

**TEMPerature Products**  
EVERY DEGREE MATTERS™  
Established 1997

# HYDROFLAME III

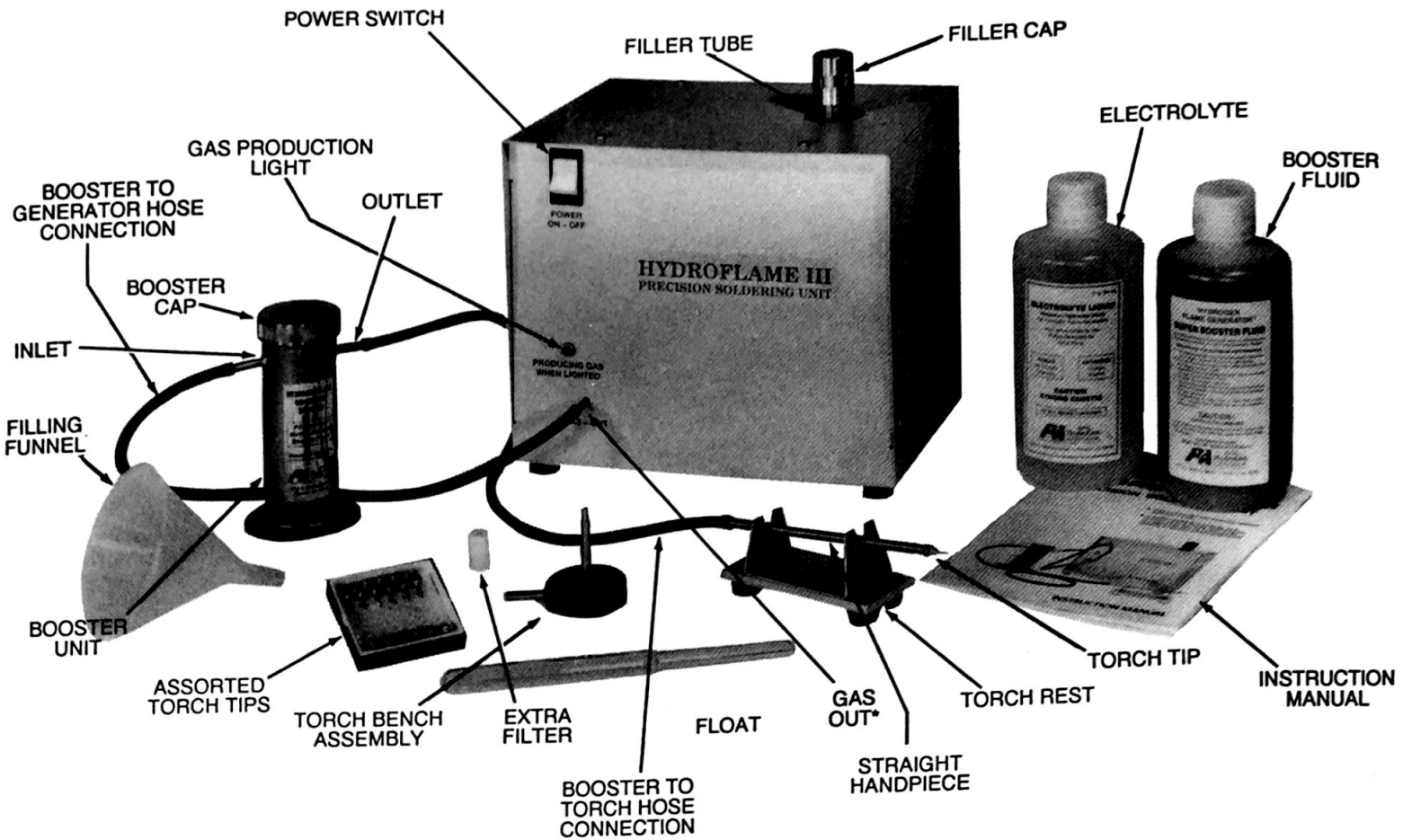
## PRECISION SOLDERING UNIT

- Pinpoint flame provides controlled, localized application of heat
- Expanded capability in soldering, from precision crown and bridge work to heavier wire appliances-ideal for continuous lab soldering of retainers and Crozat appliances

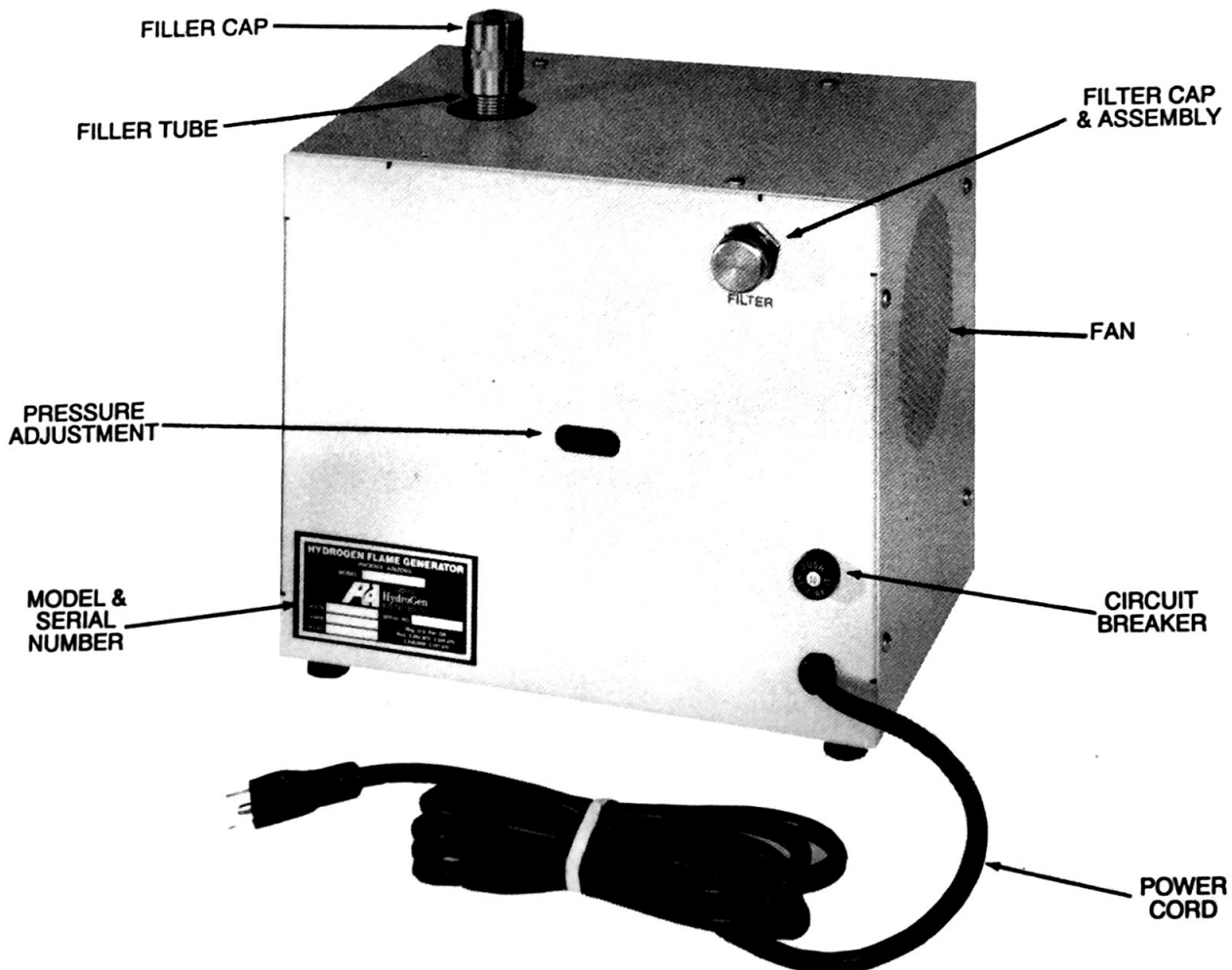


**INSTRUCTION MANUAL**

# GAS GENERATOR UNIT



\*DISCONNECT GAS OUT HOSE AT THE GENERATOR OUTLET WITHIN 30-45 SECONDS AFTER TURNING OFF GENERATOR



The Hydroflame III Soldering Unit requires only water and electricity for its operation. It produces hydrogen and oxygen at a controlled rate, automatically mixing them in the correct proportion for ideal combustion.

The soldering unit burns oxygen and hydrogen at a constant temperature of close to 6,000°F. Since this flame temperature is much too hot for most dental and orthodontic laboratory applications, an alcohol booster unit is used.

When gases produced in the generator tank bubble through the alcohol in the booster unit, they are mixed with alcohol vapors. This results in a lower flame temperature of about 4,500°F. At the same time, the flame size is increased and oxidation of the working surfaces is reduced.

An acetone-methyl alcohol with or without flux is also available through the factory. This will produce a noticeable longer and cooler flame. For most applications the straight methyl alcohol booster fluid will be found satisfactory, but for specialized applications this combination should be tried for jobs which require increased carbonizing characteristics.

#### **BENEFITS OF ACETONE-METHYL ALCOHOL MIX**

1. Very low flame velocity
2. Temperatures in the 3000°F to 3500°F range
3. Highly elongated primary flame cone

The above flame temperatures are only approximate since difference areas within the flame tip are burning at different temperatures.

#### **PREPARING THE HYDROFLAME III UNIT FOR OPERATION**

1. With power cord disconnected from electrical outlet, remove the plastic filler tube plug (red color) from the gas generator. Using the funnel provided, pour the entire contents of the electrolyte bottle into the gas generator through the filler tube.

**CAUTION: This solution is extremely caustic, and must be handled carefully.**

2. Carefully lower the glass float (large end down) into the filler tube. Proper liquid level is indicated when the top of the float rod rests at the lip of the filler tube. Tap the tip of the float gently with the forefinger to test if it is floating freely and giving a true indication of liquid depth. Install the filler cap, and tighten it gently.
3. Remove cap from booster unit. Add booster fluid until unit is one-half full. Replace and tighten cap gently.
4. Connect short black rubber hose between the gas generator outlet and the booster unit (noting direction of gas flow as indicated by the arrow on booster label). Using the longer black rubber hose, connect booster output to the handpiece or bench stand torch assembly.

#### **OPERATING INSTRUCTIONS**

The Hydroflame III generator and booster units should be placed and used on a firm, flat countertop, where there is no danger of their being overturned. Connect generator power cord to a convenient electrical outlet and switch unit to "Low". The on/off switch and gas producing light should both be illuminated. Place the

desired tip onto the handpiece with a pushing and twisting motion until it is tightly held on the torch handle. Wait two minutes for gas flow to begin, then light torch tip.

There is a pressure switch adjustment located in the rear middle section of the machine. When facing the back of the machine adjustment from left to right will increase pressure limits while adjusting from right to left decreases pressure. The switch is set at 20 ounces of pressure from the factory and will automatically cut current when maximum pressure is attained. The red pilot light will be lit when gas is being generated and go out when current is cut. When pressure is reduced by three to four ounces the machine will switch current on and continue to cycle as gas is used. The on/off switch will remain lighted however, the fan will cycle on and off with the machine and will run only when the producing gas light is lit. When switching from "Low" to "High" pause momentarily at the center "Off" position to avoid overloading the breaker. The torch may be left burning while this is done. When the soldering operation is completed, the following sequence should be followed.

1. Pinch hose near torch handle to extinguish flame, or blow out flame.
2. Turn off generator.
3. Wait approximately 30-45 seconds to allow pressure in tank and booster to be relieved.
4. **Disconnect booster hose from the gas generator outlet. If it is not disconnected within 5 minutes, a vacuum will be created, drawing booster fluid back into the generator and contaminating the electrolyte.**

**CAUTION: Never disconnect booster hose from gas generator before extinguishing the flame and turning off the generator.**

**Failure to follow these instructions, particularly instruction #4 can be hazardous when reusing the generator and booster units.**

#### **MAINTENANCE**

Before each day's use, run the cleaning wire through the torch tip. The generator electrolyte level should be checked daily, and distilled water added when required. For proper operation, it is essential that you DO NOT OVERFILL. The booster fluid should be checked at the same time and replenished as necessary (see SPECIFICATIONS section for water and fluid consumption rates). When replacing the friction-fit torch tips on handpiece, insert tip with a pushing and twisting motion until it is tightly held on torch handle.

Hydroflame III is supplied with three sizes of torch tips (4 each 21,22,&23). Sample applications for the three tips are:

**Tip #21:** Soldering retainers and Crozats. Set switch on "High".

**Tip #22:** Soldering retainers and Crozats. Set switch on "Low" or "High".

**Tip #23:** Soldering brackets to bands. Set on "Low".

The Hydroflame III contains a filter assembly with a readily removable filter element, which is easily cleaned or replaced.

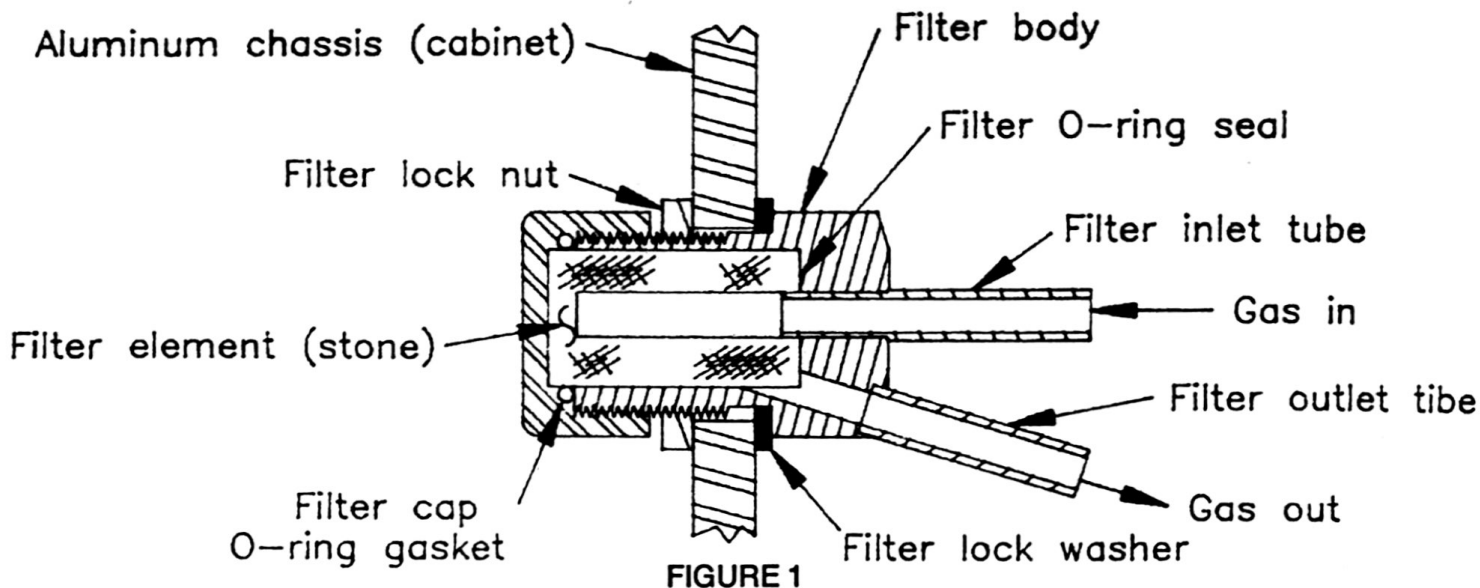


FIGURE 1

The stainless steel filter assembly is constructed as shown in Figure 1. It contains one replaceable filter element (stone) which must be thoroughly cleaned and dried, or changed every three months or 250 operating hours. The element is very simply removed and replaced in a few minutes from the outside of the gas generator, as follows:

1. Locate the knurled stainless steel filter cap which is at the rear, high on the outside of the gas generator. It is approximately 1-in. (2.54-cm.) in diameter, 1/2-in. (12.7-mm.) long, and loosens by turning counterclockwise. While wearing rubber gloves, carefully unscrew the filter cap.
2. Be careful not to let moisture or liquid contained in the filter assembly drip or run onto anything, as the electrolyte contains powerful caustic chemicals which can damage materials susceptible to caustic attack.
3. Carefully twist and pull out the filter stone, and discard it in a chemical waste container for caustic items. Next, remove and discard the filter cap O-ring gasket and filter O-ring seal in the same manner. As an alternative to discarding the filter stone and O-rings, they may be cleaned in an ultrasonic bath of clean water, dried, and reused if they appear to be in good mechanical condition.
4. In sequence, replace the filter O-ring seal, filter O-ring gasket, filter element (stone), and filter cap. Tighten the filter cap snugly so oxyhydrogen gas cannot leak or escape when the gas generator is operating.

Make certain the O-rings are installed properly and that the assembly fits together snugly. If the O-rings and filter stone are not in the proper arrangement, loud and frightening flashbacks into the gas generator tank may possibly occur when operating the Hydroflame III.

5. All items which have come in contact with the internal filter assembly components should now be washed completely with soap and water, thoroughly rinsed with clear water, and carefully dried.

6. Filter stone and O-ring replacement kits are available as Part No. K11001.

### CHANGING ELECTROLYTE IN THE GAS GENERATOR

With normal operation the electrolyte should not require replacement before 1500 operating hours have lapsed.

Proper fluid level is maintained by adding distilled water. However, if the electrolyte becomes contaminated by booster fuel back-up or other foreign matter, it should be replaced according to the following procedure:

1. Disconnect power cord of the gas generator from the electrical outlet.
2. Wearing rubber gloves for protection, remove filler cap and withdraw the glass float from the generator tank. Use care not to drip electrolyte from the float onto anything, as the electrolyte contains powerful caustic chemicals which can damage materials susceptible to caustic attack. Wash the float thoroughly with distilled water, wipe it dry, and lay it aside in a clean place.
3. Move the gas generator close to a sink having a waste water drain. Secure a small lift-pump with a plastic or stainless steel pumping mechanism and all-plastic or stainless steel connections or tubing. (An electrically driven centrifugal laboratory pump works well.) Insert the end of the intake tube of the pump into the gas generator tank through the filler tube, pushing the tube down to the very bottom of the gas generator tank. Place the discharge end of outlet tube for the pump into the drain opening of the sink. Open a faucet to start fresh water running slowly into the sink. With one person (wearing rubber gloves) holding the discharge end of the pump into the drain opening of the sink, a second person (wearing rubber gloves) should turn on the pump while holding the intake tube down at the bottom of the gas generator tank.

**NOTE:** A pump of small pumping volume must be used in order to minimize the chances of splashing electrolyte out the discharge end.

Splashing could result in the unwanted wetting of nearby objects with electrolyte.

A dark, muddy-looking substance will be observed in the electrolyte being pumped out - this is normal. Rinse water, running slowly in the sink, will dilute the electrolyte and wash it rapidly down the drain - minimizing the possibility of electrolyte damage to the sink or drain pipe.

4. Refill the emptied gas generator with distilled water to 3-in. (7.6-cm.) from the lip of the filler tube, and pump empty again, using the same pumping procedure described above.
5. Repeat the flushing operation several times or until clean water is evacuated from the unit.
6. Withdraw the pump intake tube from the gas generator, being careful not to drip liquid from it onto anything, then wash it thoroughly with clean water. Run clean water through the pump for a minute or two to remove electrolyte from its tubes and moving parts.
7. Thoroughly wash down the sink and allow fresh water to run down the drain for two or three minutes.
8. Wash hands, face, and other exposed skin areas thoroughly with soap and water.
9. Place the discharge end of plastic funnel into the opened gas generator filler tube.
10. Very carefully pour new electrolyte into the gas generator tank through the funnel, using only the specified amount (1 quart).
11. Insert the glass float, large end first, into the gas generator tank through the filler tube.
12. Replace the metal pressure relief (safety) filler cap on the filler tube and tighten gently in place. The gas generator is now ready to operate again.

**All components must be secure to avoid the possibility of a gas leak.**

**IMPORTANT SAFETY RULES** to follow when checking, handling, operating and servicing the Hydroflame III:

#### **A) PRELIMINARY CHECKOUT**

1. Unplug power cord from wall outlet when not using Hydroflame III, and before checking electrolyte and booster fluid levels.
2. Always check electrolyte level **before** starting gas generator. Replenish as necessary with **distilled water** being very careful as electrolyte is a **powerful caustic**.
3. Do not place the face, **particularly the eye**, close to or over an open filler tube or booster.
4. **Avoid** skin contact with the caustic electrolyte fluid. Any object accidentally wetted with this fluid must be thoroughly washed with clear water immediately - then scrubbed with soap and water, and rinsed with clear water again.
5. Always check booster fluid level **before** start-

ing gas generator. Replenish as necessary with booster fluid or with methyl alcohol. **Do not** run booster dry.

#### **B) OPERATING**

1. **Wait** two minutes after starting gas generator before lighting torch flame.
2. **Never** leave gas generator running while unattended.
3. **Do not** change rocker switch from "High" to "Low" in a single rapid movement. Move the switch slowly through the center "Off" position to avoid damaging it or tripping the breaker.
4. **Never** point the torch flame at the gas hoses, the gas generator, the booster, or any flammable material. The torch flame should be directed only at the workpiece.
5. **Never** attempt to change torch tips, remove gas hoses, or turn off the electricity while the torch flame is burning. Always extinguish the flame **first** by pinching the hose near the torch handpiece, or by blowing out the flame. If the flame should pop-back into the hose when extinguishing by pinching the hose, then the flame should be **blown out only** to prevent such pop-backs.
6. **Always** extinguish torch flame by "**blowing out**" or "**pinching off**" before:
  - a) turning off gas generator
  - b) removing or changing a torch tip
  - c) removing or changing hoses
  - d) removing gas generator filler cap or booster cap
  - e) laying torch down unattended

#### **C) HANDLING**

1. **Always** install torch tip onto torch handpiece or benchpiece with a **very firm** pushing and twisting motion to assure a tight and leak-free connection.
2. The gas generator and booster should be placed on a flat, firm countertop so they cannot overturn accidentally. Under no circumstances should these units be laid on their sides or turned upside down when containing electrolyte and booster fluids.
3. **Never** allow open flame, lit cigarettes, or other hot, glowing materials near the open mouth of the filler tube or the booster.
4. Highly flammable hydrogen and oxygen gases are contained in the gas generator and remain inside for about one hour after the electricity has been turned off.

#### **D) MAINTENANCE AND FACTORY SERVICE**

1. Do not attempt to service or repair the gas generator unless the power cord is removed from the electrical outlet.
2. If a flame cannot be sustained at the torch tip, a gas leak may be the cause. The gas generator should be immediately returned to the factory for check-out and repair.

3. If the screw rises on the gas generator filler cap, a plugged gas line may be causing excessive pressure buildup. If replacing the filter element does not correct this problem, the gas generator should be immediately sent to the factory for servicing.
4. Periodic servicing at the factory every 18 months or 2000 operating hours, whichever occurs first, is highly recommended. Periodic servicing includes safety inspection, thorough cleaning, hose and gasket replacement, and operational testing.

## TROUBLE SHOOTING

1. Torch hard to light
  - a) Booster fuel contaminated - rinse out booster and replace fuel
  - b) Condensation in torch hose - dry hose and torch with compressed air
  - c) Torch tip plugged - run cleaning wire through tip or replace with new tip
2. Flame too small
  - a) Generator low on water - add distilled water to recommended level
  - b) Booster low on fuel - add as required
  - c) Gas leak in system - check filler and booster cap for tightness, inspect hoses for leaks. If filter elements have recently been replaced, check filter assembly and internal generator hose for leaks.
3. Flame too large
  - a) Generator overfilled - run for several hours on "Low", in ventilated area, away from open flame, to boil away excess.
4. Feathery flame - inadequate heat
  - a) Booster hose not disconnected after use - booster fuel has been drawn into generator. Run unit continuously on "Low", in ventilated

area, away from open flame, until flame returns to normal.

- b) Contaminates (e.g. oil, alcohol, tap water) have been added to electrolyte. Run unit for several hours on "Low", in ventilated area, away from open flame, to boil away contaminants, If flame has not returned to normal after eight hours, clean tank and put in new electrolyte.
5. Unit inoperative - on/off switch out
  - a) Circuit breaker tripped - reset circuit breaker
  - b) Defective electrical outlet - check fuse or circuit breaker
  - c) Defective switch in unit - replace
  - d) None of the above - return to factory for service

If any major service is required, the complete generator unit should be returned to the factory along with the booster and torch handpiece. **All liquid must be emptied** out of the generator before shipping. Retighten filler cap securely and seal generator outlet tube. Units received at the factory will be serviced, tested, and reshipped within one-two weeks of their arrival.

## STEPS TO FOLLOW WHEN SHIPPING UNIT BACK TO FACTORY

- 1) Remove glass float and keep in a safe place
- 2) Empty all liquid out of gas generator as previously explained
- 3) Retighten filler cap securely
- 4) Seal gas generator outlet tube
- 5) Empty booster chamber and secure lid
- 6) Properly package generator, booster and torch handpiece. Use insulating material between container and generator. Make sure generator is secure inside container to prevent damage should container get turned upside down or laid on its side.

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## Specifications

Power Requirements**	..... 120 volts AC, 60 Hz
Circuit Breaker	..... 10 amps
Maximum BTU Output	..... 650 BTU's/hr.
Gas Production*	..... 0.75-1.50 cu. ft./hr.
Torch Tip Sizes	..... #21, #22, #23 gauges
Flame Temperatures	
Without Booster Unit	..... 6,000°F
With Booster Unit	..... 4,500°F
With Booster/Acetone Mixture	..... 3,000°F
Operating Pressure	..... 10 to 20 oz./sq. in.
Electrolyte Capacity	..... 1 qt.
Water Consumption*	..... 0.50 oz./hr.
Water Addition Interval*	..... 8 hrs.
Booster Fuel Capacity	..... 4 ozs.
Booster Fuel Consumption*	..... 0.20 oz./hr.
Booster Fuel Addition Interval*	..... 8 hrs.
Electrolyte Replacement Interval*	..... 1,500 hrs.
Filter Element Replacement	
Interval*	..... 3 mo./250 hrs.

\*In continuous operation

\*\*220 Volt units available upon request, call for pricing

### Ordering Information

HYDROFLAME III Precision Soldering Unit includes the gas generator and booster unit, glass float, filling funnel, straight handpiece and torch bench assembly, torch rest, 12 assorted soldering needles, electrolyte and booster fuel, connecting hoses, cleanout wire, extra filter and instructions.

### Warranty

The Hydroflame III Precision Soldering Unit is warranted for one year against defects in materials or workmanship.

Call 1-800-TIP-TEMP for support.



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### ACCESSORIES

