

**TECHNICS**

**The PlanarEtch IIA  
Plasma System**

TECHNICS INC.  
STANDARD WARRANTY

TECHNICS INC. STANDARD WARRANTY POLICY IS TO ASSUME SYSTEM RESPONSIBILITY. ALL PRODUCTS MANUFACTURED BY SELLER ARE WARRANTIED TO BE FREE FROM DEFECTS IN MATERIALS OR WORKMANSHIP FOR ONE YEAR ON PARTS AND 90 DAYS ON LABOR, FROM THE DATE OF PURCHASE. TECHNICS INC. WILL WARRANTY ALL PRODUCTS NOT MANUFACTURED BY THEM FOR A PERIOD NOT TO EXCEED THE MANUFACTURER'S WARRANTY. SHOULD BUYER HAVE ANY CLAIMS AGAINST THE PURCHASED SYSTEM, TECHNICS ASSUMES FULL SYSTEM RESPONSIBILITY FOR INSURING PROMPT REPAIR. ALL WARRANTIED SHIPMENTS ARE FOB, TECHNICS INC., SAN JOSE, CALIFORNIA.

O<sup>2</sup> ON GAS I INPUT

EFFECTIVE 3-1-83

TECHNICS INC.  
SERVICE SCHEDULE

1. OUT OF WARRANTY SERVICE

THE SERVICING OF TECHNICS INC., EQUIPMENT NO LONGER UNDER WARRANTY WILL BE PROVIDED ON A "AS REQUESTED" BASIS. OUR SERVICE PERSONNEL WILL RESPOND WITHIN 48 HOURS WHENEVER POSSIBLE. WE REQUEST A VALID PURCHASE ORDER PRIOR TO SENDING ANY OF OUR SERVICE PERSONNEL INTO THE FIELD.

PRICE (MINIMUM 1/2 DAY)           \$440.00/DAY, + PARTS AND  
EXPENSES (TRAVEL, LODGING,  
MEALS)

2. IN HOUSE SERVICE

FOR SYSTEMS RETURNED TO TECHNICS INC., FOR OUT OF WARRANTY SERVICE THE FOLLOWING RATES WILL APPLY:

PRICE (MINIMUM 1 HOUR)           \$45.00/HOUR + PARTS

3. APPLICATIONS LAB SERVICE

FOR CUSTOMERS WISHING TO DO CONTRACT SERVICE WORK, PROCESS DEVELOPMENT (OTHER THAN CUSTOMER SAMPLES), OR LIMITED DEVICE MANUFACTURING, THE FOLLOWING RATES ARE IN EFFECT:

PRICE (MINIMUM 1/2 DAY)           \$640.00/DAY + MATERIAL

(NOTE: CUSTOMERS WISHING TO CONTRACT FOR EXTENSIVE LONG TERM DEVELOPMENT PROGRAMS, OTHER PRICING STRUCTURES ARE AVAILABLE ON REQUEST.)

4. SERVICE CONTRACTS

TECHNICS INC., OFFERS A PREVENTATIVE MAINTENANCE SERVICE CONTRACT ON ALL OF OUR SYSTEMS. WE SHOULD PROMOTE AND SELL THIS SERVICE TO OUR CUSTOMERS WHENEVER POSSIBLE. THIS SERVICE REDUCES THE NUMBER OF PREVENTABLE SERVICE CALLS WE RECEIVE AND ALLOWS US TO SCHEDULE OUR SERVICE PERSONNEL FOR BETTER UTILIZATION OF THEIR TIME. THE PRICING ON THESE CONTRACTS IS ON A PER CUSTOMER/SYSTEM TYPE BASIS. PRICING IS AVAILABLE FROM THE FACTORY. (CUSTOMER STOCKING OF A & B LEVEL KITS IS REQUIRED.)

EFFECTIVE 3-1-83

Table 5-1. Preventive Maintenance Checklist. Use this checklist to maintain the efficiency of your Technics PE-IIA PM Program. These sheets may be removed and duplicated as a handy assignemnt log for the person doing the maintenance.

CAUTION

Use lintfree gloves when working inside the process chamber, because fingerprints cause contamination of the processing operations.

*Telex - 357-482*  
*FAX - 408-946-1898*  
*Telephone - 408-946-8700*  
*(8701)*

CHAMBER, BASEPLATE AND PROCESS KIT CLEANING

Chamber Wet clean	100 hours etching
Pedestal: Check for deposits; clean if needed	One weekly check
Viewport: Clean the window	One monthly check
O-ring: Clean	One weekly check
O-ring: Replace	12-month check

VACUUM SYSTEM

Roughing pump: Check oil level	One weekly check
Oil purifier: Inspect filter, replace if pressure not within 18-22 psi	One monthly check
Throttle valve: Replace O-rings (if used)	6-month check
Roughing valve: Replace O-rings	6-month check

GAS FLOW SYSTEM PD-IIA (if used)

AFMS: Calibrate	3-month check
(Mass flow meter: Clean it if it cannot be calibrated)	
(Gas filters: Replace if mass flow meter cannot be calibrated after cleaning)	

RF SYSTEM

RF generator: Inspect and clean; recalibrate if out of tolerance	3-month check
Water flow switch: Make sure it functions	One weekly check

CAUTION

Use the lintfree gloves when working inside the process chamber, because fingerprints cause contamination of the processing operations.

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FACILITIES

H<sub>2</sub>O check for 20psi Δ P between inlet and return lines

One weekly check

N<sub>2</sub> pressure: Check for 60psi (4.2 kg/cm<sup>2</sup>)

One weekly check

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MAINTENANCE CERTIFICATION

     WEEKLY

     MONTHLY

     3-MONTH

     6-MONTH

     12-MONTH

PERFORMED BY:

\_\_\_\_\_ (Signature)

\_\_\_\_\_ (Title)

\_\_\_\_\_ (Department)

\_\_\_\_\_ (Date)

VERIFIED BY:

\_\_\_\_\_ (Signature)

\_\_\_\_\_ (Title)

\_\_\_\_\_ (Department)

\_\_\_\_\_ (Date)

On the back of this sheet, note any comments or problems encountered during this preventive maintenance check.

PREVENTIVE MAINTENANCE

Comments, problems, or suggestions:

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)

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# TECHNICS

PEIIA/PDIIA  
REQUIRED SERVICES AND SUPPLIES

SALES REPRESENTATIVE: \_\_\_\_\_ COMPANY: \_\_\_\_\_  
 OFFICE ADDRESS: \_\_\_\_\_ ADDRESS: \_\_\_\_\_  
 TELEPHONE #: \_\_\_\_\_ TELEPHONE #: \_\_\_\_\_  
 JOB (SERIAL) #: \_\_\_\_\_ TECHNICAL USER: \_\_\_\_\_

THE FOLLOWING ARE REQUIRED SERVICES AND SUPPLIES REQUIRED PRIOR TO START-UP OF THE TECHNICS PEIIA/PDIIA PLASMA SYSTEM.

ELECTRICAL REQUIREMENTS:

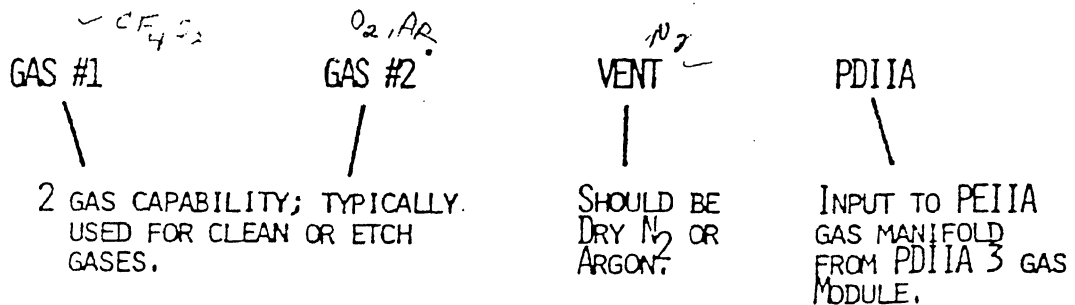
PEIIA SYSTEM POWER: 115VAC, 20A, 50/60Hz, 1 PH ✓  
 PDIIA MODULE POWER: 115VAC, 20A, 50/60Hz, 1 PH  
 VACUUM PUMP (LH-D16AC): 115/230VAC, 15A\*, 60Hz, 1 PH\*

OPTIONS:

A) EXTERNAL OIL PURIFICATION SYSTEM: 115VAC, 5A, 60Hz ✓  
 B) DOWNSTREAM PRESSURE CONTROL: 115VAC, 1A, 60Hz ✓

GAS SYSTEM:

GAS CONNECTIONS ARE MADE TO THE REAR PANEL OF THE PEIIA AND PDIIA BY MEANS OF ~~THE~~ COMPRESSION FITTINGS. TEFLON TUBING IS ACCEPTABLE FOR USE WITH FLUORINATED ETCHING GASES. STAINLESS STEEL TUBING IS RECOMMENDED FOR USE WITH SILANE OR CORROSIVE GASES. (THE PEIIA/PDIIA INTERNAL GAS LINES ARE STAINLESS STEEL). IN EITHER CASE, TUBING SHOULD BE CLEAN AND FREE OF DEFECTS. PLUMBING SHOULD BE ACCOMPLISHED WITH A MINIMUM NUMBER OF FITTINGS TO INSURE A LEAK TIGHT GAS SYSTEM. (I.E., TUBE BENDING INSTEAD OF ANGLE FITTINGS) NOTE: IN HOUSE PLUMBING SHOULD BE LEAK CHECKED; PARTICULARLY IF ANY HAZARDOUS GASES ARE TO BE USED. THE REAR PANEL OF THE PEIIA HAS FOUR (4) GAS INLETS LOCATED UNDER THE VACUUM PORT LABELED:



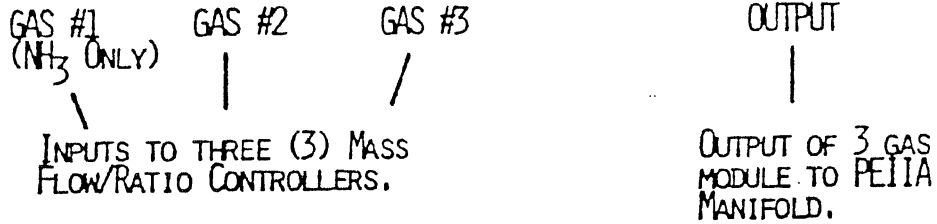
THE REAR PANEL OF THE PDIIA HAS THREE (3) GAS INLETS AND ONE (1) GAS OUTPUT LABELED:

\*OTHER MOTOR VOLTAGES AND PHASING AVAILABLE UPON REQUEST (CHECK PURCHASE ORDER)



# TECHNICS

PAGE 2.



PROCESS GASES USED SHOULD BE ELECTRONIC GRADE QUALITY.

## OTHER SERVICES REQUIRED:

COMPRESSED AIR: (FOR PNEUMATIC VACUUM VALVE)  
70-100 PSI - CONNECTS TO PEIIA REAR PANEL BY MEANS OF 1/4" COMPRESSION FITTING.

WATER COOLING: (FOR BASEPLATE AND ELECTRODE)  
FLOW: 1/2 GPM  
PRESSURE: NOT TO EXCEED 20 PSI *must be greater than 20 PSI*  
TEMP: 20-40°C 104°F  
PURITY: 5 MICRON FILTER RECOMMENDED OR DE-IONIZED WATER

*68°F*

*CHEM-TEC  
LPH-250-2A*

WATER IN AND WATER OUT CONNECTIONS TO PEIIA REAR PANEL BY 1/4" COMPRESSION FITTINGS.

## VACUUM PUMP EXHAUST:

PUMP EXHAUST SHOULD GO THROUGH A FUME SCRUBBER. PUMP THROUGHPUT IS 14.1 CFM.

*EPA - regulates emissions →*

*OSHA - requires*

*AT Attention Mike -  
Belmar - 6692*

*Dan  
Kern*

*Mike  
Ling - 6178*

*Mike  
Golden - 5169*

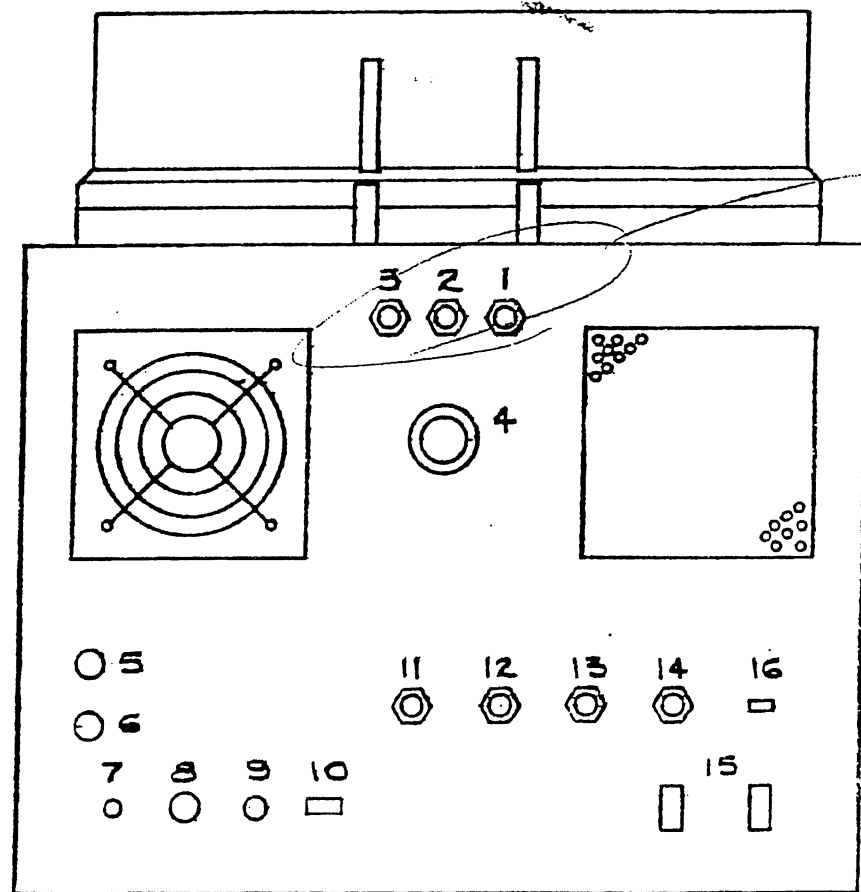
*20 3" PVC pipe*

# TECHNICS

## PE II-A

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. WATER IN. <math>\frac{1}{2}</math> GPM, 15-20 P.S.I. *</li> <li>2. WATER OUT. *</li> <li>3. COMPRESSED AIR 70-100 P.S.I. *</li> <li>4. VACUUM LINE <math>1\frac{1}{2}</math>" I.D.</li> <li>5. FUSE, RF GENERATOR 20AMP.</li> <li>6. FUSE, RF GENERATOR 20AMP.</li> <li>7. SYSTEM POWER 115VAC/20A/50-60Hz/1PH</li> <li>8. FUSE, SYSTEM 20AMP</li> </ol> | <ol style="list-style-type: none"> <li>9. STRIP CHART RECORDER</li> <li>10. T.C. CONNECTION PD II-A</li> <li>11. GAS #2</li> <li>12. GAS #1</li> <li>13. VENT</li> <li>14. GAS CONN. PD II-A MODULE</li> <li>15. ELECT. CONN. PD II-A MODU</li> <li>16. PE II-A / PD II-A, SELECTOR</li> </ol> |
|--|--|

\*  $\frac{1}{4}$  COMPRESSION FITTING

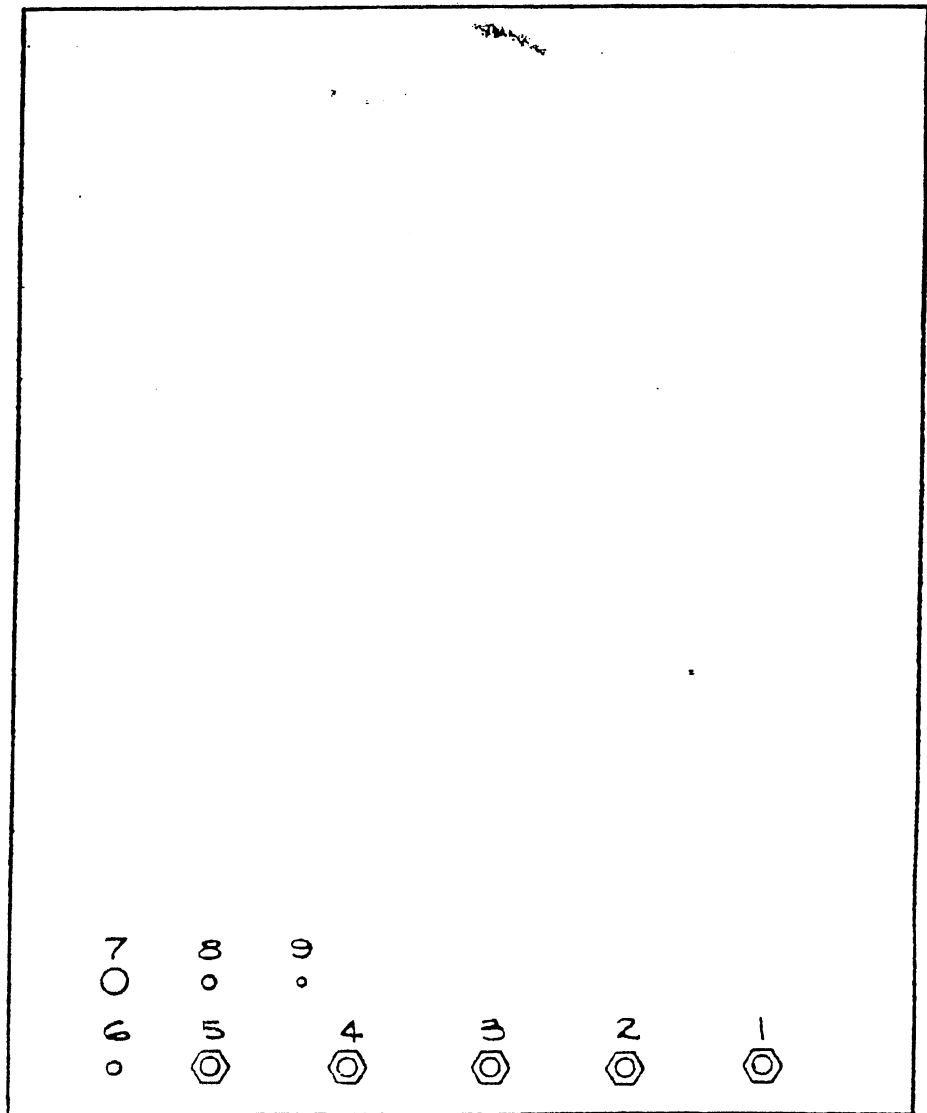


SYSTEM DIMENSIONS :  $17\frac{1}{4}$  (w) x 21 (D) x 21 (H)  
inches (31 inches open)

TECHNICS  
PD II-A

1. GAS #3 \*
2. GAS #2 \*
3. GAS #1 \*
4. OUTPUT \*
5. COMPRESSED AIR 70-100 P.S.I. \*
6. SYSTEM POWER 115 VAC/20A/50-60Hz/1 PH
7. FUSE 20AMP.
8. ELECTRICAL CONNECTION PE II-A
9. THERMOCOUPLE to PE II-A

\* 1/4 COMPRESSION FITTINGS



SYSTEM DIMENSIONS: 10(W) x 21(D) x 15(H) inches

## 1.1 DESCRIPTION

The Technics PlanarEtch IIA plasma system, PE-IIA, generates a low pressure, low temperature, gaseous plasma. Plasma reactions such as ashing and etching can be performed by this system.

With the addition of the Planar Deposition IIA module, PD-IIA, the PE-IIA can be converted from an etching system to a deposition system.

The system consists of a vacuum system, a gas system, an RF generator, solid state electronics, a water cooling system, a plasma treatment chamber, pneumatic air, interlocks, front panel controls and indicators.

## 1.2 VACUUM

The vacuum system consists of a single phase, direct drive 14 cfm pump, a pneumatic vacuum valve, and a Baratron vacuum sensor.

The vacuum valve and sensor are attached to the baseplate of the chamber. A vacuum line extends from the valve out through the back of the system.

The vacuum pump is filled with Fomblin Y25/5 oil. Fomblin oil is an oxygen resistant, halocarbon type oil used as a safety precaution when using oxygen.

## 1.3 GAS

The Gas system consists of four (4) input ports on the back of the PE-IIA. It allows the user to control three (3) gas flows into the chamber and provides a chamber vent. They are labeled GAS1, GAS2, VENT and PD-IIA.

The GAS 1 and 2 ports connect directly to the manual control valves. The GAS1 and 2 lines then go to electrical valves which connect to the gas inject manifold.

The vent line goes to an electrical valve which then connects to the gas manifold.

The PD-IIA line goes directly to the gas manifold. The gas manifold then goes directly to the chamber lid, which spreads the gas radially around the electrode.

#### 1.4 RF GENERATOR

The RF generator is a self contained module from Advance Energy Plasma Sources.

This unit provides up to 500 watts at 30 KHz frequency to the chamber electrode.

#### 1.5 WATER COOLING

The water cooling system provides cooling for the baseplate and electrode. The water input and output connections are on the back of the PE-IIA. The input line runs thru a flow switch which connects to the baseplate. It then circles thru the baseplate and goes to the electrode. From the electrode it returns to the output connection. The system requires .5 GPM at ~~15-20~~ psi. *greater than 25 PSI*

#### 1.6 PNEUMATIC AIR

The systems pneumatic air operates the vacuum valve. The drive connection is at the back of the PE-IIA. There is no return connection. 70-100 psi air is required.

#### 1.7 INTERLOCKS

There are two side microswitches to shut off system power when the side panels are removed. This does not shut off incoming power.

The water flow switch will not apply RF power to the electrode if there is inadequate water flow.

The vacuum set points, high and low, control RF power on and GAS1 and 2 respectively.

The high setpoint is factory set at 1 torr. Once the pressure is below this setpoint, the RF power can be turned on.

The low setpoint is adjustable, but is factory set at .050 torr. Once the pressure is below this set point in automatic mode, the gas lines can be turned on.

#### 1.8 CHAMBER

The plasma treatment chamber consists of the baseplate, the electrode assembly and the cover.

The cover has a viewport and is hinged to the baseplate. It is O ring sealed.

The electrode assembly attaches to the cover and is O ring sealed. The electrode assembly has an electrode which is separated by an insulator and a spacer from the cover.

The electrode is water cooled and the RF power from the generator is connected here.

The spacer provides the proper distance from the electrode to the baseplate which is ground, for the etching operation.

The cover has a gas connection from the inject manifold. The gas is spread radially around the electrode and is drawn in axially by the vacuum port in the center of the baseplate.

### 1.9 PLANAR DEPOSITION IIA (PD-IIA)

The Planar Deposition IIA module with a heated platen and a thermocouple allows the plasma etch system to be converted to a plasma deposition system.

The module contains three (3) gas lines with flow meters and controllers. The module also contains the temperature controller for the heated platen.

## 2.0 INSTALLATION

### Unpacking:

The PE-IIA is packed in a wooden crate. This crate should be carefully inspected for any shipping damage. Return to the carrier if any damage is found.

Once the unit and pump have been placed, DO NOT plug in the power to either. Check the facilities, then proceed to the start-up of the system.

## 2.1 FACILITIES PE-IIA

### 2.1.1 Power:

PE-IIA uses 115VAC, 20A, single phase.  
PE-IIA standard pump uses 115VAC, 13.2A, single phase.  
Optional pump voltages and phasing can be purchased. Please refer to your purchase order.

### 2.1.2 Gas Connections-See Figure 3:

GAS 1 - 1/4" compression fitting -  $CF_4/O_2$  490  
GAS 2 - 1/4" compression fitting -  $O_2 + ARGON$   
VENT - 1/4" compression fitting  $N_2$  -  $N_2$  or ARGON  
PD-IIA - 1/4" compression fitting

\* Gas input pressure should not exceed 5 psi. *Except Compressed Air 70-75 PSI*

### 2.1.3 Vacuum Connection-See Figure 3:

A vacuum port extends from the rear of the system. A flex hose is provided with clamps and O rings, type KF-25.

The vacuum pump uses Y25/5 Fomblin oil. This is an oxygen resistant halocarbon type oil. This is to prevent possible damage or injury.

The pump is filled with oil before shipping.

### 2.1.4 Exhaust:

The pump exhaust should go to a scrubbed exhaust. The pump throughput is 14 cfm. The pump exhaust and input ports are KF-25 connections.

### 2.1.5 Water Coolings-See Figure 3:

Water In - 1/4" compression fitting  
Water Out - 1/4" compression fitting

Supply .5 GPM at a pressure ~~not to exceed~~ 20 psi. *of water in am 20 PSI*  
(8 megaohm or greater)



2.1.6 Pneumatic Air-See Figure 3:

Compressed Air - 1/4" compression fitting

Supply between 70-100 psi of air.

2.1.7 PD-IIA-See Figures 3 and 10:

Power	- 115VAC, 20A, single phase
GAS 1	- 1/4" compression fitting
GAS 2	- 1/4" compression fitting
GAS 3	- 1/4" compression fitting
Gas output to PE-IIA	- 1/4" compression fitting
Compressed Air	- 1/4" compression fitting
Heater output to PE-IIA	- male connection
Type J thermocouple into PE-IIA	- female connection
Auto Remote PD-IIA gas on	- male connection

2.2 START-UP PE-IIA

The system is shipped in the etched configuration. For deposition, proceed to the PD-IIA start-up. DO NOT connect any power to the system yet. The PEIIA is shipped under a vacuum seal.

2.2.1 See Figure 4:

Remove the black plastic cover of the chamber lid. Inspect quartz insulator ring for damage. Check water connections on chamber lid, then connect and turn on water supply to .5 GPM, 15-20 psi. Look for leaks. Next, check chamber gas connection and RF power connection. Measure the resistance with an ohmmeter between the electrode and the cover. The reading should be 1 meg ohm or greater. Replace the black cover.

2.2.2 See Figure 3:

Attach vacuum flex hose to pump and PE-IIA. Attach exhaust of pump to exhaust line. Check pump manual for inlet and exhaust ports.

2.2.3 See Figure 5:

Lower the cover plate for the controls and put the MODE switch in the MANUAL position and the END PT/TIME switch in the TIME ONLY position. Place all other switches in the OFF or CLOSED positions. Make sure that the START/STOP button, the power button and the pump switch are in the OFF positions.

#### 2.2.4

Connect power to the PE-IIA and the pump.

#### 2.2.5 See Figure 1:

Push the power button. The watts, torr, minutes and mode displays should light. The torr display will read 1\_ \_ \_ until the unit pumps down.

#### 2.2.6 See Figures 2, 3, 5, and 11:

Switch the vent solenoid switch to open to vent the chamber. Connect and turn on the compressed air between 70-100 psi. Switch the vacuum sol'n switch to open. This will open the vacuum valve. Open the chamber lid and switch on the pump. This is to put a no load condition on the pump until the oil warms up. The pump when cold will make a loud racket and may pop the circuit breaker next to the pump switch. If this happens, simply reset the breaker and restart the pump. Allow a warm up of 2-5 mins. then close the chamber lid and let the system pump down.

#### 2.2.7 See Figures 3 and 6:

\* The system should pump down to .030 torr within 2 hours. If not, there is a leak. First separate the gas plumbing from the chamber by plugging the chamber gas connection at the chamber.

If the leak is still present, the chamber assembly leaks. **CAUTION:** When entering inside the PE-IIA, there are many unmarked live connections. The interlock should shut off the main power but not the incoming power. Disconnect the power plug to remove all power to the system. Remove the side panels and check the Baratron sensor, the T/C sensor, the heater feedthru, the electrode assembly, the vacuum valve and flex lines. If the system pumps down, the gas plumbing leaks. Check and tighten all gas fittings. If the leak is still present, plug all gas and vent lines coming into the PE-IIA. This will separate all incoming gases to the PE-IIA. If the leak is still present you must identify which gas line leaks by plugging and unplugging each of the separate gas lines. Start at the chamber inject manifold and work backwards.

#### 2.2.8 See Figure 5:

Once your system is leak tight, an air plasma can be run.

- ✓ A. Open the vacuum valve and pump the system down.
- ✓ B. Switch on GAS1 or 2 and adjust flow until the pressure reads .250 torr. ✓
- ✓ C. Turn RF power level adjustment full counter-clockwise. Switch RF power on. Slowly rotate adjustment clockwise until a plasma discharge occurs.

D) Place the RF power and gas switches in the OFF position.

#### 2.2.9 See Figure 3:

Connect gas and vent lines to desired gases making sure the input pressure is not greater than 5 psi.

The PE-IIA is now ready for process.

### 2.3 START-UP PD-IIA

The start-up of the PD-IIA is virtually the same as the PE-IIA. The difference between the two is that the electrode assembly has to be changed to accommodate the heater platen and the addition of the deposition module. DO NOT CONNECT ANY POWER TO THE SYSTEM YET.

#### 2.3.1

The PE-IIA is shipped under vacuum. Lower the switch panel and put the MODE switch in the manual position. Place all other switches in the OFF or CLOSED positions. Make sure the START/STOP button, the RF power button and the pump switch are in the OFF positions. Connect power to the PE-IIA and push the power button. The displays will light up.

#### 2.3.2 See Figure 4:

Switch the vent solenoid switch to open to vent the chamber. Once vented, switch OFF the power and unplug the unit. Remove the black plastic cover. Lift the chamber cover and place a support under the electrode to hold it up and in place for disassembly. Anything that will not damage the electrode can be used.

#### 2.3.3 See Figure 7:

Close the cover over the support and unbolt the electrode from the cover. Remove water and RF power connections. Lift the cover; the spacer, the quartz insulator and electrode should remain on the support. Remove the spacer ring.

#### 2.3.4

Make sure the O ring is in the chamber cover. Close the cover over the quartz ring and the electrode. Re-attach the electrode assembly with the bolts cut to length for the deposition electrode assembly. **CAUTION:** Do not overtighten the assembly. The electrode assembly must be tightened evenly to get the seal and not break the quartz ring.

### 2.3.5 See Figure 4:

Once the electrode has been assembled, connect the water cooling lines and the RF power connection. Connect the water supply and return line to the PE-IIA. Turn on the supply at .5 GPM, 15-20 psi and check for leaks. Using an ohmmeter, measure the resistance between the electrode and the chamber. It should be 1 meg ohm or better. Replace the black cover.

### 2.3.6 See Figure 6:

Remove the left side panel. **CAUTION:** DO NOT connect any power to the system. There are many unmarked live connections inside the PE-IIA. The interlock will turn off the main power, but not the incoming power.

Remove the heater feedthru plug by loosening the Cajon fitting.

Open the chamber cover and put the heater platen and the power feedthru in place. The power feedthru should not be forced. Remove any obstructions, such as burrs, from the feedthru hole. Push the thermocouple up into the platen; make sure it goes all the way and bottoms in the drilled hole on the platen. Attach the heater power wires from the PE-IIA/PD-IIA connection to the heater feedthru. Either clip on the feedthru can be used for either wire.

### 2.3.7 See Figures 3 and 10:

Connect the PD-IIA module gas output line to the back of the PE-IIA. Switch the mode switch from PE-IIA to PD-IIA on the back of the PE-IIA.

Attach the thermocouple connection from the PD-IIA to the connection on the PE-IIA.

Attach the heater power connection from the PD-IIA to the connection on the PE-IIA.

Attach remote connection from PD-IIA to the PE-IIA for automatic control of the PD-IIA gases.

### 2.3.8

Connect vacuum flex hose between the pump and the PE-IIA. Connect the pump exhaust to the exhaust line.

### 2.3.9 See Figure 5:

Lower the coverplate for the controls and put the MODE switch in the manual position and the END PT/TIME in the TIME ONLY position. Make sure that the START/STOP button, the power button and the pump switch are in the OFF positions.

### 2.3.10 See Figure 1:

The power button, the heater button and the flow controllers should be in the OFF position on the PD-IIA module.

### 2.3.11

Connect power to the PE-IIA, PD-IIA, and the pump.

### 2.3.12 See Figures 1 and 8:

Switch on main power to the PE-IIA and PD-IIA. The watts, torr, minutes and mode displays will light up. The torr readout will read 1\_ \_ \_ until the system is pumped down. The PD-IIA will show the flow controllers on only. The heater controller will come on only when the heater button is pushed.

### 2.3.13 See Figures 3 and 10:

Connect compressed air to back of PE-IIA and PD-IIA, set the pressure between 70-100 psi. Open the chamber cover and switch the vacuum sol'n switch to open. Leaving the chamber cover up, turn on the pump. This will put a no load condition on the pump until the oil warms up. The pump when cold will make a loud racket and may pop the circuit breaker. If this happens, simply reset the breaker and restart the pump. Allow a 2-5 min. warm-up, then close the chamber cover and let the system pump down.

### 2.3.14 See Figure 3:

The system should pump down to .030 torr within 2 hours. If not, there is a leak. First, separate the gas plumbing from the chamber by plugging the chamber gas connection at the chamber. If the leak is still present, the chamber assembly leaks. **CAUTION:** When entering inside the PE-IIA, there are many unmarked and live connections. The interlock should shut off the main power, but not the incoming power. Disconnect the power plug to remove all power to the system.

Remove the side panels and check the Baratron sensor, the thermocouple, the heater feedthru, the vacuum valve, the flex line and the electrode assembly.

If the system pumps down, the gas plumbing leaks. Check and tighten all gas fittings. If the leak is still present, plug all gas and vent lines coming into the PE-IIA. This will separate all incoming gases to the PE-IIA. If the leak is still present you must identify which gas line by plugging and unplugging each of the separate gas lines. Start at the chamber inject manifold and work backwards. This same procedure can be followed back thru the PD-IIA module to the PD-IIA gas inputs.

2.3.15

Once the system is leak tight, an air plasma can be run.

- A. Open the vacuum valve and pump the system down.
- B. Switch on GAS1 or 2 and adjust flow until the pressure reads .250 torr.
- C. Turn RF power level adjustment fully counter-clockwise. Switch RF power on. Slowly rotate adjustment clockwise until a plasma discharge occurs.
- D. Switch the RF power and gas OFF.

2.3.16 See Figure 3:

Connect gas and vent lines of the PE-IIA and PD-IIA to desired gases. The input pressure must not exceed 5 psi.

2.3.17 See Figure 9:

Vent the system and open the chamber cover. Switch on the heater at the PD-IIA module. Set the heater setpoint by pushing in and turning the center button on the temperature controller. \*The heater temperature should rise to and control at setpoint. DO NOT leave the heater alone during heat-up. Make sure the heater stops at setpoint.

2.3.18

The system is now ready for process.

**\*DO NOT SET THE TEMPERATURE SETPOINT ABOVE 350 DEGREES CENTIGRADE.**

### 3.0 OPERATION

#### 3.1 PE-IIA Front Panel Controls-See Figure 5:

##### 3.1.1 Mode Switch Auto/Manual Positions:

Auto position will cycle the system automatically when the START/STOP button is pushed.

Manual position allows the system to respond to all control switches. (If interlocks are satisfied)

##### 3.1.2 Vacuum Controls-3 Switches:

Sol'n Switch:                    Opens and closes the vacuum valve  
Vent Switch:                    Opens and closes the vent valve  
Torr Set Point Switch: Views torr high/low interlock setpoints. Allows manual adjustment of low setpoint.

##### 3.1.3 Power Controls-On/Off Switch, Level Knob:

Plasma power controls. Turns plasma power on and off and has a level adjustment knob to set power level.

##### 3.1.4 Gas 1 Controls-On/Off Switch, Level Knob:

Gas 1 controls turn gas on and off and has a flow adjustment to set flow to pressure.

##### 3.1.5 Gas 2 Controls-On/Off Switch, Level Knob:

Same as Gas 1.

##### 3.1.6 End Pt/Time Controls-End Pt/Timer only switch, Thumbwheel switches, 4 adjustments Z,G,S,L

The end point detector and timer controls. The switch selects the timer only or the timer and the end point detector together. The set position is a momentary select and allows adjustment of the L pot adjustment which sets the reference level for the end point detector. There are four (4) adjustment pots; marked Z, G, S, and L. Z is the zero, G is the gain, S is the slope and L is the level. The thumbwheel dials the setpoint for the timer 0.00 to 99.9 mins. The E/T set positions are not used, neither are the pot Z,G,S, & L. The only position usable is the timer only.

##### 3.1.7 Start/Stop Control-Pushbutton-See Figure 1:

This control is used in the automatic mode. It starts the auto sequence. At the end of the sequence, an alarm will sound until the button is pushed again to stop it.

3.1.8 Power Control-Pushbutton:

This control applies power throughout the system.

3.2 PE-IIA Front Panel Large Indicators:

3.2.1 Watts:

Indicates chamber RF power in watts.

3.2.2 Torr-See Figure 1:

Indicates chamber pressure in torr units.

3.2.3 Minutes:

Indicates amount of time plasma will be on in chamber.

3.3 PE-IIA Front Panel Small Indicators-See Figure 1:

3.3.1 Man:

Manual Mode

3.3.2 Auto:

Auto Mode

3.3.3 E/T:

End Point Detector and Time

3.3.4 Time:

Timer Only

3.3.5 Vac:

Vacuum sol'n open

3.3.6 Vent:

Vent sol'n open

3.3.7 Gas #1:

Gas 1 sol'n open

3.3.8 Gas #2:

Gas 2 sol'n open

3.3.9 Plas:

Plasma power switch on



### 3.4 Manual Operation

#### 3.4.1 See Figure 5:

With the power on, place the MODE switch in the MANUAL position. Place the End Pt/Time switch in the TIME ONLY position. Set desired time. Place all other switches in the OFF or CLOSED positions. Turn the level adjustments on the RF power, GAS 1 and GAS 2 fully counterclockwise.

#### 3.4.2 See Figure 9:

Place the vacuum sol'n switch in the OPEN position. Allow the system to pump down to .050 torr to insure vacuum integrity. Push the heater button on the PD-IIA module to turn on the heated platen. Set desired temperature setpoint. DO NOT set above 350 degrees centigrade.

#### 3.4.3 See Figures 5 and 9:

Turn on and set flows of desired gases in the PD-IIA module by setting the AUTO/OFF switch of the flow controller to AUTO and adjusting flow with the 10 turn potentiometer. Turn on and set gas flows to pressure for GAS 1 or GAS 2 by using the gas flow to pressure charts.

#### 3.4.4 See Figures 1, 5, and 9:

With the pressure stabilized and the gas flows and heated platen at desired settings, switch on the RF power and adjust the power level to desired setting with the WATTS readout.

#### 3.4.5

This sets the pressure, power level, gas flows and temperature parameters for the process to be performed.

#### 3.4.6 See Figure 5:

Switch OFF the gases and RF power. Let the system pump down. Then close the vacuum valve and open the vent valve.

#### 3.4.7 See Figure 2:

Once the system vents, close the vent valve. Load the parts to be treated in the chamber on either the heated platen or the baseplate. Place the parts directly under the electrode. Do not cover the vacuum port at the center of the baseplate or platen.

### 3.5 Automatic Operation

#### 3.5.1

Please use steps 3.4.1 thru 3.4.5 of the manual operation procedure. This will set-up the system parameters of pressure, RF power level, gas flows and temperature.

#### 3.5.2 See Figures 3 and 5:

Place the MODE switch in Auto. Place the vacuum sol'n and the vent sol'n switches in the open position. Place GAS 1 and GAS 2 or both switches to ON position. If the PD-IIA module is being used, place the GAS 1 switch to the ON position, GAS2 switch to the OFF position and put the AUTO/OFF switches on the PD-IIA flow controllers to the AUTO positions. Make sure that the PE-IIA to PD-IIA mode switch on the back of the PE-IIA is in the PD-IIA position. This will allow the GAS 1 signal to turn on the PD-IIA module flow controllers.

#### 3.5.3 See Figure 5:

Set the timer thumbwheel switches to the desired time. Place the RF power switch to the ON position.

#### 3.5.4

Load the parts to be treated as in step 3.4.7 of the manual operation procedure.

#### 3.5.5 See Figure 1:

Push the START/STOP button. This will start the system's automatic sequence.

#### 3.5.6

The sequence will begin by:

- 1) Pumping the chamber down to the low setpoint. This is an adjustable setpoint which has been factory set at .050 torr.
- 2) Once the low setpoint has been reached, GAS 1, GAS 2, or both will turn on. If the PD-IIA is being used, GAS 1 will come on and turn on the flow controllers.
- 3) After a time delay of approximately 30 seconds to allow the pressure and flows to stabilize, the RF power will turn on. The timer will start to count down when the RF power is applied.

4) When the timer reaches 00.0 minutes, the RF power and the gases will turn off. The chamber will pump down and the system will give off an audible alarm.

3.5.7 See Figures 1 and 5:

With the audible alarm, push the START/STOP button again. This will silence the alarm, close the vacuum valve and open the vent valve.

3.5.8

With the chamber vented, open and remove the parts.

#### 4.0 MAINTENANCE

##### 4.1 Vacuum Pump

The manufacturer's instruction manual is supplied in the auxiliary section.

The vacuum pump is set-up for oxygen service. It is supplied with Y25/5 Fomblin oil. This oil is an oxygen resistant halocarbon type. It is specifically designed for safe oxygen service. In standard pump oils, the presence of hydrocarbons with oxygen concentrations greater than atmosphere may present an explosive hazard to the equipment and personnel.

Due to the buildup of contaminants, the pumping speed will degrade with use. It is recommended that a filtration system be used. This will save the cost of replacing the Fomblin oil, which is very expensive. Technics provides an optional Motorguard 1 X 21 filtration system. This system has shown itself to be very effective in filtering almost all contaminants from the Fomblin oil.

Over a long period of use, the pump viewport will become clouded. It is necessary to remove the viewport and clean or replace as required.

An oil trap on the pump exhaust is recommended. This will allow the recovery of oil lost out the exhaust as vapor.

##### 4.2 Plasma Chamber-See Figure 2:

The plasma chamber will generally only require periodic cleanings. For thin deposits a paper towel with alcohol and for heavier deposits, scotch brite, 600 grit sand paper or steel wool.

The chamber O ring should be inspected for damage and wear. The O ring surfaces should also be inspected for damage such as scratches across the seal.

If a heated deposition platen is used, it only needs to be cleaned to insure good thermal contact. Where the heater coil makes contact, the platen can be disassembled so that the surface can be cleaned.

There is a gas inject ring around the electrode. It is held in place by four (4) screws. An inspection of the inject rings hole should be made to prevent clogging.

#### 4.3 Water Lines

Depending on the type of cooling water used, an algae build-up will occur on the inside of the water cooling lines. Flushing the lines with hydrogen peroxide will remove this build-up. The lines can also be easily replaced.

#### 4.4 RF Generator

The RF generator is completely solid state. A periodic cleaning of the dust build-up should be done to prevent possible arcing.

# TECHNICS

RECOMMENDED SPARE PARTS  
PEIIA

<u>PART NUMBER</u>	<u>QTY</u>	<u>DESCRIPTION</u>
910057	1	Window Retainer, plexiglass
910005	1	Window, quartz
510005	1	O Ring (window)
910062	1	Ring, quartz
510019	3	O Ring, (Electrode assembly)
510022	1	O Ring, (Chamber)
510013	1	O Ring, (Seal plate)
510023	1	O Ring, (Seal plate)
100004	6	Seelskrew - type R
510045	1	O Ring, (Thermocouple fitting)
510003	1	O Ring, (Heater fitting)
430003	1 box(5)	Fuse, 20A
420005	2	Lamp (Power & Start stop)
560002	1	Solenoid Valve (2 Way Skinner)
610001	1 lb.	Fomblin Oil (4 lbs = 1 Qt.) (D16 pump = 1.25 Qt.)

Effective 6-4-82

6591 Sierra Ln

Doillon, C  
94568

*John Bender*  
*Clinton Evans*

*Cosby*  
415-829-901

PLANARETCH IIA PARTS LIST

TECHNICS

TECHNICS P/N
910036
*910057
*510005
*910005 - 32
910058
910060
910061
*910062 - 882
*510019 - 15
910059
910063
*510022 - 29
*510013 - 11
*510023 - 5
910064
560013
*100004 - 4
*560003 - 1100
*560018 - 145
910040 -
520027
520022
520037
520006
520029
520002
610001
520039
550010
910042
930095

DESCRIPTION
CHAMBER ASSEMBLY
WINDOW RETAINER, PLEXIGLAS
O RING, WINDOW
QUARTZ WINDOW
TOP COVER
GAS DIFFUSER RING
ALUMINUM SPACER RING
QUARTZ INSULATING RING
O RING, ELECTRODE ASSEMBLY
NYLON BOLT INSULATOR
ELECTRODE
O RING, CHAMBER
O RING, SEAL PLATE (OUTER)
O RING, SEAL PLATE (INNER)
SEAL PLATE
WATER FLOW SWITCH
SEELSKREW, TYPE R
PRESSURE TRANSDUCER, MKS 222-BHS
VACUUM VALVE
CORRUGATED S/S VACUUM HOSE
CENTERING RING, KF 40
CLAMP, KF 40
CENTERING RING, KF 25
REDUCER, KF 40/KF 25
VACUUM PUMP, LH D16AC
FOMBLIN OIL, (4 LBS=1 QT)
OIL FILTER REPLACEMENT CARTRIDGE
RF GENERATOR, ADVANCED ENERGY PE1000T
RF CABLE ASSEMBLY
"A" & "B" BOARD ASSEMBLY

PEIIA PARTS LIST(Cont)

<u>TECHNICS P/N</u>	<u>DESCRIPTION</u>
✓910049 180	MANIFOLD
✓*560002 80	SOLENOID VALVE (SKINNER) ✓ <i>Plunger</i>
✓560004 - <del>8</del> 383	FLOW CONTROLLER (PORTER) ✓
560056	SNUBBER
<u>MAINFRAME</u>	
570019	POWER CORD, (W-1)
470009	TRANSFORMER, (T-1)
✓550009 - 19	RELAY, (K-1)
430003	FUSE, 20A, (F-1)
430001	FUSE HOLDER
✓410009 33	SWITCH, (S-1)
✓420005 4	LAMP
410010	LENS, ENGRAVED POWER
410014	LENS, ENGRAVED START/STOP
✓300044 -28	POT, 1 TURN
480029	KNOB
180109	PLUG, (P-9)
180110	SOCKET, (S-9)
✓410016-35	SWITCH, (S-12, S-13)
✓410042 -3	SWITCH, (S-14)
180073	NYLON COUPLER, FEMALE (J-8, J-7)
180072	NYLON COUPLER, MALE (P-7)
✓180118 - 8	THERMOCOUPLE CONNECTOR
✓410052 -198	VACUUM SWITCH (S-15)

\*INDICATES RECOMMENDED SPARE PARTS

EFFECTIVE 10-82



TECHNICS  
PDIIA PARTS LIST

<u>TECHNICS P/N</u>	<u>DESCRIPTION</u>
560120	THERMOCOUPLE
920009	HEATER PLATEN ASSEMBLY
560117	HEATER, 880W
560119	TEMPERATURE CONTROLLER
560033	FLOW/RATIO CONTROLLER (VG 80-4)
560005	FLOW SENSOR, (0-100 sccm)
560104	CONTROL VALVE, (VG 79-6A)
560008	CONTROL VALVE, (VG 79-7A)
920024	MANIFOLD
560073	AIR VALVE (NUPRO)
560150	SOLENOID VALVE (SKINNER)
510003	O RING, HEATER FITTING
510045	O RING, THERMOCOUPLE FITTING

TECHNICS  
PDIIA ELECTRICAL SCHEMATIC  
PARTS LIST  
DWG #936-2857

<u>ITEM #</u>	<u>TECHNICS P/N</u>	<u>DESCRIPTION</u>
5		TERMINAL LUG
6	570018	TYPE J. THERMOCOUPLE WIRE
7	480021	GROMMET
8	920025	INTERCONNECT CABLE
9	480050	GROMMET
10	570019	POWER CORD
11	480051	GROMMET
12	180112	THERMOCOUPLE CONNECTOR
13	430001	FUSE HOLDER
14	430003	FUSE, 20A
15	180034	TERMINAL BOARD
16	180056	MARKER STRIP
17	180113	TERMINAL BOARD COVER
18	180114	JUMPERS
19	410043	SWITCH (HEATER)
20	410044	SWITCH (POWER)
21	300050	RESISTOR
22	550007	RELAY, 115V

EFFECTIVE 10-82

1. PEII-A - PDIIA mode switch
2. Heater connection
3. Auto connection
4. PDIIA Gas input
5. Vent gas input
6. Gas 1 input *-O<sub>2</sub>*
7. Gas 2 input *F<sub>14</sub>*
8. Thermocouple connection
9. NOT USED
10. 20A Fuse
11. RF supply 15A fuse
12. RF supply 15A fuse
13. RF supply fan
14. Baseplate
15. Chamber lid
16. Water input
17. Water line
18. R F power cable
19. Chamber gas input
20. Water line
21. Water output
22. Compressed air
23. Vacuum connection

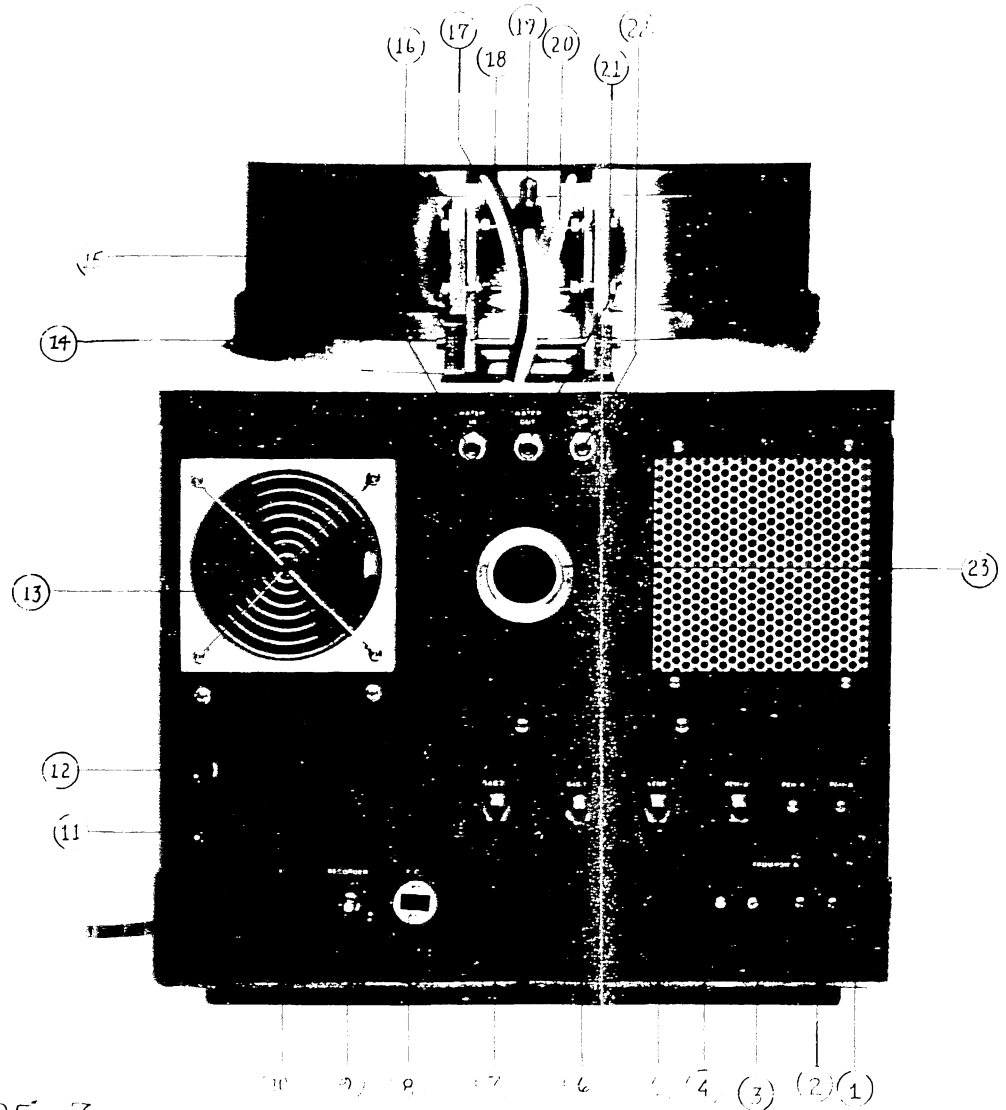


FIGURE 3

- Temperature display
- Gas display
- 3. Power switch
- 4. Heater switch

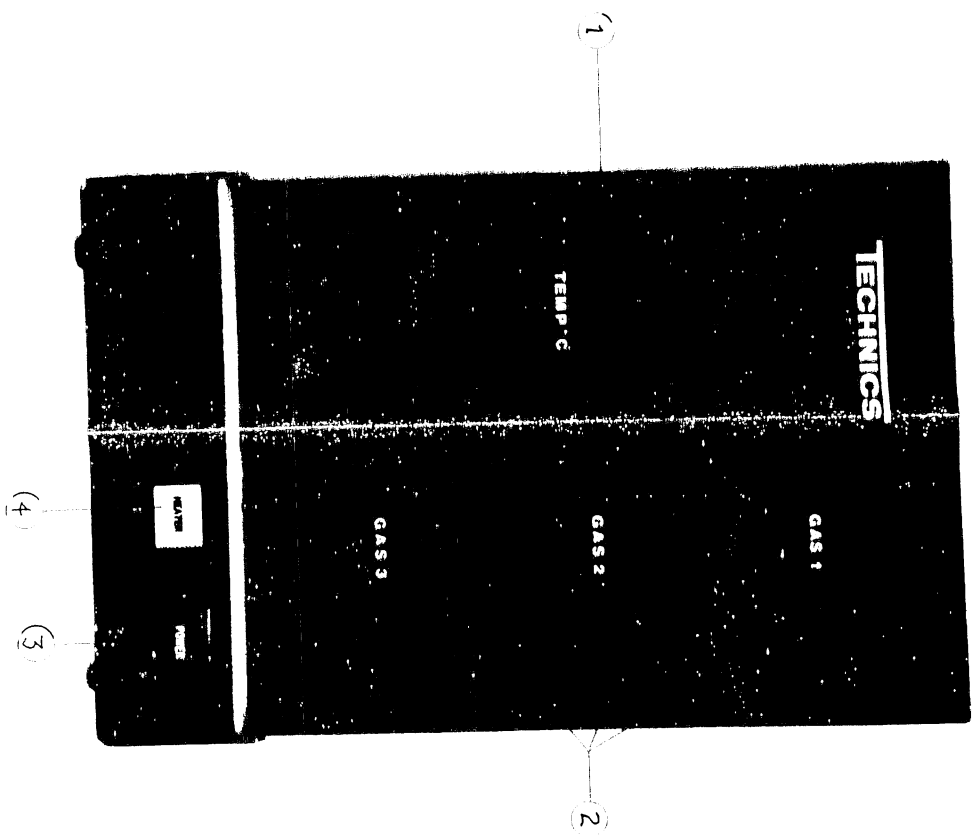


FIGURE 8

1. Temperature readout °C
- Temperature setpoint adjustment
3. Gas setpoint adjustment
4. Gas flow readout cc/min
5. Auto/Cal switch
6. Ratio/Flow/Ratio switch
7. 80-4 Flow/Ratio module
8. Zero adjustment
9. Gas calibration adjustment

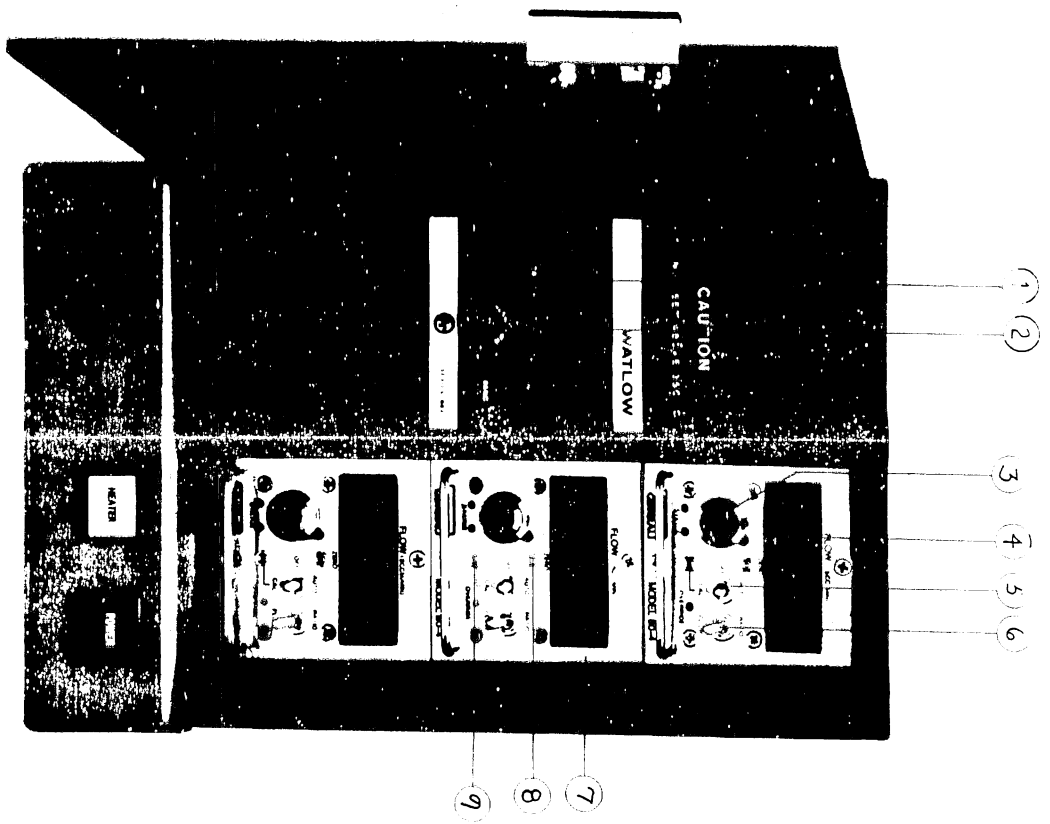
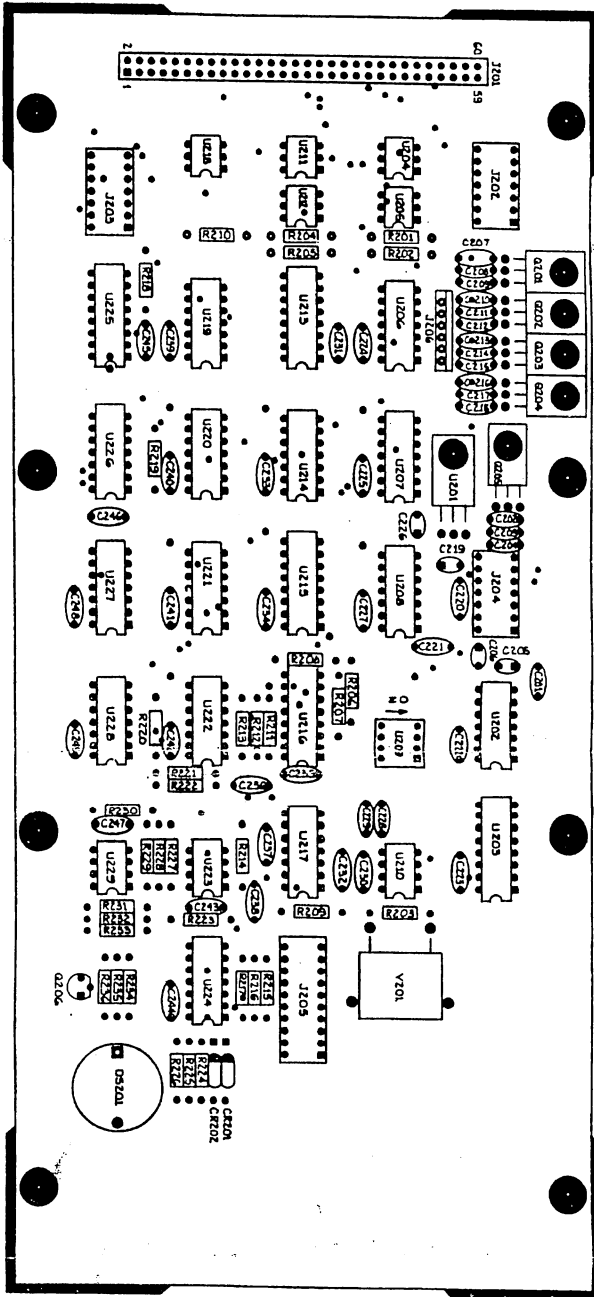


FIGURE - 9



REDUCE TO 6.000 ± .003

REDUCE TO 12.000 ± .003



ARTWORK 944-3482

PADMASTER

REV	DATE	DESCRIPTION	BY	CHKD
1	800-1401	500 II		
TECHNICAL DEPARTMENT				
DATE: 8-10-94				
ASSEMBLY DWG. BOARD * B				
S. GEM				
1-0-94				
94				

J450

LINE	REVISION	DATE	APP
1	REMOVE TRACE FROM PIN 44 TO GND. CONNECTED PIN 44 TO PIN 2 OF J204.		
2	REVERSE CONNECTION ON PIN 2 OF J204. PIN 16 IS 17 OF J205.		

THIS DWG. COMPLIANT AS CONNECT 3-B-M-C

- Pump ON/OFF switch
- Pump reset breaker
- Pump power controls

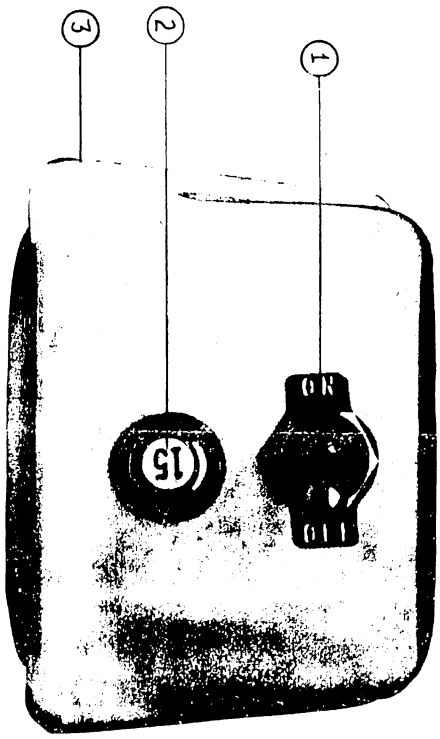


FIGURE 11



- 1 Chamber lid o-ring
- Gas dispersion ring
- 3. Electrode
- 4. Heated deposition platen
- 5. Baseplate

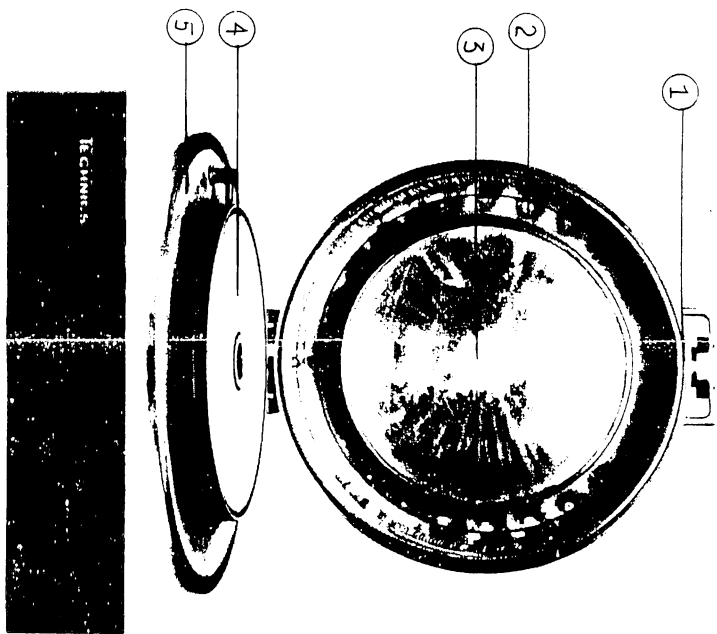


FIGURE 2

1. Chamber Viewport  
Chamber lid
3. Viewport o-ring
4. Baseplate
5. Switch cover
6. Displays
7. Start-Stop switch
8. Power switch

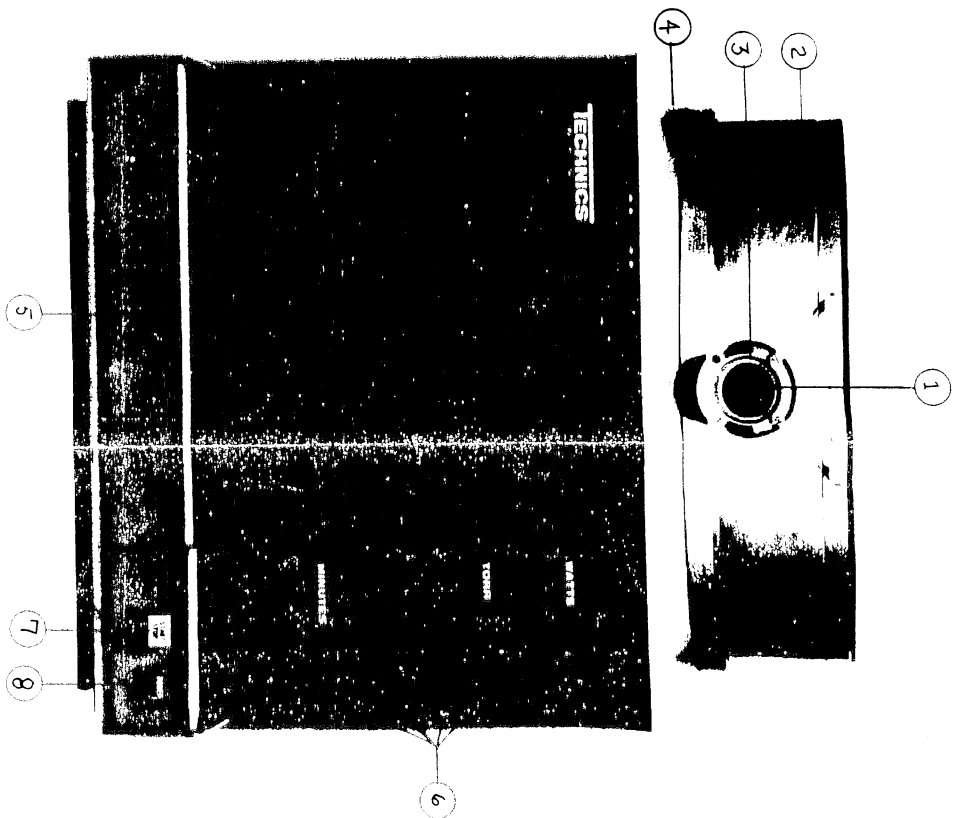
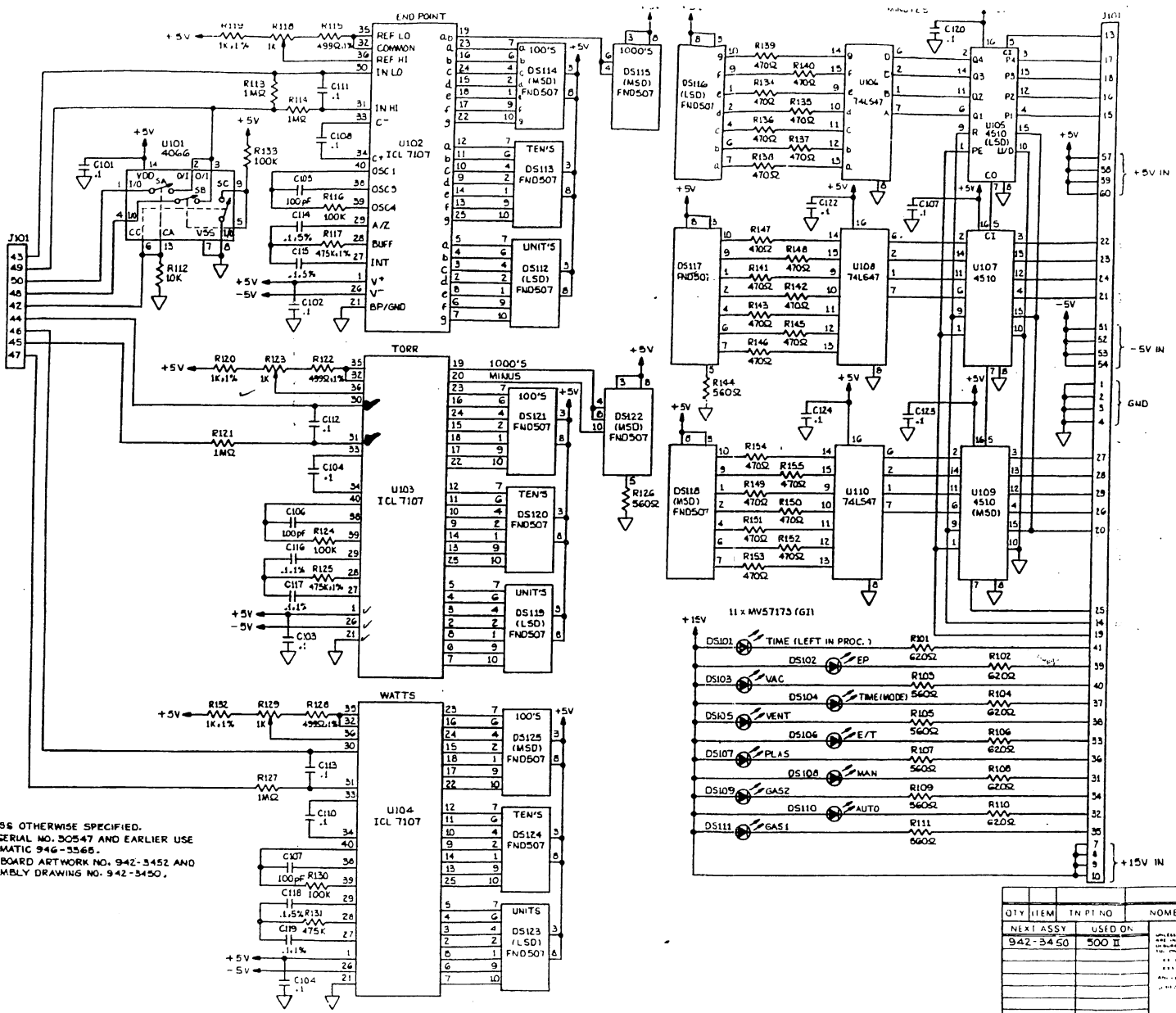


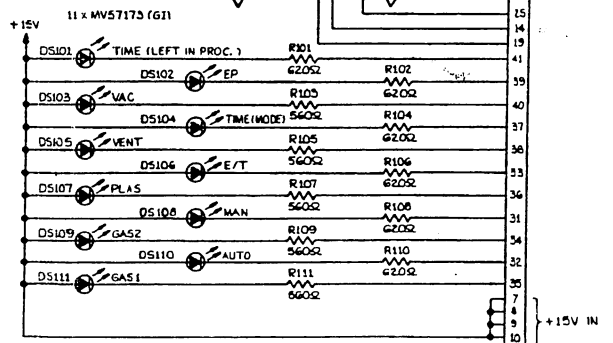
FIGURE 1

LT#	REVISION	DATE	APP
A	UPDATED NEW LAYOUT	7/9/82	J

THIS DWG CONFIRMED AS CORRECT 9-8-82 J



NOTES: UNLESS OTHERWISE SPECIFIED.  
 1. FOR SERIAL NO. 30547 AND EARLIER USE SCHEMATIC 946-3565.  
 2. P.C. BOARD ARTWORK NO. 942-3452 AND ASSEMBLY DRAWING NO. 942-3450.



GAS1	GAS2	PLAS	VENT	VAC	TIME
AUTO	MAN	E/T	TIME	E/P	TIME

MODE PROG.

QTY	ITEM	IN P/N	NO	NOMENCLATURE	MATL - VENDOR - SPEC	NOTE
	NEXT ASSY			USED ON		
	942-3450		500 II			

TECHNIG WSEY INC.			
SCHEMATIC DIAGRAM			
PRINTED CIRCUIT BOARD *A*			
DATE	7-9-82	DESIGN	946-3453
BY		CHKD	
APP'D		SH 1	OF 1

