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## SMD Operations Procedures Manual

### 8.1.1.28 OPERATION OF AUTOMATED LONG CURING PRESS

Text Pages 1 through 15  
Attachment(s) 1, 2, 3

#### Hand Processed Changes

<u>HPC No.</u>	<u>Date</u>	<u>Page Nos.</u>	<u>Initials</u>
_____	_____	_____	_____
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Revision No. 01      Approved:

Signature on File      2/27/03  
Division Head              Date

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SMD-OPM 8.1.1.28  
Category A

Revision 01  
December 24, 2002

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### **8.1.1.28 Operation of Automated Long Curing Press**

#### **1.0 Purpose and Scope**

- 1.1 The purpose of this procedure is to provide instruction in the operation of the Automated Long Curing Press (Press).
- 1.2 The following information is contained herein:
  - 1.2.1 State of the Press, before activating power;
  - 1.2.2 Activating power to the Press;
  - 1.2.3 Operating the Press;
  - 1.2.4 Shutting down the Press;
  - 1.2.5 Periodically testing the safety interlocks.
- 1.3 The following information is not contained herein:
  - 1.3.1 Preparing the magnet coil for curing;
  - 1.3.2 Transporting the coil to the Press;
  - 1.3.3 Detailed curing cycle for each type of coil;
  - 1.3.4 Storage and documentation requirements.

#### **2.0 Responsibilities**

- 2.1 The authorized operator will:
  - 2.1.1 Operate the controls of the Press;
  - 2.1.2 Test the safety interlocks every six months.

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**NOTE** *A list of authorized operators is maintained by the Coil Fabrication Plant Manager.*

- 2.2 The authorized operator shall complete the following documentation:
  - 2.2.1 Daily log book for coil programs. Entries shall include any information that the operator deems important to pass along to the Coil Fabrication Supervisor, the Cognizant Engineer, or the next work shift, including:
    - A. work accomplished regarding coil production;
    - B. coil discrepancies;
    - C. repairs to the Press (brief description);
    - D. lessons learned;
    - E. irregularities during operation of the Press.
  - 2.2.2 Maintenance log. Entries shall include:
    - A. detailed description of each repair and maintenance procedure;
    - B. detailed record of parts and material used (fittings, valves, oil,...).
  - 2.2.3 Magnet traveller.
  - 2.2.4 Manually Operated Valve (MOV) Check List (Attachment 1).
  - 2.2.5 Interlock Test Record (Attachment 2).

### **3.0 Prerequisites**

- 3.1 Training
  - 3.1.1 The operator shall be instructed by the Coil Winding/Curing Technician Supervisor before using this Procedure.
  - 3.1.2 The operator shall be trained as an "affected employee" as defined by ESH Standard 1.5.1, "Lockout/Tagout Requirements".

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3.1.3 The operator shall be trained in the hazards of compressed gases as defined in ES&H Standard 1.4.0 "Compressed Gas Cylinder Safety.

### 3.2 Equipment

3.2.1 Personal protection equipment:

- A. full face shield;
- B. protective suit: hood, jacket, pants (pump room only).
- C. hearing protection (pump room only).

## 4.0 Precautions

4.1 Do not reach into the Press.

### **CAUTION**

**Hot oil under pressure can cause personal injury.**

4.2 If it is necessary to work in the Press area with the splash shields open, wear a face shield.

4.3 If it is necessary to enter the Pump Room during operation, wear full protective gear: hood, jacket, pants, face shield. Use hearing protection.

4.4 The safety interlocks shall be tested every six months. A dated "Interlock Test Record" form (Attachment 2) shall be posted near the Press and used for verification.

4.5 To avoid errors when setting the Manually Operated Valves (MOV), use the MOV check list (Attachment 1).

### **CAUTION**

**Leaks from the heat exchanger have the potential to cause a regulatory violation.**

4.6 Inspect oil cooler for oil leaks before each cure. Report any leaks found to the Plant Manager. If the leak has the potential to impact the environment, call extension 2222 to report.

### **NOTE:**

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**The oil-water heat exchanger has been bypassed. Do not restore without notifying the ESH Coordinator.**

- 4.7 All lifting and handling operations requiring overhead crane operations shall be performed by holders of valid Safety Awareness Certificates for the lifting device being used.
- 4.8 Hard hats and safety shoes are required during crane operations.
- 4.9 Core should be taken when disconnecting formblocks to collect any oils. Secondary containment is recommended.

## **5.0 Procedure**

### **5.1 Overview of the Automated Long Curing Press**

During the magnet coil winding process, the superconducting cable insulation system is impregnated with either an epoxy resin or a thermoplastic adhesive. The Press provides a means of activating the epoxy or thermoplastic adhesive while holding the wound coil in the required shape. The Press applies heat and pressure to the coil in timed cycles under computer control, while the coil lays in a formblock. The result is a rigid coil pack which will produce the required magnetic field shape when excited.

The heat, pressure, and cycle times, will vary with the type of coil being cured.

The Press will accept magnet coils of up to 4 meters long.

Control of the Press is through a computer running a custom Windows-based program.

### **5.2 Before Activating Power to the Press**

- 5.2.1 Make all system checks as described in the Magnet Assembly Procedure.
- 5.2.2 Verify that machine guards and splash shields are in place.
- 5.2.3 Verify that the work area within the yellow tape border is clear of unauthorized, unprotected personnel; put chains in place across entrances to the Press area.

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- 5.2.4 Verify that the door to the Pump Room is closed and a "Restricted Area" sign is in place on the door.
- 5.2.5 Place the Manually Operated Valves for the heating/cooling system in the proper positions as per the Manually Operated Valve Check List for Normal Operation (Attachment 1). Check off each valve on the Check List and place the Check List in the daily log book.

If you are going to purge the heating/cooling system, then set the valves according to the Check List labeled "For Purging of System". Otherwise, set the valves according to the Check List labeled "For Normal Operation."

- 5.2.6 Verify that the disconnect switch for the oil cooler fan is in the ON position. The disconnect switch is located near the fan.
- 5.2.7 Check for leaks at the oil cooler fan.

### 5.3 Activating Power to the Press and Starting the Control Software

- 5.3.1 Place the disconnect switch on the east wall, labeled "MAIN SERVICE DISCONNECT-Long Curing Press", in the ON position. Panel P.P. 10-C-2
- 5.3.2 Place the hydraulic system main feeder switch, located in the bank of switches to the right of the Main Power Cabinet, in the ON position. The switch is labeled "HYDRAULICS-Long Curing Press". Switch 11 panel P.P. 10-C-3.

**NOTE** *This switch is normally left ON.*

- 5.3.3 In the Pump Room, place the disconnect switches labeled "HOT OIL PUMP SVC DISCONNECT-Long Curing Press" and "MAIN SVC DISCONNECT FOR HYDRAULICS-Long Curing Press" in the ON position. The following indicator lights should illuminate:
  - A. Red indicator light labeled "Control Power" on the box next to the switch labeled "MAIN SVC DISCONNECT FOR HYDRAULICS-Long Curing Press";
  - B. Red indicator light labeled "Pump Room Power" on the Control Cabinet outside of the Pump Room.

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5.3.4 Place the power switch on the outside of the Main Power Cabinet, labeled "CONTROL SYSTEM POWER-Long Curing Press", in the ON position. This switch will provide power to the adjacent Control Cabinet and to the computer rack. The following indicator lights should illuminate:

A. Four red LED's labeled "+15", "-15", "+24A", "+24B" located on the Control Cabinet.

5.3.5 Turn on the computer by operating the power switch on the front panel of the computer.

5.3.6 At the C:\ prompt, type WIN.

5.3.7 A message window will pop up, instructing you to "Turn on Control Power and Press O.K.". Depress the green CONTROL POWER ON push button above the monitor

5.3.8 Verify that the red indicator light labeled CONTROL POWER, located on the Main Power Cabinet, illuminates. If it does not, then one or more faults exists. Locate and clear the faults before continuing.

5.3.9 Click the "OK" button. The main control panel screen will be displayed. The screen is titled "RHIC- Q2 Curing Fixture Control Panel".

#### 5.4 Pump Room Access During Press Operation

5.4.1 Wear full protective gear: hood, face shield, jacket, pants, hearing protection.

5.4.2 Enter room, close door, and make adjustments.

5.4.3 Leave room, close door.

#### 5.5 Purging the Oil Heating/Cooling System

**NOTE** *Purging is required after the oil heating/cooling system is connected to newly installed formblocks, or after the system has been opened. Purging removes water and trapped air from the oil.*

5.5.1 Set the Manually Operated Valves (MOV) for purging. Refer to the "Manually Operated Valve Check List For Purging of System"

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(Attachment 1) for the correct valve settings. Complete the check list and post it in the pump room.

- 5.5.2 Verify that the nitrogen pressurizing system is operational. The two gauges on the tank should read as follows: at least 100 psi inside the tank, 5 psi after the regulator.
- 5.5.3 Click the Hydraulic Control ON button (Attachment 3, location 7). The press will move to the "up" position.
- 5.5.4 Roll in the formblock into the press to trip the limit switch. Install the stop bars.
- 5.5.5 Click the "Man" button (location 1).
- 5.5.6 Enter an oil set temperature of 164 deg. C in the box labeled "Oil Set Temp" (location 2).
- 5.5.7 Click the "HEAT" button (location 5). The oil heater and oil pump will activate.
- 5.5.8 Keep the system heated for a minimum of 30 minutes.  
  
IF you observe water vapor escaping from the expansion tank vent,  
  
THEN continue maintaining the temperature at 164°C until you do not observe any more water vapor.
- 5.5.9 When the system is purged, cool down the system by performing the following steps:
  - A. Enter an oil set temperature of 0 deg. C in the box labeled "Oil Set Temp" (location 2).
  - B. Click the "COOL Fast" button. The hot oil will be routed through the fan-cooled heat exchanger.
- 5.5.10 When the temperature reaches 35 deg. C, click the "OFF" button (location 5) to shut off the heating/cooling system.
- 5.5.11 Roll out the formblock.
- 5.5.12 Click the "OFF" button (location 7) to shut off the hydraulic system.

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- 5.5.13 Set the Manually Operated Valves for normal operation. Refer to the "Manually Operated Valve Check List For Normal Operation" (Attachment 1) for the correct valve settings. Complete the check list and post it in the pump room.

## 5.6 Operating the Press

### **CAUTION**

**The computer screen control panel, titled "RHIC- Curing Fixture Control Panel", has several operator controls which are intended for manual control of the Press. Before using these controls, read the section headed, "Manual Operation". Using manual controls without fully understanding how they function could result in unexpected operation of motors, pumps, etc, possibly resulting in equipment or product damage.**

- 5.6.1 Install the uncured coil onto the north or south formblock following the instructions in the applicable Magnet Assembly Procedure. Wear a hard hat and safety shoes when operating a crane.
- 5.6.2 Click the "ON" button in the Automated Control section.

**NOTE** *Throughout the curing process, the message window in the Automated Control section will display short messages about the current state of the process. These messages will allow you to follow the process more easily.*

*In some cases, the message will be an instruction, requiring you to perform a task.*

- 5.6.3 A window will pop up, prompting you to enter the following information:

Operator Life Number  
Coil Number  
Tooling Set Number

Using the "Tab" key to move from field to field, enter the information and click the "OK" button.

- 5.6.4 The top hat will rise under program control. The alarm will sound and a message will display in the Automated Control section:

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"PAUSE, ROLL IN FORMBLOCK"

- 5.6.5 Click the "Accept" button to shut off the alarm.

**WARNING**

**A pinch hazard exists when performing the next step.**

- 5.6.6 After checking that no one is standing near the Press opening, slide the formblock into the Press using the built-in handles on the formblock.
- 5.6.7 Fasten stop bars to hold the formblock in place.
- 5.6.8 Verify that the correct limit switch has tripped, as indicated in the message window in the "Motorized Valve State" section. The message will state one of the following:

NO LIMIT SWITCH  
NORTH LIMIT SWITCH  
SOUTH LIMIT SWITCH

**NOTE** *The program uses the switch information to determine the correct configuration for the motorized valves and the hydraulic end cylinders.*

- 5.6.9 Click the "Continue" button in the Automated Controls Section (location 10). The motorized valves will configure themselves for the formblock in use. The heater and hot oil pump will activate. The press top hat will lower and exert pressure on the coil.
- 5.6.10 Verify that the temperature of the mandrel and formblock is increasing by observing both the thermocouple readouts and the plot of temperature vs. time.

**NOTE** *The temperature that is plotted is read from the thermocouple that is highlighted in the "THERMOCOUPLES" section of the computer screen.*

- 5.6.11 IF the thermocouple highlighted in the "THERMOCOUPLES" section of the computer screen is defective (ie., if it is reading significantly different than the others),

THEN click on another thermocouple and highlight it.

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- 5.6.12 When the target temperature is reached, the Press will apply 10,000 psi coil stress and record gap measurements.
- 5.6.13 The alarm will sound and the message "PAUSE SHIM SIZE = nnn" will be displayed. Click "Accept".
- 5.6.14 Record the shim size value in the logbook and in the "remarks" section of the Traveler and click "Continue." The press top hat will rise.
- 5.6.15 The alarm will sound and the message "PAUSE INSTALL SHIM" will be displayed. Click "Accept".

### **WARNING**

**Hot oil under pressure presents a hazard to anyone working within the barriers around the Press. Wear a face shield when performing the next step.**

- 5.6.16 Install shims using the shim value noted in step 5.6.14.
- 5.6.17 Click the "Continue" button. The "Close Mold" button will highlight as the top hat exerts increasing amounts of pressure on the coil in 1000 psi increments.
- 5.6.18 Pressure will increase until all of the active LVDT's read less than the target value in the "LVDT Test Min" display window.
- 5.6.19 If the mold closes, the following message will display:

"Success @ nnn" ...applying stress until 15000".

The Press will continue increasing pressure in 1000 psi increments until an applied stress of 15000 psi is reached.

- 5.6.20 If the mold cannot close, the hat will rise and the message "No success" will be displayed. You may take one of the following actions:
  - A. Click "Continue" to try again by repeating the closing process.
  - B. Disable a possible defective LVDT by clicking on it and highlighting it. Then click "Continue" to repeat the closing process.

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C. Increment the line number by one and click "Continue". This will allow the curing process to continue. Consult with your technical supervisor before choosing this option.

5.6.21 The Press will continue to apply heat and pressure in varying amounts under computer control. Monitor the progress of the process by observing the temperature vs. time plot.

5.6.22 When the Press has cooled down, the top hat will rise and the alarm will sound. Click "Accept".

5.6.23 The message "PAUSE REMOVE SHIM" is displayed. Remove the shims.

5.6.24 Click "Continue". The Press will apply 10,000 psi of coil stress and record the final coil size measurement.

5.6.25 The top hat will rise and the alarm will sound. Click "Accept".

5.6.26 The message "PAUSE ROLL OUT FORMBLOCK" is displayed. Roll out the formblock.

5.6.27 Click "Continue". Control power for the hydraulic pump, hot oil pump, heater, and fan will turn off. Automated operation is now complete.

5.6.28 Print a cure report by performing the following steps:

A. When the window pops up with the instruction "Enter shim size", enter the shim size and click "OK".

B. The printer will begin printing the cure report.

5.6.29 Attach the cure report to the traveller.

5.6.30 Remove and store the cured coil following the instructions in the applicable MAP.

## 5.7 Manual Operation

**NOTE** *The location numbers in this section refer to those called out in the diagram of the computer screen control panel found in Attachment 3, "Computer Control Panel Reference".*

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5.7.1 To operate the heating/cooling system in manual mode, perform the following steps:

- A. Click the "Man" button (location 1).
- B. Enter an oil set temperature in the box labeled "Oil Set Temp" (location 2).
- C. Click one of the following buttons (location 5), depending on the action desired:
  - 1. "HEAT" to heat the fixture.
  - 2. "COOL Fast" to cool the fixture quickly, bypassing the heater and routing the hot oil to the oil to air heat exchanger.
  - 3. "COOL Slow" to cool the fixture slowly. The hot oil is routed through the entire system including the heater then to the oil to air heat exchanger.

5.7.2 To operate the main hydraulic pressure system in manual mode:

- A. Click the "ON" button (location 7) to activate the main hydraulic pump.
- B. IF you wish to set the applied pressure,  
  
THEN click on the "Applied Pressure" window (location 7) and type in the desired pressure.
- C. Click one of the following buttons, depending on the action desired
  - 1. "Hat up" to raise the press top hat and remove pressure from the coil.
  - 2. "Hat Down High Press" to lower the press top hat and apply high pressure (greater than 500 PSI) to the coil.
  - 3. "Hat Down Low Press" to lower the press top hat and apply low pressure (less than 500 psi) to the coil.

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- D. To shut off the main hydraulic pump, click the "OFF" button (location 7).

5.7.3 To operate the end hydraulic pressure system in manual mode:

- A. IF you wish to set the applied pressure,  
  
THEN click on the "Applied Pressure" window (location 9) and type in the desired coil end stress.
- B. Click one of the following buttons, depending on the action desired:
  - 1. "END CYLINDER EXTEND" (location 9) to activate the end hydraulic pump and apply end pressure to the coil.
  - 2. "END CYLINDER RETRACT" (location 9) to remove end pressure from the coil. The hydraulic pump will still be activated.
- C. To shut off the end hydraulic pressure pump, click "End Press OFF" (location 9).

5.7.4 To manually program a pressure cycle:

- A. Enter the number of cycles in the "Max Number of Cycles" box (location 8). Click the "Accept" button (location 12). Each cycle will consist of a specified "on" time, during which pressure is applied to the coil, and a specified "off" time, during which pressure is released from the coil.
- B. Enter the length of time that pressure will be applied in the "On Time" box.
- C. Enter the length of time that pressure will be released in the "Off Time" box.
- D. Click one of the following buttons, depending on the action desired:
  - 1. "CYCLE On-End Press" to start the cycle and apply both side pressure and end pressure to the coil.

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2. "CYCLE ON-NO End" to start the cycle and apply side pressure only to the coil.
- E. To pause the cycle, click the "CYCLE OFF" button. The cycle may be resumed by clicking the same button.
- F. To abort the cycle, click the "Abort Cycle" button. The cycle may not be resumed.

## 5.8 Shutting Down the Press

- 5.8.1 Exit the program by clicking "Exit" in the upper left corner. When the "Control Power" window appears, click "OK". The screen will show the "Program Manager" window.
- 5.8.2 Turn off the computer.
- 5.8.3 Place the power switch on the outside of the Main Power Cabinet, labeled "CONTROL SYSTEM POWER-Long Curing Press", in the OFF position.
- 5.8.4 Place the disconnect switch labeled "HYDRAULICS-Long Curing Press" in the OFF position.
- 5.8.5 Place the disconnect switch on the east wall, labeled "MAIN SERVICE DISCONNECT-Long Curing Press" in the OFF position.

## 5.9 Test of Safety Interlocks

**NOTE** *The test shall be completed at an interval not to exceed six months.*

### Test Procedure

- 5.9.1 IF a failure occurs at any step of the procedure,  
  
THEN stop work, write "fail" on the form, and immediately notify the cognizant engineer and the ES&H Coordinator.
- 5.9.2 Perform all of the steps in section 5.3, "Activating Power to the Press and Starting the Control Software."
- 5.9.3 Depress the Emergency Stop push button on the computer rack.

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5.9.4 Verify that all of the following occur:

The red indicator light labeled "Control Power" on the Main Power Cabinet extinguishes;

The alarm sounds at the computer control panel;

The computer screen displays "Control Power Failure" in the Annunciator Panel area.

Click "Accept" to shut off the alarm.

5.9.5 Depress the CONTROL POWER ON green push button. The red "Control Power" indicator light on the Main Power Cabinet should light.

5.9.6 Repeat steps 5.9.3 through 5.9.5 for all Emergency Stop push buttons of the Long Curing Press facility as shown on the location diagram on the Interlock Test Record (Attachment 2).

5.9.7 Check off, date, and initial the Interlock Test Record and post it on the Control Cabinet. Note in the daily log that the test was completed successfully.

## **6.0 Documentation**

- 6.1 Traveler
- 6.2 Daily Logbook
- 6.3 Maintenance Log
- 6.4 MOV Check List
- 6.4 Interlock Test Record

## **7.0 References**

- 7.1 ESH Standard 1.5.1, "Lockout/Tagout Requirements".

## **8.0 Attachments**

- 1. MOV Check Lists
- 2. Interlock Test Record
- 3. Computer Control Panel Reference

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**Attachment 1**

**Manually Operated Valve Check List**

**For Normal Operation**

SYSTEM #01

Hot oil heating/cooling system safety check:

There are several manually operated valves in the heating/cooling system pump room that must be in the proper operating position during the curing cycle. These valves are labeled. The following check off list must be completed prior to operating the system to assure the valves are in the proper positions. The valve is in the "open" position when the handle is in line with the system transfer line.

<b><u>Valve #</u></b>	<b><u>Position</u></b>	<b><u>Check Off</u></b>
MOV 100	Always open	_____
MOV 101	Open	_____
MOV 102	Closed	_____
MOV 110	Closed	_____
MOV 103	Open	_____
MOV 104	Open	_____
MOV 105	Closed	_____
MOV 106	Closed	_____

Above work done by:

---

Name	Date	Life #
------	------	--------

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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Manually Operated Valve Check List (Attachment 1 cont'd)

**!!For Purging of System!!**

SYSTEM #01

Hot oil heating/cooling system safety check:

There are several manually operated valves in the heating/cooling system pump room that must be in the proper operating position during purging of the heating/cooling oil. These valves are labeled. The following check off list must be completed prior to operating the system to assure the valves are in the proper positions. The valve is in the "open" position when the handle is in line with the system transfer line.

<u>Valve #</u>	<u>Position</u>	<u>Check Off</u>
MOV 100	Always open	_____
MOV 101	Closed	_____
MOV 102	Open	_____
MOV 110	Open	_____
MOV 103	Open	_____
MOV 104	Open	_____
MOV 105	Closed*	_____
MOV 106	Closed*	_____

Above work done by:

\_\_\_\_\_  
Name Date Life #

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\*Isolates oil water heat exchanger.



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### Attachment 3

### Computer Control Panel Reference

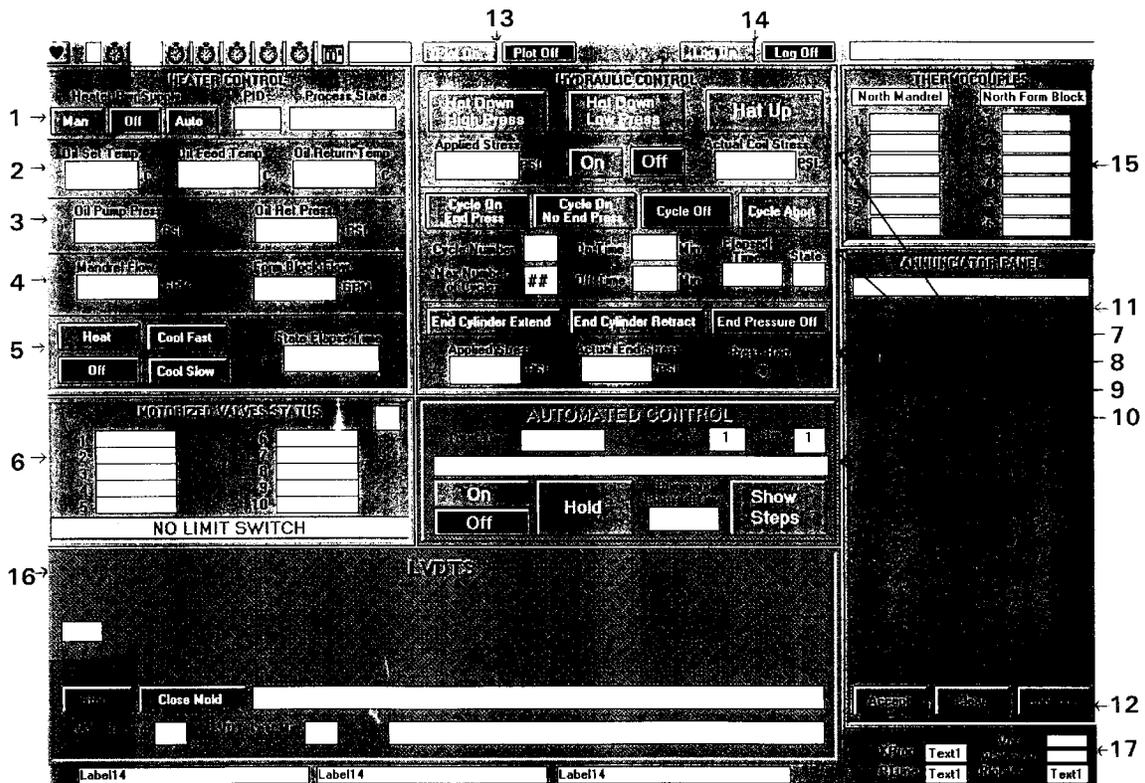


Figure 1. Computer Control Panel

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Table 1. Description of Operator Controls and Indicators

(Attachment 3 cont'd)

Note:

1. Location numbers refer to those called out on Figure 1, "Computer Control Panel."

Loc-ation#	Designation	Device Type	Function
1	Heater Pwr Supply-Man	button	Activates power to the oil heater.
1	Heater Pwr Supply-Off	button	Deactivates power to the oil heater.
1	Heater Pwr Supply-Auto	button	Enables automated control of power to the oil heater.
1	PID	data entry and display	Diagnostic use.
1	Process State	display only	Displays current state of heating/cooling system.
2	Oil Set Temp	data entry and display	Allows the operator to enter the desired fixture temperature.
2	Oil Feed Temp	display only	Reads thermocouple attached to heating/cooling oil supply line at the heater.
2	Oil Return Temp	display only	Reads thermocouple attached to heating/cooling oil return line at the heater.
3	Oil Pump Press	display only	Displays heating/cooling oil supply pressure.
3	Oil Ret Press	display only	Displays heating/cooling oil return pressure.
4	Mandrel Flow	display only	Displays heating/cooling oil supply flow rate through the mandrel.
4	Form Block Flow	display only	Displays heating/cooling oil supply flow rate through the formblock.
5	HEAT	button	Starts the process of heating the Press.
5	COOL Fast	button	Starts the process of cooling the Press. The "Fast" mode routes oil directly to the air-cooled heat exchanger, bypassing heater.
5	COOL Slow	button	Starts the process of cooling the Press. The "Slow" mode routes oil through heater and the air-cooled heat exchanger.
5	OFF	button	Deactivates the heating/cooling oil pump and heater.
5	State Elapsed Time	display only	Displays the time elapsed for the current heating or

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Location#	Designation	Device Type	Function
			cooling state.
6	Motorized Valve State- 1 thru 10	display only	Displays the state of the motorized valves: "OPEN", "CLOSED", "CYCLING", or "FAULT". The motorized valves route heating/cooling oil to either the mandrel or the formblock. "FAULT" is displayed if a valve does not finish cycling in a preset time.
6	None-Display box in "Motorized Valve State" window.	display only	Displays which mandrel is inserted into the Press: "NORTH MANDREL", "SOUTH MANDREL", or "NO LIMIT SWITCH". When a mandrel is inserted, it activates a microswitch on the Press.
7	Hat Down High Press	button	Causes the hat to lower and exert high pressure (>500 psi) on the coil.
7	Hat Down Low Press	button	Causes the hat to lower and exert low pressure (<500psi) on the coil.
7	Hat Up	button	Raises the hat.
7	Applied Stress	data entry and display	Allows the operator to enter the coil stress to be applied.
7	On	button	Activates the main hydraulic oil pump.
7	Off	button	Deactivates the main hydraulic oil pump.
7	Actual Coil Stress	display only	Displays the calculated coil stress.
8	CYCLE ON-End Press	button	Starts a cycle of applying and releasing pressure on the coil from the top side and ends.
8	CYCLE ON-No End	button	Starts a cycle of applying and releasing pressure on the coil from the top side only.
8	CYCLE OFF	button	Pauses the cycle. The cycle may be resumed by pressing one of the CYCLE ON buttons.
8	Abort Cycle	button	Stops the cycle, releases pressure, and resets the cycle parameters.
8	Max Number of Cycles	data entry and display	Allows operator to enter the number of times the cycle will occur.
8	Cycle Number	display only	Displays the current cycle.
8	On Time	data entry and display	Allows the operator to enter the length of time that pressure will be applied.
8	Off Time	data entry and display	Allows the operator to enter the length of time that pressure will be removed.
8	Elapsed Time	display only	Displays the length of time that is elapsing while pressure is being applied and while pressure is released.
8	State	display only	Displays the current cycle state.

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Location#	Designation	Device Type	Function
			For diagnostic use.
9	END CYLINDER EXTEND	button	Causes end pressure to be applied to the end saddles.
9	END CYLINDER RETRACT	button	Causes end pressure to be released from the end saddles.
9	End Press OFF	button	Deactivates the end pressure hydraulic pump.
9	Applied Stress	data entry and display	Allows the operator to enter the desired coil end stress to be applied.
9	End Stress	display only	Displays the calculated coil end stress.
9	Press Reg	Indicator light	Illuminates when the pressure regulating system is activated.
10	Total time	display only	Displays the total time that the system has been operating in automated mode.
10	Step	display only	Displays the current step as referred to in the script file. The script file is a set of English-like commands that controls automated mode.
10	Command Line	display only	Displays messages for the operator, including instructions to follow, and current automated actions being performed by the Press.
10	ON	button	Starts automated mode.
10	OFF	button	Aborts automated mode. Automated mode cannot be resumed.
10	Hold	button	Pauses automated mode. Automated mode may be resumed.
10	Command Elapsed Time	display only	Displays the length of time that has elapsed during execution of the current program line.
10	Pgm Line		Current line from the script file that is being executed.
10	Show Steps	button	Opens a window in the ANNUNCIATOR PANEL area showing the steps from the script file under which the Press is currently operating.
10	Step		Current step that is being executed.  The script file is divided into steps, which are divided into lines.
11	ANNUNCIATOR PANEL	display only	Displays fault status.  When you enter automated mode, a window will open

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Location#	Designation	Device Type	Function
			up in the ANNUNCIATOR PANEL area, showing the script file you are currently operating under. You may HOLD the program and click on a different step. Another window showing RESUME, opens up. You may click on RESUME and continue from that step.
12	Accept	button	Turns off the audible alarm.
12	Clear	button	Clears the fault from the screen when the fault is repaired.
12	Continue	button	Resumes automated mode operation.
13	Plot On, Plot Off	buttons	Starts or stops the plotting of temperature vs. time. When Plot On is clicked, the plot is displayed at the bottom of the screen.
14	Log On, Log Off	buttons	Starts or stops storage of data in a log file.
15	THERMOCOUPLES	display only	Displays temperature at several points on the mandrel and formblock.  One thermocouple is used to provide temperature values to the plot routine. The thermocouple is highlighted and may be changed by the operator by clicking on another thermocouple with the mouse.
16	LVDTs		Displays gap measurements as read from the LVDTs.
17	KProp	display only	Diagnostic use.
17	PTune	display only	Diagnostic use.
17	Plot Val	display only	Diagnostic use.
17	Vout	display only	Diagnostic use.
17	Wait State	display only	Diagnostic use.