

## Amplifier Technician Procedure for Amplifier Pre-operations Startup S-AB-P-141 Rev C

### **Introduction:**

OMEGA EP amplifiers require preparation before they are ready for shots. As with all groups in OMEGA EP, the Amplifier group has a daily Pre-operations Procedure. In addition to servicing the amplifiers and their cooling systems the spare parts inventory requires monitoring to ensure parts availability.

### **Laser Amplifier Technician (AT) Responsibilities:**

A Pre-operations shift is required on Shot Days. Prior to the start of shot operations the cooling system pump assemblies are checked, and inspection of each amplifier is completed. The requirement is to have the amplifiers and associated hardware inspections completed 60 minutes prior to the start of shot operations.

The De-ionized (DI) Water System is located in the LLE West Mechanical Room. The recirculation pump assembly consists of an expansion tank and two recirculation pumps. The Amplifier group is responsible for checking the recirculation pump assemblies and the coolant fluid level in the expansion tank. The expansion tank provides make-up water for minor losses occurring in the closed loop circulation system. The recirculation pumps (Grundfos CRN45 Pumps and Baldor Motors) circulate the DI water through the cooling loops. Although each loop has two recirculation pumps, only one is used while the second serves as a backup unit. The system also has a conditioned water makeup skid to provide makeup water to the expansion tank as required.

The DI Water System status GUI is located at the Shot Director's console or the PC in Optics Assembly Area (OAA). This GUI provides real time status, performance, and warnings for all aspects of the DI Water system.

**Policy:** This procedure is to be used by Laser Amplifiers personnel to carry out the responsibilities outlined above.

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**Laser Amplifiers Startup Checklist**

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**Inspect DI Water Main Pump and Support Equipment**

Observe the GRUNDFOS CRN45 pump and BALDOR motor assemblies during start-up and/or operation.

- 1
  - Check for the appearance of discoloration.
  - Check for metal shavings or other debris around the pump and motor.
  - Monitor sound levels for excessive volume, grinding or grating.
  - Check for any burning odors. □
  - Check lower bearings for excessive noise or temperature.
  - Check for leaks in and around the Polishing Skid, Heat Exchanger, and DI Make-up skid.

Report any anomalous findings to the Amplifier Group Leader who will in turn notify the Operations and Maintenance Group or the DI water system maintenance provider.

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**Coolant level check**

- 2
  - Check the expansion tank coolant level by examining the gold flags of the level sensor mount on the expansion tank. The level may also be checked remotely on the DI water system GUI. The current control system limits are: □
    - Normal operating level is 70% full.
    - Warn at <50 % or >80% full.
    - Shutdown at 40% full.

If the level is between 60% and 80%, no action is required. (Proceed to Step 5)

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**Coolant level adjustment**

NOTE: This process will alter the nitrogen pressure in the Cooling System. This step is to be executed when the Recirculation Pump is running:

- 3
  - OPEN the “DI Fill Valve”.
  - When the expansion tank is at the operating level specified above, CLOSE the Fill Valve. □
  - The nominal pressure is 2.5 to 3.0 psi as indicated at the DI Pump Inlet Pressure gauges.
    - If the pressure is greater than 3.0 psi release excess nitrogen from the expansion tank by opening the Bleed-Off valve.
    - If the pressure is less than 2.5 psi then build pressure by opening both “Nitrogen Fill Valves” until the minimum pressure is achieved.

(continues)

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### DI Water Pump Restart Procedure

**NOTE:** If the Recirculation Pump is not running, **DO NOT** restart until the cause of failure has been found and corrected. Causes can include:

- Drop in pressure (leak)
- Power Failure
- Pump breakdown
- Motor drive failure

WHEN repairs have been completed:

- 4
- If necessary adjust the coolant level per Step 3 even though the pump is not running.
  - Pump selection: (Change to the second pump only if necessary.)
  - Assure that ball valves immediately upstream and downstream of the pump that will be used are OPEN.
    - Press the green “Start” button on the pump drive (ADIP1 or ADIP2).
    - As the pump is coming up to speed (1 minute), monitor the Expansion Tank fluid level and execute Step 3 until the pump is at full speed.
    - Recheck the coolant level. Adjust level and nitrogen pressure per Step 3 as required.

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- 5
- Review the Shot Director’s Log, Out-of-Commission List and the Amplifiers Material Deficiency List and repair any outstanding items.

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### AFC Inspection

- 6
- Visually check all 8-AFC’s in the Laser Bay and inform the SD of any issues:

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### Amplifier Inspection

- 7
- Visually check all 72-SSA’s in the Laser Bay:
    - water-leaks,
    - flow faults,
    - nitrogen flow
    - pump module location faults,
    - HV-discharge cables
    - ground connections

Repair any items found that require attention. Note the repair in the Amplifier log book. Enter any items that cannot be immediately repaired into the Material Deficiency List and inform the SD of any unresolved issues.

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- 8
- File the completed checklist with the SD.   
(done)

**Vol. IX System Startup and Shutdown  
Chapter 4 Beamlines**



**Inventory of Critical Hardware Checklist; Replenish as necessary**

<b>P/N</b>	<b>Part Name</b>	<b>Req'd Qty</b>	<b>Comment</b>	<b>Checked</b>
A-AJ-A-01	40 cm SSA - Odd	1		<input type="checkbox"/>
A-AJ-A-51	40 cm SSA - Even	1		<input type="checkbox"/>
A-AJ-B-06	Flashlamp Brick Assembly	10		<input type="checkbox"/>
A-AJ-B-02	Flashlamp Assembly	10		<input type="checkbox"/>
A-AJ-B-03	Safety Switch Assembly	2		<input type="checkbox"/>
B-DH-B-022	Flow Meter Assy – Left	2		<input type="checkbox"/>
B-DH-B-023	Flow meter Assy – Right	2		<input type="checkbox"/>
B-DH-B-034	Fiber Optic Kit	5	6 ft cable assy's	<input type="checkbox"/>
FLS-7 (133475) B-DB-A-001 Item 31	Sensor-Level Fiber-Site	2		<input type="checkbox"/>
A-AL-C-151-2	Short Red PFN Cable	5		<input type="checkbox"/>
A-AL-C-151-4	Short White PFN Cable	5		<input type="checkbox"/>
A-AL-C-151-1	Long Red PFN Cable	5		<input type="checkbox"/>
A-AL-C-151-3	Long White PFN Cable	5		<input type="checkbox"/>
				<input type="checkbox"/>
				<input type="checkbox"/>
				<input type="checkbox"/>
				<input type="checkbox"/>
				<input type="checkbox"/>
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**AT:** \_\_\_\_\_ **SD:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Document Release:**

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