

RGALabs, Inc.

**M-Light™ HPS-1000Q Retrofit Kit
Assembly Procedure**



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February 28, 2004

Report Contents

1. Introduction	3
2. Required Tools	5
3. Unpacking and Disassembly	6
4. Preparation of the HPS-1000 Lamp	8
5. Assembly of the M-Light Unit	9
6. Attaching Auxiliary Tools, Cameras, and Equipment	10

Report Figures

Figure 1 - Fully assembled M-Light unit with HPS-1000Q lamp installed	3
Figure 2 - M-Light retro fit kit after unpacking	6
Figure 3 - M-Light kit disassembled	7
Figure 4 - Cap and Lower Structure reference marks	7

1. Introduction

This document provides the assembly instructions for the RGA Labs M-Light retrofit kit to convert an existing ROS HPS-1000Q lamp assembly into a stable core plate lighting unit. The fully assembled M-Light system is shown in Figure 1.



Figure 1 - Fully assembled M-Light unit with HPS-1000Q lamp installed

The M-Light / HPS-1000Q is designed to provide a stable lighting and auxiliary tool platform located on the core plate, typically during refueling and inspection operations. The M-Light uses the core plate flow holes for fixture support. The unit is designed to be handled by a technician direction from the lamp cable or addition support cable. The M-Light is designed to self locate in the core plate flow holes by simply lowering it into place.

The M-Light's Advantages and Features:

- The M-Light Fixture is designed to provide high performance lighting and other tooling components such as cameras and manipulator items at the reactor core plate level.
- The M-Light provides vastly improved lighting to the lower end of the reactor core and fuel assemblies during refueling and inspection activities. The M-Light provides the fuel handlers with full visibility to identify mechanical conflicts before fuel damage occurs. The M-Light improves fuel handling productivity, while fuel safety is improved.
- Fuel and reactor system safe, no loose parts, no fuel rod puncture or grid strap snagging threats.
- Light output is 360 degrees; no need to orient the fixture during placement.
- Easily lowered into place or located at mid-level hanging from the cord.

- No residual water carryover on removal from pool.
- Quick assembly / disassembly with minimum tools, and can be done in a gloved / radiation environment. Lighting element is easily removed from the structure for other uses.
- Uses standard ROS lighting fixtures.
- Protects the light elements from damage and costly replacement.
- Handled directly by the lamp cord; no ancillary cables required. Reduces the number of lamps, cables, and lighting equipment in the refueling area.
- Auxiliary mounting holes in the structure to support ancillary equipment such as cameras and monitoring detectors.
- Multiple M-Light units can be bridged together to form platforms for heavier equipment or more stable platforms.
- Durable – all stainless steel – life of the plant service.

This procedure, including unpacking, disassembly, and retrofit assembly with the HPS-1000 lamp, will require approximately 20 minutes to complete. Three steps are required:

1. Unpacking and disassembly
2. Preparation of the HPS-1000 lamp unit
3. Assembly of the M-Light structure

The procedure should be followed in the order shown. Alternate assembly procedures should be reviewed by RGA Labs before proceeding.

HPS-1000 is a product of ROS, Inc. (Remote Ocean Systems, Inc.)

<http://www.rosys.com/>

ROS Incorporated

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2. Required Tools

The following tools are helpful in assembly and disassembly.

- 5/8" and 11/16" open wrenches
OR
5/8" and 11/16" socket wrenches
OR
2 adjustable crescent wrenches
- Pliers
- Lineman's wire cutters (side-cutters)
- A soft or "no-mar" mallet

3. Unpacking and Disassembly

This portion of the procedure is designed to disassemble the M-Light unit into its component parts. If the work is to be done in a radiation area, the packing materials can be stripped before entering this area. There are no loose parts in the packing materials.

The M-Light retrofit kit will arrive assembled, with the spare Kellems Grip and HPS-1000 replacement lamp screen installed. Refer to Figure 2.

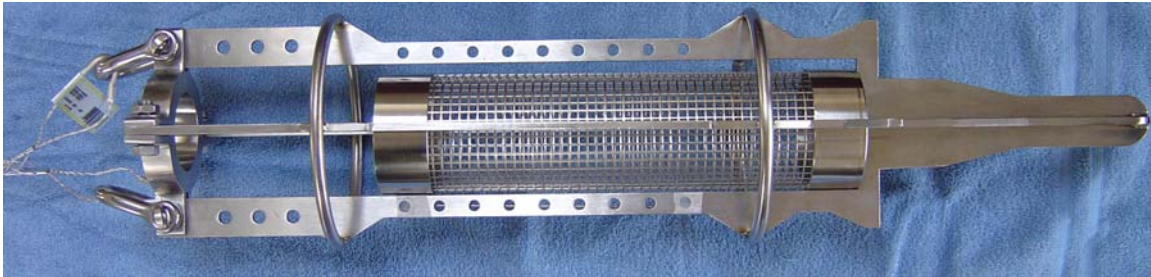


Figure 2 - M-Light retro fit kit after unpacking

1. Remove the two bolt and two shackle assemblies at the top of the unit.
2. Remove and set aside the Cap, Screen, and Hardware parts as shown in Figure 3.

The cap is a snug fit on the legs of the lower unit. Tapping with a soft mallet can aid in its removal.

Note the markings on the Cap referencing it to the Lower Structure as shown in Figure 4. These will be used to aid in reassembly.

3. Remove and set aside the safety wire taped to one leg of the lower structure.

Disassembly is now complete.

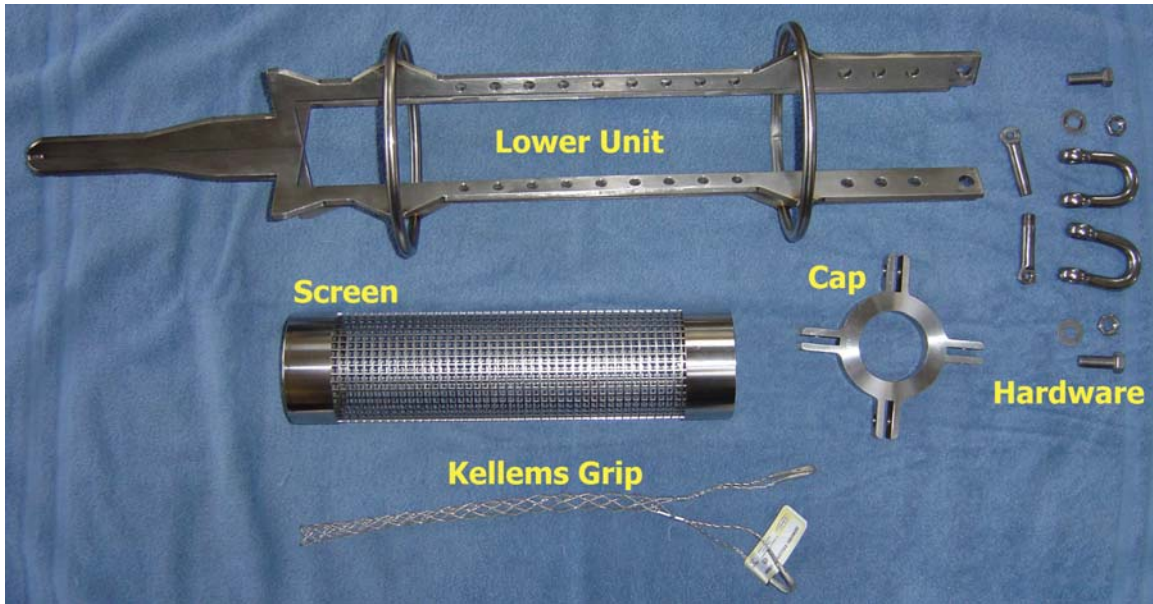


Figure 3 - M-Light kit disassembled

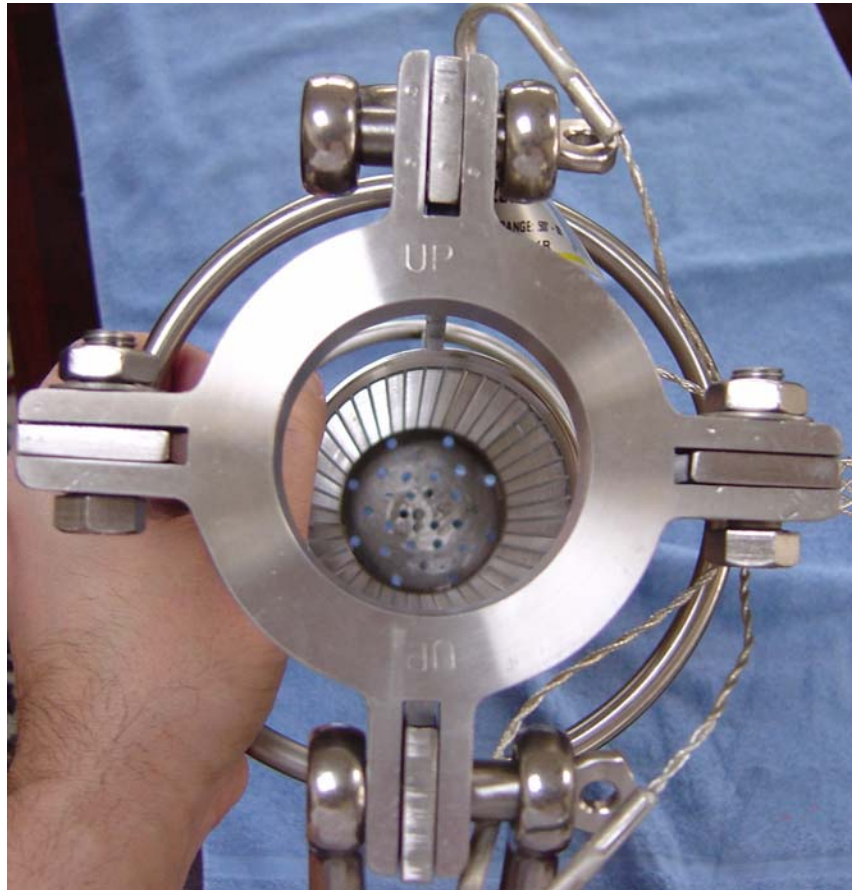


Figure 4 - Cap and Lower Structure reference marks

4. Preparation of the HPS-1000 Lamp

This portion of the procedure prepares the HPS-1000Q lamp assembly to be installed into the M-Light support fixture. **Caution:** The HPS-1000Q lamp element is a delicate instrument. DO NOT use excessive force, impact, or power tools during this phase of the procedure. The user is advised to perform this step in an area where the lamp element will not be damaged.

1. Remove the existing protective screen assembly from the lamp head. This is accomplished by unthreading the screen from the lamp head. Grasp the lamp body and the upper ring of the screen to twist.

Caution: DO NOT tap or use impact of any kind to loosen the screen assembly. This will damage the lamp element.

2. **Caution:** DO NOT grip the lower end of the screen for this step. Install the replacement screen assembly onto the lamp head. Tighten hand tight using the **upper ring** of the screen assembly.

The screen does not provide structural support in the M-Light so hand-tight is sufficient and will aid in removal.

3. Remove the existing Kellems Grip from the lamp head shackles.
4. Remove the lamp cable from the lamp head at the cable connector.
5. Inspect the existing Kellems grip for damage or wear.
6. If the existing Kellems grip is to be used, loosen its grip on the cable jacket and slide it approximately 7 inches up the cable length.

OR

If the new Kellems grip is to be used:

Remove the old Kellems grip.

Expand the new grip by compressing and working the wire mesh to a diameter sufficient to slip over the diameter of the connector. This may take some patience. A dowel or similar tool is sometimes helpful to expand the mesh.

Slip the new grip over the wire connector with the shackle loops toward the connector.

Slide the grip approximately 7 inches up the cable length.

Lamp preparation is now complete.

5. Assembly of the M-Light Unit

This phase of the assembly inserts the HPS-1000 lamp into the M-Light structure and closes the structure to provide support.

1. Insert the cable through the M-Light Cap with the words "UP" facing away from the cable connector.
2. Attach the cable connector to the HPS-1000 lamp unit.
3. Slide the HPS-1000 light assembly into the M-Light Lower Unit.
4. Install the M-Light Cap onto the Lower Unit.

It is recommended that the assembler match the alignment marks located on one of the ears of the Cap with the matching marks on one leg of the M-Light lower unit. Although this alignment is not required, it may make bolt and shackle installation easier.

Gentle use of a soft mallet may be helpful in properly locating the Cap and Lower Unit bolt holes. **Caution:** Be careful not to impact the HPS-1000 lamp element.

5. Install the two bolt-washer-nut assemblies on opposite legs to attach the Cap to the Lower Unit. Do Not tighten.
6. Slip the shackles through the Kellems grip lugs and Install the two shackle assemblies on the through the Cap ears not used by the bolts installed in #5 above. The grip position may need to be adjusted to affect this step.
7. Tighten the bolts and shackle pins snugly, but do not over tighten. 15-20 ft pounds of torque is sufficient. This is equivalent to normal hand-tool effort.
8. Install the locking wire by threading the wire through each of the bolts and shackle pins in one continuous loop. Twist the two ends of the lock wire loop together with pliers. Cut off any excess with side cutters. Bend the wire twist in toward the inside of the M-Light unit so that it will not provide a snagging hazard.
9. Adjust the Kellems grip so the light or cable connector does not contact the top of the M-Light when the entire assembly is lifted by the cable. The M-Light structure should carry all of the loads, while the HPS-1000 should be "free floating" inside the M-Light structure.

It may take several pulls on the cable to completely stretch and tighten the Kellems grip into its final position on the cable.

10. If additional support cables are required, these should be attached to the lifting shackles at this time.

The M-Light Assembly is now complete and the unit is ready for use.

6. Attaching Auxiliary Tools, Cameras, and Equipment

A variety of auxiliary tools, cameras, and equipment can be attached to the M-Light structure providing a stable and lighting platform to work from. The auxiliary mounting holes in the legs of the Lower Structure, as shown in Figure 2 are used for this purpose.

Multiple M-Light units can also be bridged together to form platforms for heavier equipment or more stable platforms.

If the auxiliary equipment to be attached to the M-Light exceeds 500 lbs in weight, we suggest the builder contact RGA Labs for consultation on the proper installation procedure and precautions.