

## PROPER USE OF ULTRASONIC CLEANERS © 2001

Ultrasonic machines (also called hydrosonic or “sonic” cleaners) are excellent devices for cleaning most scuba parts, but deliberate care and consideration must be taken during such operations. Of primary importance is the proper selection of any chemical to be utilized in the cleaner. To clean most salty scuba equipment, an acidic fluid is required. However, if this acid cleaner is the wrong type or is too strong, it may actually attack the stainless steel tank and dissolve pinholes in the metal! If the tank becomes perforated, the solvent will drip down into the machine’s hi-tech electronics and destroy them.

Perhaps the most common mistake made in choosing a solvent is the assumption that chemicals approved and sold for regulator cleaning are also approved and safe for use in ultrasonic cleaners. **THIS IS ABSOLUTELY INCORRECT!** For example, GMC Regulator Cleaner (#43190) is NOT approved for ultrasonic machines and can corrode the pan. Certain commercial solvents, as well as some home-brews, may also attack cleaner tanks or other components of the apparatus.

Various commercial chemicals come as concentrates which are very active on most metals and must be diluted before use; mistakes in making these dilutions or arbitrarily adjusting the strength of such dilutions, often results in serious damage to cleaners. To eliminate dilution problems, GMC’s Hydrosonic Solvent (#43101) comes premixed to the proper strength and should not harm pans even after years of continuous exposure. As for acidic home-brews, lengthy laboratory testing is usually required to determine what long-term effects they may have on ultrasonic cleaners.

However, various uncontrollable factors can alter the aggressiveness of ANY cleaning solution: Material dissolved off the equipment being cleaned, residues from the cleaning process, or the electrical fields generated by the machine itself may change or enhance the reactivity of the cleaning solvent. **Therefore, it is impossible to guarantee that ANY acidic solvent will NEVER attack the cleaner’s tank under any circumstance. For that reason, acidic solvents should NEVER be used directly in the main tank, but rather in a “Carrier Bath System”.** (See additional information below)

**USE OF ANY NON-APPROVED OR ACIDIC SOLVENT DIRECTLY IN YOUR ULTRASONIC CLEANER’S MAIN TANK WILL VOID YOUR WARRANTY. THIS INCLUDES GMC HYDROSONIC SOLVENT. THE WARRANTY CLAIM WILL BE PROCESSED BY THE ACTUAL MANUFACTURER OF THE MACHINE AND NOT BY GMC.**



### **GMC recommends the following:**

When possible, use the Interchangeable Pan System (also called a Carrier Bath System) for ultrasonic cleaning operations. Ultrasonic vibrations will transmit undiminished from one liquid to the other. If only “activated water” is placed in the main tank of the machine, the oscillations generated therein will pass into any liquid contained within an accessory vessel set into that “activated water”. Excellent cleaning actions will still occur and various pans containing different solvents can now be switched at will. In this manner, the technician can select respective solvents (acids, alcohols, detergents) without decanting liquids in/out of the main tank. This is particularly convenient if switching between “conventional” and “O2 cleaning” agents.

In this system, the main tank is never exposed to harsh chemicals. If an acidic solution is permanently kept in the main tank, accidents such as spillage or leakage into the electronics are likely to eventually occur. When a carrier bath is used only the secondary pan is likely to be harmed by harsh chemicals. Damage or loss of the machine's main tank is a major disaster compared to the loss of an auxiliary pan!

"Activated water," i.e. the carrier bath, is simply water to which a wetting agent has been added to prevent bubbles from clinging to the underside of the auxiliary tank; such bubbles severely interfere with ultrasonic wave transmission. Likewise, plain water does not transmit the waves very reliably. Most common detergents contain wetting chemicals, but the best agents are those used for achieving spotless rinses in dishwashers. See the accompanying literature on how to set up a carrier bath.

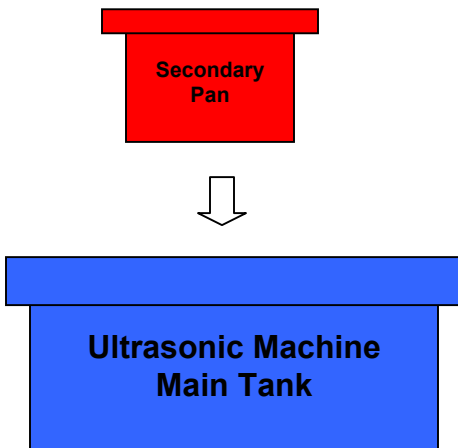
Use the proper, APPROVED solvent. To remove typical saltwater deposits from SCUBA gear, an acidic solvent is required, but only those specifically formulated for hydrosonic cleaning machines should be used. Just because a solvent is approved for cleaning regulators DOES NOT mean that it is also suitable for use in ultrasonic cleaners! GMC approves/guarantees ONLY our Hydrosonic Solvent for machine use and ONLY with a carrier Bath System. We cannot vouch for the products of other manufacturers... You must consult them for their specific recommendations.

Remove any solid debris/metallic chips, which may accumulate in the tank or pan. Such chips in an acidic medium can produce localized galvanic action, which can etch or dissolve pinholes through the stainless tank. Hydrosonic solvent can easily be purified of unwanted particulate matter by passing it through a common paper coffee filter. Most Hydrosonic solvents can be purified and used repeatedly until their aggressive action finally subsides.

**CARRIER BATH THEORY:** Ultrasonic vibrations will pass largely undiminished through a properly prepared carrier bath directly into the cleaning fluid contained in a Secondary Pan. This fact provides the basis for an Interchangeable Pan System, which has many advantages: **1.** Excellent cleaning action occurs in the Secondary Pan while the machine's Main Tank is protected from any harsh chemical that must be used. **2.** With several Secondary Pans, a variety of different cleaning agents can be employed by simply switching pans as desired. **3.** Only the Carrier Bath, which is just "activated water" remains in the Main Tank and seldom needs replacing. This eliminates the likelihood of active chemicals leaking or spilling into the machine's electronics when the cleaning solutions are actually used in the Main Tank itself.

**CARRIER BATH PREPARATIONS:** "Activated water" merely contains a wetting agent to prevent bubbles from clinging to the underside of the Secondary Pan. Such bubbles can drastically interfere with proper transmission of ultrasonic waves. The most effective wetting agents are the "spotless rinse" liquids used in dishwashing machines and obtainable in any grocery store. The common brand names are "Jet Dry" and "Rinse Aid". Fill the Main Tank half-full with water; add one 4oz. bottle of wetting agent, set a Secondary pan in place and top off the Main Tank with water until almost filled to its rim. You're ready to go!

Active cleaning solvents are placed in **Secondary/Interchangeable Pan** can be set into the Main Bath in the Main Tank.



The Carrier Bath is placed in the **Main Tank**; set the **Secondary/Interchangeable pan** in place and fill the **Main Tank** nearly to the rim with "Activated Water".

**CLEANING SOLUTIONS:** Numerous chemicals can be used in ultrasonic cleaning procedures. An acidic cleaner is needed to remove salty deposits from dive gear. GMC's green Hydrosonic Solvent is specifically formulated for this purpose, but other preparations of dilute acetic, citric or phosphoric acid can be used. Isopropyl (rubbing) alcohol is good material for cleaning O-rings, which are often harmed by acidic chemicals. Final oxygen cleaning can be achieved using GMC's Special Cleaner or Simple Green diluted about 1 part to 250 parts of water. Soap solutions work well for many rubber or plastics parts, although not all elastomers can be ultrasonically cleaned. Always check manufacturer's recommendations before cleaning elastomers or seating materials ultrasonically.

## **SPECIAL IMPORTANT WARRANTY STATEMENT**

Damage to ultrasonic cleaning machines due to ACIDIC solvents is NOT covered by the manufacturer's warranty or by GMC. This includes use of incorrect solvents, so-called regulator cleaners, and GMC Hydrosonic Solvent. Unfortunately, acidic solvents are required to satisfactorily remove the common contaminants encountered on diving equipment. While properly formulated acidic cleaners should NOT attack the machine's pan under normal conditions, the constitution of such solvents can be altered by contaminants dissolved from the materials being cleaned, by residues remaining in the solvent, or by electrical fields generated by the machine's switch and electronics. Because of the complex chemistry and physical variable involved, it is impossible to guarantee that ANY given acidic solvent will NEVER attack the main tank under ANY circumstance!!

To mitigate the chance of damage to the machine and to KEEP YOUR WARRANTY in force, the use of a carrier bath and a secondary pan is mandated if an acidic solvent is to be utilized. This system also lessens the possibility that any solvent might be spilled or seep into the machine's electronics. The above drawing shows how to set up a simple carrier bath. In this system, the cleaner's main pan is exposed only to "activated water" which should never cause damage. The acidic cleaner is carried in the secondary pan, and if it should ever be damaged or corroded, replacement is a simple, inexpensive matter.

DAMAGE/CORROSION FROM ACIDIC CLEANERS TO THE MAIN PAN IS READILY RECOGNIZABLE AND WILL VOID YOUR WARRANTY IN ALL CASES!!

**IF YOU HAVE ANY QUESTIONS PLEASE CONTACT GMC TECHNICAL SERVICES:**

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