System III, 5 gallon Leaching Unit Instructions

Insert bolts thru holes & tighten wing nuts down on each side to hold motor unit in place. It should be secure enough to keep the unit from moving but not so tight that if the paddle jams in the ore that the motor fan quits turning (the motor will burn out!)

Quartz heater

Read the entire instructions first and get your ingredients and materials together.
Run a "practice batch" using only water to ensure everything is working correctly!

System III™ is an electrolytic leaching system in which the gold is collected on a stainless steel plate which is mounted in the side of the leaching tank in a recovery (polypropylene filter) bag. An electric voltage is connected between the stainless steel plate and carbon rod electrodes in the leaching tank. This voltage creates an electric current that serves 2 purposes - (1) to enhance the leaching effect of any leach chemical being used, and (2) to precipitate the leached metals onto the stainless steel plate.

As in all systems, there are certain procedures that must be followed for proper operation. Keep all of the following details in mind during use.

Important - All ore must be pulverized *to* 80 mesh or smaller. Black sand must be pulverized to 200 mesh or smaller. Do not use with un-pulverized black sands.

Very Important - *Do not turn the motor off during operation, not even for* a *second.* The ore must be removed from the unit at any time the agitator is not in motion. **If you do turn the agitator off while ore is in the tank, you will have to remove the motor unit and agitator along with the recovery bag and plate, and then remove the ore before the unit can be started again!** The unit cannot be started while ore has settled on the agitator blade. It will break.

Also Important - Keep in mind that although the unit can be operated with as little as 10 pounds of ore, *the liquid level in the bucket must always be ½-¾ full to* give maximum use of the stainless steel recovery plate.

If any of the ore is allowed to settle on the bottom under the paddle, it will be the heavy particles and the precious metals and it will not leach. Be sure that the paddle is adjusted close to the bottom almost dragging. To check this, when you empty the system take the last particles that are on the bottom of the tank and assay them. The assay reading will tell you if your gold is settling out. If it is ground fine enough, settling will not happen if the paddle is adjusted correctly.

OPERATION STEPS:

⓿ Be sure everything is assembled properly. Do not screw it in so far that it hits against the agitator blade as it turns. The carbon electrodes fit into the holder and are held in place by hose clamps. The electrode holder is bolted near the top of the motor unit in the 15 gallon System and is clamped to the side of the 5 gallon System. (See illustration.) The stainless steel plate hangs in position on the side of the tank and the filter bag slips over it. Mount the stainless steel plate directly across from the carbon electrodes. The 5-gallon System has 1 carbon rod & plate & bag and the 15 gallon System has 2 of each (see drawing). If your unit came with the quartz heater, set the holder in place as per the illustration and insert the quartz heater. While the heater is on, *you must always* keep the water level at least half way up the quartz tube. If your water level gets too low, the tube will break!

❶ Fill the tank 1/2 full of water.

❷ Turn the agitator unit on after first making sure that the set screw that holds the agitator shaft to the motor shaft is tight.

❸ Connect the power supply. The red (positive) alligator clip lead connects to one of the carbon electrodes at the top (above the water level). (A wire with 2 large alligator clips is furnished for the 15 gallon System III™ -

use these clips to connect the 2 carbon electrodes together). *Remember, the positive goes to the carbon electrodes. It will not work if reversed.* You will have to replace these alligator clips occasionally as the leach will corrode them. Stainless steel clips are not available.

❹ Connect the black (negative) alligator lead to the stainless steel plate.

❺ Fill the tank with the amount of ore that you intend to leach. The 55 gallon System can accommodate up to 400 lbs. of some ores but in most cases it will handle somewhat less (about 300 to 350). The 5-gallon Unit will hold about 5-10 lbs. It is important that the water remain completely fluid and does not over-tax the motor. Add water and ore until the level has reached about 3" below the top of the FILTER RECOVERY BAG. If you have the quartz heater, turn it on and set the temperature control (if you got one) to whatever temperature you want to run your ore.

❻ Adjust the pH. If leaching with CLS, thiourea, nitrate leaches, bromine, halogens, or chlorine, adjust the pH to about 1.5 with sulfuric acid (or other acids if applicable from previous tests).

WARNING do not get cyanide near acids. Do not put acids into cyanide water. It produces a lethal gas that kills.

❼ Add your leach. Use about 1 to 2 oz. of CLS powder to each gallon of water. This is the average amount used.. Some ores require up to 6 oz. of powder to each gallon of water. You have to test your ore to determine the correct strength.

❽ Turn on the battery charger and set for either 6 volts or 12 volts to adjust for as close to 10 amps as possible. Anywhere from 5 to 10 amps is okay. There will not be any difference in the recovery and only a small difference in the recovery time between 5 and 10 amps. So don't worry about the exact setting of the amps. But don't let the needle "peg" off the dial. That would burn out the charger.

❾ As the metals leach out of the ore, you will notice an increase in amps (assuming that your line voltage remains the same). As the metals are deposited on the stainless steel electrode, you will notice a decrease in amps. Once you have established the correct amount of acid and leach to use, the amp meter will be an indication of when the leaching has completed.

❿ *This step may not be necessary but in many cases you will find that it helps or that it speeds up the operation.* After leaching for several hours (from 2 to 12 hours depending on your ore), you will find it advantageous to readjust the pH. Adjust the pH between 4 and 5 only on the acid leaches. Use a sodium hydroxide solution of about 20% sodium hydroxide to water for this purpose. (Sodium hydroxide is lye or caustic soda). In most cases you will notice that when the leaching is complete, the amps will be at maximum. This is the proper time to adjust the pH to 4 to 5.

HANDLING PRECIPITATES

When Leaching is Completed

When leaching is complete and the recovery is complete, turn off the agitator motor unit on the 5-gallon System III™ and remove the unit from the tank.

After a given period of time (probably the first time should be 18 to 24 hours), remove the filter bag and plate. Take the stainless steel plate out of the bag and carefully wash the bag out into a container. *This bag will contain your gold.* Scrape the stainless steel plate into the same container. Now allow the scrapings and washings to settle to the bottom and pour the water off. If they will not settle, you must run the solution through a filter system. These are your precipitates.

This material (scrapings and washings) must first be roasted at 750° F for about an hour and then smelted. It is very easy to lose gold into the slag during smelting. The best way to avoid this is to use a standard assay formula for smelting and then go through the trouble of cupelling the resulting lead buttons.

Another way to handle the scrapings and washings is to first roast at 750° F for about an hour and then dissolve in aqua regia. Steps are as follows:

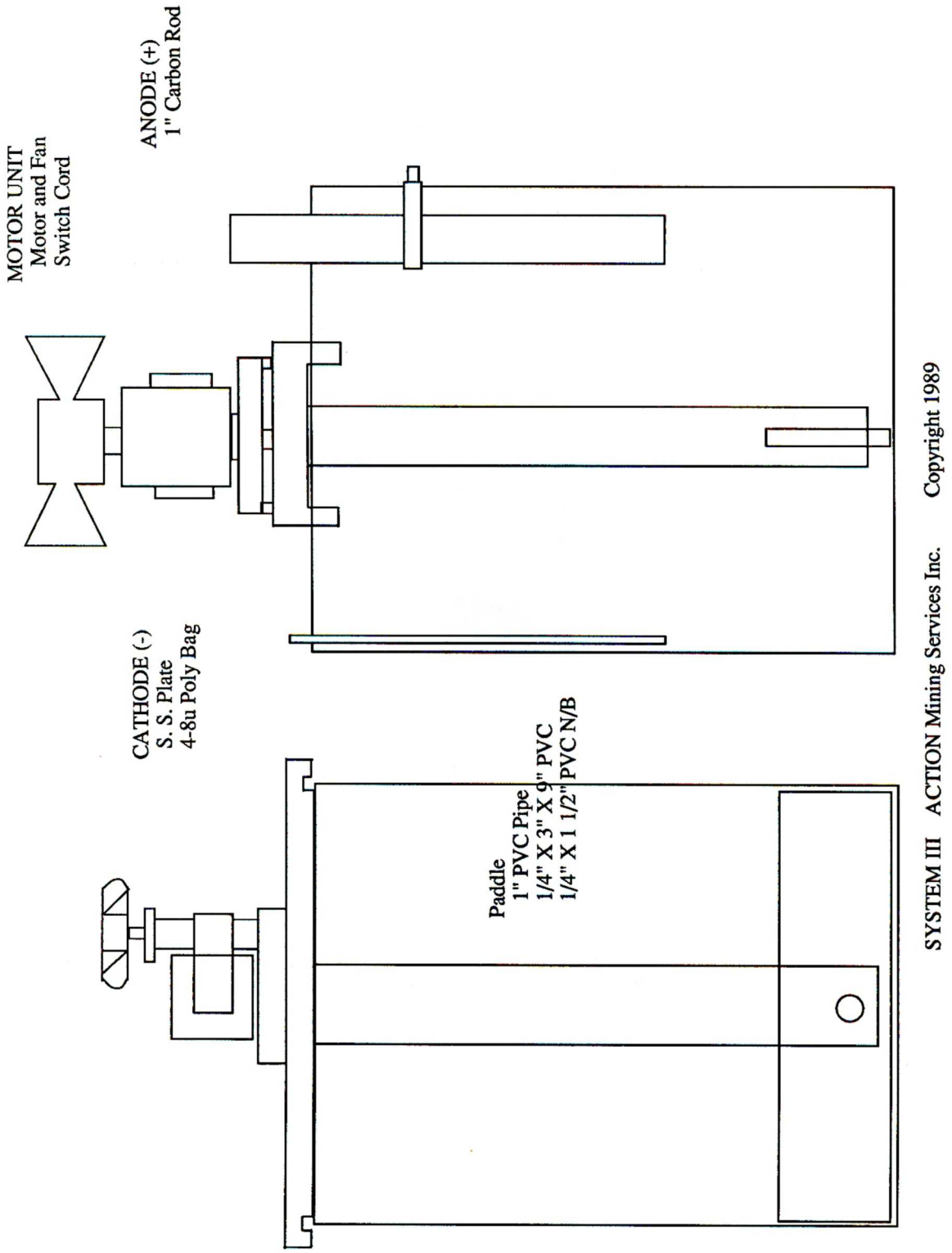
(1) roast.
(2) dissolve in aqua regia.
(3) Boil the aqua regia down to wet crystals and add just enough HCl to dissolve the crystals. Do this 3 times and then add 5 times as much water as HCl.
(4) Use twice as much sodium sulfite as gold that you expect to get. Dissolve the sodium sulfite in water and pour into the HCl and water solution that you have just made.
(5) Gold should precipitate out as a brown powder or black powder. Wait overnight for the gold to settle.
(6) Smelt the gold with assay mix and cupel the lead button.

WARNING - WARNING

Anytime System III™ is being used and the meter of the battery charger pegs out at the high side, this indicates that too much current is being drawn from the charger. It is necessary to adjust the carbon electrode (this is the positive electrode) so that the needle is not above the maximum capacity of the charger. This can be done by covering the carbon with a PVC pipe so that the pipe extends beyond the carbon electrode into the water. In this case the electricity will have to travel up into the pipe to reach the carbon electrode. The current should be adjusted properly by this method.

CAUTION: Always follow standard safety procedures in the lab - wear mask, goggles, gloves and apron. The use of mining and/or laboratory equipment, like all equipment, pose certain hazards and dangers. It is the responsibility of those performing tasks in a laboratory or mining environment to understand and adhere to all standard safety rules and regulations.

Safety procedures not understood should be recognized as such, before attempting any laboratory procedure that would endanger oneself or others. Take precautions on the proper disposal of chemicals and spent materials. Be environmentally safe.



Headquarters:
37482 Ruben Lane
Sandy OR 97055

Customer service
& Tech Support: 503 826-9330
Fax: 503 826-1340

Website: www.actionmining.com
E-mail tech support: mikeglenn@actionmining.com

PARTS CHECKLIST

- ❑1 - bucket w/slots (2) for hose clamp
- ❑1 - gear motor unit w/blue fan and cord (attached to base)
- ❑1 - hole drilled in motor unit (for optional quartz heater)
- ❑1 - paddle assembly (shaft, pvc pipe w/ paddle)
- ❑1 - stainless steel plate (cathode)
- ❑1 - filter bag (poly)
- ❑1 - carbon rod 1”x12” (anode)
- ❑1 - clamp plastic (holds bag on side of bucket)
- ❑1 - hose clamp
- ❑2 - J-bolt w/wing nut & washer
- ❑1 - battery charger
- ❑1 - ADDITIONAL OPTION ****QUARTZ HEATER 500W
- ❑1 - Action labels
- ❑1 - Instructions

Headquarters:
37390 Ruben Lane
Sandy OR 97055

Customer service
& Tech Support: 503 826-9330
Fax: 503 826-1340

Website: www.actionmining.com
E-mail tech support: techsupport@actionmining.com