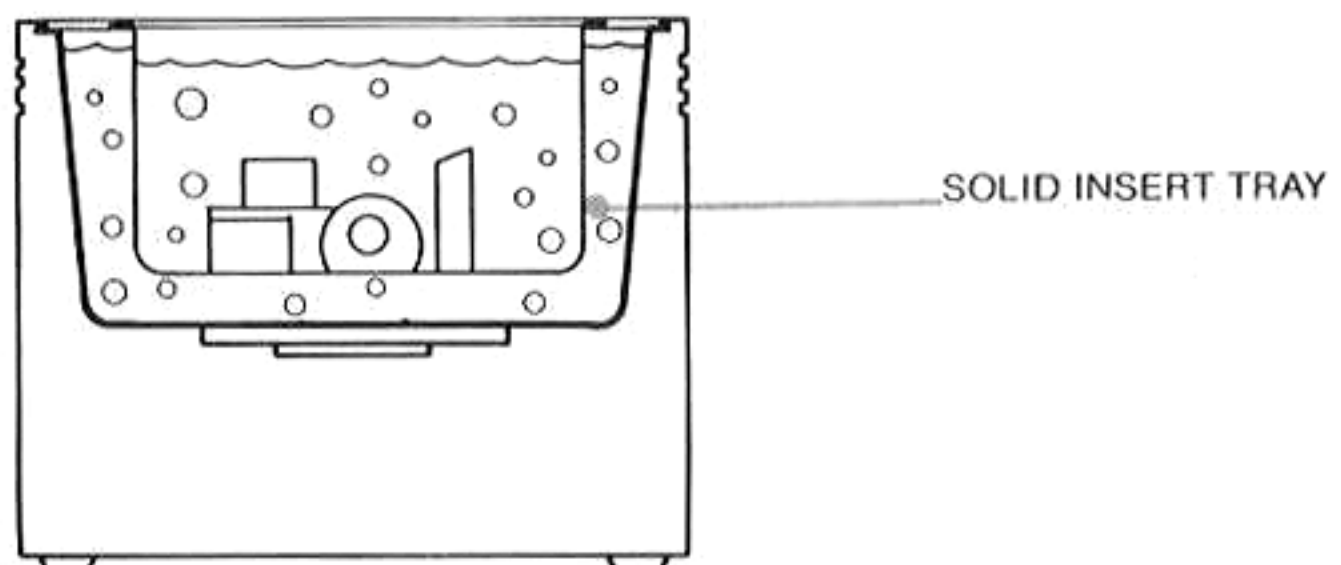
Indirect method

The indirect method provides more flexibility and control over the cleaning cycle. In this method:

- The tank is filled with a liquid driving medium, such as water plus a wetting agent (detergent), to improve cavitation.
- Cleaning solutions are poured into one or more beakers or into solid insert trays.
- The beakers are placed in a beaker positioning cover which suspends them in the tank. If a solid tray is being used, its handles should fit over the edges of the unit and suspend it in the tank.

The advantages of the indirect method are:

- Removed soil stays in the beaker or tray; it can be easily examined, filtered or discarded.
- One or more solutions may be used at the same time. For example:
 One beaker or tray with cleaning solution and one with a rinse solution.
 Two completely different cleaning solutions.



Achieving the best results

Rinsing drying and lubrication

Rinse away chemicals which adhere to items after cleaning. A highly effective method of rinsing is using a clean water bath in your Branson Ultrasonic Cleaner.

Air drying at room temperature works well for some items. Place items requiring faster drying under hot air blowers or in ovens.

Relubricate parts that need lubrication immediately after cleaning.

Cleaning solutions

The Branson Ultrasonic Cleaner was designed to operate only with **NON-FLAMMABLE LIQUIDS AND WATER-BASED SOLUTIONS. DO NOT USE SOLVENTS.**

Branson cleaning concentrates are formulated specifically for use in your Branson Ultrasonic Cleaner. They are listed with their recommended applications and container sizes, and are available from most Branson distributors. (*See pages 18-19.*)

Change the cleaning solution periodically. Like most chemicals, solutions become spent over time. Cleaning solutions can become contaminated with suspended soil particles which coat the tank bottom. This coating dampens the ultrasonic action and reduces cleaning efficiency.

Corrosive solutions

NEVER USE CORROSIVE SOLUTIONS SUCH AS STRONG ACIDS OR POWERFUL CAUSTICS DIRECTLY IN THE TANK. Besides causing damage to the unit, their use will void the warranty.

Liquid Level

When heavy or bulky loads are removed from the cleaner the liquid level may drop below the 1" level. Caution must be taken when operating heated units (-2,-4) as low liquid levels may cause the heater to fail.

Tank overload

Excessive weight on the tank bottom dampens sound energy and may cause damage to the transducer. Do not rest items on the tank bottom. Reduce the load size, and use a perforated tray to support heavy items.

BRANSON ULTRASONIC CLEANING SOLUTIONS

Water-based solutions

Your Branson Ultrasonic Cleaner was designed to *OPERATE ONLY WITH NON-FLAMMABLE LIQUIDS AND WATER-BASED SOLUTIONS*. Water-based solutions fall into two categories—acidic and alkaline. They include detergents, soaps and industrial cleaners to remove specific soils. (See *page 18*). **DO NOT USE SOLVENTS IN BRANSONIC ULTRASONIC CLEANERS.**

Alkaline water-based solutions

Alkaline water-based detergents include carbonates, silicates, caustics and phosphates. These materials help emulsifying action, keep soil from redepositing on the cleaned surface, and improve cleaning action in hard water.

Light oils and greases, cutting oils and coolant compounds can be removed with mild alkalines.

Wax or fat base buffing and polishing compounds, heavy grease and oil, waxes, vegetable oils, inks, milk residues and carbohydrates require mild to strong alkalines.

Mill scale, heat-treat scale, corrosion or oxides require heavy-duty alkalines.

Acidic water-based solutions

Acids are generally used to remove rust, tarnish or scale. They range from mild solutions that remove silver tarnish to concentrated, inhibited acidic solutions that remove investment plaster, milkstone, zinc oxide and rust from steel and cast iron as well as smut and heat-treat scale from hardened steel.

**Solutions:
amounts and
effects**

Solution amounts may vary. The amount used depends on the detergent and the type of soil to be removed. Follow the instructions on the solution container. (*See table below for effects of solutions on metals.*)

**BRANSON
ULTRASONIC
CLEANING
SOLUTIONS**

EFFECTS OF SOLUTIONS ON METALS

	<i>Steel</i>	<i>Brass</i>	<i>Aluminum</i>	<i>Magnesium</i>	<i>Zinc</i>	<i>S.S. Steel Tin Copper</i>
General purpose	none	none	slight etch*	none	none	none
Industrial strength	none	none	slight etch*	none	none	none
Oxide remover	slight etch	none	slight attack	attacks	attacks	none
Jewelry cleaner	none	none	none	none	none	none
Buffing compound remover	none	slight stain	none	none	attacks	none

*Slight etch on some aluminum alloys

BRANSONIC ULTRASONIC CLEANERS

Models 1200, 2200, 3200, 5200 and 8200 have different liquid capacities and each is available with four different options:

Model -1 Ultrasonic Cleaner

Model -2 Ultrasonic Cleaner with heater

Model -3 Ultrasonic Cleaner with timer

Model -4 Ultrasonic Cleaner with digital timer and digital heat control

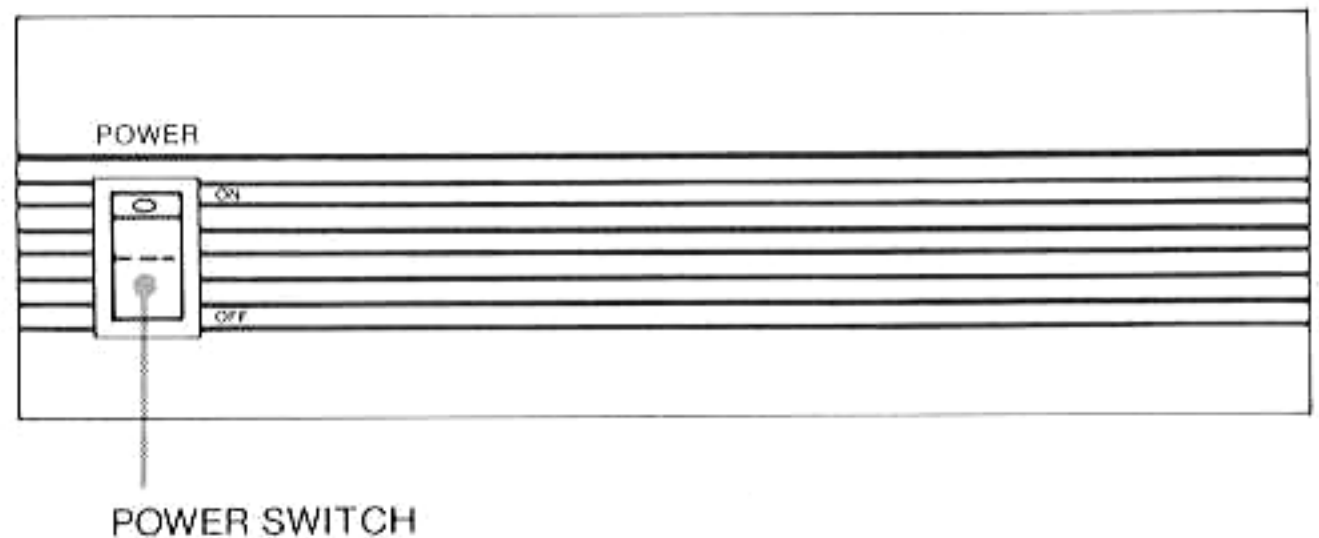
See pages 12-13 for cleaner capacities and configurations.

Setup for operation is the same for all models - but the operating procedure varies, depending on the options available on the model you have purchased.

ULTRASONIC CLEANER (Model -1)

Select the cleaning method - DIRECT or INDIRECT.
(See pages 8-9.)

Select the cleaning solution. (See pages 18-19.)



If you are using the DIRECT METHOD:

1. Fill the tank with warm tap water.

Note: The liquid should come to within one inch from the top of the tank when the tray and items to be cleaned are submerged. See. Pg. 10 for warning.

2. Add the cleaning solution to the tap water.
3. Plug the unit into its power source and press POWER to ON. Let the unit run for five to ten minutes to allow the liquid to "degas".

Operation

4. Place the items to be cleaned into a perforated tray and slowly lower the tray into the tank.
5. When the items are clean, remove the tray from the tank.
6. Rinse the clean items with clean water (the unit can be used for the rinsing cycle) and dry them, if necessary.
7. When you have finished using the unit, remember to turn it OFF.

If you are using the INDIRECT METHOD:

1. Fill the tank with warm tap water and add a wetting agent.
Note: The liquid should come to within one inch from the top of the tank when the trays or beakers (in their positioning cover) are submerged.
2. Plug the unit into its power source and press POWER to ON. Let the unit run for five to ten minutes to allow the liquid to "degas".
3. Place the items to be cleaned into individual beakers or solid trays. Pour enough cleaning solution into the beakers or trays to cover the items being cleaned.
4. Place the beakers in the positioning cover and slowly lower them into the tank.

If a solid tray is being used, its handles should fit over the edges of the unit and suspend the tray in the tank.

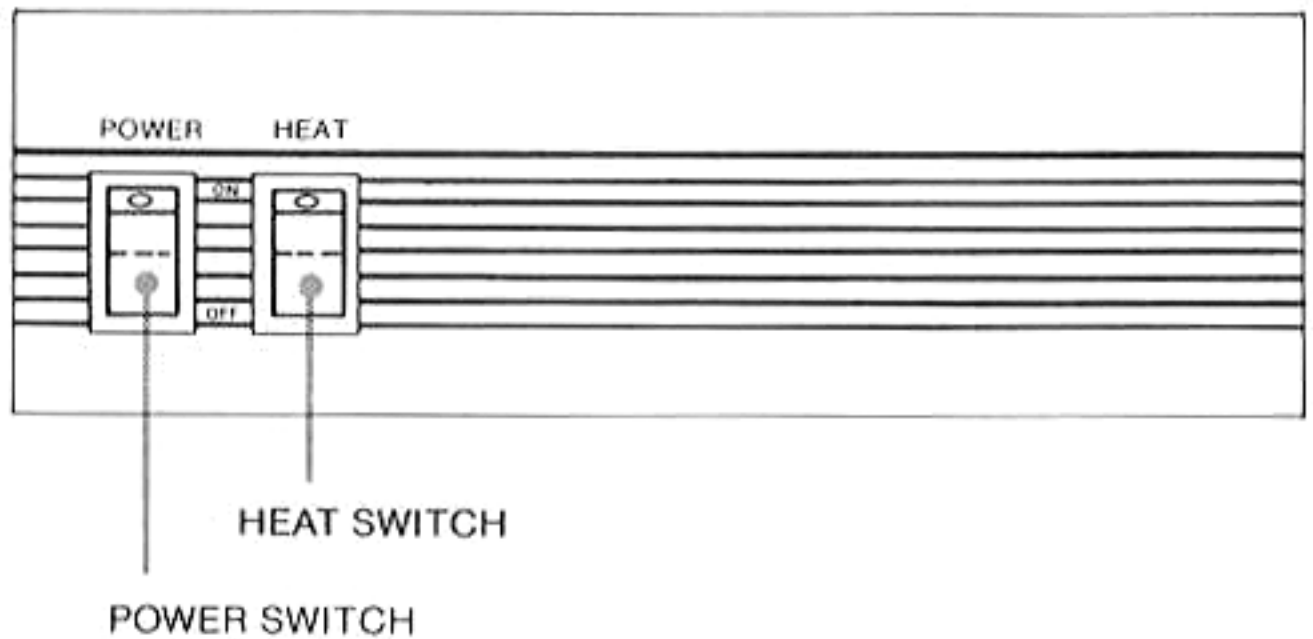
5. When the items are clean, remove the tray from the tank.
6. Rinse the clean items with clean water (the unit can be used for the rinsing cycle) and dry them, if necessary.

TURN OFF THE POWER AT THE END OF EACH DAY.

Operation

ULTRASONIC CLEANER WITH HEATER (Model -2)

The HEAT mode is designed to preheat and maintain the tank solution at a maximum of 50°C to 60°C (125°F to 140°F). The heater increases the chemical activity of the solution. The microscopic bubbles created by the ultrasonic action are greatly accelerated and intensified, resulting in thorough and faster cleaning.



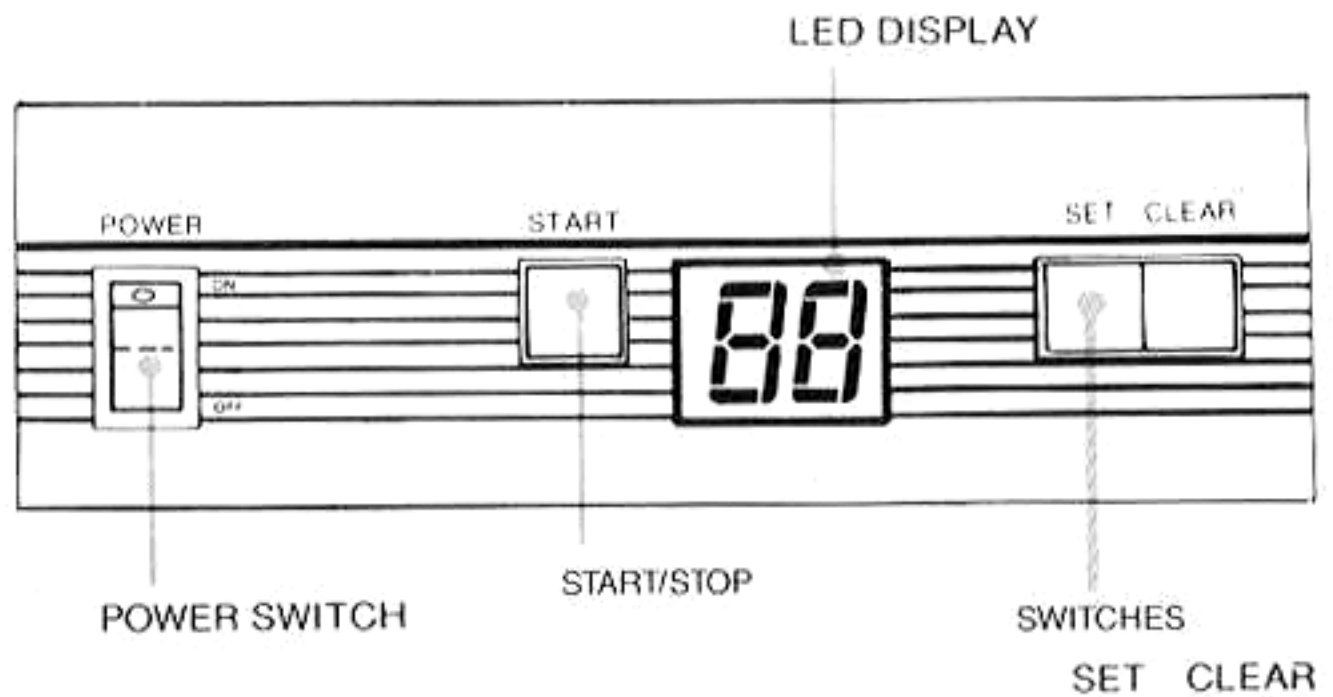
Select the cleaning method - DIRECT or INDIRECT:

1. Fill the tank with warm tap water.
Note: The liquid should come to within one inch from the top of the tank when the beakers/trays and items to be cleaned are submerged. See Pg. 10 for warning.
2. Add the cleaning solution to the tap water. (If you are using the INDIRECT METHOD, add the cleaning solution to the beakers or trays.) **USE ONLY WATER-BASED SOLUTIONS IN CLEANER.**
3. Plug the unit into its power source and press POWER and HEAT switches to ON. Let the unit run for five to ten minutes. This allows the liquid to "degas".
4. Follow ULTRASONIC CLEANER (Model-1) steps 4 through 7. In a busy office, shop or laboratory, HEAT can remain on all day.

TURN OFF THE POWER AT THE END OF EACH DAY.

ULTRASONIC CLEANER WITH TIMER (Model -3)

The digital TIMER (1 to 99 minutes) provides precise control over the short cycles typical of ultrasonic cleaning and is especially valuable when consistent results are required for consecutive batches of parts to be cleaned.



Select the cleaning method - DIRECT or INDIRECT:

1. Fill the tank with warm tap water.
Note: The liquid should come to within one inch from the top of the tank when the beakers/trays and items to be cleaned are submerged. See Pg. 10 for warning.
2. Add the cleaning solution to the tap water. (If you are using the INDIRECT method, add the cleaning solution to the tap water in the beakers or trays.)
3. Turn power ON (SET TIME LED will light). Display reads 00.
 - Press START/STOP to activate the ultrasonics. The ultrasonics will run continuously when the display reads 00.*Note: Allow the unit to run for 5-10 minutes to degas.*
 - To stop the ultrasonics press START/STOP.
4. For timed operation press the SET switch until the desired time (00-99 minutes) is displayed.
 - Press START/STOP to start timer and turn ultrasonics on.
 - To interrupt cleaning cycle, press START/STOP.
 - To resume cleaning cycle, press START/STOP.*Note: A timed cleaning cycle interrupted by pressing START/STOP will resume its countdown at the interrupted point when START/STOP is pressed again.*

Operation

5. To repeat the timed cleaning cycle after the cycle has finished, press START/STOP.

To reset TIME while the cleaning cycle is running:

- Press START/STOP to interrupt the cycle.
- Press CLEAR, 00 minutes will appear on the time LED display.
- Press SET until the minutes required for the cleaning cycle appear on the time LED display.
- Press START/STOP to resume the cleaning cycle.

6. Select operation mode.

- For TIMER MODE: Press SET until the minutes (from 1 to 99 minutes) required for the cleaning cycle appear on the time LED display. Release SET.
- For CONTINUOUS MODE: Press CLEAR to set time LED display at 00 minutes. When set at 00 minutes, the unit is ready to operate in the CONTINUOUS MODE.

7. Follow ULTRASONIC CLEANER (Model-1) steps 4 through 6. When unit is in TIMER MODE, consecutive batches may be cleaned without reprogramming, because the cleaning cycle time remains in memory until it is reset or the POWER switch is turned OFF.

To repeat the timed cleaning cycle after the cycle has finished, press START/STOP.

To reset TIME while the cleaning cycle is running:

1. Press START/STOP to interrupt the cycle.
2. Press CLEAR. 00 minutes will appear on the time LED display.
3. Press SET until the minutes required for the cleaning cycle appear on the time LED display.
4. Press START/STOP to resume the cleaning cycle.

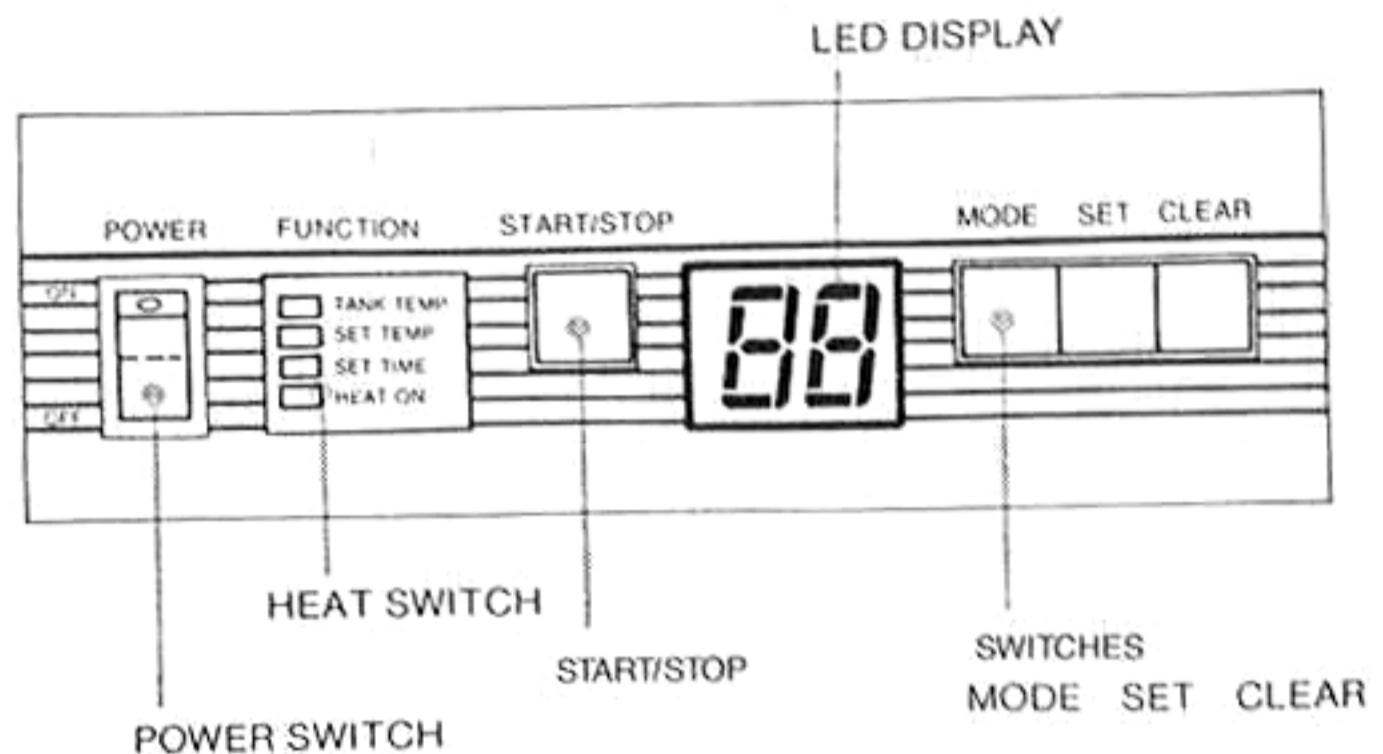
Note: A timed cleaning cycle interrupted by pressing START/STOP will resume its countdown at the interrupted point when START/STOP is pressed again.

TURN OFF THE POWER AT THE END OF EACH DAY.

ULTRASONIC CLEANER WITH DIGITAL TIMER AND DIGITAL HEAT CONTROL

(Model -4)

The digital timer and heat control mode combination provides precise control when consistent time and temperature are required for good results. The temperature can be monitored on the LED display. The temperature can also be controlled by the microprocessor according to the temperature (0-65°C) entered in "Set Temp" mode.



LED Function Explanation

"Tank Temp"

Displays tank temperature in °C from 0-99°C. ($\pm 10^\circ\text{C}$) (Monitor Temp Mode).

"Set Temp"

Allows the required tank temperature to be set from 0 to 65°C. If Start/Stop is pressed in this mode, the "Heat On" LED will either go on or off. (Control Heat Mode).

"Set Time"

Allows the timer to be set from 0-99 minutes. Press start/stop to turn ultrasonics on/off. If the display is 00 and START/STOP is pressed, the ultrasonics goes on in the continuous mode. If the display has a value of 01-99 pressing start/stop will start or stop the ultrasonics with the timer running. It will automatically stop at the end of the programmed time. (Timer Mode).

"Heat On"

This LED, when lit, indicates the microprocessor is controlling the tank temperature to the set point set in the "Set Temp" mode. When tank temperature reaches the setpoint, the heaters shut off. When the tank temperature decreases to 5°C below the setpoint, the heater will be reactivated.

Operation

IMPORTANT: MODEL-4 USES A SLIGHTLY DIFFERENT OPERATING PROCEDURE THEN -1, -2 AND -3 MODELS. FAILURE TO READ AND UNDERSTAND THE FOLLOWING MAY CAUSE YOU TO BELIEVE YOUR UNIT IS DEFECTIVE.

IN THE EVENT THE TANK TEMPERATURE RISES TO APPROXIMATELY 75°C ($\pm 5^{\circ}\text{C}$) A THERMAL PROTECTION WILL AUTOMATICALLY SHUT OFF THE HEAT AND ULTRASONICS. DISPLAY WILL READ "OF". IF THIS HAPPENS TURN OFF THE POWER SWITCH AND ALLOW THE UNIT TO COOL DOWN. TO RESUME NORMAL OPERATIONS TURN THE POWER SWITCH BACK ON AND FOLLOW THE STEPS LISTED BELOW.

Start-Up:

1. Follow ULTRASONIC CLEANER WITH TIMER (Model-3) steps 1 and 2.
2. Turn power ON (SET TIME LED will light). Display reads 00.
 - Press START/STOP to activate the ultrasonics. The ultrasonics will run continuously when the display reads 00.

NOTE: Allow the unit to run for 5-10 minutes to degas.

- To stop the ultrasonics press START/STOP.
3. For timed operation press the SET switch until the desired time (00-99 minutes) is displayed.
 - Press START/STOP to start timer and turn ultrasonics on.
 - To interrupt cleaning cycle, press START/STOP.
 - To resume cleaning cycle, press START/STOP.

NOTE: A timed cleaning cycle interrupted by pressing START/STOP will resume its countdown at the interrupted point when START/STOP is pressed again.

NOTE: When the unit is in TIMER MODE, consecutive batches may be cleaned without reprogramming, because the cleaning cycle time remains in memory until it is reset or the POWER switch is turned OFF.

To repeat the timed cleaning cycle after the cycle has finished, press START/STOP.

To reset TIME while the cleaning cycle is running:

- Press START/STOP to interrupt the cycle.
- Press CLEAR, 00 minutes will appear on the time LED display.
- Press SET until the minutes required for the cleaning cycle appear on the time LED display.
- Press START/STOP to resume the cleaning cycle.

5. To set the temperature press the MODE switch twice (SET TEMP LED will light).

- Press SET switch until desired temperature (00-65 C) is displayed.
- Press START/STOP to activate heater.
- To shut off heater press START/STOP switch.

NOTE: LED function light must be in the SET TEMP mode.

6. To check the temperature of the liquid solution in the tank:*

- Press MODE until the green TANK TEMP LED is lit. The numbers displayed are the tank temperature in degrees Centigrade ($\pm 10^{\circ}\text{C}$).

Note: The cleaning cycle continues to count down during the time the temperature is being displayed.

If a more accurate temperature reading is required, the ultrasonics have to be turned off. To do this:

- Press MODE twice (SET TIME LED will light).
- Press START/STOP to interrupt the cleaning cycle.
- Press MODE once to return to the monitor mode (TANK TEMP LED will light).
- Use a laboratory thermometer to determine the tank temperature.
- If the temperature readings on the thermometer and the LED display are identical, the unit is calibrated.
- If the temperature readings on the thermometer and LED display do not agree:
 - Press CLEAR.
 - Press and hold SET until the temperature reading on the LED display is identical to that on the thermometer.

The unit is now calibrated, and will remain accurate until the power switch is turned off.

Note: During a continuous cleaning process using ultrasonics and heat, the tank temperature may rise above the set temperature. This will cause the heater to shut off and remain off. This is caused by the added heat generated by the addition of the ultrasonics. If the ultrasonics are switched off, the tank will cool, allowing the heater control to function as normal.

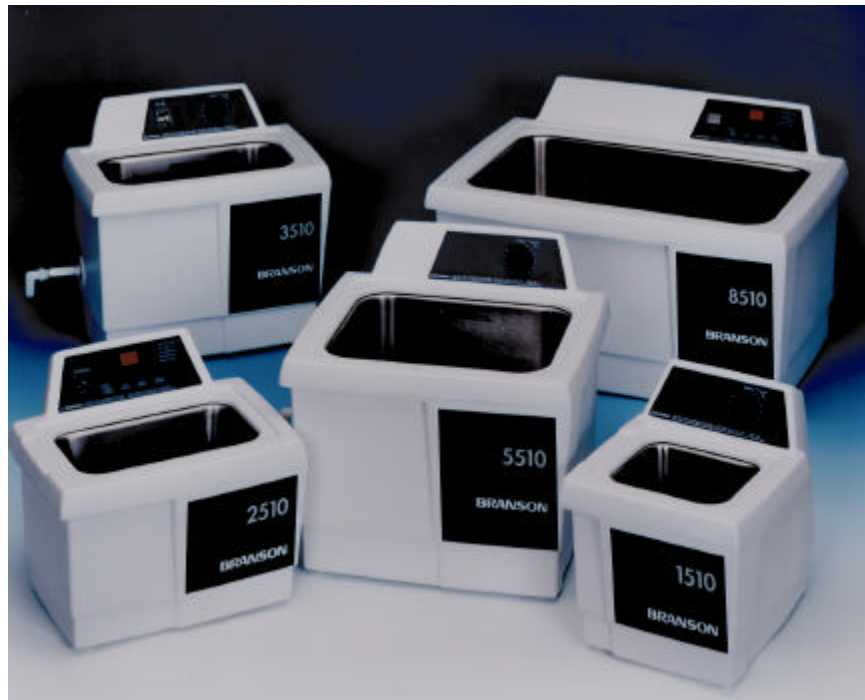
**Note: The ultrasonics may affect the accuracy of the monitored temperature. For the most accurate reading wait 20 - 80 seconds after shutting off the ultrasonics before taking the reading.*

TURN OFF THE POWER AND HEAT AT THE END OF EACH WORK DAY.

CPN-214-142
Rev. A

Ultrasonic Cleaners

Models 1510, 2510, 3510, 5510, 8510



Operator's Manual

Warranty

Ultrasonic Cleaners, when used in accordance with manufacturer's instructions and under normal use, are guaranteed for **two years after date of shipment**. Within the period guaranteed, manufacturer will repair or replace free of charge, at its sole discretion, all parts that are defective because of material or workmanship, not including costs for removing or installing parts.

Liability, whether based on warranty, negligence or other cause, arising out of and/or incidental to sale, use or operation of the transducer elements, or any part thereof, shall not in any case exceed the cost of repair or replacement of the defective equipment, and such repair or replacement shall be the exclusive remedy of the purchaser, and in no case will we be responsible for any and/or all consequential or incidental damages including without limitation, and/or all consequential damages arising out of commercial losses.

 **CAUTION** 

- Do not place parts or containers directly on the bottom of the cleaning tank; use a tray or wire to suspend items.
- Do not allow the solution to drop more than 3/8 inch below the operating level line with the cleaner on.
- Do not ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- Do not use mineral acids. These could damage the tank.

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Safety Precautions

Before using your Ultrasonic Cleaner, please read and thoroughly understand these safety precautions. Failure to follow them may result in serious personal injury or property damage.

To avoid electrical shock:

- Do unplug from power source before filling or emptying the tank.
- Do keep the control panel and the area around the cleaner clean and dry -- wipe up solution which spills over the tank brim. Water and high voltage can cause electrical shock.
- Do not operate the cleaner without proper grounding.
- Do not remove the grounding prong on the line cord plug.
- Do not disassemble your cleaner -- high voltage inside the cleaner is dangerous.
- Do not immerse the cleaner in water.

To prevent personal and/or property damage:

- Do operate the cleaner with a vented cover or no cover.
- Do use water-based solutions.
- Do not ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion and will void your warranty. Use only water-based solutions.
- Do not ever use mineral acids. These could damage the tank.
- Do not touch the stainless steel tank or cleaning solution -- they may be hot.
- Do not allow fluid temperature to exceed 70°C (160°F).
- Do not place your fingers or hands into the tank while the cleaner is operating. Doing so may cause discomfort and possible skin irritation. Avoid contact with solutions and provide adequate ventilation.
- Do not use solutions containing chlorine bleach.

To prevent damage to the cleaner:

- Do change your solution regularly.
- Do not cover vents on the cover.
- Do not operate the cleaner dry.
- Do not place parts or containers directly on the bottom of the cleaning tank; use a tray or wire to suspend items. Failure to comply may cause transducer damage and will void your warranty.
- Do not allow the solution to drop more than 3/8 inch below the operating level line with heat or ultrasonics on. Failure to comply may cause transducer and/or heater damage and will void your warranty.

2 Safety Precautions

Introduction

Ultrasonic Cleaners

This line of ultrasonic cleaners include five models with sizes ranging from 1/2 gallons, 3/4 gallons, 1-1/2 gallons, 2-1/2 gallons and 5-1/2 gallons. Each model is constructed using durable industrial style 40kHz transducers. These provide increased cleaning power along with built in sweep frequency to ensure uniform cleaning activity throughout the bath. The 1/2 and 3/4 gallon models have a molded dip in their rims to facilitate emptying of solution from the tank. The three larger sizes have built in drains and are supplied with tank drain kits. Each model can be purchased in three different configurations -- with a Mechanical Timer (MT), with a Mechanical Timer plus Heat (MTH) and with Digital Control, plus Heat and Timer (DTH).



When you first fill your unit, or refill it with fresh solution, use warm water for the solution. Turn on the heater (press the HEAT switch, if available), turn on the ultrasonics (press SONICS or rotate the Timer knob), add the cover and the solution will heat quickly to temperature.

Accessories For Your Cleaner

Accessories include regular and beaker positioning covers, solid and perforated insert trays, mesh baskets and beakers.

Unpacking Your Cleaner

Please check your cleaner and its carton carefully for any external or internal damage. **If you find damage, contact your shipping carrier immediately**, before contacting your distributor. Please retain your packaging for future use.

Installing Your Cleaner

Check the plate on the back of the cleaner for correct power requirements. Position your cleaner within easy reach of a standard grounded electrical outlet. Do not place the cleaner on a circuit which could become overloaded.

If your cleaner does not operate correctly, first refer to the troubleshooting section for possible causes, or contact an authorized service center listed at the back of this manual, for additional information.

Equipment Specifications

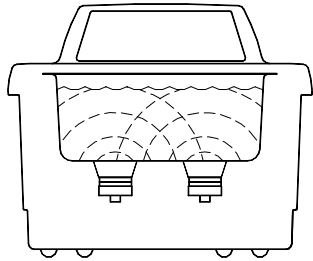
Tank Capacity	Tank Size	Overall Size	Weight	Max Input Power	Heater Power	Max. Draw Power Req. (Watts)*
1/2 gal. (1.91 L)	L: 6" W: 5.5" D: 4"	L: 10" W: 12" D: 11.5"	7 lbs. (3.2KG)	80W	0 63 63	80 143 143
3/4 gal. (2.81 L)	L: 9.5" W: 5.5" D: 4"	L: 13.5" W: 12" D: 11.5"	9 lbs. (4. KG)	130W	0 109 109	130 239 239
1-1/2 gal. (5.71 L)	L: 11.5" W: 6" D: 6"	L: 16" W: 12" D: 14.5"	12 lbs. (5.4 KG)	130W	0 205 205	130 335 335
2-1/2 gal. (9.51 L)	L: 11.5" W: 9.5" D: 6"	L: 16" W: 15.5" D: 14.5"	14 lbs. (6.4 KG)	185W	0 284 284	185 469 469
5-1/2 gal. (20.81 L)	L: 19.5" W: 11.5" D: 6"	L: 24" W: 18" D: 14.5"	26 lbs. (11.8 KG)	320W	0 561 561	320 881 881

NOTE:

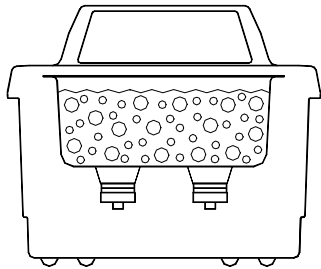
- All models have a frequency of 40kHz.
- In DTH cleaners, the temperature readout accuracy is $\pm 4^{\circ}\text{C}$.
- 120V $\pm 10\%$, 60Hz is optimum voltage for all cleaners.
- All cleaners have CSA approval and comply with FCC regulations.
- All 220V units meet CE standards.
- * indicates power levels for MT, MTH and DTH cleaners, in that order.
- Units will cause GFI sockets to trip.
- All units have a ground leakage current less than .50ma.

How Ultrasonics Cleaning Works

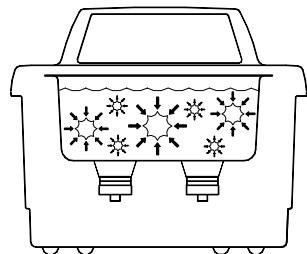
Ultrasonic sound is sound transmitted at frequencies generally beyond the range of human hearing. In your ultrasonic cleaner, ultrasonic sound (sonics) is used for cleaning materials and parts. This is how it works:



- As the sound waves from the transducer radiate through the solution in the tank, they cause alternating high and low pressures in the solution.



- During the low pressure stage, millions of microscopic bubbles form and grow. This process is called CAVITATION, meaning "formation of cavities".



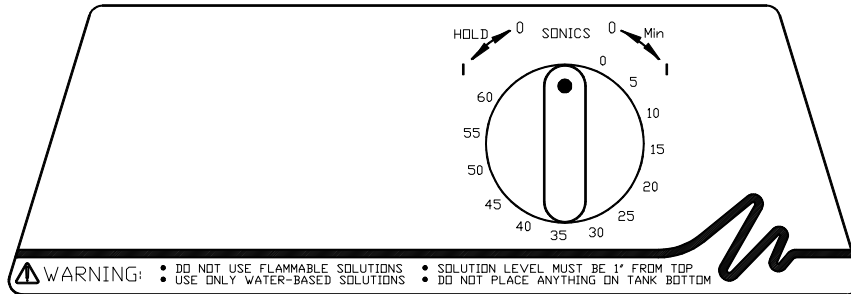
- During the high pressure stage, the bubbles collapse, or "implode" releasing enormous amounts of energy. These implosions act like an army of tiny scrub brushes. They work in all directions, attacking every surface and invading all recesses and openings.

Operating Your Cleaner

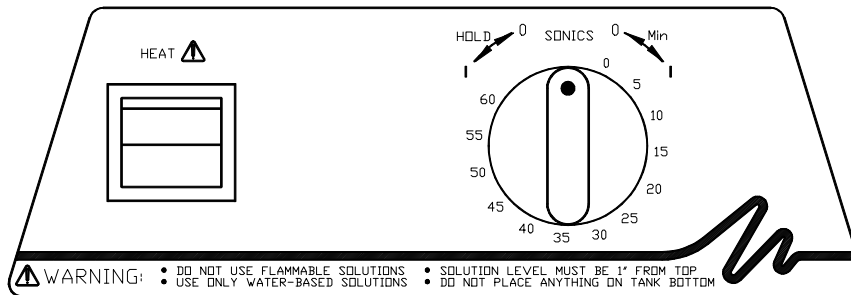
If this is the first time you are using the cleaner, please read this whole section before operating your cleaner.

Operating Your MT or MTH Cleaner

MT Cleaner



MTH Cleaner



Explanation of Controls

Control	Function
HEAT (MTH only)	Activates heat to 60°C maximum. NOTE: Refer to pages 16 and 17 for further temperature information.
TIMER	Activates ultrasonics and sets time. Use to turn unit Off.
	Turn clockwise for variable time 0-60 mins. Turn counterclockwise to hold position for continuous operation.

7 Operating Your Cleaner

Before You Start Cleaning



- Do not place parts or containers directly on the bottom of the cleaning tanks; use a tray or wire to suspend items.
- Do not allow the solution to drop more than 3/8 inch below the operating level line with the cleaner on.
- Do not ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- Do not ever use mineral acids. These could damage the tank.

Failure to comply with these cautions will void your warranty.

Step	Action
1	Select your cleaning solution (refer to page 23 for solution effects on metals).
2	Allowing for the volume of the parts you will be cleaning and cleaning solution, fill the tank with warm tap water to the operating level line (one inch from the top).
3	Add cleaning solution to the tank water.
4	Plug the cleaner into a grounded outlet.
5	For maximum efficiency, refer to page 16, "Optimizing Your Cleaner" before proceeding.

NOTE:

If this is the first time you are running the cleaner, or if you have changed cleaning solution, you must degas the solution. If not, skip to "**Cleaning Items**".

Degassing

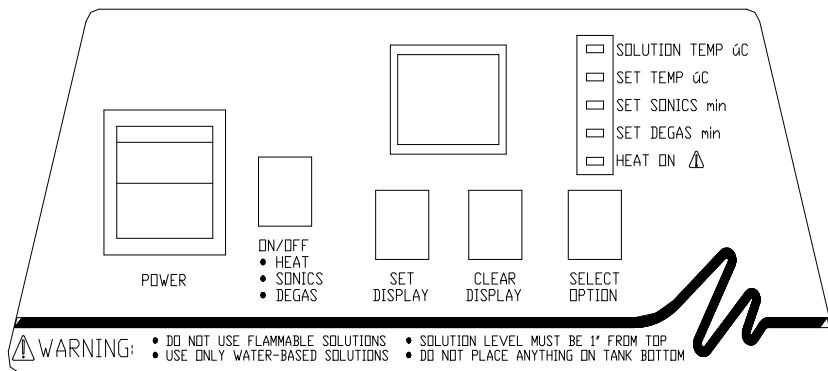
Step	Action
1	Turn the HEAT ON (MTH Cleaner only).
2	Turn the TIMER to 5-10 and let the cleaner run to allow the solution to “degas”. NOTE: Refer to page 17 for information on degassing.

Cleaning Items

NOTE: To stop ultrasonics at any time, turn the TIMER to zero.

Step	Action
1	Set the TIMER for the amount of time you wish the items to be cleaned.
2	Place the items into a basket, perforated tray, or beakers in a positioning cover.
3	If using beakers or a solid tray, add cleaning solution to beakers or tray to cover the items.
4	Slowly lower the tray or beakers into the tank. Do not allow items to contact the tank bottom. Do not stir the solution.
5	When items are clean, slowly remove them from the cleaner.
6	Rinse the clean items with clean water and dry them, if necessary.

Operating Your DTH Cleaner



Explanation of Controls

Control	Function
POWER	Press to activate/deactivate power to the cleaner.
ON/OFF	After you press SELECT OPTION and set the LED Display for the selected option, press to activate HEAT (SET TEMP), SONICS (SET SONICS) and/or DEGAS (SET DEGAS).
LED Display	Indicates the tank temperature, set temperature, ultrasonics time or degas time setting, depending on your SELECT OPTION choice.
SET/ CLEAR DISPLAY	Used in conjunction with SELECT OPTION to set or clear the LED display. Press CLEAR DISPLAY to clear the LED display to 00. Press SET DISPLAY to reach your selection.
SELECT OPTION	When pressed, toggles through the Function Indicators. This allows you to check or set the tank temperature and set ultrasonic cleaning or degas time.

Continued...

Control	Function
Function Indicators	Lights indicate the option selected by pressing SELECT OPTION. SOLUTION TEMP: Displays current solution temp. (10 - 75°C, ± 4°C). SET TEMP: Set tank temperature (01 - 69°C). SET SONICS: Set ultrasonic time (01 - 99 mins., 60 mins. default). SET DEGAS: Set degas time (01 - 99 mins., 5 mins. default). HEAT ONE: Indicates heat is activated and has been set (SET TEMP).

Before You Start Cleaning

Step	Action
1	Select your cleaning solution.
2	Allowing for the volume of the parts you will be cleaning and for the cleaning solution, fill the tank to the operating level line (one inch from the top) with warm tap water.
3	Add a cleaning agent to the tank water.
4	Plug the cleaner into a grounded outlet.
5	Turn the POWER switch On. The cleaner will run through a three-second self-test. Wait until the LED Display shows 05 and the SET DEGAS Function Indicator lights.

NOTE:

If this is the first time you are running the cleaner, or if you have changed cleaning solution, you must degas the solution. If not, move to *Setting Operating Parameters*.

Degassing

Step	Action
1	Degas for 5-10 minutes. If necessary, use SET/CLEAR DISPLAY to alter this setting. Default degas time is 5 minutes. NOTE: Refer to page 17 for information on degassing.
2	Press ON/OFF once to start the degas process.
3	After completing the degas time, you are ready to set operating parameters.

Setting Operating Parameters

Step	Parameter	Action
1	Set Time	The cleaner is now in Set Time mode with a default time of 60 mins. If necessary, use SET/CLEAR DISPLAY to alter this setting. Press ON/OFF once to activate timed ultrasonics.
2	Set Temp.	To set the tank temperature, press SELECT OPTION until the SET TEMP LED lights. Then press SET DISPLAY to alter the setting until the LED display indicates the tank temperature you wish to maintain. Press ON/OFF once to activate heat. The heat indicator lights.
3	Solution Temp.	To monitor the solution temperature, press SELECT OPTION until the SOLUTION TEMP LED lights. The LED display will indicate the actual temperature of the solution.

Cleaning Items



- Do not place parts or containers directly on the bottom of the cleaning tank; use a tray or wire to suspend items.
- Do not allow the solution to drop more than 3/8 inch below the operating level line with the cleaner on.
- Do not ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- Do not ever use mineral acids. These could damage the tank.

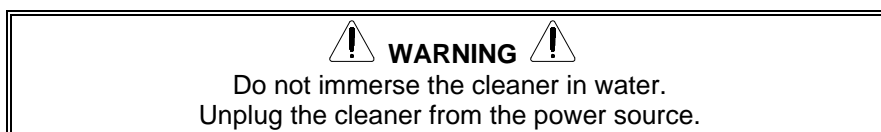
Failure to comply with these cautions will void your warranty.

NOTE: Select Set Time then press ON/OFF once to stop ultrasonics at any time.

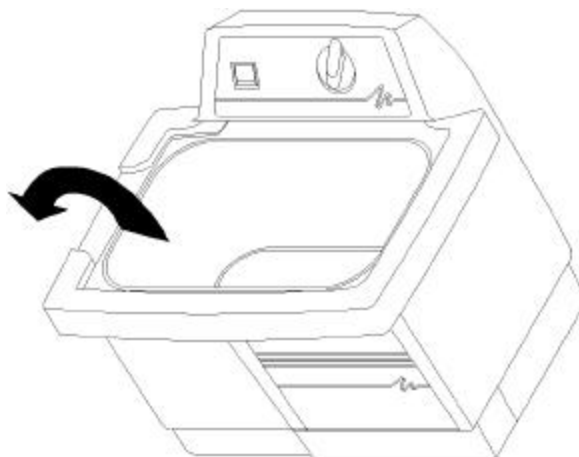
Step	Action
1	Place the items into a basket, perforated tray, or beakers in a positioning cover.
2	If using beakers or a solid tray, add cleaning solution to beakers or tray to cover the items.
3	Slowly lower the tray or beakers into the tank. Do not stir.
4	Press ON/OFF once to activate ultrasonics.
5	When the items are clean, press ON/OFF once to deactivate ultrasonics, then slowly remove the items from the cleaner.
6	Rinse clean items with clean, warm water and dry, if necessary.

- **To repeat a timed cleaning cycle** - press ON/OFF once while in the Set Sonics mode. This cleaning cycle time will remain in memory until reset or you turn off the power to the cleaner.
- **To reset ultrasonics time during a cleaning cycle** - press ON/OFF once, press SELECT OPTION until the SET SONICS LED lights. To increase time, press SET DISPLAY to your desired setting. To decrease time, press CLEAR DISPLAY, press SET DISPLAY to set the time, then press ON/OFF once to resume the cycle.
- **To monitor the solution temperature** - press SELECT OPTION until the SOLUTION TEMP LED lights. The LED Display will display the solution temperature in degrees Centigrade ($\pm 4^{\circ}\text{C}$). The cycle will continue during this process.

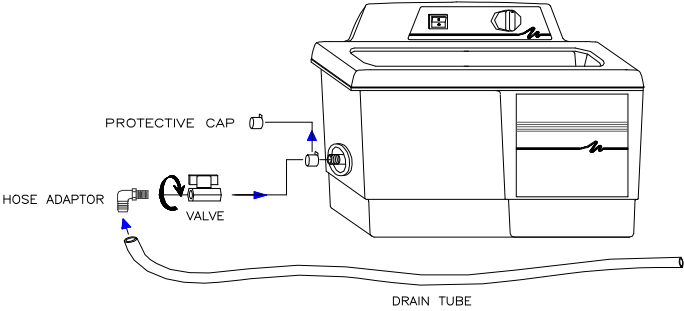
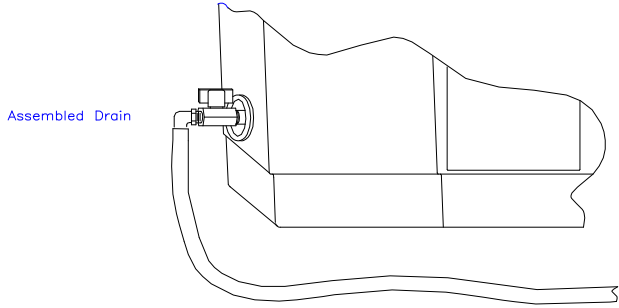
Draining Your Cleaner



$\frac{1}{2}$ and $\frac{3}{4}$ gallon models do not have a drain. To empty, use the indented side of the rim to pour the used solution into a waste disposal unit, rinse the tank thoroughly and refill with new solution.



1-1/2, 2-1/2 and 5-1/2 gallon models include a drain and valve kit.

Step	Action
1	Place the cleaner to allow easy reach of the drain tube into a waste disposal unit.
2	Remove the thread protecting cap from the end of the cleaner's drain pipe. This will expose the white teflon sealing tape on the drain pipe's threads.
3	<p>Hand tighten the drain valve onto the drain pipe over the white teflon sealing tape. Finish tightening the valve in place using an adjustable or a 21mm wrench. Tighten the valve no more than one full turn when using the wrench until the handle is on top.</p> <p>CAUTION: Over tightening of the valve can cause damage to the ultrasonic tank. Always use teflon sealing tape or a sealing paste designed for use with stainless steel if retightening or refitting of the drain valve is required.</p> 
4	<p>Hand tighten the hose adaptor into the end of the drain valve. Slide the drain tube over the barbed hose adaptor end.</p> 
5	Close the drain valve by turning the handle perpendicular to the valve body and the cleaner is ready to fill with solution. To open the valve and drain the cleaner, turn the handle so that it is in line with the valve body.

15 Operating Your Cleaner

Optimizing Your Cleaner

Tanks

Cleaning - check the tank for contamination whenever you change solution. If necessary, remove contaminants with a nonabrasive cloth and water.

Emptying - always unplug the cleaner before emptying the tank. Empty the solution into a waste disposal unit.

Filling - always unplug the line cord before filling the tank. Fill the cleaner to the operating level (one inch from the top with beaker/tray in place), using warm tap water.

Low solution level - will cause the cleaner to fail. When you remove heavy or bulky loads from the cleaner, the solution level may drop below the operating level. If so, be sure to replace lost solution and degas, if necessary, depending on the amount used.

Overload - do not rest any items on the tank bottom. Weight on the tank bottom dampens sound energy and will cause damage to the transducer. Instead, use a tray and/or beaker positioning cover to support all items. Allow at least one inch between the tank bottom and the beaker or receptacle for adequate cavitation.

Covers - allow the cleaner to heat up faster, to a higher temperature, and avoid excessive liquid evaporation. However, obstructing the cover vents will cause the cleaner to overheat.

Temperature

Heater - the heater may cause some discoloration of the tank wall. This is normal and will not affect the performance of the unit.

Solution - the fastest method to heat your cleaner is to fill with warm solution, use heat, ultrasonics (which also adds heat), and a cover.

Approximate stabilization temperatures with ultrasonics and heat running continuously:

MTH/DTH cleaner without a cover 50°
MTH/DTH cleaner with a cover 62°

continued...

Over temperature protection (DTH only) - the cleaner will shut down at 75°C and the LED display will blink "75". Turn the cleaner off and allow it to cool down. For a faster cooldown, replace some of the warm solution with cold solution.

Solution

Solution activity - the amount of visible activity is not necessarily related to optimum cavitation for cleaning.

Degassing - fresh solutions contain many dissolved gases (usually air), which reduce effective ultrasonic action. Although solutions will naturally degas over time, using Degas mode speeds up the degassing process. Solutions that have been sitting unused for 24 hours or longer have reabsorbed some gases.

Heat - increases the chemical activity of cleaning solutions.

Surface tension - can be reduced by adding solution to the bath. Reduced surface tension will increase cavitation intensity and enhance cleaning.

Solvents - never use solvents. Vapors of flammable solutions will collect under the cleaner, where ignition is possible from electrical components.

Renewal - replace cleaning solutions often to increase ultrasonic cleaning activity. Solutions, as with most chemicals, will become depleted over time. Solutions can become contaminated with suspended soil particles which coat the tank bottom, inhibiting ultrasonic activity.

Application Hints



- Never clean *novelty or inexpensive jewelry* in the cleaner. The combination of heat and vibration may loosen a cement-held setting.
- Never clean *gemstones* such as emerald, amethyst, pearl, opal, coral, turquoise, peridot or lapis lazuli in the cleaner.

First time cleaning - first experiment with one piece, then proceed with the remainder.

Solution level - Be sure to maintain solution level within 3/8 inch of the tank's "operating level" line. Surface activity can vary with liquid level.

Load size - It is faster and more efficient to run several small loads rather than a few big loads.

Placing items - Never allow items to sit on the bottom of the tank. Always place them in a tray or beaker or suspend in the solution.

Rinsing items - After cleaning, use a clean water bath to rinse away chemicals adhering to items.

Lubricating items - When necessary, re-lubricate items immediately after cleaning.

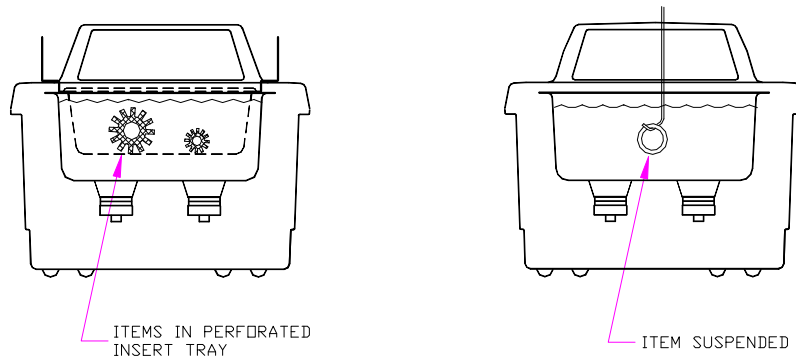
Drying items - Air drying at room temperature works for some items. Place parts requiring faster drying time under hot air blowers or in ovens.

Please call your local distributor if you have application questions.

Cleaning Methods

There are two methods of cleaning - direct and indirect. Each has advantages and disadvantages. When in doubt, run test samples using both methods to decide which one produces the best results for you.

Direct Method

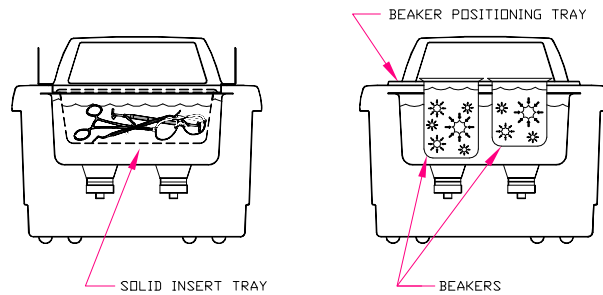


How it works:

- Fill the tank with warm water and a cleaning solution.
- Place the items to be cleaned in a perforated tray and lower them into the tank. You can also suspend items on a wire and then immerse them in the solution.

The advantages of this method are the simplicity of operation and cleaning effectiveness.

Indirect Method



How it works:

- Fill the tank with warm water and a cleaning solution.
- Pour your solution medium into one or more beakers or into a solid insert tray.
- Place the beakers in a beaker positioning cover or a solid insert tray to fit your cleaner. Beakers should not touch the tank's bottom.

The advantages of this method are:

- Removed soil stays in the beaker or tray so you can easily examine, filter or discard it.
- You can use one or more solutions at the same time.
 - two completely different cleaning solutions.
 - one beaker or tray with a cleaning solution and one with a rinse solution.
- Cleaning solution in your tank needs to be changed less often.

Cleaning Solutions



Do not use alcohol, gasoline, bleach, mineral acids, solutions with a flash point, semi-aqueous or combustible liquids in ultrasonic tanks, or you will void the warranty. Only use non-flammable solutions and water-based solutions.

Solution Types

Water-based solutions are either slightly acidic or alkaline. They include detergents, soaps and industrial cleaners designed to remove specific soils.

Acidic water-based solutions: remove rust, tarnish or scale. They range from mild solutions that remove tarnish, to concentrated, inhibited acidic solutions that remove investment plaster, milk-stone, zinc oxide and rust from steel and cast iron as well as smut and heat-treat scale from hardened steel.

Alkaline water-based solutions: include carbonates, silicates and caustics. These cause emulsifying action, which keeps soil from redepositing on the cleaned surface, and improves cleaning action in hard water.

Alkaline strength	Removes:
Mild	Light oils and greases, cutting oils and coolant compounds.
Mild to strong	Heavy grease and oil, waxes, vegetable oils, inks, wax or fat-base buffing and polishing compounds, milk residues and carbohydrates.
Heavy-duty	Mill scale, heat-treat scale, corrosion or oxides.

Change the cleaning solution periodically. Cleaning solutions can become contaminated with suspended soil particles which coat the tank bottom. This coating dampens the ultrasonic action and reduces cleaning efficiency. Certain solutions will cavitate better than others. Contact your local distributor for further information.

Heat and cavitation: increase the chemical activity of cleaning solutions. Some materials may be damaged by this stronger chemical action. When in doubt, test run samples of items to be cleaned.

Caustic solutions: used to remove rust from steels, metal alloy corrosion and a variety of tenacious soils.

Solution Amounts

Solution amounts may vary. The amount you use depends on the detergent and the type of soil to be removed. Follow instructions on the solution container and refer to the table below for the effects of solutions on metals.

Chemicals Harmful to Your Tank

The following chemicals will harm your ultrasonic tank and the action of ultrasonics and higher operating temperatures will increase their chemical activity. Do not use these or similar chemicals directly or in dilution in your ultrasonic tank or you will void your warranty.

Acetophenone	Chloracetic Acid	Hydrocyanic Acid
Aluminum Chloride	Chloric Acid	Hydrofluoric Acid
Aluminum Fluoride	Chlorine, Anhydrous	Hydrofluosilicic Acid
Aluminum Sulphate	Chromic Acid	Iodoform
Ammonium Bifluoride	Copper Chloride	Mercuric Chloride
Ammonium Chloride	Copper Fluoborate	Muriatic Acid
Ammonium Hydroxide	Ethyl Chloride	Phosphoric (crude)
Amyl Chloride	Ferric Chloride	Sodium Hypochlorite
Antimony Trichloride	Ferrous Chloride	Potassium Chloride
Aqua Regia	Ferris Sulfate	Stannic Chloride
Bromine	Fluoboric Acid	Stannous Chloride
Calcium Bisulfate	Fluorine	Sulfur chloride
Calcium Bisulfite	Hydrobromic Acid	Sulfuric Acid
Calcium Hypochloride	Hydrochloric Acid	Zinc Chloride

Solution Effects on Metals

Cleaning Agent	Steel	Brass	Aluminum	Magnesium	Zinc	S. Steel Copper	Tin
Optical (1)	none	none	none	none**	none**	none	none**
Jewelry (1)	none	none	none	none	none	none	none
Buffing (1) compound	none	slight stain	none	none	attacks	none	none
Oxide (2) remover	slight etch	none	slight attack	attacks	attacks	none	none
Electronic cleaner (1)	none	none	slight attack	none	none	none	none
General(1) purpose	none	none	slight attack	none	none	none	none
Industrial strength(1)	none	none	slight attack	none	none	none	none
Metal (1) cleaner 1	none	none	none	none	none	none	none
Metal (1) cleaner 2	none	none	slight attack	none	none	none	none
Metal (1) cleaner 3	none	none	none	none	none	none	none
Rust (3) stripper	none	none	attacks	attacks	attacks	none	slight attack

(1) = Alkaline; (2) = Acidic; and (3) = Caustic.

 WARNING  *Free hydrogen may be released if solution comes in contact with reactive metals.
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** No effect if solution temperature is less than 140°F.

Troubleshooting

If your cleaner does not operate satisfactorily, please check the tables below for possible causes before calling your authorized service center.

 **WARNING** 

**High voltage inside - dangerous shock hazard.
DO NOT attempt to disassemble or repair the cleaner.**

Problem	Cause	What to do
Cleaner will not start.	Cleaner not plugged in properly. MT - Mechanical timer not ON. DTH - POWER switch not ON. DTH - Start button malfunctioning. Blown fuse.	Plug into functioning electrical outlet. Turn timer clockwise. Press power switch ON. Call nearest authorized service center. Call nearest authorized service center.
Cleaner operates but does not heat solution	Heater malfunctions. MTH - HEAT not ON. DTH - HEAT not set properly. DTH - membrane malfunctioning.	Call nearest authorized service center. Turn heat ON See <i>Operating Your DTH Cleaner</i> . Call nearest authorized service center.
Clogged drain	Clogged drain.	Call nearest authorized service center.



WARNING

**High voltage inside - dangerous shock hazard.
DO NOT attempt to disassemble or repair the cleaner.**

Problem	Cause	What to do
Cleaner operates but does not maintain set temperature	Malfunctioning heater or sensor components.	Call nearest authorized service center.
Cleaner operates but display does not function.	Interrupted calibration sequence. DTH - timer board malfunctioning.	Press SET DISPLAY Call nearest authorized service center.
Cleaner stops operating and display blinks "75".	Overheat condition.	Turn cleaner off. Allow cleaner to cool, check solution level, then restart. Refer to <i>Optimizing Your Cleaner</i> .
Decreased ultrasonic activity. NOTE: Refer to page 27 for cavitation check.	Solution is not degassed. Solution is spent. Solution level is incorrect for load. Tank bottom is covered with soil particles. Using deionized water in the tank.	Make sure that tank was filled with warm tap water plus cleaning solution and has run 5-10 minutes. Change solution. Adjust solution to within 3/8 inch of the tank's operating level line with load. Empty, then clean tank with warm water. Wipe with a nonabrasive cloth. Deionized water does not cavitate as actively as soapy tap water.

Check your cleaner periodically to test the level of activity of the ultrasonic cavitation. Frequency of testing will depend on your use of the cleaner.

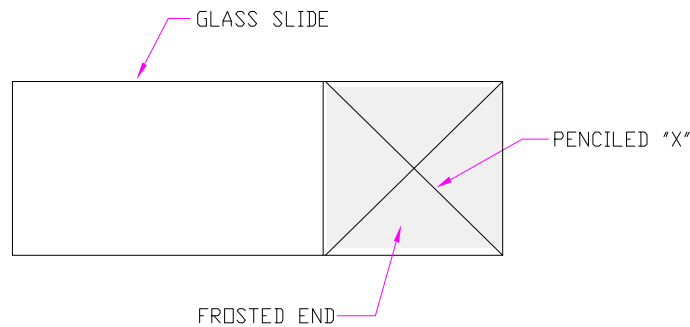
Glass Slide Test

You will need the following equipment:

- Frosted microscope glass slide (1" x 3"), such as ESCO #2951F, or equivalent;
- No. 2 lead pencil; and
- General purpose household cleaning solution, such as "Dawn" liquid soap.

Test procedure:

1. Prepare a fresh solution with general purpose household cleaning solution (concentration 1%) and warm tap water (120° - 140°F).
2. Fill the cleaner to within 3/8 inch of the "operating level" line.
3. Turn the ultrasonics on for at least five to ten minutes to allow for degassing.
4. Prepare the glass slide by first wetting the frosted portion with tap water.



5. With the No. 2 pencil, on the frosted portion make an "X" from corner to corner.
6. Immerse the frosted end of the slide into the solution. Hold the slide vertically and center it in the solution.
7. Make sure that model DTH cleaners are in SET SONICS mode, not degas mode, then turn ultrasonics On.

The ultrasonics will begin immediately to remove the lead from the slide. All lead should be removed within 10 seconds. If your cleaner passes this test, its ultrasonic cavitation is acceptable.

NOTE:

To ensure consistency from test to test, be sure to repeat test conditions - use the same solution concentration, liquid level, temperature, type of pencil, length of degassing, etc.

Service Information

With normal use, your Ultrasonic Cleaner should not require servicing. However, if it fails to operate satisfactorily, first try to diagnose the problem by following the suggestions in the Troubleshooting Guide.



You will void the warranty if you disassemble your cleaner. High voltage inside the cleaner is dangerous.

If you find that your cleaner needs repair, carefully pack and return it to your local distributor. If under warranty, remember to include proof of purchase.

Your cleaner will be shipped by ground service unless you specify otherwise.

Authorized Service Centers

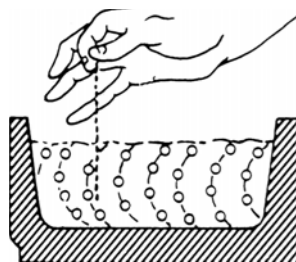
Name	Address	Tel/Fax Number
Alpha Omega Electronics Corp.	2821 National Drive Garland, TX 75041	Tel: 972-271-5569 Tel: 1-800-540-4967 Fax: 972-840-3668
Crystal Electronic Inc.	140 Centre Street Aurora Canada L4G 1K0	Tel: 905-841-5762 Fax: 905-841-9688
Paragon Electronics	11075 N.E. 6th Ave. Miami, FL 33161	Tel: 305-757-0631 Fax: 305-754-6877
Master Sonics Repair Center	445 West Queen St. Southington, CT 06489	Tel: 800-737-2198 860-621-9466 Fax: 860-621-0283

Authorized Service Centers

Notes:

Technical Support:

Branson Ultrasonics Corp.	41 Eagle Road P.O. Box 1961 Danbury, CT 06813-1961	Tel: 203-796-0339 Tel: 203-796-0557 Fax: 203-796-2240
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Ultrasonic cleaning is a fast, safe way of cleaning that's been used by laboratories, dentists, jewelers, and industry for years. And now, with this unit you can take advantage of ultrasonic cleaning for many small, difficult to clean items.

How it works:

The ultrasonic cleaner uses high frequency sound waves to create literally millions of tiny, microscopic bubbles in the solution. These bubbles expand and then rapidly collapse. As they collapse, they release a significant amount of energy creating an intense "scrubbing" action which is effective on visible surfaces as well as small crevices and even blind holes. Dirt can be loosened and removed from any surface that the liquid touches. This action, called "cavitation", occurs thousands of times every second to quickly produce clean parts.

To set up:

1. Be sure the ultrasonic cleaner is unplugged. Always unplug the unit before filling or emptying
2. Fill the tank to within 1/2" of the top edge with warm water. Be sure to leave room for your chemistry and parts. The liquid level should not be allowed to drop below 1 1/2" from the tank bottom
3. Plug the cleaner into an appropriate outlet. This would be 110-120 volts in the U.S. and 220 volts in Europe. Check the label on your unit and use only that voltage.
4. Press the "on" switch (+) and allow the cleaner to run for several minutes to drive excess gas from the solution.

To clean parts:

1. Place objects to be cleaned in the plastic basket. Items should not be placed directly on the tank bottom.
2. Suspend the basket in the cleaning solution. Cleaning is usually complete in 30 seconds to 2 minutes depending on the type and amount of soil. The cleaner automatically shuts off after 5 minutes. The unit can be shut off during the cleaning cycle by pressing the "off" switch (-). The cycle can be rerun by pressing "on" (+) again.
3. Rinse parts under running tap water and dry if necessary.



To be safe:

1. When cleaning items for the first time, test one piece before cleaning the rest.
2. Be sure that the cleaning solution you use is compatible with the stainless steel cleaner tank.
3. Follow instructions and precautions recommended by the cleaning solution manufacturer.
4. Avoid contact with solutions and provide adequate ventilation.
5. To avoid possible discomfort, do not put fingers into the tank while the ultrasonic cleaner is operating.
6. *Never* use solvents or flammable liquids in the ultrasonic cleaner.
7. If you clean items with movable parts, you should consider re-oiling immediately after cleaning.
8. Do not operate the cleaner without liquid in the tank.
9. It is normal for your cleaner to become warm after 10-15 minutes of continuous operation

What it will clean:

Due to the nature of ultrasonic cleaning you will find it very effective when used on hard materials such as metals, glass, stone, ceramic, and even dense, hard plastics. When used to clean these types of hard materials your ultrasonic cleaner can remove a great number of different types of soil. These can include such things as dust, dirt, oils, many light greases, tarnish, even solder paste. It is particularly useful in laboratories for removing chemical or protein residues from intricate or complex labware and instruments. It will also do an excellent job on jewelry with hard natural stones like sapphires, garnets, rubies, diamonds, etc.

What it will not clean:

Ultrasonics relies on the impact of cavitation bubbles against a hard surface to erode away the soils. For that reason, it is not very effective for cleaning soft materials like rubber, cloth, fibrous products, styrofoam, or products with similar properties. These materials will absorb the sound and little energy will be left for soil removal. It is also necessary to exercise care when cleaning jewelry. Soft stones like pearls and opals should not be cleaned ultrasonically as cracking or discoloration may occur.

Cleaning Solutions

Cleaning Solutions

Limited Warranty

What to look for:

There are two basic types of cleaning solutions; aqueous, which are based on water and solvents, which are more volatile and often flammable. This ultrasonic unit is designed to operate *only* with aqueous solutions. **Solvents or flammable solutions should never be used in the ultrasonic cleaner.**

Aqueous solutions come in two general types, acidic and alkaline or basic. These are available in many generally available commercial formulations designed for specific applications. Both can be used in your cleaner, which has a stainless steel tank, if they are not too strong. Ultrasonics can intensify chemical activity and some aggressive solutions may attack the stainless steel. A sign that this is happening will be the appearance of rough gray spots or pitting. If you should see this, discontinue use of that solution immediately and rinse the tank with fresh water.

How to use them:

Each manufacturer includes directions for using their chemistry on associated packaging. Follow the manufacturer's directions.

Cleaning solutions have to be degassed to work effectively with ultrasonics. This is a process whereby dissolved gases are expelled from the solutions. The ultrasonics will perform this task during the first several minutes of operation after the tank has been filled. You may note a different sound as the cleaner drives out the gas and begins to function efficiently. This process can be accelerated by filling the tank with warm water (120-140 degrees F) on startup. The cleaner and generally the solution will perform better at this slightly elevated temperature.

Cleaning solutions should be changed regularly as they can lose their effectiveness over time. Dirty solutions will re-deposit soils on the parts and can coat the tank bottom limiting ultrasonic activity.

BRANSON ULTRASONICS warrants this ultrasonic cleaner to be free from defects in material and workmanship for a period of two years from date of sale. BRANSON's liability under this warranty is limited solely to repairing, or, at BRANSON's option, replacing those products included within the warranty which are deemed defective and returned to BRANSON within the applicable warranty period, shipping charges prepaid. This warranty shall not apply to any product which has been subjected to misuse, negligence, accident, or has been improperly installed, misapplied, modified, or repaired by unauthorized persons.

Inspection: Buyer shall inspect the product upon receipt. The buyer shall notify BRANSON in writing of any claims of defects in material and workmanship within 30 days. Failure to make such a claim shall be considered a waiver of right to claim.

Disclaimer: The provisions stated herein are BRANSON's sole obligation and specifically exclude all other remedies or warranties, expressed or implied including those related to merchantability or fitness for a particular purpose.

Limitations: BRANSON shall not be liable for any incidental, consequential, or special damages, losses, or expenses. Any action relative to this warranty must be initiated within one year of purchase.

BRANSON ULTRASONIC CLEANER



Model B200

INSTRUCTIONS

BRANSON

BC Series Ultrasonic Cleaner



Operation Manual

Warranty

BC Series Ultrasonic Cleaners, when used in accordance with manufacturer's instructions and under normal use, are guaranteed for two years after date of shipment. Within the period guaranteed, Branson Ultrasonics will repair or replace free of charge, at its sole discretion, all parts that are defective because of material or workmanship, not including costs for removing or installing parts.



WARNING



- Don't place parts or containers directly on the bottom of the cleaning tank; use a wire basket or wire to suspend items.
- Don't allow the solution to drop more than 4 inches below the top with the cleaner on.
- Don't ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- Don't ever use solutions which could attack stainless steel.

Failure to comply with these warnings will void your warranty.

Branson's liability, whether based on warranty, negligence or other cause, arising out of and/or incidental to sale, use or operation of the transducer elements, or any part thereof, shall not in any case exceed the cost of repair or replacement of the defective equipment, and such repair or replacement shall be the exclusive remedy of the purchaser, and in no case shall Branson be responsible for any and/or all consequential or incidental damages including without limitation, and/or all consequential damages arising out of commercial losses.

Unpacking your cleaner:

Please check your cleaner and its carton carefully for any external or internal damage. If you find damage, contact your shipping carrier immediately, before contacting your distributor.

Please retain your packaging for future use.

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Warnings – Do's and Don'ts



Before using your Ultrasonic Cleaner, please read and thoroughly understand these warnings. Failure to follow them may result in serious personal injury or property damage.

To avoid electrical shock:

- Do unplug from power source before filling or emptying the tank.
- Do keep the control panel and the area around the cleaner clean and dry - wipe up solution which spills over the tank brim. Water and high voltage can cause electrical shock.
- Don't operate the cleaner without proper grounding.
- Don't remove the grounding prong on the line cord plug.
- Don't disassemble your cleaner - high voltage inside the cleaner is dangerous.
- Don't immerse the cleaner in water.

To prevent personal and/or property damage:

- Do use water-based solutions.
- Don't ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion and will void your warranty.
- Don't ever use solutions, which could attack stainless steel.
- Don't touch the stainless steel tank or cleaning solution - they may be hot.
- Don't place your fingers or hands into the tank while the cleaner is operating. Doing so may cause discomfort and possible skin irritation. Avoid contact with solutions and provide adequate ventilation.
- Do not use solutions containing chlorine bleach.

To prevent damage to the cleaner:

- Do change your solution regularly.
 - Don't operate the cleaner dry.
 - Don't place parts or containers directly on the bottom of the cleaning tank; use a wire basket or wire to suspend items. Failure to comply may cause transducer damage and will void your warranty.
 - Don't allow the solution to drop more than 4 inches below the top with heat or ultrasonics on. Failure to comply may cause transducer and/or heater damage and will void your warranty.
-

Installing your cleaner

Check the plate on the back of the cleaner for correct power requirements. Position your cleaner within easy reach of a standard grounded electrical outlet. Do not place the cleaner on a circuit which could become overloaded.

The supply voltage should be the normal supply voltage of the cleaner + or – 10%. Check the serial number label at the rear side of the cleaner for the nominal voltage.

If your cleaner does not operate correctly, first refer to the troubleshooting section for possible causes. Please contact an authorized service center listed at the back of this manual, for additional information.

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Introduction

Ultrasonic Cleaners:

This line of ultrasonic cleaners includes 2 models each available in two frequencies:

- BC-1216-25 (10 gal)
- BC-1216-40 (10 gal)
- BC-1620-25 (18 gal)
- BC-1620-40 (18 gal)

Each model is manufactured from high quality stainless steel with integrated ultrasonic components, electrical heating, and microprocessor controlled display with time and temperature functions.

Durable industrial style 25 or 40 kHz transducers provide high reliability and consistent cleaning results.



When you first fill your unit, or refill it with fresh solution, it is best to use warm water. Turn on the heater (press the HEAT switch), turn on the ultrasonics (press SONICS or rotate the Timer knob), add the cover and the solution will heat quickly to temperature.

Equipment specifications

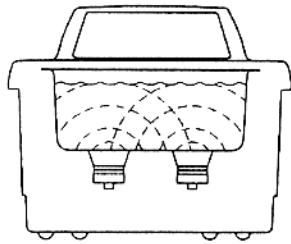
Model	Capacity Gallons	Inside dimensions LxWxH (in)	Fre- quency kHz	Max. input power W	Peak RF power W	Heating power W
BC-1216-25	10	18x12x14	25	2600	1000	1600
BC-1216-40	10	18x12x14	40	2600	1000	1600
BC-1620-25	18	20x16x16	25	3700	1500	2200
BC-1620-40	18	20x16x16	40	3700	1500	2200

NOTE:

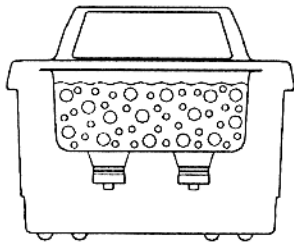
- 230V \pm 10%, 50/60 Hz is optimum voltage for all cleaners.
 - All cleaners comply with the relevant FCC and CE-Directives.
 - Units will cause GFI outlets to trip.
-

How ultrasonics works

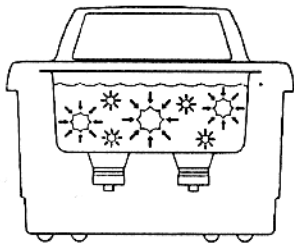
Ultrasonic sound is sound transmitted at frequencies generally beyond the range of human hearing. In your ultrasonic cleaner, ultrasonic sound (sonics) is used for cleaning materials and parts. This is how it works:



As the sound waves from the transducer radiate through the solution in the tank, they cause alternating high and low pressure areas in the solution.

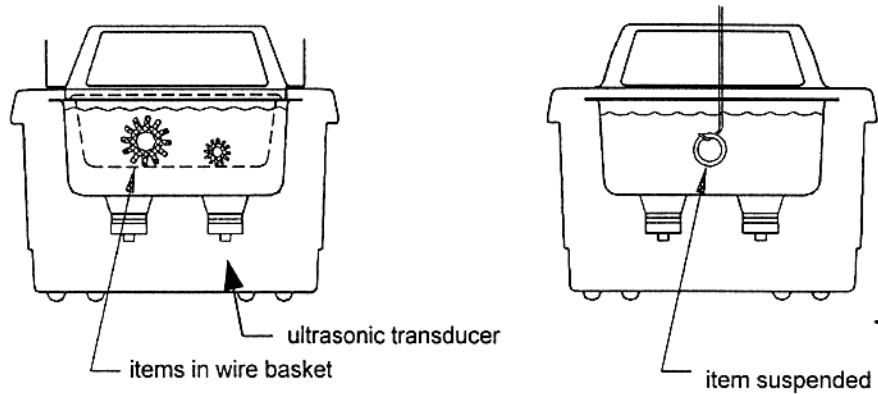


During the low pressure stage, millions of microscopic bubbles form. These bubbles grow as the pressure decreases.



During the high pressure stage, these bubbles collapse, or "implode", releasing enormous amounts of energy. These implosions act like an army of tiny scrub brushes. They work in all directions, attacking every surface and invading all recesses and openings. This process is called CAVITATION.

Cleaning method



How it works:

- Fill the tank with warm water and a cleaning solution.
- Place the items to be cleaned in a wire basket and lower them into the tank. You can also suspend items on a wire and then immerse them in the solution.

Rinsing, drying and lubrication:

- Rinse the parts to remove the chemicals which adhere to the parts after cleaning.
 - Dry the parts with clean compressed air, hot air blowers or in an oven.
 - Relubricate parts that need lubrication.
-

Application hints

First time cleaning - First experiment with one piece, then proceed with the remainder.

Solution level - Be sure to maintain solution level within 4 inches of the tank's top.

Load size - It is faster and more efficient to run several small loads rather than a few big loads.

Placing items - Never allow items to sit on the bottom of the tank. Always place them in a wire basket or suspend in the solution.

Rinsing items - After cleaning, use a clean water bath to rinse away chemicals adhering to items.

Drying items - Air drying at room temperature works well for some items. Place items requiring faster drying under hot air blowers or in ovens.

Lubricating items - When necessary, re-lubricate items immediately after cleaning.

Please call your local distributor if you have application questions.

Cleaning solutions



WARNING



Do not use corrosive solutions, such as bleaches, strong acids or powerful caustics, in ultrasonic tanks, or you will void the warranty. Only use non-flammable solutions and water-based solutions. Do not use hydrocarbon solutions or solutions attacking stainless steel.

Solution types:

Water-based solutions are either slightly acidic or alkaline. They include detergents, soaps and industrial cleaners designed to remove specific soils.

Acidic water-based solutions remove rust, tarnish or scale. They range from mild solutions that remove tarnish, to concentrated, inhibited acidic solutions that remove investment plaster, milk-stone, zinc oxide and rust from steel and cast iron as well as smut and heat-treat scale from hardened steel.

Alkaline water-based solutions include carbonates, silicates and caustics. These cause an emulsifying action on oils and other soils and prevent soils from redepositing on the cleaned surface. They also provide better part wetting and improve cleaning action in hard water.

Alkaline strength:

Mild	Removes light oils and greases, cutting oils and coolant compounds.
Mild to strong	Removes heavy grease and oil, waxes, vegetable oils, inks, wax or fat-base buffing and polishing compounds, milk residues and carbohydrates.
Caustic	Removes mill scale, heat-treat scale, corrosion or oxides.

Change the cleaning solution periodically. Cleaning solutions can become contaminated with suspended soil particles which settle on the tank bottom.

This coating dampens the ultrasonic action and reduces cleaning efficiency.

Certain solutions will cavitate better than others. Contact your local distributor for further information.

Heat and cavitation: increase the chemical activity of cleaning solutions. Some materials may be damaged by this stronger chemical action. When in doubt, test run samples of items to be cleaned.

Solution amounts:

Solution amounts may vary. The amount you use depends on the detergent and the type of soil to be removed. Follow instructions on the solution container.



WARNING



Free hydrogen may be released if solution comes in contact with reactive metals.

-

Optimizing your cleaner

Tanks:

Cleaning - check the tank for contamination whenever you change solution. If necessary, remove contaminants with a nonabrasive cloth and water.

Emptying - always unplug the cleaner before emptying the tank. Empty the solution into a waste disposal unit.

Filling - always unplug the line cord before filling the tank. Fill the cleaner to the operating level (2-4 inches below the top), using warm tap water.

Low solution level - will cause the cleaner to fail. When you remove heavy or bulky loads from the cleaner, the solution level may drop below the operating level. If so, be sure to replace lost solution and degas, if necessary, depending on the amount used.

Overload - do not rest any items on the tank bottom. Weight on the tank bottom dampens sound energy and will cause damage to the transducers. Instead, use a wire basket.

Covers - allow the cleaner to heat up faster, to a higher temperature, and avoid excessive liquid evaporation.

Heating - the heater may cause some discoloration of the tank wall. This is normal and will not affect the performance of the unit.

Solution:

Solution activity - the amount of visible activity is not necessarily related to optimum cavitation for cleaning.

Degassing - fresh solutions contain many dissolved gases (usually air), which reduce effective ultrasonic action. Although solutions will naturally degas over time, using Degas mode speeds up the degassing process. Solutions that have been sitting unused for 24 hours or longer have reabsorbed some gases.

Heat - increases the chemical activity of cleaning solutions.

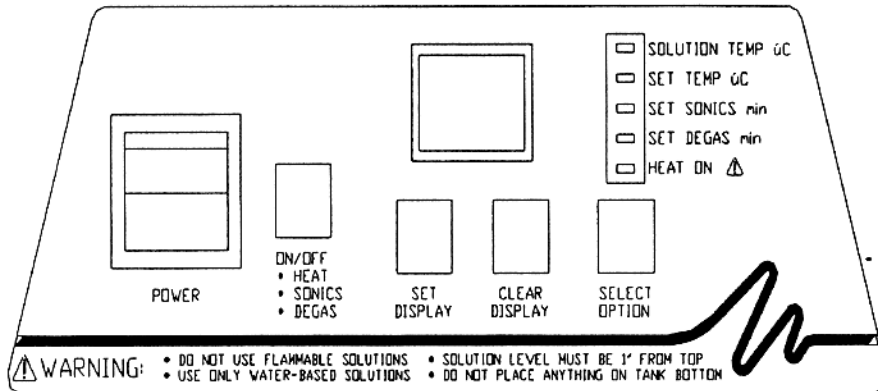
Surface tension - can be reduced by adding a wetting agent or surfactant to the bath. Reduced surface tension will increase cavitation.

Solvents - never use solvents. Vapors of flammable solutions will collect under the cleaner, where ignition is possible from electrical components.

Renewal - replace cleaning solutions often to increase ultrasonic cleaning activity. Solutions, as with most chemicals, become spent over time. Solutions can become contaminated with suspended soil particles which coat the tank bottom, inhibiting ultrasonic activity.

Operating your cleaner

NOTE: If this is the first time you are using the cleaner, please read **“Optimizing your cleaner”** before operating your cleaner.



Explanation of controls:

Control	Function
POWER	Press to activate/deactivate power to the cleaner.
ON/OFF	After you press SELECT OPTION and set the LED Display for the selected option, press to activate HEAT (SET TEMP), Sonics (SET SONICS) and/or Degas (DEGAS TIME).
LED-Display	Indicates the tank temperature, set temperature, ultrasonics time or degas time setting, depending on your SELECT OPTION choice.
SET DISPLAY / CLEAR DISPLAY	Used in conjunction with SELECT OPTION to set or clear the LED-display. Press CLEAR DISPLAY to clear the LED-display to 00. Press SET DISPLAY to reach your selection.

Control	Function
SELECT OPTION	When pressed, toggles through the Function Indicators. This allows you to check or set the tank temperature and set ultrasonic cleaning or degas time.
Function Indicators	Lights indicate the option selected by pressing SELECT OPTION: <ul style="list-style-type: none">• SOLUTION TEMP: Displays current solution temp. (10-85°C, ± 4°C);• SET TEMP: Set tank temperature (01-80°C);• SET SONICS: Set ultrasonic time (01-99 min., 60 min. default);• SET DEGAS: Set degas time (01-99 min., 5 min. default);• HEAT ON: Indicates heat is activated and has been set (SET TEMP).

Before you start cleaning:

Step	Action
1	Select your cleaning solution.
2	Allowing for the volume of the parts you will be cleaning and for the cleaning solution, fill the tank to the operating level (2-4 inches below the top) with warm tap water.
3	Add a cleaning agent to the tank water.
4	Plug the cleaner into a grounded outlet.
5	Turn the POWER switch ON. The cleaner will run through a three-second self-test. Wait until the LED Display shows 05 and the DEGAS TIME Function Indicator lights.

NOTE: If this is the first time you are running the cleaner, or if you have changed cleaning solution, you must degas the solution. If not, move to "**Setting operating parameters**".

Degassing:

Step	Action
1	Degas for 5-10 minutes. If necessary, use SET/CLEAR DISPLAY to alter this setting. Default degas time is 5 minutes.
2	Press ON/OFF once to start the degas process.
3	After completing the degas time, you are ready to set operating parameters.

Setting operating parameters:

Step	Parameter	Action
1	SET SONICS	The cleaner is now in Set Sonics mode with a default time of 60 min. If necessary, use SET/CLEAR DISPLAY to alter this setting. Press ON/OFF once to activate timed ultrasonics.
2	SET TEMP	To set the tank temperature, press SELECT OPTION until the SET TEMP LED lights. Then press SET DISPLAY to alter the setting until the LED display indicates the tank temperature you wish to maintain. Press ON/OFF once to activate heat. The heat indicator lights.
3	SOLUTION TEMP	To monitor the solution temperature, press SELECT OPTION until the SOLUTION TEMP LED lights. The LED display will indicate the actual temperature of the solution.

NOTE:

You may require a maximum temperature limit for your application.

Please note that ultrasonics may continue to heat the solution beyond your set temperature, even though the heater has cycled off and the "Heat On" light is still lit.

If this happens, turn the cleaner off and allow the solution to cool down.

For a fast cooldown, replace some of the warm solution with cold solution.

Cleaning items:



WARNING



- Don't place parts or containers directly on the bottom of the cleaning tank; use a wire basket or wire to suspend items.
- Don't allow the solution to drop more than 4 inches below the top with the cleaner on.
- Don't ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- Don't ever use mineral acids. These could damage the tank.

Failure to comply with these cautions will void your warranty.

NOTE: Select SET SONICS then press ON/OFF once to stop ultrasonics at any time.

Step	Action
1	Place the items into a wire basket.
2	Slowly lower the wire basket into the tank. Do not stir.
3	Press ON/OFF once to activate ultrasonics.
4	When the items are clean, press ON/OFF once to deactivate ultrasonics, then slowly remove the items from the cleaner.
5	Rinse clean items with clean water and dry, if necessary.

-
- ***To repeat a timed cleaning cycle:***
Press ON/OFF once while in the SET SONICS mode. This cleaning cycle time will remain in memory until reset or you turn off the power to the cleaner.

 - ***To reset ultrasonics time during a cleaning:***
Press ON/OFF once, press SELECT OPTION until the Set SONICS LED lights. To increase time, press SET DISPLAY to your desired setting. To decrease time, press CLEAR DISPLAY, press SET DISPLAY to set the time, then press ON/OFF once to resume the cycle.

 - ***To monitor the solution temperature:***
Press SELECT OPTION until the SOLUTION TEMP LED lights. The LED Display will display the solution temperature in degrees Centigrade ($\pm 4^{\circ}\text{C}$). The cycle will continue during this process.
-

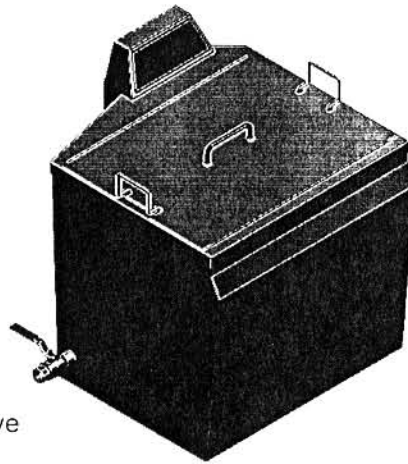
Draining your cleaner



WARNING



- Do not immerse the cleaner in water.
- Unplug the cleaner from the power source.



Drain valve

Step	Action
1	Place the cleaner to allow easy reach of the drain valve into a waste disposal unit.
2	Close the drain valve by turning the handle perpendicular to the valve body and the cleaner is ready to fill with solution. To open the valve and drain the cleaner, turn the handle so that it is in line with the valve body.

Troubleshooting

If your cleaner does not operate satisfactorily, please check the tables below for possible causes before calling your authorized service center.



WARNING



High voltage inside - dangerous shock hazard. DO NOT attempt to disassemble or repair the cleaner.

Problem	Cause	What to do
Cleaner will not start.	Cleaner not plugged in properly. POWER switch not ON. Malfunctioning start button. Blown fuse.	Plug into functioning electrical outlet. Press power switch ON. Call nearest authorized service center. Call nearest authorized service center.
Cleaner operates but does not heat solution.	HEAT not set properly. Malfunctioning membrane. Malfunctioning heater.	See " <i>Operating your BC cleaner</i> ". Call nearest authorized service center. Call nearest authorized service center.
Cleaner operates but does not maintain set temperature.	Malfunctioning heater or sensor components.	Call nearest authorized service center.

Problem	Cause	What to do
Cleaner operates but display does not function.	Interrupted calibration sequence. Malfunctioning timer board.	Press SET DISPLAY. Call nearest authorized service center.
Decreased ultrasonic activity.	Solution is not degassed. Solution is spent. Solution level is incorrect for load. Tank bottom is covered with soil particles. Using deionized water in the tank.	Make sure that tank was filled with warm tap water plus cleaning solution and has run 5-10 minutes. Change solution. Adjust solution to operating level line with load. Empty, then clean tank with warm water. Wipe with a nonabrasive cloth. Deionized water does not cavitate as actively as soapy tap water.
Clogged drain.	Clogged drain.	Unblock.

Service centers

With normal use, your Ultrasonic Cleaner should not require servicing. However, if it fails to operate satisfactorily, first try to diagnose the problem by following the suggestions in the Troubleshooting Guide.



WARNING



DO NOT DISASSEMBLE YOUR CLEANER OR YOU WILL VOID THE WARRANTY. HIGH VOLTAGE INSIDE THE CLEANER IS DANGEROUS.

If you find that your cleaner needs repair, carefully pack and return it to your local service center. If under warranty, remember to include proof of purchase.

Your cleaner will be shipped by ground service unless you specify otherwise.

Authorized Service Centers

Name	Address	Tel/Fax Number
Alpha Omega Electronics Corp.	2821 National Drive Garland, TX 75041	Tel: 972-271-5571 Tel: 1-800-540-4967 FAX: 972-840-3668
Crystal Electronic Inc.	140 Centre Street Aurora Canada L4G 1K0	Tel: 905-841-5762 FAX: 905-841-9688
Paragon Electronics	11075 N.E. 6th Ave. Miami, FL 33161	Tel: 305-757-0631 Fax: 305-754-6877
Master Sonics Repair Center	445 West Queen St. Southington, CT 06489	Tel: 800-737-2198 860-621-9466 Fax: 860-621-0283

Operator's Manual

DHA-1000

**Tabletop
Ultrasonic Cleaner**

CPN-214-160

Warranty

This ultrasonic Cleaner, when used in accordance with manufacturer's instructions and under normal use, is guaranteed for **two years after date of shipment**. Within the period guaranteed, we will repair or replace free of charge, at our sole discretion, all parts that are defective because of material or workmanship, not including costs for removing or installing parts.

Liability, whether based on warranty, negligence or other cause, arising out of and/or incidental to sale, use or operation of the transducer elements, or any part thereof, shall not in any case exceed the cost of repair or replacement of the defective equipment, and such repair or replacement shall be the exclusive remedy of the purchaser, and in no case will we be responsible for any and/or all consequential or incidental damages including without limitation, and/or all consequential damages arising out of commercial losses.

 **CAUTION** 

- Do not place parts or containers directly on the bottom of the cleaning tank; use a basket or other device to suspend items.
- Do not allow the cleaning solution level to drop more than four inches below the top of the tank.
- Do not ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- Do not ever use mineral acids. These could damage the tank.

Failure to comply with these cautions will void your warranty.

Contents

Front Cover	Warranty
1	Safety Precautions
3	Introduction
3	DHA-1000 General Information
4	Accessories
4	Unpacking Your Cleaner
4	Installing Your Cleaner
5	Equipment Specifications
6	How Ultrasonic Cleaning Works
7	Operating Your Cleaner
7	Before You Start
7	Explanation of Controls
8	Getting Ready
8	Cleaning Items
9	Optimizing Your Cleaner
10	Application Hints
11	Cleaning Solutions
13	Troubleshooting
14	Performance
15	Service

Safety Precautions

Before using your Ultrasonic Cleaner, please read and thoroughly understand these safety precautions. Failure to follow them may result in serious personal injury or property damage.

To avoid electrical shock:

- Do unplug from power source before filling or emptying the tank.
- Do keep the area around the cleaner clean and dry -- wipe up solution which spills over the tank brim. Water and high voltage can cause electrical shock.
- Do not operate the cleaner without proper grounding.
- Do not remove the grounding prong on the line cord plug.
- Do not disassemble your cleaner -- high voltage inside the cleaner is dangerous.
- Do not immerse the cleaner in water.

To prevent personal and/or property damage:

- Do use water-based solutions.
- Do not ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire, explosion, or serious personal injury and will void your warranty. Use only water-based solutions.
- Do not ever use mineral acids. These could damage the tank.
- Do not touch the stainless steel tank or cleaning solution -- they may be hot.
- Do not allow fluid temperature to exceed 80°C (175°F).
- Do not place your fingers or hands into the tank while the cleaner is operating. Doing so may cause discomfort and possible skin irritation. Avoid contact with solutions and provide adequate ventilation.
- Do not use solutions containing chlorine bleach.

To prevent damage to the cleaner:

- Do change your solution regularly.
- Do not operate the cleaner dry.
- Do not place parts or containers directly on the bottom of the cleaning tank; use a basket or other device to suspend items. Failure to comply may cause transducer damage and will void your warranty.
- Do not allow the cleaning solution level to drop more than four inches below the top of the tank with heat or ultrasonics on. Failure to comply may cause transducer and/or heater damage and will void your warranty.

Introduction

DHA-1000 General Information

This DHA-1000 ultrasonic cleaner is a self-contained unit which consists of a powerful ultrasonic generator, a stainless steel cleaning tank and an array of durable industrial style 44 kHz transducers. These transducers provide increased cleaning power and ensure uniform cleaning activity throughout the bath. The unit includes heaters and controls to raise the bath temperature for improved cleaning activity. The DHA-1000 incorporates a drain and is available in three voltages to meet requirements around the world. Be sure the unit you have purchased is correct for your area.



Accessories For Your Cleaner

A stainless steel cover and a parts cleaning basket are available for your DHA-1000.

Description	Part Number
Stainless Steel Cover	100-246-802
Stainless Steel Parts Basket	CPN-916-032

Consult your distributor for price and delivery.

Unpacking Your Cleaner

Please check your cleaner and its carton carefully for any external or internal damage. **If you find damage, contact your shipping carrier immediately**, before contacting your distributor. Please retain your packaging for future use.

Installing Your Cleaner

Check the label on the back of the cleaner for correct input power requirements. Position your cleaner within easy reach of a standard grounded electrical outlet and a drain facility. Do not place the cleaner on a circuit which could become overloaded. Allow at least 6" (15cm) on all sides of the cleaner for air circulation.

If you believe your cleaner is not operating correctly, first refer to the troubleshooting section for possible causes, or contact an authorized service center listed at the back of this manual for additional information.

Equipment Specifications

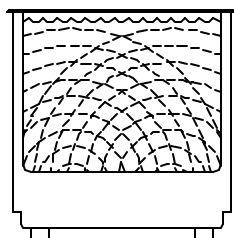
Model	Tank Capacity	Tank Size	Overall Size	Weight	Heater Power	Input Power
DHA-1000R 000-914-506	10.0 gal. (38 l))	L: 16" W: 14" D: 10.5"	L: 19" W: 19" H: 17"	46 lbs. (20.9Kg)	1000 watts	117 V 60 Hz 11.5 A
DHA-1000J CPN-914-005	10.0 gal. (38 l))	L: 16" W: 14" D: 10.5"	L: 19" W: 19" H: 17"	46 lbs. (20.9Kg)	800 watts	100 V 60 Hz 10.5 A
DHA-1000E 000-914-606	10.0 gal. (38 l))	L: 16" W: 14" D: 10.5"	L: 19" W: 19" H: 17"	46 lbs. (20.9Kg)	1000 watts	230 V 50/60 Hz 5.7 A

NOTE:

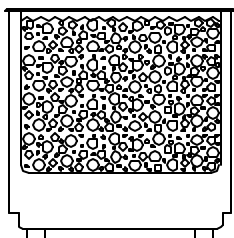
- All models have a nominal frequency of 44 kHz.
- All cleaners have CSA approval and comply with FCC regulations.
- Units may cause GFI outlets to trip.
- All units have a ground leakage current less than .50ma.

How Ultrasonic Cleaning Works

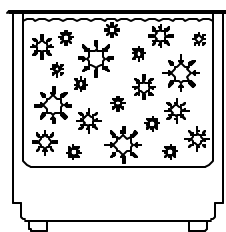
Ultrasonic sound is sound transmitted at frequencies generally beyond the range of human hearing. In your ultrasonic cleaner, ultrasonic sound (sonics) is used for cleaning materials and parts. This is how it works:



As the sound waves from the transducer radiate through the solution in the tank, they cause alternating high and low pressure areas in the solution.



During the low pressure stage, millions of microscopic bubbles form and grow. This process is called CAVITATION.



During the high pressure stage, the bubbles collapse or “implode” releasing enormous amounts of energy. These implosions act like scrub brushes, eroding soils, away. They work in all directions attacking every surface and invading all recesses and openings.

Operating Your Cleaner

If this is the first time you are using the cleaner, please read this whole section before proceeding.

Before You Start Cleaning



- Do not place parts or containers directly on the bottom of the cleaning tanks; use a basket or other device to suspend items.
- Do not allow the cleaning solution level to drop more than four inches below the top of the tank with the cleaner on.
- Do not ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- Do not ever use mineral acids. These could damage the tank.

Failure to comply with these cautions can cause injury or damage to your cleaner and will void your warranty.

Explanation of Controls

Control	Function
Ultrasonic Power Switch	Activates and de-activates ultrasonic cavitation in the tank
Heater Power Switch	Activates the external heater on the cleaning tank. The heater power has been selected to provide the optimum temperature for most cleaning applications.

Getting Ready

Step	Action
1	Select your cleaning chemistry (check with your chemical supplier for solution effects on metals).
2	Allowing for the volume of the parts you will be cleaning and cleaning chemistry, fill the tank with warm tap water to the operating level (two to four inches from the top).
3	Add cleaning chemistry to the tank water.
4	Plug the cleaner into a grounded outlet.
5	For maximum efficiency, refer to page 9, "Optimizing Your Cleaner" before proceeding.

NOTE:

If this is the first time you are running the cleaner, or if you have changed cleaning solution, you must degas the solution. This is done by setting the cleaner up for operation and allowing the ultrasonics to drive the warm solution for 5-10 minutes. This will force out excess gas and assure optimum cleaning. You will likely notice a change in the sound of the unit as it degasses.

Cleaning Items

Step	Action
1	Place the items to be cleaned into a basket or other carrier.
2	Slowly lower the basket into the tank. Do not allow items to contact the tank bottom. Do not stir the solution.
3	When items are clean, slowly remove them from the cleaner.
4	Rinse the clean items with fresh water and dry them, if necessary.

Optimizing Your Cleaner

Tanks

Cleaning - check the tank for contamination whenever you change solution. If necessary, remove contaminants with a nonabrasive cloth and water.

Emptying - always unplug the cleaner before emptying the tank. Empty the solution into a proper waste disposal unit.

Filling - always unplug the line cord before filling the tank. Fill the cleaner to the operating level (1-2 inches from the top) using warm tap water.

Low solution level - will cause the cleaner to fail. When you remove heavy or bulky loads from the cleaner, the solution level may drop below the operating level. If so, be sure to replace lost solution and degas, if necessary, depending on the amount used.

Overload - do not rest any items on the tank bottom. Weight on the tank bottom dampens sound energy and will cause damage to the transducer. Instead, use a basket or other method to support all items. Allow at least one inch between the tank bottom and the parts or receptacle for adequate cavitation.

Covers - allow the cleaner to heat up faster, to a higher temperature, and avoid excessive liquid evaporation. However, leaving the cover on with heat and ultrasonics can cause the solution to boil, diminishing effectiveness.

Temperature

Heater - the heater may cause some discoloration of the tank wall. This is normal and will not affect the performance of the unit.

Solution - the fastest method to get your cleaner to the best operating temperature is to fill it with warm solution, turn on both the heat and ultrasonics, and use a cover.

Application Hints

First time cleaning - first experiment with one piece, then proceed with the remainder.

Solution level - Be sure to maintain solution level within one or two inches of the tank top. Surface activity can vary with liquid level.

Load size - It is faster and more efficient to run several small loads rather than a few big loads.

Placing items - Never allow items to sit on the bottom of the tank. Always place them in a basket or suspend in the solution.

Rinsing items - After cleaning, use clean water to rinse away chemicals adhering to items.

Lubricating items - When necessary, re-lubricate items immediately after cleaning.

Drying items - Air drying at room temperature works for some items. Place parts requiring faster drying time under hot air blowers or in ovens.

Please call your local distributor if you have application questions.

Cleaning Solutions



Do not use alcohol, gasoline, bleach, mineral acids, solutions with a flash point, semi-aqueous or combustible liquids in ultrasonic tanks, or you will void the warranty. Only use non-flammable and water-based solutions.

Solution Types

Water-based solutions are either slightly acidic or alkaline. They include detergents, soaps and industrial cleaners designed to remove specific soils.

Acidic water-based solutions: remove rust, tarnish or scale. They range from mild solutions that remove tarnish, to concentrated, inhibited acidic solutions that remove investment plaster, milk-stone, zinc oxide and rust from steel and cast iron as well as smut and heat-treat scale from hardened steel.

Alkaline water-based solutions: include carbonates, silicates and caustics. These cause emulsifying action, which keeps soil from redepositing on the cleaned surface, and improves cleaning action in hard water.

Alkaline strength	Removes:
Mild	Light oils and greases, cutting oils and coolant compounds.
Mild to strong	Heavy grease and oil, waxes, vegetable oils, inks, wax or fat-base buffing and polishing compounds, milk residues and carbohydrates.
Heavy-duty	Mill scale, heat-treat scale, corrosion or oxides.

Change the cleaning solution periodically. Cleaning solutions can become contaminated with soil particles which coat the tank bottom. This coating dampens the ultrasonic action and reduces cleaning efficiency. Certain solutions will cavitate better than others. Contact your local distributor for further information.

Heat and cavitation: increase the chemical activity of cleaning solutions. Some materials may be damaged by this stronger chemical action. When in doubt, test run samples of items to be cleaned.

Chemistry Concentrations

Chemistry concentrations may vary. The amount you use depends on the detergent and the type of soil to be removed. Follow instructions on the chemistry container and refer to the table below for the effects of chemistry on metals.

Chemicals Harmful to Your Tank

The following chemicals will harm your ultrasonic tank and the action of ultrasonics and higher operating temperatures will increase their chemical activity. Do not use these or similar chemicals directly or in dilution in your ultrasonic tank or you will void your warranty.

Acetophenone	Chloroacetic Acid	Hydrocyanic Acid
Aluminum Chloride	Chloric Acid	Hydrofluoric Acid
Aluminum Fluoride	Chlorine, Anhydrous	Hydrofluosilicic Acid
Aluminum Sulphate	Chromic Acid	Iodoform
Ammonium Bifluoride	Copper Chloride	Mercuric Chloride
Ammonium Chloride	Copper Fluoborate	Muriatic Acid
Ammonium Hydroxide	Ethyl Chloride	Phosphoric (crude)
Amyl Chloride	Ferric Chloride	Sodium Hypochlorite
Antimony Trichloride	Ferrous Chloride	Potassium Chloride
Aqua Regia	Ferris Sulfate	Stannic Chloride
Bromine	Fluoboric Acid	Stannous Chloride
Calcium Bisulfate	Fluorine	Sulfur chloride
Calcium Bisulfite	Hydrobromic Acid	Sulfuric Acid
Calcium Hypochloride	Hydrochloric Acid	Zinc Chloride

Troubleshooting

If your cleaner does not operate satisfactorily, please check the tables below for possible causes before calling your authorized service center.

⚠ WARNING ⚠
High voltage inside - dangerous shock hazard.
DO NOT attempt to disassemble or repair the cleaner.

Problem	Cause	What to do
Cleaner will not start.	Cleaner not plugged in properly.	Plug into functioning electrical outlet.
	Circuit board fuse blown	Call nearest authorized service center.
Cleaner operates but does not heat solution	Heater malfunctions.	Call nearest authorized service center.
Decreased ultrasonic activity.	Solution is not degassed.	Make sure that tank was filled with warm tap water plus cleaning chemistry and has run 5-10 minutes.
	Solution is spent.	Change solution.
	Solution level is incorrect for load.	Adjust solution +/- 3/8 inch from current level.
	Tank bottom is covered with soil particles.	Empty, then clean tank with warm water. Wipe with a nonabrasive cloth.
	Using deionized water in the tank.	Deionized water does not cavitate as actively as soapy tap water.

Performance

Check your cleaner periodically to test the level of activity of the ultrasonic cavitation. Frequency of testing will depend on your use of the cleaner, however, we suggest running this test monthly.

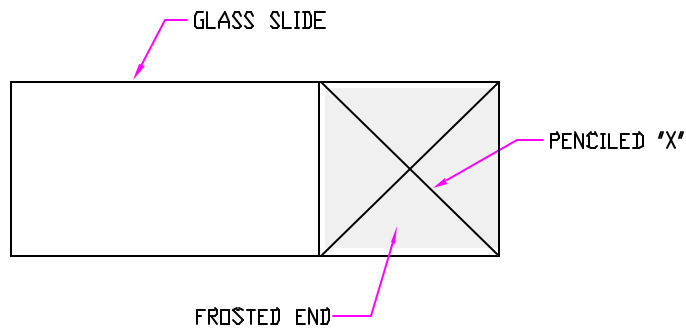
Glass Slide Test

You will need the following equipment:

- Frosted microscope glass slide (1" x 3"), such as ESCO #2951F, or equivalent;
- No. 2 lead pencil; and
- General purpose dish detergent or liquid soap.

Test procedure:

1. Prepare a fresh solution with general purpose dish detergent (concentration 1%) and warm tap water (120° - 140°F).
2. Fill the cleaner to within 2-4 inches of the tank top.
3. Turn the ultrasonics on for at least five minutes to allow for degassing.
4. Prepare the glass slide by first wetting the frosted portion with tap water.



5. With the No. 2 pencil, on the frosted portion make an "X" from corner to corner.
6. Immerse the frosted end of the slide into the solution. Hold the slide vertically and center it in the solution.
7. Turn the ultrasonic switch to "On"

The ultrasonics will begin immediately to remove the lead from the slide. All lead should be removed within 10 seconds. If your cleaner passes this test, its ultrasonic cavitation is acceptable.

NOTE:

To ensure consistency from test to test, be sure to repeat test conditions - use the same solution concentration, liquid level, temperature, type of pencil, length of degassing, etc.

Service

With normal use, your Ultrasonic Cleaner should not require servicing. However, if it fails to operate satisfactorily, first try to diagnose the problem by following the suggestions in the Troubleshooting Guide. If you find that your cleaner needs repair, carefully pack and return it to your local distributor. If under warranty, remember to include proof of purchase. Your cleaner will be returned by ground service unless you specify otherwise.

BRANSON ULTRASONICS CORPORATION

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Operator's Manual

PC-620-1 & PC-620-2

**Tabletop
Ultrasonic Cleaners**

Warranty

Ultrasonic Cleaners, when used in accordance with manufacturer's instructions and under normal use, are guaranteed for **two years after date of shipment**. Within the period guaranteed, we will repair or replace free of charge, at our sole discretion, all parts that are defective because of material or workmanship, not including costs for removing or installing parts.

Liability, whether based on warranty, negligence or other cause, arising out of and/or incidental to sale, use or operation of the transducer elements, or any part thereof, shall not in any case exceed the cost of repair or replacement of the defective equipment, and such repair or replacement shall be the exclusive remedy of the purchaser, and in no case will we be responsible for any and/or all consequential or incidental damages including without limitation, and/or all consequential damages arising out of commercial losses.

 **CAUTION** 

- Do not place parts or containers directly on the bottom of the cleaning tank; use a tray, wire hook or other device to suspend items.
- Do not allow the cleaning solution level to drop more than one inch below the top of the tank.
- Do not ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- Do not ever use mineral acids. These could damage the tank.

Failure to comply with these cautions will void your warranty.

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Safety Precautions

Before using your Ultrasonic Cleaner, please read and thoroughly understand these safety precautions. Failure to follow them may result in serious personal injury or property damage.

To avoid electrical shock:

- Do unplug from power source before filling or emptying the tank.
- Do keep the switches and the area around the cleaner clean and dry -
- wipe up solution which spills over the tank brim. Water and high voltage can cause electrical shock.
- Do not operate the cleaner without proper grounding.
- Do not remove the grounding prong on the line cord plug.
- Do not disassemble your cleaner -- high voltage inside the cleaner is dangerous.
- Do not immerse the cleaner in water.

To prevent personal and/or property damage:

- Do use water-based solutions.
- Do not ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire, explosion, or serious personal injury and will void your warranty. Use only water-based solutions.
- Do not ever use mineral acids. These could damage the tank.
- Do not touch the stainless steel tank or cleaning solution -- they may be hot.
- Do not allow fluid temperature to exceed 80°C (175°F).
- Do not place your fingers or hands into the tank while the cleaner is operating. Doing so may cause discomfort and possible skin irritation. Avoid contact with solutions and provide adequate ventilation.
- Do not use solutions containing chlorine bleach.

To prevent damage to the cleaner:

- Do change your solution regularly.
- Do not operate the cleaner dry.
- Do not place parts or containers directly on the bottom of the cleaning tank; use a tray, wire hook or other device to suspend items. Failure to comply may cause transducer damage and will void your warranty.
- Do not allow the cleaning solution level to drop more than one inch below the top of the tank with heat or ultrasonics on. Failure to comply may cause transducer and/or heater damage and will void your warranty.

2 Safety Precautions

Introduction

PC620 General Information

This PC-620 ultrasonic cleaner is available in two models; the unheated PC-620-1 and the heated PC-620-2. Each model is constructed using durable industrial style 44 kHz transducers. These provide increased cleaning power and ensure uniform cleaning activity throughout the bath. Both models have drains and are supplied with tank drain kits. For customer convenience, both units are available in three voltages to meet requirements around the world. Be sure the unit you have purchased is correct for your area.



Accessories For Your Cleaner

A stainless steel cover and solid wall-perforated bottom parts basket are available for both models. Consult your distributor for price and delivery.

Unpacking Your Cleaner

Please check your cleaner and its carton carefully for any external or internal damage. **If you find damage, contact your shipping carrier immediately**, before contacting your distributor. Please retain your packaging for future use.

Installing Your Cleaner

Check the label on the back of the cleaner for correct input power requirements. Position your cleaner within easy reach of a standard grounded electrical outlet. Do not place the cleaner on a circuit which could become overloaded.

If your cleaner does not operate correctly, first refer to the troubleshooting section for possible causes, or contact an authorized service center listed at the back of this manual for additional information.

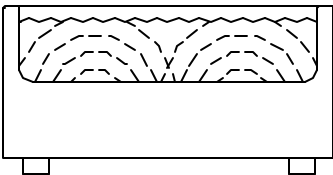
Equipment Specifications

Model	Tank Volume	Tank Size	Overall Size	Weight	Heater Power	Input Power
PC620R-1	2.75 gal. (8.5 L)	L: 19.5" W: 5.8" D: 6"	L: 20.3" W: 6.3" H: 10.5"	23 lbs. (10.5Kg)	None	115 V 1.4A
PC620R-2					180 Watts	115 V 3.1A
PC-620E-1	2.75 gal. (8.5 L)	L: 19.5" W: 5.8" D: 6"	L: 20.3" W: 6.3" H: 10.5"	24 lbs. 10.9 Kg)	None	230 V .7A
PC620E-2					180 Watts	230 V 1.6A
PC-620J-1	2.75 gal. (8.5 L)	L: 19.5" W: 5.8" D: 6"	L: 20.3" W: 6.3" H: 10.5"	24 lbs. 10.9 Kg)	None	100 V 1.6A
PC-620J-2					135 Watts	100 V 3.1A

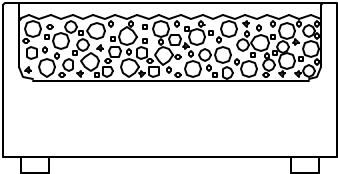
NOTE:
<ul style="list-style-type: none"> • All models have a frequency of 44 kHz. • Cleaners have NRTL/CSA approval and comply with FCC regulations. • All 230V units meet CE standards. • Units may cause GFI outlets to trip. • All units have a ground leakage current less than .50ma.

How Ultrasonic Cleaning Works

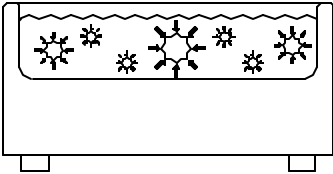
Ultrasonic sound is sound transmitted at frequencies generally beyond the range of human hearing. In your ultrasonic cleaner, ultrasonic sound (sonics) is used for cleaning materials and parts. This is how it works:



As the sound waves from the transducer radiate through the solution in the tank, they cause alternating high and low pressure areas in the solution.



During the low pressure stage, millions of microscopic bubbles form and grow. This process is called CAVITATION.



During the high pressure stage, the bubbles collapse or “implode” releasing enormous amounts of energy. These implosions act like scrub brushes, eroding soils, away. They work in all directions attacking every surface and invading all recesses and openings.

Operating Your Cleaner

If this is the first time you are using the cleaner, please read this whole section before proceeding.

Before You Start Cleaning



- Do not place parts or containers directly on the bottom of the cleaning tanks; use a basket, wire hook or other device to suspend items.
- Do not allow the cleaning solution level to drop more than one inch below the top of the tank with the cleaner on.
- Do not ever use alcohol, gasoline or flammable solutions. Doing so could cause a fire or explosion. Use only water-based solutions.
- Do not ever use mineral acids. These could damage the tank.

Failure to comply with these cautions will void your warranty.

Operating Your PC-620-1 or PC-620-2 Cleaner

Explanation of Controls

Control	Function
ULTRASONIC POWER SWITCH	Activates and de-activates ultrasonic cavitation in the tank
HEATER SWITCH	Activates the external heater on the cleaning tank. The heater power has been selected to provide the optimum temperature for most cleaning applications.

Getting Ready

Step	Action
1	Select your cleaning chemistry (check with your chemical supplier for solution effects on metals).
2	Allowing for the volume of the parts you will be cleaning and cleaning chemistry, fill the tank with warm tap water to the operating level (one inch from the top).
3	Add cleaning chemistry to the tank water.
4	Plug the cleaner into a grounded outlet.
5	For maximum efficiency, refer to page 9, "Optimizing Your Cleaner" before proceeding.

NOTE:

If this is the first time you are running the cleaner, or if you have changed cleaning solution, you must degas the solution. This is done by setting the cleaner up for operation and allowing the ultrasonics to drive the warm solution for 5-10 minutes. This will force out excess gas and assure optimum cleaning. You will likely notice a change in the sound of the unit as it degasses.

Cleaning Items

Step	Action
1	Place the items to be cleaned into a basket or perforated tray.
2	If using a solid container, add cleaning solution to the container to cover the items.
3	Slowly lower the tray into the tank. Do not allow items to contact the tank bottom. Do not stir the solution.
4	When items are clean, slowly remove them from the cleaner.
5	Rinse the clean items with fresh water and dry them, if necessary.

Optimizing Your Cleaner

Tanks

Cleaning - check the tank for contamination whenever you change solution. If necessary, remove contaminants with a nonabrasive cloth and water.

Emptying - always unplug the cleaner before emptying the tank. Dispose of the contents in an environmentally responsible way.

Filling - always unplug the line cord before filling the tank. Fill the cleaner to the operating level (one inch from the top with beaker/tray in place), using warm tap water.

Low solution level - will cause the cleaner to fail. When you remove heavy or bulky loads from the cleaner, the solution level may drop below the operating level. If so, be sure to replace lost solution and degas, if necessary, depending on the amount used.

Overload - do not rest any items on the tank bottom. Weight on the tank bottom dampens sound energy and will cause damage to the transducer. Instead, use a basket or other method to support all items. Allow at least one inch between the tank bottom and the parts or receptacle for adequate cavitation.

Covers - allow the cleaner to heat up faster, to a higher temperature, and avoid excessive liquid evaporation. However, leaving the cover on with heat and ultrasonics can cause the solution to boil, diminishing effectiveness.

Temperature

Heater - the heater may cause some discoloration of the tank wall. This is normal and will not affect the performance of the unit.

Solution - the fastest method to get your cleaner to the best operating temperature is to fill it with warm solution, turn on both the heat and ultrasonics, and use a cover.

Application Hints

First time cleaning - first experiment with one piece, then proceed with the remainder.

Solution level - Be sure to maintain solution level within one inch of the tank top. Surface activity will vary with liquid level.

Load size - It is faster and more efficient to run several small loads rather than a few big loads.

Placing items- Never allow items to sit on the bottom of the tank. Always place them in a basket or suspend in the solution.

Rinsing items- After cleaning, use clean water to rinse away chemicals adhering to items.

Lubricating items- When necessary, re-lubricate items immediately after cleaning.

Drying items - Air drying at room temperature works for some items. Place parts requiring faster drying time under hot air blowers or in ovens.

Please call your local distributor if you have application questions.

Cleaning Solutions



Do not use alcohol, gasoline, bleach, mineral acids, solutions with a flash point, semi-aqueous or combustible liquids in ultrasonic tanks, or you will void the warranty. Only use non-flammable and water-based solutions.

Solution Types

Water-based solutions are either slightly acidic or alkaline. They include detergents, soaps and industrial cleaners designed to remove specific soils.

Acidic water-based solutions: remove rust, tarnish or scale. They range from mild solutions that remove tarnish, to concentrated, inhibited acidic solutions that remove investment plaster, milk-stone, zinc oxide and rust from steel and cast iron as well as smut and heat-treat scale from hardened steel.

Alkaline water-based solutions: include carbonates, silicates and caustics. These cause emulsifying action, which keeps soil from redepositing on the cleaned surface, and improves cleaning action in hard water.

Alkaline strength	Removes:
Mild	Light oils and greases, cutting oils and coolant compounds.
Mild to strong	Heavy grease and oil, waxes, vegetable oils, inks, wax or fat-base buffing and polishing compounds, milk residues and carbohydrates.
Heavy-duty	Mill scale, heat-treat scale, corrosion or oxides.

Change the cleaning solution periodically. Cleaning solutions can become contaminated with soil particles which coat the tank bottom. This coating dampens the ultrasonic action and reduces cleaning efficiency. Certain solutions will cavitate better than others. Contact your local distributor for further information.

Heat and cavitation: increase the chemical activity of cleaning solutions. Some materials may be damaged by this stronger chemical action. When in doubt, test run samples of items to be cleaned.

Chemistry Concentrations

Chemistry concentrations may vary. The amount you use depends on the detergent and the type of soil to be removed. Follow instructions on the chemistry container and refer to the table below for the effects of chemistry on metals.

Chemicals Harmful to Your Tank

The following chemicals will harm your ultrasonic tank and the action of ultrasonics and higher operating temperatures will increase their chemical activity. Do not use these or similar chemicals directly or in dilution in your ultrasonic tank or you will void your warranty.

Acetophenone	Chloracetic Acid	Hydrocyanic Acid
Aluminum Chloride	Chloric Acid	Hydrofluoric Acid
Aluminum Fluoride	Chlorine, Anhydrous	Hydrofluosilicic Acid
Aluminum Sulphate	Chromic Acid	Iodoform
Ammonium Bifluoride	Copper Chloride	Mercuric Chloride
Ammonium Chloride	Copper Fluoborate	Muriatic Acid
Ammonium Hydroxide	Ethyl Chloride	Phosphoric (crude)
Amyl Chloride	Ferric Chloride	Sodium Hypochlorite
Antimony Trichloride	Ferrous Chloride	Potassium Chloride
Aqua Regia	Ferris Sulfate	Stannic Chloride
Bromine	Fluoboric Acid	Stannous Chloride
Calcium Bisulfate	Fluorine	Sulfur chloride
Calcium Bisulfite	Hydrobromic Acid	Sulfuric Acid
Calcium Hypochloride	Hydrochloric Acid	Zinc Chloride

Troubleshooting

If your cleaner does not operate satisfactorily, please check the tables below for possible causes before calling your authorized service center.

⚠ WARNING ⚠
High voltage inside - dangerous shock hazard.
DO NOT attempt to disassemble or repair the cleaner.

Problem	Cause	What to do
Cleaner will not start.	Cleaner not plugged in properly.	Plug into functioning electrical outlet.
	Circuit board fuse blown	Call nearest authorized service center.
Cleaner operates but does not heat solution	Heater malfunctions.	Call nearest authorized service center.
Decreased ultrasonic activity.	Solution is not degassed.	Make sure that tank was filled with warm tap water plus cleaning chemistry and has run 5-10 minutes.
	Solution is spent.	Change solution.
	Solution level is incorrect for load.	Adjust solution +/- 3/8 inch from current level.
	Tank bottom is covered with soil particles.	Empty, then clean tank with warm water. Wipe with a nonabrasive cloth.
	Using deionized water in the tank.	Deionized water does not cavitate as actively as soapy tap water.

Performance

Check your cleaner periodically to test the level of activity of the ultrasonic cavitation. Frequency of testing will depend on your use of the cleaner, however, we suggest running this test monthly.

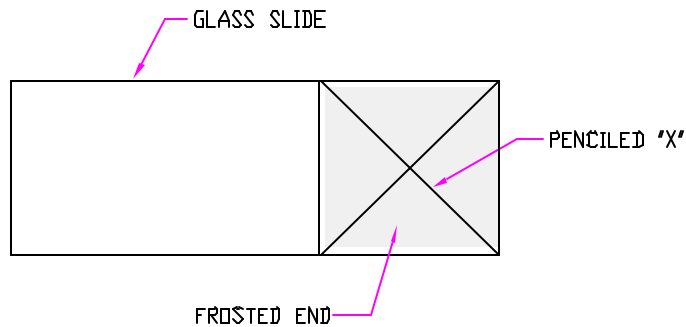
Glass Slide Test

You will need the following equipment:

- Frosted microscope glass slide (1" x 3"), such as ESCO #2951F, or equivalent;
- No. 2 lead pencil; and
- General purpose dish detergent.

Test procedure:

1. Prepare a fresh solution with general purpose dish detergent (concentration 1%) and warm tap water (120° - 140°F).
2. Fill the cleaner to within one(1) inch of the tank top.
3. Turn the ultrasonics on for at least five minutes to allow for degassing.
4. Prepare the glass slide by first wetting the frosted portion with tap water.



5. With the No. 2 pencil, on the frosted portion make an "X" from corner to corner.
6. Immerse the frosted end of the slide into the solution. Hold the slide vertically and center it in the solution.
7. Turn ultrasonic switch to "On".

14 Troubleshooting

The ultrasonics will begin immediately to remove the lead from the slide. All lead should be removed within 10 seconds. If your cleaner passes this test, its ultrasonic cavitation is acceptable.

NOTE:

To ensure consistency from test to test, be sure to repeat test conditions - use the same solution concentration, liquid level, temperature, type of pencil, length of degassing, etc.

Service

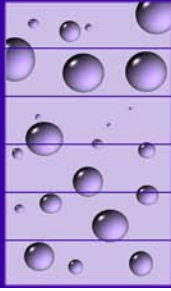
With normal use, your Ultrasonic Cleaner should not require servicing. However, if it fails to operate satisfactorily, first try to diagnose the problem by following the suggestions in the Troubleshooting Guide. If you find that your cleaner needs repair, carefully pack and return it to your local Service Center. If under warranty, remember to include proof of purchase. Your cleaner will be returned by ground service unless you specify otherwise.

Authorized Service Centers

Name	Address	Tel/Fax Number
Alpha Omega Electronics Corp.	2821 National Drive Garland, TX 75041	Tel: 972-271-5571 Tel: 1-800-540-4967 FAX: 972-840-3668
Crystal Electronic Inc.	140 Centre Street Aurora, Ontario Canada L4G 1K1	Tel: 905-841-5762 FAX: 905-841-9688
Paragon Electronics	6861 SW 196 th Avenue Pembroke Pines, FL 33332	Tel: 954-434-8191 Fax: 954-434-8385
Master Sonics Repair Center	77 Whiting Street Plainville, CT 06062	Tel: 800-737-2198 860-410-1700 Fax: 860-410-1704

CPN-214-159

BRANSON



Bulletin S-1067

B SERIES ULTRASONIC VAPOR DEGREASERS

OVERVIEW

The Branson *B Series Ultrasonic Vapor Degreasers* are the latest in a series of environmentally sound, cost effective precision degreasers. Branson, well known for ultrasonics, is also the global leader in solvent cleaning technology. The B Series integrates over 50 years of degreasing experience with the demanding needs of a changing marketplace to offer you a functional solvent solution to your cleaning needs. Similar in operation to traditional two sump units, they incorporate all of the important environmental and safety features you need, including onboard compressors for both primary and sub-zero cooling and high-frequency ultrasonics. All controls are clustered on compact, front-mounted, digital control panels. The B Series is ideal for use with most commercially-available vapor degreasing solvents.

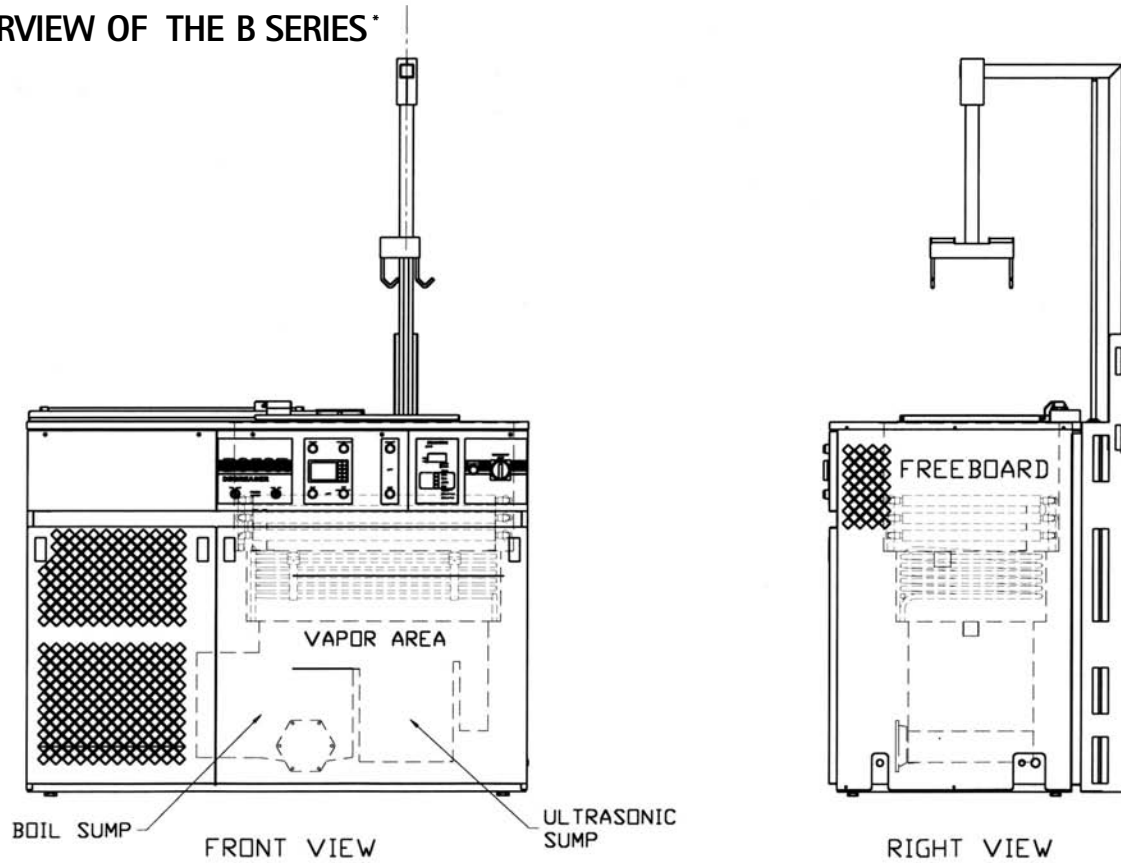
FEATURES

- **Freeboard ratio** of greater than 120% to eliminate diffusion losses
- **Refrigerated primary condensing coil** to condense the bulk of the solvent vapors
- **Refrigerated sub-zero freeboard condenser** to provide a cold air barrier, minimizing fugitive losses
- **Sliding cover** to eliminate drafts and minimize evaporation during periods of inactivity
- **Offset boiling sump** with liquid level control (*except on B452R*)
- **Bag filter** to reduce solvent loss during routine maintenance
- **Internal water separator** to reduce losses
- **Stainless plumbing** for solvent-wetted areas
- **Low voltage controls** for operator safety
- **"Ready" light** indicates to operator that it is safe to process parts
- **Coolant indicator** confirms that the refrigeration system is operating
- **High vapor level sensor** to prevent accidental solvent boil off
- **Heater Over Temp sensor** to prevent solvent degradation and heater damage
- **Early warning contamination indicator** to signal the need for solvent replacement
- **Temperature control of ultrasonic sump** (*except on B452R*)
- **Lift-off skirt panels** to facilitate maintenance

In addition to the benefits associated with minimizing solvent losses, the B Series degreasers have many other features which contribute to safety and reliability. Key among these are:



OVERVIEW OF THE B SERIES*



* The system shown is the B950R with the optional vertical lift.
While there are slight differences between each model, this drawing is representative of the basic system layout.

SPECIFICATIONS

	MODEL B452R	MODEL B950R	MODEL B1950R	MODEL B3550R
Working dimensions	10" X 12" X 8"D	12" X 16" X 12"	16" X 20" X 14.5"	20" X 24" X 17"
Boil sump heat	2000W immersion heat	4000W immersion heat	8000W immersion heat	14000W immersion heat
Ultrasonic heat	NA	1000W	1500W	2000W
Ultrasonics *	250W @ 40 kHz standard	500W @ 40 kHz standard	1000W @ 40 kHz standard	1500W @ 40 kHz standard
Distillation rate **	7 gph	14 gph	28 gph	49 gph
Recirculation	1 gpm @ 10 μ	2 gpm @ 10 μ	4 gpm @ 10 μ	6 gpm @ 10 μ
Load capacity **	200lbs. steel/hr	400lbs. steel/hr	800lbs. steel/hr	1400lbs. steel/hr
Vapor zone	28.7" L X 15.2" W X 8.5" D	32.7" X 19.2" X 12"	40.7" X 23.2" X 14.5"	48.7" X 27.2" X 17"
Control voltage	24 volts	24 volts	24 volts	24 volts
Solvent capacity	9.2 gallons	26 gallons	50 gallons	82 gallons
Overall	54.7" X 28.5" X 46" H	64.7" X 32.5" X 48.7"	88" X 36.5" X 59"	110" X 40.5" X 68"
Input power	208 or 230V, 3 ϕ , 27A	208 or 230V, 3 ϕ , 39A	208 or 230V 3 ϕ , 62A, or 460, 3 ϕ , 33A	208 or 230V, 3 ϕ , 81A, or 460, 3 ϕ , 42A
Shipping weight	500lbs. with pallet	750lbs. with pallet	950lbs. with pallet	1200lbs. with pallet
Options for all systems: PLC-controlled vertical lift, power cover, TDR interface, and dessicant dryer				

* Higher frequencies available upon request.

** Based on HCFC, HFE, and HFC solvents. Specifications subject to change without notice.

BRANSON ULTRASONICS CORPORATION

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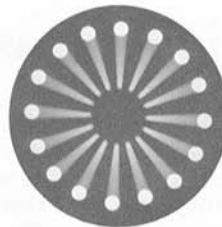
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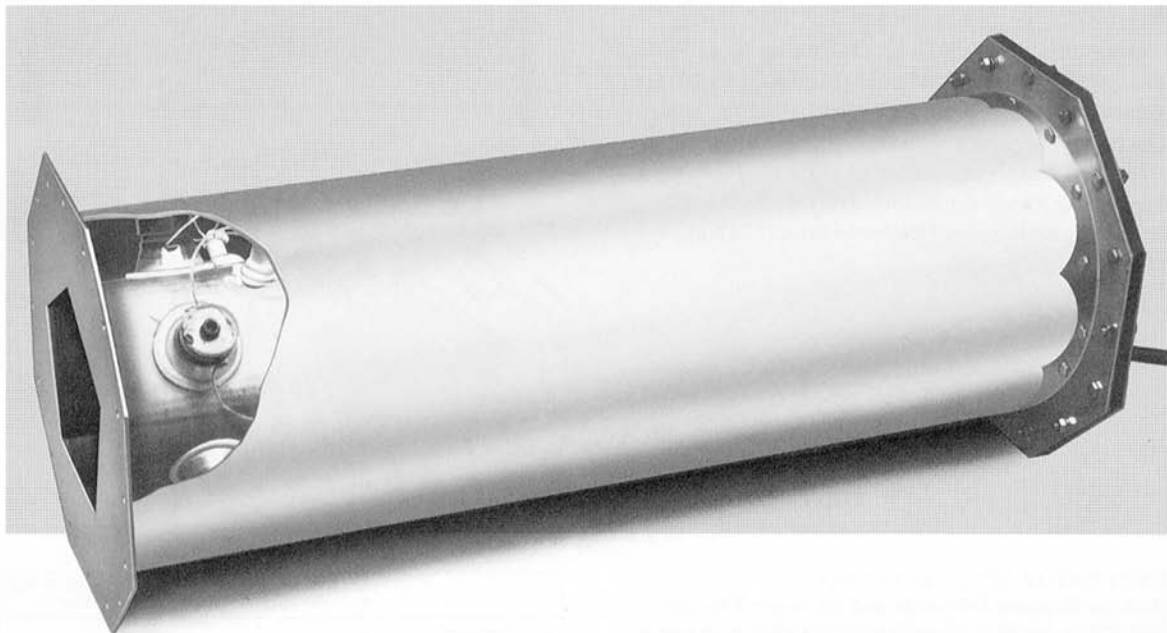
Branson de Mexico
Nuevo Laredo, Mexico

BRANSON

Sound Ideas in Liquid Processing



Pentagonal Liquid Processor



The need to process increased volumes of liquids has led Branson – the pioneer in ultrasonics – to the development of the Pentagonal In-Line Liquid Processor System. Its unique pentagonal shape is designed to optimize acoustic properties to give you exceptional performance in a wide range of liquid processing applications. The System can be used for the same applications as the Branson Cylindrical Liquid Processor, especially ultrasonic pasteurization (at significantly lower temperatures), as well as crystallization, degassing, dispersion and emulsification.

Advantages of the Pentagonal Liquid Processor

1. Significantly larger volume capacity allows for high flow rates, 10-50 gpm (37.8-189 liters/minute).
2. A powerful *uniform ultrasonic field* insures that each *incremental volume* of liquid is treated with ultrasonics.
3. Higher processed liquid to energy consumption ratio.
4. Units are modular to allow customization for particular applications and flow rates. Multiple units can be used in a series or parallel.
5. 3.96 gallons (15 liters) capacity.
6. All electronic parts of the transducerized pentagonal assembly are protected by a SS heliarc welded cover. Allows for easy maintenance and wash down.
7. Inert gas filled.
8. Custom adaptors available for any piping system up to 5" (12.7 cm) outside diameter.

Pentagonal Liquid Processor

TRANSDUCER SPECIFICATIONS

The transducer design permits the process liquid to flow through its center. Thus, it can easily be used in-line with a production process, allowing continuous rather than batch operation. All parts of the transducer assembly which contact the processing liquid are constructed of 316L stainless steel. The Branson transducer is hermetically sealed so that spills will not affect its performance.

Overall Dimensions: 30" x 12" (76.20 cm x 30.48 cm)

Processing Chamber: 6.4" x 30" (16.26 cm x 76.20 cm)

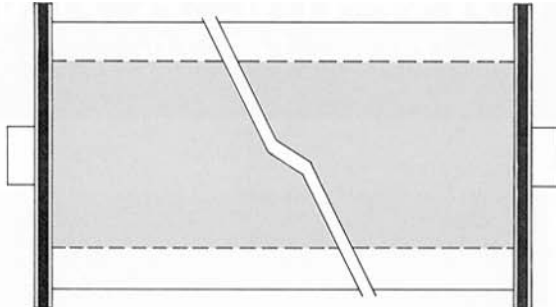
Volume Capacity: 3.96 gal. (15 liters)

Operating Frequency: 40 KHz

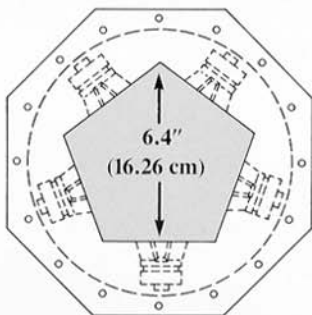
Operating Temperature: 35°F to 220°F (1.7°C to 104°C)

Transducer Elements: Piezoelectric (35)

Approximate Shipping Weight: 60 lbs. (27.24 Kg)



30" (76.20 cm)



12"
(30.48 cm)

GENERATOR SPECIFICATIONS

Both the Branson E-Module and the larger EM-100 generators combine all-solid-state circuitry with modular construction for easy installation and maintenance. Branson generators are engineered for high reliability, uniform power delivery and continuous low-maintenance operation.



Standard E-Module
powers one Pentagonal Processor.

	MODEL EM-100 P.N. 902-999	MODEL EMA 70-36B P.N. 902-036
# Of Pentagonal Liquid Processors Generator will power	4-8 Maximum	1 Maximum
Operating Frequency	40 KHz	40 KHz
Operating Temp.	35°F to 110°F (1.7°C to 43.3°C)	35°F to 110°F (1.7°C to 43.3°C)
Approximate Ship. Wt.	400 lbs. (181.6 Kg)	75 lbs. (34 Kg)
Power Requirements	230V 3 Phase	208, 220 or 240V 1 Phase 5 amps at 220V

BRANSON CLEANING EQUIPMENT COMPANY

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