

# INSTRUCTION MANUAL

## Model 207 Scanning Monochromator

Serial Number: \_\_\_\_\_

*– A Schoeffel Group Company –*

**MCPHERSON**<sup>TM</sup>

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## **IMPORTANT NOTICE**

**ELECTRICAL EQUIPMENT MAY BE DANGEROUS IF NOT HANDLED WITH CAUTION. ALL INSTRUMENTS SHOULD BE OPERATED WITH PROPER GROUNDS ON POWER LINES. ELECTRICAL OR ELECTRICALLY OPERATED COMPONENTS SHOULD NOT BE EXPOSED OR HANDLED WITHOUT BEING SWITCHED OFF AND DISCONNECTED FROM THE POWER LINE.**

**McPHERSON WILL NOT BE RESPONSIBLE FOR ANY DAMAGE CAUSED BY SUCH UNITS IF INSTRUCTIONS HEREIN ARE NOT FOLLOWED, AND REPAIRS ARE NOT PERFORMED BY COMPANY-TRAINED OR COMPANY-LICENSED PERSONNEL.**

# Model 207 Monochromator



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## CERTIFICATE OF PERFORMANCE

Model: \_\_\_\_\_

Serial No: \_\_\_\_\_

This notification serves to certify that instrument described above has been inspected and tested to be in accordance with the specifications.

Specifications (with 1200gr/mm grating)				
Wavelength accuracy		±0.05		
Wavelength reproducibility		±0.005		
Focus trimming adjustment				
Gratings	gr/mm	Blaze,nm	Mic. reading	Home switch position, nm

Date: \_\_\_\_\_



Inspector

# Model 207 Monochromator

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# Model 207 Monochromator

## GENERAL DESCRIPTION

### **1.1 Optical System**

The McPherson Model 207 Monochromator-Spectrometer has a two mirror, plane grating, 1.0 meter focal length, optical system. Mirrors and slits remain in fixed positions while the grating is rotated for wavelength selection. The optical system has an f/4.7 effective aperture (f/5.8 with smaller grating).

### **1.2 Instrument Base**

The optical components are mounted to a cast aluminum base. The top of the base is finished flat for mounting of the mirror, grating and precision lead screw assemblies. A separate casting is mounted to the base to support the slit assemblies and camera attachment. A removable cover allows easy access to internal components. The entire instrument can be leveled using three adjustable feet.

### **1.3 Slit Assembly Mounting**

Entrance and exit slit assemblies are end or side mounted. 45° mirrors may be rotated in and out of the light beam for use of side or end mounted slits.

### **1.4 Slit Types**

Entrance and exit slits are the bilateral opening type. Bilateral slit widths are adjustable from 5 microns to 4mm. Occulters are adjustable for spectral line heights from 2 to 20mm. Fixed width slits or pinhole apertures, or dovetail mounted fixed width slits are optional. Fixed width slits are user selected upon placement of order.

### **1.5 Slit Mounting Accessories**

Some available accessories include CCD camera attachments, light sources, detectors, double beam attachments and sample chambers. Several combinations of accessories are feasible. Two examples are: 1) a CCD detector array can be installed at the side mounted exit slit and an optical fiber at the end exit slit. The mirror therefore can be positioned to deflect the exit beam to the CCD or moved out of the beam for standard monochromator operation, 2) light sources may be mounted to the side or end mounted entrance slits.

### **1.6 Gratings**

Gratings are "Snap-In" (U.S. Patent #3,433,557), and therefore, easily interchanged and automatically aligned. Available grating sizes are listed separately under Specifications 2-2.

### **1.7 Wavelength Drive**

A precision sine drive positions the grating to a selected wavelength or range. A Model 789A-3 stepper drive (optional) controls wavelength output through a stepping motor coupled to the drive screw.

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## **1.8 Extended Wavelength Coverage**

The grating mount may be rotated an additional 20° for Echelle grating or extended wavelength use. In the 20° position, the upper wavelength limit is approximately 1574nm with a 1200 G/mm grating installed.

## **1.9 Instrument Support Table**

A McPherson Model 090 Support Table (U.S. Patent #3,329,105) is an optional accessory that provides a convenient and useful support for the instrument. Three adjustable legs provide leveling and height adjustment. Three casted legs allow for easy relocation.

## **1.10 Camera Attachment**

CCD and other cameras can be accommodated. Camera mounts are supplied to fit selected models, i.e. Andor, Roger or other types.

## **1.11 Mechanical Wavelength Counter**

The mechanical wavelength counter is connected to the drive system of the Model 207. The counter displays the wavelength at the exit slit of the Monochromator. It reads correctly for 1200gr/mm grating. Other grating densities require factoring the counter value. Readout is correct to 1/10 of nm.

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## SPECIFICATIONS

### 2.1 Instrument

Model 207 High Performance Monochromator-Spectrometer

### 2.2 Optical System

- a) Focal length 0.67 meter
- b) Optical Design Czerny-Turner
- c) Mirrors Spherical
- d) Gratings "Snap-In" (U.S. Patent #3,433,557) plane gratings with ruled or holographic area.

Grating surface area (mm)	Ruled Area (mm)	f/#
110 X 110	102 X 102	5.8
120 X 140	116 X 136	4.7

### 2.3 Mechanical

- a) Slits Bilateral, adjustable slits, 5 $\mu$ m to 4mm. Slits have occulter for height adjustment from 2 to 20 mm.
- b) Slit Mounts Standard mounting, end-on. Alternate side mounting positions require 45° mirror for each slit assembly. Mirror rotation feature permits operation at either slit location.
- c) Wavelength Scan Manual sine drive system. Optional Stepping Drive System, 789A-3.
- d) Mechanical Counter Mechanical wavelength counter to display the wavelength at the exit slit in Angstroms.

### 2.4 Performance

- a) Wavelength Range 185 nm to 78 microns
- b) Effective Aperture f/4.7 with 120 X 140 mm grating (f/5.8 with 110 X 110 mm grating)



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<b>GRATING (G/mm)*</b>	<b>2400</b>	<b>1200</b>	<b>600</b>	<b>20</b>
Wavelength Range**	185 to 650 nm	185 nm to 1.3 μ	185 nm to 2.6 μ	185 nm to 78 μ
1st Order Littrow Blaze	240 nm 300 nm Holographic	250 nm 300 nm 500 nm 750 nm 1.0 μ Holographic	300 nm 500 nm 750 nm 1.0 μ 1.85μ	45 μ
Resolution (nm)	0.02	0.04	0.08	2.4
Dispersion (nm/mm)	0.62	1.24	2.48	74.4
Wavelength Range at Focal Plane***	31 nm	62 nm	124 nm	3720 nm
Wavelength Accuracy		±0.05 nm		
Wavelength Reproducibility		±0.005 nm		
Counter reading	2 x Actual	Actual	Actual/2	Actual/60

\* Other gratings, i.e. 3600 gr/mm, are available upon request.

\*\* Does not include extended  $\lambda$  position.

\*\*\* Focal plane is 50 mm wide. Multiply detector head width by dispersion to calculate simultaneous coverage.

### **2.5 Physical**

- a) Length                                      0.81 m (32 inches)
- b) Width                                        0.565 m (22 1/4 inches)
- c) Height                                        0.4 m (15 3/4 inches)
- d) Weight                                        68 kg (210 pounds) (with two slit assemblies)

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## INSTALLATION

The instrument is completely assembled, aligned and tested before shipment. For shipping, slit mounted accessories and gratings are normally removed, and the precision sine drive and 45° slit mirrors are tied down. Read the complete instruction manual before preparing and operating the instrument.

### **3.1 Locating the Instrument**

Locate the instrument in an area relatively free of corrosive fumes, high humidity and dust. Refer to Section 3.5 for environmental trimming. Place the instrument on a solid surface, free from mechanical vibrations and shocks, otherwise, optical performance may be affected.

The instrument base has three adjustable feet if leveling adjustment is necessary.

### **3.2 Removal of Shipping Ties and Protective Covers**

To prevent damage during shipping, the precision sine drive is protected by securing the grating mount lever arm against the driving block.

#### 3.2.1 Removal of Shipping Ties

1. Lift off the instrument cover, Item 1, Figure 1.

**CAUTION: DO NOT TOUCH THE PRECISION LEAD SCREW ASSEMBLY**

2. Cut the tie holding the lever arm against the Teflon protective pad and driving block, Item 12, Figure 2. Discard the tie.
3. Pull the lever arm away from the driving block about 1 cm and remove the Teflon pad. Carefully bring the lever arm in contact with the block.

**CAUTION: DO NOT ALLOW LEVER ARM TO STRIKE BLOCK WITH FORCE**

#### 3.2.2 Releasing the Slit Mirrors

When optional 45° Entrance and Exit Slit Mirrors are factory installed, they are immobilized during shipment to protect them from damage. They are immobilized with a spring (painted red) connected from the pin, Item 8, Figure 2, on the mirror assembly to a 5-40 cap screw on the side of the slit bracket. To release the mirror holder, it is necessary to remove the baffle in front of the mirror assembly for access to the spring.

**CAUTION: WHEN THE BAFFLE IS REMOVED THE MIRRORS ARE EXPOSED.  
DO NOT TOUCH, TALK OR BREATHE OVER THE MIRROR  
SURFACES**

Remove the immobilizing Spring as follows:

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1. Remove the spring (painted red) by sliding it down the pin, Item 8, Figure 2, until it releases.
2. Slide the remaining spring down the pin, Item 8, Figure 2, of the mirror assembly until spring seats in pin groove.

### 3.2.3 Removing Protective Covers

The focusing and collimating mirror assemblies, Figure 5, are shipped with protective covers. Remove them as follows:

1. Remove the rubber band holding the protective cover to the collimating mirror holder.
2. Slide the protective cover off the springs and shoulder screws on the mirror holder.

***CAUTION: MIRROR IS NOW EXPOSED. DO NOT TOUCH, TOUCH OR BREATHE OVER THE MIRROR SURFACE.***

3. Ensure that collimating mirror, Item 2, Figure 5 is seated by lightly pushing the mirror mask, Item 1, Figure 5 toward the mirror at the three (3) spring and shoulder screw positions.
4. Repeat Steps 1-3 for the focusing mirror assembly, Item 8, except in Step 3, substitute Items 7 and 6 for Items 1 and 2 (refer to Figure 5).
5. Replace the instrument cover.

### **3.3 Grating Installation**

Gratings are individually boxed, Figure 3, for protection during shipment and storage. An external label indicates grating part number, serial number, coating (if applicable), rulings per millimeter and blaze wavelength. Gratings should remain sealed in box until installation instructions have been carefully read and the instrument is ready for grating installation. Gratings are further identified by a label on the back of the grating.

The mirror masks (Figure 5 Item 1 and 7) should be installed when operating instrument with the smaller diffraction grating and removed when operating with a larger diffraction grating. Use four small screws in the corners of the mirror holder/mask to put or remove the mask.

#### 3.3.1 Mounting the Grating

There are two different size gratings and a procedure for installing each. Follow Steps 1 and 2 below for either size grating. Go to Step 3 when installing the 110 x 110 mm grating or, go to Step 4 when installing the 120 x 140 mm grating.

1. Remove the instrument cover.

***CAUTION: DO NOT TOUCH THE PRECISION LEAD SCREW ASSEMBLY.***

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2. Identify the box, Figure 3, containing the grating to be installed and proceed as follows:
  - a. Place the box, face up, in a flat, stable and convenient location (McPherson tag readable). Familiarize yourself with the grating holder, Figure 2.
  - b. With box on working surface, remove tape from around box.
  - c. Carefully open the box. The Grating is covered with plexiglass Item 3, Figure 3, and secured with tape Item 4, Figure 3,. Remove tape and plexiglass cover wearing Latex gloves.

***CAUTION: GRATING FACE IS NOW EXPOSED AND DAMAGE BEYOND REPAIR CAN RESULT BY CONTACT WITH ANY VAPOR, LIQUIDS OR SOLIDS. DO NOT TOUCH, TALK OR BREATHE OVER RULED AREA.***

- d. Visually locate the kinematic mounting points of the grating. The two half round rods, Item 5, Figure 3, mate in "V" grooves Item 21, Figure 2, of the grating holder, Item 4, Figure 2. The half ball, Item 2, Figure 3, locates in the cantilever type spring hole, Item 3, Figure 2.
3. To install a 110 x 110 mm grating:
    - a. Avoid contact with the ruled surface of a grating. Wear Latex gloves and carefully grasp grating with thumb, middle and ring fingers positioned as shown in Figure 4A. Keep thumb, middle and ring fingers arched, index and little fingers straight.
    - b. Carefully lift the grating out of the box and check label on back to ensure that correct grating is being installed. Insert into holder, Item 4, Figure 2, by positioning the rods, Item 5, Figure 3, into the "V" grooves, Item 21, Figure 2, then tilt grating toward holder until ball, Item 2, Figure 3, locates in hole of the cantilevered spring, Item 3, Figure 2.
    - c. Use light side-to-side pressures to ensure that grating is properly positioned. A definite click can be heard when ball mates with hole in the cantilevered spring.
  4. To install a 120 x 140 mm Grating:
    - a. Wear Latex gloves and carefully grasp grating with both hands using thumb and index finger as shown in Figure 4B.
    - b. Follow Steps 3.b and 3.c above to position grating, except, refer to Figure 4B instead of 4A.

### 3.3.2 Focus Trimming Adjustment

Since there are variations in the wavefront (flatness) of the best available plane gratings, a focus trimming adjustment may be required. This will ensure optimum performance when interchanging gratings in a high resolution spectrometer.

The Model 207 is factory aligned and focus adjusted with a master grating having minimum wavefront error. The focusing mirror, Item 6, Figure 5, is positioned using a micrometer, Item 3, Figure 5. The micrometer setting(s) for the grating(s) supplied with this instrument are listed in

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Table on Certificate of Performance. The information tag on the back of each grating also shows the micrometer setting. Refer to Section 3.5 for environmental conditions.

If the micrometer setting for the grating being installed differs from the actual micrometer reading in the instrument, adjust as follows:

1. Remove the instrument cover, Figure 1.

***CAUTION: USE EVERY PRECAUTION TO AVOID CONTACT WITH OR BREATHING ON MIRROR SURFACES OR IRREPARABLE DAMAGE MAY RESULT.***

2. Loosen torque screw, Item 5, Figure 5, one (1) full turn.
3. Use the right hand to adjust focusing mirror micrometer, Item 3, Figure 5, to the exact setting indicated for the grating installed. At the same time, with the left hand, pull the adjusting handle, Item 4, Figure 5, to ensure a light but positive contact of the mirror base against the micrometer spindle.
4. Maintain mirror mount contact with micrometer spindle and tighten torque screw, Item 5, Figure 5.
5. Replace instrument cover.

### **3.4 Input Power**

Connect motor and limit switch cables to 789A-3 controller (refer to 789A-3 manual).

### **3.5 Operating environment**

The Model 207 is a precision monochromator, therefore, the wavelength calibration and resolution (focus) may be affected by temperature change. The Model 207 should be operated in surroundings of 20 to 27°C (68 to 80°F) temperature and constant within  $\pm 1^\circ\text{C}$  ( $\pm 2^\circ\text{F}$ ).

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## OPERATION

On completion of the installation procedures the instrument is ready for operation.

### **4.0 Bilateral Slits**

#### a. Adjustment of Slit Width

The bilateral slit widths are adjusted by a micrometer. The slit micrometer thimble has 25 graduations, each representing 10 microns. A full rotation of the thimble, therefore, represents 250 microns. Each thimble rotation is represented by one graduation on the micrometer barrel and the 16 graduations represent maximum slit opening 4 mm. A mechanical stop prevents the slit jaws from closing below 5 microns.

***CAUTION: DO NOT ROTATE THIMBLE BEYOND THE MECHANICAL STOP OR SLIT MAY BE DAMAGED.***

#### b. Adjustment of Slit Height (Spectral Line Length)

Slit heights can be indexed into position externally by a control knob and shaft located next to the slit micrometer. The height control shaft has six (6) detent positions for indexing the desired slit height into position. Slit heights of 2, 4, 6, 8, 16 and 20 mm indented into position correspond to the number located on the control shaft. (Readable next to the slit body outside diameter).

#### c. Shutter Operation

Each entrance and exit slit assembly contains a shutter. The shutter has two (2) detent positions and is controlled by a knob Item 4, Figure 1, located on top of the slit assembly. When the knob is pointing at the light source or detector, the shutter is open. Rotate the knob clockwise 90° to close the shutter.

### **4.1 Wavelength Scanning**

The Stepping Drive System supplies 36,000 steps per revolution of the drive screw and can scan at speeds from 0.05 to 500 nm/min. Speed can be adjusted at the Model 789A-3 Stepper Drive. Refer to stepper control instruction manual for description and operation.

### **4.2 "HOME" position switch**

This monochromator may be equipped with a "HOME" position switch. The switch provides quick and accurate recalibration if the wavelength count is lost in the instrument control software. This switch is intended only for use in a software control environment. The "Home" function is disabled in "Local" mode. The value of the "Home" switch is indicated on the Certificate of Performance. For more information refer to 789A-3 controller and Software manuals.

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### 4.3 Positioning Grating for "Normal" or "20° Extended Wavelength" Operation

The instrument is normally supplied with the grating adjusted at "Normal" operating position. The instrument design allows 20° extended position of the grating for scanning to longer wavelength.

#### a. Determining Grating Holder Position

A lever arm, Item 15, Figure 2, is attached to the bottom of the grating holder, Item 4, Figure 2 by a split clamp held closed by a 10-32 cap screw.

The lever arm contains two mechanical stops, Items 9 and 19, Figure 2. A holder arm, Item 20, Figure 2, fastened permanently to the grating holder, is positioned against one of the mechanical stops. The holder arm against stop, Item 9, Figure 2, positions the grating for normal operation.

#### b. Changing Grating Holder Position

Contact McPherson Inc. for assistance as changing grating holder position may require refocusing and recalibration of the instrument.

### 4.4 Exchanging Gratings

**CAUTION: GRATINGS ARE EASILY DAMAGED DURING HANDLING.  
TAKE EVERY PRECAUTION TO ENSURE THAT PROPER  
PROCEDURES ARE FOLLOWED.**

#### a. Before Removing Grating

1. Identify the grating storage box for the grating being removed and locate in a position convenient to the instrument.
2. Place the box containing the grating to be installed nearby. Do not remove securing tape or plexiglass cover at this time.
3. The mirror masks (Figure 5 Item 1 and 7) should be installed when operating instrument with the smaller diffraction grating and removed when operating with a larger diffraction grating. Use four small screws in the corners of the mirror holder/mask to put or remove the mask.

#### b. Removing the Grating

There are two different size gratings and a procedure for removing each. Follow Steps 1-3 below for either size grating. Go to Step 4 when removing the 110 x 110 mm grating, or go to Step 5 when removing the 120 x 140 mm grating.

1. Scan to 00000 wavelength (central image) position.
2. Remove the instrument cover, Item 1, Figure 1.

**CAUTION: DO NOT TOUCH THE PRECISION DRIVE SCREW**

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3. To remove the 110 X 110 mm grating:

- a) Wear Latex gloves and carefully grasp grating with thumb, middle and ring fingers positioned as shown in Figure 4a. Keep thumb, middle and ring finger arched, index and little fingers straight to avoid contact with ruled surface of the grating.
- b) Tilt the top of grating away from holder and remove from instrument.
- c) Immediately cover the grating face with the plexiglass cover and secure it with tape.
- d) Return the grating to its original container for storage.

4. To remove the 120 X 140 mm grating:

- a) Wear Latex gloves and carefully grasp grating with both hands using thumb and index finger as shown in Figure 4B.
- b) Follow Steps 4b-d above.
- c. Reinstalling a Grating
  1. Before reinstallation, refer to Certificate of Performance and determine if focus trimming is necessary. If it is, see Section 3.3b.
  2. When using the 20° extended wavelength position and it is necessary to return the normal wavelength position, make the change before mounting grating. (Refer to Section 4.2)
  3. The grating may now be mounted in the instrument following the procedures outlined in Section 3.3a.

### **4.5 Positioning of Entrance and Exit Slit Mirrors (Optional) for Operation**

#### a. Four Slit Positions

Slit assemblies may be end mounted, side mounted, or up to four slit assemblies can be mounted at the same time (depends on options chosen at the time of purchase).

For operation each side mounted slit requires a mirror positioned at 45° to normal optical path. These mirrors may be rotated out of the beam when end mounted slits are used.

#### b. Positioning Mirrors for Side Slit Operation

Mirrors are correctly positioned when the mirror knobs, Item 2 and 3, Figure 1, are 45° to the beam.

**CAUTION: MIRRORS ARE SPRING LOADED IN BOTH DIRECTIONS.  
ROTATE MIRROR POSITIONING KNOBS SLOWLY AND**



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***CAREFULLY TO PREVENT SNAPPING AGAINST STOPS OR TOPS MAY BE DAMAGED CAUSING INACCURACIES IN MIRROR ADJUSTMENT.***

### c. Positioning Mirrors for End Slit Operation

Mirrors are correctly positioned when the mirror knobs, Item 2 and 3, Figure 1, are parallel to the length of the instrument.

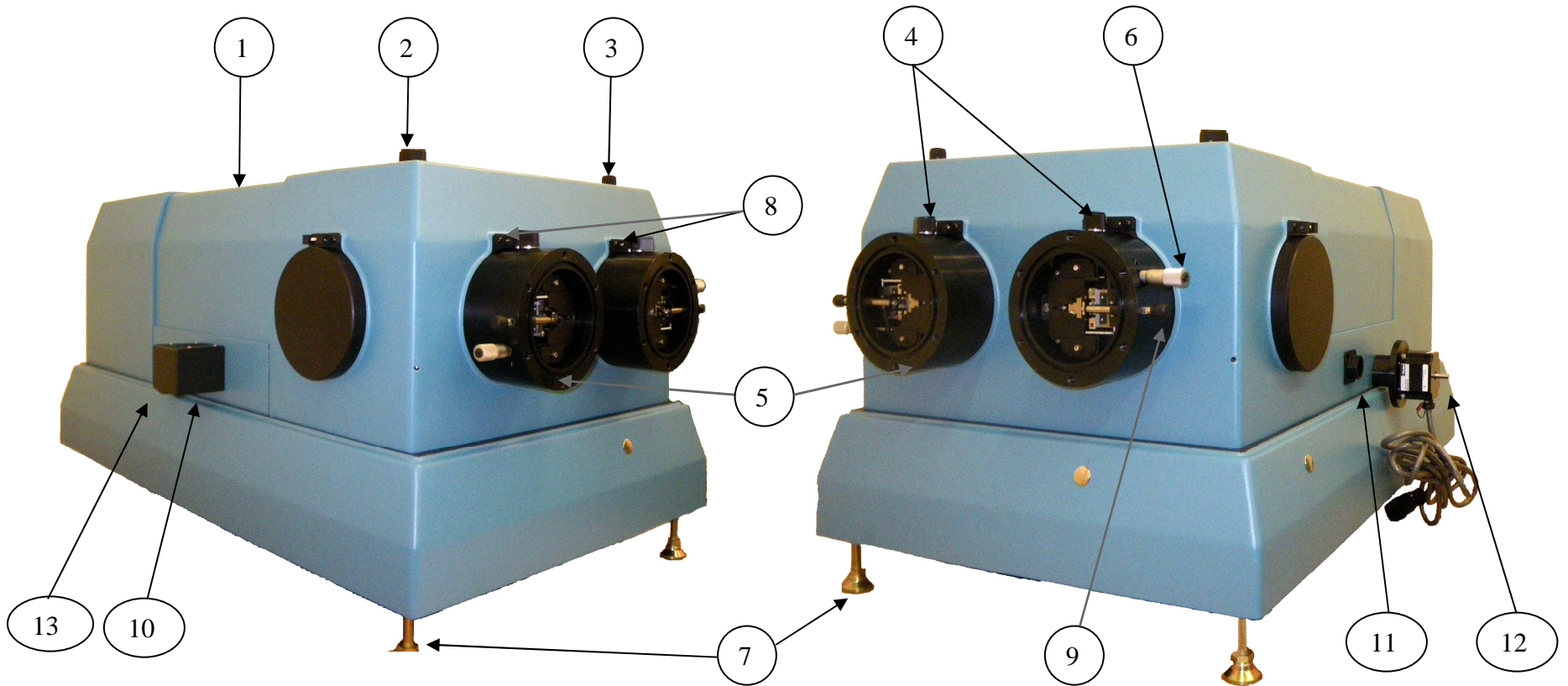
## **4.6 Camera Operation**

Camera Attachments are designed to mount Andor, Roper and other cameras to an accurate focal plane distance. The accessories are available from McPherson Instruments.

## **4.7 Purging**

For absorption or emission studies in the ultraviolet when water bonds interfere from approximately 195nm to below 180 nm, it is necessary to eliminate oxygen from the optical path of the system. Oxygen will absorb strongly in this region and must be displaced by a transparent gas to allow sufficient radiation emitted by the source to reach the detector. The Model 207 is designed for purging with Nitrogen (depends on options chosen at the time of purchase). For more information please contact McPherson Inc.

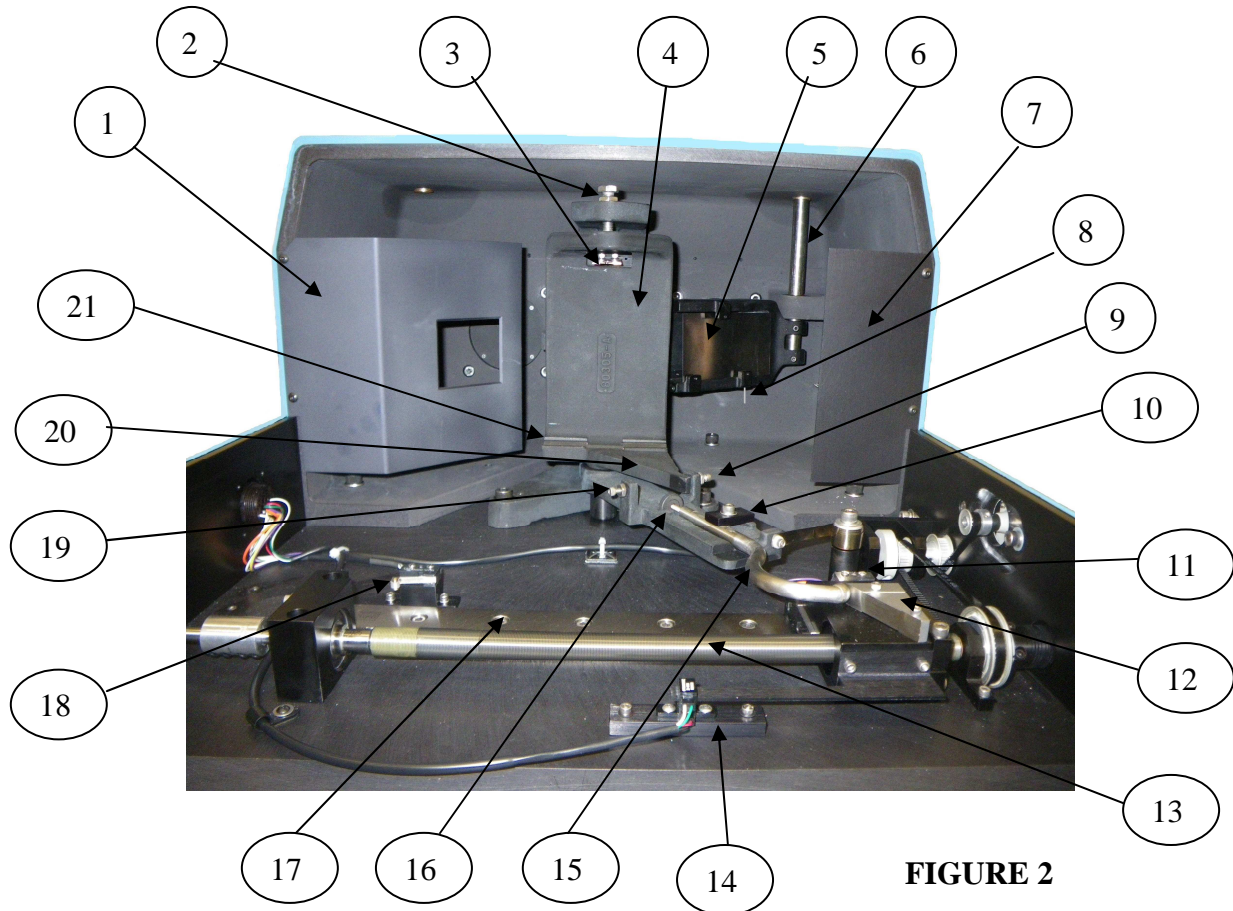
# FIGURES



**FIGURE 1**

- 1. COVER
- 2. EXIT MIRROR KNOB
- 3. ENTRANCE MIRROR KNOB
- 4. SHUTTER KNOB
- 5. SLIT MOUNTING FACE
- 6. SLIT MICROMETER
- 7. ADJUSTABLE FEET

- 8. TANGENT BLOCK
- 9. SLIT OCCULTER
- 10. COUNTER
- 11. LIMIT AND HOME SWITCH CONNECTOR
- 12. MOTOR
- 13. WAVELENGTH KNOB

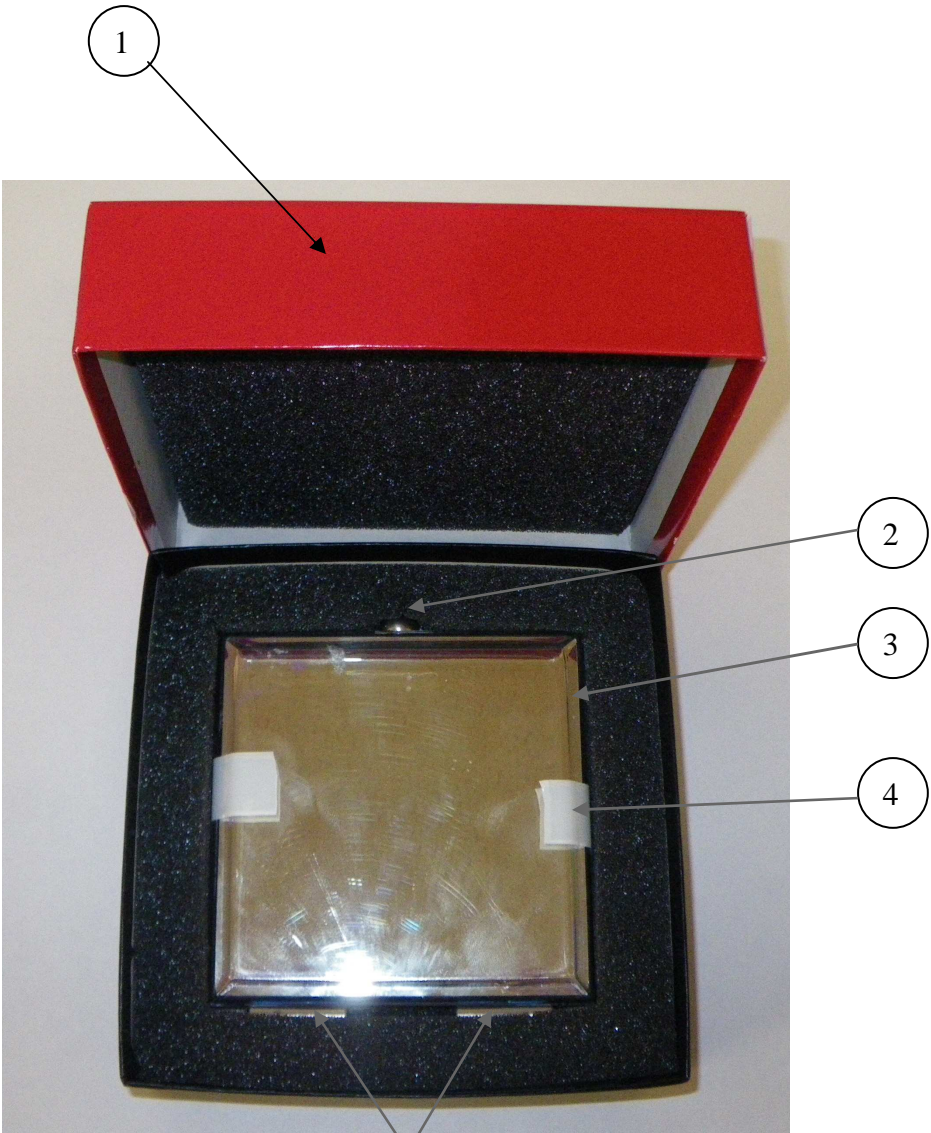


**FIGURE 2**

1. ENTRANCE Baffle
2. HOLDER PIVOT
3. CANTILEVER SPRING
4. GRATING HOLDER
5. EXIT 45° MIRROR
6. EXIT MIRROR SHAFT
7. EXIT Baffle
8. MIRROR SPRING PIN
9. LEVER ARM CLAMP SCREW
10. NORMAL POSITION STOP
11. LOW WAVELENGTH LIMIT SWITCH

12. DRIVING BLOCK
13. LEADSCREW
14. HOME SWITCH
15. LEVER ARM
16. KNURLED NUT
17. DRIVING BLOCK GUIDE
18. HIGH WAVELENGTH LIMIT SWITCH
19. 20° EXTENDED POSITION STOP
20. HOLDER ARM
21. "V" GROOVE

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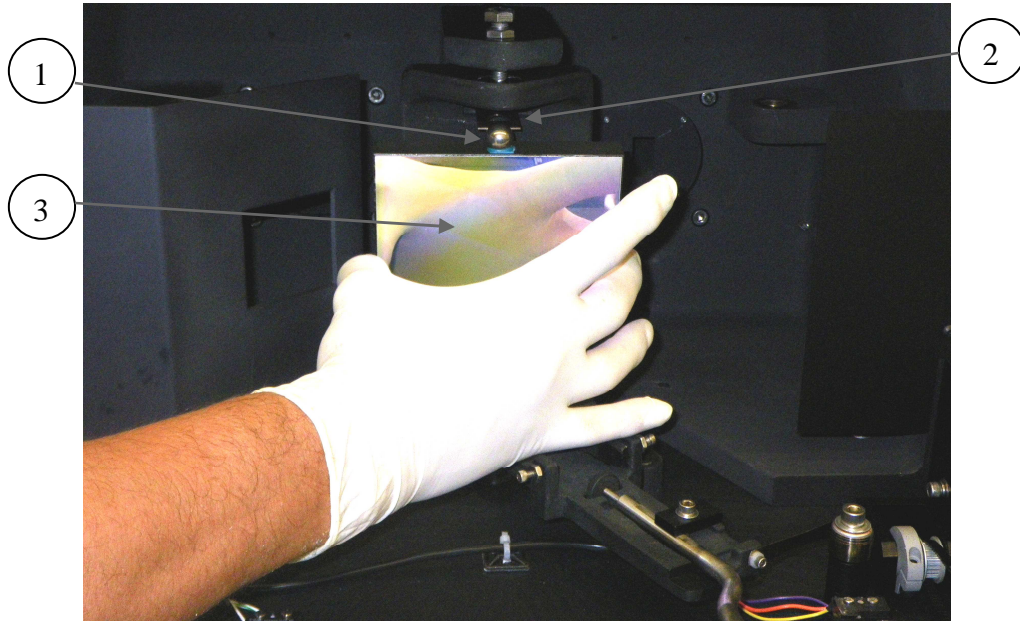
**FIGURE 3**

5

- 1. BOX COVER
- 2. HALF BALL
- 3. PROTECTIVE COVER
- 4. COVER SECURING TAPE
- 5. POSITIONING RODS



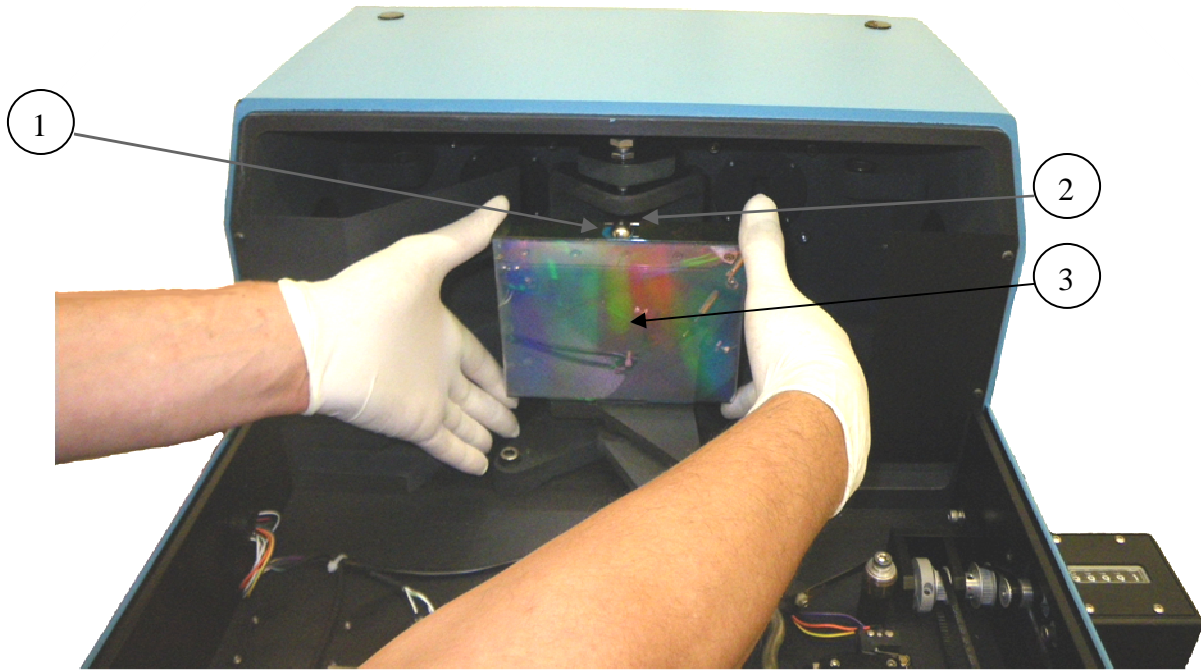
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**FIGURE 4A**

1. HALF BALL
2. CANTILEVERED SPRING
3. GRATING FACE

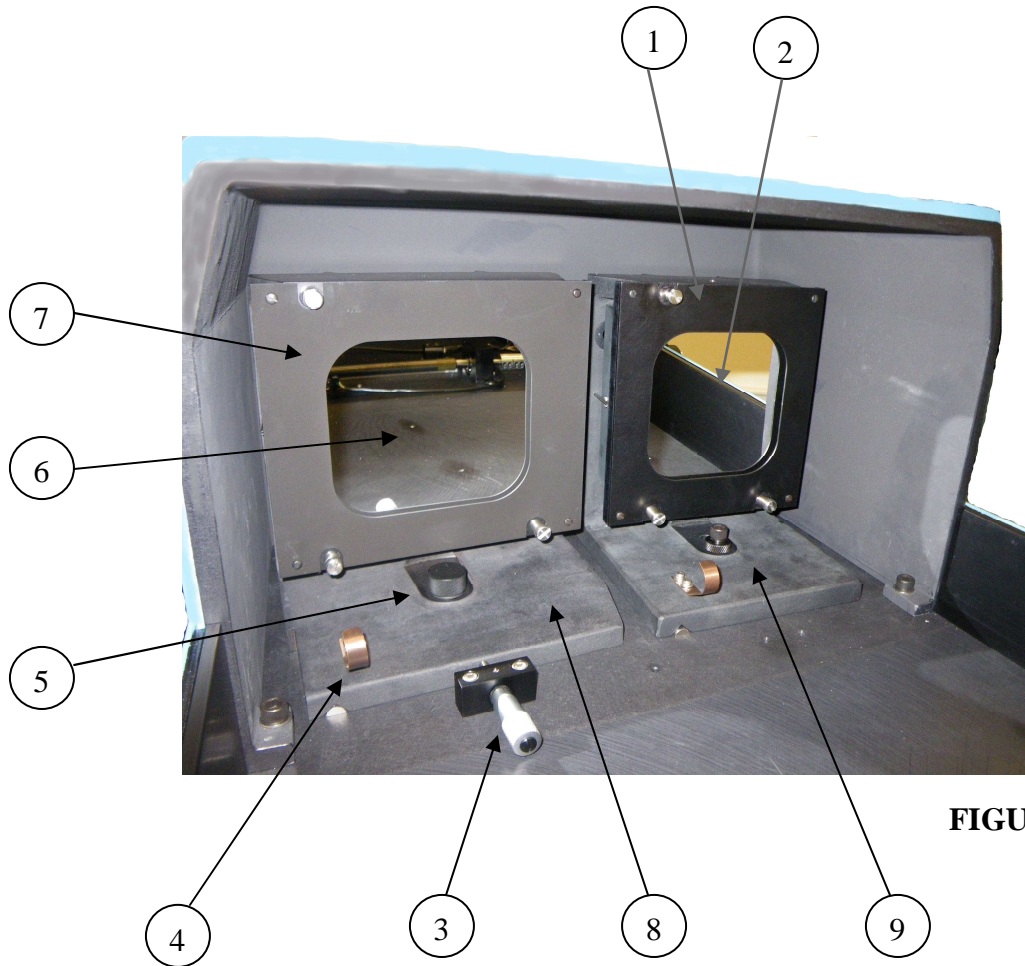
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**FIGURE 4B**

1. HALF BALL
2. CANTILEVERED SPRING
3. GRATING FACE

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**FIGURE 5**

1. MIRROR MASK
2. COLLIMATING MIRROR
3. FOCUSING MIRROR MICROMETER
4. ADJUSTING HANDLE
5. TORQUE SCREW
6. FOCUSING MIRROR
7. MIRROR MASK
8. FOCUSING MIRROR ASSEMBLY
9. COLLIMATING MIRROR ASSEMBLY

# Model 207 Monochromator

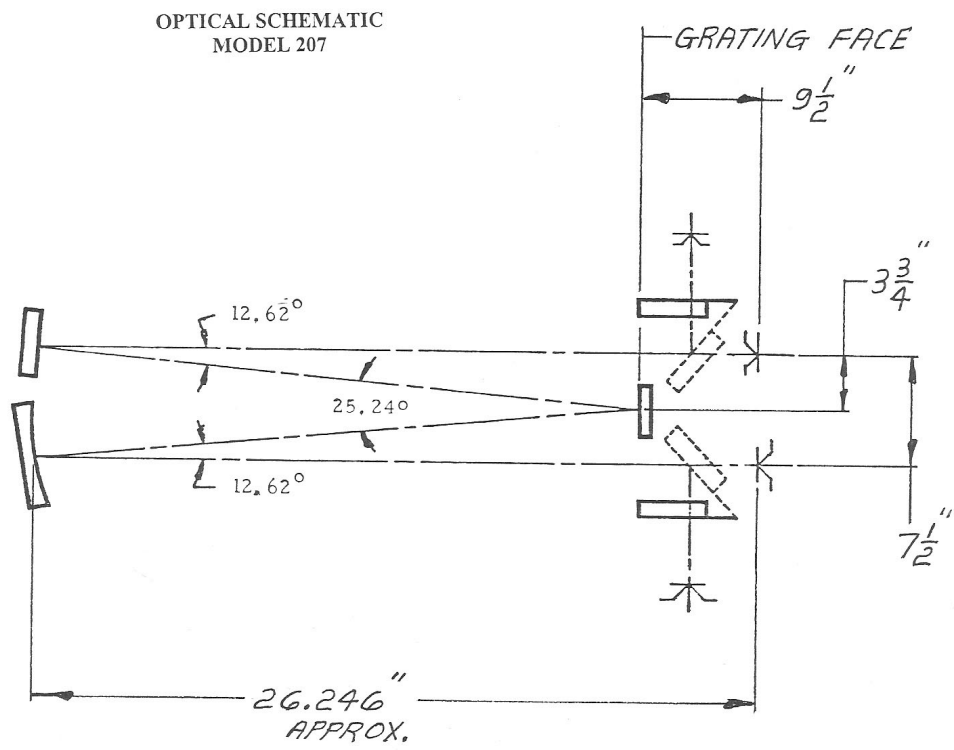


FIGURE 6



# Model 207 Monochromator

## Appendix

Warranty and Assistance, Warranty Exceptions, and Returning Goods

### ***Warranty and Assistance***

McPherson products are warranted to be free from defects in material and workmanship and conform to the specifications furnished by the company at date of delivery. The company's obligation under this warranty is limited to servicing, adjusting, or repairing or replacing any McPherson made part or parts thereof, returned to the factory or in the field. Shipping or travel expenses to be prepaid by customer both ways. Items manufactured by McPherson carry a warranty of one year. Purchased items carry the original manufacturer's guarantee where available.

McPherson shall not be liable for consequential damages resulting from accidents, alterations, misuse, improper installation, handling by improperly qualified personnel, operation on low or excessive voltages, or any use in violation of operating instructions furnished by the company.

If any defect appears upon receipt, the purchaser shall promptly notify the company. No material will be accepted for repair or replacement without prior authorization from the company. (See instructions for returning goods on page A-3.) Upon such authorization and in accordance with instructions from the company, parts, materials or equipment for which repair or replacement is requested shall be returned to the company for examination, or be examined in the field. Shipping and/or travel charges will be quoted and must be prepaid by the purchaser. Final determination as to whether a product or part is actually defective rests with the company.

For parts not subject to warranty or after lapse of warranty period, an estimate of repair charges will be submitted to the customer before servicing the equipment.

The company reserves the right to make changes or improve its products and will supply such replacement where available without imposing upon itself the obligation to supply the same in lieu of its product(s) previously offered and/or manufactured.

This warranty is in lieu of all other obligations or liabilities expressed or declared on the part of the company. The company neither assumes, nor authorizes any other person to assume for them, other obligations or liability in connection with the sale of equipment manufactured by McPherson.

# Model 207 Monochromator

## ***Warranty Exceptions***

The warranty will not apply in case of any misuse, neglect of instructions and violations of the policy. Furthermore, the performance of systems assembled by the customer which incorporate McPherson parts, supplies or instruments is not covered by this warranty. The following indicate other exceptions to the one year warranty.

Parts and Supplies — Optics, photomultipliers, MCP PDA, CCD, and other detectors, light sources, fuses, rubber products (i.e. o-rings, gaskets), quartz capillaries and any other items that can be damaged by misuse, overexposure and/or are of expendable nature will not be warranted unless received defective or destroyed by the malfunctioning of warranted components.

Obvious Abuse — Components or assemblies that require replacement or repair due to obvious abuse or unauthorized repair attempts will not be subject to or considered a warranted item.

This certifies that Model \_\_\_\_\_, S/N \_\_\_\_\_ carries a limited warranty of one year from date of delivery, with above limitations and terms.

This certifies that Model \_\_\_\_\_, S/N \_\_\_\_\_ carries a purchased \* second year of limited warranty beginning one year after the original date of delivery, with above limitations and terms.

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\*Additional warranties and / or service subject to written quotations and purchase orders.

# Model 207 Monochromator

## Returning Goods

Please observe the following procedure when returning goods:

Obtain a return material authorization (RMA) number from McPherson. This number must appear on the outside of the package returned.

1. For WARRANTY repairs obtain an RMA Number.

This return material authorization number must appear on the outside of the package and on all documents and packing slips, etc. A description of the problem and/or repairs needed should be enclosed and the information should include the purchase date, the original purchase order number, McPherson job number and invoice number (if possible).

The serial number must be included.

2. For NON-WARRANTY repairs obtain a JOB number.

A purchase order for defect evaluation in the amount of \$250.00 has to be issued. This should be done before returning the instrument or the purchase order must accompany the instrument.

After completion of the evaluation, McPherson will provide a quotation detailing the cost of needed repairs and shipping.

Thereafter, McPherson will expect to receive a purchase order for the amount quoted. The evaluation charge will be credited against this amount. Upon receipt of the purchase order, work will commence.

3. Return the goods, shipping and insurance prepaid, to:

If possible,  
send to the attention of  
Contact Person.

McPherson Inc. 7A Stuart Road Chelmsford, MA 01824  RMA or JOB #: _____ ATTN: _____
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4. If the return shipment comes from outside the USA, the following additional information should be on all paperwork as well as on the outside of the package. To avoid possible customs charges.
  - a) USA Made Equipment
  - b) NOT FOR SALE
  - c) Submitted for repair/service
  - d) To Be Returned