Service Mode Number	LCD Display Indication	Notes
00	Acid Flow Counter Count= Rate= Next	Indication of Acid Flow Detector pulses only
01	Oxi Flow Counter Count= Rate= Next	Indication of Oxidizer Flow Detector pulses only
02	Acid Min. Flow Now= Min.= Next Down Up Fact	Test to determine actual flow after initial setup of controller. Set min. to 20% less than actual.
03	Oxi Min. Flow Now= Min.= Next Down Up Fact	Test to determine actual flow after initial setup of controller. Set min. to 20% less than actual.
04	Light Cell 1 Value= Pwr= Next Down Up Fact	First Input Light Cell. Corresponds with top bar graph on Input Monitor
05	Light Cell 2 Value= Pwr= Next Down Up Fact	Second Input Light Cell. Corresponds with bottom bar graph on Input Monitor
06	Light Cell 3 Value= Pwr= Next Down Up Fact	First Output Light Cell. Corresponds with top bar graph on Output Monitor
07	Light Cell 4 Value= Pwr= Next Down Up Fact	Second Output Light Cell. Corresponds with bottom bar graph on Output Monitor
08	Etch Temperature Now= Min.= Next Down Up Fact	If feature is used, set Min. to 4-5 numbers less than when etchant is heated to normal temperature.
09	Etch Temperature Min. Temp. Enable Y Next On Off	Prevents regeneration until min. temperature is reached if enabled.
10	Conductivity Probe Now= Min.= Next Down Up Fact	Approximate values in mS (i.e.: 50=100mS, 100=200mS, etc.)
11	Conductivity Probe Min. Acid Ctrl Y Next On Off	Enables/disables conductivity control for minimum acid level above Light Cell control
12	Event History Erase history now? Next Yes No	Used for diagnostic purposes only. Do not erase unless instructed by Oxford V.U.E., Inc. personnel.
13	Input 0:00 1:FC 2:BC Next	Internal diagnostics used by Oxford V.U.E., Inc. factory only.
14	Max Acid Regenerations= Next Down Up Fact	Probably 2 after etchant stabilized. Can be 1-5 for cupric controlled by conductivity.
15	Max Oxi Regenerations= Next Down Up Fact	Probably 4-6 after etchant is stabilized. Watch reaction after acid add to verify.
16	Chemical Imbalance Disable Regen Y Next Yes No	Yes after etchant is stabilized. No to start.
17	Min. output swing Now= Min.= Next Down Up Fact	Range: 0-255. Lower setting used for bringing etchant closer to full regeneration

Service Mode Number	LCD Display Indication	Notes
18	Restore all factory Settings? Next Yes No	Used only to reset all parameters to original factory settings
19	Metal/Method Copper Next Down Up Fact	Indicates mode used for current metal. Do not change unless instructed by Oxford V.U.E., Inc.
20	Std. Acid Time 9 Seconds Next Down Up Fact	9 probably OK. Based on desired operation during regeneration
21	Std. Oxi Time 9 Seconds Next Down Up Fact	9 probably OK. Controller tries 3 seconds first to test if oxidizer is required in ferric mode.
22	Stop Pumping Spent When Full Y Next Yes No	Yes prevents spent pumping when spent tank is full. No allows spent pumping to continue
23	Auto Calibrate In & Out N Next Yes No	Primary control for auto calibration routine. Overrides service mode 24.
24	Auto Calibrate Output Y Next Yes No	Secondary control for auto calibration of Output Light Cell only if service mode 23 = No
25	MAC Address AA:55:AA:55:AA:55 Next Down Up Fact	Do not change! Used by Oxford V.U.E., Inc. ONLY.
26	IP Address 192.168.1.124 Next Down Up Fact	Customer provided subnet value to enable remote monitoring function. Last bit changeable. Range: 1-252
27	Prevent Regen When J104-4 is Low N Next Yes No	Auxiliary connector pin 4-GND (GND=pin 14 or 15). Contact Oxford V.U.E., Inc. for assistance.
28	Prevent Regen When J104-5 is Low N Next Yes No	Auxiliary connector pin 5-GND (GND=pin 14 or 15). Contact Oxford V.U.E., Inc. for assistance.
29	Conductivity Probe J104-6 0/1 Input N Next Yes No	Auxiliary probe input. Used by Oxford V.U.E., Inc. ONLY!
30	Prevent Regen When Spent is Full Y Next Yes No	Yes prevents regeneration when spent tank is full. No allows regeneration to continue
31	Archive Parameters Set Number: 00-07 Next Load Save Next	Load = Old set of parameters. Save = Current set of parameters. Next = Selection of memory set.
32	Use Oxygen Injection No Next Yes No	Custom feature. Contact Oxford V.U.E., Inc. for assistance.
33	Prevent Regen When Acid is High N Next Yes No	Prevents regeneration if acid value is higher than normal.
34	High Acid Increment Now Inc Next Down Up Fact	Upper acid limitation value for service mode 33.
35	Watch Dog Timing Next Down Up	Selects timing method used for metal/method used in service mode 19.

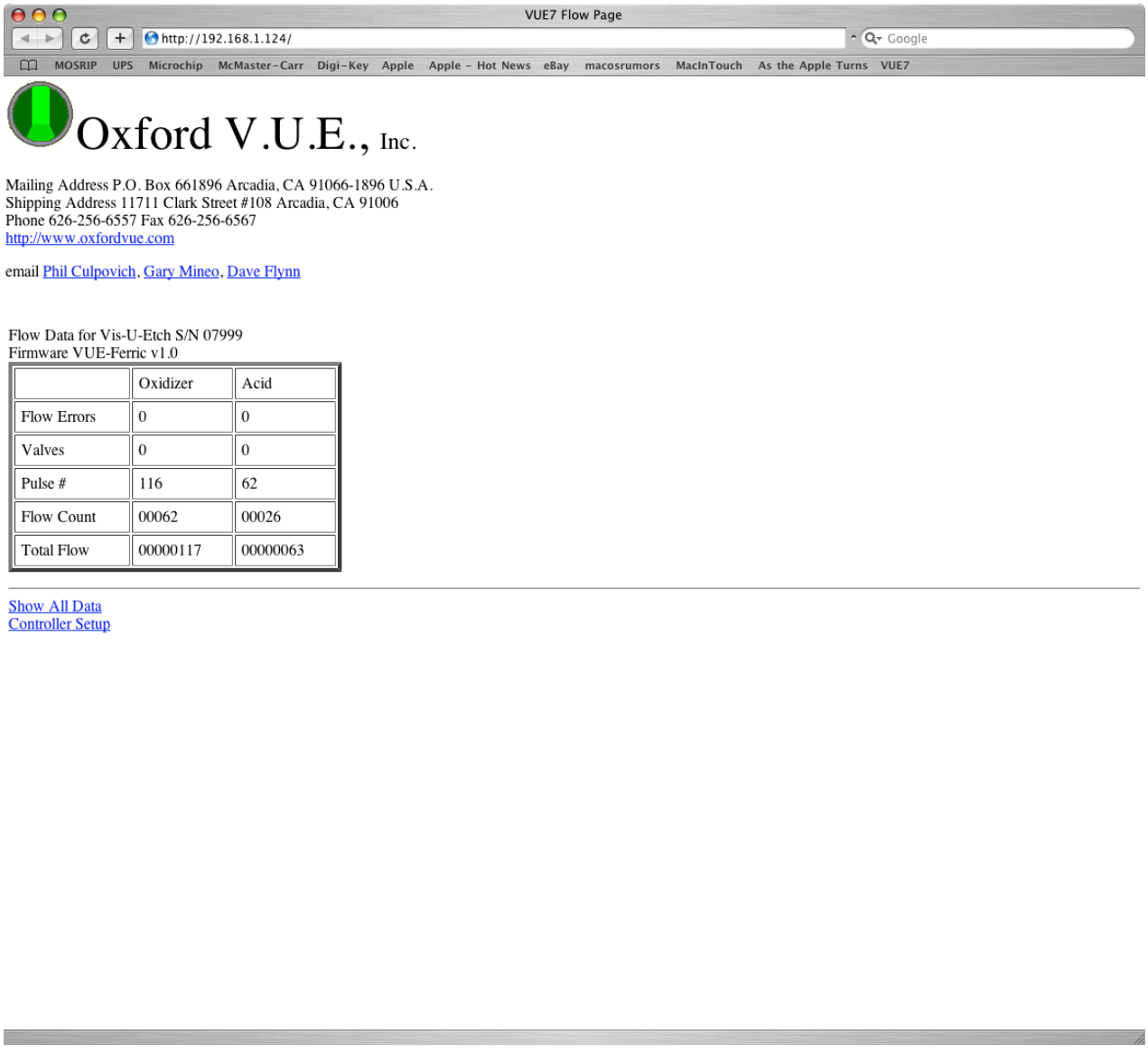
Service Mode Number	LCD Display Indication	Notes
36	Prevent Regen When Meter Error Next Yes No	Default = Yes. Used during correction of etchant imbalance.
37	Prevent Regen When A/O Sw is Off Next Yes No	Default = No. Used during correction of etchant imbalance. Should be set to yes after startup

REMOTE MONITORING

Vis-U-Etch™ 7 operation can be remotely monitored and adjusted via computer using an up-to-date web browser. A LAN cable connector is located on the bottom of the Electronic Section for this purpose.

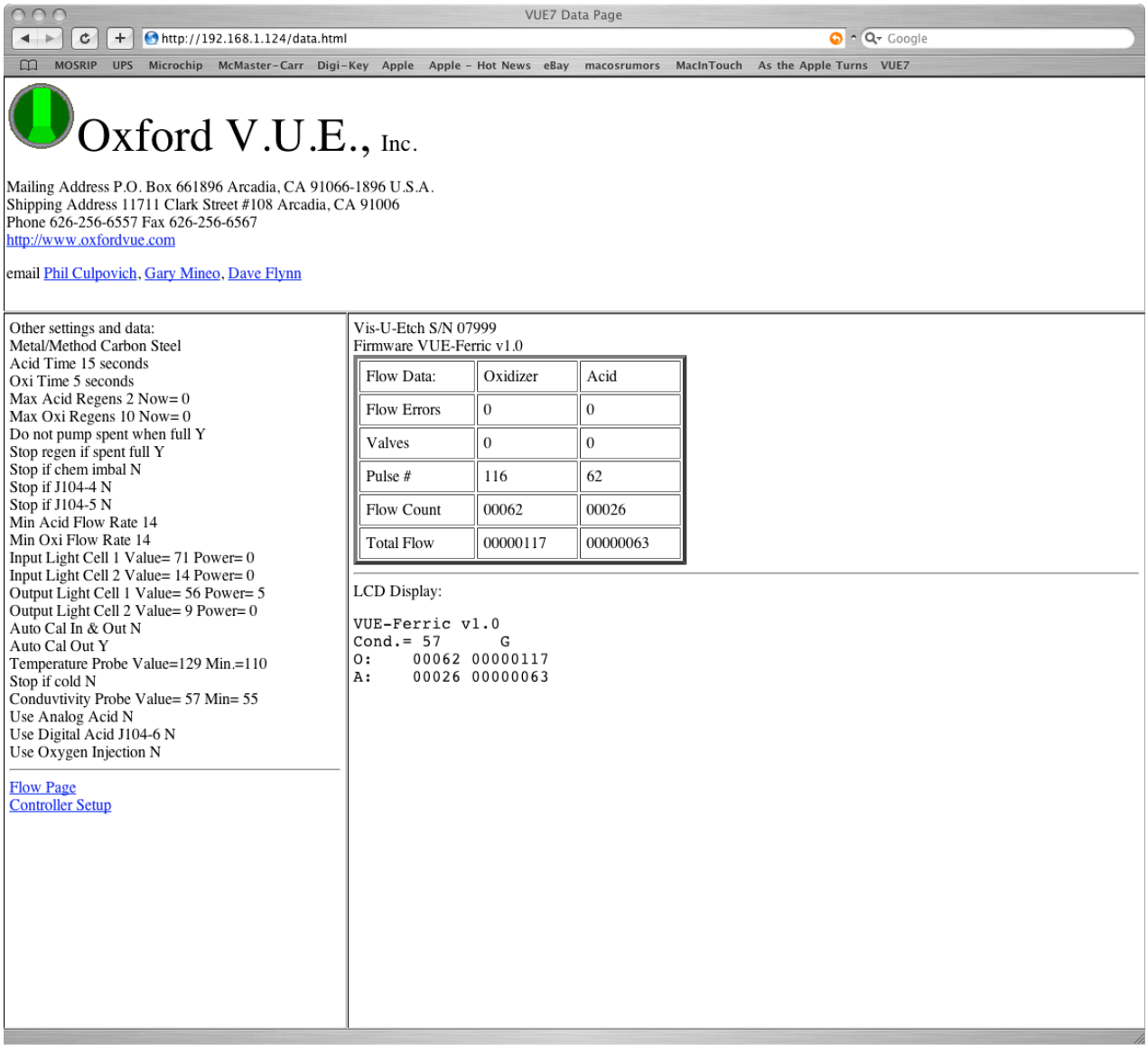
To access the information after connected to your local area network, activate your web browser and type in the IP address as listed on the front panel LCD display in the Electronic Section. You can follow the links on-screen to obtain the same information displayed on the LCD display and have the interactive functionality of the internal switches.

Sample screens shown below and on the following pages:

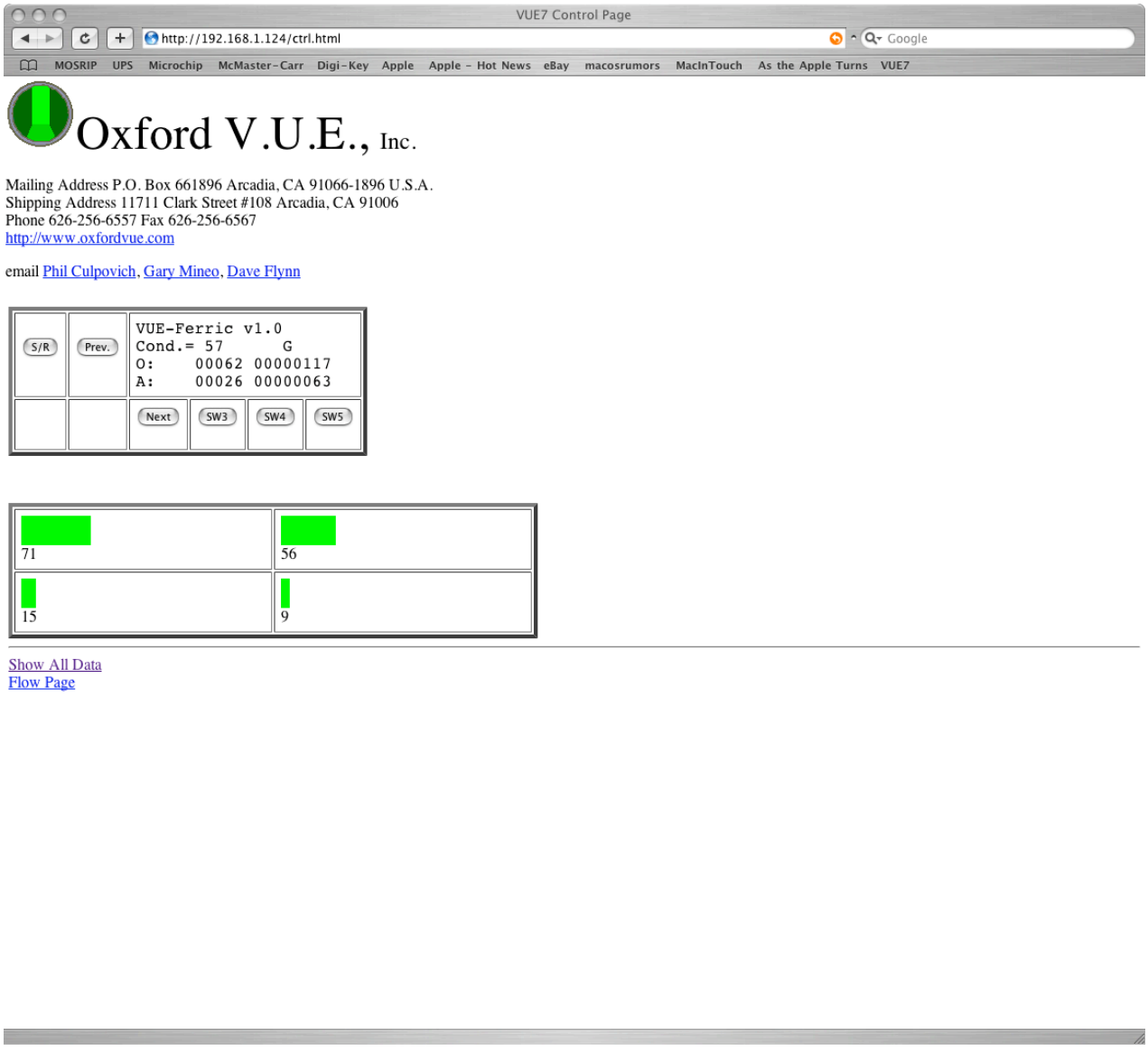


	Oxidizer	Acid
Flow Errors	0	0
Valves	0	0
Pulse #	116	62
Flow Count	00062	00026
Total Flow	00000117	00000063

VUE-7 Flow Page



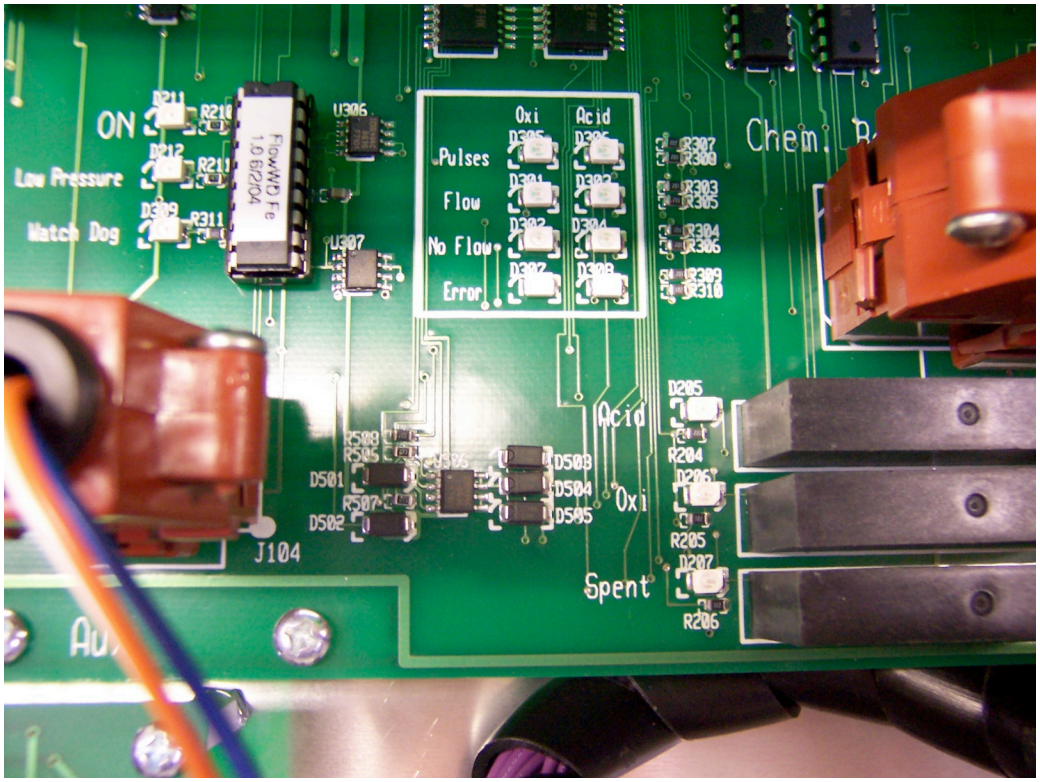
VUE-7 Data Page



VUE-7 Control Page

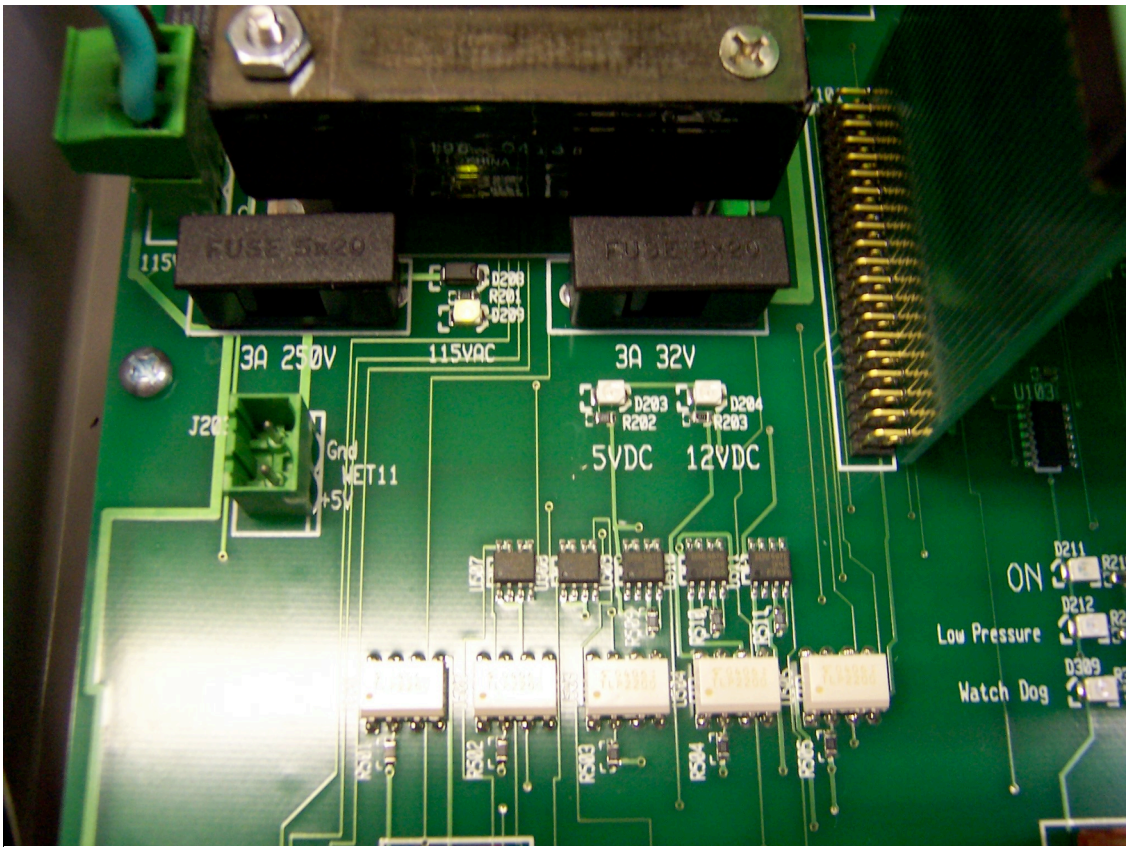
ELECTRONIC SECTION – INTERNAL INDICATORS – MOTHERBOARD

L.E.D.	Color	Description
ON	Amber	Controller senses etchant pressure and is operating.
Low Pressure	Red	Pressure switch sensing low incoming pressure or intermittent operation. Comes on briefly when controller shuts down.
Watch Dog	Amber	Flashing indicates normal operation. Turns off or stays on solid if failure of unit occurs. Contact Oxford V.U.E., Inc. for assistance.
Oxi Pulses	Green	Indicates function of Oxidizer Flow Detector. Flash rate can be used to determine if oxidizer flow is restricted or incorrect.
Acid Pulses	Green	Indicates function of Acid Flow Detector. Flash rate can be used to determine if acid flow is restricted or incorrect.
Oxi Flow	Green	Indicates oxidizer is flowing through oxidizer valve.
Acid Flow	Green	Indicates acid is flowing through acid valve.
Oxi No Flow	Green	Indicates oxidizer is not flowing through oxidizer valve.
Acid No Flow	Green	Indicates acid is not flowing through acid valve.
Oxi Error	Red	Indicates incorrect flow condition for oxidizer input. (i.e.: flow indication when valve is closed or no flow indication when valve is open). May indicate closed ball valve or oxidizer valve failure.
Acid Error	Red	Indicates incorrect flow condition for oxidizer input. (i.e.: flow indication when valve is closed or no flow indication when valve is open). May indicate closed ball valve or oxidizer valve failure.
Acid	Green	Indicates power to acid valve
Oxi	Green	Indicates power to oxidizer valve
Spent	Green	Indicates power to spent valve



ELECTRONIC SECTION – INTERNAL INDICATORS – MOTHERBOARD POWER SECTION

	L.E.D.	Color	Description
Power Supply Section	115VAC	Green	Indicates when Vis-U-Etch™ 7 is plugged in to a live wall outlet and the input (3A, 250V) fuse is good.
	5VDC	Green	Indicates internal 5-volt D/C power and that low voltage (3A, 32V) fuse is good (On whenever unit is operating).
	12VDC	Green	Indicates internal 12-volt D/C power and that low voltage (3A, 32V) fuse is good (On whenever unit is operating).

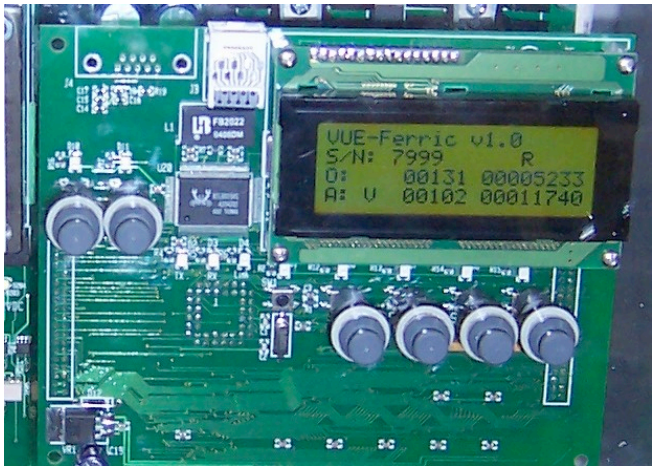


Motherboard Power Section

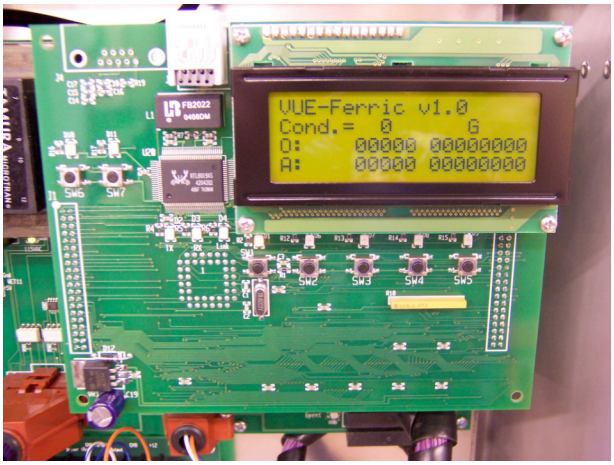
INTERNAL SWITCHES

The PLC printed circuit board in front with the LCD display is seen through the front cover and contains the function switches. Function switches should be operated with the front cover closed by using the gray colored pushbuttons. The function of each switch is listed in the table below:

SW1	Resets or "reboots" the computer (All stored settings remain in memory).
SW2	Advances to the next service mode when service mode operation is selected or the next display mode when normal display is selected.
SW3	Function is according to the text listed directly above on the LCD display when service mode operation is selected.
SW4	Function is according to the text listed directly above on the LCD display when service mode operation is selected.
SW5	Function is according to the text listed directly above on the LCD display when service mode operation is selected. Cancels Input Chemical Failure Alarm if activated.
SW6	Enters/Exits service mode from normal display mode.
SW7	Returns to previous service mode by numerical order or previous normal display mode.



Pushbuttons On Front Cover (Closed)



Switches On Computer PCB (Cover Open)

CHEMICAL BOX CONNECTOR COLOR CODE

Category	Item	Color Order From Main Harness Toward Connector End
Valves		
	Acid	Green/Red
	Oxidizer	Green/Blue
	Spent	Green/Yellow
Light Cells		
	Input	Blue
	Output	Green
Signet Flow Detectors		
	Acid	Yellow/Red
	Oxidizer	Yellow/Green
Pressure Switch	-	Red/Green

Color code refers to the color of the tie wraps around each connector starting from the wiring harness side of each connector of the Chemical Section Internal Wiring Harness.

ELECTRICAL REQUIREMENTS

110VAC, 50-60HZ, 2.5A, Standard USA Grounded Outlet.

DO NOT use on same circuit as electric motors or with other devices that cause electrical interference.

CHEMICAL REQUIREMENTS

I. Oxidizer: Various. Contact Oxford V.U.E., Inc. for an approved vendor.

II. Acid: Use only water white acid (31%, 20^{o} Baumé, Fe <1ppm, Sulfates <250ppm).

CHEMICAL PRECAUTIONS

SODIUM CHLORATE BASED OXIDIZER **($NaClO_3$)** is a powerful oxidizing agent. A fire hazard exists when it is mixed and dried with any oxidizable material such as wood, paper, etc. Instruct **ALL** personnel handling this chemical of its properties - read the Material Safety Data Sheet supplied with ALL chemicals. There is no longer a fire hazard once the oxidizer mixes with the etchant as controlled by the Vis-U-Etch™ 7.

HYDROCHLORIC (Muriatic) ACID is a strong acid. Never mix acid and chlorate, as a violent chemical reaction occurs and an abundance of chlorine gas will be liberated.

As a rule, etchant has very little odor to it however powered venting is required. A strong chlorine odor indicates an out of balance chemistry (See "Causes of Chlorine Gassing" section). If chlorine is detected, turn the Etch In ball valve **"off"**. Etch metal until the excess chlorine is consumed and then check for the cause.

DO NOT TURN THE ETCH MACHINE OFF WHILE REGENERATION IS IN PROCESS. Allow at least five (5) minutes after all lights go off (except pilot and spent lights) before turning off etcher to flush the lines of any concentrated chemicals.

RECOMMENDED MAINTENANCE AND TESTING SCHEDULE

Daily:

- Pressure at Vis-U-Etch™ 7. If down, check Y-Strainer and any filter(s) in Etch In line.
- Operate each valve manually, check for fluid movement at glass tubes.
- Inspect for leaks: Repair immediately.
- Verify metal content of etchant. Due to the wide variety of types of metal etched, use the appropriate standard lab test for the metal you are etching.
- Verify Baumé of etchant (see "Etcher: Baumé Inspection Tube" section).
- Verify that etchant has not back-flowed through the oxidizer or acid valve and into the lines coming from the tanks. A back-flow of etchant through the acid or oxidizer valve indicates a plugged Etch Out return line.

Annually:

- Replace ball valves.
- Replace black Parker fittings.
- Replace all o-rings.

Valves:

- Two valves are used for vacuum operation. The spent valve (when used) is the only pressure-operated valve. If any leakage is observed from a valve, replace the valve core or the valve as necessary. These valves have a custom Aflas® core and seals specially designed for use with etchant chemicals and are available only from Oxford V.U.E., Inc. Standard valve replacements are not designed for this purpose and will fail quickly.

General:

- Keep the cabinet clean with 210 Plastic Cleaner or equivalent. Use no solvents on the case.
- When replacing any plumbing parts, use silicone dielectric compound only on the O-rings.
- For threaded non-permanent fittings, use 100% Silicone® sealer.
- **NEVER USE TEFLON TAPE ON FITTINGS. Teflon tape WILL leak and cause operating problems.**

COPPER ETCHANT TESTING - COPPER ANALYSIS

1. Pipette a 1.0 ml. sample of cupric chloride etching solution into a 250 ml. Erlenmeyer flask. For best accuracy, a "To Contain" (TC) pipette is recommended. After dispensing cupric solution from pipette wipe down the exterior of the pipette and rinse out the interior with DI water into the sample flask-total DI water addition should be approximately 50 ml.

2. Add 1-3 ml. of 28% ammonium hydroxide to a deep blue color. Upon color change add a couple extra drops for confirmation of saturation.

3. Add 1-3 ml. of concentrated acetic acid to a clear light blue solution. Upon color change add a couple extra drops for confirmation of saturation.

4. Add 4-5 grams potassium iodide to a dark almost transparent brown-again, excess is preferred.

5. Titrate with 0.10 normal sodium thiosulfate to a clear "water" color.

Calculations:

$$\text{Copper by ounces per gallon} = \frac{\text{ml. sodium thiosulfate} \times 6.354}{7.5}$$

COPPER ETCHANT TESTING - ANALYSIS FOR FREE ACID NORMALITY

1. Put 10 ml etchant into 200 ml beaker.

2. Add 40 ml DI water. If solution becomes turbid (cloudy) stop normality is <= 0.005N.

3. If solution is clear blue titrate with 0.1N Sodium Hydroxide (NaOH). Add 0.1N NaOH until turbid (cloudy). Normality is milliliters of NaOH divided by 100.

Example: If 3 ml of NaOH is required, Normality is 0.03N

Note: Solution becomes turbid when hydroxide (OH) ions are available to bond with the $CuCl_2$. This occurs at 2.9 pH. None of the common color indicators work accurately because the critical pH is 2.4 – 2.9 and a large amount of OH is absorbed by the $CuCl_2$ without a change in pH.

COPPER ETCHANT TESTING - SODIUM CHLORATE CONCENTRATION

Scope and Application

Chlorate is reduced with ferrous sulfate (added in excess) and the excess ferrous sulfate is back titrated with potassium dichromate in the presence of BDAS indicator. The color change of the redox reaction is green to purple. Please note the reaction stoichiometry is 6 mol potassium dichromate to every one mol of sodium chlorate.

Equipment Required
Burette, 50 ml
Erlenmeyer flask, 250 ml
Pipettes, 5 and 25 ml

Reagents Required
BDAS indicator, (0.15% w/v (1.5 g/1000 ml) barium diphenyl amine sulfonate dissolved into phosphoric acid, 75%)
Ferrous sulfate, standardized, 0.20 N
Phosphoric/sulfuric acid solution, (50% v/v phosphoric acid 75%, 25% v/v sulfuric acid, and 25% v/v DI water)
Potassium dichromate, 0.20 N

Procedure

1. Pipette a 10.0 ml sample of the cupric chloride solution into a 250 ml Erlenmeyer flask containing 50 ml of DI water. Add 25 ml of phosphoric/sulfuric acid solution.

3. Pipette 25.0 ml of ferrous sulfate, standardized, into the sample and heat to **near boiling** for three minutes. Allow to cool.

4. Add approximately 10-15 drops of BDAS indicator and titrate with potassium dichromate, standardized, from a green to a purple endpoint. Record the number of ml required as "S".

5. **Ferrous sulfate, standardized is unstable!** It is necessary to run a blank each day to account for changes in the ferrous sulfate concentration. To prepare a blank, pipette 25.0 ml of ferrous sulfate into a 250 ml Erlenmeyer flask containing 50 ml of DI water and 25 ml of phosphoric/sulfuric acid mixture. Add approximately 10-15 drops of BDAS indicator and titrate with potassium dichromate, standardized, from a green to purple endpoint. Record the number of required as "B".

Calculations

$$\frac{(B - S) \times N \times M \times R}{V} = \text{g/L sodium chlorate}$$

Where
- B = ml titrant required for the "Blank"
- S = ml titrant required for the "Sample"
- N = N of potassium dichromate
- M = M.W. of sodium chlorate (106.45)
- R = Reaction stoichiometry (1:6 or 0.1667)
- V = volume of sample in ml (10)

The typical range for free sodium chlorate in a working bath is =<5 g/L. Adjustments to the sodium chlorate concentration are not necessary.

CHLORINE GAS EVENT - SAFETY PROCEDURE

In order to regenerate or convert cuprous chloride (CuCl) back to cupric chloride ($CuCl_2$), chlorine gas (Cl_2) must be added to the etchant. The safest method of chlorine gas addition is to combine two agents in the etchant that produce chlorine gas that is immediately consumed by the cuprous to cupric reaction. This is how your Vis-U-Etch™ 7 operates. Combined with a sodium (Na) buffer/catalyst, the Vis-U-Etch™ 7 is the safest and most stable of all systems. There is, however, the ever-present possibility of a chlorine gas event due to improper calibration, mechanical failure or operator error. At the **first** sign of a chlorine gas smell, calibration and/or mechanical failure should be checked. **If corrected immediately, the etchant will remain balanced and no loss of production will occur. If left unchecked, a significant chlorine gas release can occur, stopping production and clearing the etch room of all personnel.** In a perfect world, all personnel would read all owner's manuals and procedure manuals and be properly trained in the operation and safety of the equipment they use. Realizing that sometimes things don't go as planned, here is the proper way to handle a chlorine gas event:

1. Turn off the etcher and all equipment except for room and etcher ventilation.
2. Leave the affected area until the chlorine gas has dissipated.
3. Since there is still an excess of chlorine gas trapped in the etchant, a sufficient amount of metal panels (or other form of same metal composition as normally etched) must be obtained to be dissolved by the etchant.
4. Put on an activated carbon respirator before entering the etch room.
5. Upon return to the etch room, place metal panels on the conveyor and run the conveyor **only** to bring the panels into the spray area of the etcher then stop the conveyor.
6. **Make sure that acid and oxidizer switches are turned off.**
7. **Turn on the etchant spray for only a few seconds** to cover the panels with etchant.
8. Allow the panels to sit for about one minute and then turn on the spray again for a **few seconds only**.
9. Repeat this procedure until all metal is removed from the panels.
10. Run new panels into the etcher and the etched panels out.
11. Repeat the above procedure until no more chlorine smell is evident when the spray nozzles are turned on and can be left on. (This may take quite a while)
12. At this point it is imperative to determine the cause of the gas release or you will end up with the same problem again. Consult the appropriate sections of this owner's manual or call Oxford V.U.E., Inc. for technical help or to set up a training session.
13. Make sure the problem is corrected before acid and oxidizer switches are returned to the automatic position.
14. If etchant is severely over-oxidized, the Vis-U-Etch™ 7 can be operated in automatic for acid only with the oxidizer switched off until all oxidizer is consumed. This would be accomplished by continuing to etch after the chlorine smell is gone. You will know that all oxidizer has been consumed when regeneration with acid alone is not enough to bring the Input Monitor higher than the four bar minimum for completion of regeneration.
15. In case of a severely unbalanced condition, it may be best to have the etchant pumped out of the etcher and into a properly vented and fume-scrubbed spent tank. Fresh or properly regenerated etchant should then be pumped in.

Remember: The goal is to learn how to prevent these problems from happening in the first place.

CAUSES OF CHLORINE GAS RELEASE (IN ORDER OF USUAL OCCURRENCE)

CAUSE	SOLUTION
Too much oxidizer.	Turn off Etch In ball valve. Find reason for excessive oxidizer. (Calibration, leaky valve, etc.)
Improper calibration.	Recalibrate. (Get metal up to normal first)
Excess metal sludge in etchant.	Clean out etcher and refill with fresh etchant.
Yellow acid or oxidizer.	Use water white acid. Yellow "fools" the Light Cells. Use only oxidizer approved by Oxford V.U.E., Inc.
Controller failure	Contact Oxford V.U.E., Inc. to arrange service call.

TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
Salt crystals form overnight. May clog lines or Vis-U-Etch™ 7 injector.	Metal content in etchant too high.	Add water to etch machine. Check Baumé controller water feed and operation.
Low reading on monitors, may display "Error".	Metal content in etchant too high.	Add water to etch.
	Filters in oxidizer or acid pickup tubes clogged.	Clean filters.
	Injector plugged with salt or foreign material.	Back flush lines with water to clear.
	Etching too fast for Vis-U-Etch™ 7 to keep up.	Allow more space between panels being etched on conveyor.
Vis-U-Etch™ 7 unable to regenerate fast enough to keep up with etching all or most times.	Vis-U-Etch™ 7 capacity too low.	Contact Oxford V.U.E., Inc. for Chemical Section upgrade.
Monitors too sensitive, may display red "Error" LED.	Metal content too low.	Check for water diluting the etchant. Use appropriate metal test procedure to determine metal level.
	Etch temperature too low.	Raise etchant temperature to no more than 125°F (52°C).
System does not come on or goes on and off while regenerating and releasing spent etchant.	Filter in Etch In line dirty.	Clean Filters.
	Flow valve improperly set.	Readjust flow valve to 20 - 25 PSI.
	Etching machine pressure too low.	Check etching machine pressure at Vis-U-Etch™ 7. 20 - 25 lbs required.
Etching speed slow.	Temperature low. Metal	Adjust to normal. Check metal

PROBLEM	CAUSE	SOLUTION
	content low.	content.
	Rinse water diluting etchant.	Minimize any water drag-in to etchant.
Regeneration slow.	Filters in oxidizer and/or acid barrel pickup tubes clogged.	Clean filters.
	Etch machine pressure low, causing slow injection.	Clean filters.
Rapid movements, fluctuations of monitors, or insensitivity.	Air bubbles in etch.	Check for etcher pump cavitation. Check for leaks in acid and oxidizer feed lines.
Etch moving backwards (i.e.: from etch machine to acid/oxidizer barrels).	Blockage in Etch Out return line from Vis-U-Etch™ 7.	Clear restriction or blockage. Make sure there are no valves in return line.
	Blockage in return line from Vis-U-Etch™ 7. Baumé too high.	Check operation of Baumé controller. Add water to etchant to lower Baumé.
Chlorine gas.		Turn off Etch In ball valve. Etch boards until gas is eliminated. See "Chlorine Gas Event-Safety Procedure" section.
Spent Valve won't turn off (spent pumping light is off).	Defective valve or valve core.	Replace valve or valve core.
	Pressure too high	Reduce Etch In pressure to 20-25 PSI.
Movement in Output Monitor only. Flow Error indicated.	Air leak in acid or oxidizer pickup tubes or fittings on feed lines.	Look for bubbles in lines and repair.
Acid Flow Error occurs, Acid Pumping light on.	Little or no Acid coming through plumbing, bubbles noted in plumbing.	Locate leak between Acid barrel and Chemical Section. Repair leak. See "Input Chemical Failure Alarm" section.
Oxidizer Flow Error occurs, Oxidizer Pumping light on.	Little or no Oxidizer coming through plumbing, bubbles noted in plumbing.	Locate leak between Oxidizer barrel and Chemical Section. Repair leak. See "Input Chemical Failure Alarm" section.
Acid Flow Error light occurs, Acid Pumping light off.	Acid coming through plumbing due to stuck open Acid Valve.	Repair or replace Acid Valve. See "Input Chemical Failure Alarm" section.
Oxidizer Flow Error occurs, Oxidizer Pumping light off.	Oxidizer coming through plumbing due to stuck open Oxidizer Valve.	Repair or replace Oxidizer Valve. See "Input Chemical Failure Alarm" section.

WARRANTY

Oxford V.U.E., Inc. herein referred to as the Company, warrants the Vis-U-Etch™ 7 to be free from defects in material and workmanship under the prescribed installation and under normal use and service.

The Company's obligation under this warranty is limited to repairing or replacing, at its option, any part or parts thereof, claimed to be defective, which shall, within six (6) months after delivery to the original purchaser, be returned prepaid to the Company. The six-month warranty period shall extend to all parts only.

Parts that have been modified, disassembled, abused or operated in a manner inconsistent with this manual or instruction by Oxford V.U.E., Inc. personnel will void the warranty on such parts.

Parts returned to the Company shall be accompanied by a statement describing the problem, the date placed in service and examination of the part shall disclose the company's satisfaction to have been defective.

This warranty does not cover fitness for a particular purpose nor does it cover improper operation caused by failure of other equipment to which it is attached or incompatibility with said other equipment.

This warranty is in lieu of any other warranties, expressed or implied.

No warranty or any other technical service will be provided for delinquent accounts more than thirty (30) days late.

DISCLAIMER

The information contained is this manual is intended to be a guide for the usage of the Vis-U-Etch™ 7 and its control of etchant solution. This manual does not and cannot cover all situations for all etchant and etcher uses since this information changes continuously as new equipment models and practices are introduced to the workplace. It is best to consult Oxford V.U.E., Inc. or your local distributor as well as other applicable equipment and chemical vendors to find the latest information available as it applies to your workplace.

Oxford V.U.E., Inc. always recommends the highest level of safety and concern for the environment be followed.