PHASE II J

INSTALLATION & OPERATION MANUAL

NOVEMBER 2005

NOTE: Information and data in this manual are subject to periodic amendments, revisions and additions. Please consult factory for the most current information and revision.

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IMPORTANT
Before using this program all users should be familiar with the manual operation of the system and should be aware of all safety **WARNINGS** as described in the ATC Sputtering System Installation and Operation Manual.

IMPORTANT
The laptop computer is set up for direct network control of the PHASEIIJ control only. Further networking of the computer is not recommended. Contact AJA with questions.

NOTE: Also refer to the PHASE IIJ computer screen while reviewing this manual.

A. **STARTUP**

1. Click the PHASE IIJ icon on the desktop to the start the program. Enter your operator password. Contact AJA for password information. NOTE: The USB dongle key must be in place before starting the program.

B. SYSTEM CONFIGURATION SCREEN

This is the next screen after entering the password. This display consists of a series of graphic window boxes and control selectors that will represent the actual custom hardware configuration of the sputter system. The following list on the next page describes the functionality of the various window boxes. It is here that you enter and select the values that represent the specific configuration of your system.

NOTE: Your system may not use all the configurations available therefore, these devices will be "grayed" out.
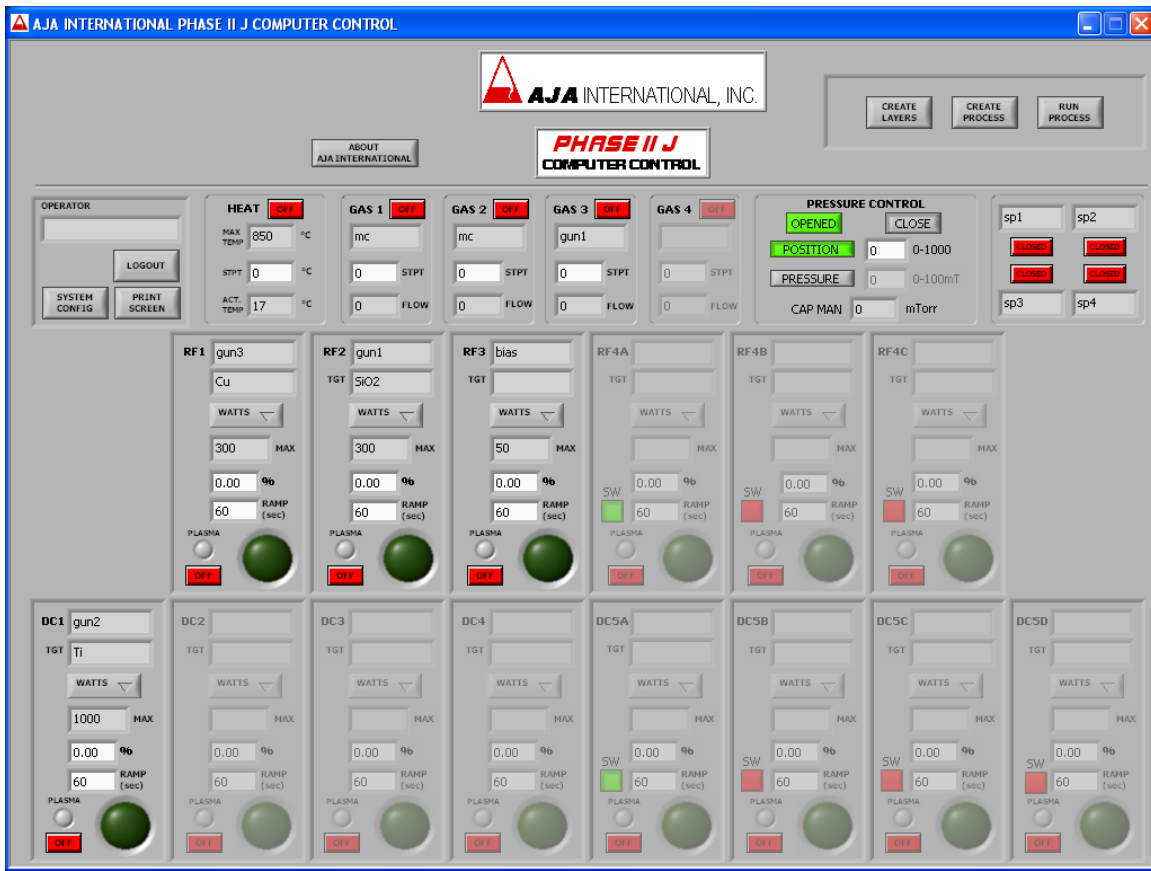
C. SYSTEM CONFIGURATION OPTIONS

1. HEATER, MAX TEMP: Enter the max specified temperature of the heater.
2. CM HEAD SIZE: Enter the capacitance manometer(CM) range.
3. GAS 1, 2, 3, 4:
   FACTOR: Enter the gas correction factor.
   MFC: Enter the MFC maximum flow in sccm.
   GAS INFO: Enter the process gas type.
   VALVE POSITION: Click the pull down menu to select the pneumatic control valve
                    position.
4. SP1, 2, 3, 4 INFO: Enter the spare valve(s) information if applicable, and select the control valve position.
   a. CM isolation valve (not shown here). Select control valve position.

5. **RF1, 2, 3, 4A, 4B, 4C**: Enter the source location (example: GUN1, GUN2 or BIAS).
   Note: 4A, 4B, 4C are switched output positions. If your system is equipped with a custom RF output switch
   then also enter the data required for options 6 - 10.
6. TGT: Enter the target material.
7. W: Enter the maximum watts power output of the power supply. Note: In some cases
       the power is limited by the software especially for a supply used to power the BIAS.
8. V: Enter the maximum volts power output of the power supply. Note: In some cases the
       volts are limited by the software especially for a supply used to power the BIAS.
9. VALVE POSITION: Click the pull down menu to select the pneumatic control valve
                    position for the desired source shutter.
10. ACTIVE/INACTIVE: Select ACTIVE. If power supply is not present, select INACTIVE.
    (The above options 5 - 10 are enabled only when ACTIVE is selected).

11. **DC1, 2, 3, 4, 5A, 5B, 5C, 5D:** Enter the source location (example: GUN1, GUN2).
    Note: 5A, 5B, 5C, 5D are switched output positions. If your system is equipped with a custom DC output switch
    then also enter the data required for options 12 - 17.
12. TGT: Enter the target material.
13. W: Enter the maximum watts power output of the power supply.
14. V: Enter the maximum volts power output of the power supply.
15. mA: Enter the maximum milliamp power output of the power supply.
16. VALVE POSITION: Click the pull down menu to select the pneumatic control valve
                     position for the desired source shutter.
17. ACTIVE/INACTIVE: Select ACTIVE. If power supply is not present, select INACTIVE.
    (The above options 11 - 16 are enabled only when ACTIVE is selected)

D. SAVING SYSTEM CONFIGURATION

1. CONFIG SAVE/CLOSE: When all the appropriate configuration settings are selected
                       then click the CONFIG SAVE/CLOSE button.
2. PRINT SCREEN: Before saving use this button to print the current screen to an
                    installed printer.
3. CANCEL: Closes the configuration screen without saving any new data entered.

4. OPERATOR: Before saving you can enter an operator name. (optional).

After saving or canceling the configuration, the main display PHASE II J screen will show.

E. PHASE II J COMPUTER CONTROL MAIN DISPLAY

This display consists of a series of graphic window boxes, buttons and indicators that represent the functions of the sputter system associated with the PHASE II J computer control. Some of the parameters entered from the configuration screen are also shown here. The following list describes the functionality of the various window boxes, buttons, and pull down menus.

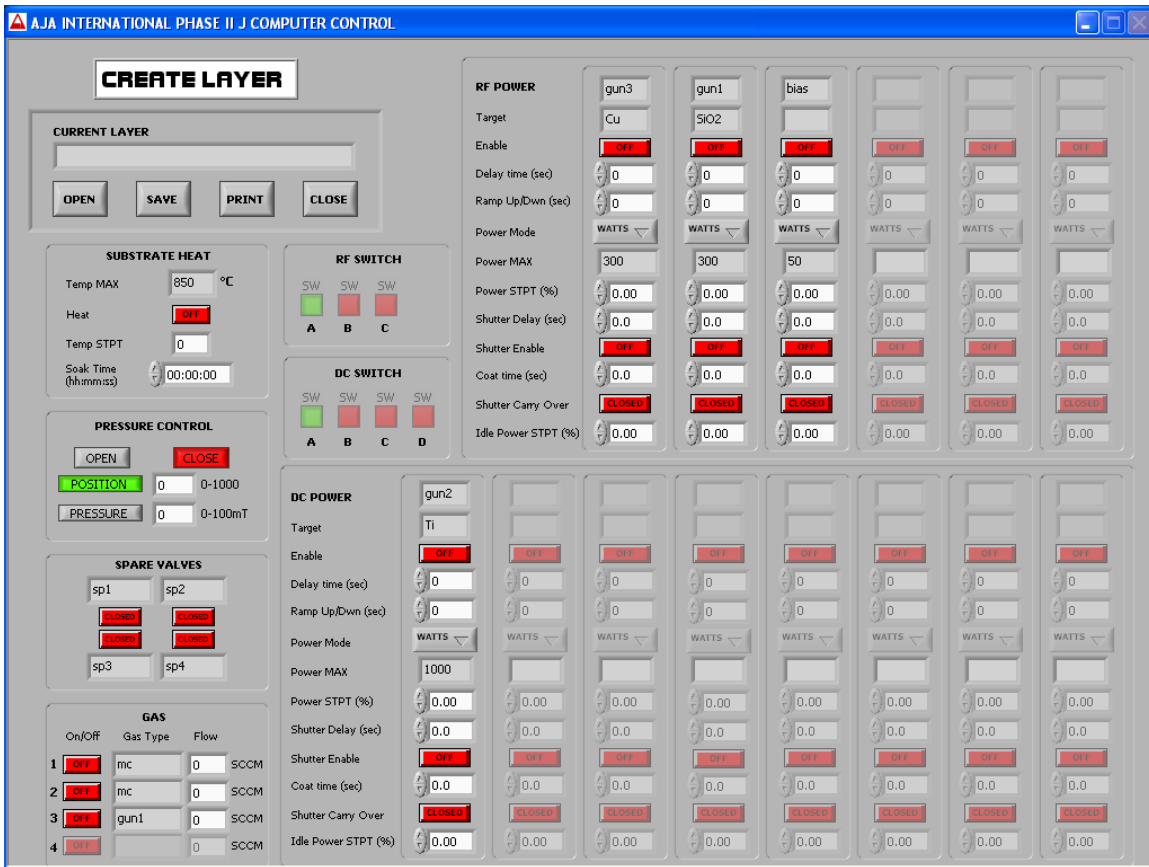E.2 MAIN DISPLAY ACCESS BUTTONS

1. OPERATOR: The current operator is displayed.

2. LOGOUT: Logs out the current user.

3. PRINT SCREEN: Use this button to print the current screen to an installed printer.

4. CREATE LAYERS: Use this button to access the Create Layer screen.

5. CREATE PROCESS: Use this button to access the Create Process screen.

6. RUN PROCESS: Use this button to access the Run Process screen.

E. **PHASE II J COMPUTER CONTROL MAIN DISPLAY continued.**

E.2 MAIN DISPLAY FUNCTIONS

1. HEAT: Type a set point into the STPT field then click the OFF/ON button to start the heater.
        MAX TEMP and ACTUAL TEMP are also displayed.

2. GAS1 - GAS4: Type a set point into the STPT field then click the OFF/ON button to start
        the gas flow. Gas INFO and FLOW are also displayed.

3. a. PRESSURE CONTROL: Click OPENED or CLOSE to open or close the VAT gate valve.
    b. POSITION: Type a set point and click the button to position the VAT.

    c. PRESSURE: Type a set point and click the button to start the automatic pressure control
            IMPORTANT: The gas should be flowing before using the pressure button.
    d. CAP MAN: The process pressure is displayed here.

4. SP1 - SP4: Click the button to operate the desired spare pneumatic valve.
    a. CM isolation valve (not shown). Click to operate. Only operational from Main display.

5. **RF1, RF2, RF3 - DC1, DC2, DC3, DC4:** Indicates the source location.

    a. TGT: Target material.
    b. WATTS, VOLTS, mA: Power control mode. Click the pull down menu to select mode.
                    Important: When operating the source be sure not to exceed its
                    maximum power.
                    NOTE: mA applies to DC only
    c. MAX: Indicates maximum power. This changes depended on selected mode.
            Note: This is the value set in the configuration screen.
    d. %: Percent of MAX power output. Type a value and press enter.
    e. RAMP sec: Ramp time of output power. Default is 60 seconds. Type another value
            if required. In general, use zero to first strike an RF plasma.
    f. OFF/ON: Power output enable. Click to start or stop the power output.
    g. PLASMA: Indicates whether a plasma is present. Purple yes, gray no.
    h. ROUND GREEN BUTTON: Shutter control. Click to operate. Dark green OFF,
                    bright green is ON.

    i. **RF4A, B, C - DC5A, B, C, D:** Indicates the source location.
        There is one RF and or one DC power supply. The power output is connected to a
        multiple output switch.

    j. **SW:**   Click this button to switch the power output. DO NOT HOT SWITCH.
            The power OFF/ON must be OFF for the switch to operate.
            After switching, the other positions will be "grayed out".
            Follow the same steps as RF1 - RF3, DC1 - DC4 to operate the power supply.

F. CREATE LAYER SCREEN

AJA INTERNATIONAL PHASE II J COMPUTER CONTROL

CREATE LAYER

CURRENT LAYER

| OPEN | SAVE | PRINT | CLOSE |

SUBSTRATE HEAT
Temp MAX   850 °C
Heat   OFF
Temp STPT   0
Soak Time (hh:mm:ss)   00:00:00

RF SWITCH
SW A (green) SW B SW C

DC SWITCH
SW A (green) SW B SW C SW D

PRESSURE CONTROL
OPEN   CLOSE
POSITION   0   0-1000
PRESSURE   0   0-100mT

SPARE VALVES
sp1   sp2
CLOSED   CLOSED
CLOSED   CLOSED
sp3   sp4

GAS
	On/Off	Gas Type	Flow	
1	OFF	mc	0	SCCM
2	OFF	mc	0	SCCM
3	OFF	gun1	0	SCCM
4	OFF		0	SCCM

RF POWER
	gun3	gun1	bias			
Target	Cu	SiO2				
Enable	OFF	OFF	OFF	OFF	OFF	OFF
Delay time (sec)	0	0	0	0	0	0
Ramp Up/Dwn (sec)	0	0	0	0	0	0
Power Mode	WATTS	WATTS	WATTS	WATTS	WATTS	WATTS
Power MAX	300	300	50			
Power STPT (%)	0.00	0.00	0.00	0.00	0.00	0.00
Shutter Delay (sec)	0.0	0.0	0.0	0.0	0.0	0.0
Shutter Enable	OFF	OFF	OFF	OFF	OFF	OFF
Coat time (sec)	0.0	0.0	0.0	0.0	0.0	0.0
Shutter Carry Over	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED
Idle Power STPT (%)	0.00	0.00	0.00	0.00	0.00	0.00

DC POWER
	gun2							
Target	Ti							
Enable	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Delay time (sec)	0	0	0	0	0	0	0	0
Ramp Up/Dwn (sec)	0	0	0	0	0	0	0	0
Power Mode	WATTS	WATTS	WATTS	WATTS	WATTS	WATTS	WATTS	WATTS
Power MAX	1000							
Power STPT (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shutter Delay (sec)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shutter Enable	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Coat time (sec)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shutter Carry Over	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED
Idle Power STPT (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

F.1 LAYER SCREEN ACCESS BUTTONS

1. CURRENT LAYER: Displays the current opened layer.

2. OPEN: Use this button to access the existing layers. Highlight a layer and click OK.

3. SAVE: Use this button to access the save screen. Type the layer name and click save.
    Note: You can use the Windows copy/paste function to highlight the current layer name and insert it into the save box.

4. PRINT: Use this button to print the current screen to an installed printer.

5. CLOSE: Closes the Create Layer screen. DO NOT use the X button in the upper right.

F.   CREATE LAYER SCREEN continued.

F.2 LAYER SCREEN FUNCTIONS **Note: You must press Enter after typing values.**

1. SUBSTRATE HEAT:
    a. TEMP MAX: Indicates the maximum specified temperature of the heater.
    b. HEAT: Click ON to enable the heater for this layer.
    c. TEMP STPT: Type a set point value.
    d. SOAK TIME: Enter the heater soak(dwell) time in Hours, Minutes, Seconds.
        NOTE: The SOAK timer does not start until the TEMP STPT is reached.
        NOTE: The power supply functions are delayed until soak time is done,
        the heater will then remain ON until the end of the layer.
2. PRESSURE CONTROL:
    a. OPEN or CLOSE: Use to keep OPEN or CLOSE the VAT during this layer.
    b. POSITION: Type a value to fix the position of the VAT in this layer.
    c. PRESSURE: Type a value to enable the VAT to control in pressure mode in this layer.
3. SPARE VALVES: Use to active a spare valve during this layer.
4. GAS:
    a. ON/OFF: Use to enable a gas for this layer.
    b. GAS TYPE: Displays location or gas type information.
    c. FLOW: Type a flow value for this layer.
5. RF SWITCH: Use to enable a different switch position. NOTE: When creating layers you
        must have "zero" values in all unused power supply positions.
6. DC SWITCH: Same as RF switch.

7. **RF POWER and DC POWER**: Indicates the source location.
    a. TARGET: Indicates the target material.
    b. ENABLE: Enables the power supply for this layer.
    c. DELAY TIME: Type a value if required. This is the time that will elapse from the
        beginning of the layer to the beginning of the power ramp up.
    d. RAMP UP/DOWN: Type a value. If the value is > 0 the power will ramp up to the power
        set point. Note: The power will also ramp DOWN or UP to the IDLE
        POWER % STPT when the COAT TIME is over.
    e. POWER MODE: Click to choose power control mode.
    f. POWER MAX: Indicates maximum power output.
    g. POWER STPT %: Type a value(percent of MAX value).
    h. SHUTTER DELAY: Type a value. This is the time delay in seconds after the power
        reaches the power set point percent until the shutter OPENS.
    i. COAT TIME: The time in seconds the shutter remains open.
    j. SHUTTER CARRY OVER: Use this to keep a shutter OPEN to the next layer.
    k. IDLE POWER STPT %: Type a value to keep the power output ON to the next layer.
        This set point will remain in effect after the layer is complete.
    Note: If the RAMP UP/DOWN time is > 0 then the power will ramp up or down to IDLE POWER set point before the
    next layer is run.

8.

> **NOTE:** Be sure to save the layer after filling in your layer values. To edit an existing layer click OPEN and restore
> it to the layer screen, edit the values and click save. If the layer
> name is the same you will prompted to overwrite the existing name.
> **NOTE:** The layer files will be saved under the current operator login password.

G. CREATE PROCESS SCREEN
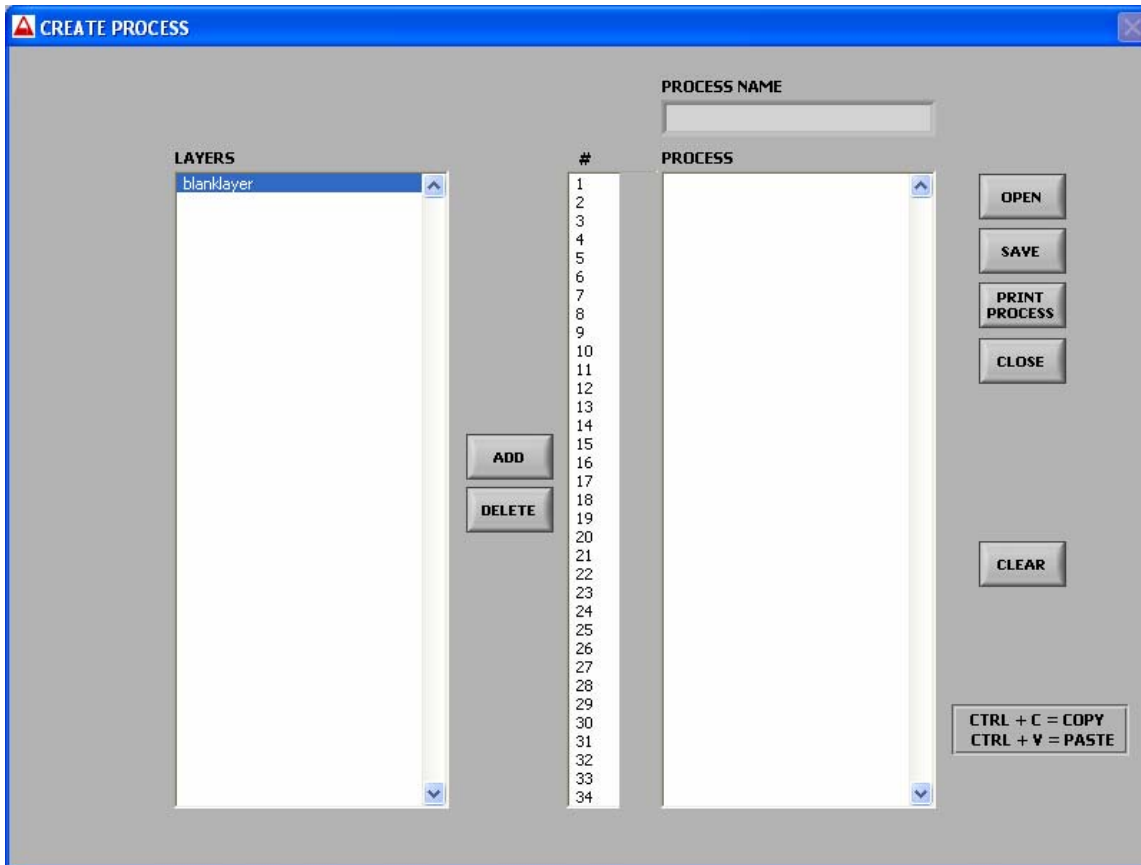
1. PROCESS NAME: Displays the current opened process file name.

2. LAYERS: Displays a list of the layer file(s) associated with the current operator password.
3. #: Shows the sequence number position of the layer in the PROCESS window.

3. PROCESS: Displays a list of layers files as they are added or displays the layers files of an existing process.
4. ADD: Highlight a layer file and click ADD. The file will be added to the PROCESS window.
5. DELETE: Deletes a highlighted file from the PROCESS window.
6. OPEN: Use this button to access the existing process files. Highlight a file and click OPEN.

7. SAVE: Use this button to access the save screen. Type the process name and click save.
   Note: You can use the Windows copy/paste function to highlight the current file name and insert it into the save box.
8. PRINT PROCESS: Use this button to print the current screen to an installed printer.

9. CLOSE: Closes the Create Process screen. DO NOT use the X button in the upper right.

10. CLEAR: Clears all process files from the PROCESS window.

H. RUN / SELECT PROCESS SCREEN
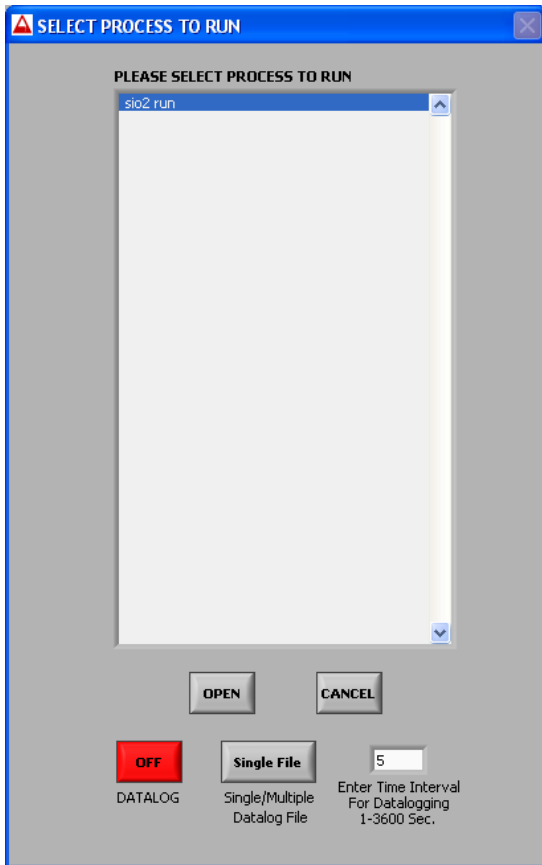
1. PLEASE SELECT PROCESS: Displays a list of process file names.

2. OPEN: Highlight a file and click OPEN. This will pop-up a window with reminders for you to review such as " is rotation on?", " are devices in the proper remote mode?".
   After reviewing, then click RUN/OK to start the process. The PROCESSING screen will appear.

3. CANCEL: Closes the Select Process screen.

4. DATALOG: Use this to activate data-logging. If you wish to data-log a process then you must pick this <u>before</u> you OPEN a file.

5. SINGLE/MUTIPLE FILE: Determines if data-logging is one or multiple files. In general, it is recommended to use SINGLE file.

6. TIME INTERVAL: Type a value and press enter. Determines the data-log interval.

I.   **PROCESSING... (PROCESS RUNNING SCREEN)**
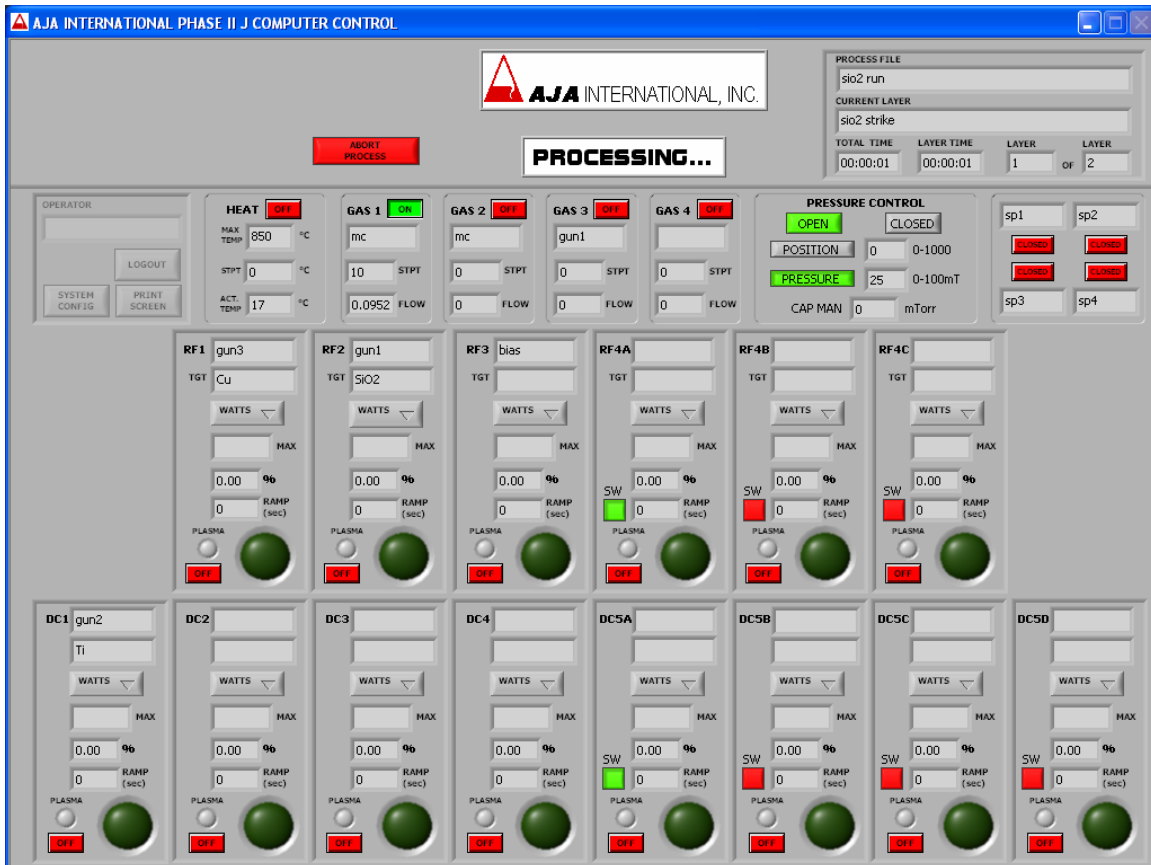
After starting a process, the **PROCESSING…** display screen appears, with the Process File name and the Current Layer name shown in the upper right of the screen. Each new layer name, total elapsed process time, layer elapsed time and the current layer number are also shown.

Manual use of the controls are disabled during processing, only the ABORT PROCESS button is active.

When the process is finished the PROCESS COMPLETE pop-up window will appear. Click OK to return to the MAIN DISPLAY.

1. ABORT PROCESS: Use this to abort a process. Click to bring up another screen with two large red buttons. Click CONFIRM ABORT and the system will stop all processing and the system will return to an idle state.
Or click CANCEL ABORT and the processing will continue.

J. FILE MANAGEMENT

When an operator logs into PHASE IIJ he or she uses an authorized password. All the LAYER, PROCESS, and DATALOG files created by the operator are kept in a PASSWORD folder.
It will be necessary to occasionally manage these files. The layer and process files can be deleted or cut and pasted to a backup folder. You must use Windows functions to do this.

To access these files go to My Computer in the Windows start menu.

1. Go to Local Disk C → Program Files → PHASE IIJ folder → and open one of the ten PASSWORD folders.

2. The Layer files have a .rcp extension. Process files have a .ajp extension.

3. These files can be highlighted and then deleted. Or, these files can be cut and pasted to another folder on the desktop for example.
    CAUTION: Do not create another folder within the PHASE IIJ program.
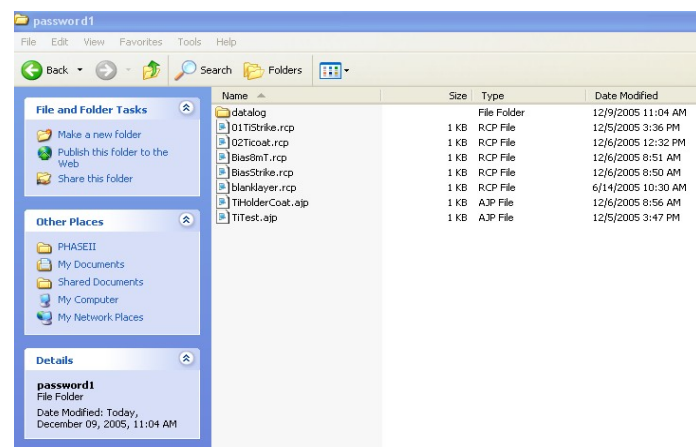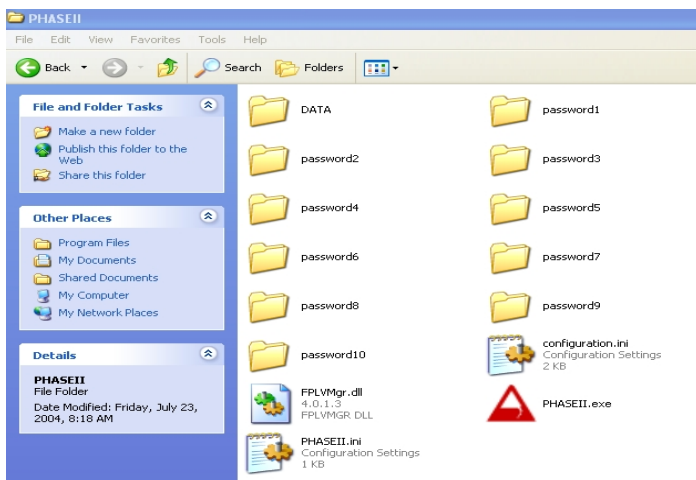
K. DATA LOG FILES

DATALOG files are accessed in the PASSWORD folder. (NOT the DATA folder in PHASEII).

1. Open the desired PASSWORD folder.

2. Open the **datalog** folder.
   Datalog files are saved as the process **name_date_time** with a .dlg extension.

3. Datalog files may be viewed using a spread sheet program such as Quattro Pro or Excel.

K. DATA LOG FILES continued.

4. The Date, Time(AM or PM), Layer # and process parameters such as CM Pressure, Gas Flow, Substrate Temp, etc. are shown in the column headings.

5. The Time will show the data log interval that was chosen when the process was selected to run.

6. Scroll through the columns and rows to view the data log information.

The example below shows an open **single** data log file.

End of manual.