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Micro-Pulse Lidar (MPL) Pump Diode Replacement Procedure

I. Purpose:

This procedure describes how to replace the pump diode on a 4B Series Micro-Pulse Lidar (MPL) System at the Tropical Western Pacific Facilities and the ARM Mobile Facility.

II. Cautions and Hazards:

- The MPL in its standard operating configuration (i.e., all covers in place, transmitting 532 nm) is a Class-II laser product. However, once the system is opened up, this classification no longer applies. Technicians will then be exposed to the embedded pump diode, which is a Class-IV laser capable of exceeding 1 W. Furthermore, it is focused via the fiber optic cable and presents the potential for serious eye damage. Replacing the diode alone has very little risk associated, as the system is de-energized. However, in order to measure the output power of the new diode, technicians will need to energize the diode and then risk exposure to the Class-IV beam. Therefore, the maintenance activity outlined in this procedure requires that the appropriate laser safety eyewear be worn.
 - ⇒ The diode has a wavelength of ~800 nm and an output of 1 to 1.5 W. The recommended laser safety goggles Optical Density (OD) for this power range is OD > 4.
 - ⇒ It is highly recommended to take an online laser safety class from Pacific Northwest National Laboratory:

Laser Safety Training <http://online-training.pnl.gov/default.asp>
 - ⇒ A slit eye exam is recommended every 2 years.
- Post a temporary warning sign on the I-Van doors to prevent unprotected personnel from looking into the van windows. For example:

“Keep away – Laser Hazard. Do not look in the van windows.”
- Notify onsite personnel that MPL maintenance is being carried out and advise them to stay away from the I-Van for the duration of the maintenance activity.
- Always point the diode away from any body parts.
- Two persons are required to replace the pump diode.
- Wear antistatic wrist strap throughout this procedure.

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III. Requirements:

- Laser safety goggles (OD > 4)
- Antistatic wrist strap
- 5/32 ball driver
- Phillips-head screwdriver
- 0.050" Allen key

IV. Procedure:

A. Replacing Pump Diode

1. Shut down the MPL system.
2. Unplug laser power supply and disconnect the umbilical cable.
3. Using a 5/32 ball driver release the elevation adjustment screws. Swing the transceiver to a horizontal position, with the heat sink side down. Tighten the adjustment screws.
4. Using a Phillips-head screwdriver, remove all screws from the smaller of the two MPL aft optics access panels. This should be on the top side of the assembly.
5. Locate the access panel on the laser head for the fiber end of the pump diode. The panel is flush with the laser head and secured by four button head screws. Use a 0.050" Allen key to open the panel.
6. Carefully unscrew the SMA end of the fiber from the mount. Retrieve the coiled up section of the fiber.
7. Unscrew the cover for the pump diode housing located on the laser head. **Note: There may be wire ties that have to be cut to release the fiber.**
8. Disconnect the diode power connector. **Note the polarity of the plug. Mark with permanent marker to ensure it is reinstalled correctly.**
9. Remove the four screws holding the pump diode module to the TEC assembly.
10. Apply a small amount of heat sink compound to the bottom of the replacement diode.
11. Secure the diode to the TEC assembly using four screws. Clean off any excess grease with a wipe or cloth.
12. Plug in the power connector across the pins. **Ensure correct polarity of the plug. Check markings.**

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13. Clean the fiber end of the pump diode with a fiber cleaner.
WARNING: Laser light emitted by the diode is of sufficient strength to cause eyesight damage. Wear safety goggles. Always point the diode away from any body parts.
14. Zero the laser power meter. Place diode in the sensor cavity.
15. One person holds the diode in the sensor cavity. The other carries out the following three steps:
 - a) Pull up the interlock plunger to defeat interlock.
 - b) Test the fiber output by powering up the laser power supply and using LDD control to increase current to ~1.5A. The output of the diode should be 1W. Turn the current down, and shut off the laser power supply. Note the current setting for 1W output.
 - c) Turn off laser remove diode from sensor cavity. Install diode.
16. Install pump diode housing cover.
17. Wind the fiber loosely in a 2" diameter loop and secure the SMA connector in the laser head.
18. Close access panel with the four screws. Use wire ties to secure fiber.
19. Close laser access panel on MPL.
20. Bring MPL back to vertical.
21. Ensure correct positioning of the telescope.
22. Start the MPL system.
23. Carry out After Pulse check and Dark Count check. Save results on the desktop for mentor to view.
24. Remove the temporary warning sign from the door. Notify everyone that MPL maintenance is complete.
25. Post a contact sheet and notify mentor that the laser diode has been changed.

V. References:

1. MPL Installation, Operation, Alignment/Characterization, Repair and Maintenance Procedure, MAN(MPL)-030.
2. MPL Shutdown and Restart, PRO(MPL)-011.

VI. Attachments:

None.