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MPLHR Scaler & Control and Transceiver Removal

I. Purpose:

This procedure details the actions required to remove the transceiver and MPLHR Scaler & Control controller from the MPLHR and prepare them for shipping. The MPLHR Shutdown/Startup procedure should be carried out to shutdown prior to beginning this procedure.

II. Cautions and Hazards:

- **All** MPLHR components must be turned off and unplugged from electrical power prior to taking it apart.
- The MPLHR contains fragile optical components that must be handled with care, even when being sent for repair.

III. Requirements:

- The MPLHR Shutdown/Startup Procedure must be used to shut down the system.
- A set of Allen wrenches
- The white oblong crate custom-fit to hold the MPLHR transceiver and cables.
- At least two people are required to pack the MPLHR for shipping.
- One 20”L x 12” D x 8”H box (or larger) to hold the LIDAR controller and cables.
- Assorted packing supplies: foam, tape, etc..

IV. Procedure:

A. Complete power down and disconnect from electricity:

1. Perform MPLHR Shutdown/Startup Procedure to shut down MPLHR.
2. Disconnect the electrical power to the MPLHR computer, laser, and LIDAR control by unplugging each from the electrical socket.

B. Disconnect MPLHR Scaler and Control and remove from rack:

Working left to right (as seen from behind) the cables will be disconnected from the MPLHR Scaler & Control.

1. Examine Figure 1 while looking at the backside of the MPLHR Scaler & Control, identifying each connection.

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2. Unplug the AC power cable from the left-hand side (when viewed from back) by pulling directly out (wiggle, but don't twist). Place the cable in a plastic bag for shipping.
3. Unplug the "Detector Signal" coaxial cable from the MPLHR Scaler & Control. This cable has a BNC connector. Remove the BNC connector by pushing in slightly while turning counter-clockwise about one-quarter of a turn. Then the connector should release easily by pulling directly out. Follow the cable to the other end at the MPLHR transceiver, disconnecting it as well. (It may be easier to access the back end of the MPLHR transceiver if the hex-head screws at the pivot are loosened with an Allen wrench.) After removing the cable, place it in a plastic bag for shipping.
4. Unplug the "Laser Trigger" coaxial cable from the MPLHR Scaler & Control. It also has a BNC connector and is disconnected just like the "Detector Signal" cable. Follow the cable to the other end at the Laser Power Supply, disconnecting it as well. Place the cable in a plastic bag for shipping.
5. Unplug the "Computer" cable from the MPLHR Scaler & Control. It is a ribbon cable with a long Centronics connector. There are two spring clips on both ends that hold the connector on. The spring clips are released by flicking them outwards from the connector. Once released, gentle wiggling will free the cable. Leave the other end of the cable attached to the computer. It will not be shipped.
6. Unplug the "Transmitter" multi-conductor cable from the right-hand side of the MPLHR Scaler & Control. A small screwdriver will be necessary to loosen the two screws at either end fastening the 25-pin "D" connector to the MPLHR Scaler & Control. It is only necessary to loosen the screws, not to entirely remove them. Once the screws are loosened, the cable should come off with gentle wiggling. Follow the cable to the other end at the MPLHR transceiver. It is connected to the MPLHR transceiver with a large 18-pin "LEMO" connector. LEMO connectors push straight on and pull straight off. They are not threaded, twisted, or screwed on or off. They have a special spring-loaded collar that helps to lock the cable in position. To remove a LEMO connector, grasp the cable by the collar. As the cable is pulled directly outwards, the collar slips back a bit, compressing a spring. The connector for the MPLHR transceiver is pretty stiff. Firm wiggling while grasping the collar and pulling directly out (no twisting) will eventually release the cable. Coil the cable and place it in a plastic bag for shipping.
7. The MPLHR Scaler & Control should now be free of connectors. It is fastened to the MPLHR rack with four machine screws from the front. The four screws should be removed by one person from in

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front of the rack while another person supports the MPLHR Scaler and Control box from the back. After the screws are removed, the entire box easily removes through the front of the rack. It should be put in a large plastic bag or wrapped in plastic and then carefully packed with the cables in a box with plenty of padding.

Contents of MPLHR Scaler & Control shipping box:

- AC power cable
- Detector Signal coaxial cable with BNC connectors
- Laser Trigger coaxial cable with BNC connectors
- Transmitter multi-conductor cable with 25-pin "D" connector and large 18-pin LEMO connector
- MPLHR Scaler & Control sealed in a separate plastic bag

C. Disconnect Laser Diode Supply and MPLHR Transceiver

The only cables remaining attached to the MPLHR transceiver are from the Laser Diode Supply. Working again from left to right, the cables will be disconnected from the Laser Diode Supply one by one.

1. Examine figure 2 while looking at the back side of the Laser Diode Supply, identifying each connection.
2. For safety's sake, unplug the power cable from the far left-hand side of the Laser Diode Supply, but do not pack it for shipping. The Laser Diode Supply will not be shipped.
3. Unplug the Laser Temp Control cable from the 9-pin "D" connector at the back of the Laser Diode Supply. A screwdriver may be necessary to loosen the two screws fastening either end of the connector. It is only necessary to loosen the screws, not to entirely remove them. Once the screws are loosened, the cable should come off with gentle wiggling. Follow the cable to the other end at the MPLHR transceiver. It is connected to the MPLHR transceiver with a small four-pin "LEMO" connector. This LEMO connector is not as tight as the large one so is much easier to remove. Simply grasp the small LEMO collar and pull the connector directly out from the transceiver. Once removed, coil the cable and place it in a plastic bag for shipping.
4. Unplug the Laser Q-switch coaxial cable attached at the top right-hand end of the Laser Diode Supply with a BNC connector. As before, press in slightly and then remove the connector with about a quarter turn counter-clockwise. Follow the cable to the other end at the MPLHR Transceiver where it is connected with a gold colored SMA connector. SMA connectors are threaded connectors

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removed by turning counter-clockwise. Once removed, place the cable in a plastic bag for shipping.

Read the next two steps through completely before removing the fiber optic cable from the Laser Diode Supply and the MPLHR Transceiver.

5. Only one last cable remains attached to the transceiver, but it is the most delicate and expensive one: the fiber optic cable. The fiber optic cable is attached at both ends using a special connector with a threaded collar. The fiber optic cable should never be subject to much strain, tension, tight bends, or twists. The ends should not be touched or left exposed. After disconnecting the cable, special caps attached to the fiber optic cable with plastic loops should be threaded onto the connector ends to protect them from contact. Remove the fiber optic cable from the lower right-hand edge of the Laser Diode Supply by grasping only the threaded collar and turning counter-clockwise. The connector should start out snug but once started, the collar should turn smoothly and easily. When the collar is very loose, the connector is carefully drawn straight out of the Laser Diode Supply. Thread the supplied caps onto the exposed end of the fiber optic cable and also onto the exposed connector on the Laser Diode Supply.
6. Without straining or kinking the fiber optic cable, follow the cable back to the MPLHR Transceiver. Remove the fiber optic cable from the transceiver as described above. Loosely coil the fiber optic cable and store in a safe place. The fiber optic cable will not be shipped.

D. Packing MPLHR Transceiver for shipping

The MPLHR Transceiver should be shipped in the original packing container which was provided for it. This container is an oblong rectangular white plastic crate with foam packing shaped to accommodate the MPLHR Transceiver. Two people are required to move the MPLHR Transceiver to the shipping container.

1. The MPLHR Transceiver telescope should be covered with the supplied telescope lid. The black lid has slots to accommodate two small pegs on the MPLHR transceiver telescope. After guiding the pegs through the slots, the lid is secured with a slight clockwise turn. A couple strips of electrical tape should be applied as well to make sure the lid doesn't loosen and come off during shipping.
2. Position the MPLHR Transceiver in a vertical orientation and tighten the pivot with an Allen wrench.

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3. Seal the MPLHR Transceiver inside a large plastic bag, securing the bag with twist-ties or tape.
4. Move the MPLHR Transceiver into the shipping container, positioning it so that the hex screws for the pivot are facing up. This should generally be done with two people; one person supporting the legs and base and the other person supporting the telescope.
5. After the MPLHR Transceiver is positioned within the shipping container, the pivot should be loosened with an Allen wrench to minimize mechanical strain during shipping. (It's okay to make a couple of small holes in the plastic bag to get at the hex screws with the Allen wrench.) Additional foam padding may be packed around the unit as well.

Contents of MPLHR Transceiver shipping container:

- Laser Temp Control cable with 9-pin "D" and small 4-pin LEMO connectors
- Laser Q-Switch coaxial cable with BNC and SMA connectors
- MPLHR Transceiver sealed in separate plastic bag.

V. References:

MPLHR Shutdown/Startup Procedure

VI. Attachments:

1. Figure 1. Back side of MPLHR Scaler & Control
2. Figure 2. Back side of Laser Diode Supply

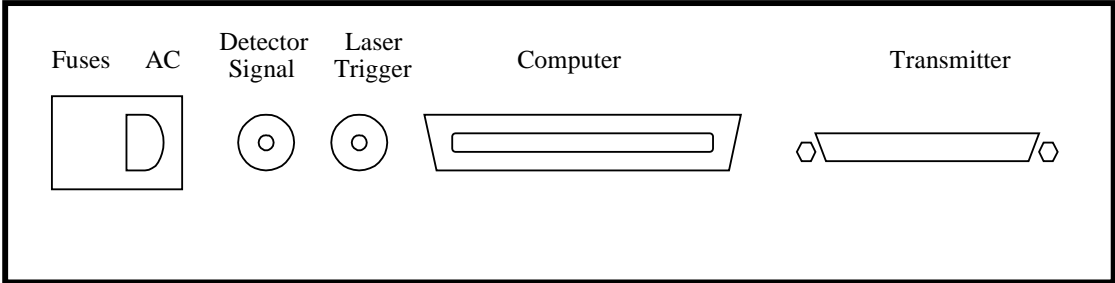


Figure 1. Back side of MPL Scaler & Control

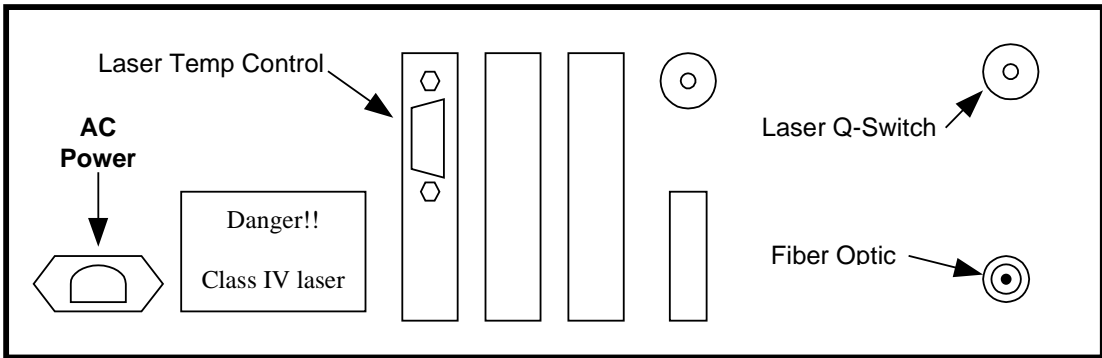


Figure 2. Back side of Laser Diode Supply