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Micro-Pulse LIDAR (MPL) Daily Operating Procedure

I. Purpose:

This document assumes that the MPL has operated continuously for a period of at least several days without problems. It describes the daily care and maintenance for the Micro-Pulse LIDARs (MPLs) currently operated at the Southern Great Plains and Tropical Western Pacific CART Sites (MPL01 and MPL02).

II. Cautions and Hazards:

- During normal operation, the MPL is an eye-safe laser radar system. Nonetheless, one should avoid directly viewing the transmitter beam for an extended period of time (more than several seconds). If the side panels are removed from the MPL Transmitter/Receiver module, or if the fiber optic cable is disconnected from the laser head, the system is no longer eye-safe and the following WARNING applies:

WARNING: *The Spectra-Physics Model 7300 laser diode module employed in the MPL is a Class IV High Power Laser. The laser radiation is in the near-infrared spectral range (800nm) and is not visible to the human eye. Do not look into the end of the fiber optic cable when the diode module is "On". The Model 7960 laser head and the Model 7965 frequency doubler employed in the MPL Transmitter/Receiver head are classified as Class III-b High Power Lasers. The output beam from each is, by definition, a safety hazard. Avoid direct viewing of the beam or its specular reflection.*

III. Requirements:

- Spray bottle containing either methanol or distilled water.
- Lens tissue or non-abrasive paper towels.

IV. Procedure:

A. Steps:

1. Verify that all indicator lights on the MPL computer, computer monitor, lidar power supply, laser diode module, and (if installed) shutter control box are illuminated.
2. During routine operation, the MPL computer monitor intensity is turned down to prevent "burning in" the display. Increase the monitor intensity and verify that the MPL is updating the display every 60 seconds. The display should appear as seen in Figure 1.

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3. Verify that all displayed MPL parameters are within their acceptable ranges:
 - Laser temperature (acceptable range 10C-35C, typical 30C).
 - Detector temperature (acceptable range 10C-40C, typical 35C); detector automatically shuts down if temperature exceeds 40C.
 - Box temperature (acceptable range 10C-40C, typical 30C).
 - Frequency (2500 Hz).
 - Energy (acceptable range 0-15 microjoules, typical 0 [laser off] or 10 microjoules).
 - Background (typical [clear sky] 1E-2 photoelectrons per microsecond); (typical [overcast sky] 1E-1 photoelectrons per microsecond).
4. Check that the date and time are correct. "Now" time is the current time. "Time of fire" is the time that the last atmospheric profile was saved. The "time of fire" updates every minute. Turn the display intensity back down to "minimum" (fully counterclockwise).
5. Check the remote laser control handset. (See Figure 2.)
 - The display should read "1.00W," and the word "WATTS" is lit. If "WATTS" is not lit, push button #3 on the handset until "WATTS" lights up. If display does not read "1.00W," press button #1 to select which character you need to change, and buttons #2 and #4 to make the display read 1.00W.
 - Push button #3 once so that "WATTS" is replaced by "PRF." The display should now read "2500 Hz". If the numeric display does not read "2500," press button #1 to select which character you need to change and buttons #2 and #4 to make the display read "2500 Hz."
 - Push button # 3 until "STATUS" is displayed. It should read "1.00W," and may vary over time by several hundredths of a watt.
6. Hold a sheet of white paper above the lidar telescope; a green, circular beam of light, approximately 20 cm in diameter, should appear.
7. Check for debris/dust on the telescope window (Schmidt corrector plate). To avoid eye exposure to laser radiation, do not stare into telescope. Remove any debris. If dust remains, spray telescope window with methanol or distilled water and wipe clean with lens tissue or non-abrasive paper towels.
8. After climbing onto seatainer/trailer roof, check for debris/dust on MPL ceiling port window and on sun position sensor tube window (if unit is equipped with shutter). To avoid eye exposure to laser radiation, do not

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stare into MPL ceiling port window. If necessary, clean windows with distilled water or mild detergent solution (e.g., Windex) and wipe dry with paper towels.

9. Sign and date the procedure checklist; add any comments or questions you have.

V. References:

None.

VI. Attachments:

1. Figure1 - MPL Screen Display.
2. Figure 2 - Diagram of Remote Handset for Laser Control.

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Figure1 - MPL Screen Display.

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