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Hardware Handbook for the *OLIS* RSM and RSM CD

Version I
5/26/94

On-Line Instrument Systems, Inc.

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Specific Hardware

OLIS RSM

OLIS RSM hardware includes the scanning monochromator with ScanDisk and gratings, a light source (see page 2), a dual-beam optical system (sample/reference) with two photomultiplier detectors, amplifiers, and two 2MHz 12 bit A/D converters.

The monochromator should be purged with nitrogen gas to insure the longest life. A purge rate of a few liters/min is more than adequate. The nitrogen line should be attached to the appropriate port on the monochromator. The line can easily be detached and reattached if needed.

Options you may have chosen to include in your system are a color printer, red sensitive photomultipliers for scanning in 700-1100 nm, additional gratings or ScanDisks, an optic cable, a means to flash at your sample, etc. 'Extra' hardware can be purchased with the basic unit and can be purchased throughout the years ahead as the needs of your lab change.

An *U.S.A.-SF* can be fitted to a standard RSM 1000 by removing the cuvettes from the sample compartment and positioning the stopped-flow in the chamber top. Four Allen screens are used to hold the stopped-flow in place. Once the mixing unit is positioned and fastened, PMTs must be added and the sensors from the five positions on the stopped-flow must be hooked up to the trigger box. Please refer to Stopped-flow specific handbook or call *OLIS* for additional assistance.

RSM CD

In addition to the components listed above, the *OLIS* RSM CD Module includes a PEM (photoelastic modulator), polarizer, sample holders specific to the detection system of the CD configuration, and parallel PMTs.

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Lamp

The RSM and RSM CD come equipped with one of these lamps:

75 watt air cooled
150 or 450 watt water cooled xenon arc lamp
tungsten lamp

The manufacturers' quoted typical lifespan of these lamps is approximately 300 hours. Lamps show their age by becoming harder to start because the electrodes inside the quartz envelope corrode and in increasing instability.

Replacing the xenon lamp:

Always wear gloves and goggles whenever you handle a hot xenon lamp because there is a risk of the bulb exploding!

1. Remove the four screws on the rear of the lamp housing.
2. Remove the wires from the lamp housing.
3. Carefully remove the lamp/reflector assembly.
4. Loosen the (Allen) socket head set screws
5. Carefully replace the lamp. If you touch the quartz envelope, wash it with methanol and wipe it dry with a Kimwipe® or lens tissue.
6. Tighten the set screws.
7. Reverse steps 3,2,1.

Aligning the lamp:

Always wear dark glasses when looking directly into the light beam.

1. Remove the telescope between the lamp housing and the RSM.
2. Turn the three adjustment screws until the light beam is focused on the slit. You will have the best focus when the light shining on the slit is approximately the size of a dime.
3. Replace the telescope.

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Slits

The RSM has three slits the light beam passes through. The typical slit sizes are:

0.6 mm for the entrance slit
0.2 mm for the intermediate slit (ScanDisk)
from 0.6 mm to 0.12 mm for the exit slit.

When you insert a slit in the RSM, the notched edge of the slit should be inserted first, notched edge down.

The resolution (approximately (light level)$^{-1}$) is determined by the size of the two smallest slits. Thus it is possible to run the RSM without using either the entrance or the exit slits. If you are using both the entrance and exit slits, they are interchangeable.

One reason for removing the entrance slit is to eliminate the ringing associated with the arc lamp wandering due to stopped-flow shock.

The ScanDisk slit width combined with the grating ruling density determines the resolution.

For example:

If you are using a grating with 400 lines and a 0.2 mm ScanDisk, the resolution would be approximately 1.5 nm. You would have the same resolution if you were using a grating with 1200 lines and a 0.5 mm or 1 mm ScanDisk.

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Gratings

Grating access doors should be kept on at all times. Remove these doors only when you are changing gratings.

To change gratings:

1. Loosen the thumbscrews on the top of the gratings' trapdoors.
2. Remove tension from the spring-locked clips which hold the gratings in place by rotating the handle at the top of the grating 90° in either direction.
3. Remove the gratings by grasping the sheet-metal "ears" on the top of each grating and lifting the grating straight up and out of the monochromator.
4. Insert the new gratings
5. Return the spring-clip to its original position; you will hear a distinctive clip when the springs are set.

Do not touch or attempt to clean the surface of the gratings. Any dust may be removed with a gentle stream of dry air.

If the RSM is not producing a deep UV signal, make sure that you are using an appropriate grating. The number of lines per mm and the blaze wavelength are written on the back of every grating. The lines of the grating determine the dispersive power, wavelength span, and resolution of your instrument. The blaze wavelength is the wavelength for which the grating is optimized.

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Computer

The control unit supplied with the RSM and the RSM CD includes a 486/66 MHz computer with a least 8 Megabytes of RAM, a hard disk with at least 200 Megabytes, MS-DOS version 6.0 or higher, one RS-232 and one parallel port, a high resolution color graphics monitor and a printer.

Other computer components include:

Timer Board
DAC Board
12 bit dual A/D converter (some temperature control instruments have an additional A/D converter or I/O card)
optional tape drive for storage of RSM data.

All components of the computer system are sensitive to shock (static charges) and should not be connected or disconnected if the power supply is on.

These components should not be removed from the system while the power is on or without taking adequate antistatic measures.

The computer is an essential component of the RSM system; treat it as such! Never swap the computer from your RSM system with any computer in your lab. The performance of the RSM system is only guaranteed when used with the computer provided at installation.

Refer to manufacturers' manuals for normal troubleshooting for your computer and printer. These manuals are provided at installation.

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Cuvettes

Rectangular cuvettes are used with the RSM.

Curved or rectangular cuvettes are used with the RSM CD. The cuvette used with the RSM CD must be large enough to allow both light beams to pass through the sample. The surface area of the cuvette must be at least 10 mm across.

When using the RSM CD, any stress will induce bifrigence, Be sure to use a high quality cuvette made of fused silica

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Electronic Boxes

The electronics boxes contain sockets and circuitry. Problems with chips can be diagnosed by OLIS and are easy and inexpensive to replace.

Never poke around inside electronics boxes when they are on because they run at lethal voltages!

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Mirrors

There are several mirrors inside the RSM. These mirrors should last indefinitely but can be damaged.

The aluminum oxide coating on the mirror can be damaged by the xenon light beam. Although this is an infrequent occurance, light shining directly on the mirror can damage the coating of the mirror, producing a white aluminum oxide. We recommend that you pull out the entrance slit by a few millimeters to block the xenon light beam and reduce wear on the optical components whenever the system is on but not being used to scan a sample.

The magnesium fluoride coating on the mirror has a very low solubility in water. When the mirrors are exposed to humidity, they can begin to disintegrate. We recommend that you purge the mirrors with a steady stream of nitrogen to protect them from any damage caused by humidity.

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Photomultiplier Tubes

In the RSM CD, the two photomultipliers are parallel, not at 90° as they are in conventional absorbance configurations.

When selecting PMTs for the *OLIS* RSM, our engineers attempt to match performance. Performance can never be identical, so you will see differences in the right-hand graph depicting the HVs from the two channels. Because of the means by which we extract CD/LD data from the collected data matrices, the differences between the PMTs is minimized to near insignificance, but we still encourage you to heed any significant differences that appear over time, alerting you to the need to replace aging tubes.

The PMTs can be removed and replaced in different positions. For example, to collect fluorescence data with the RSM, you would position the PMT 90° to the excited beam.

You should remove the PMTs in the RSM CD when you are replacing them.

If you remove the photomultiplier tubes from your instrument, cover them with aluminum foil or store them in a dark place so that they are exposed to a minimum of light and premature aging does not occur.

Never drop or touch the glass envelope of the tube. If you do happen to touch the glass envelope, clean it off with Kimwipe® or lens paper. And, if you do drop a PMT, it will break!

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Water Cooling Devices

Two different kinds of water cooling devices are used with the RSM system.

If you are using a water cooling device with the 450 watt xenon arc lamp, make sure that the cooling device is on when the lamp is on to prevent the lamp from overheating.

If you are using a water cooling device for the cuvette, be aware that whatever fluid you are using to keep the cuvette cool will condensate so you must keep the device dry by purging with nitrogen gas.

If you are also using a stopped-flow device, the temperature range is limited by the seals on the flow device. Do not drop below 10-15°C as this will lead to leakage problems that can only be repaired at the *OLIS* facility.

Other cooling devices can be used with *OLIS* instruments, including Dewer cells. Hardware customization of the sample compartment is usually necessary.

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Important Information

Serial Number of your RSM: _____

Date your RSM was installed: _____

Additional accessories purchased: _____

OLIS address and phone number: 130 Conway Drive, Suites A&B
Bogart, GA 30622-1724
1-800-852-3504 and 706-353-6547
E-mail: desa@bchiris.biochem.uga.edu

Address used by the RSM hardware:

A/D board	360 - 36E	Hex
Timer & I/O Board	IA0 - IA3	Hex
DAC Board	300 - 30F	Hex

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